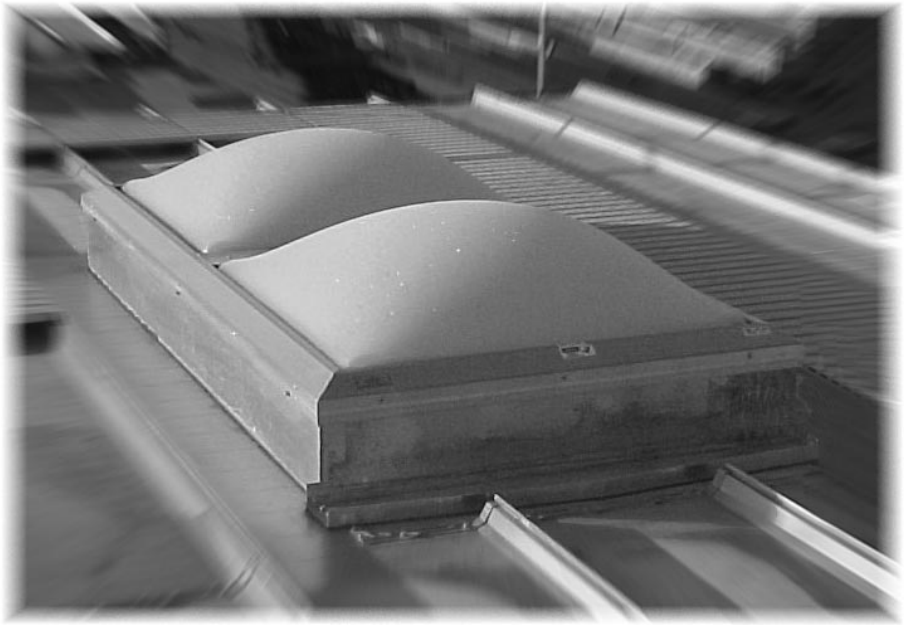
BUTLER® Manufacturing Company

IFCurb
Installation Manual

For MR-24®, CMR-24® and VSR™ Roof Systems



May 2000

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ROOFING WORK SAFETY INSTRUCTIONS

Working off the ground even a few feet can be extremely dangerous. Falls from a height of six feet or less can be fatal. You should be aware of the following hazards while installing roof panels:

I. PANELS CAN COLLAPSE

Roof panels can be a safe walking surface (except for slipperiness) **ONLY** when they are **completely** seamed or fastened as applicable. Panels not completely seamed or fastened **are not safe** and can collapse suddenly and without warning.

When installing roof panels, **always** use fall protection.

Follow these additional safety precautions:

1. Never step, kneel or place weight on an edge or edge corrugations of any panel.
2. Use extra care when installing panels with creased or kinked corrugation or edges. Placing weight on **any** portion of such a panel before it is completely installed may cause the panel to collapse.
3. Never stand or work within five (5) feet from the end of a panel that is not completely seamed or fastened.
4. Before a panel is completely installed, always stand, kneel or work directly over the roof structural.
5. Never allow more than one worker to stand, kneel or work on the same panel between two roof structurals before the panel is completely installed.
6. When walking on CMR-24 liner panel that has been completely fastened to the roof structural, do not step on the sidelap. Step only on the liner panel area that is directly over the roof structural. Observe inspection slots to verify underlying panel has been attached to structural.

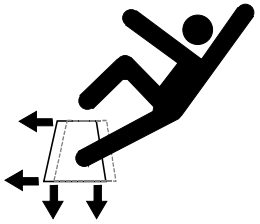
Never use unattached roof panels as a work platform for any purpose. This is an **extremely** hazardous practice and should **never** be done.

II. PANELS ARE SLIPPERY

All roof panels, whether painted or unpainted, are slippery to walk on. Dew, frost, or any other moisture on roof panels greatly increases the slipperiness of the panels and extra care should be taken. The pitch of the roof (its slope) can also increase the hazard.

Because of these hazardous conditions, it is **essential** that fall protection be used at all times.

III. LOOSE PANELS MAY SLIDE OUT FROM UNDER YOU



Never step on a single roof panel or a stack of several roof panels lying unattached on the roof structurals. If you step onto a single panel on the roof structurals, it may slip causing you to lose your balance and fall. Even a stack of several panels on the roof structurals may slip if you step on it.

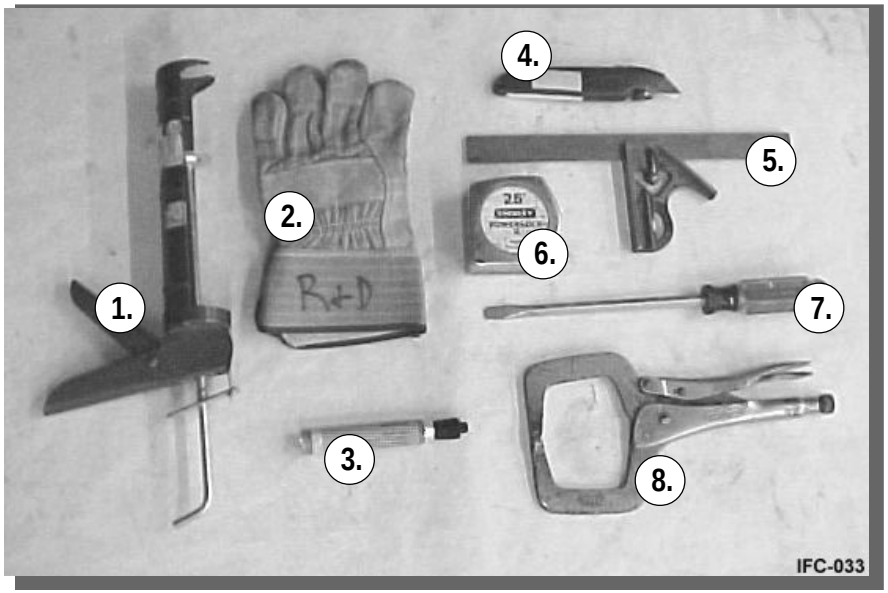
WHAT TO DO TO PREVENT ROOF FALLS

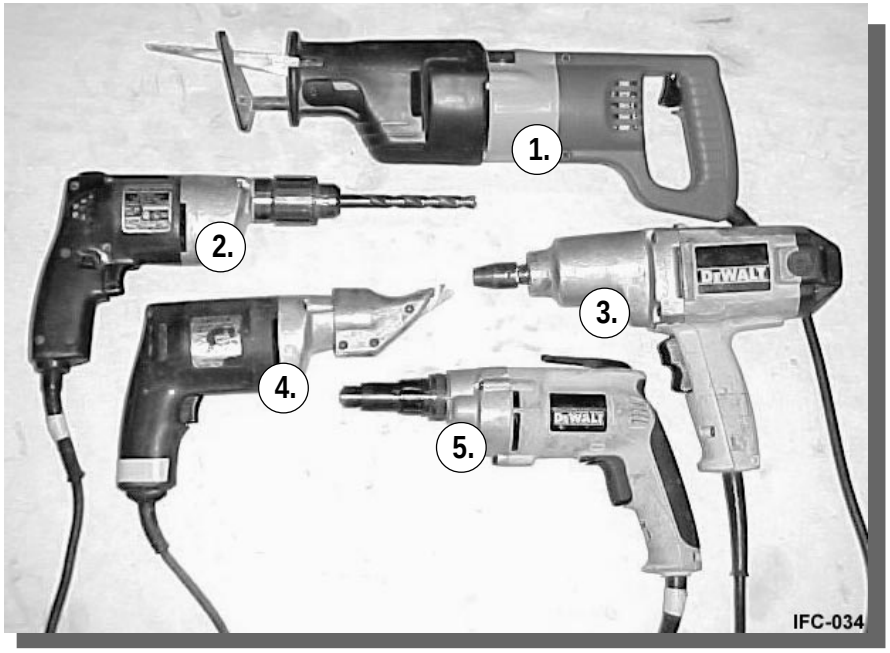
1. **Always Use Fall Protection -** including but not limited to, lifelines, safety harnesses, lanyards, safety nets, scaffolding, man-lifts, catch platforms, and the Sky-Web® systems.
2. **If You Need a Work Platform -** for laying insulation or any other purpose, use only platforms constructed in accordance with OSHA regulations. Never use unattached or partially attached panels as a work platform.
3. **To Avoid Slipping -** wear good work boots while on the roof. The danger from a slip is greatest while installing roof panels or insulation at the edge of the roof. Use walkboards in the flat of panels when installing panels. When working near the edge of the roof, always use fall protection.
4. **To Prevent Panels from Slipping -** Do not step on loose roof panels or even a stack of several roof panels.
5. **Walkboards -** One method to add stability to panels during erection is to place walkboards in the flat of panels. (Use 2x12 lumber for CMR-24 liner panels. For all other panels, use “2x” lumber sized to fit in the flat.) The boards should run the full length of the roof slope and should be fastened together by drilling a hole near the ends of each board and tying it to the next board with rope. Cut a groove in the bottom of each board so that the board will lie flat and not tip back and forth because of the rope. This will prevent the boards from slipping out from under you when you step on them. Adequately secure walkboards to the building. Walkboards are not a substitute for appropriate fall protection.

Recommended Tools List

(Tools Not Provided by Butler)

1. **Caulk Gun**
2. **Gloves**
3. **Felt Marker**
   (Do Not Use Lead Pencils)
4. **Utility Knife**
5. **Carpenter Square**
6. **Tape Measure**
7. **Screwdriver**
8. **Locking C-Clamp Pliers**
   (Minimum Quantity - 4)





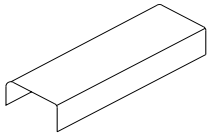
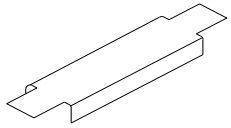
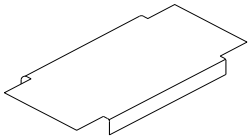
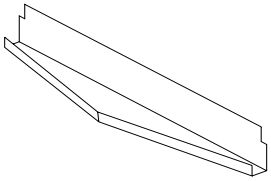
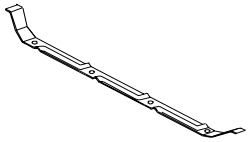
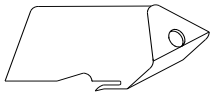
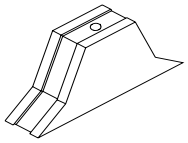
1. **Reciprocating Saw**
2. **Drill with a 3/8” to 1/2” Bit**
3. **1/2” Impact Wrench with Extension and 3/8” Socket**
   (Extension Not Shown)
4. **Double-Cut Shear**
5. **Screwgun with 3/8” Socket** (2500 rpm maximum)

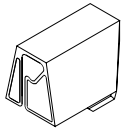
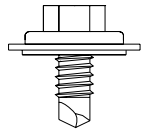
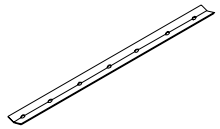
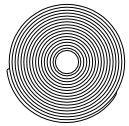
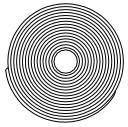
Not Shown:

Fall Protection Equipment, Hardhats, Walkboards, Broom and Vacuum

Parts List

(Provided with IFCurb Package)

Part and Number	Pictorial
Side Support Channel ..... Uninsulated purlins - 1-1/4" legs ends notched Insulated purlins - 1-1/4" legs CMR-24® - 1/2" legs	
Rear Support Channel ..... MR-24® / VSR™ - 1-1/4" legs CMR-24® - 1/2" legs	
Diverter Plate	
Diverter Angle	
MR-24® Panel Strap (560004)	
MR-24® Lockseam Plug (560158)	
MR-24® Corrugation Plug (560000)	

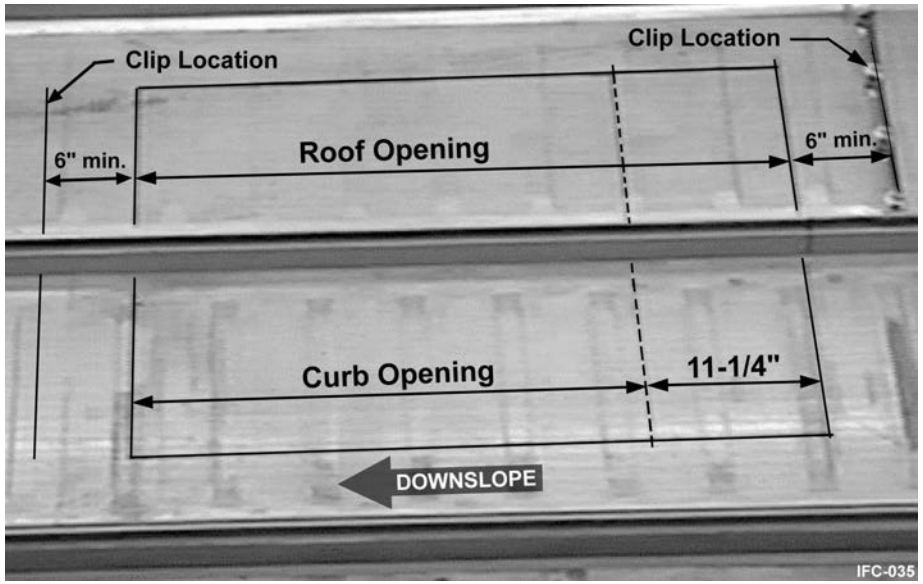
Part and Number	Pictorial
VSR™ Corrugation Plug (560621)	
1/4"-14 x 7/8" Stainless Steel Self-Drilling Screw (097409)	
11/32" x 2-3/4" Scrubolt™ (097264)	
Gungrade Gray Sealant (016688)	
Insulation Retainer (650209)	
1-1/2" Tape Panlastic® (042715)	
Foam Sealant Tape (560185)	

Step 1 Locating The Curb Opening On The Roof Panel

Locate the purlin (secondary structural member) to install the curb in the proper location.

The upslope and downslope edge of the roof opening ***MUST BE LOCATED AT LEAST SIX INCHES*** from the centerline of the roof panel attaching clips to allow for roof expansion and contraction.

The curb opening is measured from the inside edge of flange to inside edge of flange. The curb opening and 11-1/4" space for the Diverter Plate, comprise the roof opening.



Step 2 Marking The Cutout

Place the curb over the panel seams and use the **INSIDE** edge as a template to mark the roof opening on the roof panel.

Symmetrical curbs may be rotated 180° to mark the upslope **INSIDE** edges of the openings. Unsymmetrical curbs may be slid upslope to mark the upslope **INSIDE** edges of the openings.

Once the roof opening is marked, measure the distance between each set of opposite corners (diagonals). If these two dimensions are the same, the layout is square. The layout must be square before proceeding.

Step 1 Cutting Through The Panel Corrugations

Before cutting, double-check to ensure the marks for the curb opening corresponds to the **INSIDE** edge of the curb flanges.

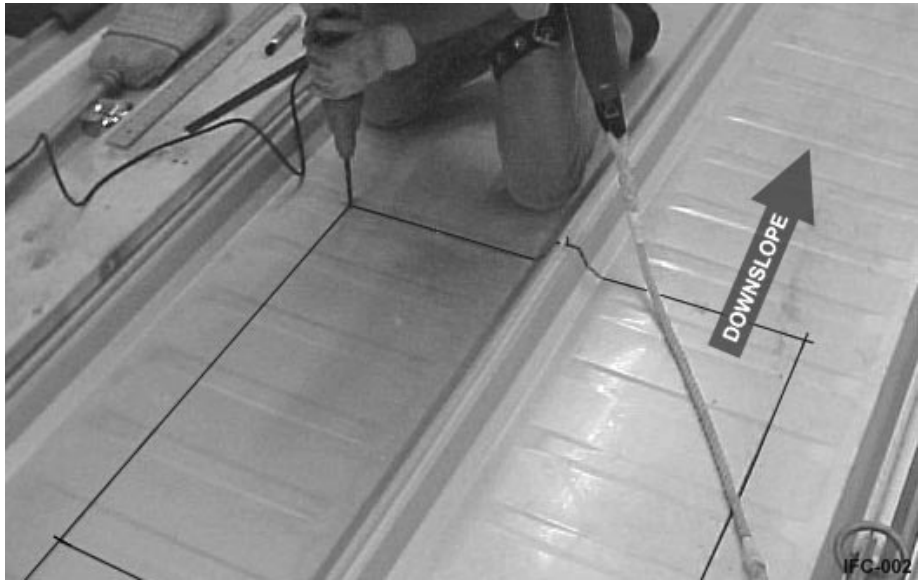
Once the roof opening is marked, cut through the panel corrugations using a Reciprocating Saw as shown.

DO NOT USE A HOT SAW.

Step 2 Drilling The Starter Holes At The Corners

Drill 3/8" to 1/2" diameter starting holes at the corners. Drill all four corners to provide radius in the corners so the panel material will not tear during the life of the curb.

CMR-24® Note: See Alternate Step 2, Appendix Page C-1.



Step 3 Cutting The Roof Opening At The Ends

Using a double-cut shear, cut the roof opening following the layout.

Starting at the drill hole, finish cutting the panel to the corrugation following the roof opening mark.

Use walkboards on the panels next to those being cut for added stability.

Step 4 Cutting The Roof Opening At the Sides

Cut the roof opening on each side following the layout.

DO NOT USE A HOT SAW to cut the opening.

WARNING: Do not walk on panels containing the roof opening. Always use fall protection when working within six feet of the roof opening.

Step 5 Removing The Panel Clips

Bend each panel piece back to expose panel clips.

Using an impact wrench with a 3/8" socket and extension, remove the Scrubolt™ from the clip(s).

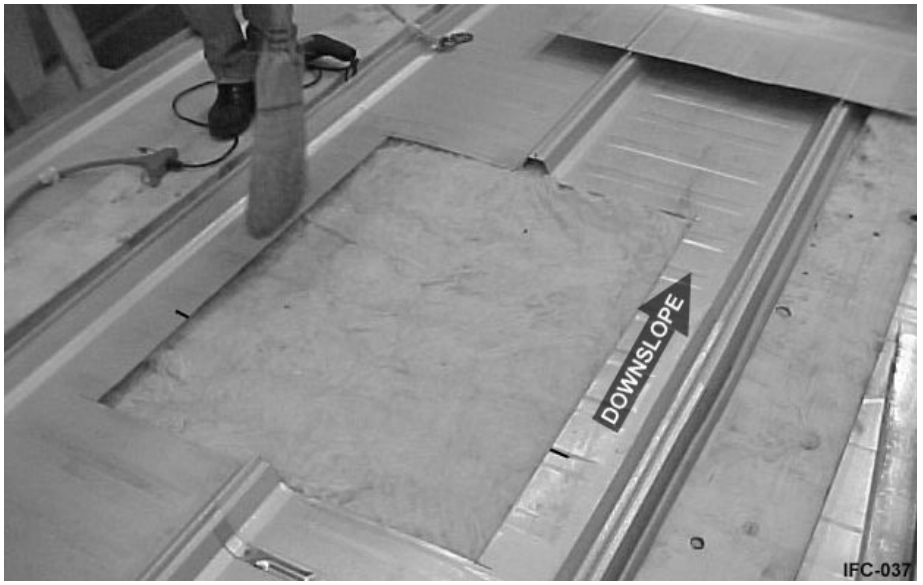
Use caution not to drop any pieces removed.

WARNING: Do not walk on panels containing the roof opening. Always use fall protection when working within six feet of the roof opening.

Step 6 Completing The Roof Opening

With the roof opening completed, remove all shavings and cuttings from the roof.

CMR-24® Note: See Alternate Step 6 and Additional Step 7, Appendix Pages C-1 and C-2.

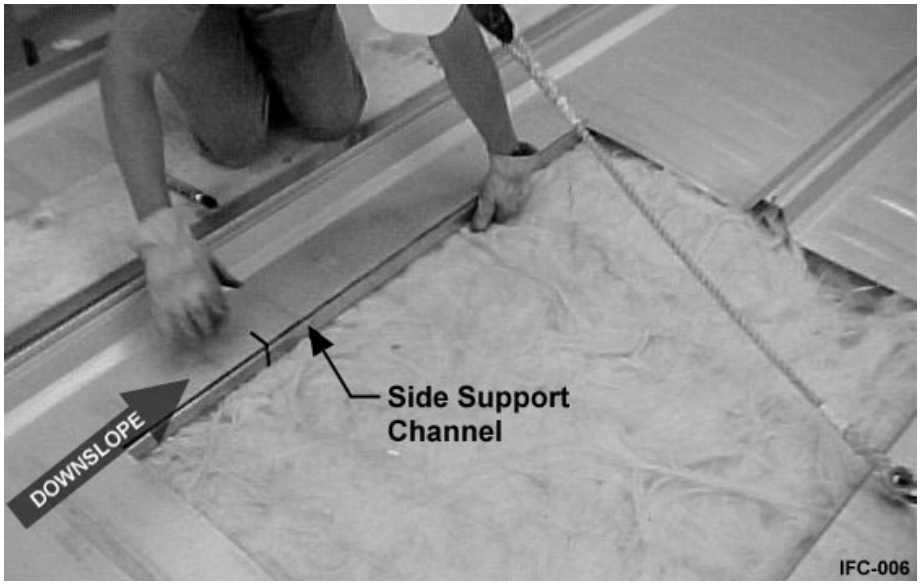


Step 1 Installing The Side Support Channels

Install the Side Support Channels by sliding them between the panel and the supporting structure. The Side Support Channels span from purlin to purlin and are aligned with the edge of the roof opening.

Attach two Locking C-Clamp pliers to each Side Support Channel (not shown).

The Side Support Channel must extend to the roof structurals beyond the roof opening. If one purlin is located within the roof opening, then two Side Support Channels are required on each side.



Step 2 Installing The Rear Support Channel

The Rear Support Channel spans from Side Support Channel to Side Support Channel.

Slide the factory-notched Rear Support Channel between the Side Support Channels and the roof panel.

Align the edge of the Rear Support Channel with the edge of the roof opening.

Rear Support Channel is 1-3/4" longer than the outside width of the curb.

Step 3 Side And Rear Support Channels Installed

The Side and Rear Support Channels are installed as shown in photo.

Move one Locking C-Clamp Pliers from each side to the corner as shown.

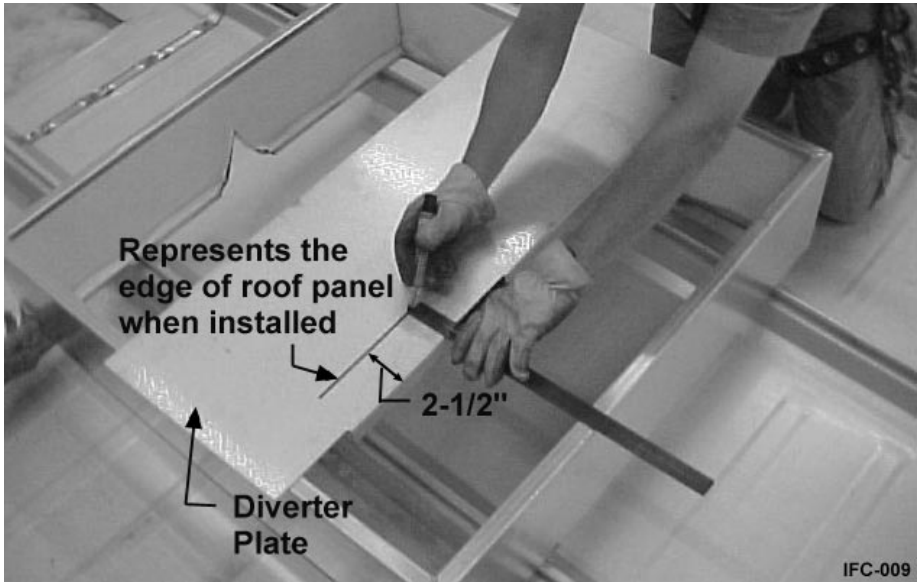
WARNING: Do not walk on panels containing the roof opening. Always use fall protection when working within six feet of the roof opening.

Step 1 Locating The Edge Of The Roof Panel

Draw a line 2-1/2" from the upslope edge (side with holes for MR-24) on the Diverter Plate.

DO NOT USE PENCIL TO MARK PLATE. Use a felt marker. This line represents the roof panel edge when the Diverter Plate is installed.

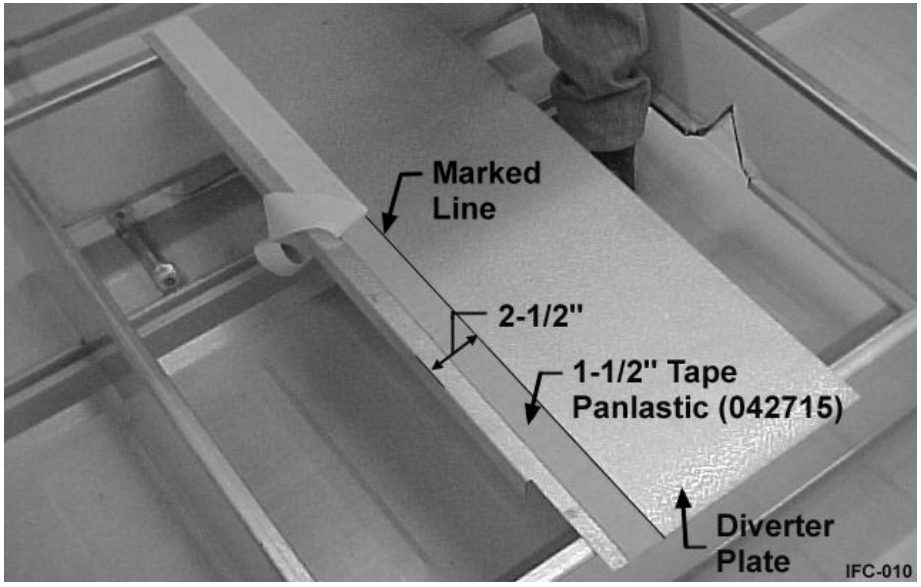
CMR-24® Note: See Additions to Step 1, Page C-3.



Step 2 Applying Tape Panlastic® To The Diverter Plate

Apply the 1-1/2" Tape Panlastic® against the marked 2-1/2" line as shown. The Tape Panlastic must run the length of the Diverter Plate.

Always use a utility knife to cut the Tape Panlastic.



Step 3 Installing The MR-24® Corrugation Plug(s)

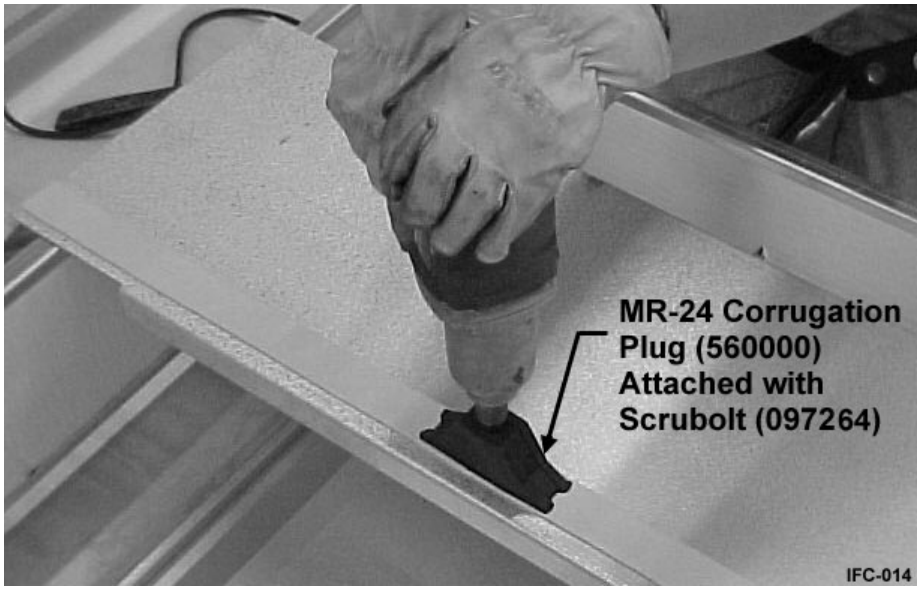
MR-24® Corrugation Plug(s) must be installed at the factory-punched holes on the Diverter Plate.

Locate holes through 1-1/2" Tape Panlastic.

Insert the Scrubolt through the MR-24 Corrugation Plug and into the hole.

Install MR-24 Corrugation Plug(s) using impact wrench. Apply pressure to MR-24 Corrugation Plug and Tape Panlastic during the installation of the Scrubolt so Tape Panlastic stays in place.

VSR™ Note: See Alternate Step 3, Appendix Page B-1.

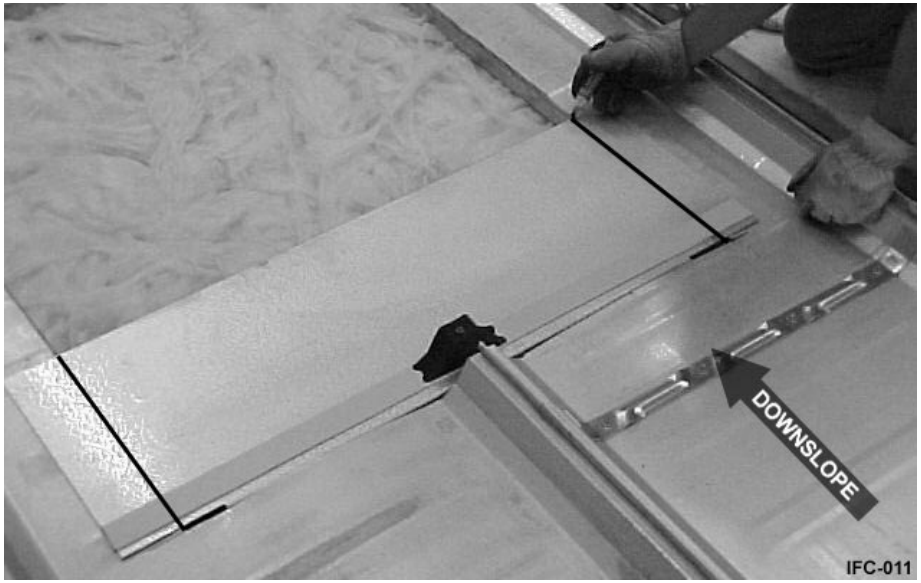


Step 4 Marking The Edge Of The Roof Opening On The Diverter Plate

Center the Diverter Plate on the roof opening.

On the front and rear edges of the Diverter Plate, mark the roof opening.

Using a square, draw a line connecting the marks on each end of the Diverter Plate.



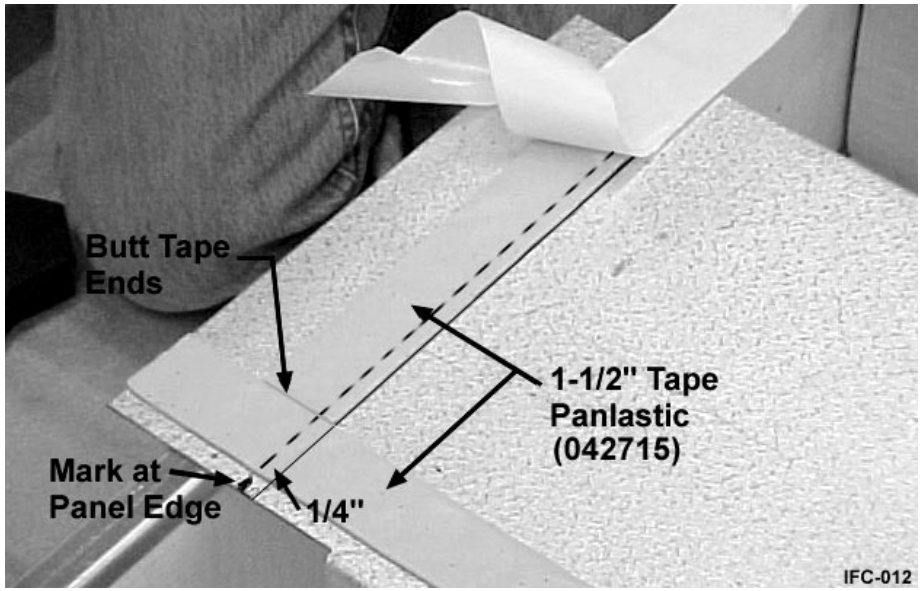
Step 5 Locating The Tape Panlastic® On Each End

Apply 1-1/2" Tape Panlastic 1/4" over the line and against the previously applied Tape Panlastic as shown in the photo.

DO NOT LAP THE TAPE PANLASTIC.

DO NOT LEAVE VOIDS.

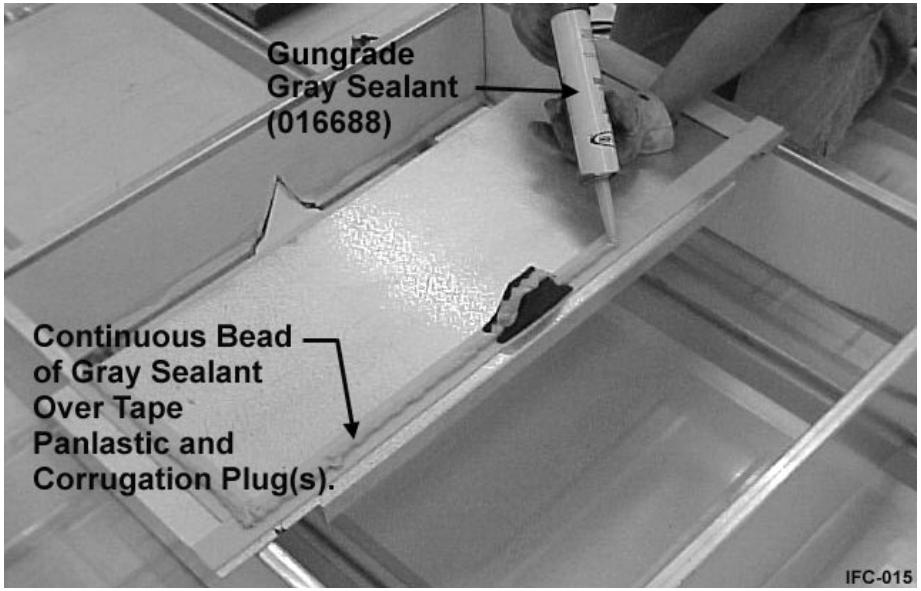
WARNING: Do not walk on panels containing the roof opening. Always use fall protection when working within six feet of the roof opening.



Step 6 Applying Gungrade Gray Sealant

After the MR-24 Corrugation Plug(s) is installed, apply Gungrade Gray Sealant over the Tape Panlastic and plug(s) with a 1/2" continuous bead as shown.

VSR Note: No Corrugation Plug is installed on the Diverter Plate.



Step 7 Installing The Diverter Plate

Slide the Diverter Plate between Side Support Channels and the roof panel. Align the Diverter Plate in the roof opening using the marks previously made on the Diverter Plate.

1/4” of Tape Panlastic must be exposed at each end. On the upslope side, the Tape Panlastic must be flush with the roof panel. During installation do not touch or move the Tape Panlastic.

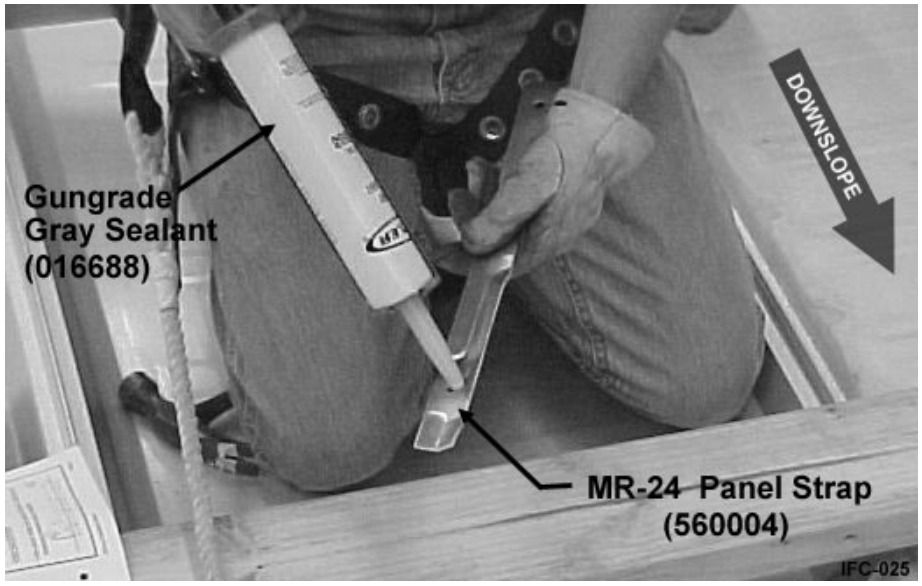
Locking C-Clamp Pliers are required in each of the downslope corners and on each side (as shown) of the roof opening to secure the Side Support Channels to the roof panel.

Step 8 Caulking The MR-24® Panel Straps

Field cut the MR-24 Panel Straps so they extend two inches (2”) beyond the side of the roof opening.

Apply a thin donut of Gungrade Gray Sealant around each hole on the bottom of the MR-24 Panel Strap.

VSR™ Note: See Alternate Steps 8 and 9, Appendix Page B-1.

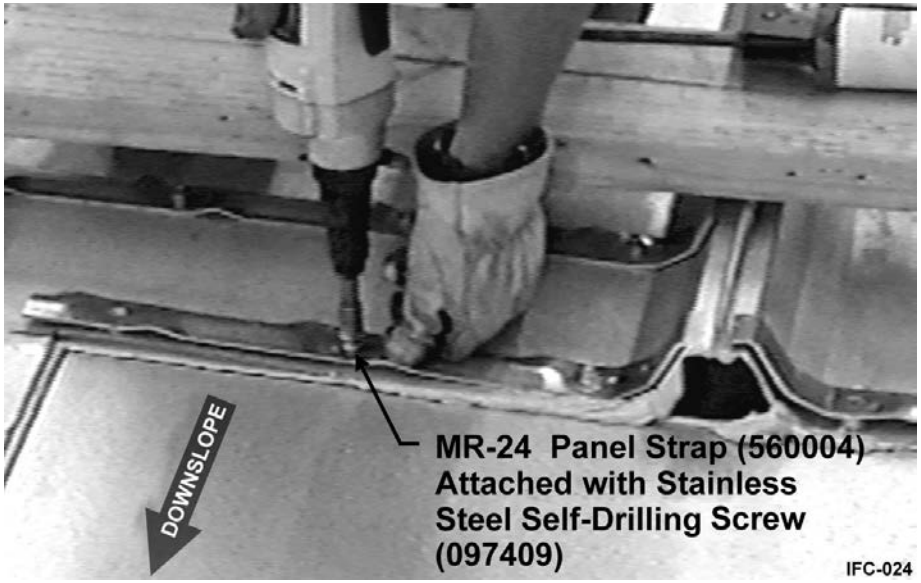


Step 9 Installing The MR-24® Panel Straps

Fasten the MR-24 Panel Strap to the roof panel and Diverter Plate using Stainless Steel Self-Drilling Screws.

WARNING: Do not walk on panels containing the roof opening. Always use fall protection when working within six feet of the roof opening.

VSR™ Note: See Alternate Steps 8 and 9, Appendix Page B-1.

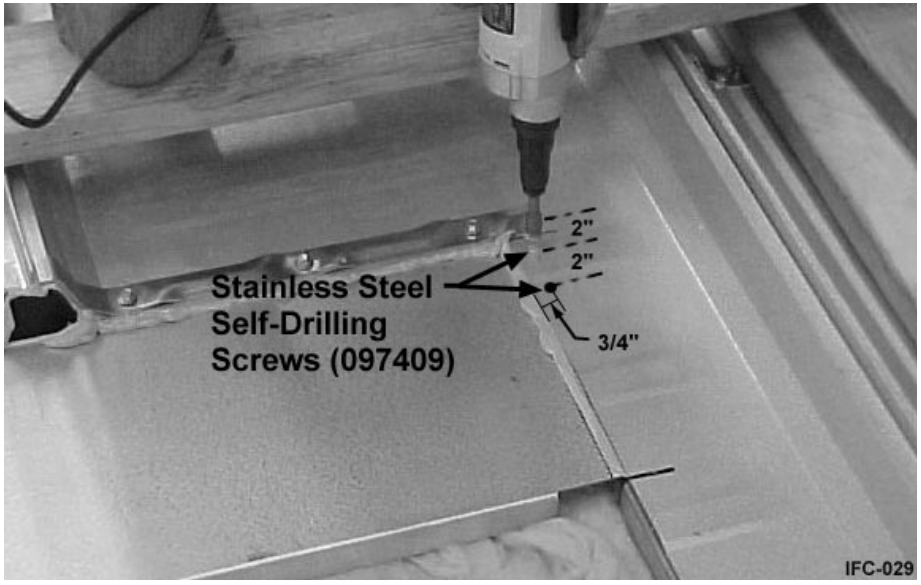


Step 10 Securing The Panel At The Sides of The Diverter Plate

Install two Stainless Steel Self-Drilling Screws two inches (2") on center from the MR-24 Panel Strap. Position screws 3/4" from the panel edge as shown in photo.

Remove Locking C-Clamp pliers before proceeding to the next step.

CMR-24® Note: See Additional Step 11, Appendix Page C-3.



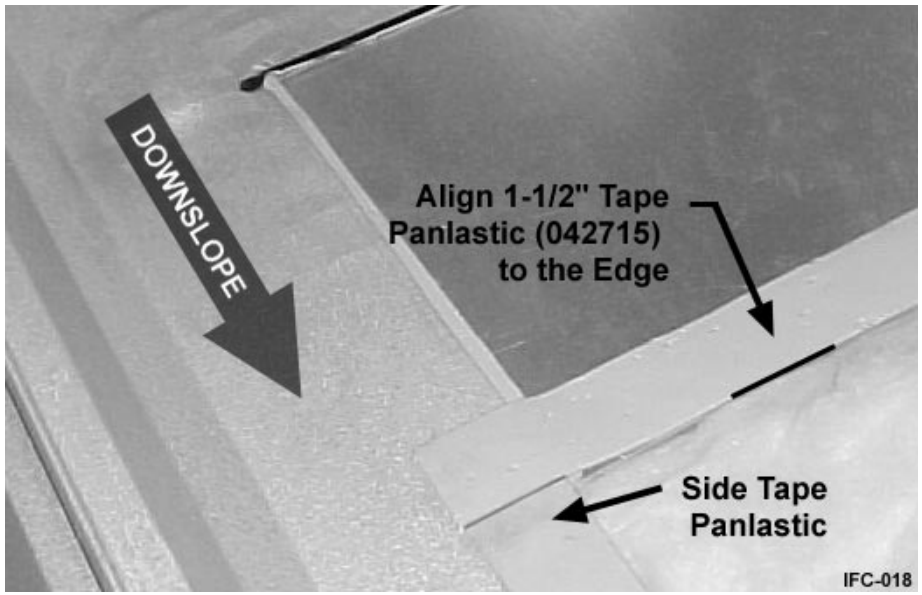
Step 1 Applying Tape Panlastic® Around The Curb Opening

Install 1-1/2” Tape Panlastic across the upslope edge of the curb opening, aligning it to the free edge of the Diverter Plate. Start the tape 1-1/2” beyond the roof opening to allow side Tape Panlastic to butt against the front piece. It is important to lay the tape in this manner.

DO NOT LAP THE TAPE PANLASTIC.

DO NOT LEAVE VOIDS.

Install the Tape Panlastic to the sides of the roof opening by butting the tape to the tape on the Diverter Plate and extending it 1-1/2” beyond the downslope edge of the roof opening.



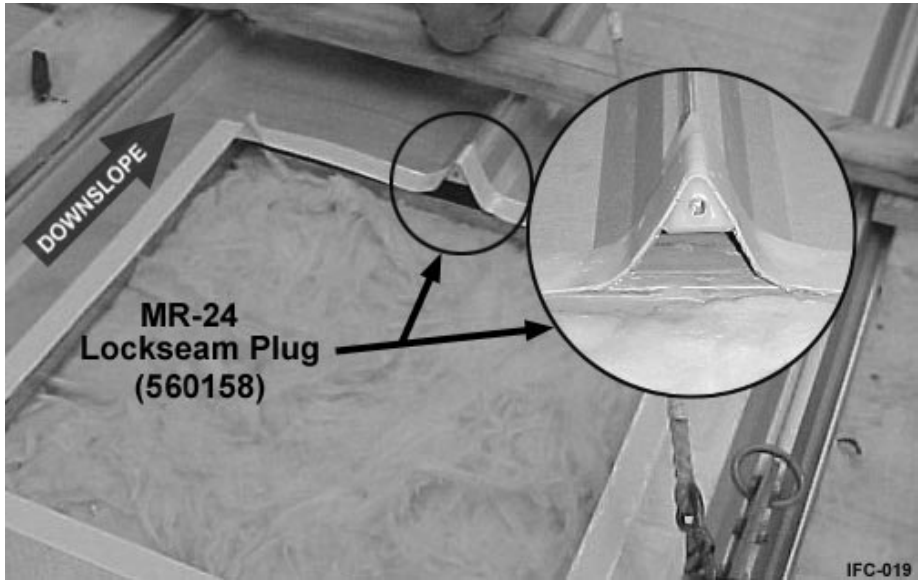
Step 2 Installing The MR-24® Lockseam Plug(s)

Install the MR-24 Lockseam Plug(s) on the curb’s downslope panel corrugation(s).

Apply 1-1/2” Tape Panlastic from one side to the other and over the corrugation(s) and plug(s).

Remove the parting paper from all the Tape Panlastic installed.

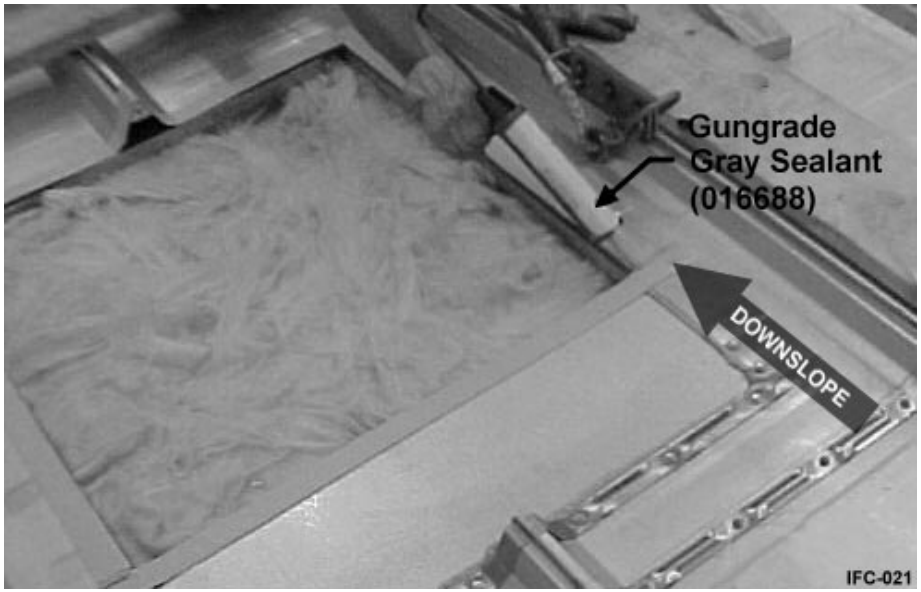
VSR™ Note: See Alternate Step 2, Appendix Page B-2.



Step 3 Applying Gungrade Gray Sealant

Apply a 5/16" diameter continuous bead of Gungrade Gray Sealant centering it on the 1-1/2" Tape Panlastic applied around the opening.

WARNING: Do not walk on panels containing the roof opening. Always use fall protection when working within six feet of the roof opening.



Step 4 Placing The Curb On The Roof Panel

Align the curb's inside edges to the roof opening and gently place it on the Tape Panlastic and Gungrade Gray Sealant.

Minimize the roof curb movement once the curb is placed on the roof panel.

Step 5 Securing The Curb To The Roof Panel

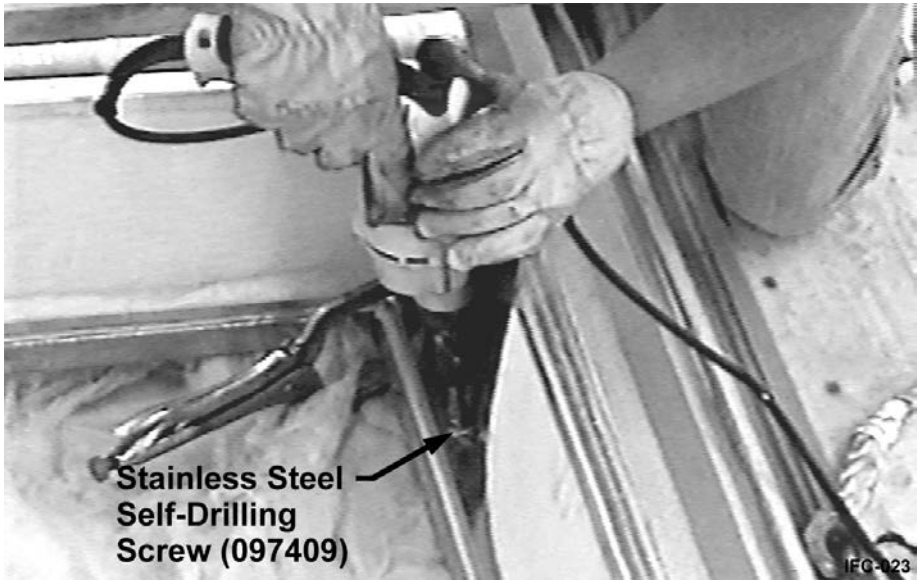
Using Locking C-Clamp Pliers, secure the curb to the roof panel and support channels.

WARNING: Do not walk on panels containing the roof opening. Always use fall protection when working within six feet of the roof opening.

Step 6 Attaching The Curb To The Roof

Use Stainless Steel Self-Drilling Screws to secure the curb to the roof panel and support channels in the holes which are not greater than six inches (6”) apart.

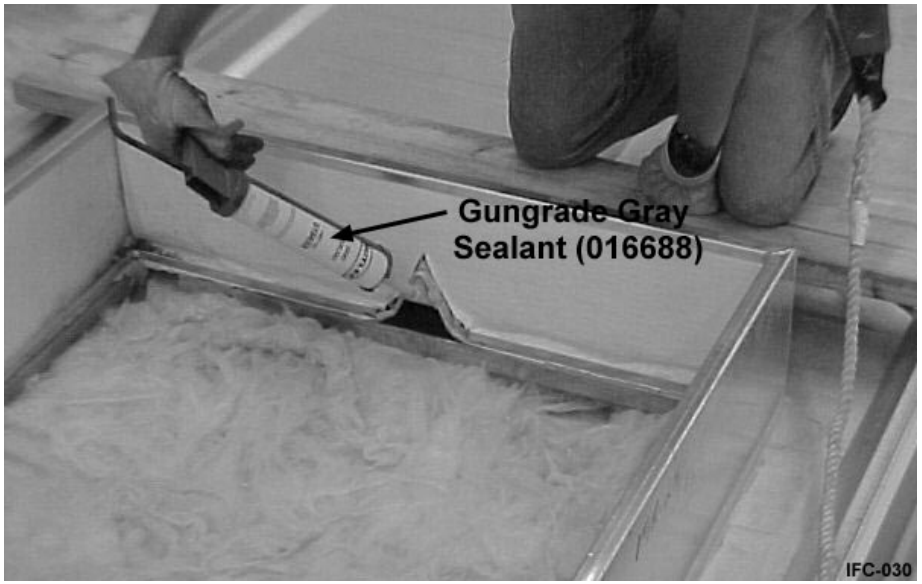
Clamp the curb to the Support Channel at each fastener to keep the Tape Panlastic in place.



Step 7 Applying Gungrade Gray Sealant

Fill the MR-24 Lockseam Plug(s) with Gungrade Gray Sealant.

VSR™ Note: This step has been performed.



Step 8 Installing The Insulation Retainers

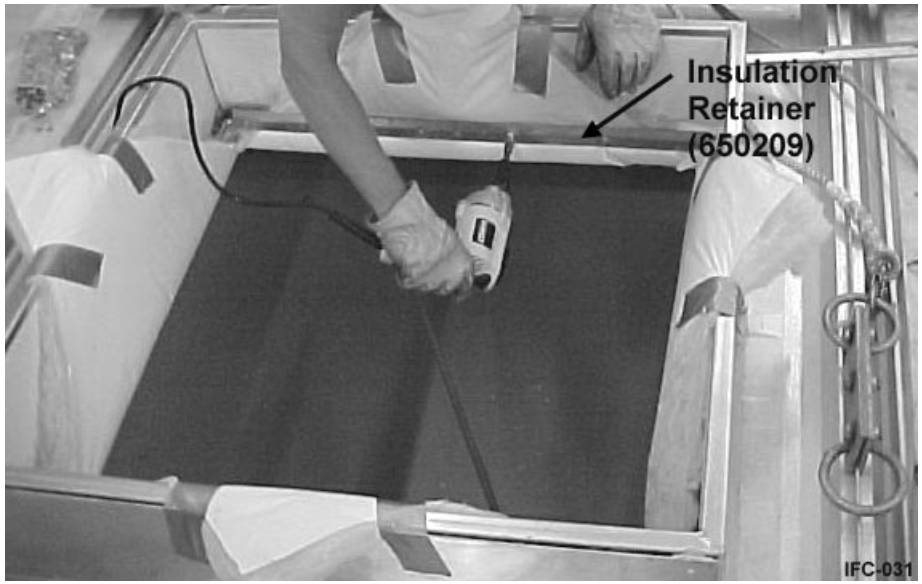
Cut the insulation as shown below in Figure 1-1.

Thin the insulation by removing some of its thickness around the perimeter of the opening.

Secure the insulation to the side of the curb with Insulation Retainers and Stainless Steel Self-Drilling Screws six inches (6”) on center as shown in Figure 1-1.

Trim the excess insulation.

WARNING: Do not walk on panels containing the roof opening. Always use fall protection when working within six feet of the roof opening.



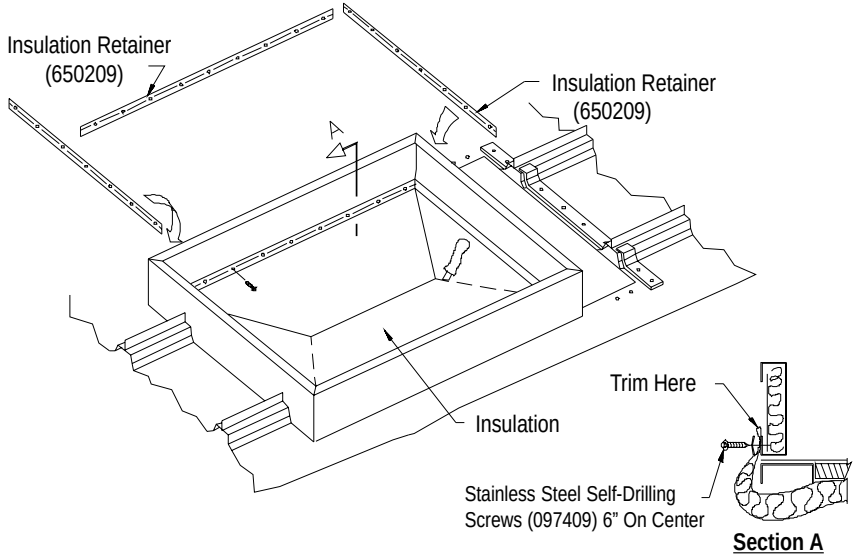
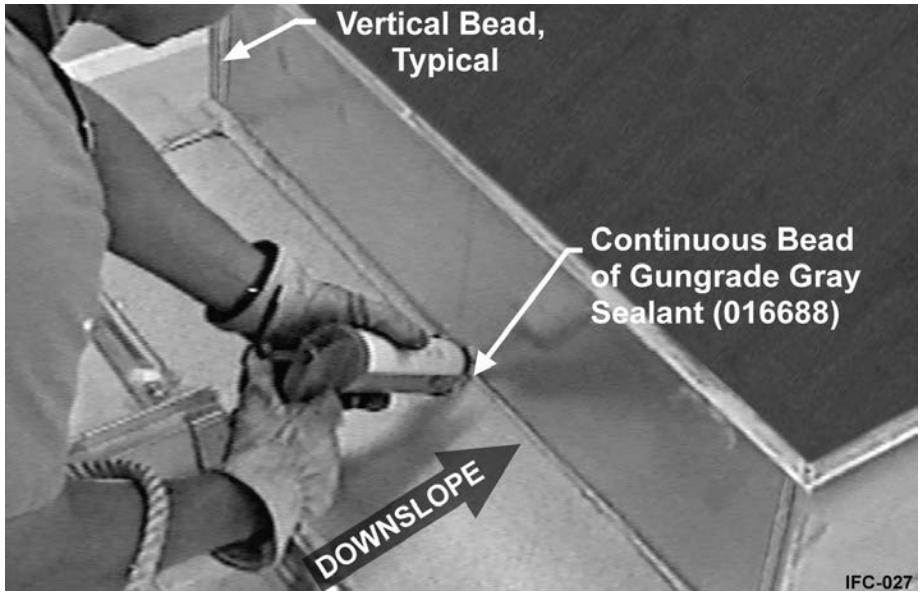


Figure 1-1. Installing The Insulation Retainers Detail

Step 1 Applying Gungrade Gray Sealant

Apply Gungrade Gray Sealant to the corners of the curb front (vertical bottom to top).

Apply a 3/8" bead of Gungrade Gray Sealant to the bottom of the curb front.



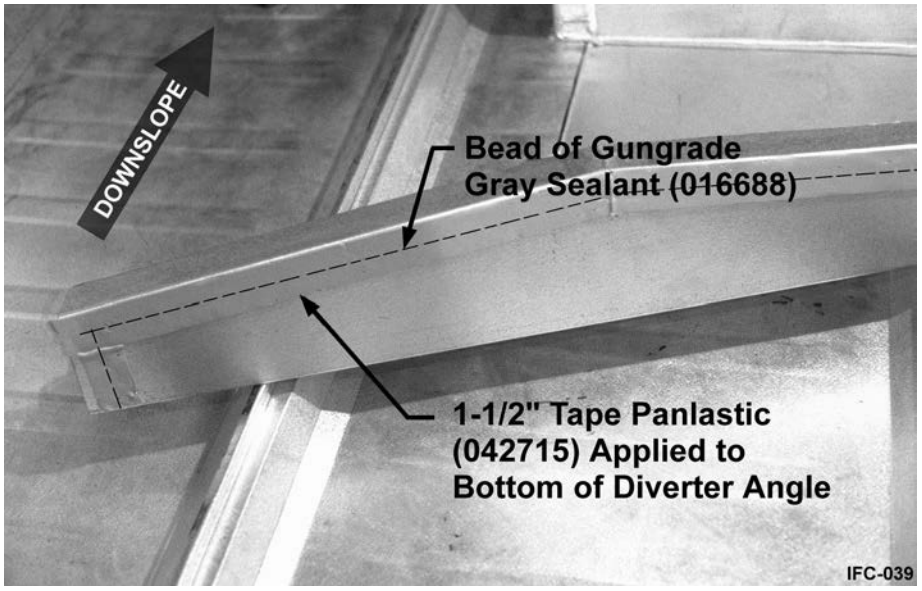
Step 2 Applying Tape Panlastic® On The Diverter Angle

Apply the 1-1/2" Tape Panlastic around the edge of the bottom of the Diverter Angle. Butt the Tape Panlastic at the corners.

DO NOT LAP THE TAPE PANLASTIC.

DO NOT LEAVE VOIDS.

Add a bead of Gungrade Gray Sealant along the Tape Panlastic.

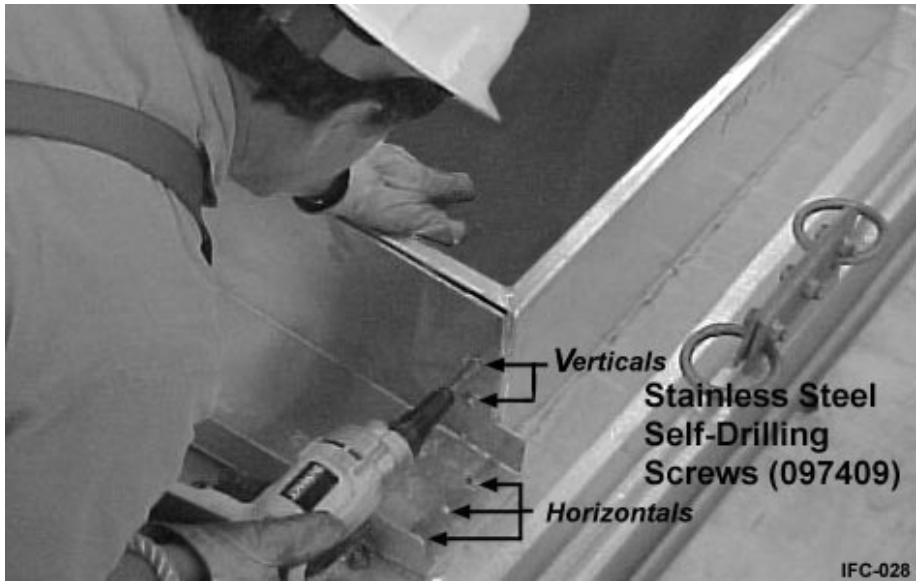


Step 3 Attaching The Diverter Angle To The Curb

Install the Diverter Angle with the Stainless Steel Self-Drilling Screws.

Place the Diverter Angle against the roof curb on top of the Diverter Plate. Secure to the curb with Locking C-Clamp Pliers, if required.

Reduce the torque setting on the Screwgun and fasten the Diverter Angle to the Curb with Stainless Steel Self-Drilling Screws at the prepunched holes in the vertical leg from the bottom up.



Step 4 Attaching The Diverter Angle To The Diverter Plate

Fasten the Diverter Angle to the Diverter Plate at the front center of the Diverter Angle in the prepunched holes.

Fasten the Diverter Angle to the Diverter Plate at the remaining prepunched holes at the front and sides of the Diverter Angle.

Step 1 Final Clean-Up

Carefully remove all metal shavings and cuttings from the roof.

Shavings and cuttings left on the roof will rust and damage the roof panel.

Step 2 Final Inspection

Inspect for any voids in the connections, and trim excess sealant. Apply a bead of the Gungrade Gray Sealant around the curb base and Diverter Angle. Shape the bead of Gungrade Gray Sealant to shed water.

The completed curb opening must be covered until the curb unit is installed.

Apply Foam Tape Sealant to the top edge of the curb when installing any unit to the top of curb.

Notes:

Double-Wall Curbs

Single-Wall Curbs will support a maximum equipment weight of 2000 pounds, while allowing roof movement as designed.

Equipment weight over 2000 pounds requires a double-wall curb. See Figure 1-2 and Figure 1-3. This installation uses an inner structural curb to support the equipment and an outer curb that seals to the roof and allows for expansion and contraction.

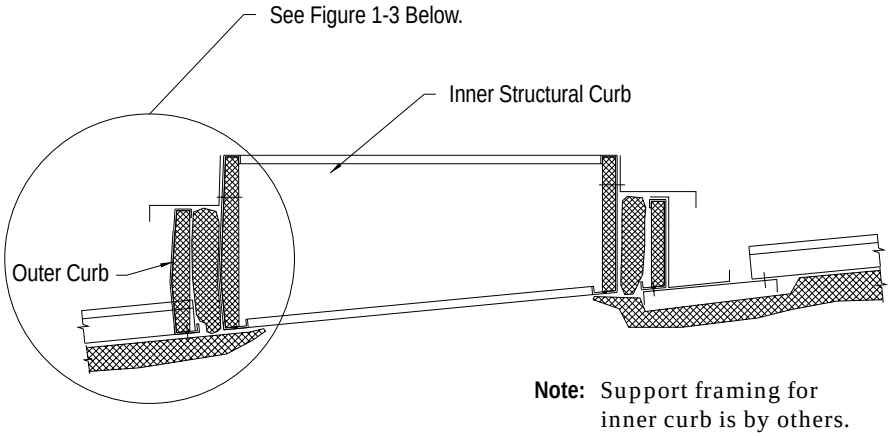


Figure 1-2. Double-Wall Curb Detail.

Retrofit Curbs

Retrofit Curbs are installed around existing equipment. They must be ordered oversized to allow the curb to fit over and around the equipment during installation.

A screwgun must fit between the retrofit curb and the existing equipment around the inside of the retrofit curb during the installation.

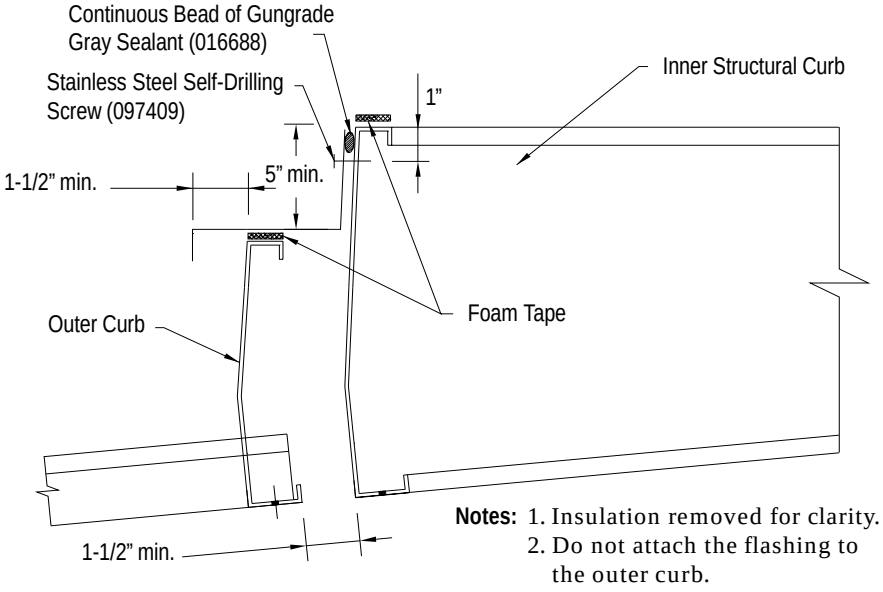
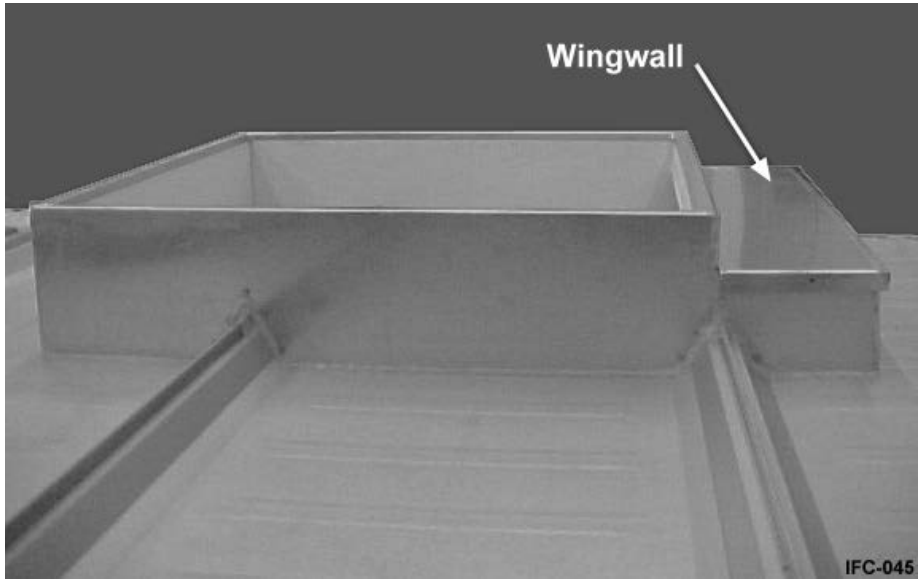


Figure 1-3. Double-Wall Curb Flashing Detail.

Wingwall Curbs

Wingwall Curbs are required when the side of the curb is located too close to a corrugation. The wingwall extends the base of the curb beyond the corrugation to the flat of the roof panel.



VSR™ Alternate Step 3 Sealing VSR™ Panel Corrugation(s)

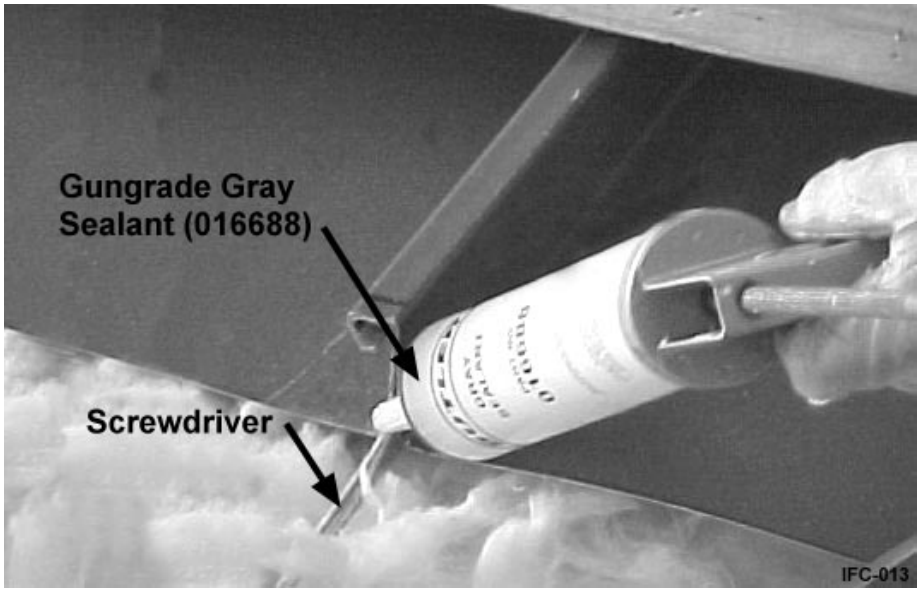
Page 12, *Procedure 4*

NO CORRUGATION PLUG IS NEEDED.

On the upslope edge of the roof opening, use a screwdriver to pry open the VSR panel legs to create a gap.

Completely fill the gap with Gungrade Gray Sealant.

Proceed to Step 4, Page 12.



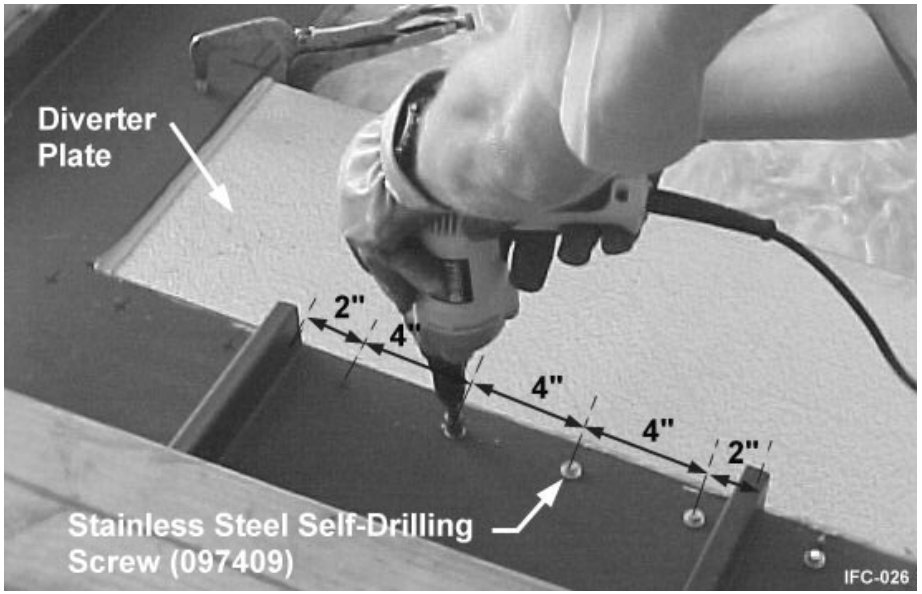
VSR™ Alternate Steps 8 and 9 Attaching The Diverter Plate To The VSR™ Panel

Pages 14 and 15, *Procedure 4*

No panel straps are used on the VSR panel.

Install four Stainless Steel Self-Drilling Screws between the panel corrugations, as shown in the photo, and along the full width of the Diverter Plate. Position the screws one inch (1”) from the panel edge.

Proceed to Step 10, Page 15.



VSR™ Alternate

Step 2 Installing The VSR™ Corrugation Plug(s)

Page 16, *Procedure 5*

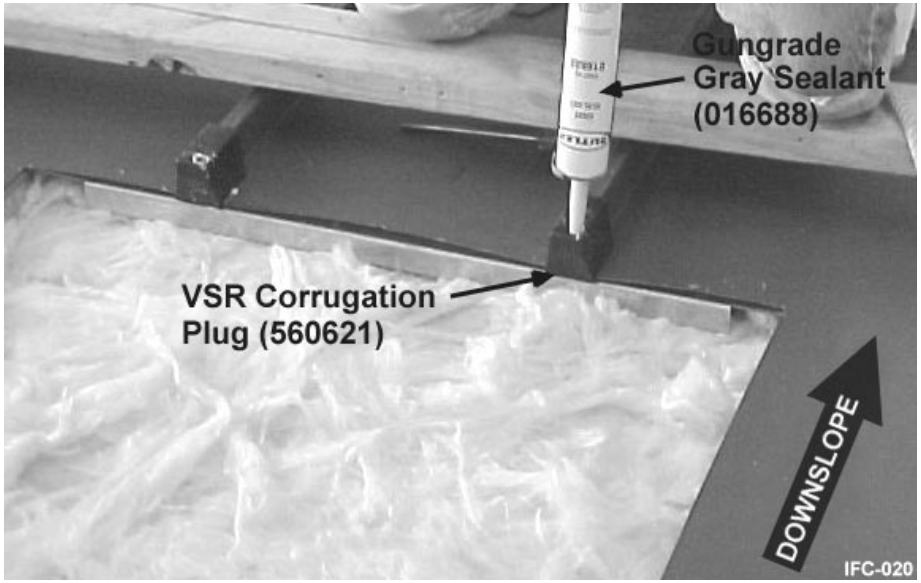
Install the VSR Corrugation Plug on the curb's downslope panel corrugation(s).

Fill the plug with Gungrade Gray Sealant.

Apply 1-1/2" Tape Panlastic over the corrugation(s) and plug(s).

Remove the parting paper from all the Tape Panlastic installed.

Proceed to Step 3, Page 17.

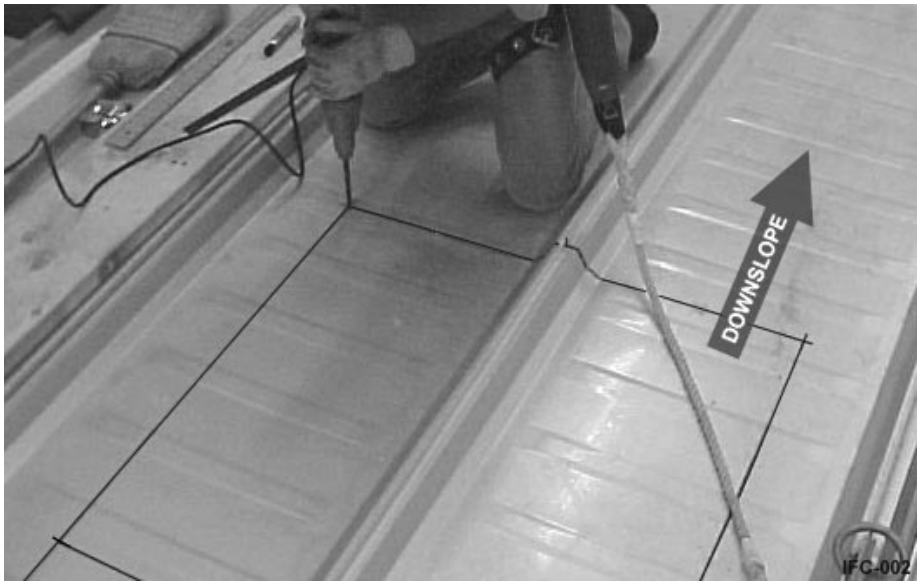


CMR-24® Alternate Step 2 Drilling The Starter Holes At The Corners

Page 6, *Procedure 2*

Drill 1/2" diameter holes in the downslope corners through the roof panel, rigid insulation and liner panel. Drill the upslope corners through the roof panel only.

Proceed to Step 3, Page 7.



CMR-24® Alternate Step 6 Completing The Roof Opening

Page 8, *Procedure 2*

Use a knife to cut out the rigid insulation and vapor retardant in the entire roof opening plus 2-1/2" beyond the roof opening on the upslope side. Figure 1-4 shows the completed curb opening. Save the removed insulation for use in Step 1, Page C-3.

Use a Reciprocating Saw to cut out the liner panel in the curb opening only, not in the entire roof opening. See Figure 1-5 below. With the roof opening completed, remove all shavings and cuttings from the roof.

Proceed to Step 7, Page C-2.

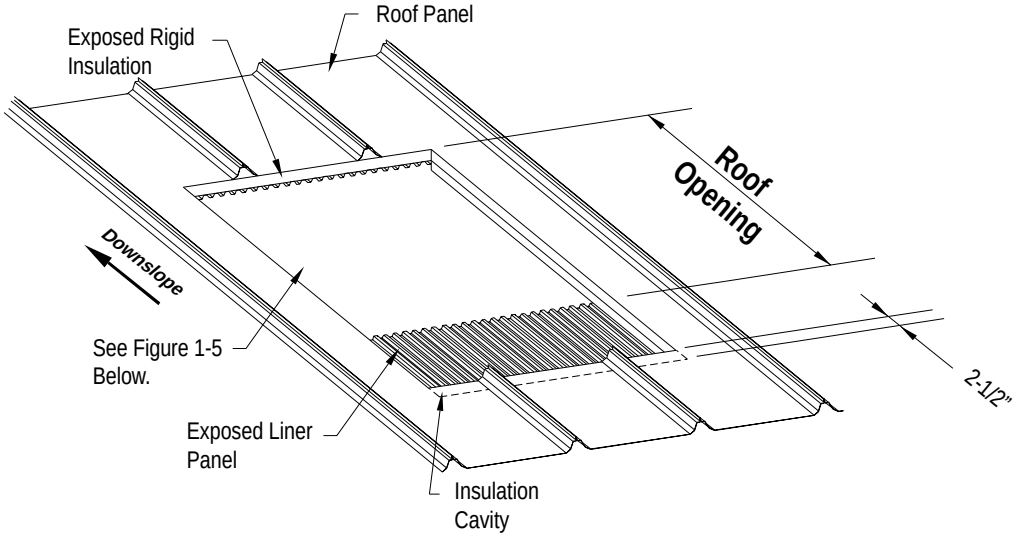


Figure 1-4. Insulation Board, Vapor Retardant and Liner Panel Cutout Detail.

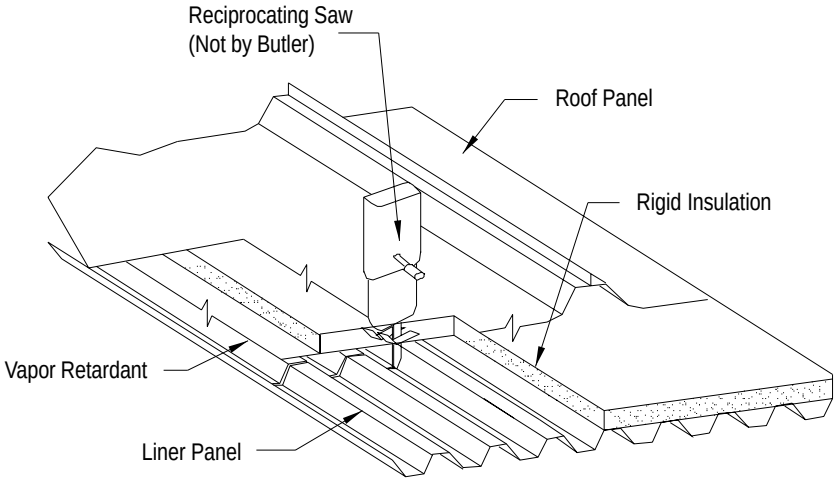


Figure 1-5. Cutting Detail.

CMR-24® Additional Step 7 Installing Insulation Trim Channels

Page 8, *Procedure 2*

Install trim channels (not included in the IFCurb package) on the sides and downslope edge of the curb opening. See Figure 1-6 and Figure 1-7. Field drill and fasten trim channels at the downslope corners with blind fasteners.

Proceed to Step 1, Page 9.

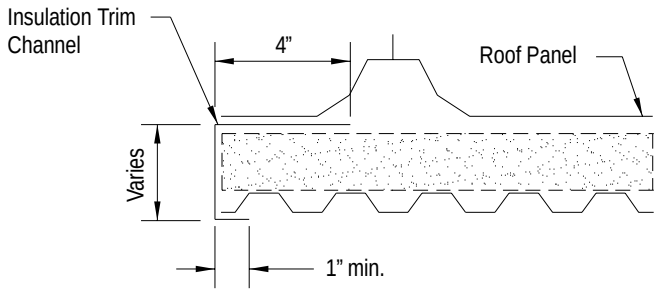


Figure 1-7. Section A.

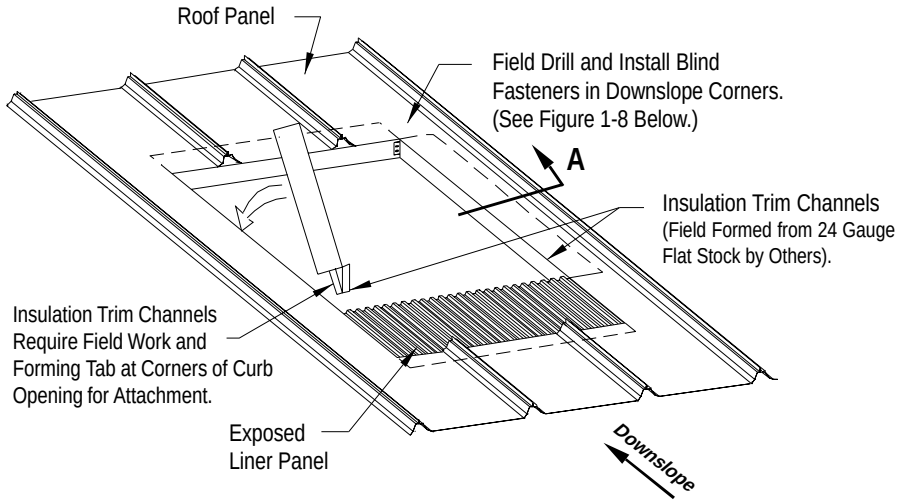


Figure 1-6. Insulation Trim Channels Cutting and Preparation Detail.

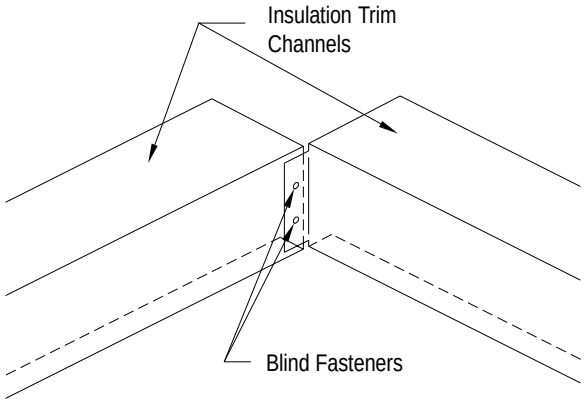


Figure 1-8. Insulation Trim Channel Attachment Detail.

CMR-24® Additions to Step 1 Trimming The Diverter Plate

Page 11, *Procedure 4*

If the rigid insulation is one inch (1") thick or less, field trim the legs of the Diverter Plate to the thickness of the rigid insulation.

Attach the rigid insulation (removed in Step 6, Page C-1) to the bottom of the Diverter Plate as shown in Figure 1-10. Do not allow voids in the rigid insulation.

Proceed to Step 2, Page 11.

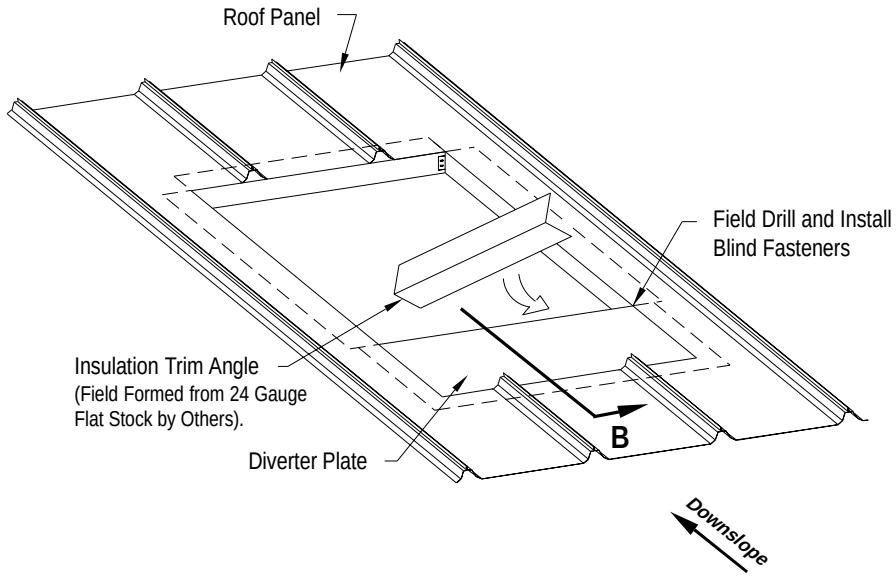


Figure 1-9. Insulation Trim Angle Cutting and Preparation Detail.

CMR-24® Additional Step 11 Installing Insulation Trim Angle

Page 15, *Procedure 4*

Install trim angle on the upslope edge of the curb opening. See Figures 1-9 and 1-10. Field drill and fasten trim angle to the trim channels at the corners with blind fasteners.

Field drill and fasten trim angle to the liner panel with blind fasteners 12" on center.

Proceed to Step 1, Page 16.

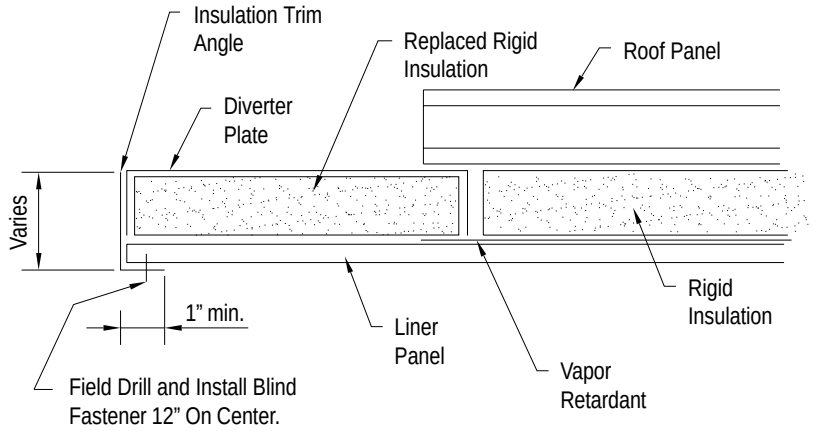


Figure 1-10. Section B.

⚠ WARNING

You may fall from roof and be killed or seriously injured.

Any panel can collapse.

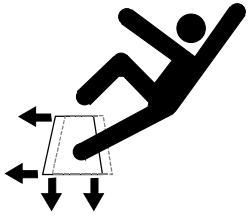
Do not step on panels with creased edges.

Do not step on or NEAR edge of panel.

Do not step within 5 feet of panel end.

Panels are slippery.

Use fall protection.



Loose panels may slide out from under you.

Do not step on loose panels or stacks of panels.

Always use fall protection.
Get and read “Roofing Work Safety Instructions” from supervisor.

Dwg. No. A-029944-05 11-11-99

Roof Panel Warning Label

Butler Manufacturing Company
13500 Botts Road
Grandview, MO 64030
(816) 968-5700

Form No. 5063
05-10-00