WCL

COMMERCIAL 4.00" CORRUGATION EXTERNALLY STIFFENED GRAIN BIN

OWNER'S MANUAL

Manual# PNEG-1400

Date: 3-28-2006

GSI

a division of

THE GSI GROUP

PNEG-1400

Table of Contents

BIN ASSEMBLY 13
PROPERLY STORE GRAIN BIN MATERIALS 14
GENERAL INFORMATION 15
CONSTRUCTION PROCEDURES AND LIFTING JACK USAGE 16
DECAL SHEET PLACEMENT 17
BOLTING REQUIREMENTS - 2 STIFFENERS PER SIDEWALL SHEET 18
BOLTING REQUIREMENTS - 3 STIFFENERS PER SIDEWALL SHEET 19
HARDWARE 20
CAULKING DETAIL 21
CAULKING DETAILS 22
BASE ANGLE INSTALLATION 23
BOLT IDENTIFICATION 24-28
4" WCL COMMERCIAL TANK STIFFENER INSTRUCTIONS 29
4" CORRUGATION WCL COMMERCIAL STIFFENER SPLICE DETAILS 30
COMMERCIAL STIFFENERS FOR 4.00" CORRUGATION 31
STIFFENER SPLICE DETAILS 32-33
LAMINATED STIFFENER SPLICE 34
STIFFENERS TO SIDEWALL SHEET DETAILS 35-42
WIND RING & ACCESS DOOR ASSEMBLY 43
WIND RING ASSEMBLY 44
ACCESS DOORS 45-46
SIDE DRAW ACCESSORY INSTRUCTIONS 47
INSTALLATION AND MANAGEMENT OF SIDE DRAW SYSTEMS 48
1" DIAMETER ANCHOR BOLT REQUIREMENTS FOR SIDEDRAW SYSTEMS 49
SIDE DRAW SYSTEM INSTALLATION 50
WIND RINGS SIDEDRAW USAGE - WCL 2 POST STIFFENED TANKS 51
WIND RINGS SIDEDRAW USAGE - WCL 3 POST STIFFENED TANKS 52
SIDE DRAW INSTALLATION 53-55
WARRANTY 56

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 Information and Decals

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

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

⚠ CAUTION **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

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.

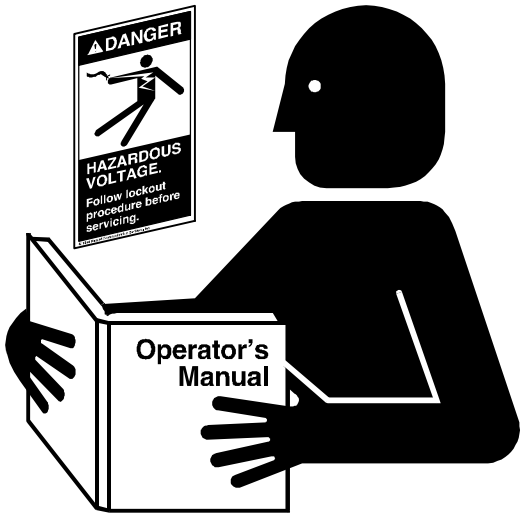
FOLLOW SAFETY INSTRUCTIONS

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.

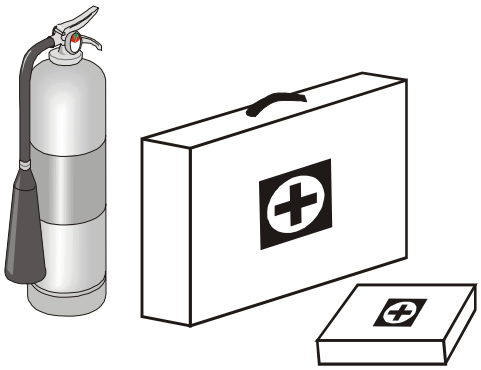
Keep all parts in good condition and properly installed. Fix damage immediately. Replace worn or broken parts. Remove any build up of grease, oil, or debris.

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.

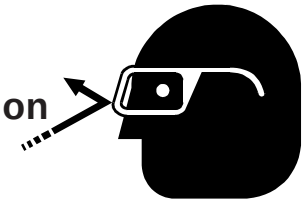
Safety glasses should be worn at all times to protect eyes from debris.

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

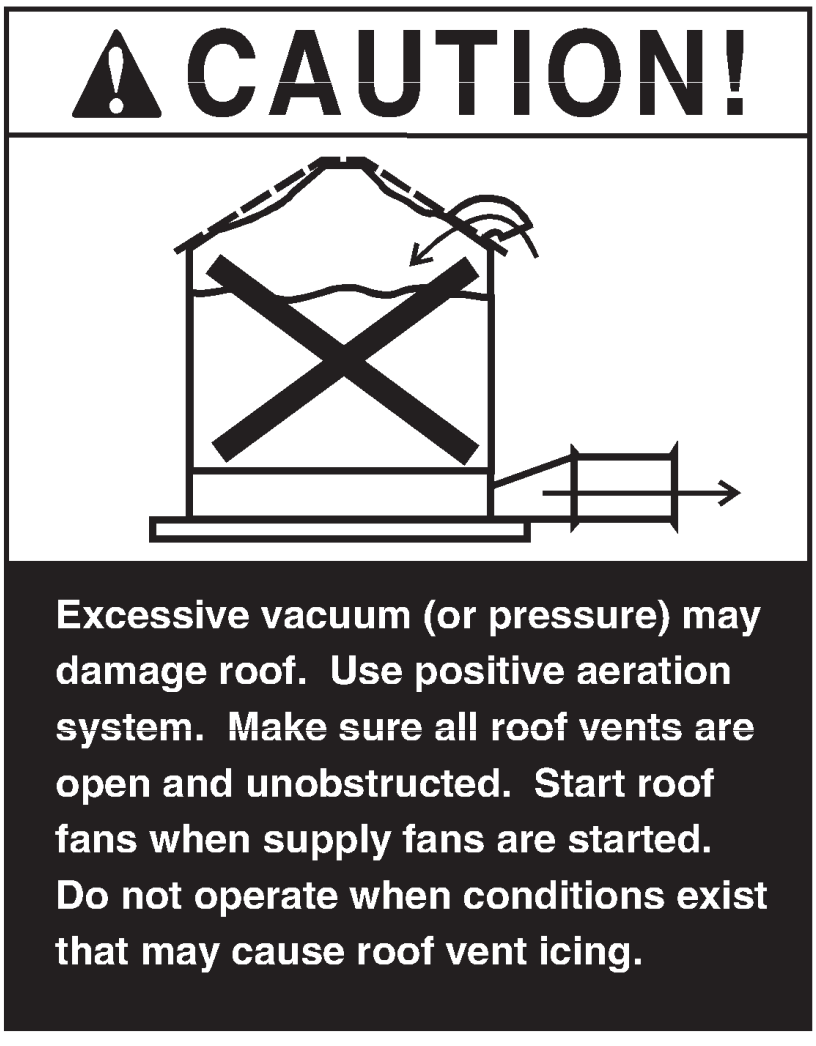
Steel Toe Boots

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. 62510-00020
(217)-226-4421

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

Bin Assembly Instructions

PROPERLY STORE GRAIN BIN/SILO MATERIALS PRIOR TO CONSTRUCTION TO PREVENT WET STORAGE STAIN:

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.

GENERAL INFORMATION

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.

Read this manual carefully. This manual will provide instructions on building the sidewall and stiffeners. You will also need to consult other instructions in building the tank. These include, but may not be limited to:

A stiffener and sidewall gage layout chart. If such a chart is not included with this manual, contact GSI.

Roof instructions must be followed. The roof construction manual (PNEG-1092) will contain instructions for 60' diameter and smaller bins. See appropriate individual diameter instructions for other diameters.

Ladders, roof stairs, roof handrails and other products are covered by seperate instruction manuals. Consult the appropriate accessory manual.

Areation systems and transitions are to be installed according to the instructions provided with the system or transition.

Anchor bolt palcement details are provided in the GSI Concrete Recommendation Manual (PNEG-318). See this manual.

TOOLS FOR CONSTRUCTION:

Combination wrench set 7/16" to 1"
Alignment punches 12" long
Hammer
Screwdrivers - standard and philips
3/8" Drive socket set and ratchet
1/2" Drive socket set and ratchet
Nail aprons or tool pouches to hold supplies
Gloves for hand protection
Tape measure

1/2" Drive electric or pneumatic impact gun
1/2" Drive impact socket set

Lifting jacks
Center pole roof support
Step ladders

Large C-Clamp or welding v-grip for clamping

Quantities required will depend on the number of workers and size of the bin/silo

CONSTRUCTION PROCEDURES AND LIFTING JACK USAGE:

NOTE: The roof and top ring or two rings will be installed prior to the beginning of bin lifting/jacking procedures. Reference all other procedures on sidewall and stiffener installation prior to the start of construction.

1.) Consider the starting location of your bin, relative to the location of doors and other accessories. Proper placement of lifting jacks in relationship to anchor bolts could make a difference in final locations. Note that the sidewall sheets will be staggered.

2.) The bin is lifted by the use of lifting jacks. Lifting jacks are used to slowly and evenly lift the bin during construction. Lifting jacks must be properly sized and designed to carry all dead and live loads and job site conditions associated with the construction of the bin.

The number of lifting jacks required is best determined by personal experience and expertise. Factors such as bin size, jack design, construction conditions, support surface, etc. are all to be considered when deciding how many to use. If in doubt, use one jack on every sheet. The lifting jack must be adequate to carry all loads. Heavy Duty jacks, generally hydraulic or electric powered in the case of large bins, should be used for commercial installation. All jacks should be secured with braces or otherwise maintained in a stable condition.

Lifting of the bins should not be done under windy conditions.

Follow the jack manufacturers recommendations on capacity and operations.

3) Lifting brackets must be attached through the stiffener bolt holes. Normally you will need to attach to at least 4 bolts per stiffener.

4.) Raise the bin just high enough to assemble the next ring. When lifting your bin, **all jacks must lift at an equal rate**. Monitor the lift to insure even lifting is occuring.

5.) To the **inside** of the first ring, bolt the next ring. Be sure to **stagger** the sheets and select the proper gauge material.

6.) Lower the bin onto the foundation after assembling and tightening bolts on the new ring or rings.

7.) Attach stiffeners to the body sheets every two tiers (on the external surface of the bin). You may want to leave sheets loose to make the attachment of the stiffeners easier.

8.) Now re-bolt the lifting brackets to the lowest ring in place thus far. Continue ring additions by repeating steps 5 and 6.

9.) Add inside and outside ladders as you continue to raise the bin. (Refer to the manual supplied with your ladder.)

10.) Lower the tank and secure to the foundation before leaving the job site.

11.) At the completion of the tank, set stiffeners over the anchor bolts and measure the tank to insure it is in a round condition. Consult with GSI for questions on tolerances.

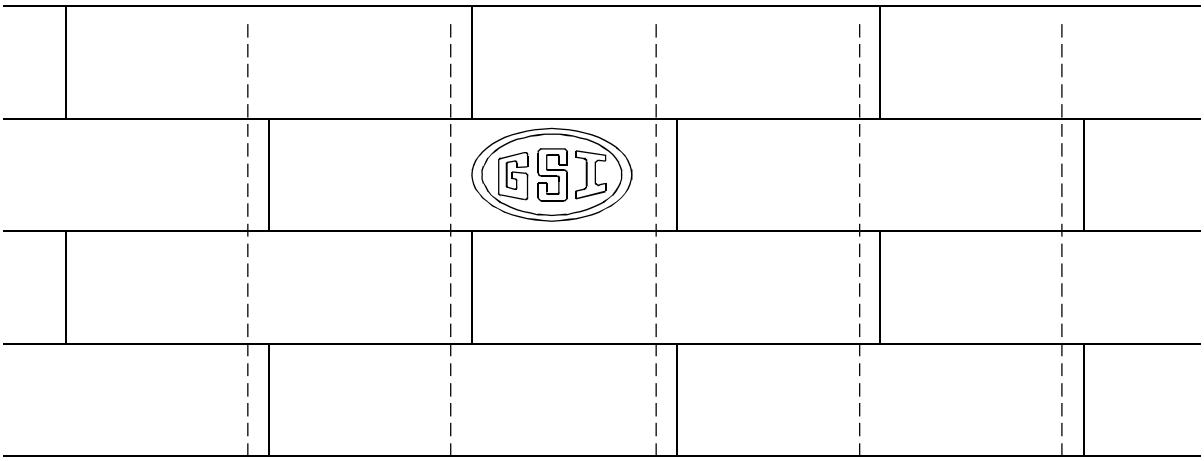
NOTE: For two ring doors or vehicle traffic doors special placement issues may apply. Consult the special instructions provided with two ring doors or vehicle traffic doors for these options.

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.

2 - POST

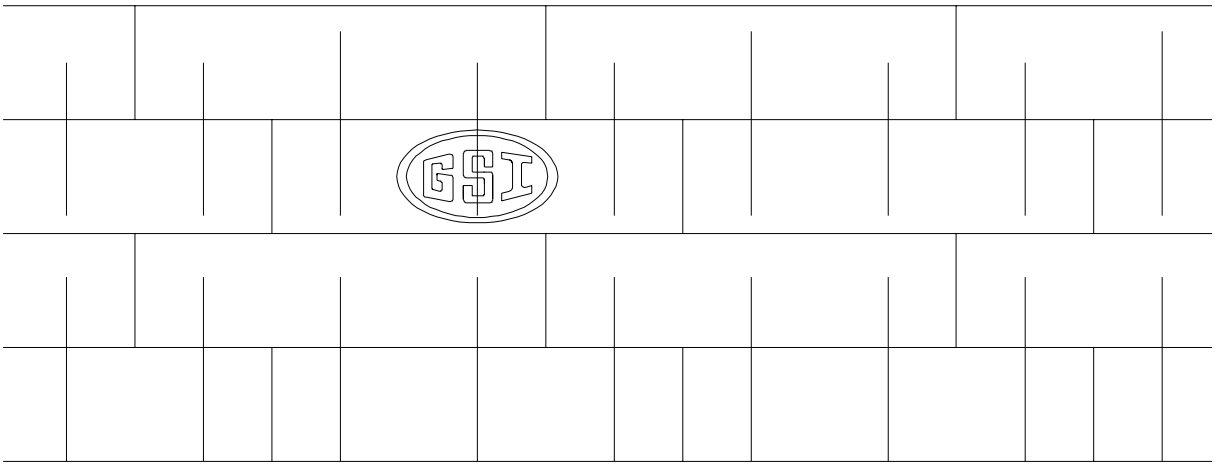
(Two rows of stiffeners used on each sidewall sheet)



Note: Dashed lines represent stiffener locations.

3 - POST

(Three rows of stiffeners used on each sidewall sheet)



Note: Dashed lines represent stiffener locations

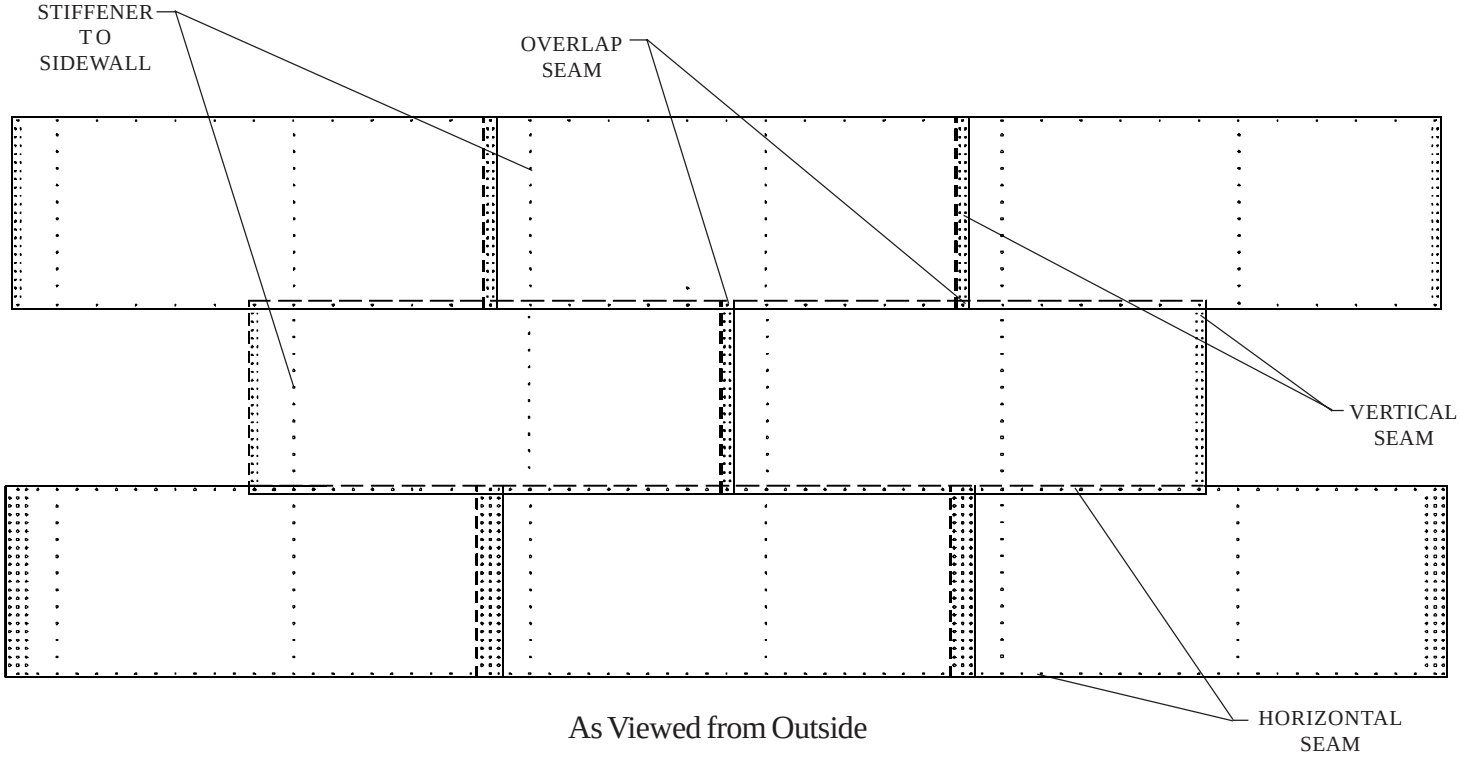
BOLTING REQUIREMENTS
2 STIFFENERS PER SIDEWALL SHEET

Sidewall Gage	Horizontal Seam	Vertical Seam	Sitffener to Sidewall	Overlap Seam
20 -15	5/16" x 3/4" (S-275) [8]	5/16" x 3/4" (S-275) [42]	3/8" x 1" (S-455) [22]	5/16" x 3/4" (S-275) [2]
14 - 12	3/8" x 1" (S-455) [20]	3/8" x 1" (S-455) [42]	3/8" x 1" (S-455) [22]	3/8" x 1" (S-455) [2]
11 -9	7/16" x 1" (S-9312) [20]	7/16" x 1" (S-9312) [42]	3/8" x 1" (S-455) [22]	7/16" x 1.1/2" (S-3885) [2]
8	7/16" x 1" (S-9312) [20]	1/2" x 1.1/2" (S-9307) [42]	3/8" x 1.1/2" (S-5060) [22]	7/16" x 1.1/2" (S-3885) [2]
13L - 6L (Laminated)	7/16" x 1.1/2" (S-3885) [20]	1/2" x 1.1/2" (S-9307) [63]	3/8" x 1.1/2" (S-5060) [22]	7/16" x 1.1/2" (S-3885) [4]

- At splice plate locations utilize 3/8" x 1.1/2" (S-5060) bin bolts for attachment of the stiffener / splice plate to the sidewall.

- Laminated stiffeners will utilize 3/8" x 1.1/2" (S-5060) bin bolts for attachment of stiffeners to the Sidewall sheet

- Reference the stiffener assembly details and the caulking detail for stiffener assembly hardware usage and caulking details. Reference the hardware identification section for aid in hardware identification.



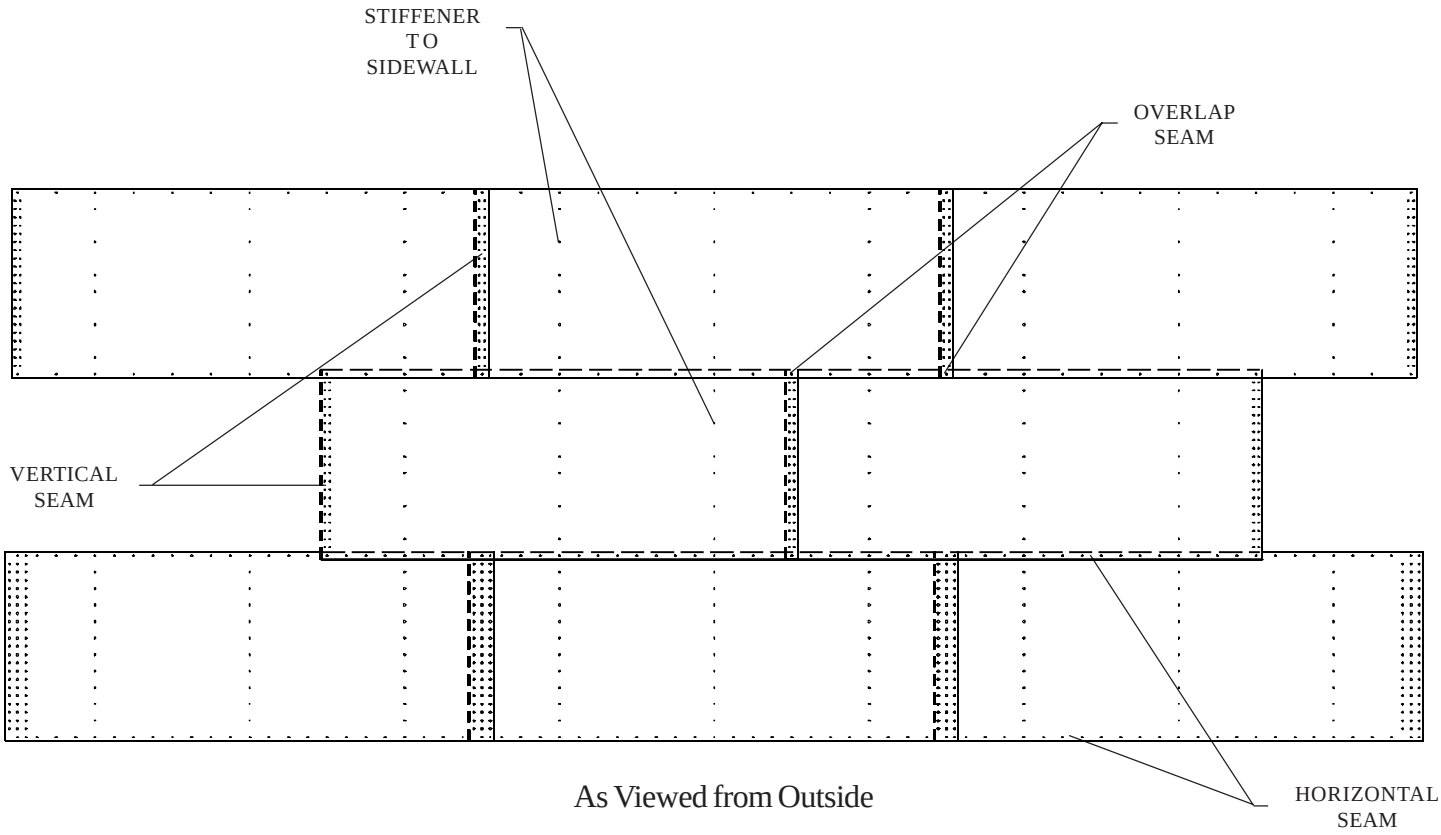
BOLTING REQUIREMENTS
3 STIFFENERS PER SIDEWALL SHEET

Sidewall Gage	Horizontal Seam	Vertical Seam	Sitffener to Sidewall	Overlap Seam
20 -15	5/16" x 3/4" (S-275) [8]	5/16" x 3/4" (S-275) [42]	3/8" x 1" (S-455) [21]	5/16" x 3/4" (S-275) [2]
14 - 12	3/8" x 1" (S-455) [20]	3/8" x 1" (S-455) [42]	3/8" x 1" (S-455) [21]	3/8" x 1" (S-455) [2]
11 -9	7/16" x 1" (S-9312) [20]	7/16" x 1" (S-9312) [42]	3/8" x 1" (S-455) [21]	7/16" x 1.1/2" (S-3885) [2]
8	7/16" x 1" (S-9312) [20]	1/2" x 1.1/2" (S-9307) [42]	3/8" x 1.1/2" (S-5060) [21]	7/16" x 1.1/2" (S-3885) [2]
13L - 6L (Laminated)	7/16" x 1.1/2" (S-3885) [20]	1/2" x 1.1/2" (S-9307) [63]	3/8" x 1.1/2" (S-5060) [33]	7/16" x 1.1/2" (S-3885) [4]

- At splice plate locations utilize 3/8" x 1.1/2" (S-5060) bin bolts for attachment of the stiffener / splice plate to the sidewall.

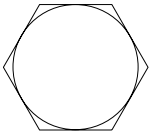
- Laminated stiffeners will utilize 3/8" x 1.1/2" (S-5060) bin bolts for attachment of stiffeners to the Sidewall sheet

- Reference the stiffener assembly details and the caulking detail for stiffener assembly hardware usage and caulking details. Reference the hardware identification section for aid in hardware identification.

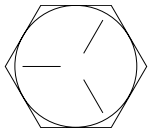


HARDWARE

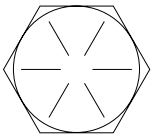
Grade 2 bolts are designated with a plain head.
NOTE: Grade 2 Bolts are not used in a GSI grain bin/silo.



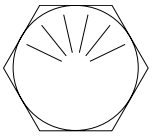
Grade 5 bolts are designated by 3 slash marks on the head.



Grade 8 bolts are designated by 6 slash marks on the head.



Grade 8.2 bolts are designated by 6 slash marks on the head in a sunrise pattern.



CAUTION

UNDER NO CONDITION SHALL ANY OTHER BOLTS BE SUBSTITUTED FOR THOSE SUPPLIED BY GRAIN SYSTEMS

DO NOT TIGHTEN BOLTS TO EXCEED THE TORQUE SPECIFICATIONS LISTED BELOW.

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

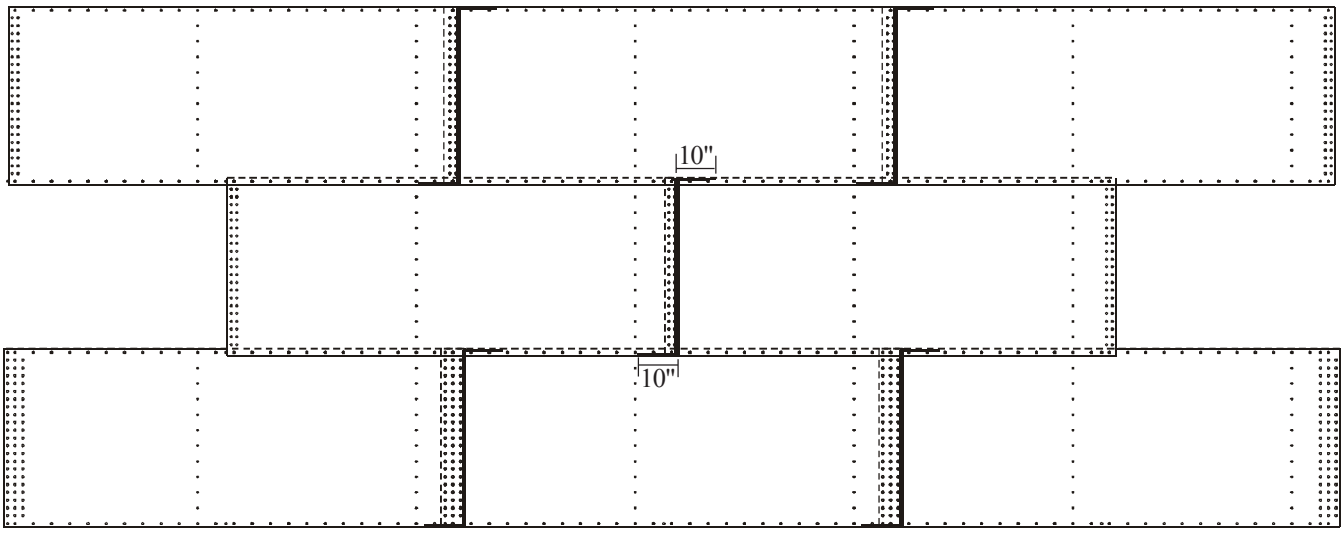
NOTE

All bolts should be tightened from the nut side.

Reference the bolt identification section for further information on identification of the bin hardware.

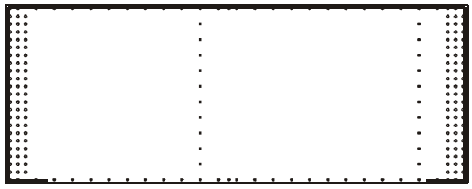
CAULKING DETAIL

As Viewed from Outside



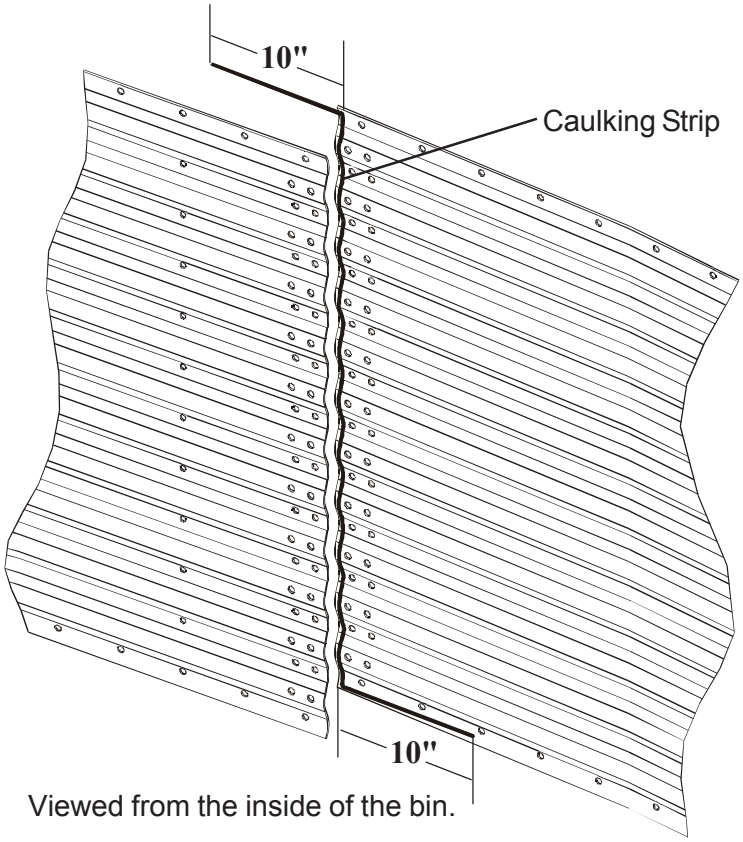
Apply one strip of caulking near the outside edge of the outer sheet. Refer to illustration above. A strip of caulking 10" long, should be placed along the horizontal seams. Before bolting the next ring into place, apply one strip of caulking 10" long on the front of the underlapped sheet at each joint. 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.

Caulking Between Laminated Sheets



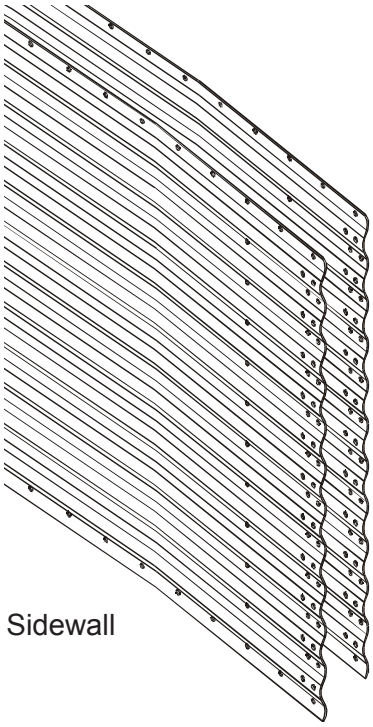
Before bolting sheets together, apply a single strip of caulking on both sides and along top edge. **DO NOT CAULK BOTTOM EDGE!**

CAULKING DETAIL



Viewed from the inside of the bin.

LAMINATED SHEET ILLUSTRATION



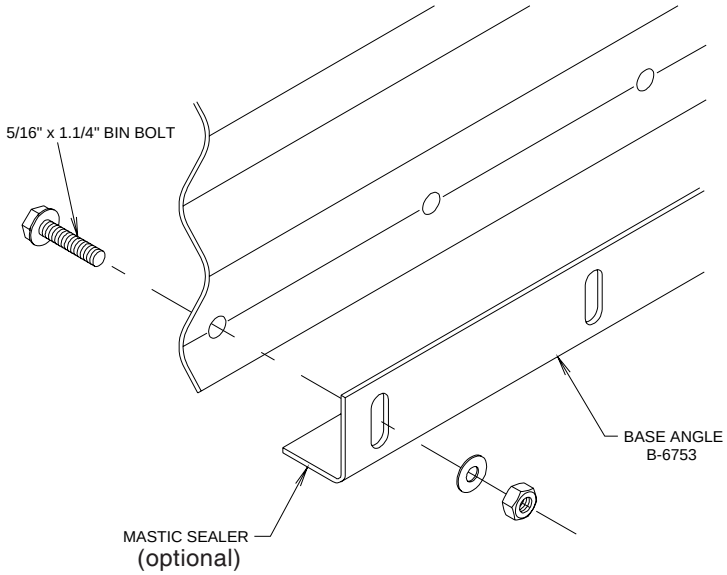
NOTE: Caulking not shown in this view.

Laminated Sidewall

BASE ANGLE INSTALLATION

On the lower edge of the final bottom ring, attach the base angle ring utilizing 5/16" x 1 1/4" bin bolts. Before the bolts are tightened, push the angle tight against the bottom edge of the sheet. Before lowering the bin, apply the optional base 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.

If base sealer strip is not used some other method should be utilized to seal the base ring to the concrete.



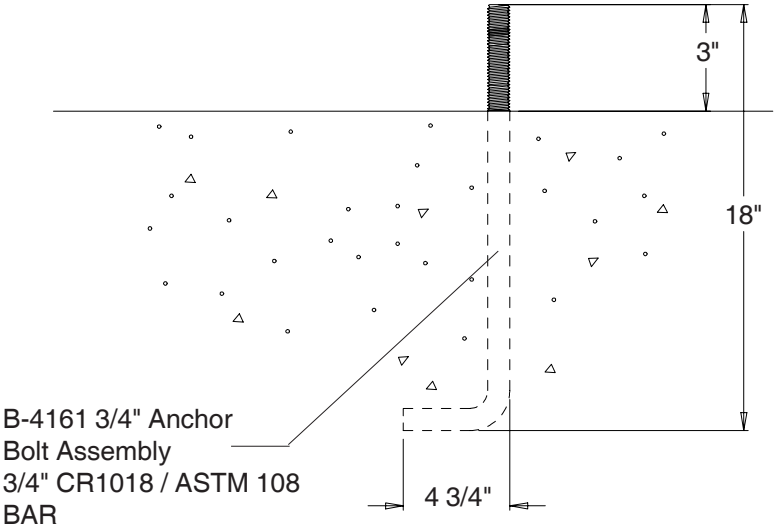
4.00" Sidewall Gauges

Note: Some colors are different than those used for stiffeners.

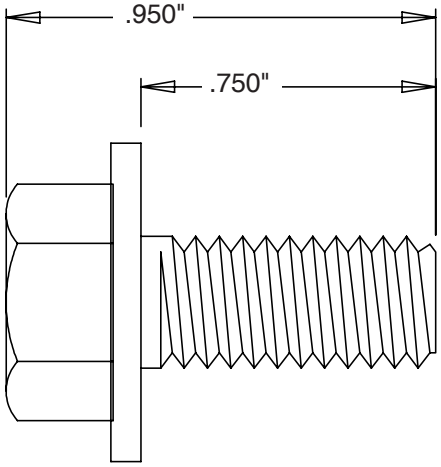
Sidewall Gauge	Color Code
20	Red
19	Black/Yellow
18	Orange
17	Pink/Light Blue
16	Blue
15	Brown/Red
14	Green
13	Yellow/Blue
12	Black
11	Pink/Purple
10	Light Blue/Purple
9	Blue/Orange/Purple
8	Yellow/Purple
6	White/Purple
5	Flour. Green/Purple
Laminated Sidewall	Color Code
10	Light Blue/Gold
9	Blue/Orange/Gold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

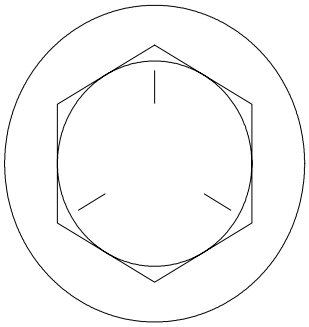
ANCHOR BOLT DETAIL



Refer to 4" Commercial Tank Bolting Requirements for complete bolt usage on pages 17 & 18.



SIDE VIEW



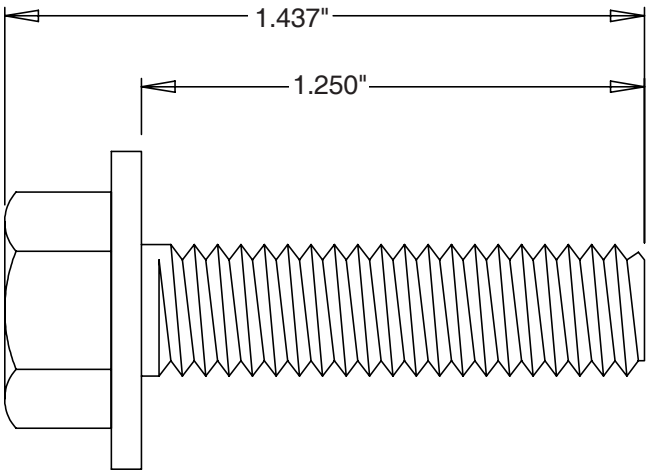
GRADE 5

TOP VIEW

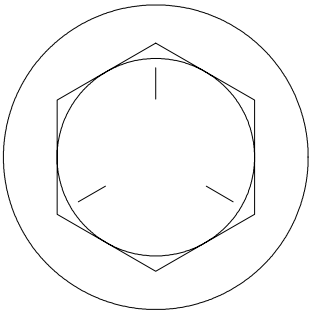
S-275

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

This bolt is used to connect horizontal and vertical seams for 15 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

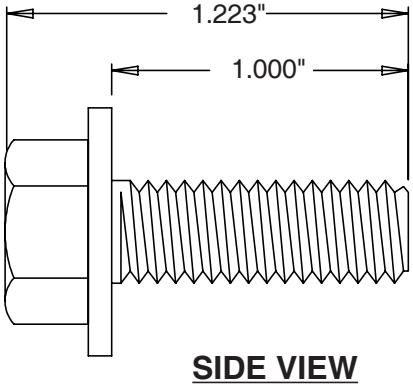
TOP VIEW

S-277

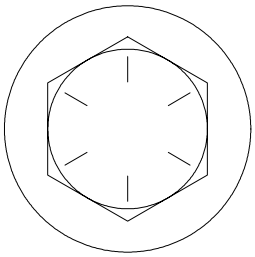
.3125" x 1.250" pre-assembled with a steel backed neoprene washer.

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.

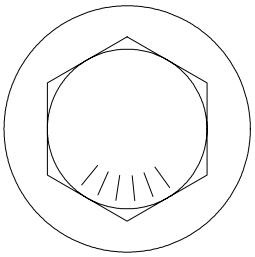
Refer to 4" Commercial Tank Bolting Requirements for complete bolt usage on pages 17 & 18.



SIDE VIEW



GRADE 8



GRADE 8.2

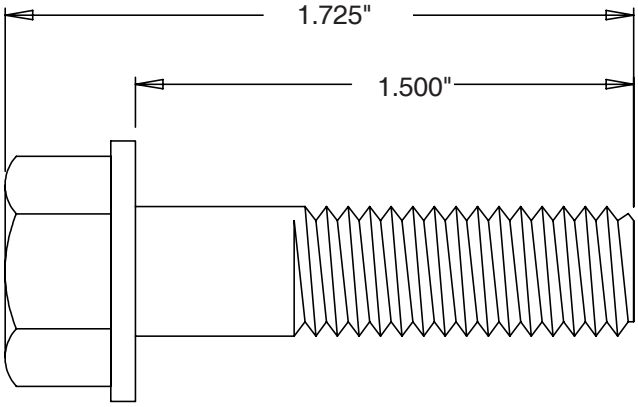
TOP VIEW

S-455

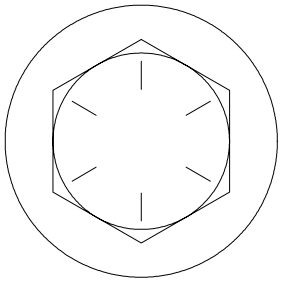
.375" x 1.000" pre-assembled with a steel backed neoprene washer.

This bolt is used in horizontal and vertical seams for 14 gauge through 13 gauge laminate sidewall to attach the sheets to each other. It is also used to attach the stiffener to the sidewall sheet for up to 12 gage sidewall. It is **not** used to splice the stiffeners together on the flanges where they connect to each other or the splice plates.

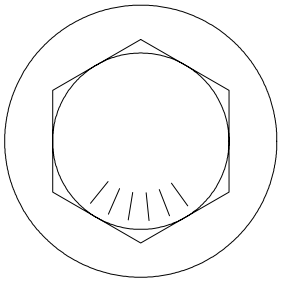
NOTE: 3/8" x 1 1/2" (S-5060) Bolts are provided for laminated stiffeners and splices.



SIDE VIEW



GRADE 8



GRADE 8.2

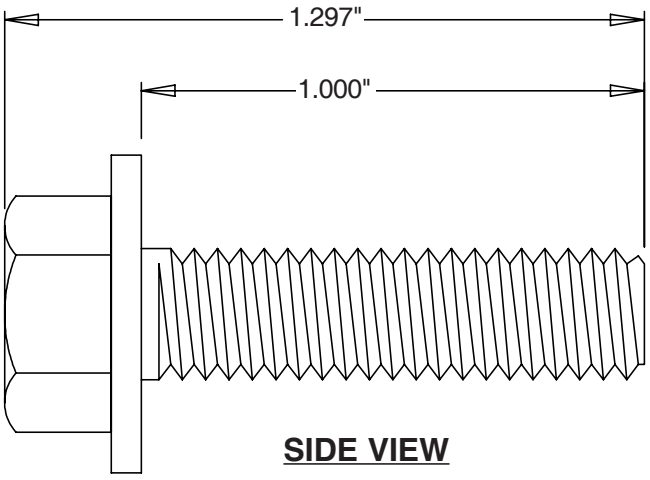
TOP VIEW

S-5060

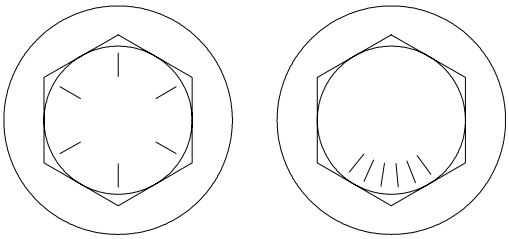
.375" x 1.500" pre-assembled with a steel backed neoprene washer.

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 11 gauge and thicker sidewall. The stiffener usage is only 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 rubber washer).

Refer to 4" Commercial Tank Bolting Requirements for complete bolt usage on pages 17 & 18.



SIDE VIEW

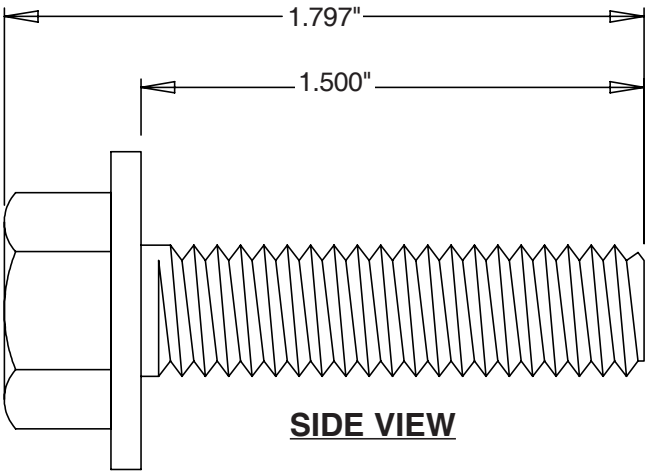


GRADE 8 OR 8.2
TOP VIEW

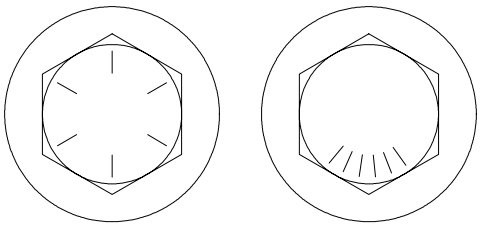
S-9312

.4375" x 1.000" pre-assembled steel backed neoprene washer.

This bolt is used to in horizontal and vertical seams for 11-9 gage sidewalls and horizontal seams on 8 gage sidewalls.



SIDE VIEW



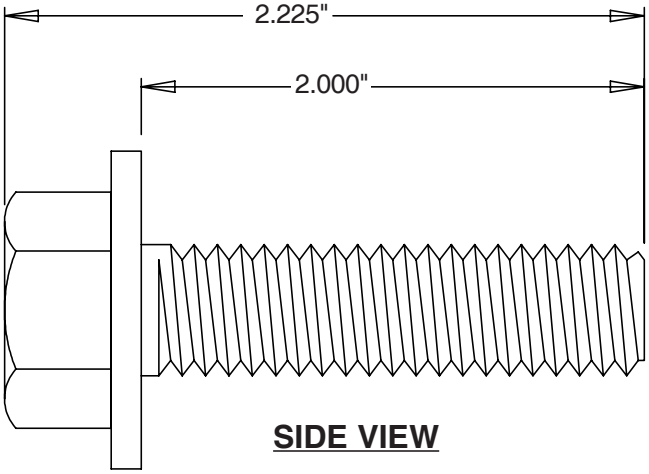
GRADE 8 OR 8.2
TOP VIEW

S-3885

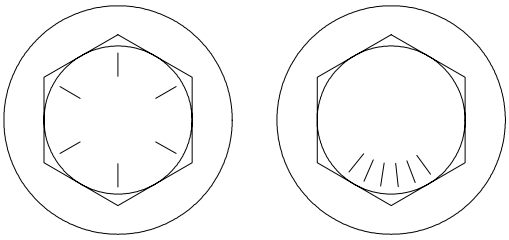
.4375" x 1.500" pre-assemled steel backed neoprene washer.

This bolt is used in the horizontal seams of all laminated sidewall rings. It is also used in some horizontal overlap seams.

Refer to 4" Commercial Tank Bolting Requirements for complete bolt usage on pages 17 & 18.



SIDE VIEW



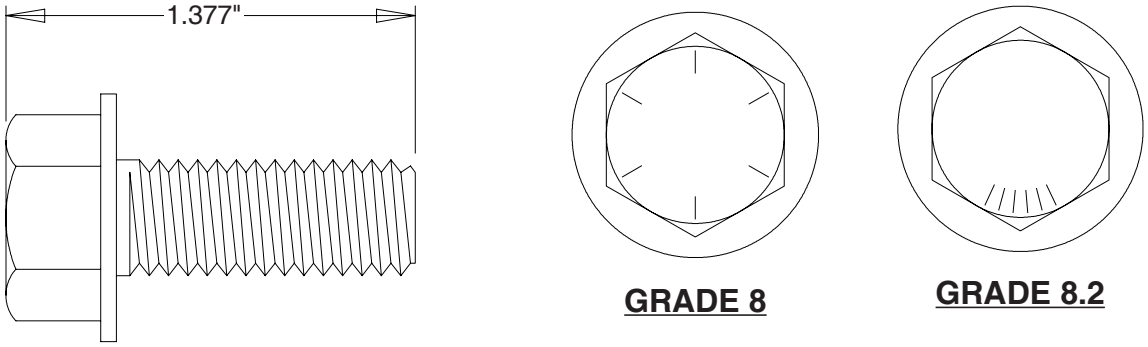
GRADE 8 OR 8.2
TOP VIEW

S-9307

.5" x 1.5" pre-assembled steel backed neoprene washer.

This bolt is used in vertical seams for 8 gage and all laminated sidewall rings.

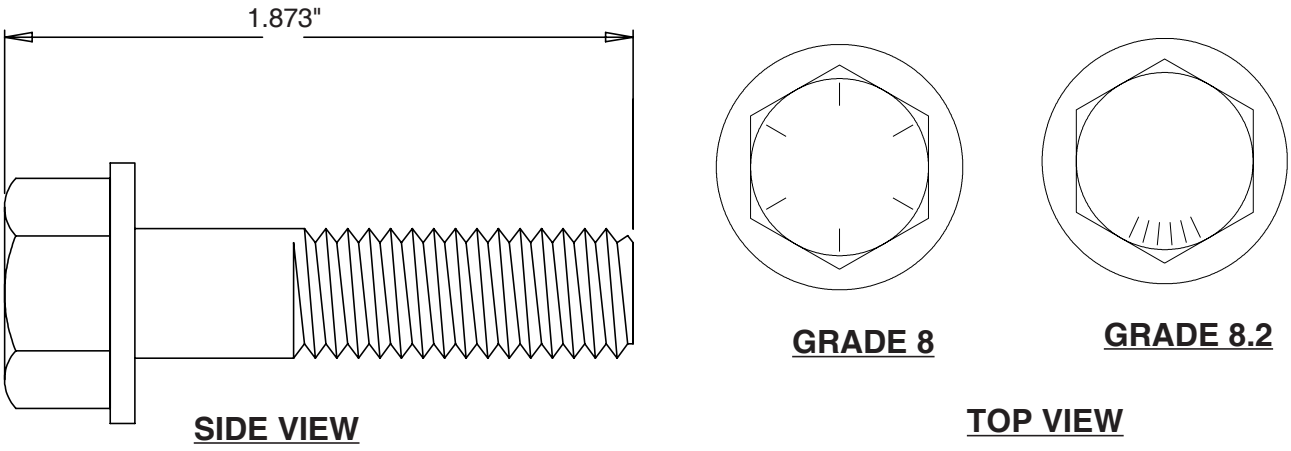
Refer to 4" Commercial Tank Bolting Requirements for complete bolt usage on pages 17 & 18.



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 some commercial roof systems.



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.

NOTE: The only washers shipped loose with the bins in quantity are the steel flat washers. 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 some are used in the roof rafter splices.

4" WCL COMMERCIAL TANK STIFFENER INSTRUCTIONS

4" CORRUGATION WCL
COMMERCIAL STIFFENER SPLICE DETAILS

WCL tank stiffeners will be mounted on the outside of the tank.

The non- offset, stiffeners that splice with a splice plate, must not overlap. Contact GSI if overlapping is observed during construction.

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 any opening between base plate and concrete.

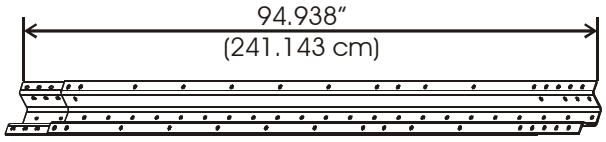
IMPORTANT: If shim plates are not used where required, the downward pressure of the stiffeners will not be transferred directly to the foundation, and bin failure could result.

Stiffener Color Code Chart

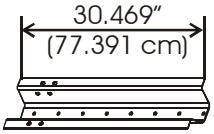
Note: Some colors are different than those used for sidewall sheets.

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

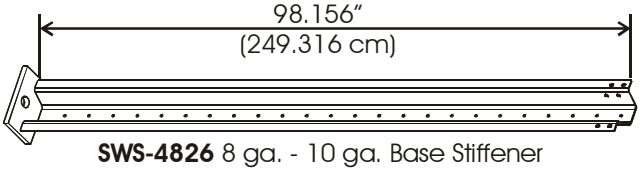
COMMERCIAL STIFFENERS FOR 4.00" CORRUGATION



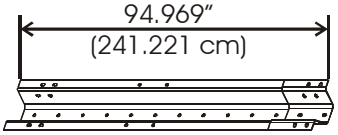
SWS-4838 Laminated Two-Ring Stiffener



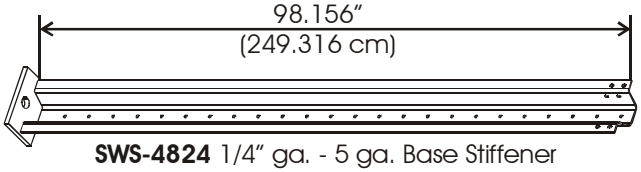
SWS-4839 1-Ring Top Stiffener



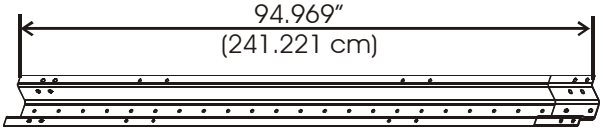
SWS-4826 8 ga. - 10 ga. Base Stiffener



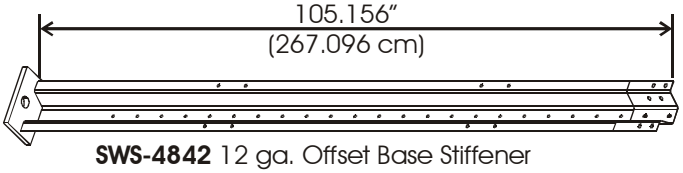
SWS-4817 13,14, & 15 ga. Offset 1-Ring Stiffener



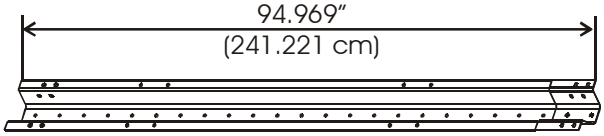
SWS-4824 1/4" ga. - 5 ga. Base Stiffener



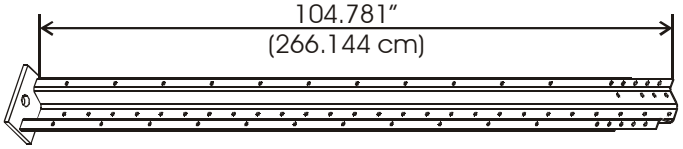
SWS-4818 14 & 15 ga. Offset 2-Ring Stiffener



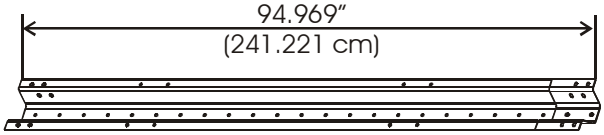
SWS-4842 12 ga. Offset Base Stiffener



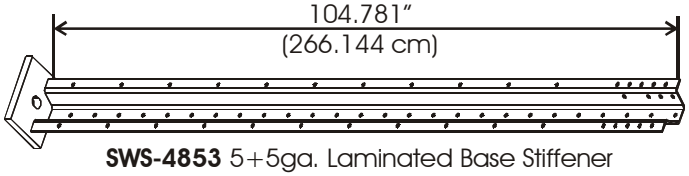
SWS-4819 12 & 13 ga. Offset 2-Ring Stiffener



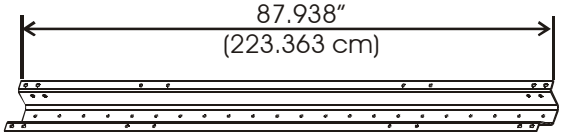
SWS-4832 5+12, 5+10, 5+8 ga. Laminated Base Stiffener



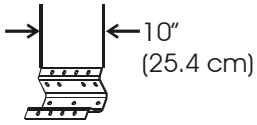
SWS-4820 12 ga. Offset Transition 2-Ring Stiffener



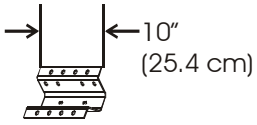
SWS-4853 5+5ga. Laminated Base Stiffener



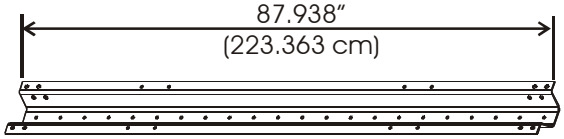
SWS-4821 8-11 ga. 2-Ring Stiffener



SWS-4828
8ga. Splice

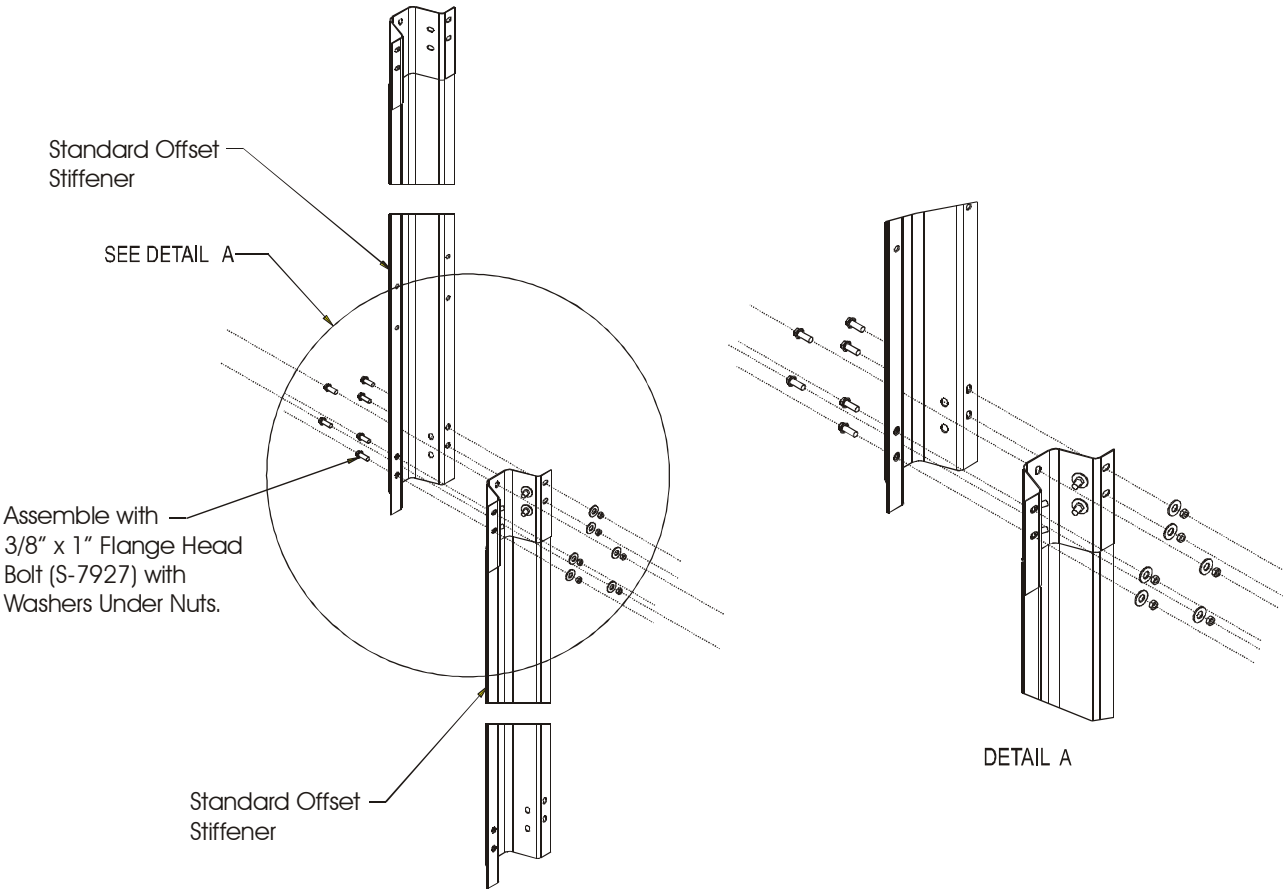


SWS-4829
10ga. Splice

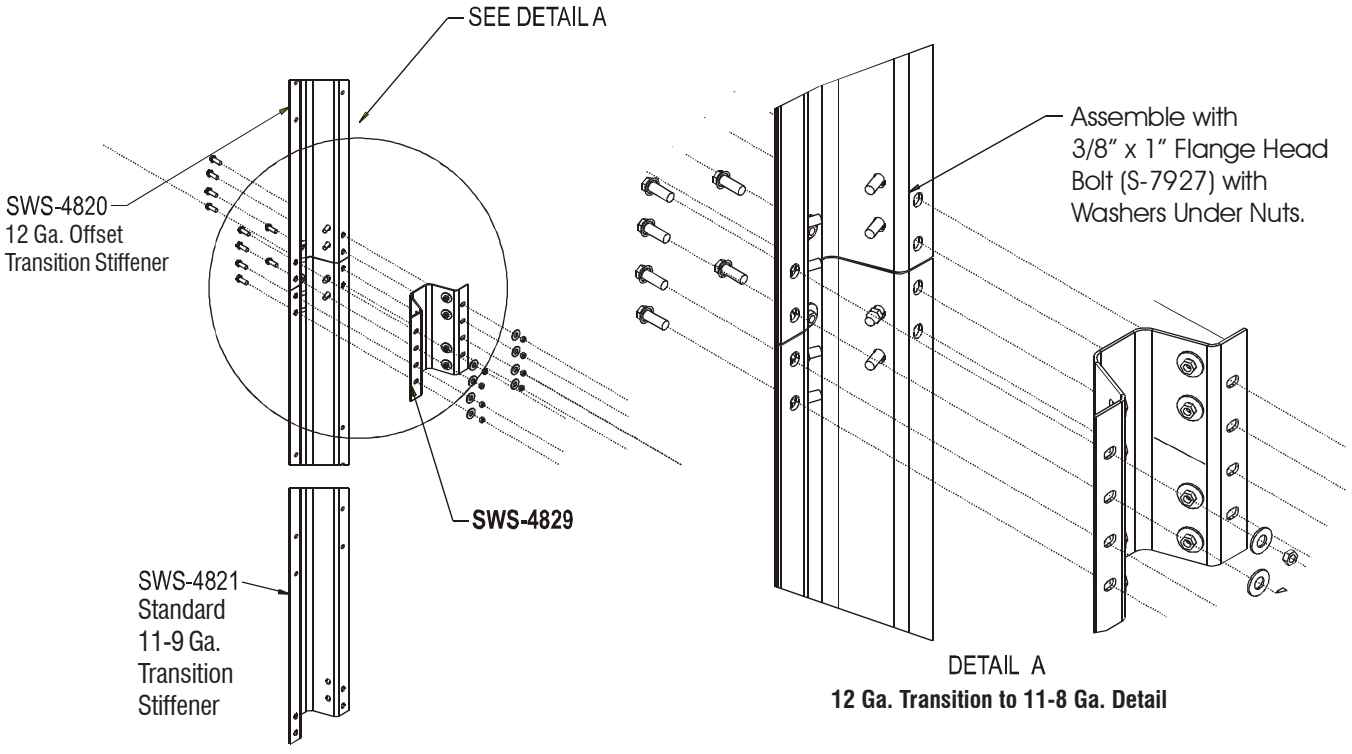


SWS-4822 5 ga. 2-Ring Stiffener

Standard Offset Stiffener Connection Detail

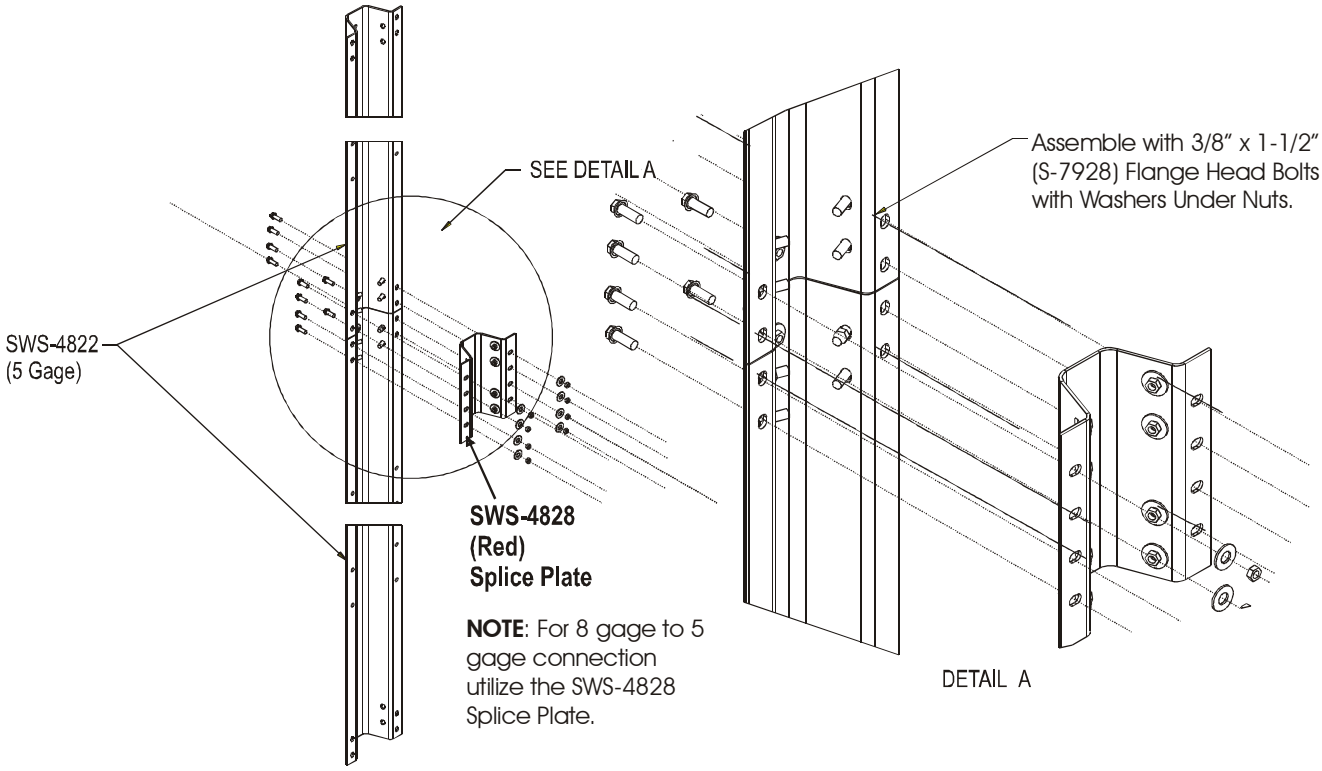


4.00" Corrugation
Commercial Stiffener Splice Details

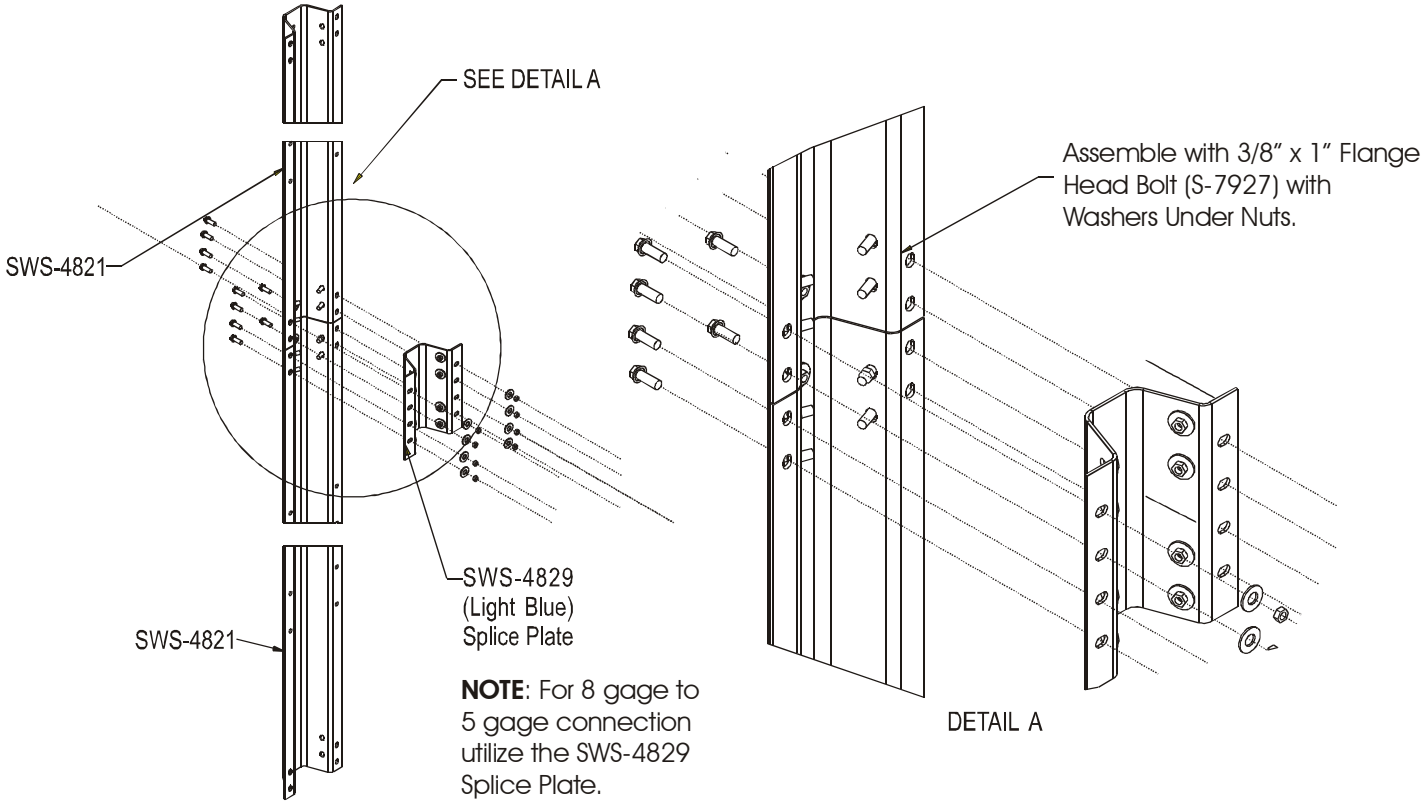


12 Ga. Transition to 11-8 Ga. Detail

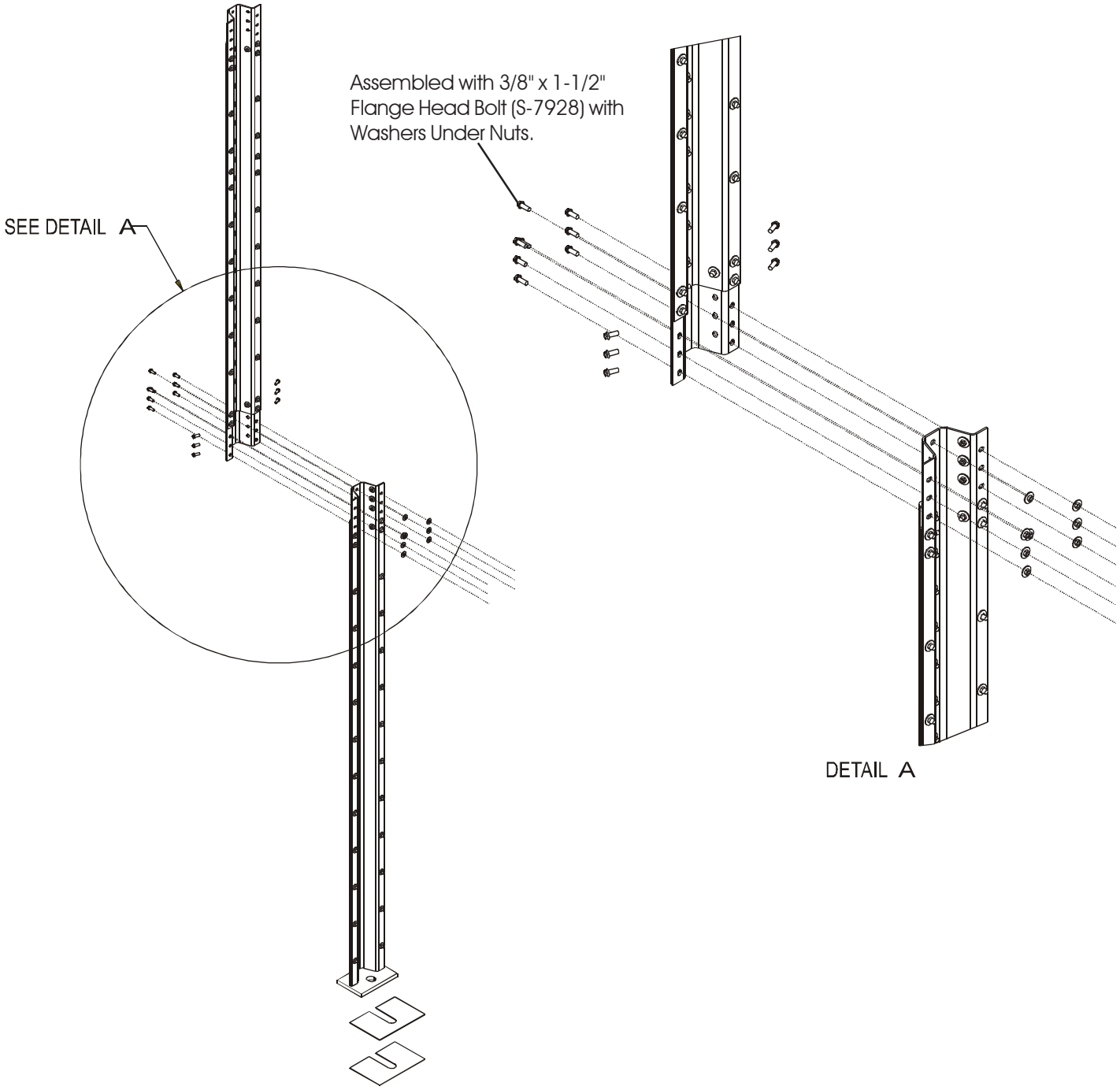
5 Gage to 5 Gage Splice Connection



11 - 8 Gage Stiffener Splice Detail

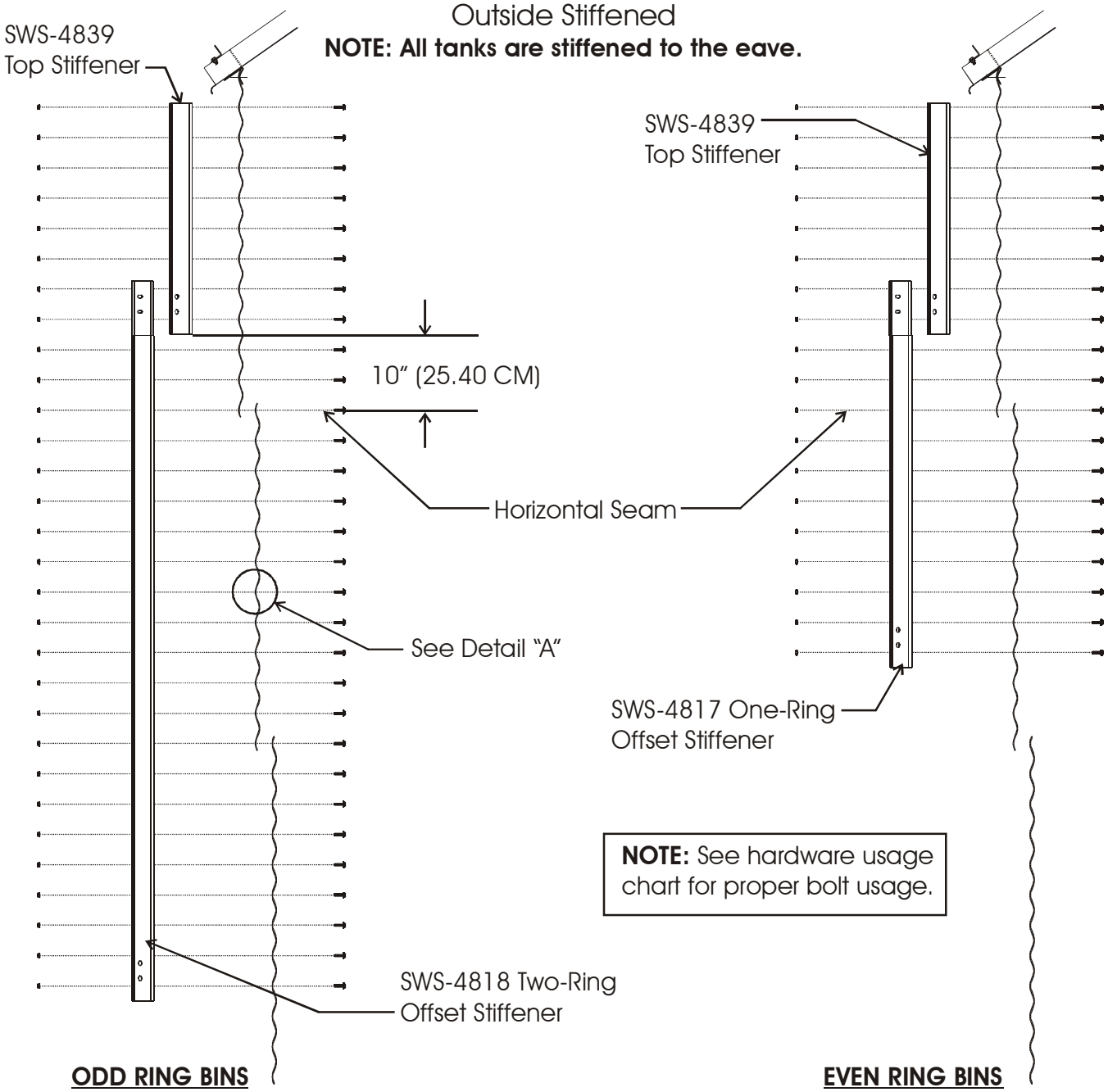


LAMINATED STIFFENER SPLICE



2 Stiffeners Per Sidewall Sheet
Commercial Stiffener Starting Location
36' Dia. & Smaller - 4" Corrugation
Outside Stiffened

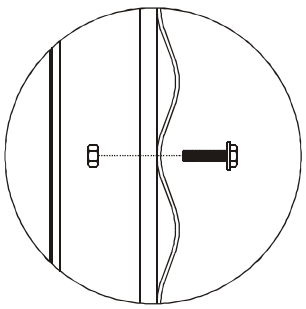
NOTE: All tanks are stiffened to the eave.



ODD RING BINS

EVEN RING BINS

NOTE: See hardware usage chart for proper bolt usage.

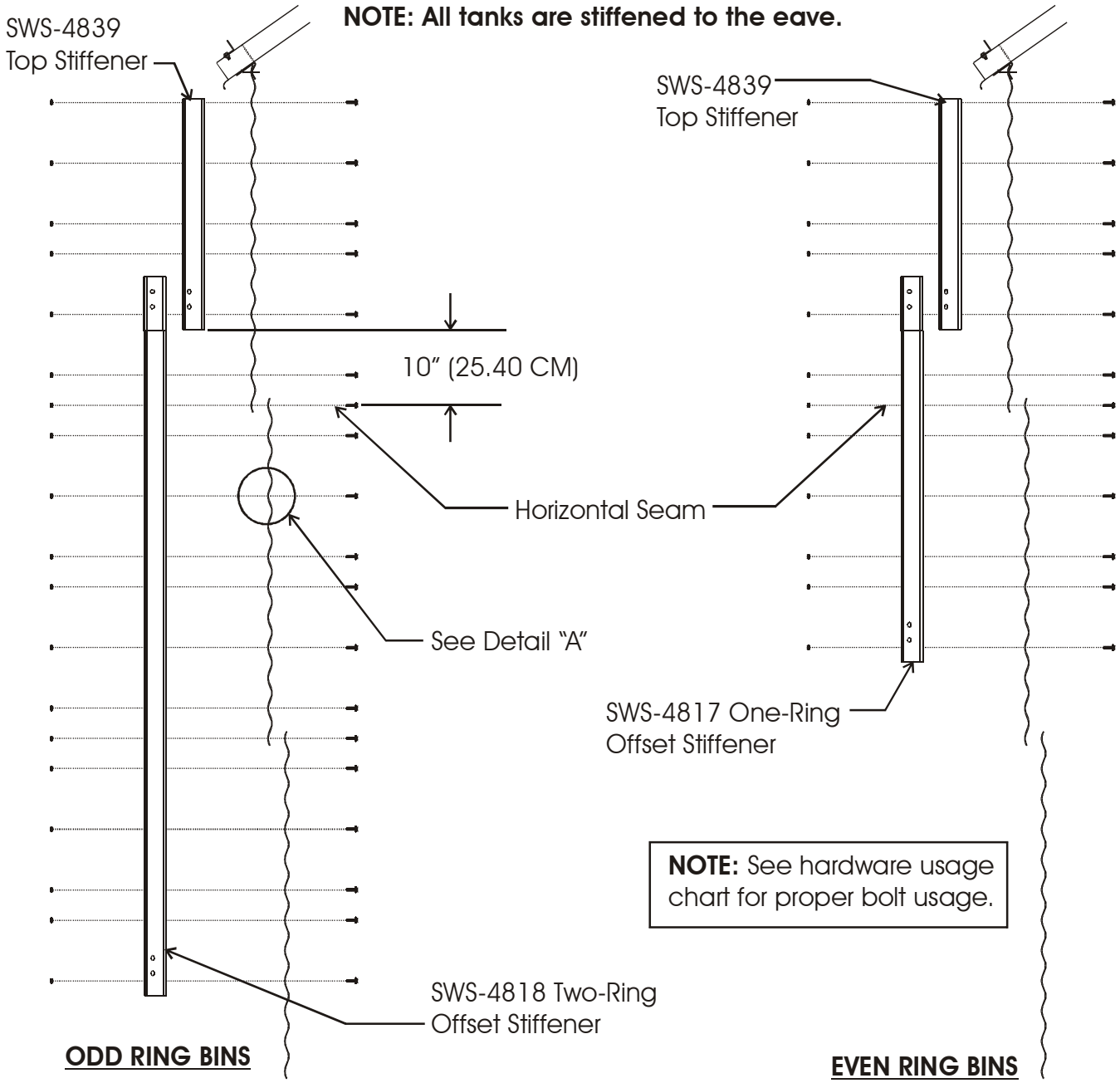


Detail "A"

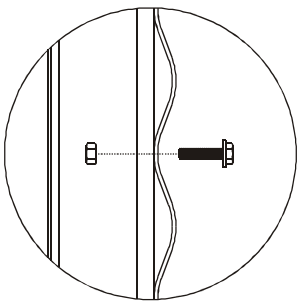
Offset joints & 10 gauge splice plated joints use 3/8" x 1" hex flanged head bolts. All other stiffener joints use 3/8" x 1-1/2" hex flanged head bolts. Washers are used on the nut side of all stiffener joint connections.

3 Stiffeners Per Sidewall Sheet
Commercial Stiffener Starting Location
36' Dia. & Smaller - 4" Corrugation
Outside Stiffened

NOTE: All tanks are stiffened to the eave.



NOTE: See hardware usage chart for proper bolt usage.

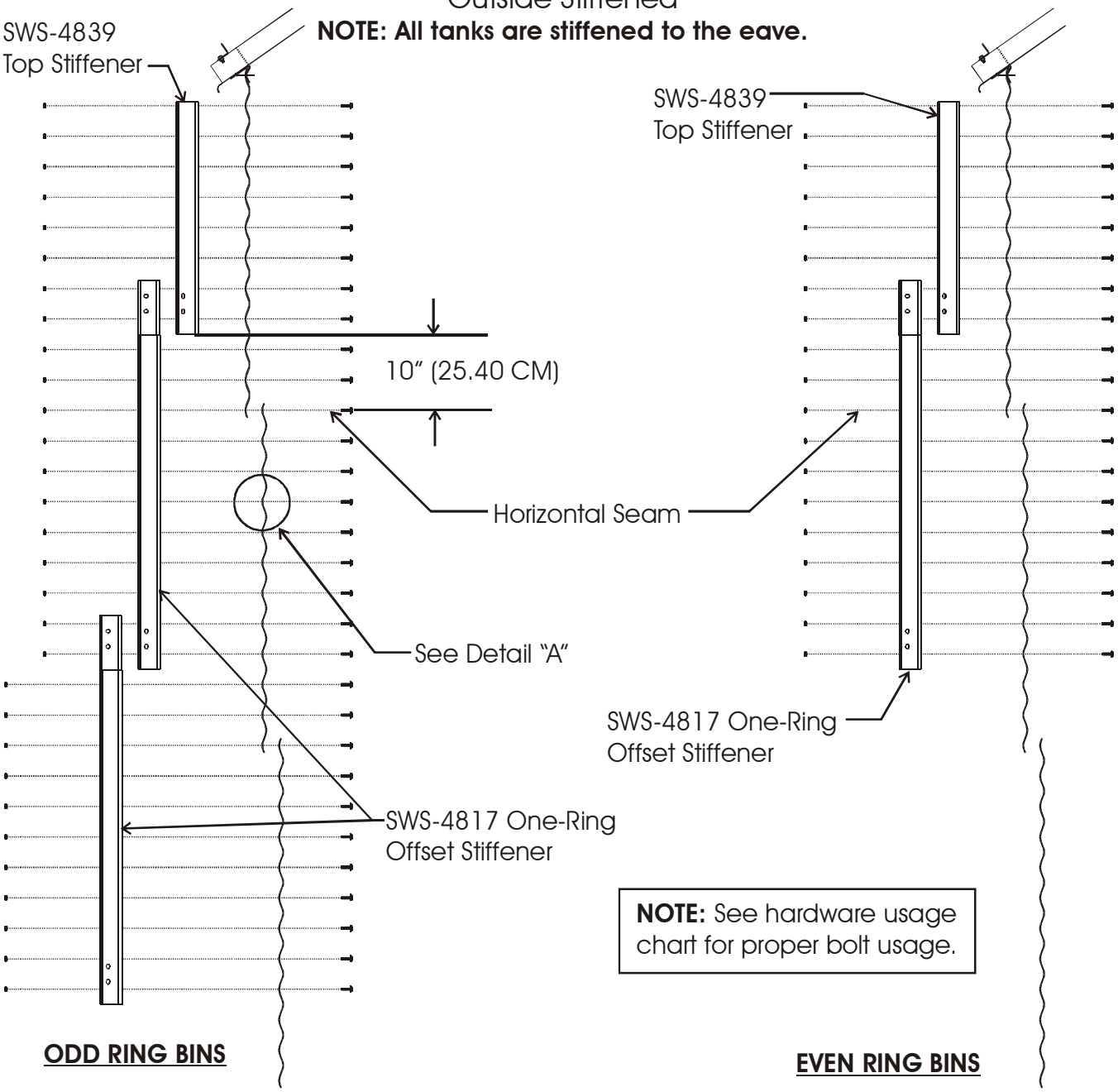


Detail "A"

Offset joints & 10 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.

2 Stiffeners Per Sidewall Sheet
Commercial Stiffener Starting Location
42' to 105' Dia. - 4" Corrugation
Outside Stiffened

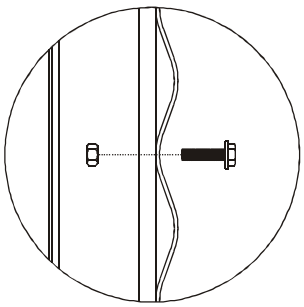
NOTE: All tanks are stiffened to the eave.



NOTE: See hardware usage chart for proper bolt usage.

ODD RING BINS

EVEN RING BINS

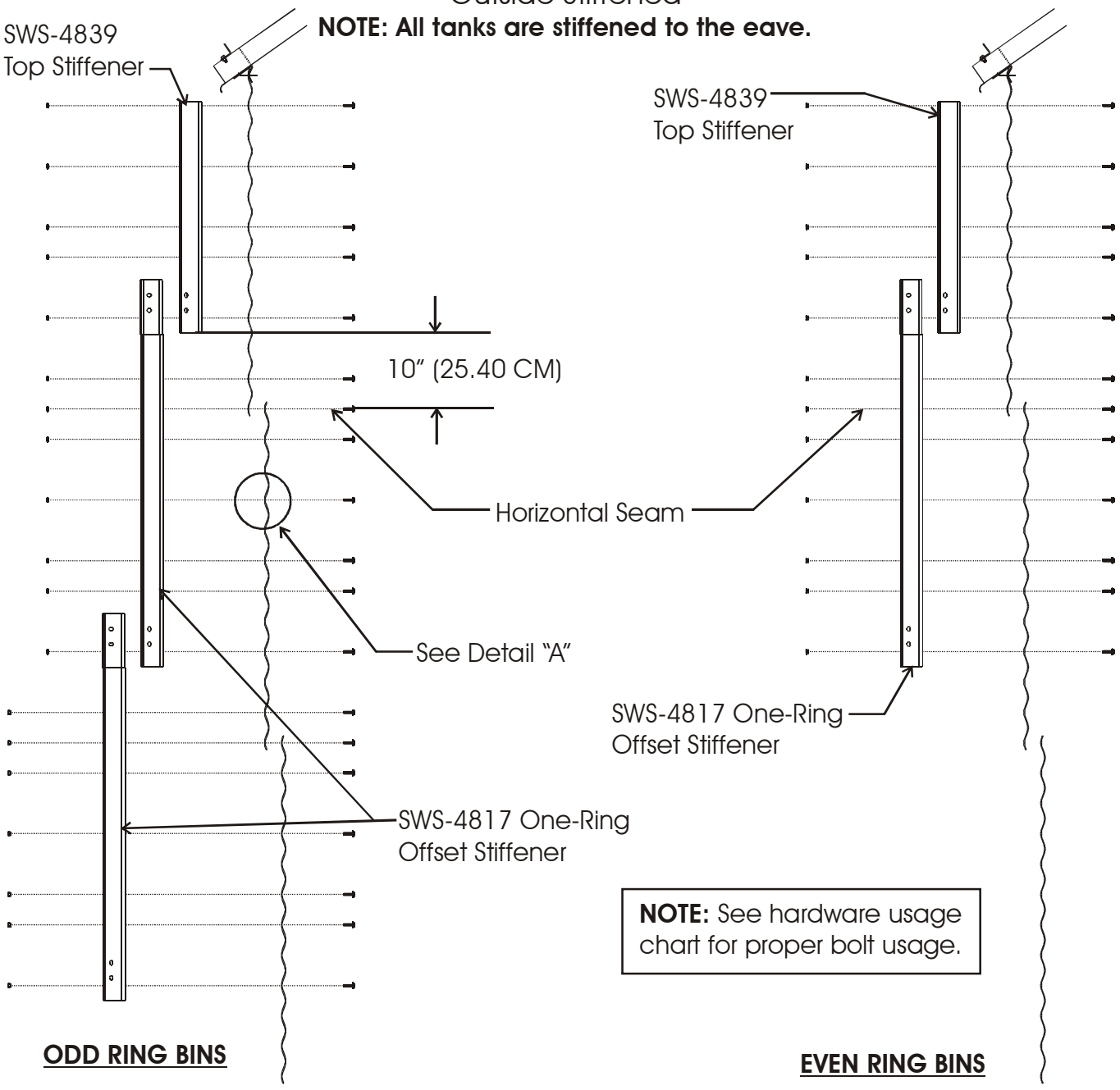


Detail "A"

Offset joints & 10 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.

3 Stiffeners Per Sidewall Sheet
Commercial Stiffener Starting Location
42' to 105' Dia. - 4" Corrugation
Outside Stiffened

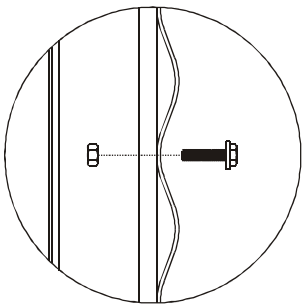
NOTE: All tanks are stiffened to the eave.



NOTE: See hardware usage chart for proper bolt usage.

ODD RING BINS

EVEN RING BINS

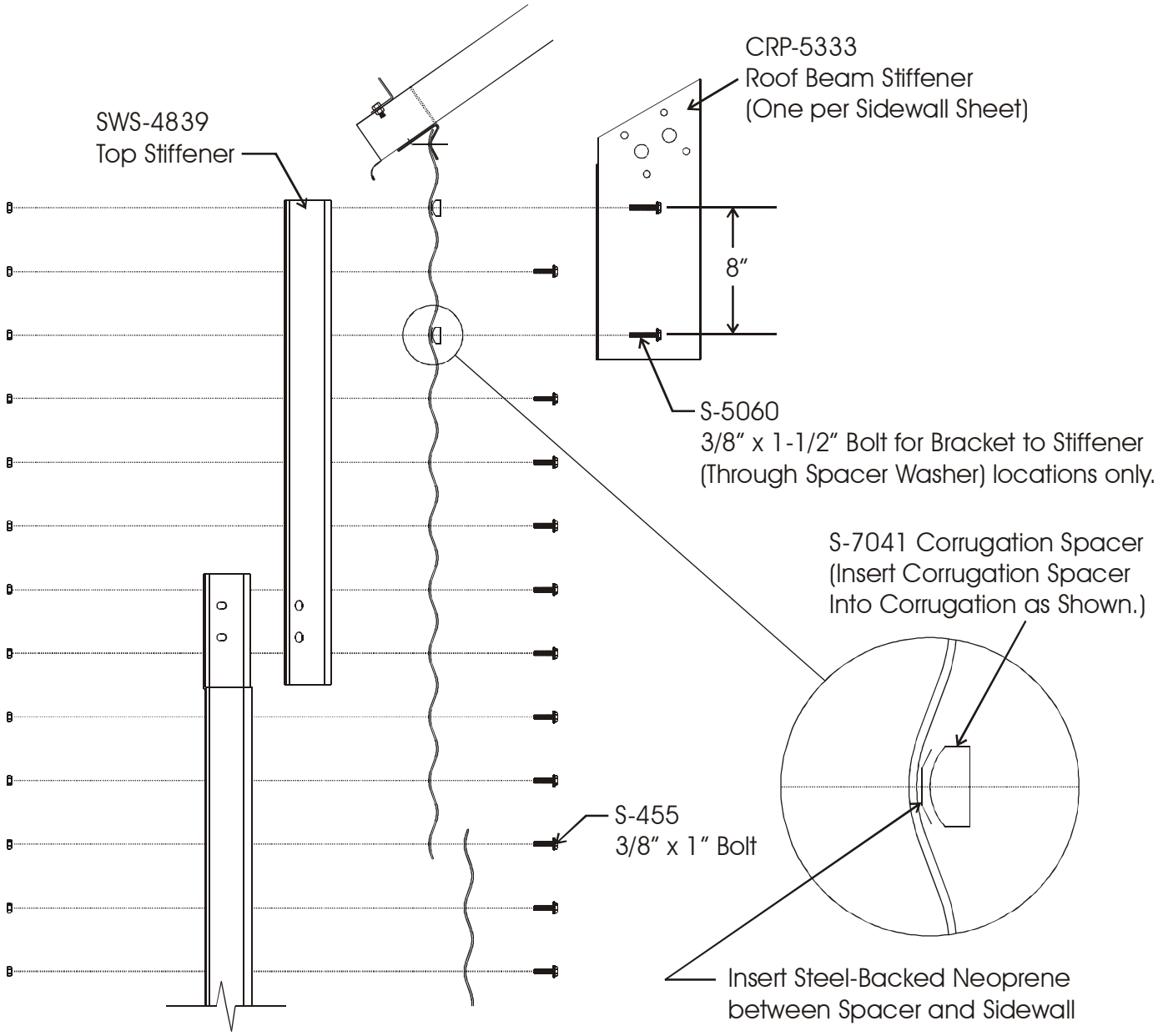


Detail "A"

Offset joints & 10 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.

39’ Dia. Standard Roof Standard Roof Stiffener Detail
4” Corrugation - Outside Stiffened

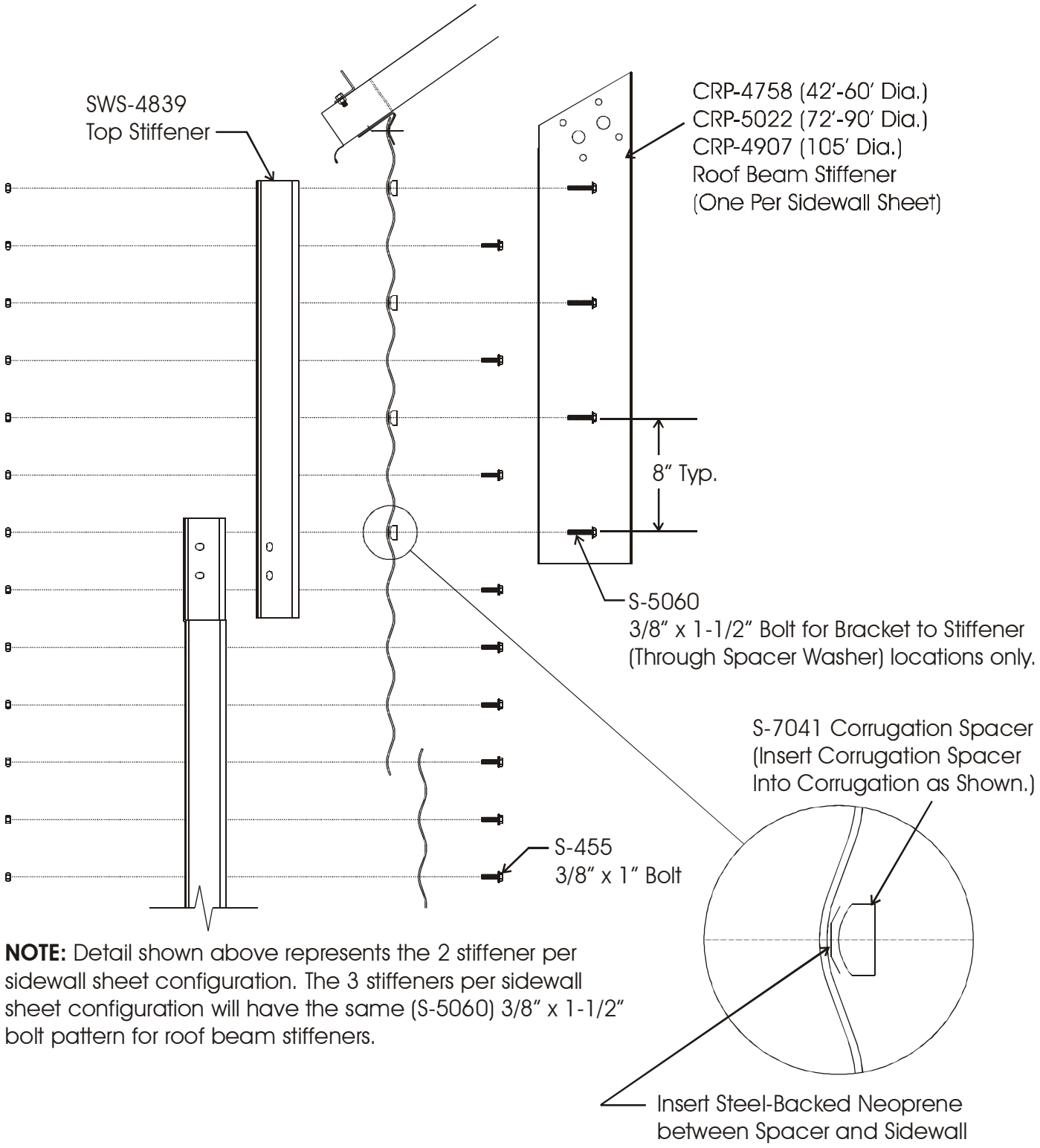
NOTE: All tanks are stiffened to the eave.



NOTE: Detail shown above represents the 2 stiffener per sidewall sheet configuration. The 3 stiffeners per sidewall sheet configuration will have the same (S-5060) 3/8” x 1-1/2” bolt pattern for roof beam stiffeners.

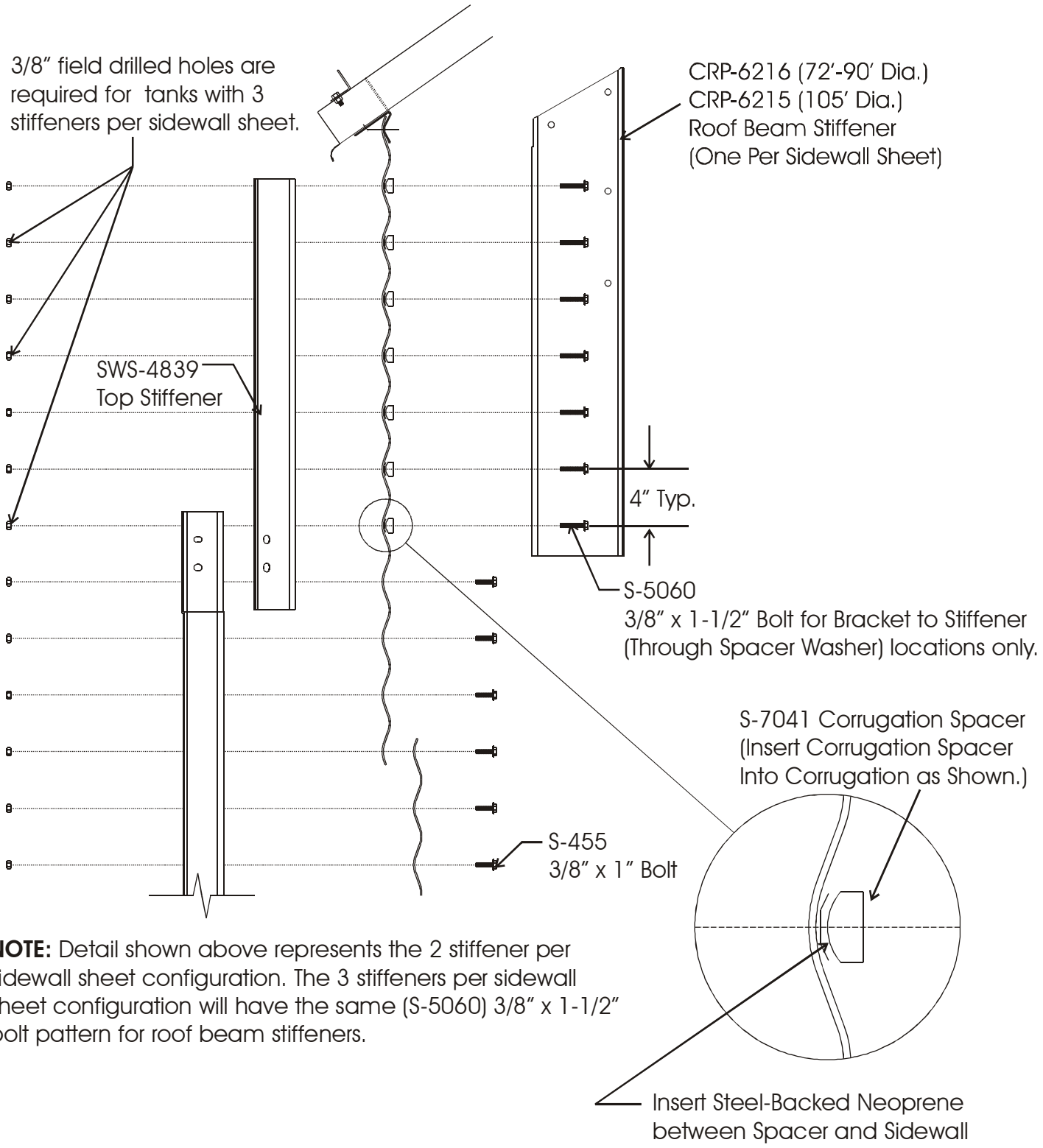
42' Thru 105' Dia. Standard Roof Standard Roof Stiffener Detail
4" Corrugation - Outside Stiffened
10,000 Lb. Peak Load Roof

NOTE: All tanks are stiffened to the eave.

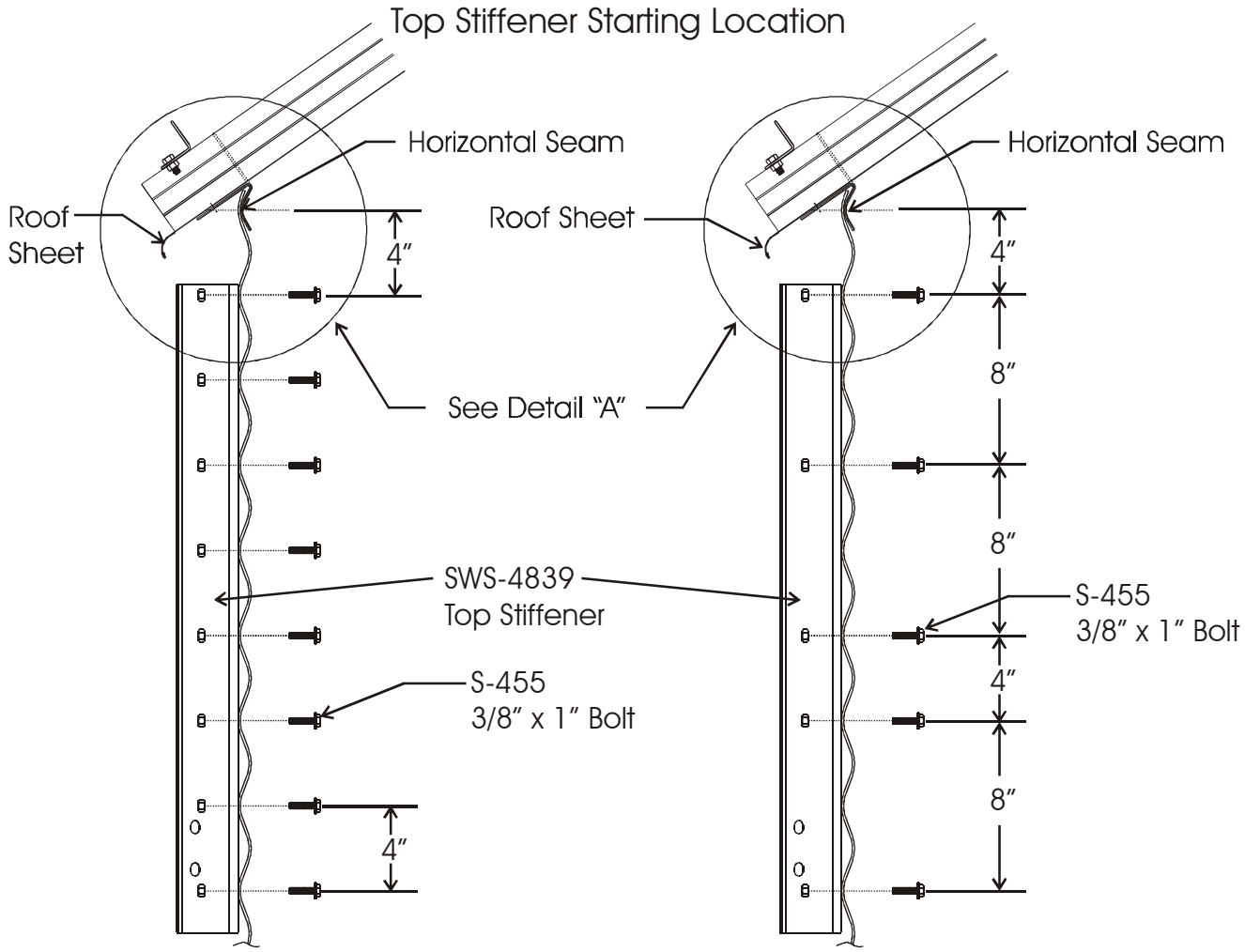


NOTE: Detail shown above represents the 2 stiffener per sidewall sheet configuration. The 3 stiffeners per sidewall sheet configuration will have the same (S-5060) 3/8" x 1-1/2" bolt pattern for roof beam stiffeners.

72’ Thru 105’ Dia. Standard Roof Standard Roof Stiffener Detail
4” Corrugation - Outside Stiffened
20,000 Lb. Peak Load Roof
NOTE: All tanks are stiffened to the eave.



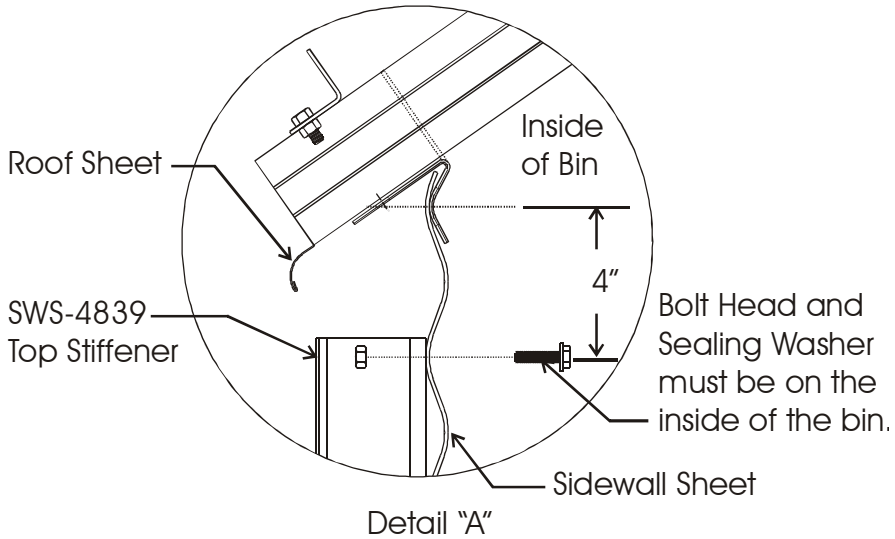
NOTE: Detail shown above represents the 2 stiffener per sidewall sheet configuration. The 3 stiffeners per sidewall sheet configuration will have the same (S-5060) 3/8” x 1-1/2” bolt pattern for roof beam stiffeners.



SIDE VIEW
2 Stiffeners Per
Sidewall Sheet

SIDE VIEW
3 Stiffeners Per
Sidewall Sheet

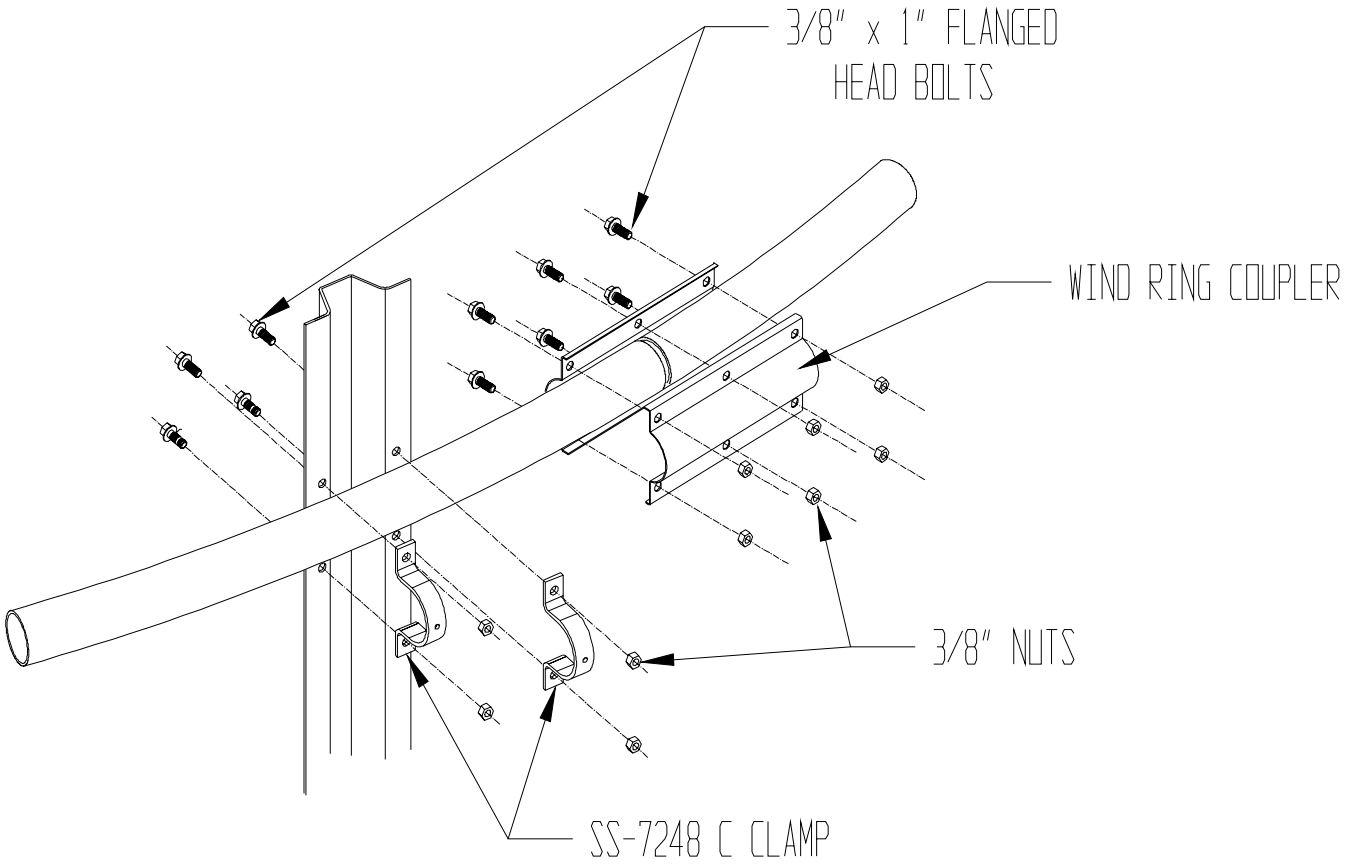
Installing Stiffeners
All stiffeners are to be installed on the exterior of the bin using 3/8″ x 1″ Grade 8 bolts with neoprene washers. The bolt head and washer must be on the inside of the grain bin.



Detail "A"

Wind Ring and Access Door Assembly

WIND RING ASSEMBLY



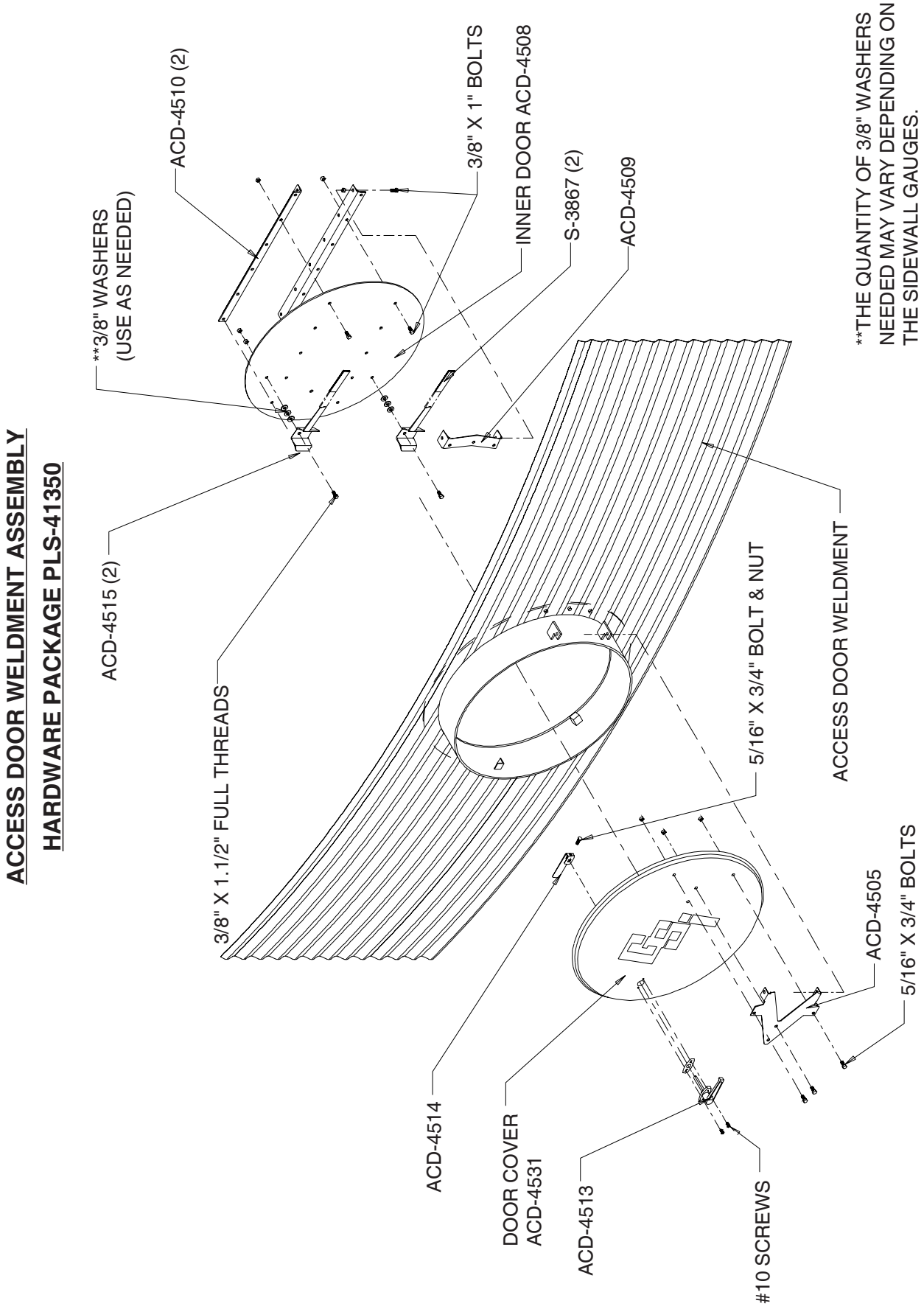
1. To connect wind ring pipe to the stiffeners, attach with 3/8" x 1" bolts through the flange of the stiffener. In some cases field drilling of wind ring locations may be required.

2. Attach wind ring pipe section to stiffener using (2) 3/8" x 6" (S-7248) wind ring clamps.

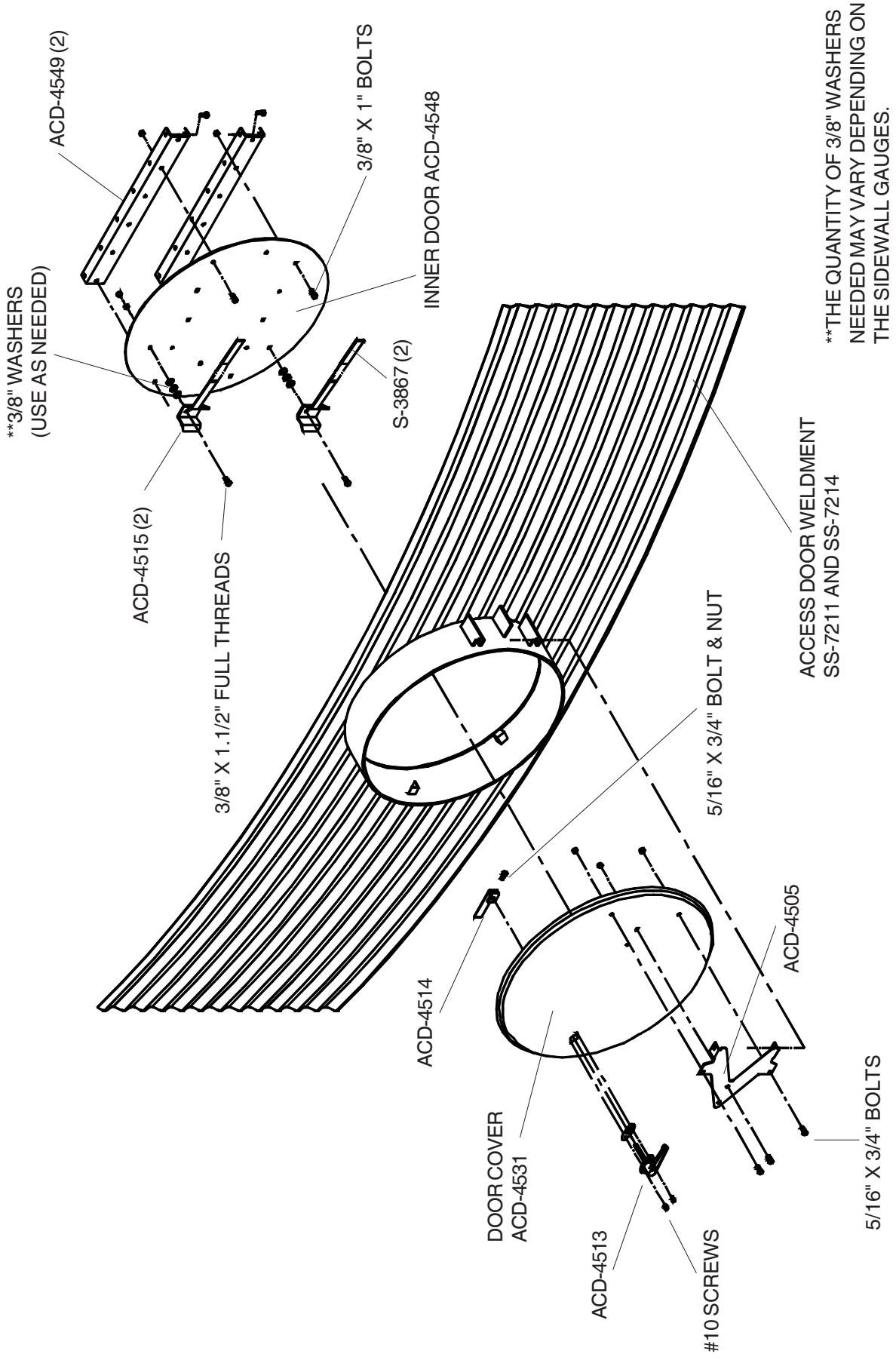
3. Place pipes end to end without overlapping. Fasten together using (2) wind ring couplers and (6) 3/8" x 1" flanged head bolts with nuts. Couplers should be centered on the seam of pipes.

ACCESS DOOR WELDMENT ASSEMBLY

HARDWARE PACKAGE PLS-41350



ACCESS DOOR WELDMENT ASSEMBLY
HARDWARE PACKAGE PLS-41985



Side Draw
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.

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 tank gage sheet for wind ring placement or contact GSI. Reference the chart on 1" anchor bolt usage.

Installation of multiple systems may require additional wind rings and must be placed a minimum of 90° apart. Installation of multiple systems requires approval of GSI.

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

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" DIAMETER ANCHOR BOLT REQUIREMENTS FOR SIDEDRAW SYSTEMS INSTALLED IN WCL - 4.00" CORRUGATION COMMERCIAL TANKS

2 Post Tanks (2 Stiffeners per Sidewall Sheet)

Nominal Tank Diameter	Total Number of of Anchors
36	24
39	26
42	28
48	32
54	36
60	40
72	48
75	50
78	52
90	60
105	70

3 Post Tanks (3 Stiffeners per Sidewall Sheet)

Nominal Tank Diameter	Total Number of of Anchors
42	42
48	48
54	54
60	60
72	72
75	75
78	78
90	90
105	105

SIDE DRAW SYSTEM INSTALLATION (CONT.)

Wind Ring Installation

1. Side Draw Systems may require additional wind rings. They will need to be attached during the beginning of assembly because they go on the upper most rings. (See Wind Ring Requirements Chart.)

2. To connect wind ring pipe to the stiffeners, attach with 3/8" x 1" bolts through the flange of the stiffener. (See Figure 35.) In some cases field drilling of wind ring locations may be required.

3. Attach wind ring pipe section to stiffener using (2) 3/8" x 6" (S-7248) wind ring clamps. (See Figure 35.)

4. Place pipes end to end without overlapping. Fasten together using (2) wind ring couplers and (6) 3/8" x 1" flanged head bolts with nuts. Couplers should be centered on the seam of pipes. (See Figure 35.)

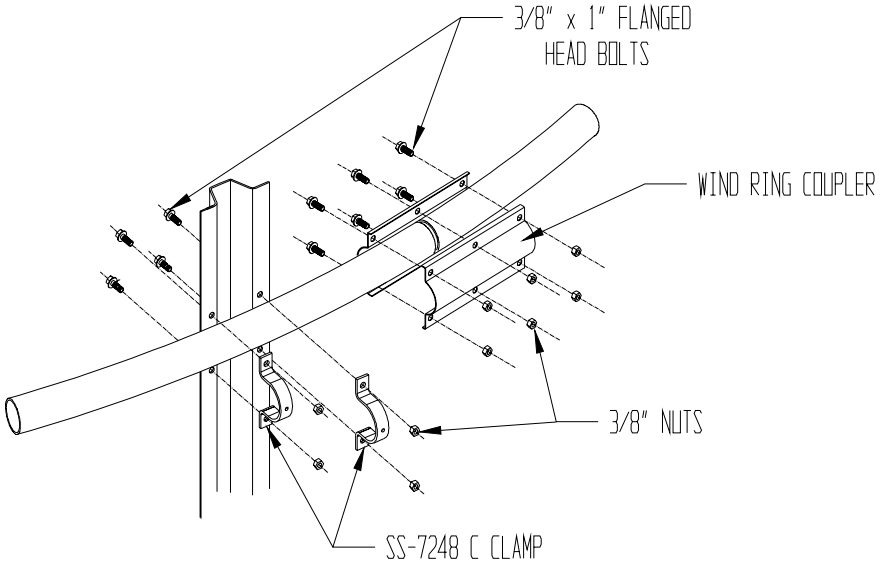


Figure 35

ADDITIONAL WIND RINGS SIDEDRAW USAGE WITH WCL 2 POST STIFFENED TANKS

	27'		30'		33'		36'		42'		48'		54'		
RINGS	STD	ADD	STD	ADD	STD	ADD	STD	ADD	STD	ADD	STD	ADD	STD	ADD	RINGS
20	2	2	2	--	--	--	--	--	--	--	--	--	--	--	20
19	1	2	1	1	--	--	--	--	2	1	2	1	--	--	19
18	1	2	1	1	2	1	2	2	2	1	2	1	3	2	18
17	1	1	1	1	2	1	2	1	2	1	2	1	2	2	17
16	1	1	1	1	2	--	2	2	2	1	2	1	2	1	16
15	1	1	1	1	1	1	1	1	2	1	2	1	2	1	15
14	1	1	1	--	1	--	1	1	1	1	1	1	2	1	14
13	--	1	1	--	1	--	1	1	1	1	1	1	2	1	13
12	--	1	1	--	1	--	1	1	1	1	1	1	1	--	12
11	--	--	--	--	--	--	--	--	--	--	--	--	--	1	11
10	--	--	--	--	--	--	--	--	--	--	--	--	--	1	10

	60'		72'		75'		78'		90'		105'		
RINGS	STD	ADD	STD	ADD	STD	ADD	STD	ADD	STD	ADD	STD	ADD	RINGS
20	--	--	--	--	--	--	--	--	--	--	--	--	20
19	--	--	--	--	--	--	--	--	--	--	--	--	19
18	3	2	4	1	5	--	5	--	6	--	6	--	18
17	3	1	4	1	4	1	4	1	6	--	6	--	17
16	3	1	4	1	4	--	4	--	5	1	6	--	16
15	3	1	3	1	4	--	4	--	5	--	5	--	15
14	2	2	3	1	3	1	4	--	4	--	5	--	14
13	2	1	2	1	3	--	3	--	3	--	4	--	13
12	1	2	2	1	2	1	3	--	2	1	3	1	12
11	1	1	2	--	2	1	2	1	2	1	3	1	11
10	--	2	2	--	2	--	--	--	2	1	3	1	10

Use the above chart for the installation of a single standard sidedraw system at the standard discharge location in a WCL 2 post per sidewall (ex. WCL48-15O) tank. For multiple systems or special locations consult with GSI.

Reference the gage sheet supplied with your tank for the placement and number of wind rings in your tank.

ADDITIONAL WIND RINGS SIDEDRAW USAGE WITH WCL 3 POST STIFFENED TANKS

	33'		36'		42'		48'		54'		60'		
RINGS	STD	ADD	STD	ADD	STD	ADD	STD	ADD	STD	ADD	STD	ADD	RINGS
23	4	- -	4	- -	3	2	3	2	4	1	4	1	23
22	3	1	2	1	2	2	3	2	4	1	4	1	22
21	2	- -	2	- -	2	1	3	1	3	2	3	2	21
20	1	- -	2	- -	2	1	2	1	2	2	2	2	20
19	1	- -	1	- -	1	1	2	1	2	2	2	2	19
18	- -	- -	- -	- -	--	--	1	1	1	1	1	2	18

	72'		75'		78'		90'		105'		
RINGS	STD	ADD	STD	ADD	STD	ADD	STD	ADD	STD	ADD	RINGS
23	5	1	5	1	5	1	5	1	4	4	23
22	4	1	4	1	4	1	4	2	4	3	22
21	3	1	3	2	3	2	4	2	4	3	21
20	3	1	3	2	3	2	4	2	4	3	20
19	2	2	2	2	3	2	3	3	3	4	19
18	2	2	2	2	2	2	3	3	3	4	18
17	2	2	2	2	2	2	2	3	2	4	17
16	2	2	2	2	2	2	2	3	2	3	16
15	2	2	2	2	2	2	2	3	2	3	15
14	2	2	2	2	2	2	2	3	2	3	14
13	1	3	1	3	2	2	2	3	2	3	13
12	1	2	1	2	1	2	1	3	2	2	12
11	1	2	1	2	1	2	1	2	1	2	11
10	- -	2	- -	2	1	- -	1	2	1	1	10

Use the above chart for the installation of a single standard sidedraw system at the standard discharge location in a WCL 3 post per sidewall (ex. WCL72-19O3) tank. For multiple systems or special locations consult with GSI.

Reference the gage sheet supplied with your tank for the placement and number of wind rings in your tank.

SIDE DRAW INSTALLATION

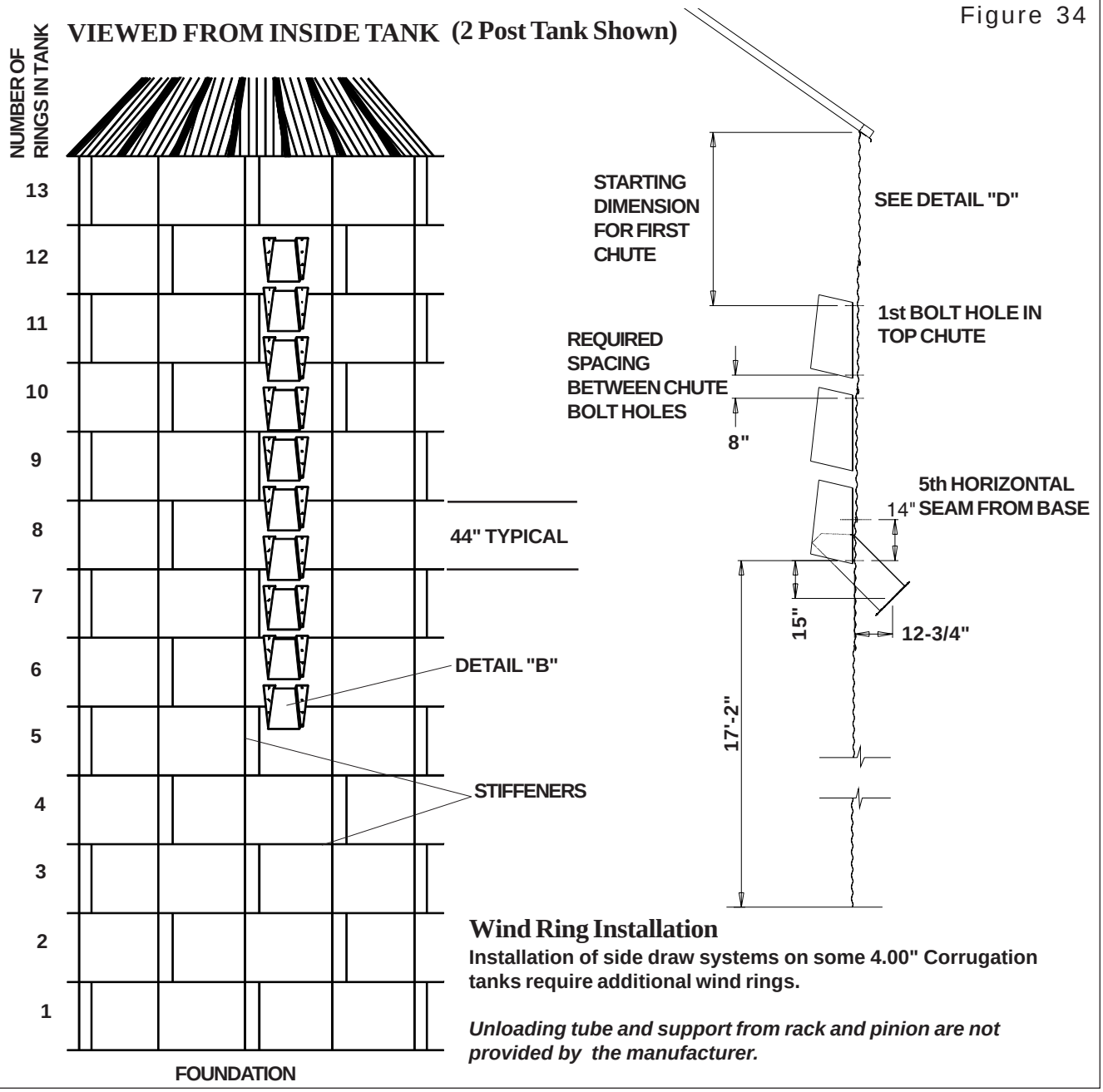
4" / WC SIDEDRAW CHUTE INSTALLATION

Number or Rings	Starting Dimension	Number of Chutes	Horizontal Location for First Chute
24	58	25	Center Between Stiffener
23	46	24	Center Between Stiffener
22	34	23	Center Between Stiffener
21	54	21	Center Between Stiffener
20	42	20	Center Between Stiffener
19	62	18	Center Between Stiffener
18	50	17	Center Between Stiffener
17	38	16	Center Between Stiffener
16	58	14	Center Between Stiffener

4" / WC SIDEDRAW CHUTE INSTALLATION

Number or Rings	Starting Dimension	Number of Chutes	Horizontal Location for First Chute
15	46	13	Center Between Stiffener
14	34	12	Center Between Stiffener
13	54	10	Center Between Stiffener
12	42	9	Center Between Stiffener
11	62	7	Center Between Stiffener
10	50	6	Center Between Stiffener
9	38	5	Center Between Stiffener
8	58	3	Center Between Stiffener
7	46	2	Center Between Stiffener

Figure 34



Wind Ring Installation

Installation of side draw systems on some 4.00" Corrugation tanks require additional wind rings.

Unloading tube and support from rack and pinion are not provided by the manufacturer.

SIDE DRAW SYSTEM INSTALLATION (CONT.)

Locating Chutes

1. Starting from the 1st row of holes in the top sheet, measure down the "starting distance" for your bin. (See Side Draw Chute Chart. on page 54.) (See Figure 34 & 36.)

2. Keep adding the required number of chutes, making sure to leave 8" between the chute bolt holes. (See Figure 34 on page 60.)

3. Stagger the sidewall sheets on 3 post stiffened tanks to create a vertical strip between stiffeners free of vertical seams. Install the chutes between the stiffeners in this area.

Locate Discharge Opening

1. The last bolt hole in the chute should line up with the center of the discharge chute opening that is to be cut. (See Figure 37.) Therefore, you should be able to approximate an opening by measuring 9-1/2" above and below the last bolt hole of the chute. Mark horizontal cut lines.

2. To find the vertical center of the chute opening, measure over 11" to the right and left of the chute bolt rows. Mark center point. (See Figure 37.) Then from the center point , measure 7" on both sides and mark vertical cut lines.

3. Cut opening where marked, make sure corners have a minimum of 1-1/2" radius. (See Figure 37.)

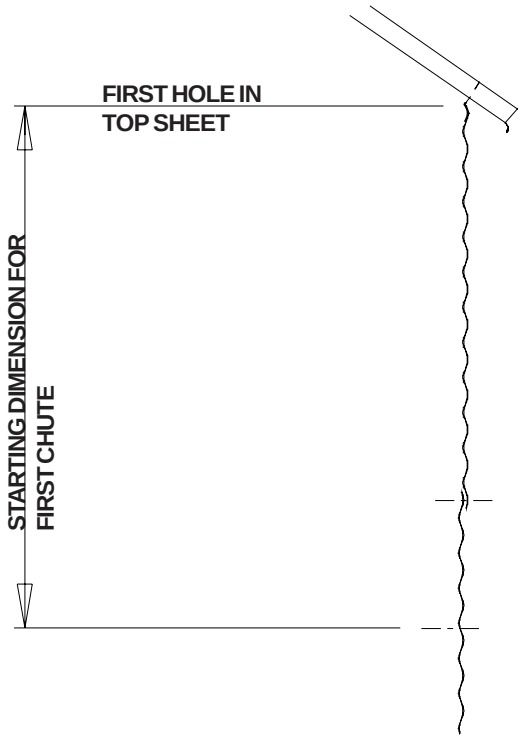


Figure 36

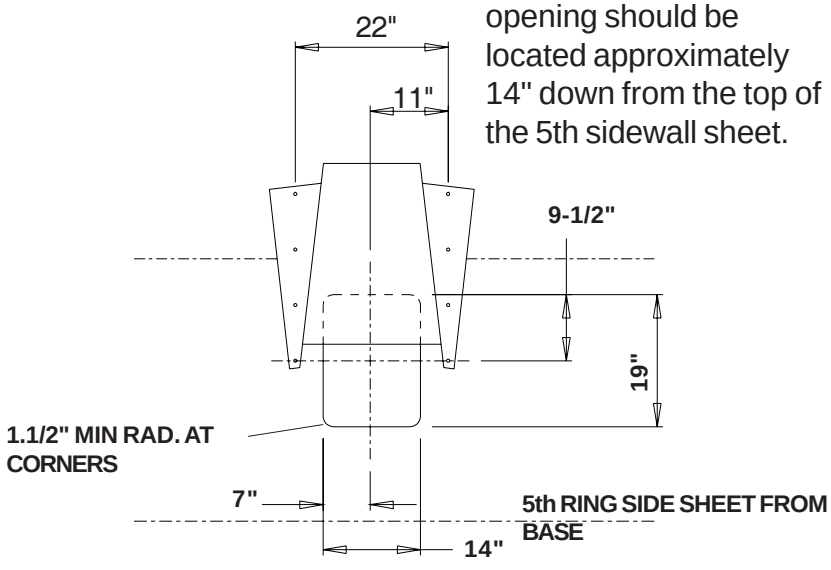


Figure 37

SIDE DRAW SYSTEM INSTALLATION (CONT.)

SIDEWALL OVERLAP

1. For proper watershed, make sure that the upper side sheet overlaps on top of the side draw weldment. (See Figure 38.)

CAULKING

1. To seal the side draw weldment to the sidewall sheets use two beads of caulking, one bead of caulk on each side of the outside row of vertical bolts. Use discharge tube weldment as a template to field drill the bolt holes through side wall sheet. Use 3/8" bolts and nuts provided to bolt sheets together. (See Figure 39 & 40.) Use supplemental caulk as necessary for sealing purposes.

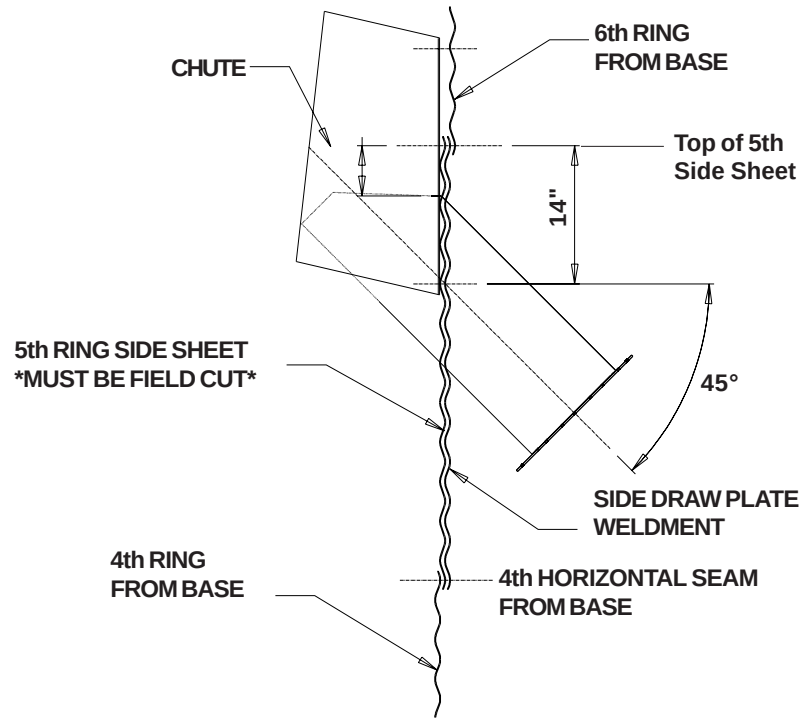


Figure 38

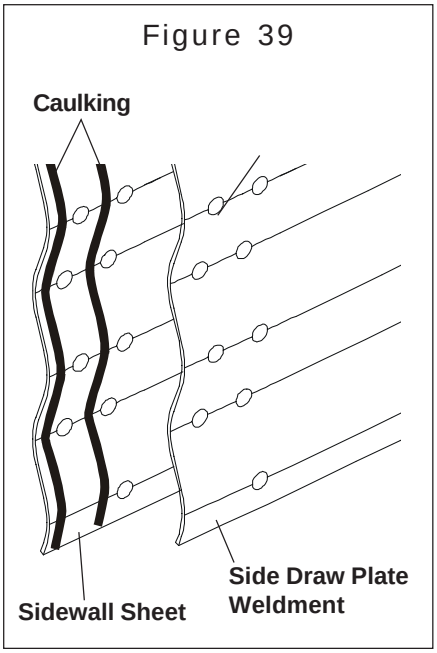


Figure 39

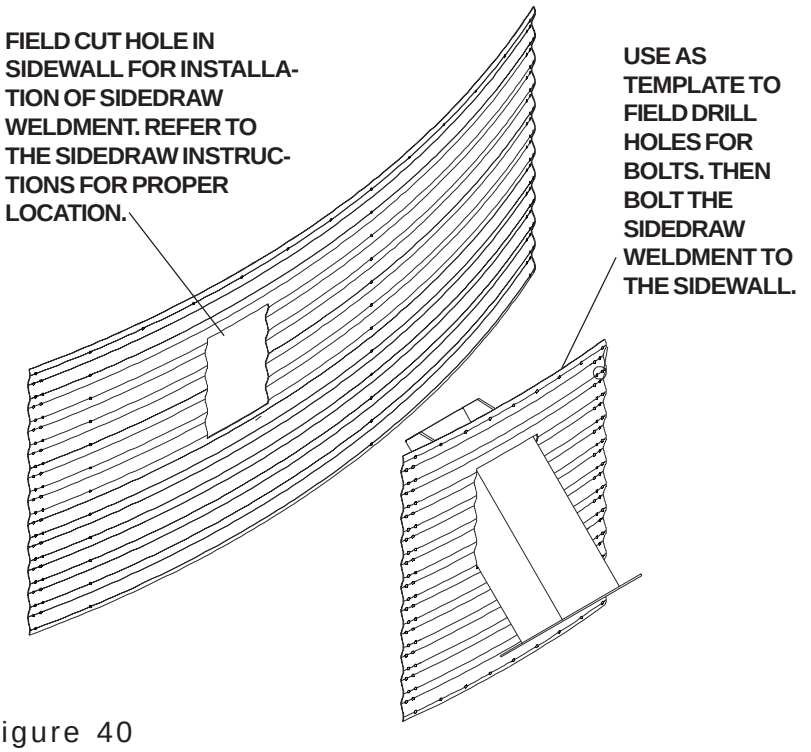


Figure 40

WARRANTY

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