



# **IMP Power Series™**

**Insulated Metal Wall and Roof Panels**

## **Design Manual**

The application and detail drawings in this manual are strictly for illustration purposes and may not be applicable to all building designs or product installations. All projects should conform to applicable building codes for that particular area. It is recommended to follow all building regulations and standard industry practices.

Metal Sales Manufacturing Corporation is not responsible for the performance of the roof or wall system if it is not installed in accordance with the suggested instructions referenced in this manual. If there is a conflict between this manual and the approved Metal Sales' erection drawings, the approved erection drawings are to take precedence.

Prior to ordering and installing materials, all dimensions should be verified by field measurements.

Oil canning is not a cause for rejection. Oil canning can be described as the amount of waviness found in the flat areas of metal panels. Oil canning is an inherent characteristic of light gauge cold formed metal products, particularly those with broad flat areas. There are many factors which may contribute to oil canning that Metal Sales is not able to control. These factors include: misalignment of the support system, over driving of fasteners used on the panels, stress (whether inherent in the panel or induced), thermal expansion and contraction of the panel, material handling, width, gauge, length, color of panels, and installation. (Reference Metal Construction Association "Oil Canning Position Paper" - Appendix A).

Metal Sales reserves the right to modify, without notice, any details, recommendations or suggestions. Consult Metal Sales for any additional information not outlined in this manual.

Metal Sales shall not be responsible for any damage and injuries incurred while handling and/or installing the panels, trim, and accessories. On-site personnel shall follow the appropriate safety protocols as determined by the relevant governing bodies.

## SAFETY

### STUDY APPLICABLE OSHA AND OTHER SAFETY REQUIREMENTS BEFORE FOLLOWING THESE INSTRUCTIONS.

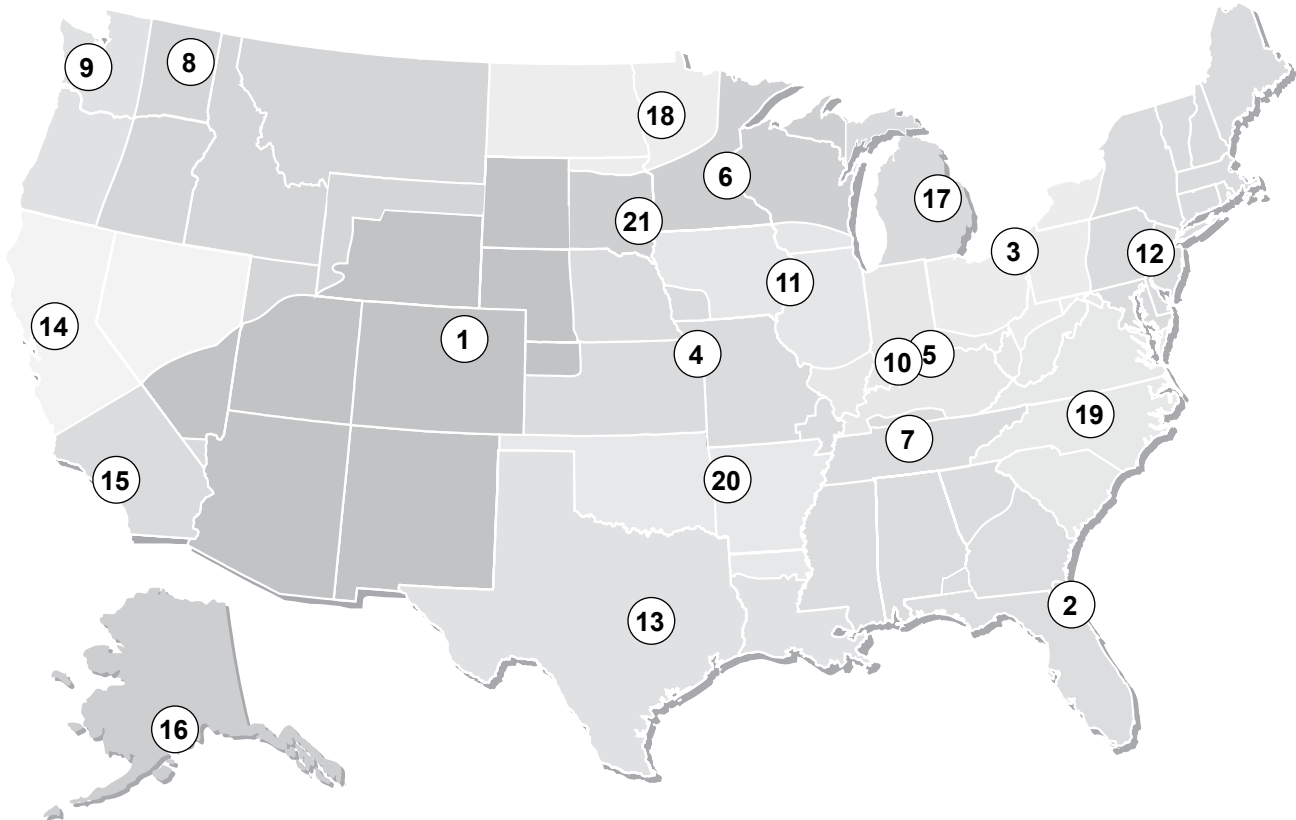
The installation of metal roof systems is a dangerous procedure and should be supervised by trained knowledgeable erectors. **USE EXTREME CARE WHILE INSTALLING ROOF AND WALL PANELS.** It is not possible for Metal Sales to be aware of all the possible job site situations that could cause an unsafe condition to exist. The erector of the roof system is responsible for reading these instructions and determining the safest way to install the roof system.

These instructions are provided only as a guide to show a knowledgeable, trained erector the correct parts placement one to another. If following any of the installation steps would endanger a worker, the erector should stop work and decide upon a corrective action.

Provide required safety railing, netting, or safety lines for crew members working on the roof.

Do not use the roof panel as a walking platform. The roof panels will not withstand the weight of a person standing at the edge of the panel.

Do not stand on any part of a roof panel until the panel has been completely attached.



*\*NOTE: Shaded areas represent regions served by each location.*

# **ms metal sales** manufacturing corporation

Metal Sales offers a complete line of metal roof, wall, and fascia panel systems for the commercial, architectural, industrial and residential markets. Metal Sales offers over 75 profiles with a wide selection of widths, colors, and gauges - new construction or retrofit.

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**10.) NEW ALBANY BRANCH**

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**20.) FORT SMITH BRANCH**

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**21.) SIOUX FALLS BRANCH**

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## 1.0 ARRIVAL ON SITE

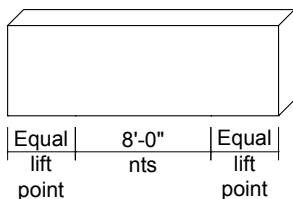
- 1.1 IMPower Series panels are carefully bundled and stretch-wrapped to prevent damage during shipping. The transportation company is responsible for delivering these components undamaged. Freight claims should be handled directly with the freight company.
- 1.2 When shipment is received, check each item against the bill of lading for quantity, length, transit damage, etc. If shortage or damage is found, make sure a notation of it is made on the bill of lading and signed by the driver. It is the customer's responsibility to make any damage claim(s).
- 1.3 Please notify Metal Sales of any order discrepancies within 72 hours of delivery. Otherwise, Metal Sales will conclude that the order was completed successfully.
- 1.4 A panel packing list is provided for each bundle and is located within a sleeve adhered to the side wrapping. Please use this document to check for bundle information.
- 1.5 IMPower Series panels will generally arrive in large, stretch-wrapped bundles on flat bed trailers. Consequently, the bundles should be off-loaded by means of crane system or forklift.

## 2.0 UNLOADING WITH A FORKLIFT

- 2.1 All panel bundles are reinforced with bottom sheet(s) of OSB at lifting points to prevent damage during handling. Lift bundles one at a time with a forklift. See figure 1 (below) for recommended lifting point locations. Long-length bundles (36'-0" or longer) will have four or more lifting points (see figure 2, below).

Note: ensure that forks are between the 3" foam stickers at the bottom of each bundle.

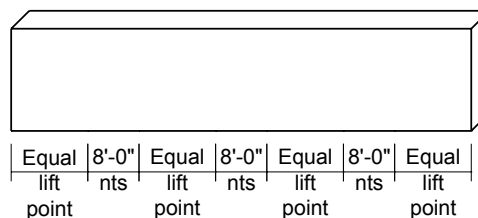
### "Standard-length" bundles (8'-0" to 36'-0")



Use one forklift to lift bundles at the lift point sections.

Figure 1

### "Long-length" bundles (36'-0" or longer)



When handling long-length bundles, be careful not to position your lift at the center of the bundles as this may damage the panels. Use two forklifts (or crane straps) to lift bundle at the lift point sections.

Figure 2

- 2.2 Do not over-engage forks when lifting a bundle as doing so may damage the bundle(s) behind it.
- 2.3 Assuming 48" fork blades, 6" foam blocks may be placed on the back (upright) leg of the forks to soften the contact between the forks and the bundle.
- 2.4 Caution stickers are affixed to either side of each bundle as a quick on-site reference for off-loading.

Note: extreme care should be taken to avoid bumping the panels when lifting and maneuvering.

## 3.0 UNLOADING WITH A CRANE

- 3.1 Only lift one bundle at a time. When moving bundle(s) with a crane, use an appropriate combination of spreader bars, slings, and anti-pinch boards to safely distribute the bundle's weight. When bundles are longer than 15'-0", it is suggested that a properly designed and fabricated lifting beam / spreader bar is used.

Note: unloading with a crane is recommended for any bundles over 50'-0" long.

- 3.2 Anti-pinch boards should be long enough to swallow the entire width of the bundle and be placed at the top and bottom of the bundle. Use one set (top and bottom) of anti-pinch boards per sling.
- 3.3 The size and quantity of the spreader bar(s) may vary depending on the length and weight of the bundle(s). Long-length bundles (36'-0" or longer) will have four or more lifting points (see figure 2, below).
- 3.4 Only lift one bundle at a time.

## 4.0 MANUALLY UNLOADING

4.1 On small projects, unloading of the panels may be done by hand.

Note: special care should be taken when handling panels. Always lift the panels when removing from a bundle, never drag them.

4.2 Avoid carrying the panel from a flat orientation, especially long panels which are more prone to bending damage. If necessary, use more than two personnel to evenly support the panel.

4.3 To prevent joint damage, never lift the panel from the flat position by the side joint or the overlapping rib. Doing so may cause the metal and foam to separate.

Note: all personnel performing these tasks must wear proper clothing and protective equipment at all times.

## 5.0 SITE STORAGE

5.1 If the panels are to be used immediately, the bundles should be placed at the pre-planned locations around the perimeter or the building, as close as possible to the corresponding work areas. Place bundles as far practical from the site to avoid possible damage from later site maneuvering or undue handling.

5.2 Ideally, the bundles should be stored under a temporary shelter with the plastic removed from the top and sides of the bundle. Site storage time should be minimized.

5.3 If the bundles cannot be stored in a covered location, it is necessary to cut the outside plastic wrapping and arrange the bundles such that they are inclined at a (minimum) 1:12 slope such that water does not accumulate, and moisture build up between panels is avoided. The continuous cut should be made along the width of the bundle; cut 1'-0" slits 5'-0" o/c along the length of the bundle (see figure 3, below). Do not store for longer than 30 days. Moisture between panels can cause corrosion and oxidation of painted surfaces can occur.

Note: if temporary shelter is not available, our panels are packaged with plastic stretch wrap and expanded polystyrene board. It is, however, a requirement that additional protection be provided to protect the panels from wet weather conditions during transit and at the jobsite. Standing water on stored and/or bundled skids may cause damage to the panel finish and is not acceptable.

Note: do not stand panels on edge of joinery or saw cut edge. Never store or handle panels in a horizontal position.

5.4 Bundles should be stacked no more than two high. The foam stickers for the upper bundle should be located in line with the foam stickers on the lower bundle (see figure 3, below).

5.5 Bundles should be firmly tied or weighted down when broken open for use.

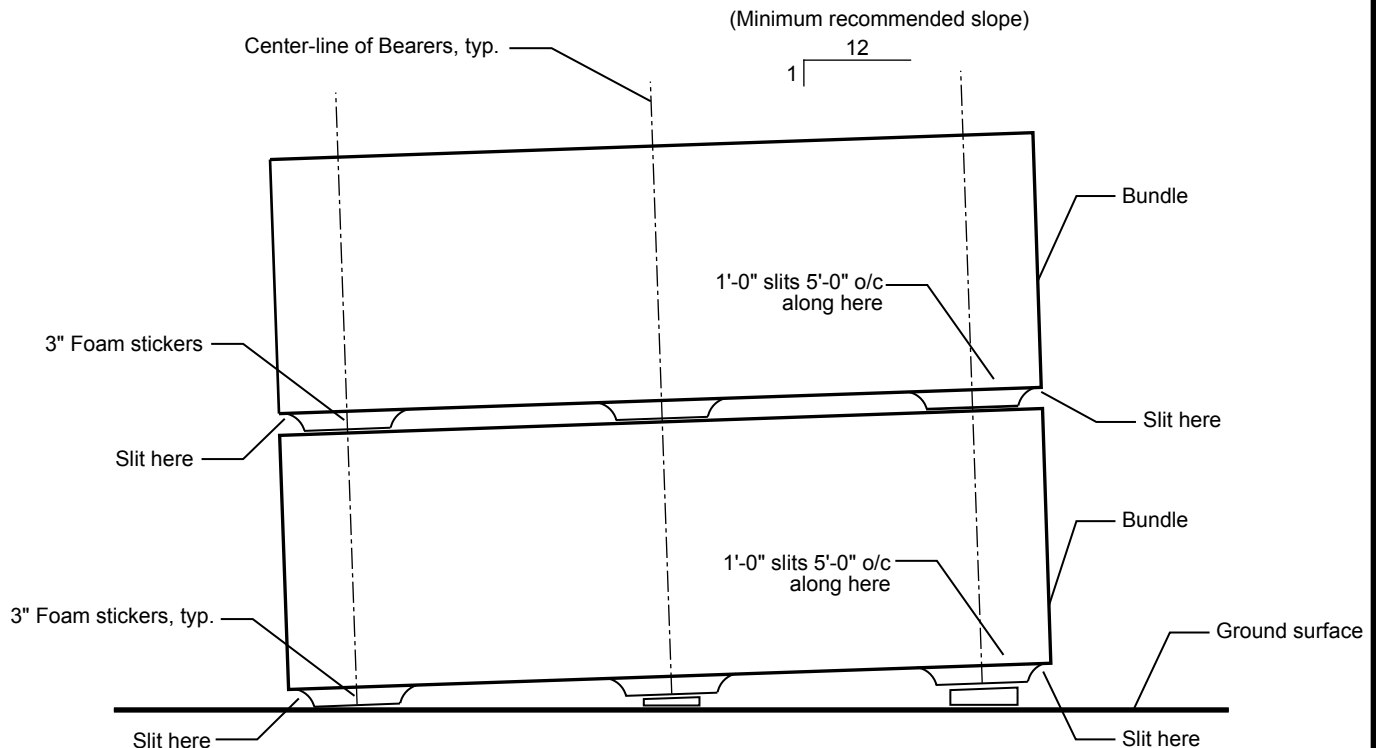


Figure 3

**6.0 ACCESSORIES AND AUXILIARY ITEMS**

- 6.1 Due care should be afforded to the handling and storage of small items (e.g. flashings, fasteners, sealants, etc.) that arrive on site for inclusion in the work. All accessories must be stored in a covered location on the jobsite and not exposed to the elements.
- 6.2 Cover all pallet crates and/or boxes to protect materials from weather but allow for adequate ventilation to prevent collection of condensation.

**7.0 SUPPORTING STEEL**

- 7.1 For quality panel installation, the panel contractor shall examine the alignment of the support steel before installation of the roof panels. The steel shall be aligned to per the tolerances established in the AISC code of standard practice, section 7, and the supplement modification control section 7.11.3, adjustable items. The maximum deviation of steel alignment should be limited to -0, + 3/16" from the control with an 1/8" maximum change in deviation for any member of any 10'-0" run of panel.
- 7.2 Any variance(s) from these tolerances can affect both performance and aesthetics and must be reported to the architect and general contractor and corrected by the general contractor or accepted, in writing, by the architect before panel installation proceeds.
- 7.3 The face(s) of all support members to which the panel is attached must be in the same vertical plane, flat, and free of obstructions such as weld marks, bolts, or rivet heads. Installation of the panels should proceed only if the alignment of support members meets the tolerances established in the contract documents.

**8.0 VERTICAL LOADING ON PANELS**

- 8.1 To prevent the panels from taking vertical loads, attachments to rigid supports must have means of allowing the structure to deflect without damaging the insulated panels.
- 8.2 Panel shall always be attached to support members running perpendicular to the panel length. Never attach panels directly to a structural (primary) support member, e.g. column flange.

**9.0 PROTECTIVE PLASTIC FILM**

- 9.1 IMPower Series panels and metal trims have a temporary protective plastic film. This plastic film helps prevent damage during shipping and handling.
- 9.2 This protective plastic film is not to be removed until panels and metal trims are ready for erection.
- 9.3 Protective plastic film shall not be exposed to direct sun for more than 48 hours as this may cause the plastic film to bond to the metal panel face and may become more difficult to remove. Additionally, prolonged exposure to temperatures above 80°F is not recommended as this may cause the peel coat to leave an adhesive residue on the panel facing(s).

Note: see section 5.0 for instructions on proper storage.

**10.0 PROTECTIVE PLASTIC FILM REMOVAL**

- 10.0 The best way to remove the protective plastic film is to start at a panel corner and peel off at a 45° angle (see figure 4, below).
- 10.1 The plastic film must be removed from both panel faces and metal trims (if applicable).
- 10.2 Any residue on the metal face(s) from the plastic film will weather off naturally. If desired, it can be removed using a soft cloth and water. It may be necessary to use a citrus-based cleaning solution added to the water in a sufficient dilution ratio to effect complete removal of the adhesive.

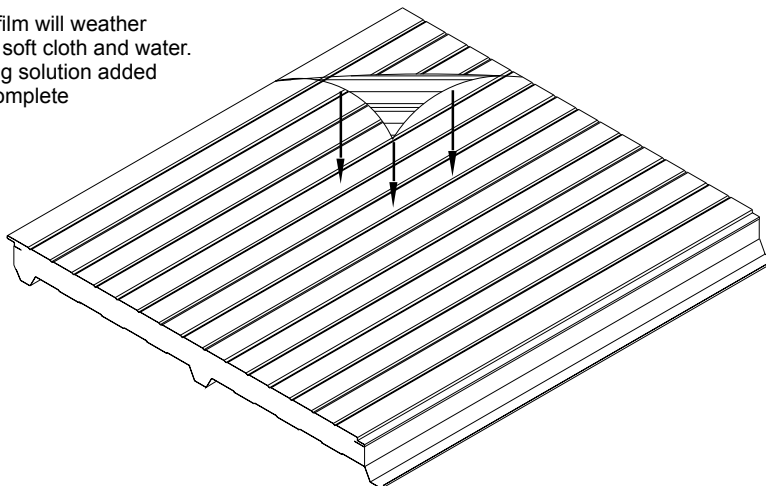
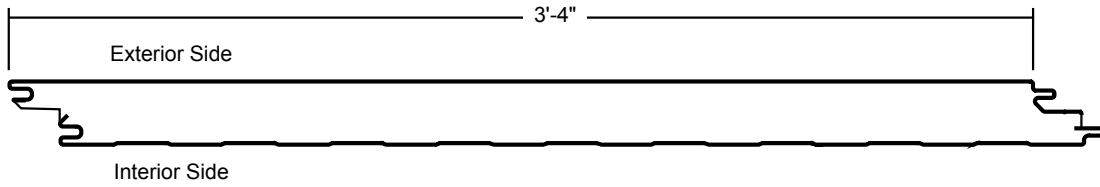


Figure 4

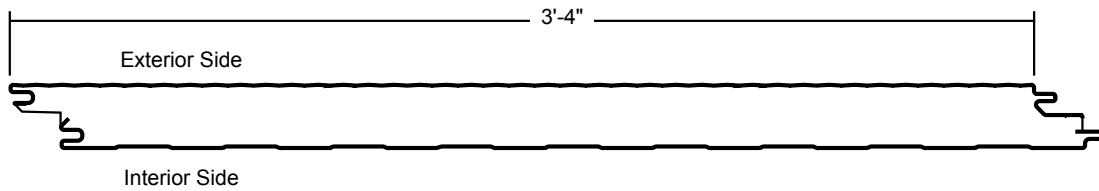
**FL40 Flat Wall System**

<b>Panel Thickness</b>	2"	2.5"	3"
<b>Insulating R-Values</b>	16	20	24



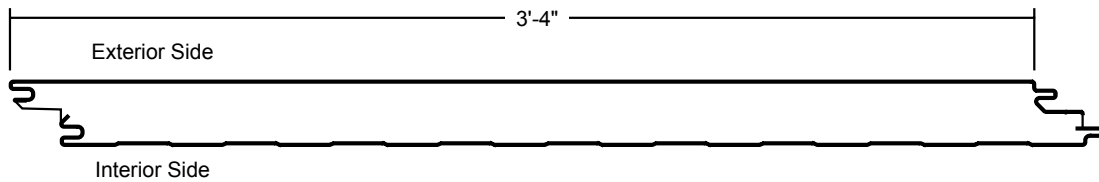
**ST40 Striated Wall System**

<b>Panel Thickness</b>	2"	2.5"	3"	4"
<b>Insulating R-Values</b>	16	20	24	32



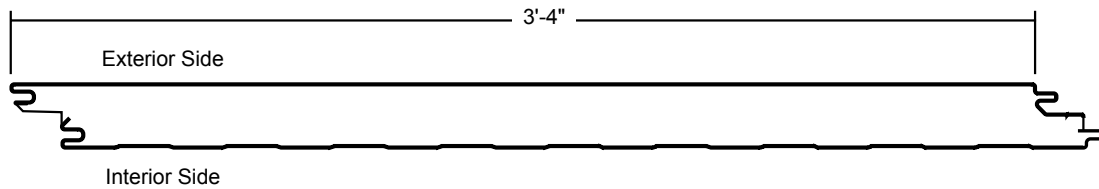
**HE40 Heavy Embossed Wall System**

<b>Panel Thickness</b>	2"	2.5"	3"	4"
<b>Insulating R-Values</b>	16	20	24	32



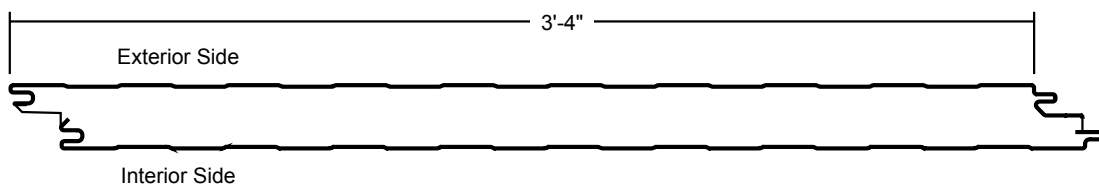
**HE40A AdobeTexture™ Wall System**

<b>Panel Thickness</b>	2"	2.5"	3"	4"
<b>Insulating R-Values</b>	16	20	24	32



**DM40 Double Mesa Wall System**

<b>Panel Thickness</b>	2"	2.5"	3"	4"
<b>Insulating R-Values</b>	16	20	24	32





**11.0 PANEL CUTTING PROCEDURES**

11.1 Panels may be cut prior to installation or cut in-place. Metal Sales recommends cutting the panels prior to installation to minimize panel damage and to ensure a good fit.

11.2 A Trumpf TPC 150-2 panel cutter or Milwaukee 6370-21 circular saw with an 8" diameter, 40 tooth carbide blade is recommended.

11.3 To perform a good cut, follow steps 1 through 4 shown below. If the panel thickness is greater than the saw's blade radius, cutting should be done in two steps, cutting one side at a time; follow steps 1 through 6.

1. Measure the area to cut and mark a line on the panel surface.
2. Use adhesive tape on both sides of the cutting line to protect panel surface.
3. Recheck measurements and proceed with cutting operation.
4. Clean off any metal chips left on panel after cutting procedure. Any metal chips on the foam can be removed by hand.
5. If necessary, turn panel over and follow steps 1 through 4 for the other side of the panel.
6. File or sand off any burrs on the metal after cutting. The panel is now ready for installation. The installer must consider the application of a continuous bead of sealant and, if necessary, the cutting of thermal breaks prior to installation; such tasks shall be done on the ground.

Note: Do not use a reciprocating saw as friction between the cutting blade and the panel creates heat and may damage the painted surface of the panel.

**12.0 THERMAL BREAKS**

12.1 Thermal breaks (cutting the interior metal skin) may be necessary to stop temperature conductivity in the panel. Consult your Metal Sales representative for specific detail(s) and/or review the details in the shop drawings.

**13.0 CAULKING / SEALANT PLACEMENT**

13.1 Apply caulking to panel joinery as shown on the shop drawing details to provide a barrier against vapor and air infiltration. Caulking is best applied while panels are lying flat. Apply beads of caulk immediately prior to engaging panels (see figure 5, below).

13.2 Caulking should be provided around panel openings and support steel where panel ends occur to develop vapor and air infiltration seals. The beads of caulk on the support steel must be married to the beads of caulk in the panel joint.

Note: See joint detail(s) in the project shop drawings for job-specific caulking instructions.

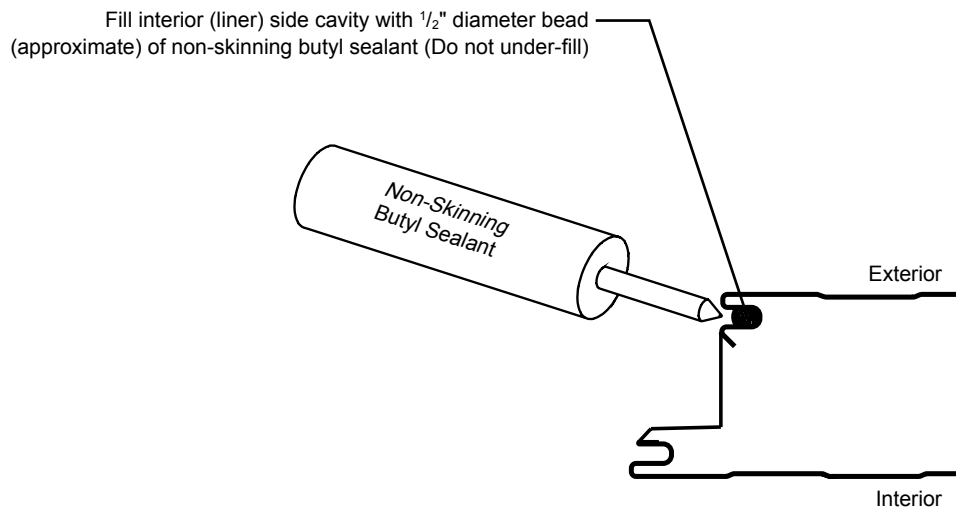


Figure 5

## 14.0 CORNER INSTALLATION

14.1 Panels are installed from left to right when viewed from the exterior. Starter and end panels should be field cut as shown (see figure 6, below).

**Note:** Panels may be installed from right to left by turning the panel over. Remember that the female edge of the wall panel is always the leading edge when using the hidden fasteners.



Figure 6

14.2 Place bottom end of panel on base and tilt to vertical position. Longer panels may require the use of a rope hoist or a panel lifting device such as a Wood's Powr-Grip.

14.3 After drilling or cutting panels, always remove metal chips that have fallen on the flashing or panels to preclude later damage.

14.4 Position starter panel in place and through-fasten to the support steel with #14 through fastener(s) at each girt line. Position the #14 through fastener(s) close enough to the panel edge such that they are covered by the outside corner trim. Position the end or other starter panel in place and through-fasten to the support steel. Caulk and fasten the outside corner trim to the wall panels with color-matched screws or pop rivets at 12" o.c. (unless noted otherwise on the project shop drawings) to complete the corner installation.

**Note:** if installing the (optional) inside corner trim, fasten at 12" o.c. with #10 x 3/4" Pancake head fasteners between girts (unless noted otherwise on the project shop drawings).

## 15.0 WALL PANEL INSTALLATION

15.1 Place bottom end of panel on base and tilt to vertical position. Longer panels may require the use of a rope hoist or a panel lifting device such as a Wood's Powr-Grip.

15.2 Slide panel firmly into groove of the preceding panel using firm, gradual pressure to draw panels together. Do not pound into place. Do not use localized forces which may damage panels. To ensure a consistent joint modulation, spacers (5/32" max.) may be used at the exterior side as panel are being engaged (non-cold storage applications only). Plumb and square each panel before installing fasteners.

**Note:** Prior to installation, panels may need to be placed in a covered location to prevent excessive thermal bow which may hinder panel engagement.

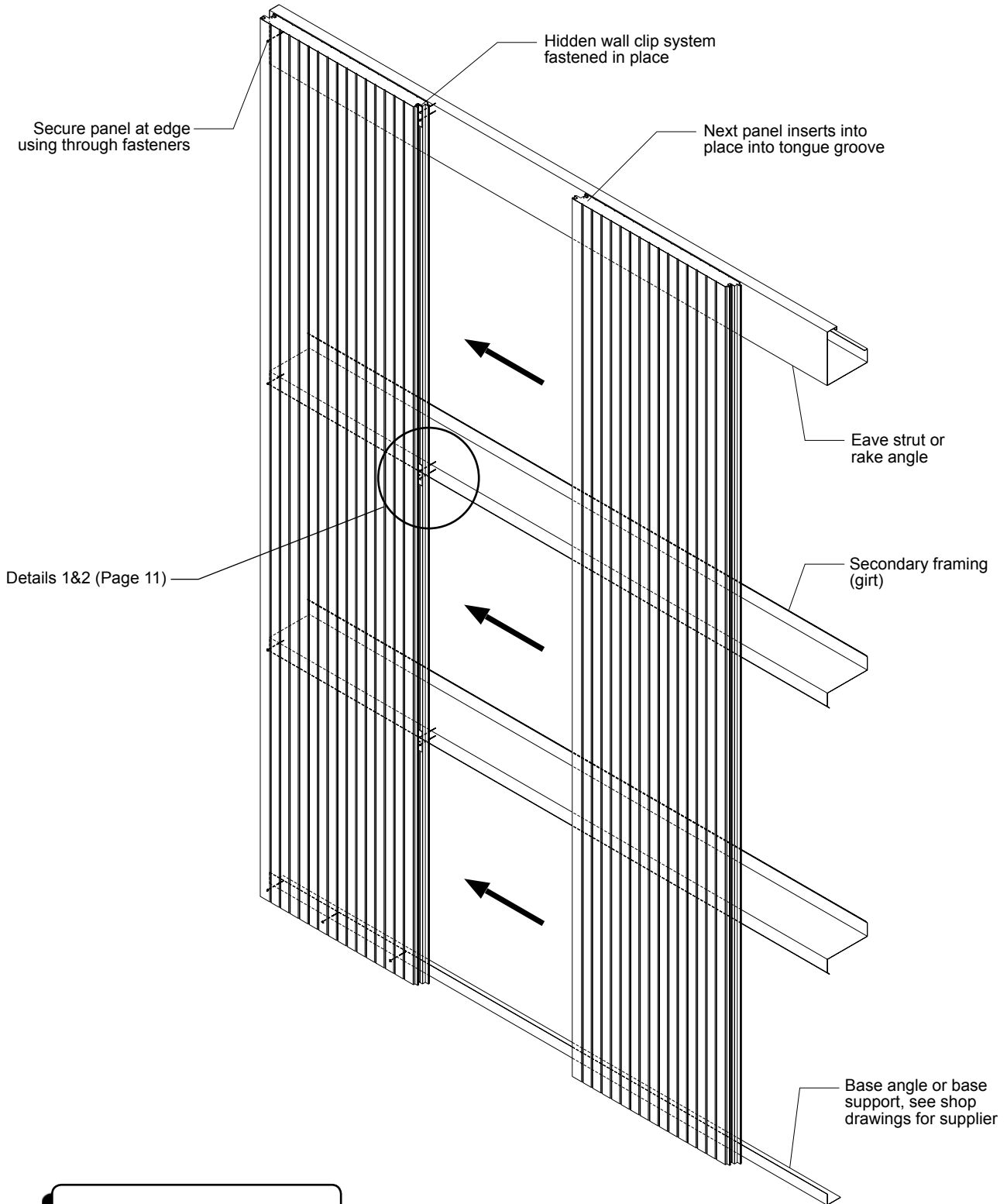
15.3 Hidden clip style wall panels are attached to support steel using WC-01 clip and fastener assemblies.

15.4 To install fastener, pre-drill (as required) using the appropriate drill size. Insert fastener through clip and tighten down until clip and fastener assembly are snug. Fastener requirements are based on given design loads. Panels are to be fastened per shop drawing details and calculated fastener schedule provided on shop drawing projects. Use a 600 rpm electric screw gun to drive fasteners. Do not use impact tools. Do not over-tighten.

15.5 Trim(s) shown in the shop drawings should be used where panels terminate such as head, sill, base, butt, etc. conditions. Cover exposed edges as soon as possible.

**Note:** Use suction lifters, as needed, to maximize safety and minimize undue manual handling.

PANEL INSTALLATION DETAIL

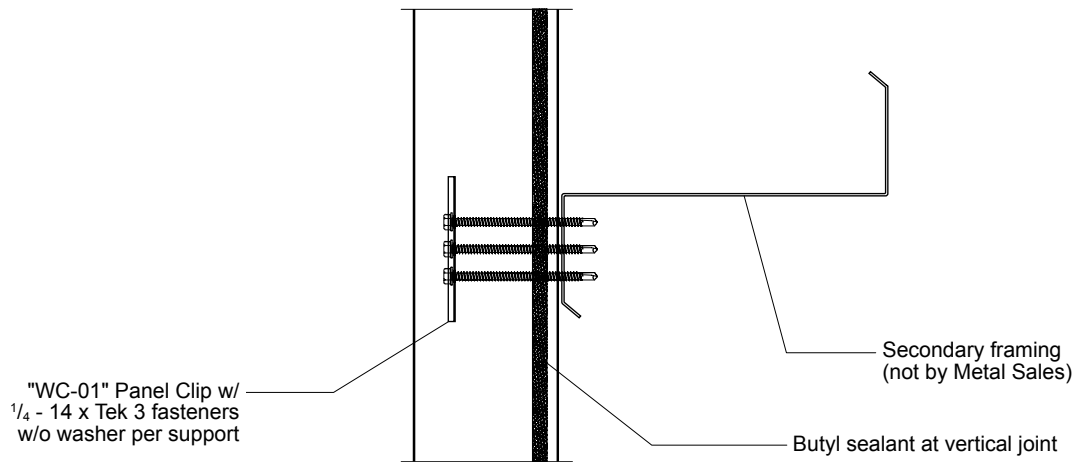


**NOTE:** Panel installation is from left to right

Figure 7

INTERMEDIATE SUPPORT

DETAIL 1

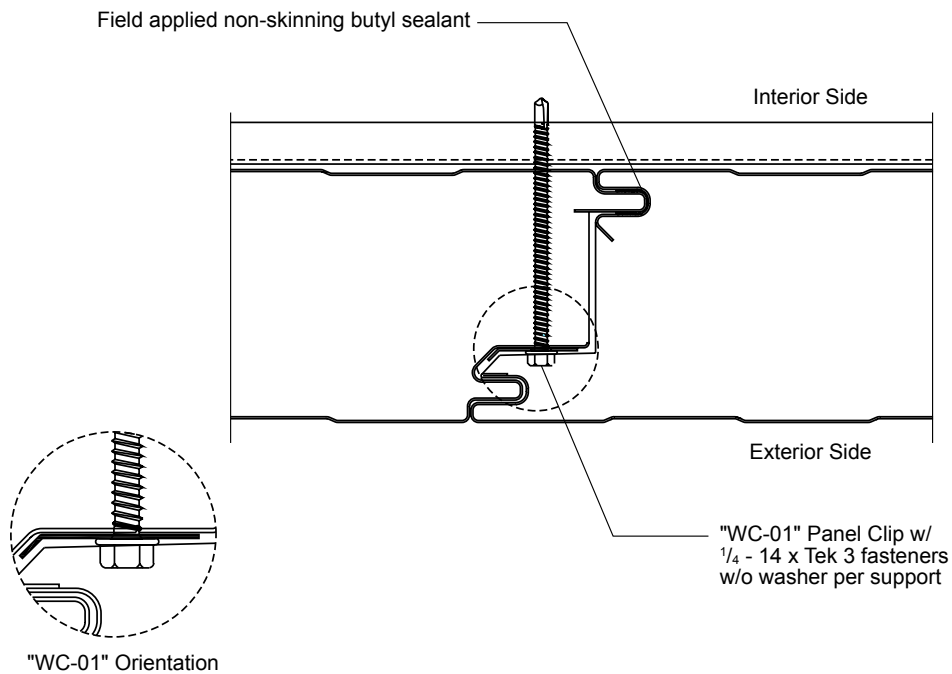


**NOTE:** General details shown. Refer to shop drawings for project-specific details.

**NOTE:** Fill panel exterior cavity with 1/2" diameter bead (approximate) of non-skinning butyl sealant (do not under fill).

PANEL JOINT

DETAIL 2

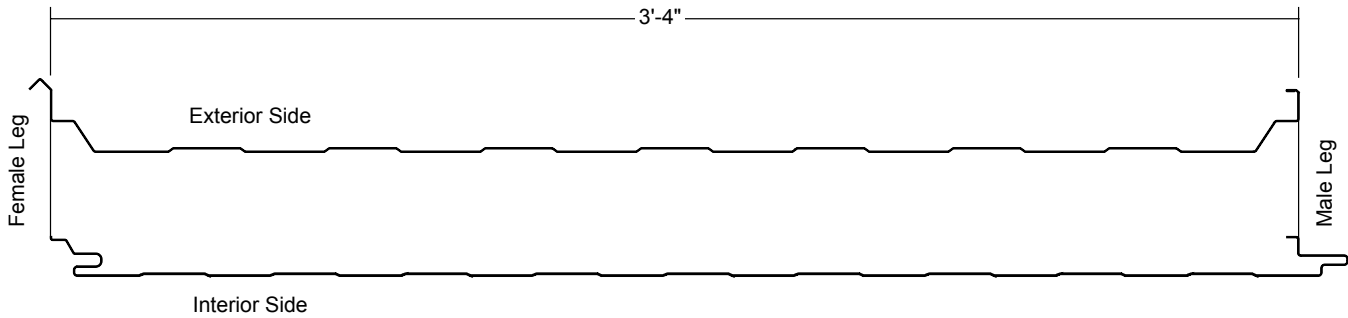


**NOTE:** Fastening schedule may vary depending on specific applications.

**NOTE:** General details shown. Refer to shop drawings for project-specific details.

**SR2 STANDING SEAM ROOF SYSTEM**

<b>Panel Thickness</b>	3.25"	4"	5"	6"
<b>Insulating R-Values</b>	26	32	41	49



**STRUCTURAL LOAD TABLE - THREE OR MORE SPANS**

PANEL THICKNESS	PANEL WEIGHT	DESIGN CRITERIA	SPAN (FT.)								
			2.5	3	3.5	4	4.5	5	5.5	6	7
3.25"	2.48	Panel/Deflection Limit	149	123	104	90	79	70	62	56	46
4"	2.65	Panel/Deflection Limit	185	153	130	112	98	87	78	71	59
5"	2.86	Panel/Deflection Limit	233	192	164	142	125	111	100	90	75
6"	3.12	Panel/Deflection Limit	262	233	198	172	151	135	121	110	92

FASTENING PATTERN	CONNECTION STRENGTH	SPAN (FT.)								
		2.5	3	3.5	4	4.5	5	5.5	6	7
(2) Fasteners per Clip	16 gauge purlins	70	59	50	44	39	35	32	29	25
	12 gauge purlins	149	124	106	93	83	75	68	62	53
	3/16" thick purlins	294	247	213	186	165	148	136	124	106
(3) Fasteners per Clip	16 gauge purlins	105	88	76	66	59	53	48	44	38
	12 gauge purlins	223	186	160	140	124	112	102	93	80

**NOTES:**

- Spans shown are based on transverse load testing per ASTM E 72 and strength of fastening patterns.
- Spans calculated with 26 gauge exterior and interior facings.
- The lowest allowable load between panel design and connection strength must be used to determine maximum span.
- Fastening calculated with 1/4-14 Tek 3 for 16 gauge and 12 gauge purlins. 1/4-20 Tek 5 for 3/16" thick purlins.
- Deflection limit: L/240
- Safety Factor = 2.5 for buckling, 3.0 for shear, 3.0 for fastening.
- Structural capacity of purlins have not been considered.
- Thermal effect due to temperature differentials have not been considered.

**16.0 ROOF PANEL INSTALLATION SEQUENCE**

16.1 SR2 roof panels must be installed in a specific sequence. This ensures the correct lapping of the side and end laps (see figure 8, below). The panel numbers correspond to the order of installation.

16.2 As each panel is installed, all main fastening and lap fastening should be carried out. This is especially important on SR2 roof panels and will ensure that unnecessary back trafficking over the roof is avoided (refer to section 17.8).

Note: Minimum Slope 1/2:12

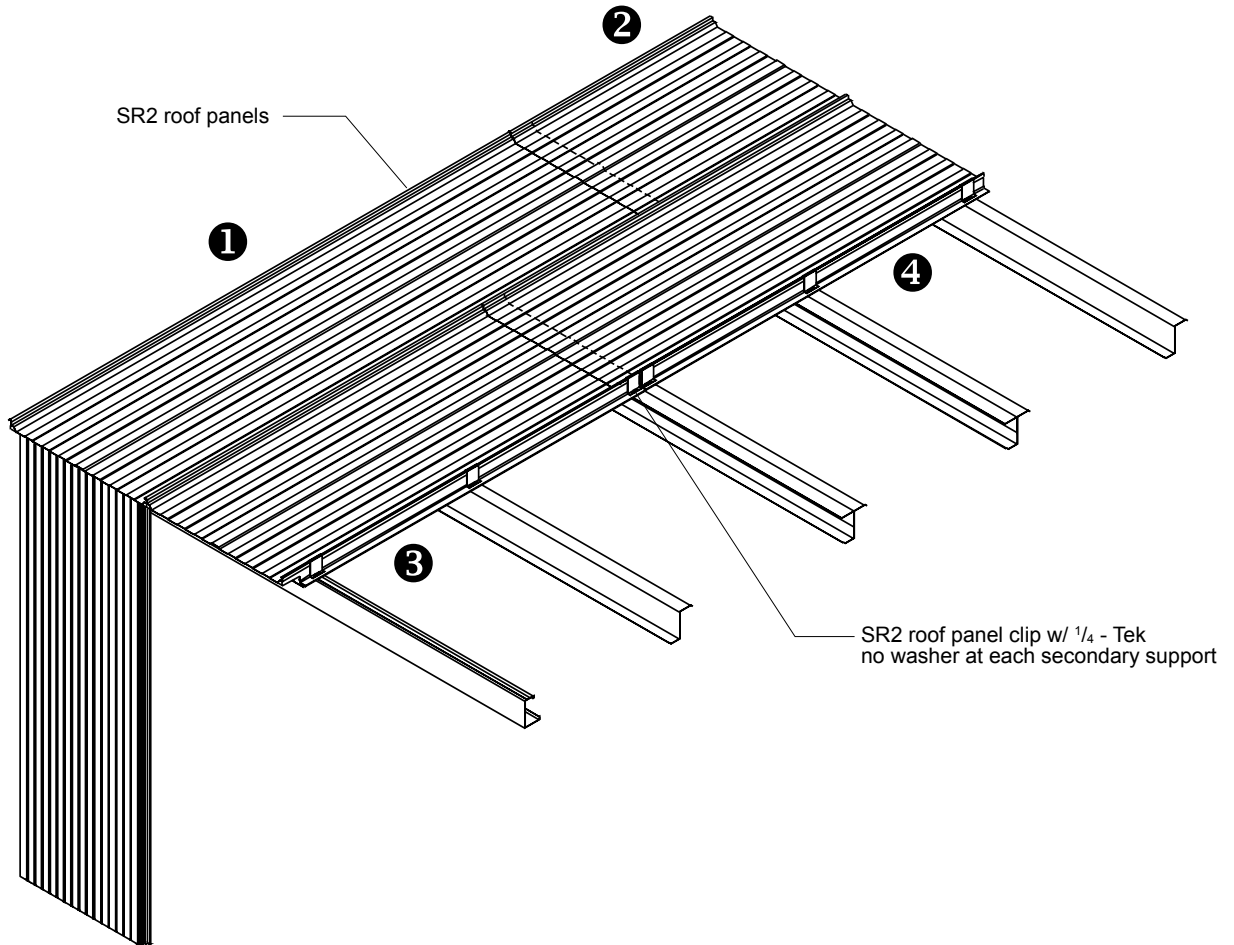


Figure 8

**17.0 INSTALLATION PROCEDURE**

17.1 As each individual panel is removed from the bundle, the male and female edges should be visually examined and any overspill of insulation should be carefully removed.

17.2 The first panel to be installed can have the overlapping hi rib edge cut back or not.

17.3 The roof panel should be laid flush with the face of the wall panel as shown on the shop drawings. It is important that the first tier of panels are laid true to line, properly lined with a string to ensure a true and neat run.

17.4 The starter panel should be fastened as shown on the shop drawings. The panel should be fastened at each purlin at the rake edge.

17.5 A 3/32" x 1/2" wide strip of butyl tape sealant should be placed on the hi rib starter panel to be overlapped.

Note: for extreme conditions, (optional) liner-side caulking should be considered in addition to tape sealant at overlaps.

17.6 Once the caulking has been placed, the overlapping panel should be placed as soon as possible.

17.7 Square each panel before installing fasteners. Prior to installing, panels may need to be placed in a shaded area to prevent excessive thermal bow which may hinder panel engagement.

17.8 If pre-drilling is required, use the drill bit sizes listed below.

Material	Fastener Type	Drill
18 GA. to 16 GA.	1/4 - 14 Hex Head Tek 3 Self-Drilling Fastener w/ Seal Washer	5/32" Pilot
14 GA.	1/4 - 14 Hex Head Tek 3 Self-Drilling Fastener w/ Seal Washer	3/32" Pilot
12 GA.	1/4 - 14 Hex Head Tek 3 Self-Drilling Fastener w/ Seal Washer	#3 Drill
11 GA.	1/4 - 20 Hex Head Tek 3 Self-Drilling Fastener w/ Seal Washer	#3 Drill
3/16" to 3/8"	1/4 - 20 Hex Head Tek 3 Self-Drilling Fastener w/ Seal Washer	#1 Drill
3/8" & Heavier	1/4 - 20 Hex Head Tek 3 Self-Drilling Fastener w/ Seal Washer	0.231" Pilot

17.9 Panels are to be fastened per the roof panel fastening schedule and calculations noted on the shop drawings. To install fastener, pre-drill using the correct drill size (see 17.8, above). Prior to placing saddle washer, a bead of butyl caulk should be placed into the pilot hole. Set the "SW-01" saddle washer in place and insert the fastener through the clip. Apply pressure to connection point by standing directly on the overlapping hi rib panel to ensure that the joinery is fully nested and tighten down until assembly is snug. Use a 600 rpm electric screw gun to drive fasteners. Do not use impact tools as these devices will over-tighten and cause damage.

17.10 The fastening pattern will depend on the panel thickness, span, substrate, and design loads. Consult your all weather insulated panels representative or the factory for allowable panel and fastener design loads. If (2) saddle washer assemblies are required, always put the second saddle washer assembly next to the overlapping hi rib (see figure 9, below).

17.11 Follow SR2 series standing seam electric seamer manual to seam joints to a 90° bend. To prevent the possibility of panels being blown off the building or wind-damaged, it is highly recommended that seaming be completed as soon as possible. This will ensure that the roof assembly is adequately secured during installation.

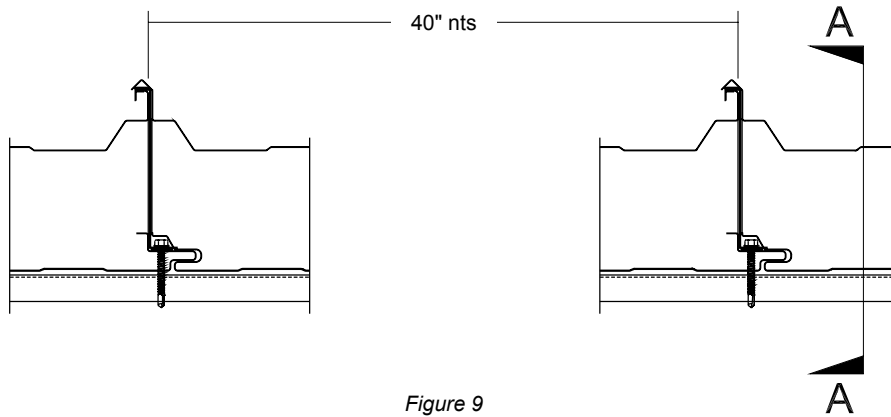
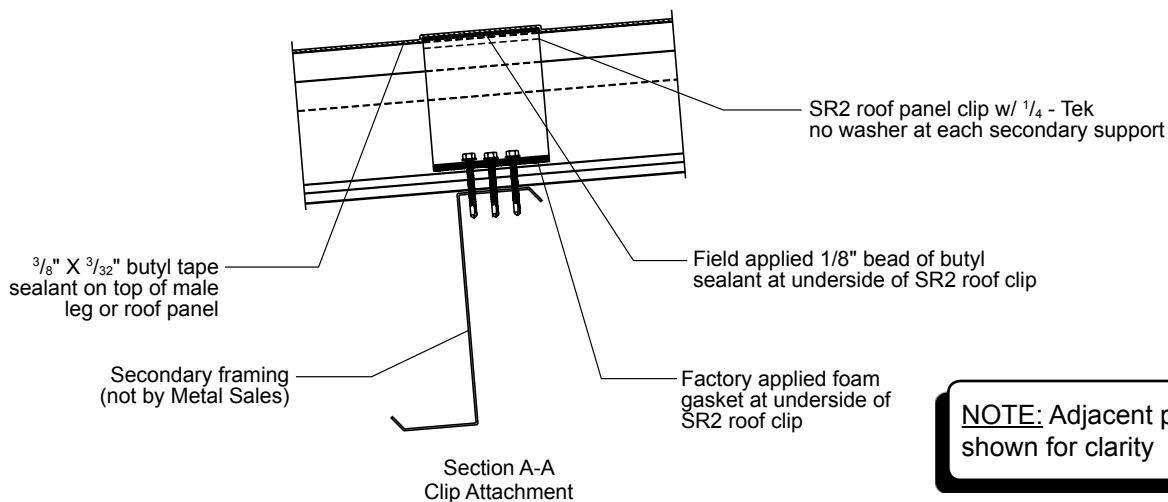


Figure 9

**NOTE:** Do not over-drive fasteners. If the metal at the edge of the panel is deformed out of plane, the adjacent panel will be difficult to engage and will not seam. After SR2 Roof Clip has been installed over male leg of standing seam panel, pre-crimp, using 1/2" hand crimping tool.



**NOTE:** Adjacent panel not shown for clarity

**18.0 ROOF PANEL END-LAP FASTENING**

- 18.1 When the roof system contains more than one course / row of panels the following steps should be observed for the fastening of the panel end-lap.
- 18.2 Stagger the panels per the panel installation sequence outlined in section 16.9. Install the panel fasteners per section 17.0 (except for fasteners at the end lap support).
- 18.3 Use metal snips to cut off the exposed metal edge at the side joint face (6") at each side of roof panel for proper nesting of upper course of overlapping SR2 roof panel.
- 18.4 Prior to placing the upper course / row of panels, the end-laps of the lower course panels must be caulked. The caulking on the end-lap should be married to the caulking in the panel side overlap. Apply caulking immediately prior to upper course panel installation.

**Notes:**

- 1. All surfaces to be caulked must be clean and dry.
- 2. Apply end-lap seal to panel surface to be lapped.
- 3. Sealant strips should overlap one another side by side (minimum 1").

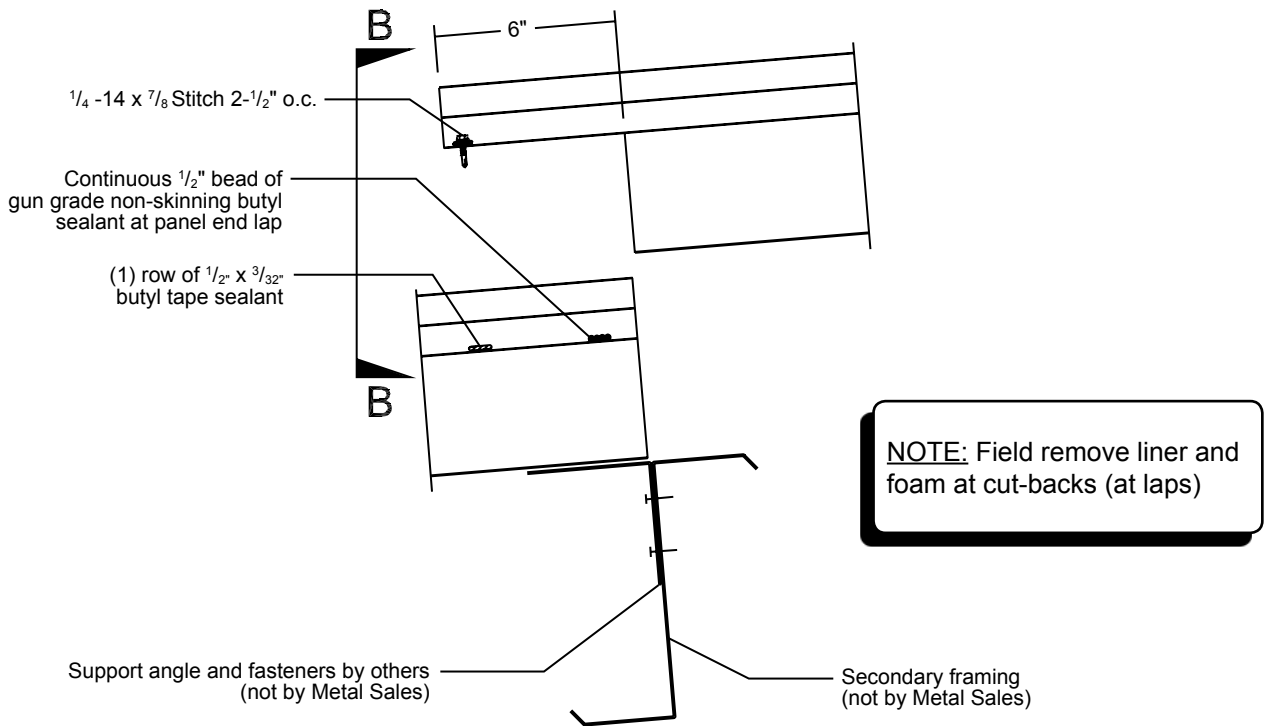
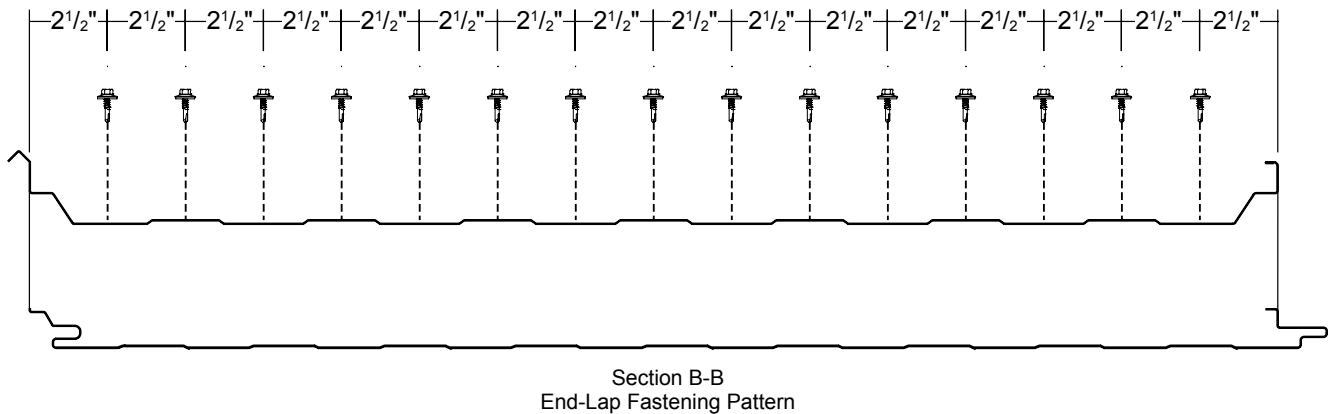


Figure 10





18.5 If the ridge cap detail is to be used, place the inside ridge cap and caulking bead as shown on the shop drawings. The caulking bead should be married to the bead in the overlapping rib as the panels are set in place.

18.6 All Weather Insulated Panels that incorporate end laps will arrive at the job site with the foam and liner face in place. The liner face of the upper course panel will have a factory saw cut 3" to 6" from the end of the panel (see figure 11, below). Remove the metal and foam at the end of the panel. Carefully remove any foam that remains on the metal skin to ensure a positive air and water infiltration seal.

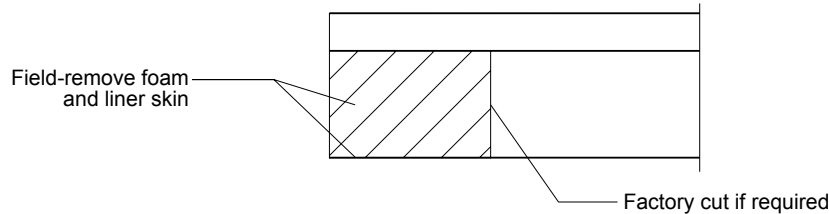


Figure 11

18.7 After preparing the upper course panel, placing the caulk, and clipping edges, set the upper course panel in place. Install SR clip assemblies on all supports.

18.8 Once the upper panel is in place and fastened, fasten down the end-lap using the 1/4 - 14 x 7/8" stitch fastener. The fasteners should be placed in the locations shown on the shop drawings. The fastener should be placed approximately 1" from the end of the upper course panel exterior facing so that it penetrates the caulking and achieves full compression of the facings at the last row of caulking.

18.9 Remove all metal chips and filings from the drilling of pilot holes and fastening of the panels immediately after installation. These filings will rust and corrode the panel surface.

18.10 Proceed to the next panel and repeat steps 18.2 through 18.9.

18.11 After all panels are installed, fasten the eave, rake, and peak trims, respectively. The trim should be fastened as shown on the shop drawings.

**19.0 PEAK TRIM INSTALLATION PROCEDURE**

19.1 Fasten the roof panels at the ridge as shown on the shop drawings.

19.2 Temporarily set the Peak trim in place to determine the location of the caulking and closure strips. Run a line or snap a chalk line along the length of the Peak trim for proper placement of the caulking and closure strips.

19.3 Apply butyl tape onto the panel as shown on shop drawings in preparation for the closure strip. All surfaces to receive caulk and closure strips.

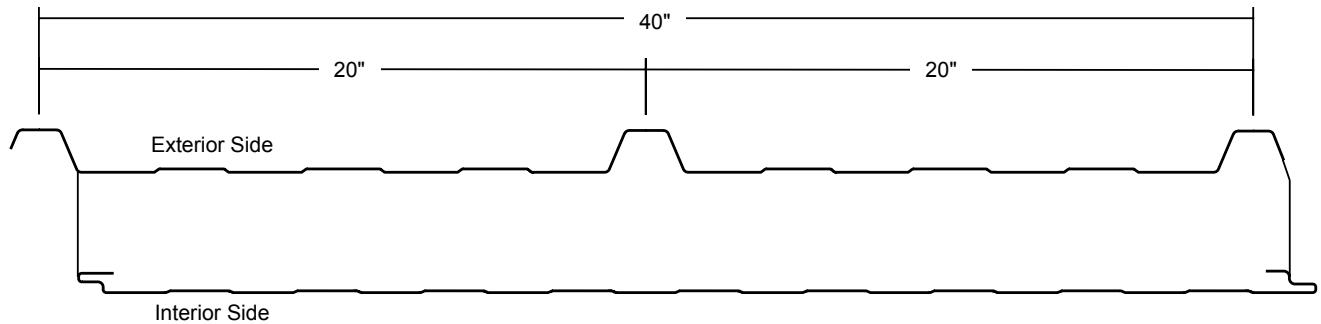
19.4 Seat the closure strip firmly onto the butyl tape to ensure a continuous seal. If voids exist, add additional butyl sealant and reseal the closure correctly.

19.5 Place butyl tape onto the closure strip and place the Peak trim as shown on shop drawings. Fasten the apex trim at each hi rib with a 1/4-14 x 7/8" stitch fastener. At the end of the Peak trim, place two beads of the caulk or tape sealant 2" from the end and overlap the next Peak trim approximately 4". Fasten the overlaps down with 1/4 - 14 x 7/8" stitch fasteners as required.

19.6 Immediately remove any metal chips or filings from the screws or sheet metal fabrication as they will rust and corrode the panel surface.

**HR3 High Rib Roof System**

<b>Panel Thickness</b>	2.5"	4"	5"	6"
<b>Insulating R-Values</b>	26	32	41	49



**STRUCTURAL LOAD TABLE - THREE OR MORE SPANS**

PANEL THICKNESS	PANEL WEIGHT	DESIGN CRITERIA	SPAN (FT.)								
			2.5	3	3.5	4	4.5	5	5.5	6	7
2.5"	2.33	Panel/Deflection Limit	139	114	96	83	73	65	59	54	45
4"	2.65	Panel/Deflection Limit	191	158	134	116	102	90	81	73	61
5"	2.86	Panel/Deflection Limit	239	198	168	146	128	114	102	93	77
6"	3.12	Panel/Deflection Limit	286	238	202	175	155	138	124	112	94

FASTENING PATTERN	CONNECTION STRENGTH	SPAN (FT.)								
		2.5	3	3.5	4	4.5	5	5.5	6	7
1 Fastener 20" on center	16 gauge purlins	71	59	50	44	39	35	32	29	25
	12 gauge purlins	149	124	106	93	83	75	68	62	53
	3/16" thick purlins	294	247	213	186	165	148	136	124	106
1 Fastener 10" on center	16 gauge purlins	105	88	76	66	59	53	48	44	38
	12 gauge purlins	223	186	160	140	124	112	102	93	80

**NOTES:**

- Spans shown are based on transverse load testing per ASTM E 72 and strength of fastening patterns.
- Spans calculated with 26 gauge exterior and interior facings.
- The lowest allowable load between panel design and connection strength must be used to determine maximum span.
- Fastening calculated with 1/4-14 Tek 3 for 16 gauge and 12 gauge purlins. 1/4-20 Tek 5 for 3/16" thick purlins.
- Deflection limit: L/240
- Safety Factor = 2.5 for buckling, 3.0 for shear, 3.0 for fastening.
- Structural capacity of purlins have not been considered.
- Thermal effect due to temperature differentials have not been considered.
- Consult your Metal Sales representative for project specific requirements.
- Consult your Metal Sales representative for FM Global Loss Prevention Data Sheet 1-28 requirements.

**19.0 ROOF PANEL INSTALLATION SEQUENCE**

- 19.1 HR3 roof panels must be installed in a specific sequence. This ensures the correct lapping of the side and end laps (see figure 12, below). The panel numbers correspond with the order of installation.
- 19.2 As each panel is installed, all main fastening and lap fastening should be carried out. This is especially important on HR3 roof panels and will ensure that unnecessary back trafficking over the roof is avoided (refer to section 17.9).

**20.0 INSTALLATION PROCEDURE**

- 20.1 As each individual panel is removed from the bundle, the male and female edges should be visually examined and any over-spill of insulation should be carefully removed.
- 20.2 The first HR3 panel to be installed can have the overlapping hi rib edge cut back or not.
- 20.3 The roof panel should be laid flush with the face of the wall panel as shown on the shop drawings. It is important that the first tier of panels are laid true to line, properly lined with a string to ensure a true and neat run.

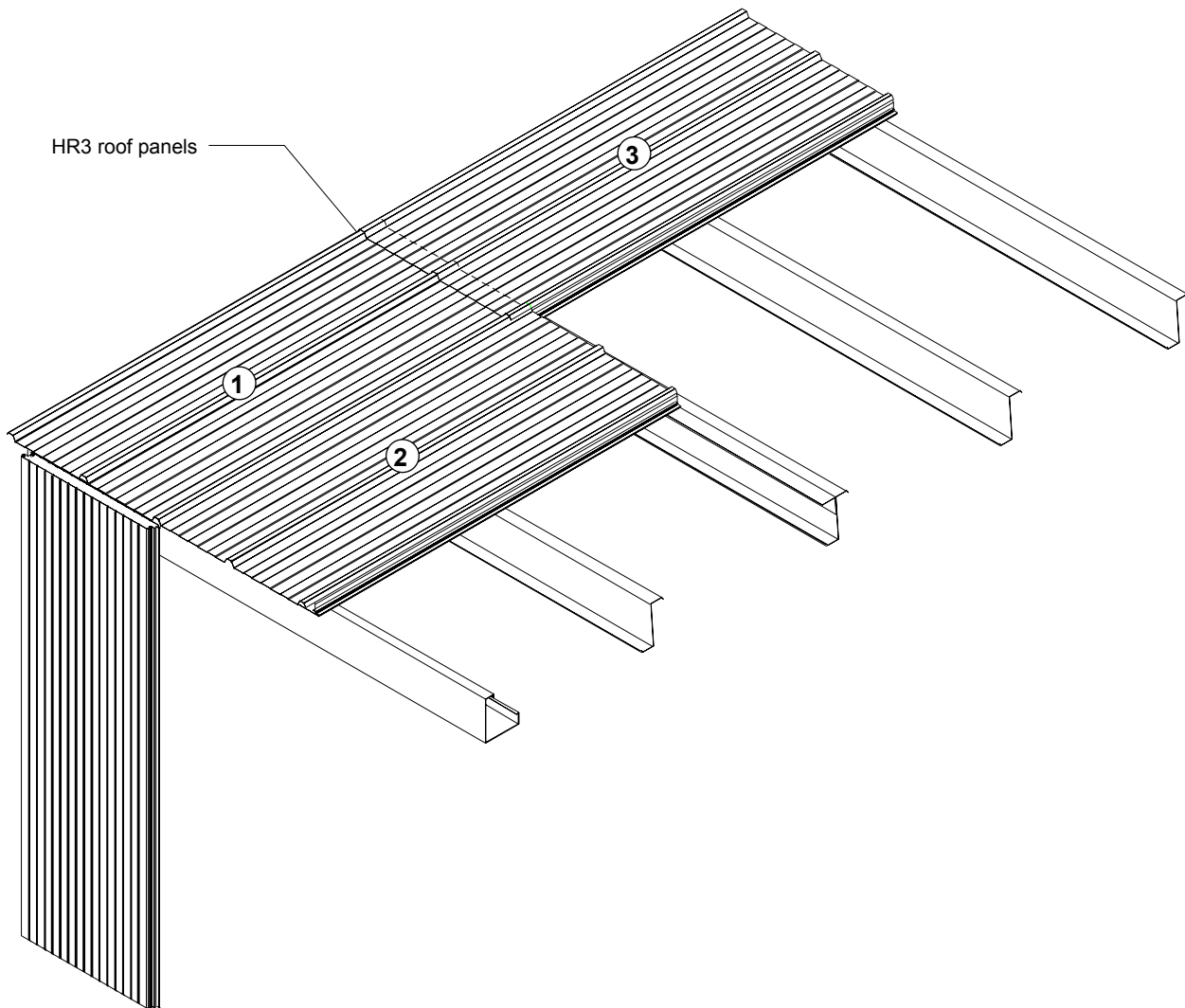


Figure 12

20.4 The starter panel should be fastened as shown on the shop drawings. The panel should be fastened at each purlin at the rake edge.

20.5 A  $\frac{3}{32}$ " x  $\frac{1}{2}$ " wide strip of butyl tape sealant should be placed on the hi rib starter panel to be overlapped.

Note: for extreme conditions, (optional) liner-side caulking should be considered in addition to tape sealant at overlaps.

20.6 Once the caulking has been placed, the overlapping panel should be placed as soon as possible.

20.7 Square each panel before installing fasteners. Prior to installing, panels may need to be placed in a shaded area to prevent excessive thermal bow which may hinder panel engagement.

20.8 If pre-drilling is required, use the drill bit sizes listed below.

Material	Fastener Type	Drill
18 GA. to 16 GA.	$\frac{1}{4}$ " - 14 Hex Head 3 Self-Drilling Fastener w/ Seal Washer	$\frac{5}{32}$ " Pilot
14 GA.	$\frac{1}{4}$ " - 14 Hex Head 3 Self-Drilling Fastener w/ Seal Washer	$\frac{3}{32}$ " Pilot
12 GA.	$\frac{1}{4}$ " - 14 Hex Head 3 Self-Drilling Fastener w/ Seal Washer	#3 Drill
11 GA.	$\frac{1}{4}$ " - 20 Hex Head 3 Self-Drilling Fastener w/ Seal Washer	#3 Drill
$\frac{3}{16}$ " to $\frac{3}{8}$ "	$\frac{1}{4}$ " - 20 Hex Head 3 Self-Drilling Fastener w/ Seal Washer	#1 Drill
$\frac{3}{8}$ " & Heavier	$\frac{1}{4}$ " - 20 Hex Head 3 Self-Drilling Fastener w/ Seal Washer	0.231" Pilot

20.9 Panels are to be fastened per the roof panel fastening schedule and calculations noted on the shop drawings. To install fastener, pre-drill using the correct drill size (see 20.8, above). Prior to placing saddle washer, a bead of butyl caulk should be placed into the pilot hole. Set the "SW-01" saddle washer in place and insert the fastener through the clip. Apply pressure to connection point by standing directly on the overlapping hi rib panel to ensure that the joinery is fully nested and tighten down until assembly is snug. Use a 600 rpm electric screw gun to drive fasteners. Do not use impact tools as these devices will over-tighten and cause damage.

20.10 The fastening pattern will depend on the panel thickness, span, substrate, and design loads. Consult your all weather insulated panels representative or the factory for allowable panel and fastener design loads. If (2) saddle washer assemblies are required, always put the second saddle washer assembly next to the overlapping hi rib (see figure 13, below).

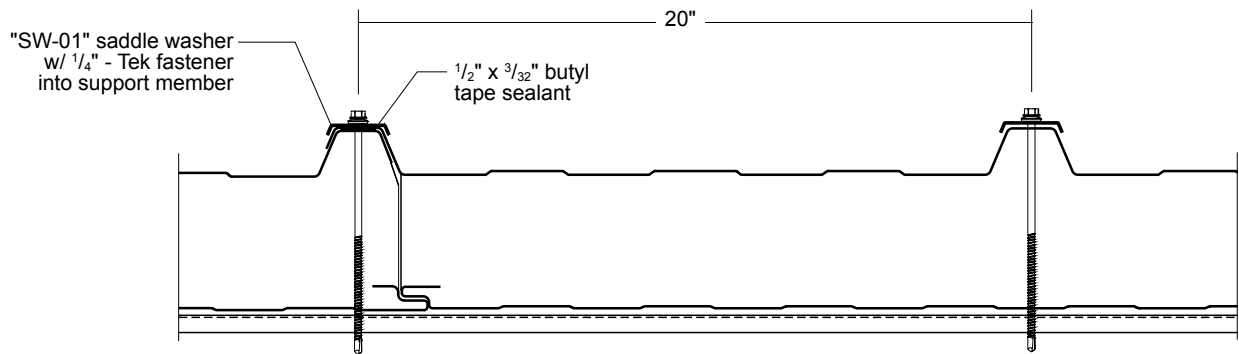


Figure 13

20.11 After the main fasteners are in place the overlapping rib should be fastened down with #14 x  $\frac{7}{8}$ " self-drilling stitch lap screws, finished to match panel (see figure 14, below).

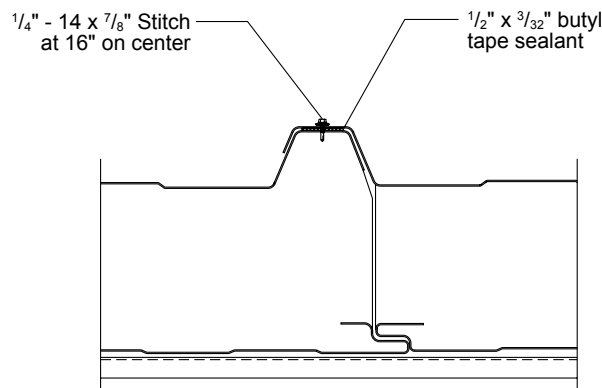


Figure 14

- 20.12 After drilling or cutting panels, always remove metal chips and foam dust that has fallen on panels or trims.
- 20.13 If the roof system consists of one course / row of panels, then proceed to the next panel and repeat steps 17.7 through 17.12 until the roof is complete. If the system consists of more than one course / row of panels, do not fasten the panels to the steel supports at the end lap and refer to section 13.0 for HR3 roof panel end lap support.
- 20.14 After all panels are installed, fasten the eave, rake, and peak trims, respectively. The trim should be fastened as shown on the shop drawings.

**21.0 ROOF PANEL END-LAP FASTENING**

- 21.1 When the roof system contains more than one course / row of panels the following steps should be observed for the fastening of the panel end-lap.
- 21.2 Following the panel installation sequence as outlined in section 16.0, the lower course panels should be installed first. Install the panel fasteners as described in section 17.0 (except for the fasteners at the end lap support).
- 21.3 Prior to placing the upper course / row of panels, the end-laps of the lower course panels must be caulked. The caulking on the end-lap should be married to the caulking in the panel side overlap. Apply caulking immediately prior to upper course panel installation.

**Notes:**

1. All surfaces to be caulked must be clean and dry.
2. Apply end-lap seal to panel surface to be lapped.
3. Sealant strips should overlap one another side by side (minimum 1").

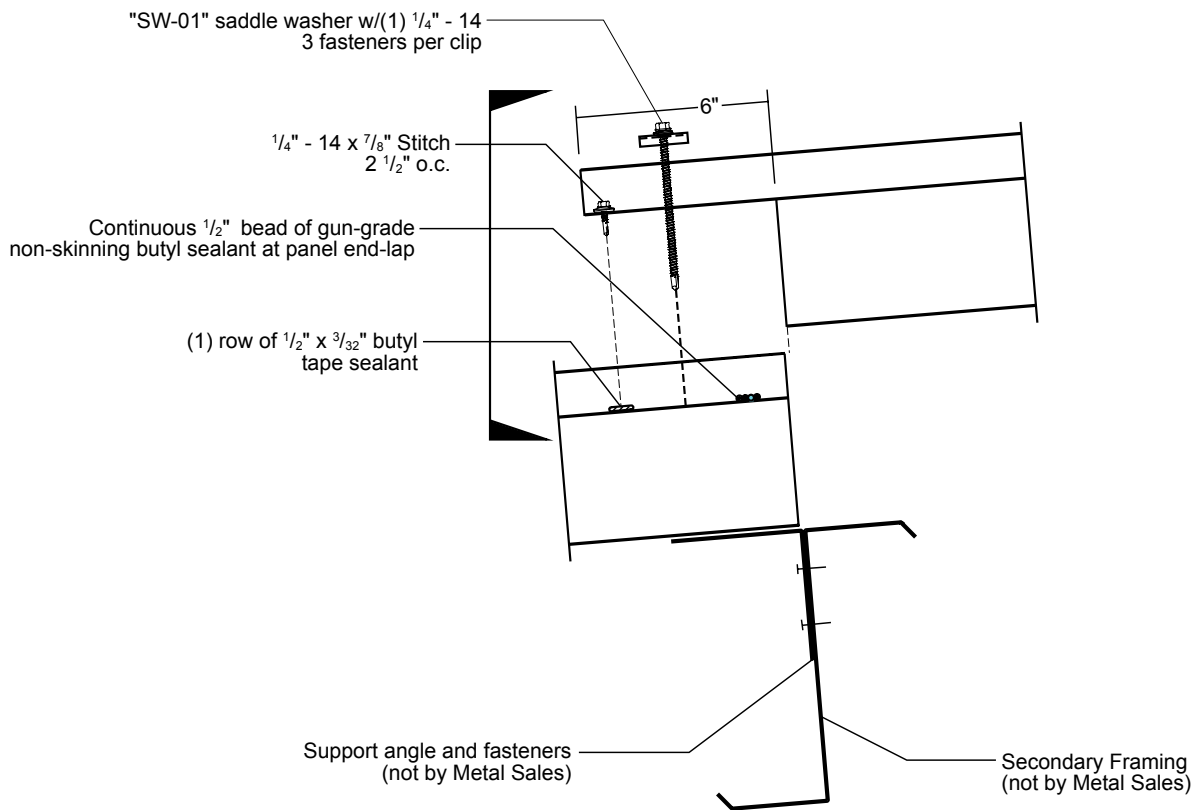


Figure 15

**NOTE:** Field remove liner and foam at cut-backs (at laps)

- 21.5 If the ridge cap detail is to be used, place the inside ridge cap and caulking bead as shown on the shop drawings. The caulking bead should be married to the bead in the overlapping ribs as the panels are set in place.
- 21.6 Roof panels that incorporate the laps will arrive at the jobsite with the foam and liner face in place. The liner face of the upper course panel will have a factory saw cut 3" to 6" from the end of the panel (see figure 16, below). Remove the metal and foam at the end of the panel. Carefully remove any foam that remain on the metal skin to ensure a positive air and water infiltration seal.

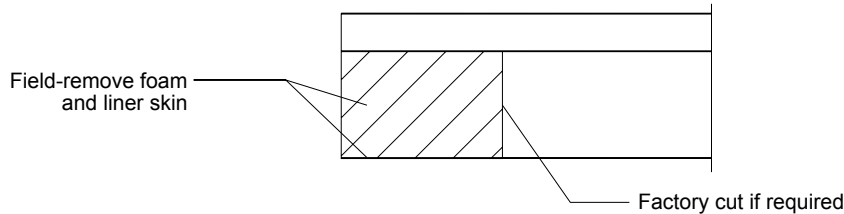


Figure 16

- 21.7 After preparing the upper course panel, placing the caulk, set the upper course panel in place. Install saddle washer assemblies on all supports.
- 21.8 Once the upper panel is in place and fastened, fasten down the end-lap using the 1/4 - 14 x 7/8" stitch fasteners. The fasteners should be placed in the locations shown on the all weather insulated panels shop drawings. The fastener should be placed approximately 1" from the end of the upper course panel exterior facing so that it penetrates the caulking and achieves full compression of the facings at the last row of caulking.
- 21.9 Remove all metal chips and filings from the drilling of pilot holes and fastening of the panels immediately after installation. These filings will rust and corrode the panel surface.
- 21.10 Proceed to the next panel and repeat steps 13.2 through 13.9.
- 21.11 After all panels are installed fasten the eave, rake, and peak trims, respectively. The trim should be fastened as shown on the shop drawings.

**22.0 PEAK TRIM INSTALLATION PROCEDURE**

- 22.1 Fasten the roof panels at the ridge as shown on the shop drawings.
- 22.2 Temporarily set the Peak trim in place to determine the location of the caulking and closure strips. Run a line or snap a chalk line along the length of the Peak trim for proper placement of the caulking and closure strips.
- 22.3 Apply butyl tape onto the panel as shown on shop drawings in preparation for the closure strip. All surfaces to receive caulk and closure strips.
- 22.4 Seat the closure strip firmly onto the butyl tape to ensure a continuous seal. If voids exist, add additional butyl sealant and reseal the closure correctly.
- 22.5 Place butyl tape onto the closure strip and place the Peak trim as shown on all weather insulated panels shop drawings. Fasten the Peak trim at each hi rib with a 1/4- 14 x 7/8" stitch fastener. At the end of the apex trim, place two beads of the caulk or tape sealant 2" from the end and overlap the next Peak trim approximately 4". Fasten the overlaps down with 1/4 - 14 x 7/8" stitch fasteners as required.
- 22.6 Immediately remove any metal chips or filings from the screws or sheet metal fabrication as they will rust and corrode the panel surface.

**NOTE:** Remove any metal chips or filings from the screws or sheet metal fabrication as they will rust and corrode the panel surface

**MISCELLANEOUS INFORMATION**

1. To prevent galvanic action, isolate any aluminum trim surface(s) from surface of panel support steel using one of the following methods:
  - a) An approved sealant or sealant tape.
  - b) A non-absorbent gasket.
  - c) Duct tape or equivalent type tape.
  - d) Paint the incompatible metal with a coating of heavy bodied bituminous paint.
2. Gas bubbles on foam panels are an industry-wide, sporadic problem. If they occur on this project, they can easily be repaired by drilling a 1/16" diameter by 1 3/4" deep hole near the bottom of the gas bubble in the exterior metal facing to allow the trapped gas to be released. The repair is completed by applying a small amount of clear acrylic touch-up paint to the raw edge of the drill hole. Gas bubbles should be repaired as soon as possible as they will continue to grow until corrected. Gas bubbles are not a cause for rejection of the panel(s).

**EXPOSURE TO HEAT OR FLAME**

1. Although the urethane core panels are acceptable for use in non-combustible building assemblies in accordance with the International Building Code (IBC) and have been exhaustively tested for fire resistivity based on their end use, they are not non-combustible in and of themselves. They are not "fire rated" per ASTM E 119. Therefore, they shall not be exposed to extremely high temperatures or direct flame at any time. Simply stated, do not use a welding torch on or near insulated panels any more than you would on a wooden building assembly. Refer to panel test data information under "fire" for detailed information on ignition, heat of combustion, and surface burning.

**CLEANING PANELS**

1. After installation, surfaces must be cleaned to remove any metal chips to prevent any possible oxidation. A wet, soft cloth is recommended.

**MAINTENANCE**

1. Proper installation and maintenance are extremely important to obtain the best performance and appearance from the insulated panels.
2. Dirt, oil, grease, fingerprints or any other kind of contaminant must be completely removed when the installation is finished to maximize coating(s) performance.
3. The building will require periodic maintenance according to site conditions (U.V. exposure, dirt, smoke, corrosive atmosphere, etc). If further assistance is required, please consult Metal Sales Technical Services department.
4. To remove superficial oxidation and tough stains, it is recommended to use a regular household cleaner followed by a thorough rinsing. Wire brushes and/or abrasive material will damage the painted coating and should never be used.
5. If "touch-up" paint is required, contact Metal Sales to obtain a paint chip for color-matching.
6. Since metal-faced insulated panels are a modular system, they require joint and intersecting caulking to minimize potential leaks in the building envelope. The flexible sealant materials typically used are gun-grade or ribbon-type and either butyl, silicone, or urethane-based, depending on the specific application. It is essential to inspect critical areas such as roof endlaps, ridges, or any trim used to complete the building envelope every 24 months after the first 60 months in-place. Over time, sealants will shrink, crack, and lose adhesion when subjected to heat and cold, freeze / thaw, expanding / contracting metal, moisture, and chemical contaminants. Sealants can be removed and replaced where practical or areas can be face-sealed from the interior. For specific recommendations of sealant type(s) and / or application(s), contact your Metal Sales representative.