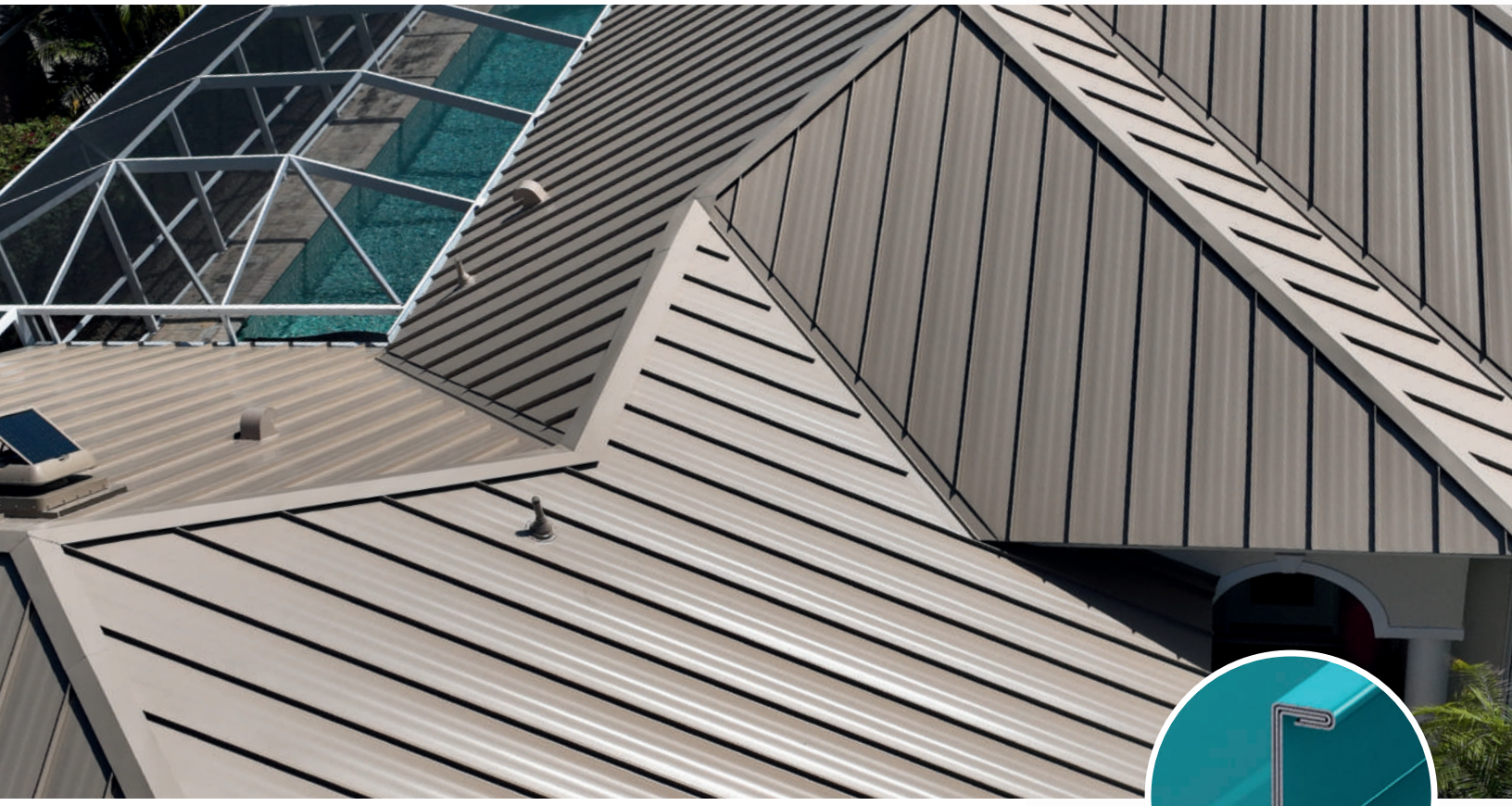
INSTALLATION MANUAL

DM CLASS 1500
1 ½" MECHANICAL



DYNAMIC METALS

Dynamic Metals, LLC
(772) 247-2465
www.dynamicmetal.net
3201 SE Dominica Terrace
Stuart, FL 34997

STANDARD INSTALLATION DETAILS

NOTE:

The Florida Building Code, section 1507.1, states all roof coverings shall be applied with the applicable provisions of the building code, the manufacturer's Florida Product Approval AND the manufacturer's installation instructions.

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GENERAL INFORMATION

1 GENERAL INFORMATION

a. Notice

- This guide offers general design advice and recommended application instructions for the proper use of Dynamic Metals, LLC (Dynamic Metals) metal roofing products. It is crucial for the installer to ensure that their installation complies with relevant building codes, safety regulations, and insurance requirements. Dynamic Metals is not responsible for any issues arising from incorrect installation or any personal injury or property damage resulting from the product's use.
- The statements in this guide are made in good faith, expecting that a design professional will be consulted before making job decisions. Projects should be designed to comply with applicable building codes, regulations, and accepted industry standards.
- Installing a metal roofing system requires significant trade knowledge and experience. This guide or Dynamic Metals does not intend to train individuals in the skills necessary for proper installation or convey all the required trade or general construction knowledge to perform roofing work safely and correctly. Dynamic Metals does not guarantee the qualifications of the installer.
  - For more information and resources on metal roofing installation, consider the following sources:
    - Sheet Metal and Air Conditioning Contractors' National Association (SMACNA) Architectural Sheet Metal Manual. Smacna.org
    - National Roofing Contractors Association (NRCA) Roofing Manual: Metal Panel and SPF Roof Systems. nrca.net
- It is the responsibility of the Dynamic Metals customer, installer, and/or designer to ensure that the details meet specific building requirements for weather-tightness.
- This guide should be used alongside engineered shop drawings specific to an individual project if applicable. Custom roof conditions and details are covered by engineered shop drawings for the specific project. In case of a conflict between this guide and the engineered shop drawings, the engineered shop drawings will prevail.
- Content in this guide may change without notice. Please contact Dynamic Metals to confirm that this manual is the most current version.

b. Applicability

- The DM Class 1500 metal roof system described in this manual is classified as an architectural, non-structural, standing seam metal roof panel. The DM Class 1500 panel is mechanically fastened with hidden fasteners to a continuous solid substrate with an underlayment. The detailing and attachment methods described best reflect "steep sloped" sheet metal joinery recognized as a craft or trade. This detailing, with clean lines and hidden fasteners, is desired for high performance combined with aesthetic appeal.

c. Safety

- There are potential hazards in installing a metal roof system. An experienced installer should recognize these hazards, be qualified to handle them, and ensure safe work practices and equipment to minimize the risk of injury. Consider these warnings when working with metal roofing; it's essential to prepare for working on roofs and handling metal properly.
  - OSHA (Occupational Safety and Health Administration): Follow OSHA regulations, particularly those related to roof construction, such as Title 29 Code of Federal, 1926 Subpart M, Fall Protection. For copies of OSHA regulations, visit osha.gov.
  - Use fall protection and appropriate safety equipment as required by agencies or jobsites.

- Avoid working on surfaces covered with moisture, frost, snow/ice, dust, or other substances that may cause unstable footing.
- Never walk on substrate, underlayment, or panels that are not securely fastened.
- Handle sheet metal panels and flashings carefully; edges can be sharp and cause severe cuts. Wear heavy gloves for protection.
- Wear eye protection when cutting and drilling to prevent injuries from flying metal fragments.
- Handle panels and trim cautiously in strong winds as wind pressure can cause loss of balance and risk workers being struck by flying objects.
- Materials loaded onto rooftops should always be secured to prevent sliding down the roof slope or being dislodged by high winds.
- Maintain a safe distance from electric power lines when handling metal panels and trims due to their conductive properties.

d. Material Handling and Storage

- Receiving a Delivery
  - Upon receiving materials, inspect the product's condition and compare the shipment against the shipping ticket to ensure all items are accounted for. If damages or shortages are found, note them on the shipping copy at delivery time. Dynamic Metals is not responsible for damages or shortages unless noted on the shipping ticket and reported within 48 hours from shipment time.

e. Packaging

- DM Class 1500 panels are shipped in bundles of about 20 - 25 panels, stacked on edge and packaged with wood blocking in an open crate design. Space is provided under crates for forklift access or for inserting lifting slings/straps during crane offloading (Figure 1).
- For LTL or special overseas shipments, panels are enclosed in wooden crates for optimal protection. Additional charges apply. Contact Dynamic Metals for further information on non-standard packaging.

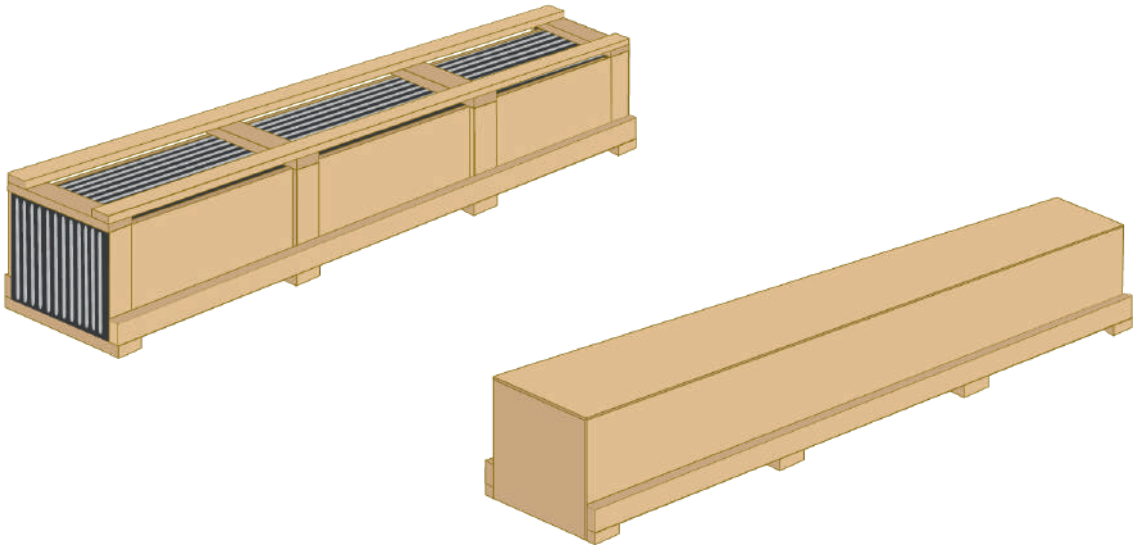


Figure 1:
Types of panel packaging: Open crate (*left*) and fully enclosed crate (*right*)

f. Unloading & Handling:

- Installers should employ suitable equipment to unload materials safely, ensuring crates and bundles are supported from underneath for stability. When using lift trucks for bundles up to 25 feet long (Figure 2), set the forks at a minimum distance of 5 feet apart. For bundles exceeding 25 feet, use nylon slings and a spreader bar instead of chains, cables, or ropes, making certain that no more than one third, or up to 15 feet, of the panel remains unsupported.

Figure 2:
Lift truck with panel bundle.

NOTE

Avoid stress points on the sheet metal.

Please refer to licensed professionals for distribution and handling.

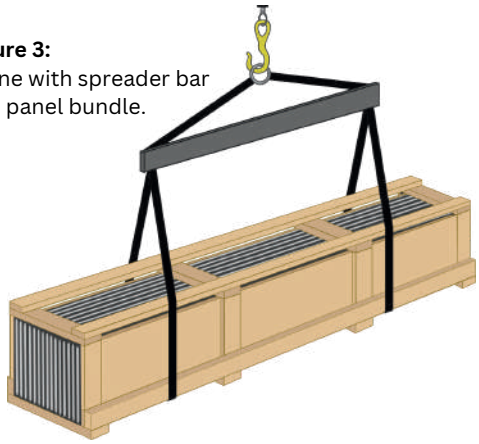


Figure 3:
Crane with spreader bar and panel bundle.

- Carry individual panels on their edge and support them evenly with a maximum gap of 10 to 12 feet (Figure 3). Avoid carrying it over head as the movement will create a wobble effect that can possibly dent or damage the material. Move uniformly to avoid bending or twisting that could cause lasting damage.

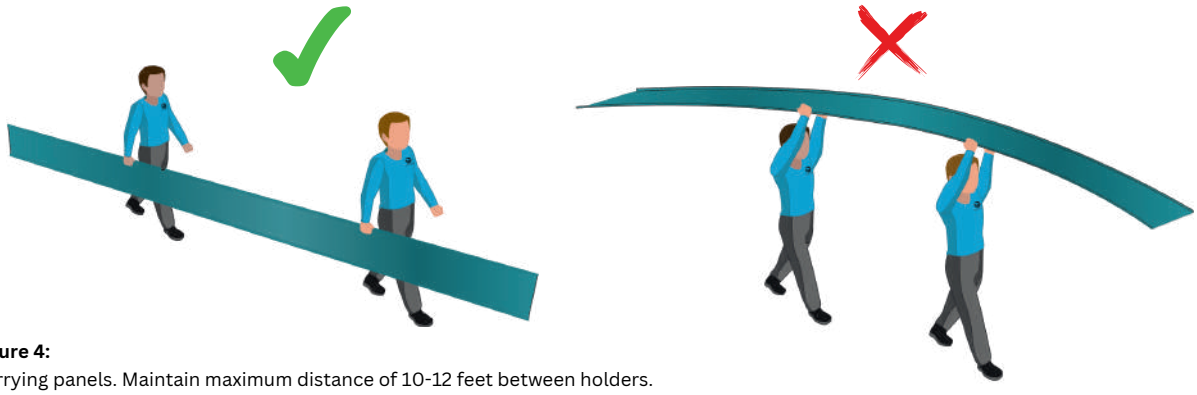


Figure 4:
Carrying panels. Maintain maximum distance of 10-12 feet between holders.

Tip:: Walk evenly, at least 10 ft. apart of eachother.

g. Storage

- Store all materials in a safe area away from standing water. Cover panels and trim to shield them from moisture, debris, and prolonged sunlight exposure. Ensure bundles are raised above the ground to allow air flow. Angle one end of the bundles so that moisture doesn't accumulate on surfaces.
- Exposure to dirt and moisture during storage can lead to damage or staining of finishes and material surfaces. Avoid long-term storage of panels and trim in bundles. If immediate installation is not possible, take extra precautions to protect materials from moisture. Dry and re-stack panels and trim if they become damp.
- Protective polyfilm may be applied to panels and trim for protection during manufacturing, packaging, and transit. This film must be removed just before installation. Prevent the polyfilm from extended exposure to moisture and direct sunlight, as prolonged sun exposure will cause it to adhere permanently to the panel surface.

WORKING WITH METAL

2 WORKING WITH METAL

a. Cutting and Drilling

- Do not use saws or grinders to cut panels. Use proper sheet metal cutting tools for clean, burr-free edges. Abrasive tools damage Galvalume and paint finishes, leading to rust. Remove metal debris from cutting and drilling immediately, as filings can rust and stain panel surfaces. Keep hot shavings off painted and unpainted surfaces to avoid embedding.

b. Expansion and Contraction

- Metal panels and trim expand and contract with temperature changes. Design allowances for this movement to prevent "oil-canning" and fastener failures.

Recommended Thermal Gap To Allow Thermal Expansion

DISTANCE FROM FIXED POINT	NOM. EXPANSION
10 FEET	1/8" (0.145")
20 FEET	5/16" (0.289")
30 FEET	7/16" (0.434")
40 FEET	9/16" (0.579")
50 FEET	3/4" (0.724")
60 FEET	7/8" (0.868")
70 FEET	1" (1.013")
80 FEET	1-3/16" (1.158")
90 FEET	1-5/6" (1.302")
100 FEET	1-7/16" (1.447")

TABLE 1

Thermal Expansion / Contraction of Steel Panels

** Coefficient of expansion = 0.0000067 in/in/F*

- Metal flashing and trim should be installed with sealed end laps that account for expansion and contraction. Panels require installation with both a “fixed” end and a “free” end, permitting uniform control of expansion and contraction at one end of the roof. This manual follows an "architectural" or "steep slope" installation approach, fixing the high end of the panels (i.e., ridge, hip, high wall, and peak) and accommodating expansion and contraction at the low end (i.e., eaves, valleys).

c. Oil-Canning

- The perceived waviness in flat metal, known as "oil-canning," is inherent to light gauge cold-formed metal panels and trim. Dynamic Metals does not accept oil-canning as a reason for rejection. Minimizing oil-canning can be achieved using heavier gauges, narrower panel widths, and panel striations. To prevent panel distortion, substructures must be level within ¼ inch over 20 feet from eave to ridge.

d. Dissimilar Metals

- Avoid direct contact between the steel roofing system and dissimilar metals such as copper or brass, as corrosion from this contact is not covered by Dynamic Metals warranties. Similarly, do not install the steel roofing system where it will be exposed to moisture runoff from copper materials, which will cause premature corrosion of steel components.

e. Chemically Treated Lumber

- Chemically treated lumber can significantly corrode metal roofing components. Separate metal components from direct contact with treated wood, and use only stainless steel or ceramic-coated fasteners for attachment. Corrosion due to chemically treated lumber is not covered by Dynamic Metals warranties.Hot dipped galvanized fasteners are also acceptable.

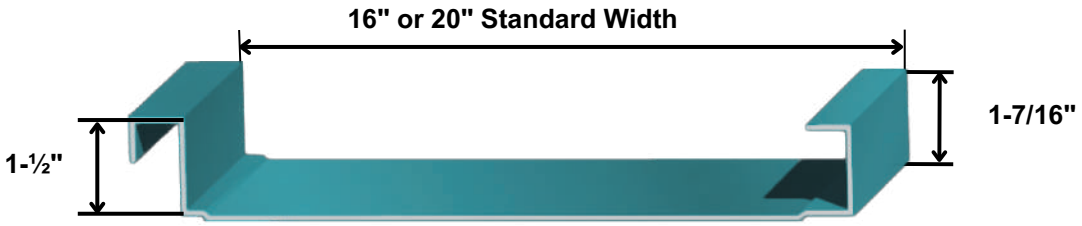
f. Graphite

- For marking unpainted Galvalume steel components, avoid the use of graphite pencils to prevent premature corrosion.

PANEL DESIGNS

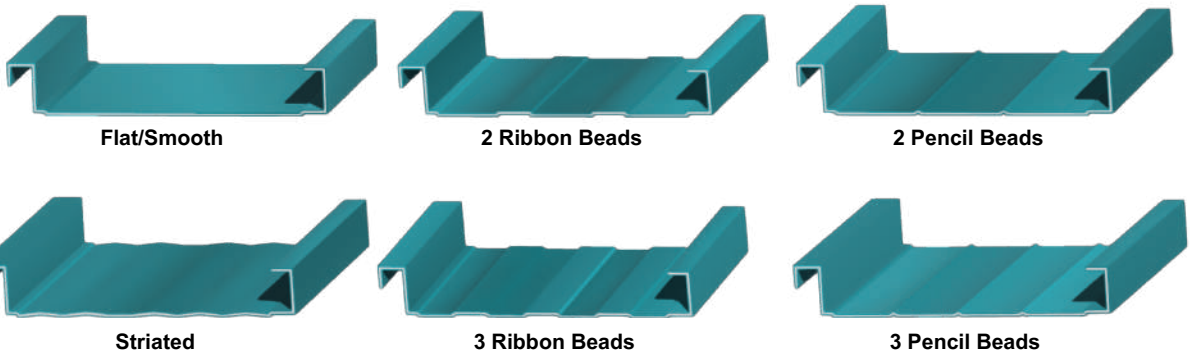
4 PANEL DESIGNS

a. DM Class 1500 Panel Description and Options



- Nailstrip profile: Integral design with 1-inch height “snap” lock and fastening flange
- Width: Standard panel width is 16 inches, with additional availability of 14” and 12” width. Custom widths can be requested.
- Profile: The standard panel profile is "striated". Alternative options include smooth profile, 2 pencil ribs, and 2 bead (mesa) ribs. The striated profile offers the best option for minimizing the visibility of potential oil-canning.

Optional Surface Patterns



- Panel Lengths: Standard lengths range from 3 to 48 feet. For longer lengths, please contact Dynamic Metals for more information on options exceeding 45 feet. Check local building code requirements for limitations.
- Materials**:** Offered in AZ-50 Galvalume coated steel in 26 and 24 gauge, as well as 0.032” & 0.040” aluminum.
- Finishes: Options include unpainted Galvalume (with clear acrylic coating) The Kynar 500 PVDF Polyvinylidene finish is available for 24 gauge steel 0.032” & 0.040” aluminum, while the Siliconized Modified Polyester finish is offered for the 26 gauge option. Check the color selection charts for available finishes.

b. Panel Fasteners:

- Fasteners should be applied through the fastening flange on the male side of the panel. For wood substrates, a #10-12 x 1 inch pancake head wood screw is recommended. These fasteners should penetrate through the substrate by at minimum of 3/16" or be embedded into sheathing by 1" minimum.

c. Sealants

- Sealant plays a crucial role in preventing water from penetrating through the metal roofing system. It is used at joints, laps, intersections, and perimeter edges of panels and flashings. Additionally, it is applied to the laps and joints of gutters and downspouts to manage water flow to the ground. For correct sealant application, consult the DM Class 1500 Sealant Details.
  - **Tape Sealant:** Butyl Tape, which does not dry, possesses excellent physical and weathering properties. Its high dimensional stability makes it ideal for use between compressed mating surfaces, such as between zee closure flashing and roof panels. Tape sealant should NOT be used as an exposed surface sealant or where it won't be compressed between surfaces. It also should NOT be installed in areas exposed to direct sunlight.
    - Material: Butyl-polyiso-butylene base extruded compound
    - Dimensions: 1/8” thick x 1/2” bead x 45 feet roll with release paper other sizes and thinkness available.
  - **Caulk Sealant:** Caulk sealants are versatile and can be used almost everywhere sealant is required. They can be applied between mating surfaces or as an exposed surface sealant. For optimal results, apply the sealant into corners or mating surfaces to ensure continuous adhesion and eliminate voids.
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    - Caulk sealants are available in approximately 10 oz. cartridges, with a coverage rate of around 25 linear feet for a ¼ inch bead diameter.

d. Metal Flashings and Trim

- Flashings and trim are brake-formed components designed to prevent water infiltration at roof perimeters, intersections, transitions, and junctions. Typically, they match the gauges and finishes of the roof panels but can also come in contrasting materials and colours. Standard lengths for flashing/trim are 10 feet. Contact Dynamic Metals, LLC for more information on non-standard lengths and profiles.

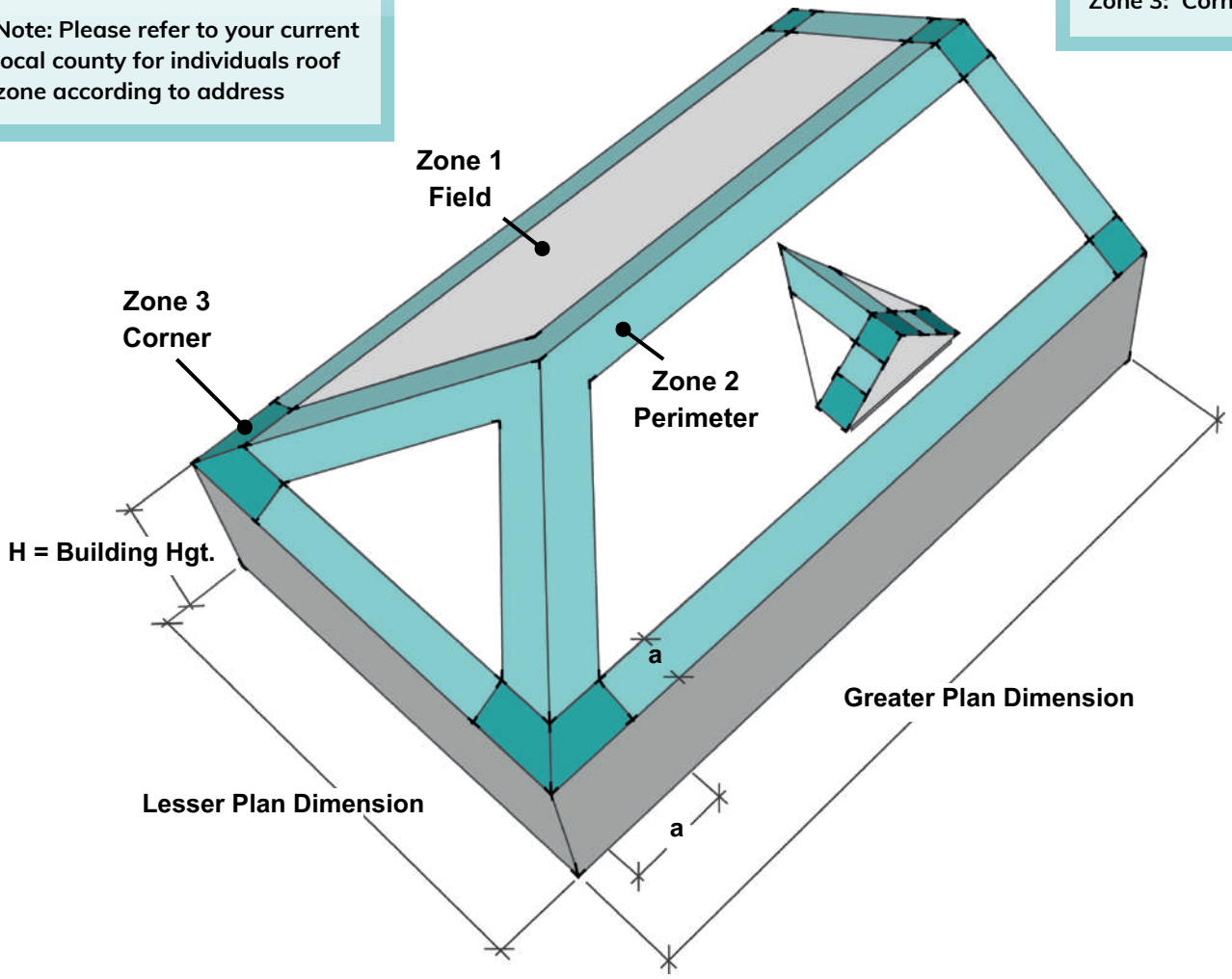
Roof Zones

NOTE

Note: Please refer to your current local county for individuals roof zone according to address

TABLE

Zone 1: Field
Zone 2: Primeter
Zone 3: Corner



Determining Perimeter (Zone 2) and Corner (Zone 3) Areas:

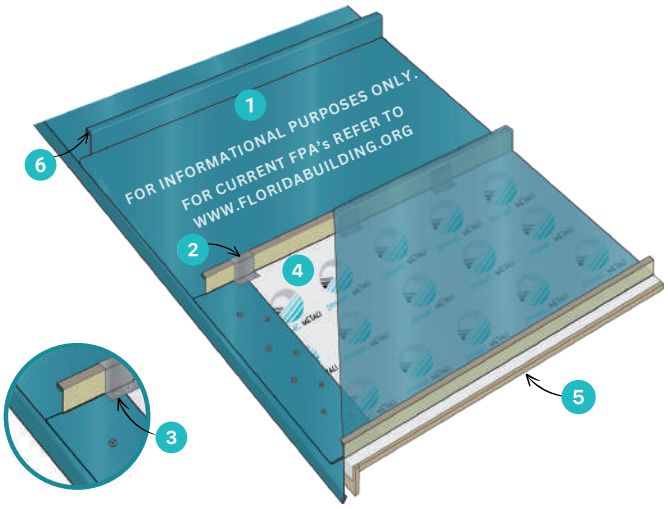
Dimension 'a' = The lesser value of 10% of the "Lesser Plan Dimension" or 40% of the Mean Roof Height (0.1 x "Lesser Plan Dimension" or 0.4 x Mean Roof Height)

NOTE

Dynamic Metals recommends minimum 4 feet wide in any direction for your corner and perimeter conditions.
Every roof is different, please consult the current Florida Building Code.

Panel Profile Fastener Installation

1. DM Class 1500 (1 ½" Mechanical Seam)
2. Dynamic Metals Approved Clip
3. 1" Pancake Fasteners
4. Approved Underlayment
5. 15/32 Plywood Decking
6. Single Lock 90° Seam

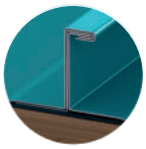


FPA NUMBER	DESCRIPTION	INSTALLATION OPTIONS	MAX. DESIGN PRESSURE	MINIMUM FASTENERS	CLIPS	PANEL SEAM	CLIP SPACING 4" FROM ENDS	PRESS LINK FOR FPA
FL# 41724.8-R1 (Coming Soon! FL# 41724.04-R2)	0.032" (MIN) ALUMINUM ROOF PANEL 20" (MAX) WIDTH	OPTION 1 OPTION 2	-156 PSF -198.5 PSF	(2) #10 X 1" FASTENER PER CLIP	2" LONG 26GA CLIP	90°	13" MAX O.C. 10.5" MAX O.C.	FL# 41724.8 - R1 FL# 41724.04-R2
FL# 41724.9-R1 (Coming Soon! FL# 41724.05-R2)	16 OZ. COPPER ROOF PANEL 16" (MAX) WIDTH	OPTION 1 OPTION 2	-146 PSF -198.5 PSF	(2) #10 X 1" FASTENER PER CLIP	2" LONG 26GA CLIP (S.S.) 3" LONG 26GA CLIP (S.S.)	90°	16" MAX O.C. 12" MAX O.C.	FL# 41724.9 - R1 FL# 41724.05-R2
FL# 41724.10-R1 (Coming Soon! FL# 41724.06-R2)	26 GA. (MIN) GALVALUME ROOF PANEL 16" (MAX) WIDTH	OPTION 1	-218.8 PSF	(2) #10 X 1" FASTENER PER CLIP	2" LONG 26GA CLIP	90°	"12 MAX O.C.	FL# 41724.10 - R1 FL# 41724.06-R2
FL# 41724.11-R1 (Coming Soon! FL# 41724.07-R2)	0.032 (MIN) ALUMINUM ROOF PANEL 16" (MAX) WIDTH	OPTION 1 OPTION 2	-138.5 PSF	(2) #10 X 1" FASTENER PER CLIP	2" LONG 26GA CLIP	90°	16" MAX O.C.	FL# 41724.11 - R1 FL# 41724.07-R2
FL# 41724.12-R1 (Coming Soon! FL# 41724.08-R2)	24 GA. (MIN) GALVALUME ROOF PANEL 16" (MAX) WIDTH	OPTION 1 OPTION 2	-138.5 PSF -213.5 PSF	(2) #10 X 1" FASTENER PER CLIP	2" LONG 26GA CLIP	90°	16" MAX O.C. 8" MAX O.C.	FL# 41724.12 - R1 FL# 41724.08-R2
FL# 41724.13-R1 (Coming Soon! FL# 41724.09-R2)	24 GA. (MIN) GALVALUME ROOF PANEL 20" (MAX) WIDTH	OPTION 1 OPTION 2	-76.PSF -178.PSF	(2) #10 X 1" FASTENER PER CLIP	2" LONG 26GA CLIP	90°	19"MAX O.C. 13" MAX O.C.	FL# 41724.13 - R1 FL# 41724.09-R2

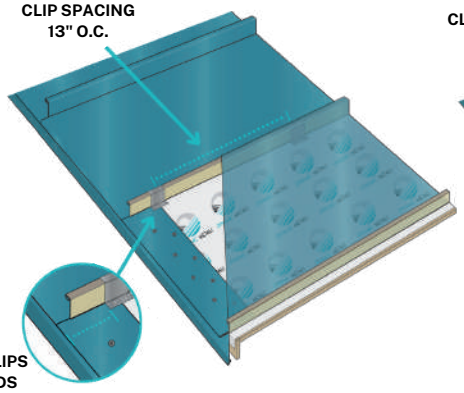
HOW TO READ PRODUCT APPROVALS

EXAMPLE

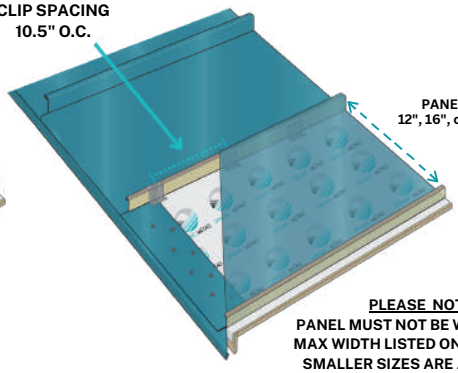
DM CLASS 1500
FL# 41724.8 - R1



OPTION 1



OPTION 2



PLEASE NOTE:
PANEL MUST NOT BE WIDER THAN MAX WIDTH LISTED ON APPROVAL. SMALLER SIZES ARE AVAILABLE.

INSTALLATION INSTRUCTIONS

5 INSTALLATION INSTRUCTIONS

a. Tools and Accessories

- Minimum Recommended Tools for Installation:
  - Sheet metal snips (left and right hand) for general cutting of trims and panels
  - Long-handled pattern (bulldog) snips for long cuts in trims and panels
  - Locking style C-clamps to hold panels and trims during cutting and drilling
  - 3” hand seamers (duckbill folder) for bending sheet metal tabs and hems
  - Panel hemming tool (16”) for forming hem on panel ends at eaves and valleys
  - Pop rivet tool for installing #42 (1/8” diameter) rivets in trims, flashing, and guttering
  - Hammer
  - Chalk line
  - Tape measure
  - Electric screw gun
  - Drill bits (1/8” diameter)
  - Electric sheet metal shears for long cuts in trims and panels
  - Marking pens for marking cuts in sheet metal components
  - Utility knife
  - Caulk gun

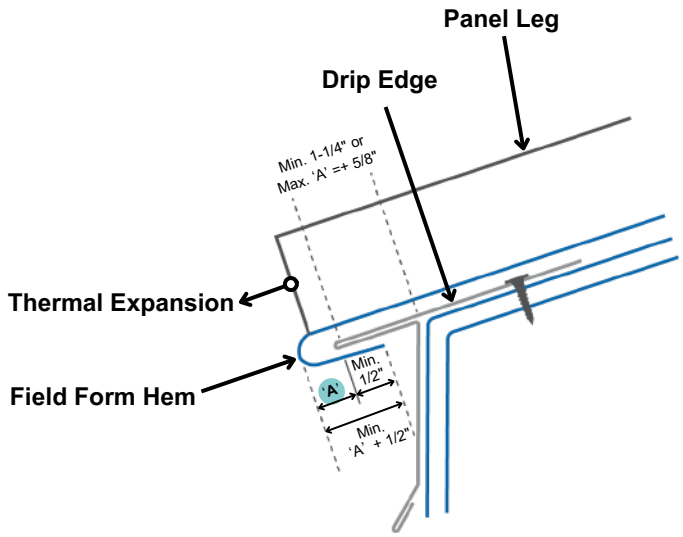
b. Underlayment Installation:

- The underlayment should cover the entire substrate continuously.
- Ensure the roof deck is clean and free of moisture, ice, dust, loose nails, protrusions, voids, and other debris.
- Apply with minimum 4” horizontal laps and minimum 12” vertical (end) laps, starting from the lowest portion of the roof. Extend the underlayment over the roof edges by at least 1-1/2". Center a full course along valleys and extend it at least 6" up vertical termination details like sidewalls and highwalls.
- Use only electroplated, galvanized, or coated fasteners. Avoid "common steel" nails, which may rust and spread corrosion to metal roof panels and flashings. Do NOT use staples for underlayment application. Secure nails 6 inches apart along head and end laps and 24 inches apart along the centre of each course.
- Self-adhered membrane underlayments should be applied with the release paper facing the roof surface. Remove the release paper diagonally from the bottom while applying heavy hand pressure on the top. Follow the manufacturer's temperature requirements for cold weather installation.
- Replace or cover underlayment exposed to elements beyond the manufacturer’s recommended duration.

c. DM Class 1500 Panel Installation:

- For optimal performance, panels should extend from the low point to the high point without interruption.
- Hem panels around drip edges and cleats at the lowest points to accommodate expansion and contraction. Hemming is done on-site by the installer. Refer to Table 4 “Thermal Gap Installation Chart” and Figure 6 for appropriate hem lengths and gap settings.

Setting Panel Thermal Gap During Installation



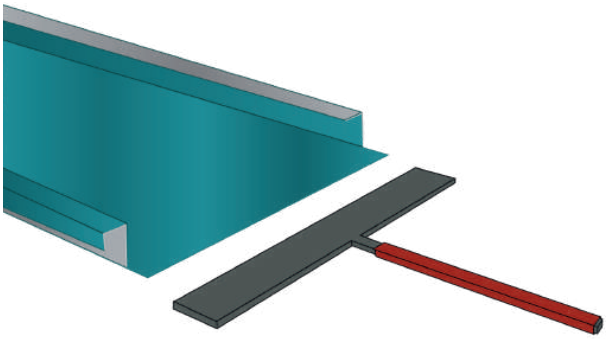
Refer to Table 1 for gap.

NOTE

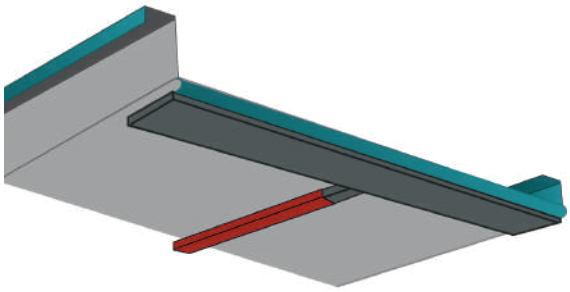
'A' = Gap from Thermal Expansion Chart during time of installation

Panel Hemming

1. Notch vertical legs back from eave end of panel equal to hem length (nominally 1 inch or maximum dimension provided.)

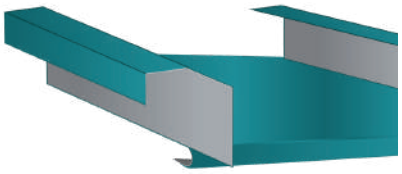


2. Use panel hemming tool to fold panel end 180 degrees.

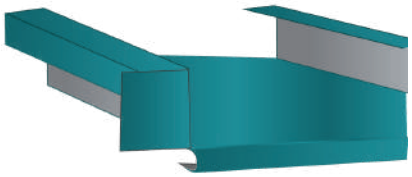


Closing Female Rib End (*optional*)

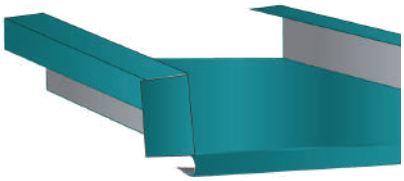
1. Leave 1" tab along inside of female leg after hemming panel and.



2. Fold tab around end of rib to close off opening.



3. Snip off excess tab along outside profile of rib.



d. Installing Panels:

- Before installing panels, the following flashing assemblies must be set up:
  - Eave drip edge
  - Valley flashing
  - Gable trims (specifically for sub-panel flashings)
- Panel installation should start at the extreme lower left or right of each roof plane. Progress can only be made in one direction across the roof plane.
- Install the First Panel: Hook the hemmed end onto the eave drip edge or offset cleat. Secure the uppermost end to the substrate with a single fastener to hold the panel in place.
- Fasten the Panel: Install fasteners along the fastener flange on the male leg of the panel at the required intervals.
- Install the Second Panel: Loosely overlap the female leg over the male leg. Allow the lower end (eave end) of the panel to extend off the roof edge so the panel hem does not interfere with the drip edge. Snap down the lower end of the panel by hand until the hem is below the extended lip of the drip edge. Carefully slide the panel up the slope to fully secure the hem around the lip. Set the expansion gap as indicated in Figure 6. Snap down the female rib onto the male rib starting at the eave and moving upslope. CAUTION: Do not use a hammer or mallet to snap panels together, as this may damage the ribs or dent the panels at fastener locations.
- Continue Installation: Repeat the above steps for the remaining panels.
- During installation, it's crucial to maintain modularity (dimension across panel width). Measure multiple ribs at both ends to ensure square installation. Failure to uphold modularity can result in poor alignment at the eave ("saw-tooth effect") and dimension variations along parallel gable edges and walls. If necessary, slight corrections can be made by applying counter adjustments at the panel ends over the next several panels. Do not exceed a 1/8 inch gap on each side lap when making these adjustments.

e. Installing Trim & Flashing Details:

- **Eave Detail:**
  - Install the first section of the extended eave drip edge tight to the roof edge over the first layer of underlayment. Secure it with appropriate substrate fasteners spaced 8 inches apart in a staggered pattern.
  - Install additional sections with a minimum 4 inch overlap and apply tube sealant at the overlaps.
- **Gable Detail - drip edge style**
  - Install the first section of the extended gable drip edge tight to the roof edge over the underlayment. Secure it with appropriate substrate fasteners spaced 8 inches apart in a staggered pattern.
  - Install additional sections with a minimum 4 inch overlap and apply tube sealant at the overlaps.
- **Gable - box style with zee closure:**
  - Install panels continuously across the roof area to the outside face of the gable edge.
  - Apply a continuous row of bead tape sealant to the base of the zee closure. Mark the face of the roof panel from the gable edge to the corresponding width of the box gable trim. Install the zee closure along the entire length of the roof panel, using markings as a guide. Secure it with appropriate substrate fasteners at a minimum of 4 fasteners per zee or 12 inches on center.
  - Install a continuous cleat along the fascia board with appropriate fasteners spaced 8 inches apart.

- Hook the box gable trim onto the cleat and overlap it over the top flange of the zee closure. Provide a minimum 4 inch overlap and apply sealant at the laps. Pop rivet the box gable trim to the top flange of the zee closure every 18 inches.

- **Valley Detail - with separate offset cleat (page 32):**
  - Start with the lowest section of valley flashing, notching and hemming a minimum of 1 inch around the drip edge.
  - Fasten both sides of the valley just below the hemmed edge at intervals of 12 inches on center.
  - Continue installing sections of valley flashing up the slope with a minimum 12 inch overlap and 2 rows of tube sealant at the overlaps.
  - Apply a continuous row of 7/8 inch double bead tape sealant to one side of the offset cleat. Install the offset cleat a minimum of 4 inches from the center line of the valley on both sides. Secure it with appropriate substrate fasteners at intervals of 8 inches on center.
  - Lap field courses of underlayment by a minimum of 4 inches on both sides of the valley flashing.
  - Install roof panels with the hemmed end hooked onto the offset cleat on both sides of the valley flashing. Take care not to scratch the valley flashing while sliding panels into place.
- **Hip Detail:**
  - Install panels continuously across roof areas along both sides of the hip line.
  - Field cut zee closure flashing to fit tightly between the panel ribs. Apply a continuous row of tape sealant to the base of the zee closure. Install the zee closures onto the panels on both sides using the hip flashing to position them correctly. Secure with appropriate substrate fasteners at a minimum of 4 fasteners per zee or 3 inches on center.
  - Apply a row of tube sealant along the back face of the zee closure adjacent to the panel legs.
  - Hook the hip flashing onto the zee closures and rivet it to the top flange of the zees every 18 inches on both sides.
  - Install additional sections of hip flashings with a minimum 4 inch overlap and apply tube sealant at the laps.
- **Sidewall Detail - with zee closure:**
  - Install panels continuously across the roof area to the face of the wall.
  - Apply a continuous row of Butyl Tape sealant to the base of the zee closure. Mark the roof panel from the wall face to match the width of the sidewall trim. Install the zee closure along the roof panel using these markings and secure with appropriate fasteners, ensuring at least 4 per zee or every 12 inches.
  - Attach sidewall flashing by hooking its open hem onto the zee closure's top flange and aligning its vertical face against the wall. Fasten the flashing to the wall every 12 inches, offering a minimum 4-inch overlap and sealing accordingly. Rivet the sidewall flashing to the zee closure's top flange every 18 inches.
- **Highwall (headwall) Details:**
  - Install panels over adjacent roof sections. Cut zee closure flashing to fit snugly between panel ribs, apply the sealant, and place zee closures on both sides. Use the highwall flashing to position the zee closures and secure them with fasteners, applying tube sealant along the back of the zee closure next to panel legs.

- **Endwall Flashing:**
  - By hooking its hemmed edge onto the zee's top flange, fastening as before, providing overlapped segments with sealant, and riveting every 18 inches.

- **Ridge Detail:**
  - On Ridge detail, extend panels across roof areas along both sides of the ridge line. After cutting zee closure flashing, apply sealant and fix Z closures on either side. Position using ridge flashing and fasten with appropriate substrate fasteners. Install tube sealant behind zee closure along panel legs. Hook ridge flashing onto zee flanges and rivet every 24 inches on both sides. For vented ridges, install vent cleats along the zee closure's opening and follow the same riveting process.
  - To construct peak details, install continuous panels over roof sections, cut zee closure flashings, apply sealant, and position zee closures. Securely fasten, adding additional tube sealant, and fit continuous cleats along fascia boards. Hook peak flashing onto the cleat and zee flange and rivet every 24 inches.
  - For pipe penetrations, create a round opening in the panel with a half-inch gap around the pipe.
  - Apply continuous bead of tube sealant around base of pipe at panel surface.
  - Note: Use EPDM pipe flashing (siliconized pipe flashing for high temperature pipes) with round base and integral aluminum base ring.
  - Cut opening in top of pipe flashing slightly smaller than pipe diameter.
  - Apply continuous bead of tube sealant to bottom of pipe flashing base and install boot over pipe and position base against panel surface.
  - Install HWH screws with washer around base of pipe flashing at 1 inch on center.
  - Apply continuous bead of tube sealant around top and base of pipe flashing.
  - Install stainless steel clamping ring around top of pipe flashing.
- **Square Penetrations:**
  - Refer to step by step illustrations and instructions for installing square curb style penetrations at the end of this manual.

ROOFING PROTECTION & REPAIR

6 ROOF PROTECTION & REPAIR

a. Roof Protection During Installation:

- During roof installation be careful to prevent damage to panels and trims such as scratches, dents, and paint abrasion. This can be caused by construction materials, tools, safety equipment, and workers on roof. Most damage can be prevented by the following means:
  - Minimize traffic on installed portions of roof from workers.
  - Use soft soled footwear. Be sure to clean debris from bottom of footwear before climbing onto roof.
  - Remove metal scraps and other construction debris from roof daily.
  - Immediately remove metal shavings from the surface of panels and trim that occur from cutting and drilling processes.

b. Roof Protection After Installation:

- After installation of roof it is advisable to perform periodic inspections and maintenance of roof to ensure proper performance. The following are recommended maintenance points:
  - Roof should be kept clean. Remove all trash, debris, and dirt from roof. Debris such as leaves and sticks may hinder the drainage of water in valleys and gutters. Debris and dirt hold moisture against the roof surface and prevent the roof from drying completely. Constant exposure to moisture can lead to paint failure and rusting of panels.
  - Trim back any overhanging tree branches
  - Penetrations: Close attention should be given to roof penetrations (pipes and curbs). For pipe penetrations, check that flexible rubber boots are properly secured to roof and pipe. If cracks or tears are observed in boot the boot should be removed and replaced.

c. Finishes and Touchup:

- Take care to protect material surfaces to protect finish from scratches and abrasions that may void finish warranty and result in failure of finish. Touch up paint may be obtained from Dynamic Metals. Apply touchup paint to scratches as required.
- Note that touchup although from same pigment, resin and or composition, paint does not have the same durability and color retention qualities as the factory applied paint finish and thus should be applied sparingly.
- Apply only enough paint to completely cover the scratched area to avoid unsightly finish variations.
- Do not use aerosol paint applicators for touch up.

d. Repairs to Roof:

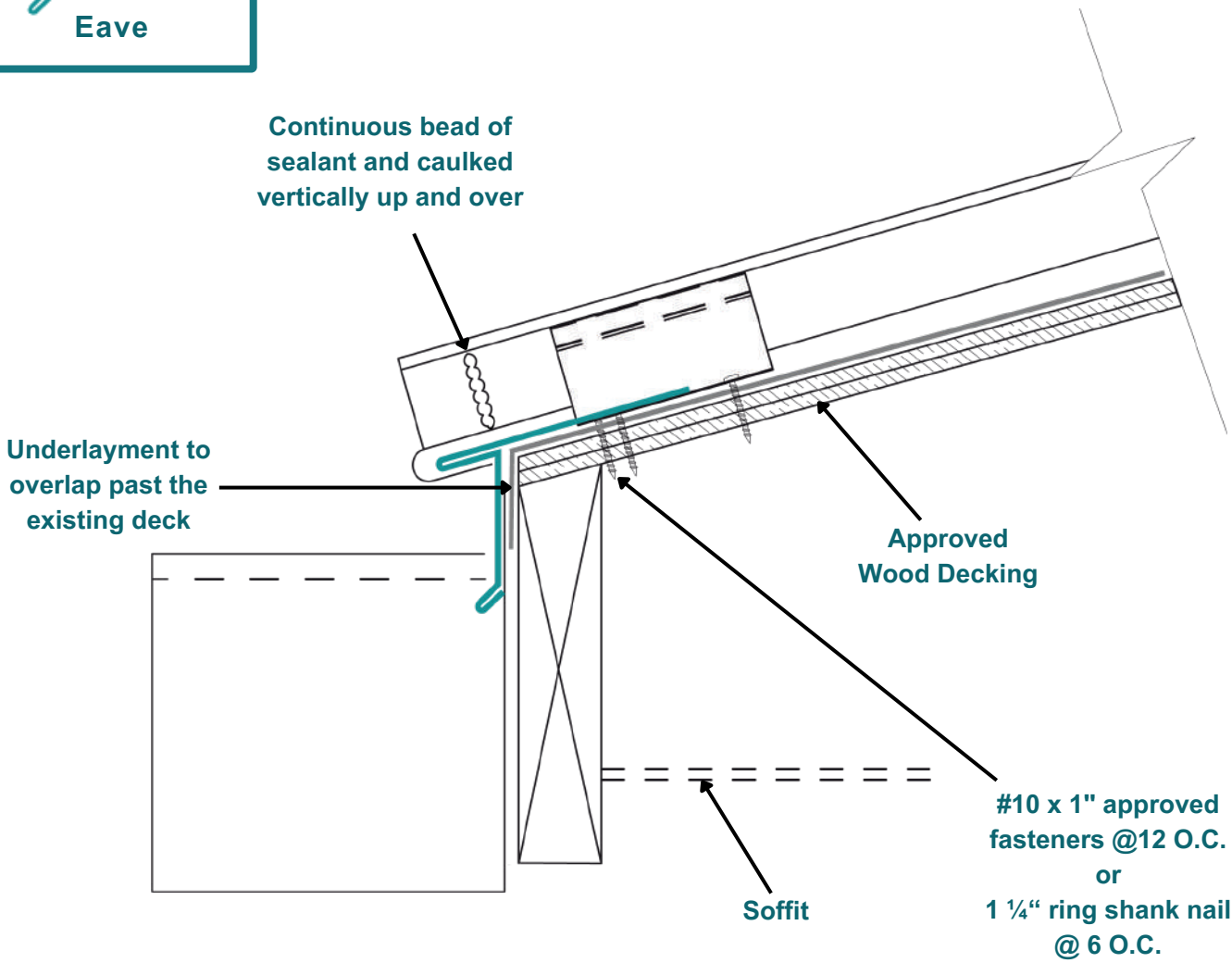
- Should repairs be needed, it is recommended that only qualified installers that are experienced in installing metal roofing systems perform the work.

INSTALLATION DETAILS

7 INSTALLATION DETAILS

Eave W/ Gutter Detail

Minimum 4" overlap with continuous concealed sealant

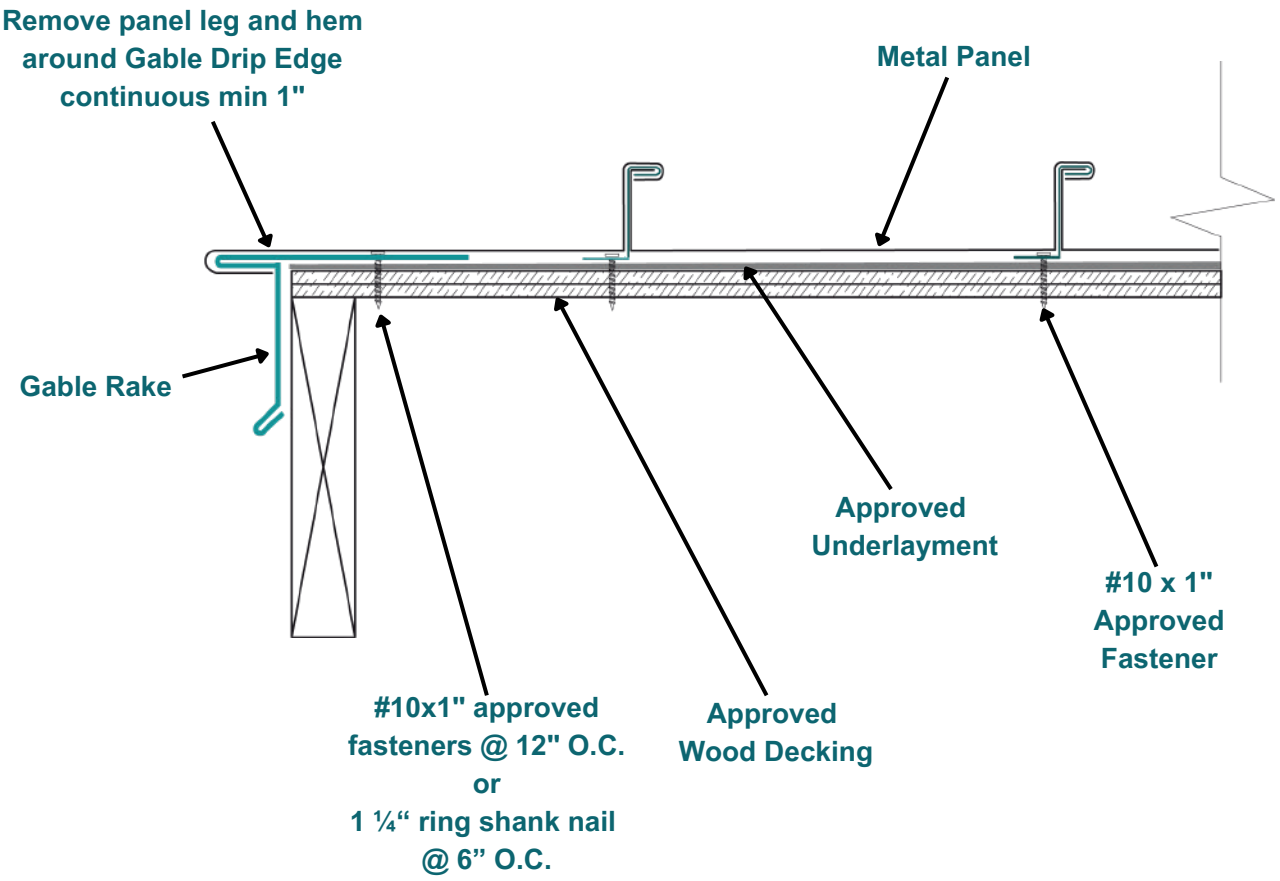


NOTE

Underlayment laps all the way down the fascia.

Gable Rake Detail

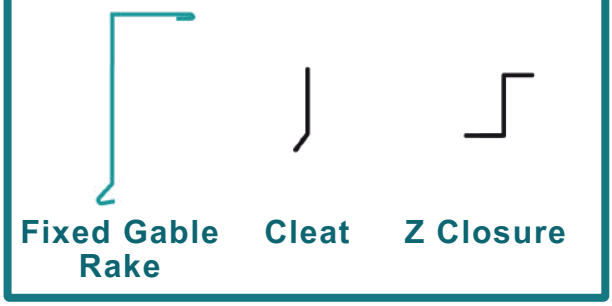
Two beads of caulking on every over lap



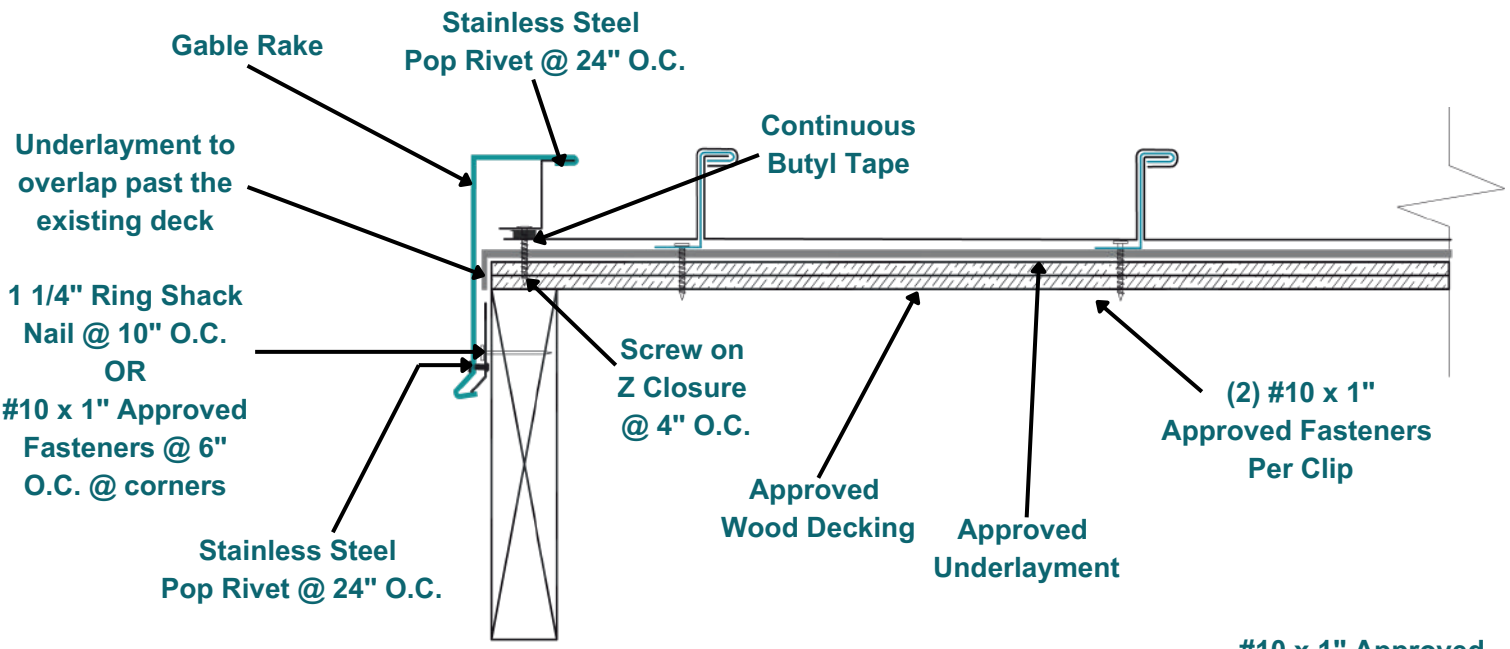
NOTE

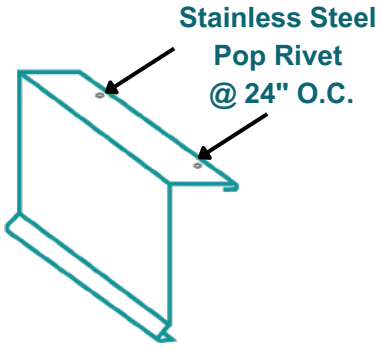
All nails or fasteners to be corrosion resistant or stainless steel when required by code.

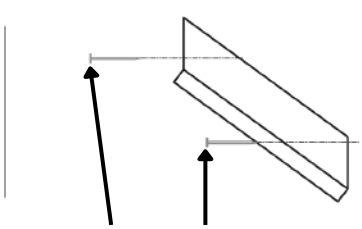
Fixed Gable Rake Detail

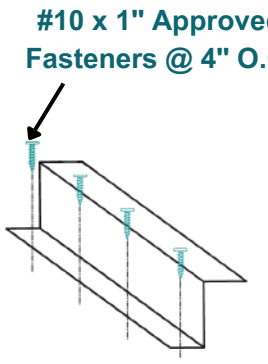


Minimum 4" Overlap with continuous concealed sealant





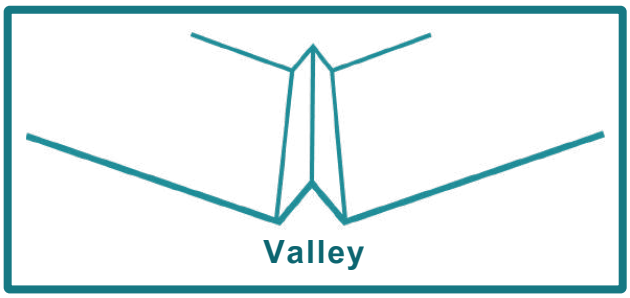




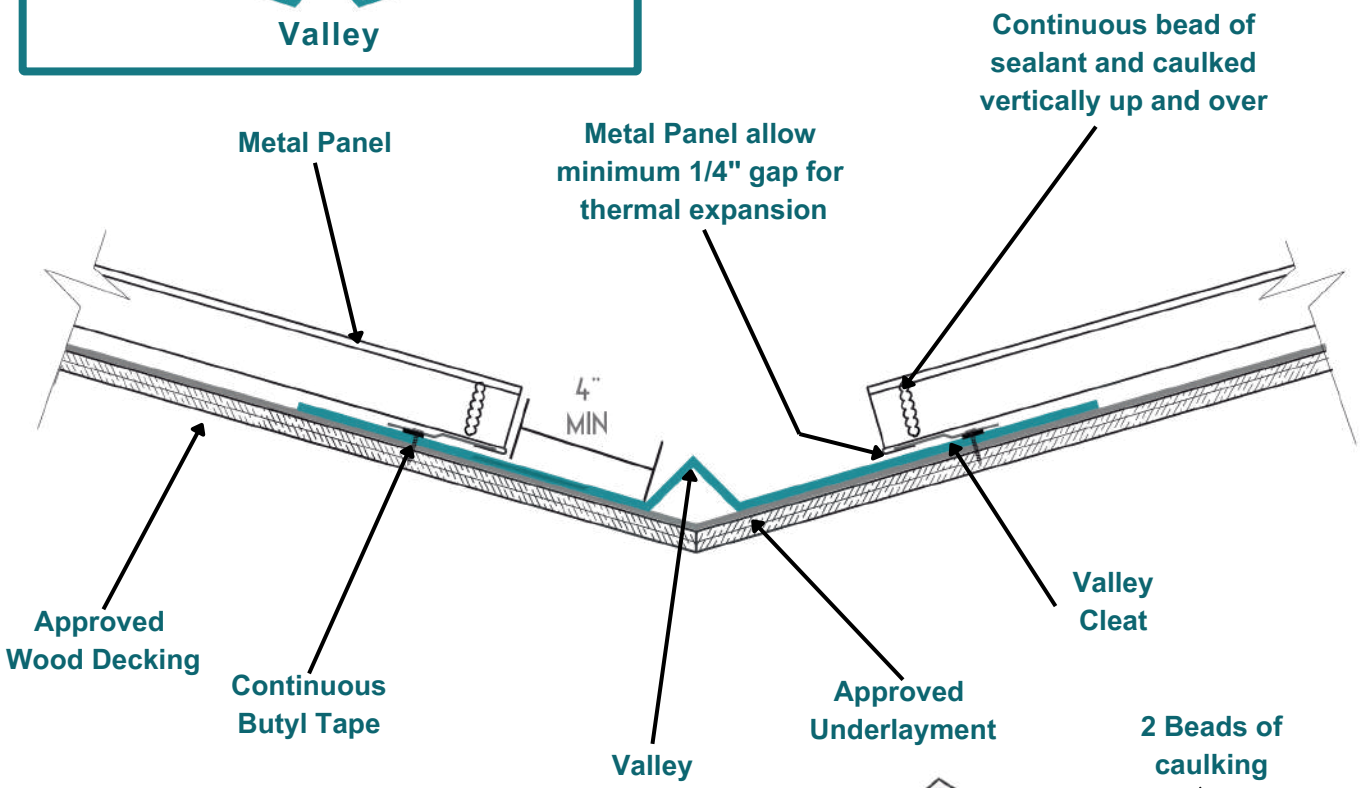
NOTE

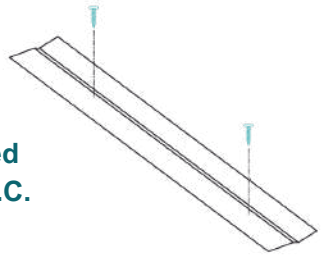
All nails or fasteners to be corrosion resistant or stainless steel when required by code.

Valley Detail

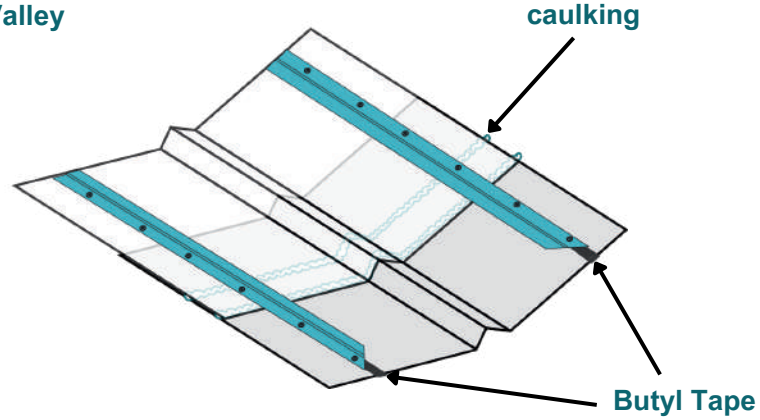


Minimum 8" Overlap with 2 rows of continuous concealed sealant





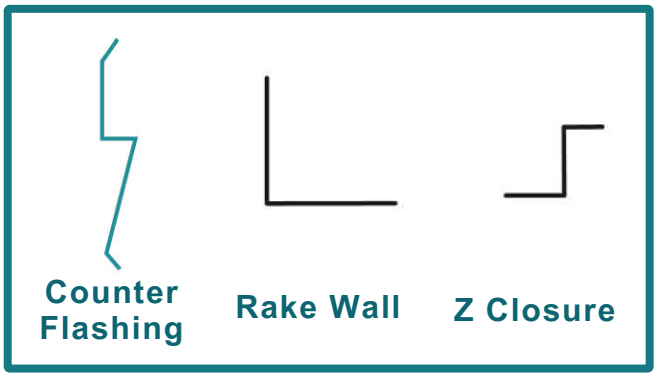
#10 x 1" Approved Fasteners @ 6" O.C.



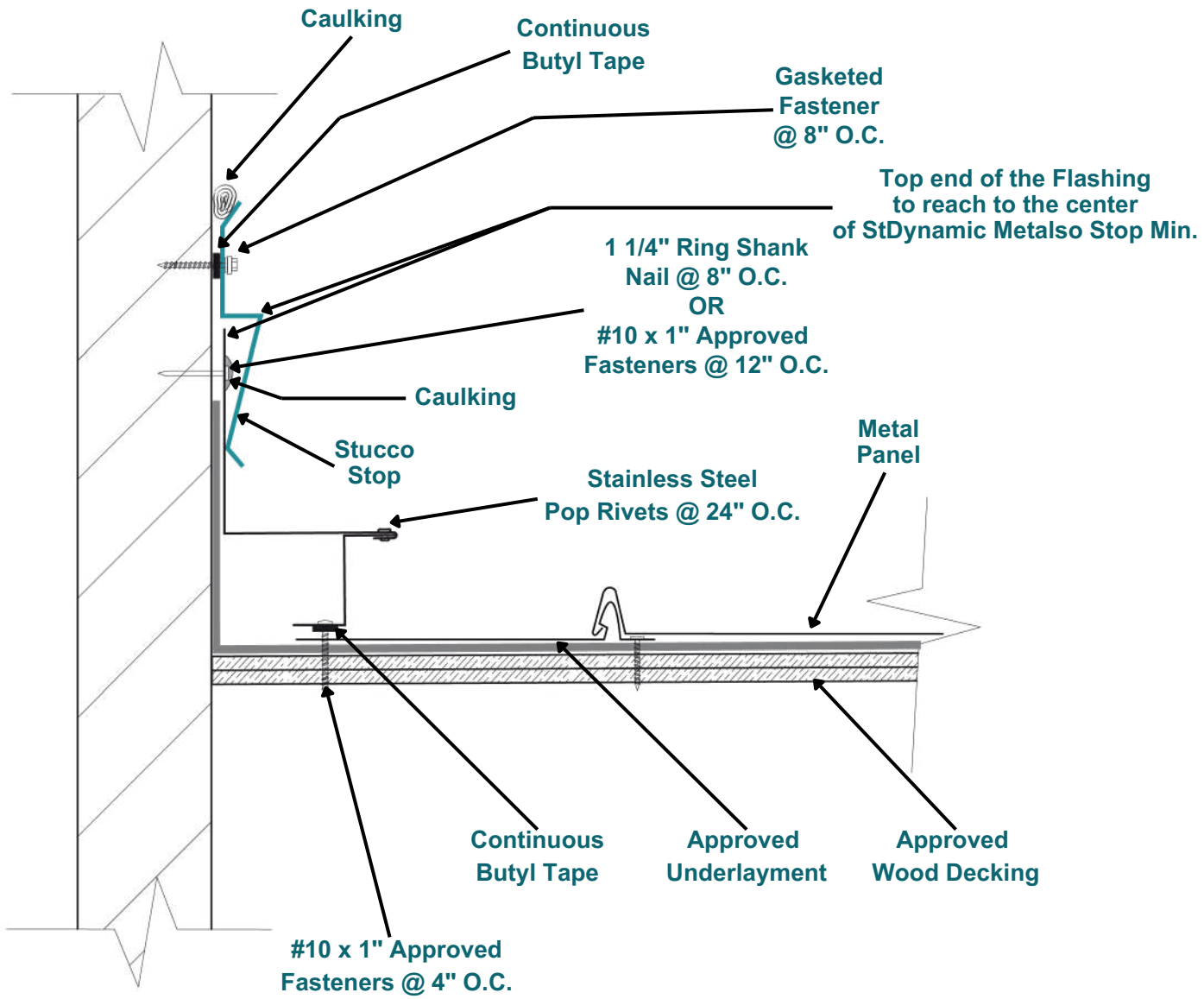
NOTE

All nails or fasteners to be corrosion resistant or stainless steel when required by code.

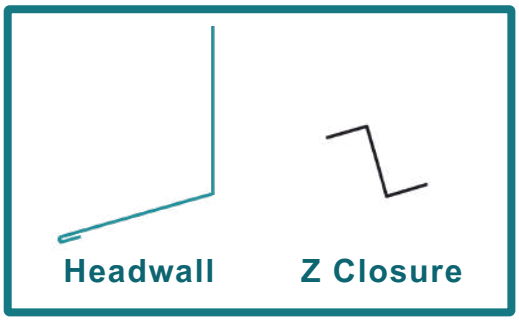
Counter Flashing Detail



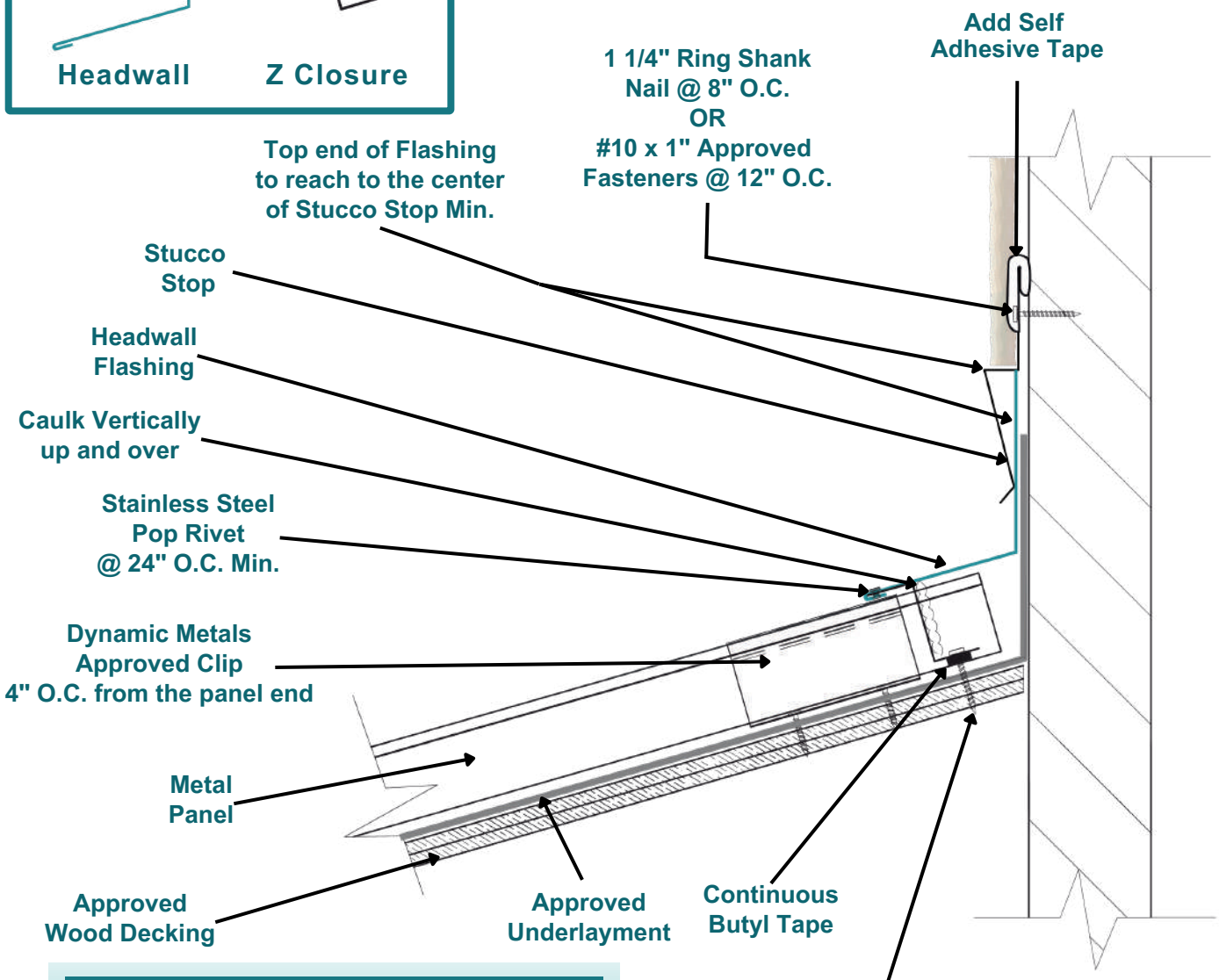
Minimum 4" Overlap with continuous concealed sealant



Headwall Detail



Minimum 4" Overlap with continuous concealed sealant

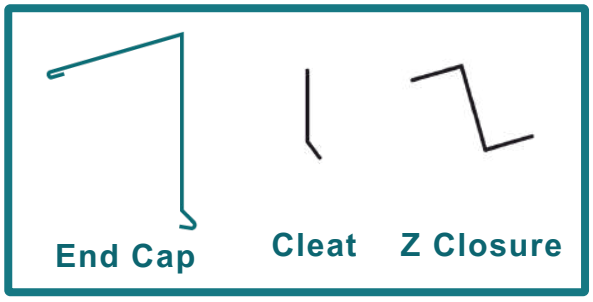


NOTE

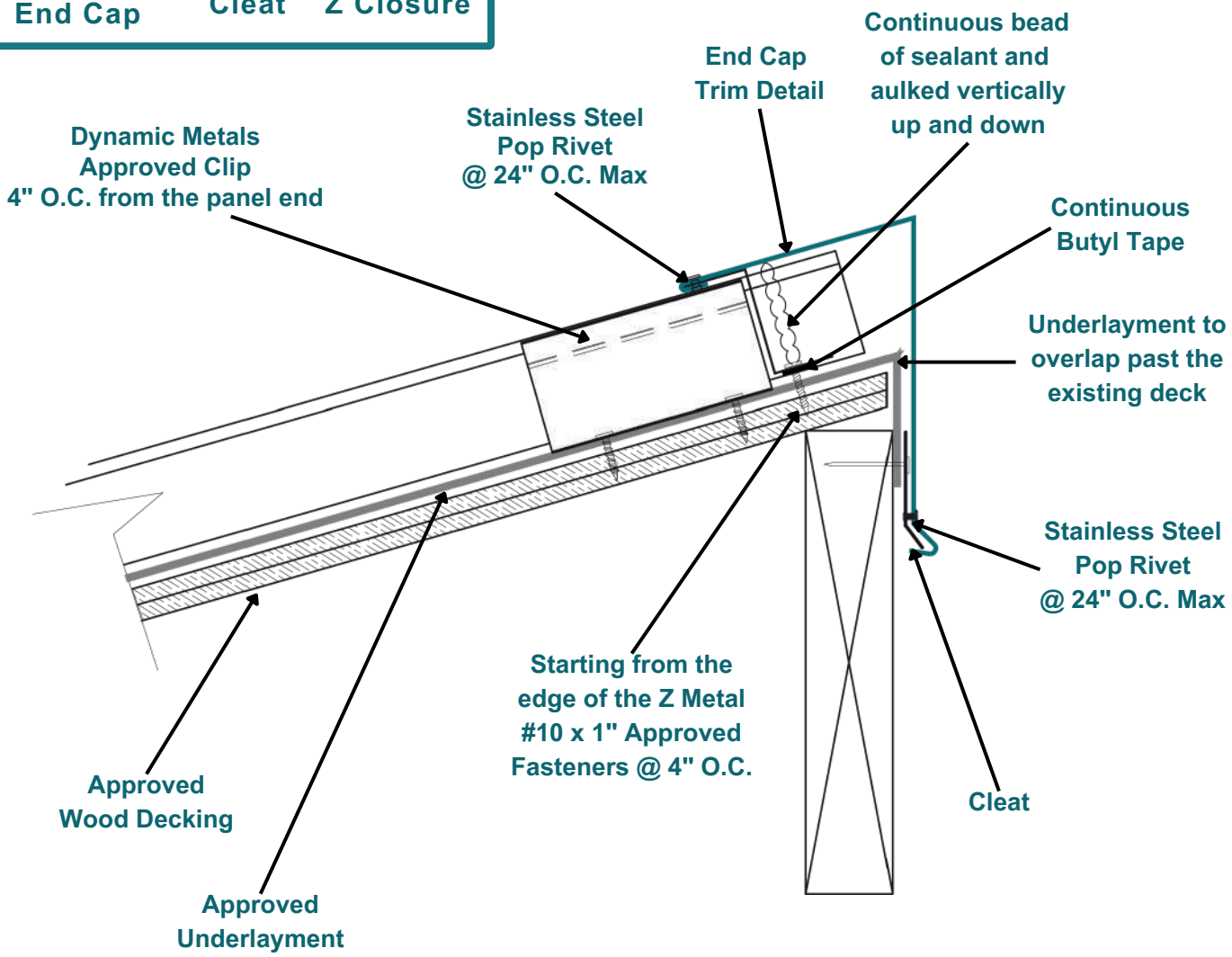
Z-Closures to fit tight between seams

Set Z-Closure with butyl tape and attached to panel with #10x1" approved fasteners @4" O.C. across the length.

End Cap Detail



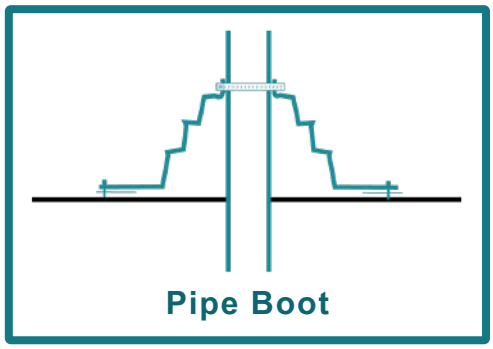
Minimum 6" Overlap with continuous concealed sealant



NOTE

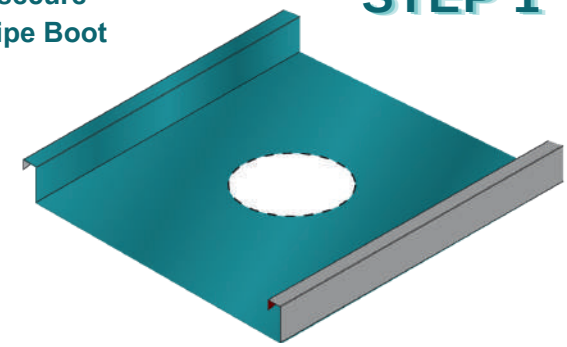
All nails or fasteners to be corrosion resistant or stainless steel when required by code.

Pipe Boot Detail

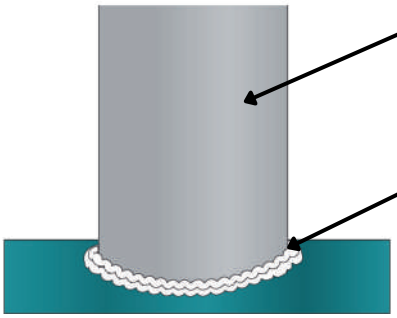


Note: Roll Pipe Boot up over Butyl Tape sealer and secure clamp around top of Pipe Boot

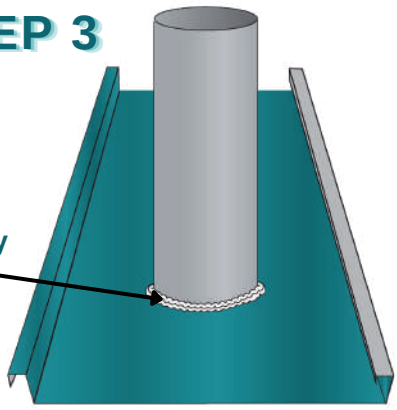
STEP 1



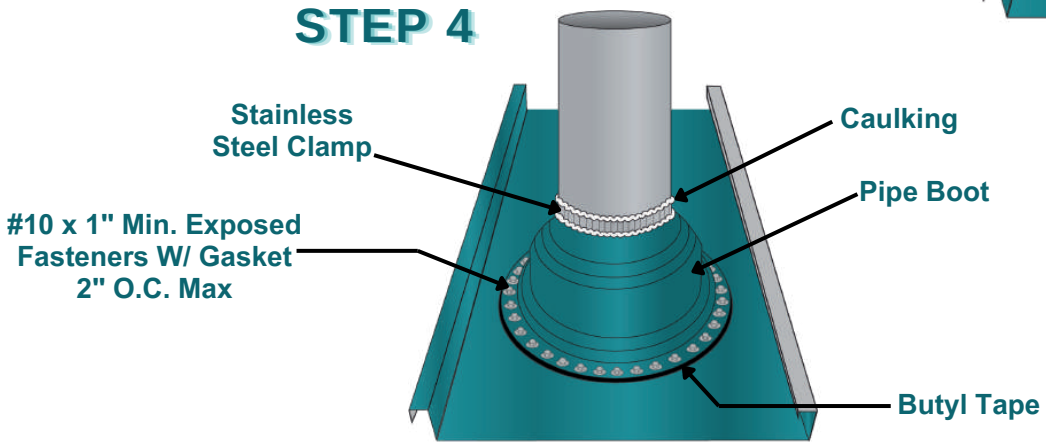
STEP 2



STEP 3



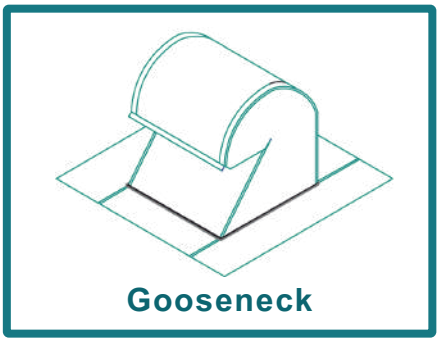
STEP 4



NOTE

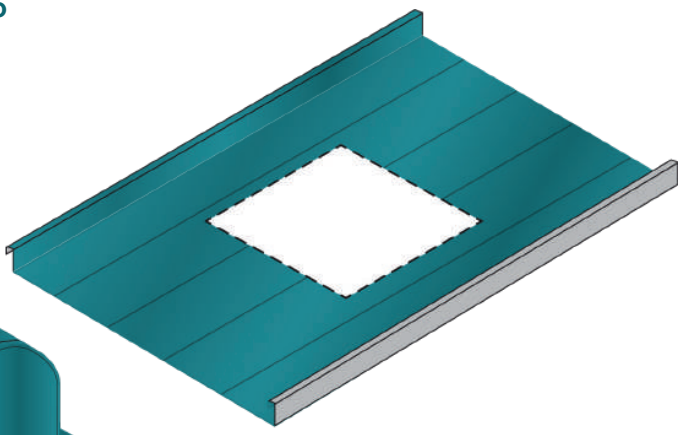
Boot Flashing to be between panel ribs @ all times.

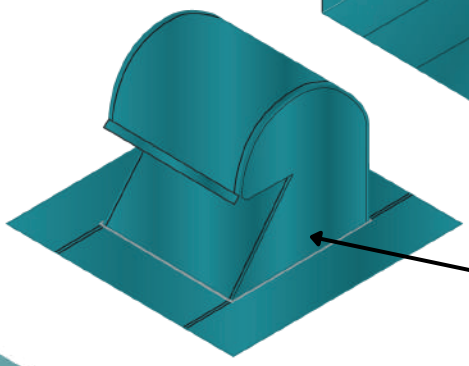
Gooseneck Detail



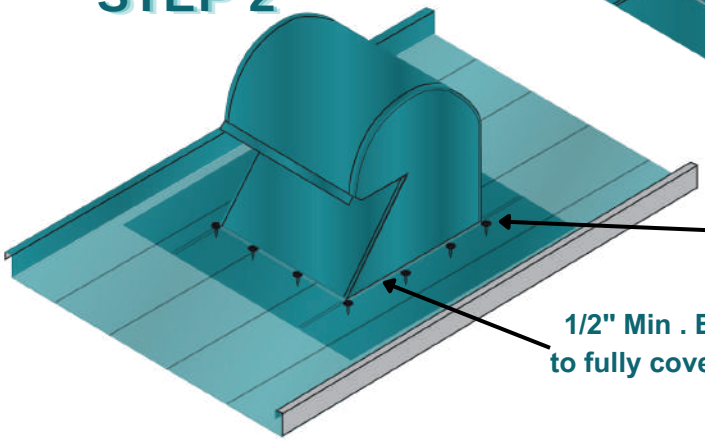
Note: Apply caulking to top & bottom

STEP 1

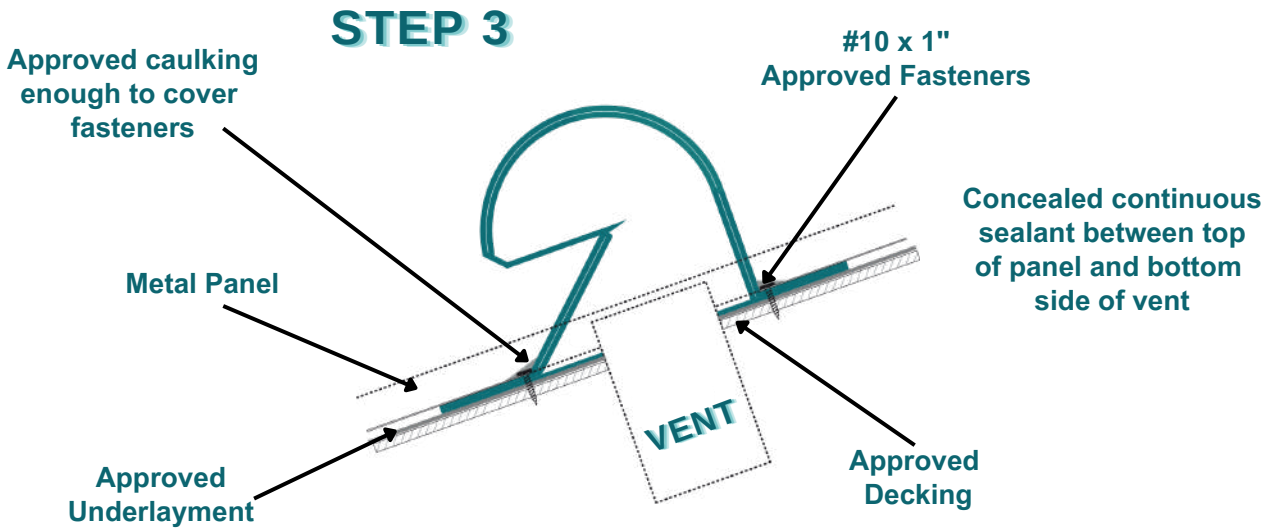




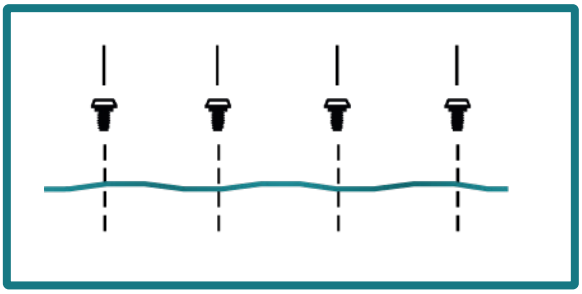
STEP 2



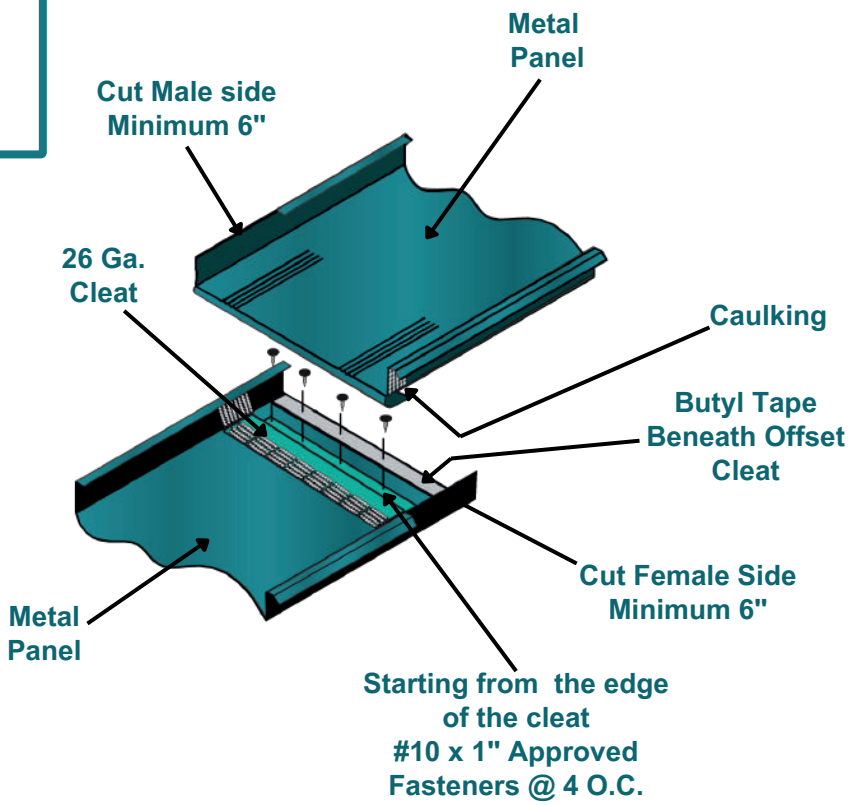
STEP 3

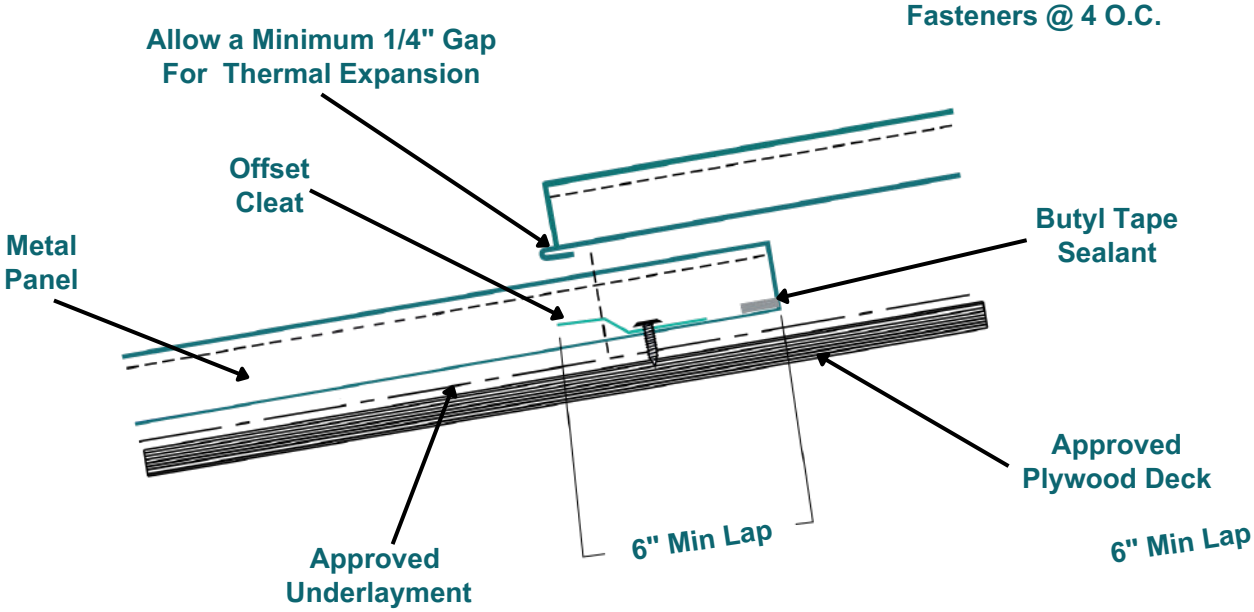


Panel Endlap Detail

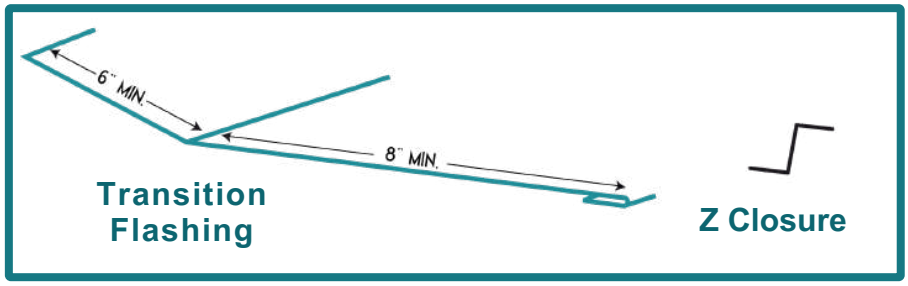


Note: Apply caulking to top & bottom

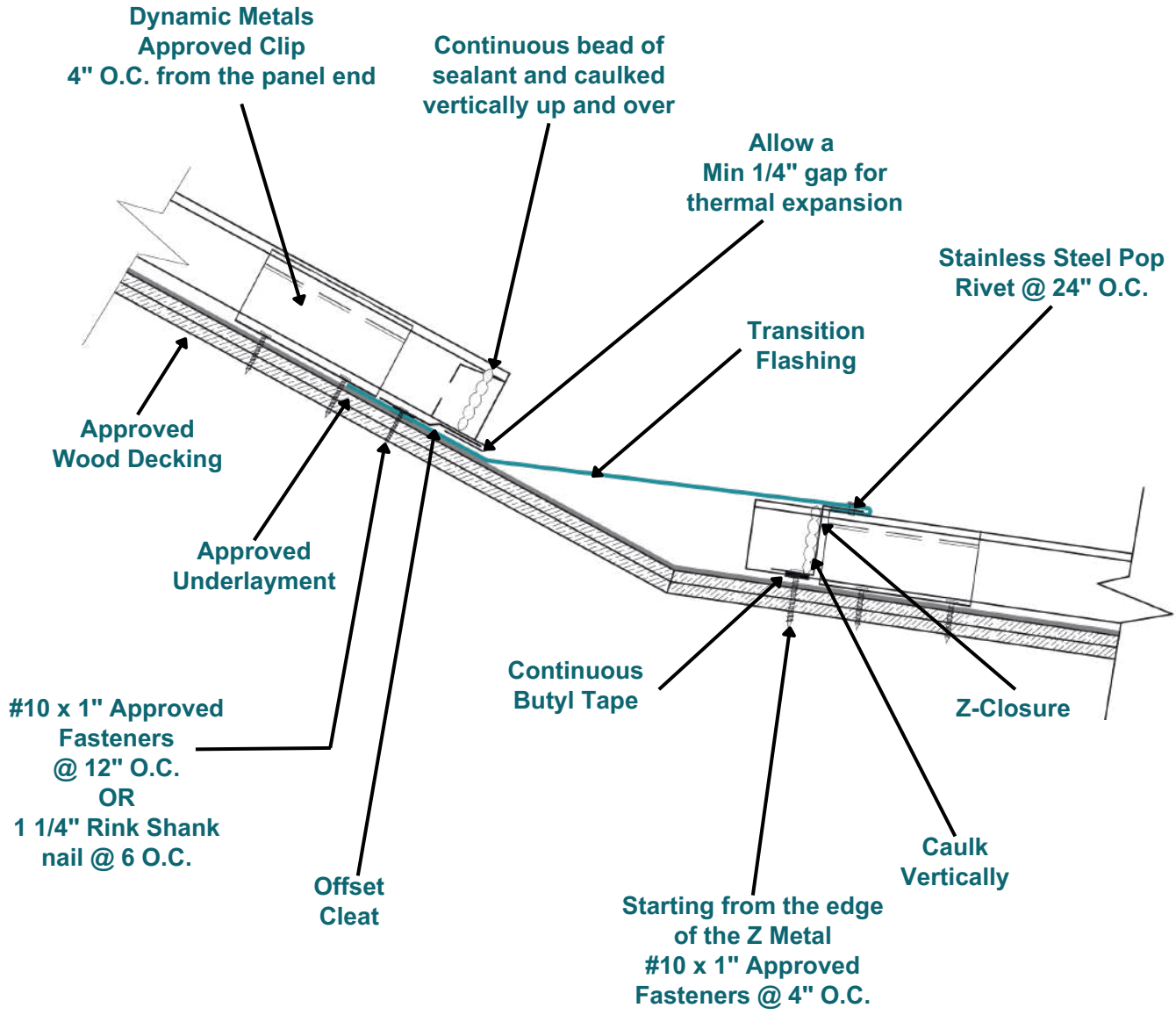




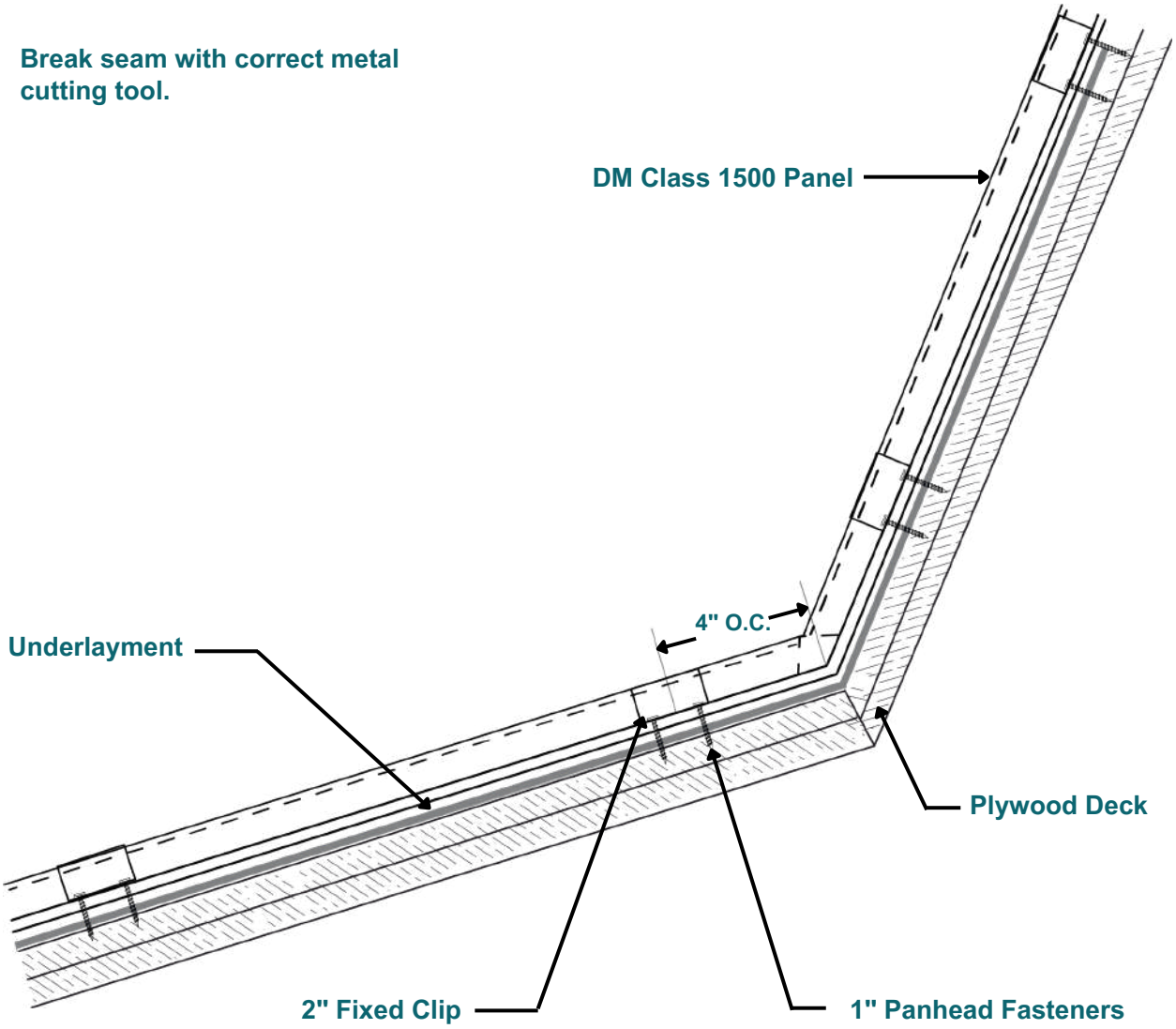
Transition Detail



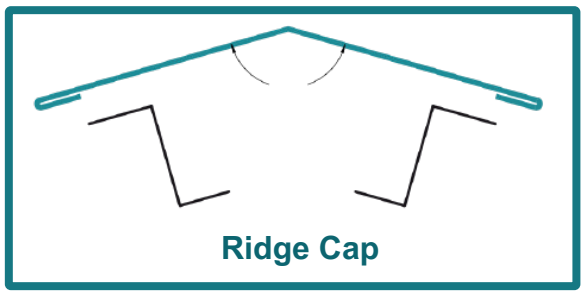
End Laps Min. 8" W/ 2 beads of concealed sealant.



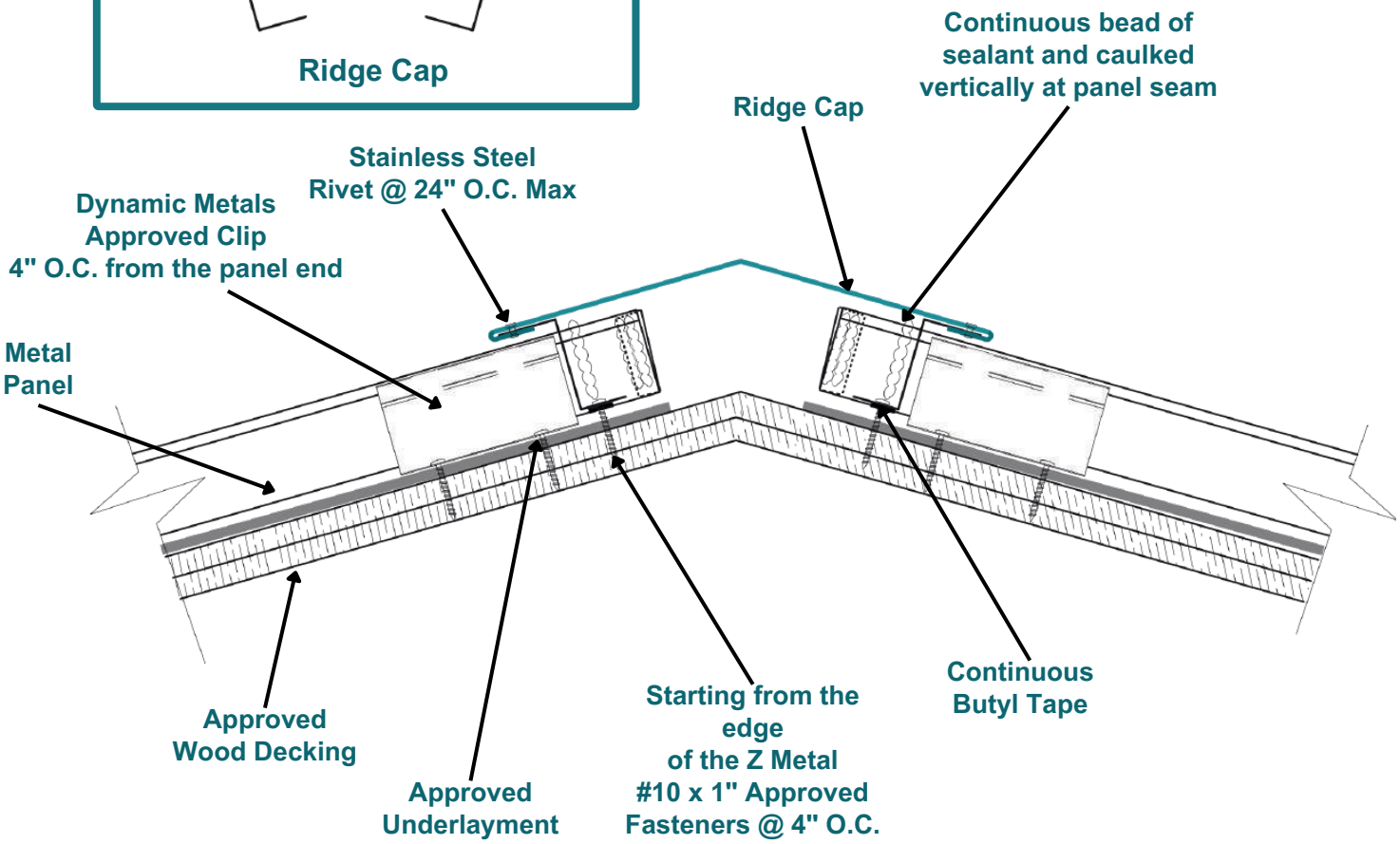
Pitch Transition With Break Detail

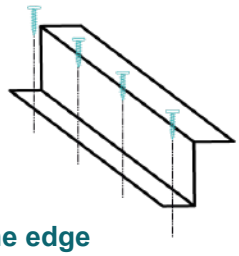


Ridge Detail

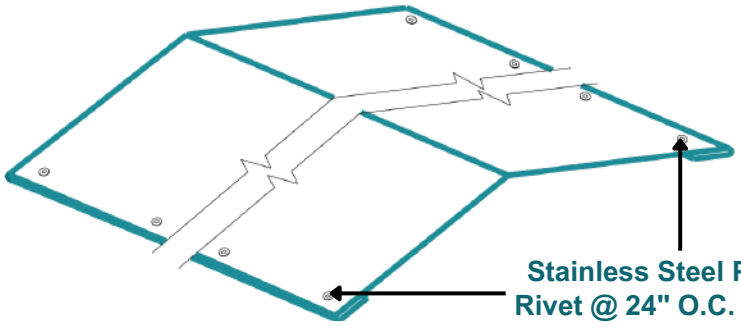


End Laps Min. 8" W/ 2 beads of concealed sealant.

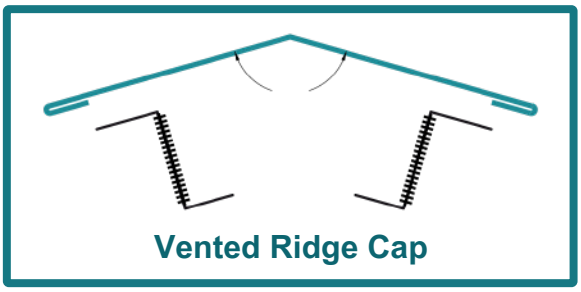




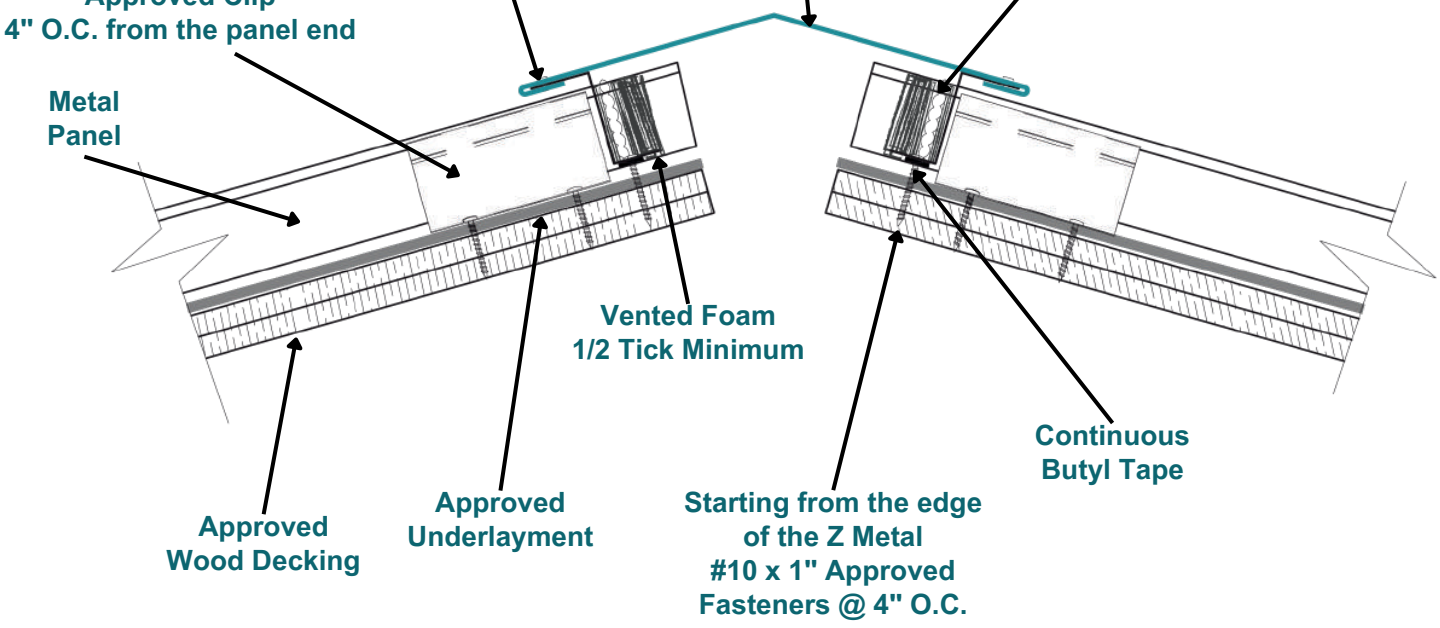
Starting from the edge of the Z Metal #10 x 1" Approved Fasteners @ 4" O.C.

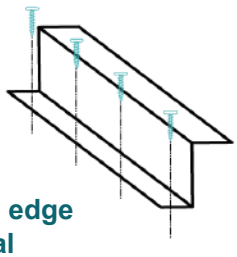


Vented Ridge Detail

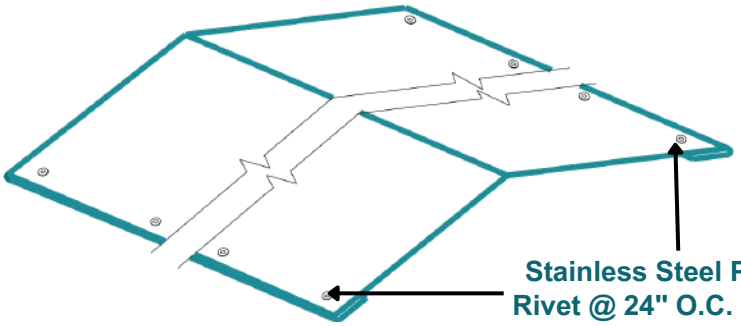


Z Closure is perforated to allow air flow





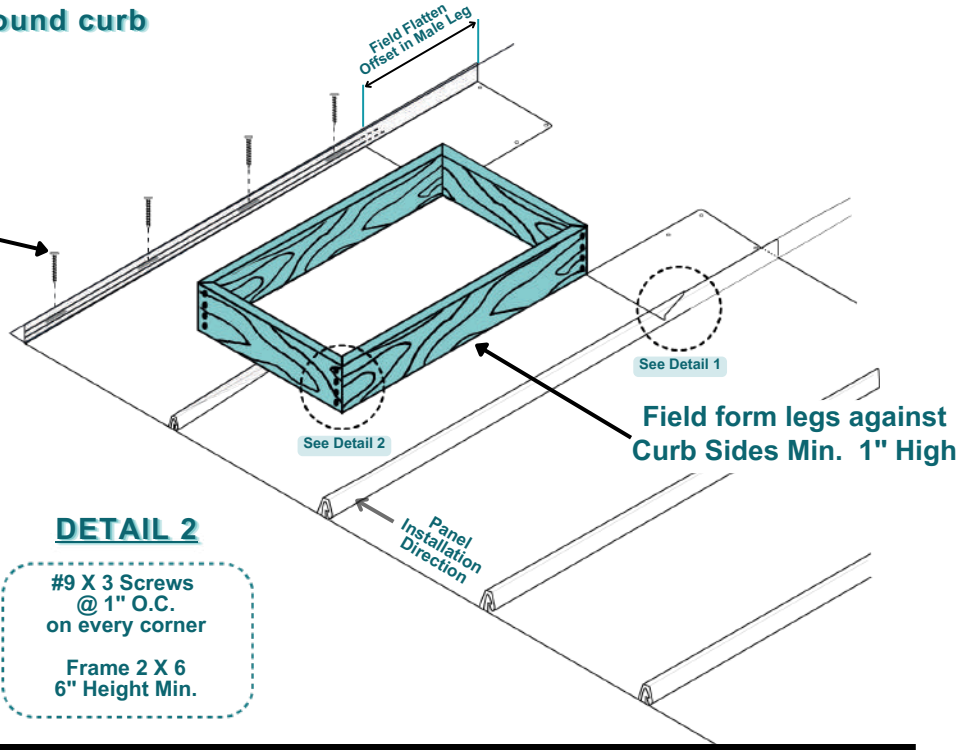
Starting from the edge of the Z Metal #10 x 1" Approved Fasteners @ 4" O.C.



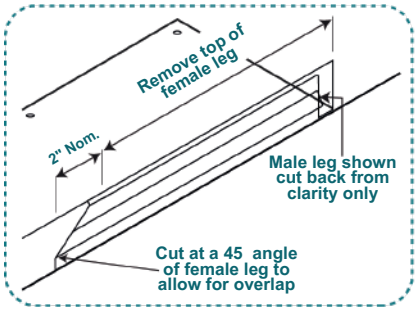
Curb Detail

STEP 1: Install panels around curb

#10 X 1"
Approved Fastener



DETAIL 1

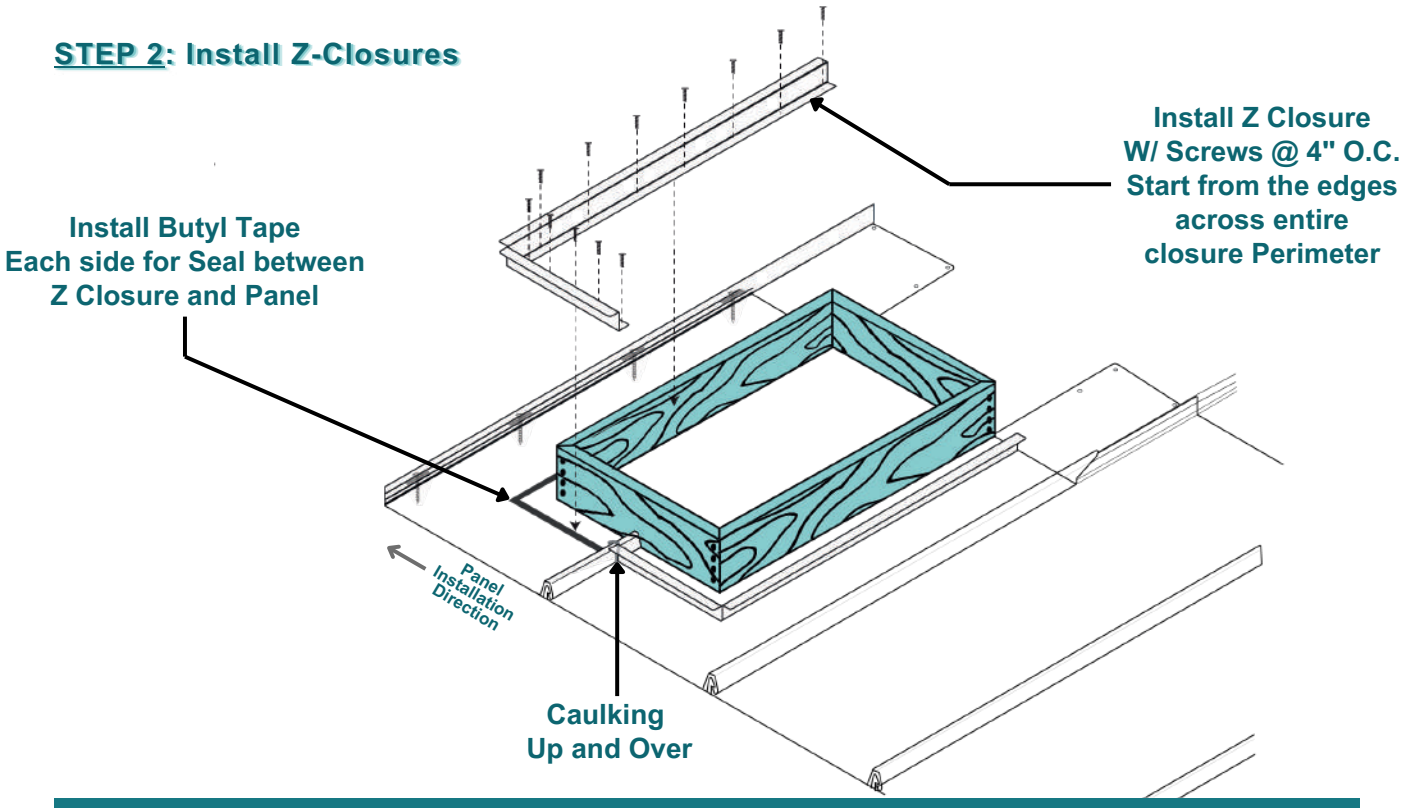


DETAIL 2

#9 X 3 Screws
@ 1" O.C.
on every corner

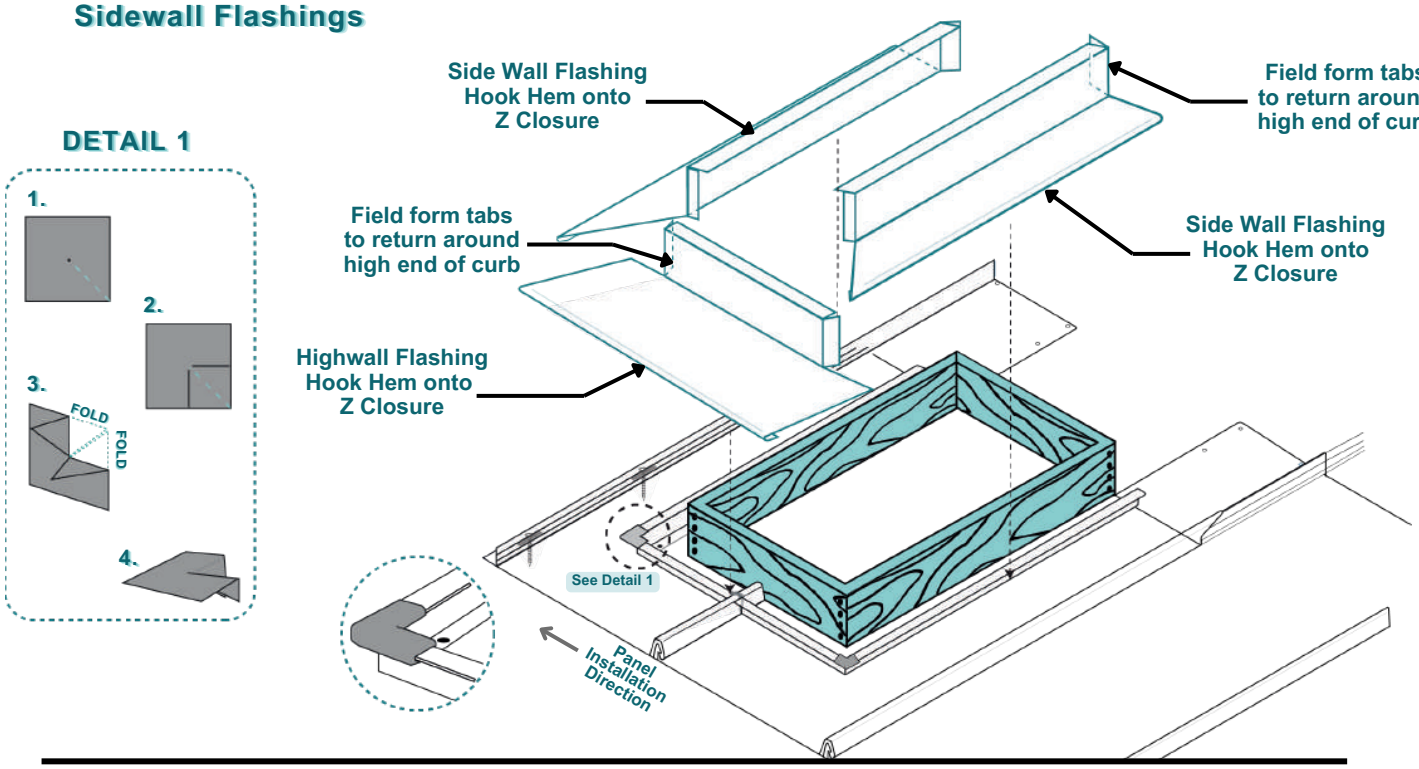
Frame 2 X 6
6" Height Min.

STEP 2: Install Z-Closures

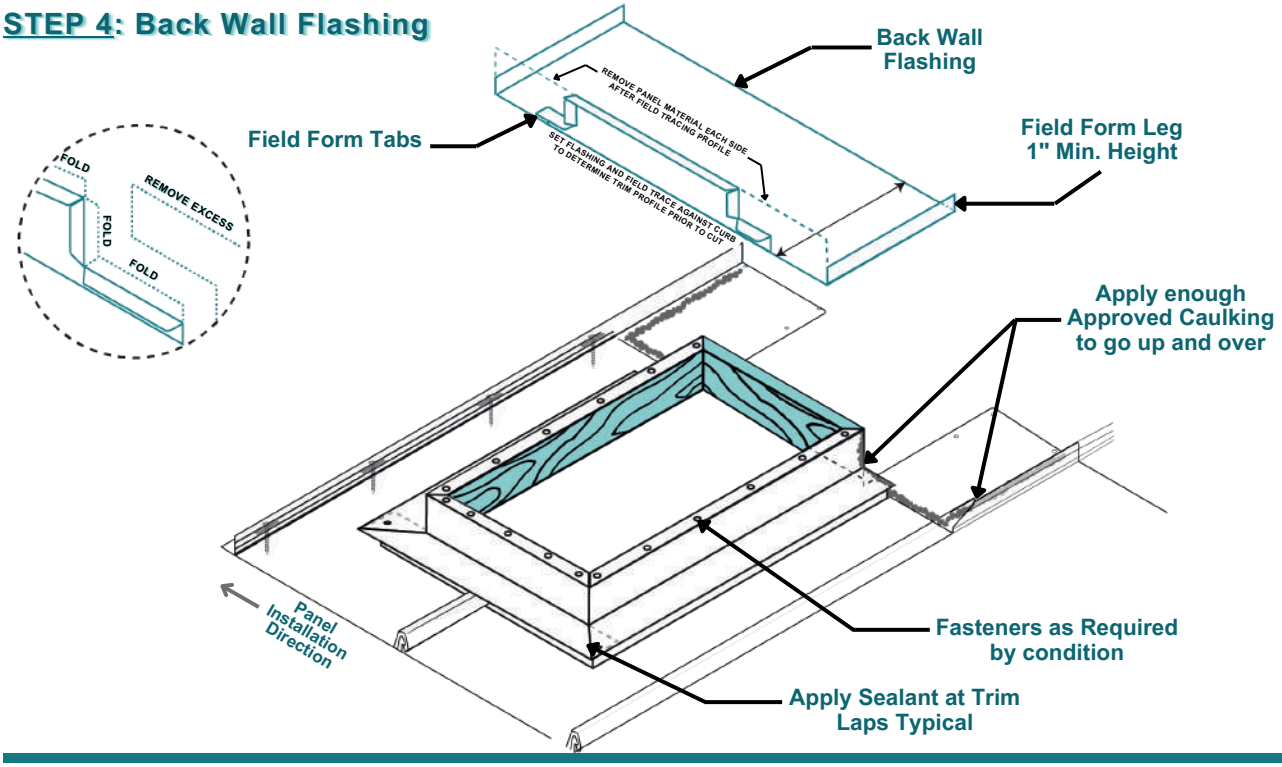


Curb Detail

STEP 3: Install Highwall and Sidewall Flashings

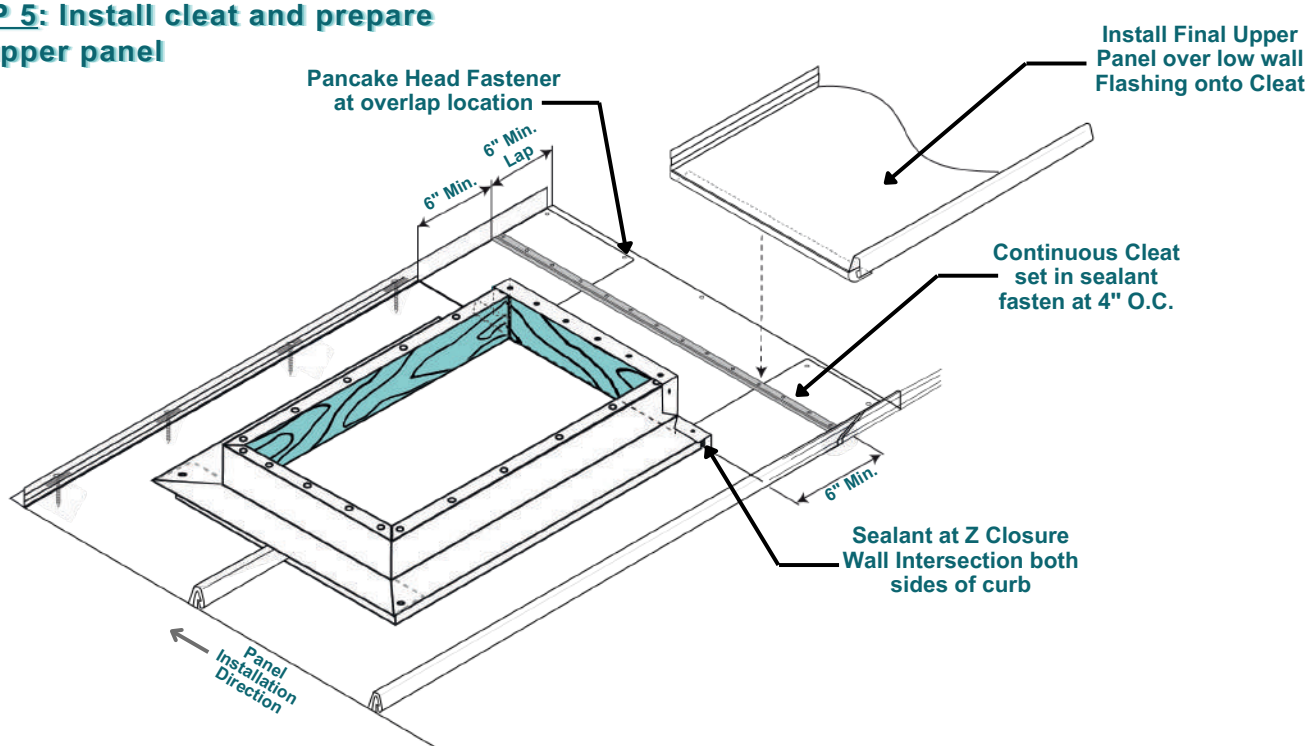


STEP 4: Back Wall Flashing

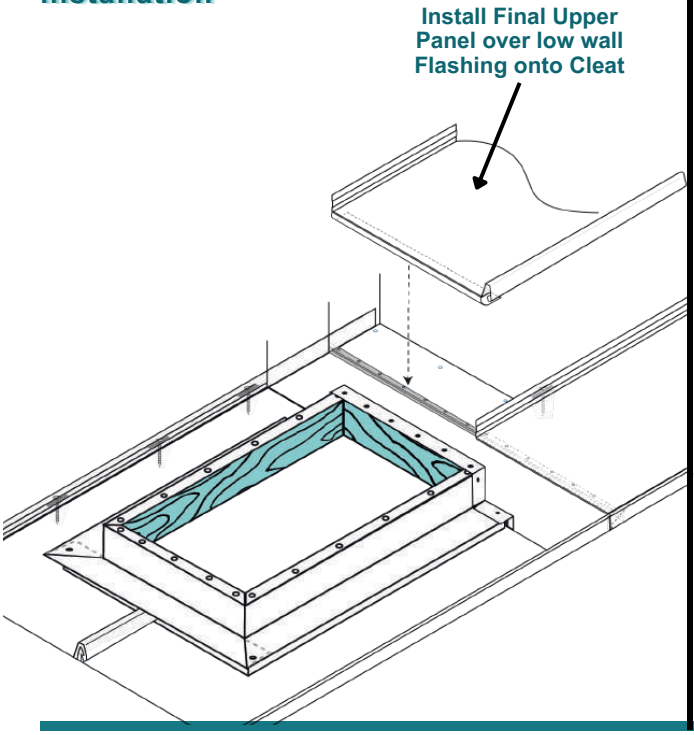


Curb Detail

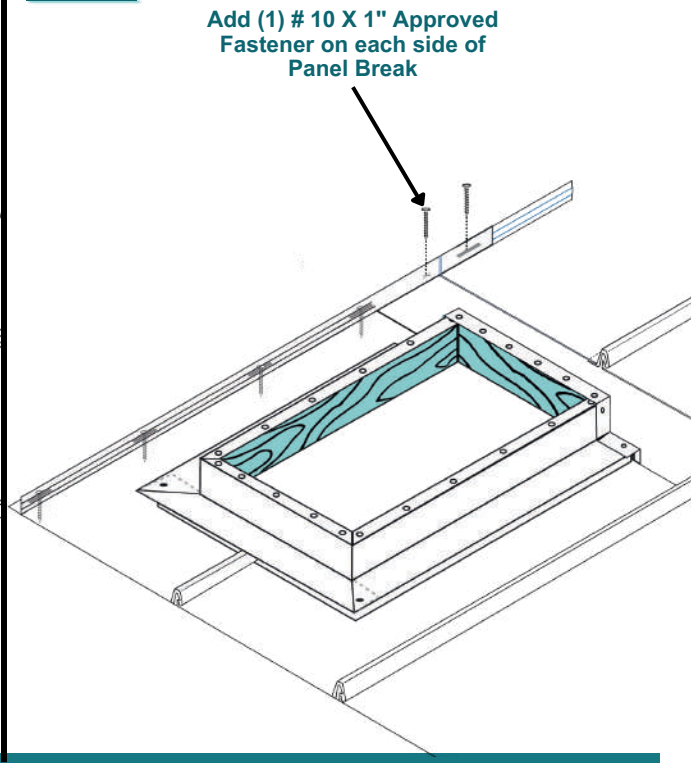
STEP 5: Install cleat and prepare for upper panel



STEP 6: Complete upper panel installation



STEP 7



CLEANING & MAINTENANCE GUIDE

Cleaning and Maintenance Guide

Galvalume and Aluminum Panels with PVDF Coatings

Environmental Considerations:

In Southeast and Southwest Florida, high humidity, salt exposure from coastal air, and intense UV radiation are significant factors that can affect the appearance and longevity of your metal panels. While PVDF coatings provide exceptional durability and protection, proper cleaning and maintenance are crucial to prevent corrosion and maintain the aesthetics of the panels.

Cleaning Frequency:

- Coastal Areas: Clean at least quarterly (every 6 months), or monthly in areas directly exposed to saltwater spray. Please refer to coating facility for more information.
- Inland Areas: A semi-annual cleaning schedule (every 6 months) should suffice.

Step-by-Step Cleaning Process:

1. Rinse with Fresh Water: Begin by rinsing the panels with fresh water using moderate pressure. This removes loose dirt, salt, and debris without damaging the surface.
2. Use a Mild Detergent: For light soil, mix a mild detergent (such as dish soap) with water and use a soft sponge or cloth to scrub the surface in horizontal and vertical motions. Avoid abrasive materials to protect the PVDF coating.
3. Address Tough Stains: For grease, oil, or stubborn stains, use a mild solvent like mineral spirits or isopropyl alcohol. Test a small area first to ensure there is no adverse reaction to the coating.
4. Rinse Thoroughly: After cleaning, rinse the panels thoroughly with clean water to remove all soap or solvent residue. This step is crucial in coastal environments to prevent salt build-up.
5. Dry the Panels: Allow the panels to air dry or wipe them down with a lint-free cloth or chamois. Make sure recessed areas are dry to prevent water from pooling and causing corrosion.

Additional Maintenance Tips:

- Conduct regular inspections for signs of damage or wear.
- Avoid using strong acids, alkaline cleaners, or abrasive pads on PVDF-coated surfaces.
- Clean the panels in cooler parts of the day (early morning or late afternoon) to avoid chemical reactions caused by heat.
- Always use fresh water for rinsing after cleaning, especially in salt-exposed environments.
- Galvalume-Specific Care:
- Galvalume is corrosion-resistant, but regular cleaning will ensure it maintains its appearance and performance.
- Follow the cleaning frequency recommendations, especially in salt-prone areas, to prevent surface deterioration.

Cleaning and Maintenance Guide

Galvalume and Aluminum Panels with PVDF Coatings

Disclosure:

Dynamic Metals does not offer maintenance programs for cleaning or maintaining any roofing system after installation. All material sales are **final**, and the responsibility for maintenance lies solely with the purchaser. **Dynamic Metals** does not endorse or encourage any individual to access their roof, particularly when the surface is **wet**, as the metal can become extremely **slippery**, posing a serious safety hazard. It is recommended that purchasers consult with a **licensed professional** before attempting any maintenance procedures on their roofing system.

The cleaning and maintenance guidelines outlined in this document are based on best practices referenced from the **American Architectural Manufacturers Association (AAMA) Cleaning and Maintenance Guide** (AAMA 609 & 610-15). For safety and the longevity of your roofing system, it is crucial to follow the correct cleaning methods as described, and to avoid harsh chemicals or improper cleaning techniques that could void warranties or damage the finish.

For further details on proper maintenance and cleaning procedures, refer to the AAMA 609 & 610-15 document, which outlines the appropriate methods for cleaning and maintaining architecturally finished aluminum and similar metal products. Always seek professional advice when performing any cleaning or maintenance on roofing materials.

TGFU.R40098-Roofing Systems
Roofing Systems

Dynamic Metals LLC **R40098**
304 Pike Rd.
West Palm Beach, FL 33411 United States

Coated steel and aluminum panels identified as: “DM Class 500", “DM Class 800”, “DM Class 1000”, “DM Class 1050”, “DM Class 1500”, “DM Class 1700”, “ DM Class 1750”, DM Class 2000”, “ DM Class 1150”, “DM PBR”.

BUILDING UNITS

Class A

1. **Deck**: C-15/32 **Incline**: Unlimited
Underlayment (optional): - One or more plies Polyglass USA Inc “Polystick-XFR”, self-adhered.
Base Sheet: - One ply type 30 base sheet, mechanically fastened.
Ply Sheet: - One ply GAF “VersaShield Underlayment” mechanically fastened.
Surfacing: - Minimum 26 ga. coated steel roofing panels, mechanically fastened.

2. **Deck**: C-15/32 **Incline**: Unlimited
Underlayment (optional): - One or more plies Polyglass USA Inc “Polystick-XFR”, self-adhered.
Base Sheet: - One ply type 30 base sheet, mechanically fastened.
Ply Sheet: - One plies GAF “VersaShield Underlayment” mechanically fastened.
Surfacing: - Minimum 0.032 aluminum roofing panels, mechanically fastened.

3. **Deck**: C-15/32 **Incline**: Unlimited
Underlayment (optional): - One or more plies Polyglass USA Inc “Polystick-XFR”, self-adhered.
Base Sheet: - One Ply type base sheet, mechanically fastened.
Ply Sheet: - One or more layers GAF “VersaShield ® Solo ™ Fire Resistant Slip Sheet”, mechanically fastened.
Surfacing: - Minimum 26 ga. coated steel or minimum 0.032 aluminum roofing panels, mechanically fastened.

4. **Deck**: C-15/32 **Incline**: Unlimited
Underlayment (Optional): - One or more plies Polyglass USA Inc “Polystick-XFR”, self-adhered.
Base Sheet: - Two layers Atlas Roofing Corp “FR50”.
Ply Sheet: - One Ply type 30 underlayment, mechanically fastened.
Surfacing: - Minimum 28 ga. coated steel roofing panels, mechanically fastened.

5. **Deck**: N/A **Incline**: Unlimited
Surfacing: - Minimum 26 ga. coated steel or minimum 0.032 aluminum roofing panels, mechanically fastened.

TGFU.R40098-Roofing Systems
Roofing Systems

6. **Deck**: C-15/32 **Incline**: Unlimited
Base Sheet: - Minimum one ply Type 15 or Type 30 asphalt saturated felt or Type G1 or Type G2 asphalt saturated glass mat, mechanically fastened.
Underlayment: - Two plies “Polystick XFR” self-adhered.
Insulation (optional): - Any UL Classified polyisocyanurate, perlite, wood fiber or polyisocyanurate/perlite board, any thickness mechanically fastened or adhered with any UL Classified insulation adhesive.
Ply Sheet (optional): - Minimum one ply Type 15 or Type 30 asphalt saturated felt or Type G1 or Type G2 asphalt saturated glass mat, mechanically fastened.
Surfacing: - Minimum 0.032 aluminum roofing panels, mechanically fastened.

7. **Deck**: C-15/32 **Incline**: Unlimited
Base Sheet: - Minimum one ply Type 15 or Type 30 asphalt saturated felt or Type G1 or Type G2 asphalt saturated glass mat, mechanically fastened.
Underlayment: - Two plies “Polystick XFR” self-adhered.
Insulated (optional): - Any UL Classified polyisocyanurate, perlite, wood fiber or polyisocyanurate/perlite board, any thickness mechanically fastened or adhered with any UL Classified insulation adhesive.
Ply Sheet (optional): - Minimum one ply Type of Type 30 asphalt saturated felt or Type G1 or Type G2 asphalt saturated glass mat, mechanically fastened.
Surfacing: - Minimum 26 ga. coated steel roofing panels, mechanically fastened.

8. **Deck**: C-15/32 **Incline**: Unlimited
Base Sheet (optional): - Minimum one ply Type 15 or Type 30 asphalt saturated felt or Type G1 or Type G2 asphalt saturated glass mat, or “PolyAnchor UDL 40” mechanically fastened, or “Polystick XFR”, “ Polystick MTS”, “Polystick MTS Plus” “Polystick MU-X”, “Polystick ® IR-Xe”, or “PolyVap SA G” self-adhered.
Underlayment: - One ply “Polystick XFR” self-adhered.
Insulation (optional): - “Polytherm” or “Polytherm-H” or any UL Classified polyisocyanurate, perlite, wood fiber or polyisocyanurate/perlite board, any thickness mechanically fastened or adhered with any UL Classified insulation adhesive.
Ply Sheet (optional): - Minimum one ply Type 15 or Type 30 asphalt saturated felt or Type G1 or Type G2 asphalt saturated glass mat or “PolyAnchor UDL 40” mechanically fastened or “Polystick XFR”, “”Polystick MTS”, “Polystick MTS Plus”, “Polystick MU-X”, “Polystick ® IR-Xe”, or “PolyVap SA G” self-adhered.
Surfacing: - Minimum 26 gauge coated steel standing seam panels, mechanically fastened.

TGFU.R40098-Roofing Systems
Roofing Systems

Class C

1. **Deck**: C-15/32 **Incline**: Unlimited
Underlayment (optional): - One of more plies Polyglass USA Inc “Polystick-XFR”, self-adhered.
Base Sheet: - One ply Type 30 base sheet, mechanically fastened.
Surfacing: - Minimum 26 ga. coated steel or minimum 0.032 aluminum roofing panels, mechanically fastened.

MAINTENANCE AND REPAIR SYSTEMS

Class A, B, C

1. **Deck**: C-15/32 **Incline**: Unlimited
Existing System: - Any Class A, B or C metal roof deck panel system to retain existing Certification.
Surfacing: - Coated steel or aluminum roofing panels, mechanically fastened.
Underlayment (optional): - One or more plies Polyglass USA Inc “Polystick-XFR”, self-adhered.

Florida's Department of Business and Professional Regulations

As of December 2024, for more updated information, visit the Department of Business and Professional Regulations.
www.floridabuilding.org

Florida's Department of Business and Professional Regulations FL 41724-R1 Cover Page

FL #	FL 41724-R1
Application Type	Revision
Code Version	2023
Application Status	Approved
Comments	
Archived	
Product Manufacturer	Dynamic Metals
Address/Phone/Email	2951 SE Dominica Terrace Stuart, FL 34997 (772) 247-2465
Authorized Signature	Juan@DynamicMetal.net
	Lara Jesus
Technically Representative Address/Phone/Email	
Quality Assurance Representative Address/Phone/Email	
Category	Roofing
Subcategory	Metal Roofing
Compliance Method	Evaluation Report from a Florida Registered Architect or a License Florida Professional Engineer Evaluation Report - Hardcopy Received
Florida Engineer or Architect Name who developed the Evaluation Report	Scott Wolters
Florida License	PE-62354
Quality Assurance Entity	Keystone Certifications, Inc.
Quality Assurance Contract Expiration Date	12/06/2026
Validated By	Lucas A. Turner, P.E.,MBA
Certificate of Independence	FL41724 R1 COI 24 COI.pdf

Reference Standard and Year (of Standard)

Standard	Year
ASTM E2140	2001
TAS 100	2023
TAS 110	2000
TAS 125	2003

Equivalence of Product Standards Certified By	
Sections from the Code	
Product Approved Method	Method 1 Option D
Date Submitted	01/25/2024
Date Validated	02/29/2024
Date Pending FBC Approved	03/03/2024
Date Approved	04/16/2024
Date Revised	04/23/2024

FL #	MODEL, NUMBER OR NAME	DESCRIPTION
41724.1	DM Class 1500 1" Nailstrip	26 Ga.(min) Galvalume Roof Panel, 1" Nailstrip x 12", 14", or 16" Wide, over 1/2" Plywood (min).

Limits of Use
Approved for use in HVNZ: Yes
Approved for use outside HVHZ: Yes
Impact Resistant: N/A
Design Pressure: N/A
Other: Please see Installation Drawings and Eval Report for Limits of Use.

Installation Instructions
FL 41724 R1 II 7241 Dwg2
Verified By: Scott Wolters FLPE# 62354
Created by Independent Third Party: Yes
Evaluation Reports
FL41724 R1 AE 7241 Eval2
Created by Independent Third Party: Yes

FL #	MODEL, NUMBER OR NAME	DESCRIPTION
41724.2	DM Class 1500 1" Nailstrip	0.032" (min) Aluminum Roof Panel, 1" Nailstrip x 12", 14", or 16" Wide, over 1/2" Plywood (min).

Limits of Use
Approved for use in HVNZ: Yes
Approved for use outside HVHZ: Yes
Impact Resistant: N/A
Design Pressure: N/A
Other: Please see Installation Drawings and Eval Report for Limits of Use.

Installation Instructions
FL 41724 R1 II 7242 Dwg2
Verified By: Scott Wolters FLPE# 62354
Created by Independent Third Party: Yes
Evaluation Reports
FL41724 R1 AE 7242 Eval2
Created by Independent Third Party: Yes

FL #	MODEL, NUMBER OR NAME	DESCRIPTION
41724.3	DM Class 1050 1 ½ " Nailstrip	0.032" (min) Aluminum Roof Panel, 1" Nailstrip x 11", 15", or 19" Wide, over 1/2" Plywood (min).

Limits of Use
Approved for use in HVNZ: Yes
Approved for use outside HVHZ: Yes
Impact Resistant: N/A
Design Pressure: N/A
Other: Please see Installation Drawings and Eval Report for Limits of Use.

Installation Instructions
FL 41724 R1 II 7243 Dwg2
Verified By: Scott Wolters FLPE# 62354
Created by Independent Third Party: Yes
Evaluation Reports
FL41724 R1 AE 7243 Eval2
Created by Independent Third Party: Yes

FL #	MODEL, NUMBER OR NAME	DESCRIPTION
41724.4	DM Class 1050 1 ½ " Nailstrip	24 Ga.(min) Galvalume Roof Panel, 1 ½ " Nailstrip x 11", 15", or 19" Wide, over 1/2" Plywood (min).

Limits of Use
Approved for use in HVNZ: Yes
Approved for use outside HVHZ: Yes
Impact Resistant: N/A
Design Pressure: N/A
Other: Please see Installation Drawings and Eval Report for Limits of Use.

Installation Instructions
FL 41724 R1 II 7244 Dwg2
Verified By: Scott Wolters FLPE# 62354
Created by Independent Third Party: Yes
Evaluation Reports
FL41724 R1 AE 7244 Eval2
Created by Independent Third Party: Yes

FL #	MODEL, NUMBER OR NAME	DESCRIPTION
41724.5	DM Class 1150 1" Mechanical Seam	0.032" (min) Galvalume Roof Panel, 1" Nailstrip x 12", 14", or 16" Wide, over 1/2" Plywood (min).

Limits of Use
Approved for use in HVNZ: Yes
Approved for use outside HVHZ: Yes
Impact Resistant: N/A
Design Pressure: N/A
Other: Please see Installation Drawings and Eval Report for Limits of Use.

Installation Instructions
FL 41724 R1 II 7245 Dwg2
Verified By: Scott Wolters FLPE# 62354
Created by Independent Third Party: Yes
Evaluation Reports
FL41724 R1 AE 7245 Eval2
Created by Independent Third Party: Yes

FL #	MODEL, NUMBER OR NAME	DESCRIPTION
41724.6	DM Class 1150 1" Mechanical Seam	0.032" (min) Aluminum Roof Panel, 1" Mechanical Seam x 13", 17", or 21" Wide, over 1/2" Plywood (min).

Limits of Use
Approved for use in HVNZ: No
Approved for use outside HVHZ: Yes
Impact Resistant: N/A
Design Pressure: N/A
Other: Please see Installation Drawings and Eval Report for Limits of Use.

Installation Instructions
FL 41724 R1 II 7246 Dwg2
Verified By: Scott Wolters FLPE# 62354
Created by Independent Third Party: Yes
Evaluation Reports
FL41724 R1 AE 7246 Eval2
Created by Independent Third Party: Yes

FL #	MODEL, NUMBER OR NAME	DESCRIPTION
41724.7	DM Class 1150 1" Mechanical Seam	26 Ga.(min) Galvalume Roof Panel, 1" Mechanical Seam x 13", 17", or 21" Wide, over 1/2" Plywood (min).

Limits of Use
Approved for use in HVNZ: Yes
Approved for use outside HVHZ: Yes
Impact Resistant: N/A
Design Pressure: N/A
Other: Please see Installation Drawings and Eval Report for Limits of Use.

Installation Instructions
FL 41724 R1 II 7247 Dwg2
Verified By: Scott Wolters FLPE# 62354
Created by Independent Third Party: Yes
Evaluation Reports
FL41724 R1 AE 7247 Eval2
Created by Independent Third Party: Yes

FL #	MODEL, NUMBER OR NAME	DESCRIPTION
41724.8	DM Class 1500 1 ½" Nailstrip	0.032" (min) Aluminum Roof Panel, 1 ½" Mechanical Seam x 12", 16", or 20" Wide, over 1/2" Plywood (min).

Limits of Use
Approved for use in HVNZ: Yes
Approved for use outside HVHZ: Yes
Impact Resistant: N/A
Design Pressure: N/A
Other: Please see Installation Drawings and Eval Report for Limits of Use.

Installation Instructions
FL 41724 R1 II 7248 Dwg2
Verified By: Scott Wolters FLPE# 62354
Created by Independent Third Party: Yes
Evaluation Reports
FL41724 R1 AE 7248 Eval2
Created by Independent Third Party: Yes

FL #	MODEL, NUMBER OR NAME	DESCRIPTION
41724.9	DM Class 1500 1 ½ " Mechanical Seam	16 Oz. or 20 Oz. Copper Roof Panel, 1 ½" Mechanical Seam x 12" or 16" Wide, over 1/2" Plywood (min).

Limits of Use
Approved for use in HVNZ: Yes
Approved for use outside HVHZ: Yes
Impact Resistant: N/A
Design Pressure: N/A
Other: Please see Installation Drawings and Eval Report for Limits of Use.

Installation Instructions
FL 41724 R1 II 7249 Dwg2
Verified By: Scott Wolters FLPE# 62354
Created by Independent Third Party: Yes
Evaluation Reports
FL41724 R1 AE 7249 Eval2
Created by Independent Third Party: Yes

FL #	MODEL, NUMBER OR NAME	DESCRIPTION
41724.10	DM Class 1500 1 ½ " Mechanical Seam	26 Ga.(min) Galvalume Roof Panel, 1 ½" Mechanical Seam x 12" or 16" Wide, over 1/2" Plywood (min).

Limits of Use
Approved for use in HVNZ: Yes
Approved for use outside HVHZ: Yes
Impact Resistant: N/A
Design Pressure: N/A
Other: Please see Installation Drawings and Eval Report for Limits of Use.

Installation Instructions
FL 41724 R1 II 72410 Dwg2
Verified By: Scott Wolters FLPE# 62354
Created by Independent Third Party: Yes
Evaluation Reports
FL41724 R1 AE 72410 Eval2
Created by Independent Third Party: Yes

FL #	MODEL, NUMBER OR NAME	DESCRIPTION
41724.11	DM Class 1500 1 ½ " Mechanical Seam	0.032 (min) Aluminum Roof Panel, 1 ½ " Mechanical Seam x 12" or 16" Wide, over 1/2" Plywood (min).
Limits of Use **Approved for use in HVNZ:** Yes **Approved for use outside HVHZ:** Yes **Impact Resistant:** N/A **Design Pressure:** N/A **Other:** Please see Installation Drawings and Eval Report for Limits of Use.		**Installation Instructions** FL 41724 R1 II 72411 Dwg2 Verified By: Scott Wolters FLPE# 62354 Created by Independent Third Party: Yes **Evaluation Reports** FL41724 R1 AE 72411 Eval2 Created by Independent Third Party: Yes

FL #	MODEL, NUMBER OR NAME	DESCRIPTION
41724.12	DM Class 1500 1 ½ " Mechanical Seam	26" Ga.(min) Galvalume Roof Panel, 1 ½" Mechanical Seam x 12" or 16" Wide, over 1/2" Plywood (min).
Limits of Use **Approved for use in HVNZ:** Yes **Approved for use outside HVHZ:** Yes **Impact Resistant:** N/A **Design Pressure:** N/A **Other:** Please see Installation Drawings and Eval Report for Limits of Use.		**Installation Instructions** FL 41724 R1 II 72412 Dwg2 Verified By: Scott Wolters FLPE# 62354 Created by Independent Third Party: Yes **Evaluation Reports** FL41724 R1 AE 72412 Eval2 Created by Independent Third Party: Yes

FL #	MODEL, NUMBER OR NAME	DESCRIPTION
41724.13	DM Class 1500 1 ½ " Mechanical Seam	24" Ga. (min) Galvalume Roof Panel, 1 ½ " Mechanical Seam x 12", 16", or 20" Wide, over 1/2" Plywood (min).
Limits of Use **Approved for use in HVNZ:** Yes **Approved for use outside HVHZ:** Yes **Impact Resistant:** N/A **Design Pressure:** N/A **Other:** Please see Installation Drawings and Eval Report for Limits of Use.		**Installation Instructions** FL 41724 R1 II 72413 Dwg2 Verified By: Scott Wolters FLPE# 62354 Created by Independent Third Party: Yes **Evaluation Reports** FL41724 R1 AE 72413 Eval2 Created by Independent Third Party: Yes

FL #	MODEL, NUMBER OR NAME	DESCRIPTION
41724.14	DM Class 1700 1 ½ " Snaplock	0.032" (min) Aluminum Roof Panel, 1 ½" Snaplock x 11", 15", or 19" Wide, over 1/2" Plywood (min).
Limits of Use **Approved for use in HVNZ:** Yes **Approved for use outside HVHZ:** Yes **Impact Resistant:** N/A **Design Pressure:** N/A **Other:** Please see Installation Drawings and Eval Report for Limits of Use.		**Installation Instructions** FL 41724 R1 II 72414 Dwg2 Verified By: Scott Wolters FLPE# 62354 Created by Independent Third Party: Yes **Evaluation Reports** FL41724 R1 AE 72414 Eval2 Created by Independent Third Party: Yes

FL #	MODEL, NUMBER OR NAME	DESCRIPTION
41724.15	DM Class 1700 1 ½ " Snaplock	26" Ga.(min) Galvalume Roof Panel, 1 ½" Snaplock x 11", 15", or 19" Wide, over 1/2" Plywood (min).
Limits of Use **Approved for use in HVNZ:** Yes **Approved for use outside HVHZ:** Yes **Impact Resistant:** N/A **Design Pressure:** N/A **Other:** Please see Installation Drawings and Eval Report for Limits of Use.		**Installation Instructions** FL 41724 R1 II 72415 Dwg2 Verified By: Scott Wolters FLPE# 62354 Created by Independent Third Party: Yes **Evaluation Reports** FL41724 R1 AE 72415 Eval2 Created by Independent Third Party: Yes

FL #	MODEL, NUMBER OR NAME	DESCRIPTION
41724.16	DM Class 1700 1 ½ " Snaplock	26" Ga. (min) Galvalume Roof Panel, 1 ½ " Snaplock x 11", 15", or 19" Wide, over 1/2" Plywood (min).

Limits of Use
Approved for use in HVNZ: No
Approved for use outside HVHZ: Yes
Impact Resistant: N/A
Design Pressure: N/A
Other: Please see Installation Drawings and Eval Report for Limits of Use.

Installation Instructions
FL 41724 R1 II 72416 Dwg2
Verified By: Scott Wolters FLPE# 62354
Created by Independent Third Party: Yes
Evaluation Reports
FL41724 R1 AE 72416 Eval2
Created by Independent Third Party: Yes

FL #	MODEL, NUMBER OR NAME	DESCRIPTION
41724.17	DM Class 1750 1 ¾" Snaplock	0.032" (min) Aluminum Roof Panel, 1 ¾" Snaplock x 14", 16", or 18" Wide, over 1/2" Plywood (min).

Limits of Use
Approved for use in HVNZ: Yes
Approved for use outside HVHZ: Yes
Impact Resistant: N/A
Design Pressure: N/A
Other: Please see Installation Drawings and Eval Report for Limits of Use.

Installation Instructions
FL 41724 R1 II 72417 Dwg2
Verified By: Scott Wolters FLPE# 62354
Created by Independent Third Party: Yes
Evaluation Reports
FL41724 R1 AE 72417 Eval2
Created by Independent Third Party: Yes

FL #	MODEL, NUMBER OR NAME	DESCRIPTION
41724.18	DM Class 1750 1 ¾" Snaplock	24" Ga. (min) Galvalume Roof Panel, 1 ¾" Snaplock x 12", 14", 16", or 18" Wide, over 1/2" Plywood (min).

Limits of Use
Approved for use in HVNZ: Yes
Approved for use outside HVHZ: Yes
Impact Resistant: N/A
Design Pressure: N/A
Other: Please see Installation Drawings and Eval Report for Limits of Use.

Installation Instructions
FL 41724 R1 II 72418 Dwg2
Verified By: Scott Wolters FLPE# 62354
Created by Independent Third Party: Yes
Evaluation Reports
FL41724 R1 AE 72418 Eval2
Created by Independent Third Party: Yes

FL #	MODEL, NUMBER OR NAME	DESCRIPTION
41724.19	DM Class 2000 2" Mechanical Seam	0.032" (min) Aluminum Roof Panel, 2" Mechanical Seam x 12", 14", 16" or 18" Wide, over 1/2" Plywood (min).

Limits of Use
Approved for use in HVNZ: Yes
Approved for use outside HVHZ: Yes
Impact Resistant: N/A
Design Pressure: N/A
Other: Please see Installation Drawings and Eval Report for Limits of Use.

Installation Instructions
FL 41724 R1 II 72419 Dwg2
Verified By: Scott Wolters FLPE# 62354
Created by Independent Third Party: Yes
Evaluation Reports
FL41724 R1 AE 72419 Eval2
Created by Independent Third Party: Yes

FL #	MODEL, NUMBER OR NAME	DESCRIPTION
41724.20	DM Class 2000 2" Mechanical Seam	24" Ga.(min) Galvalume Roof Panel, 2" Mechanical Seam x 12", 14", 16" or 18" Wide, over 1/2" Plywood (min).

Limits of Use
Approved for use in HVNZ: Yes
Approved for use outside HVHZ: Yes
Impact Resistant: N/A
Design Pressure: N/A
Other: Please see Installation Drawings and Eval Report for Limits of Use.

Installation Instructions
FL 41724 R1 II 72420 Dwg2
Verified By: Scott Wolters FLPE# 62354
Created by Independent Third Party: Yes
Evaluation Reports
FL41724 R1 AE 72420 Eval2
Created by Independent Third Party: Yes

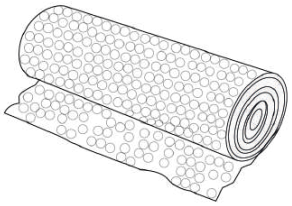
FL #	MODEL, NUMBER OR NAME	DESCRIPTION
41724.21	DM Class 500 5V Crimp	26" Ga. (min) Galvalume Roof Panel, 3/8" 5V Crimp x 20" Wide, over Plywood (min.)
Limits of Use **Approved for use in HVNZ:** Yes **Approved for use outside HVHZ:** Yes **Impact Resistant:** N/A **Design Pressure:** N/A **Other:** Please see Installation Drawings and Eval Report for Limits of Use.		**Installation Instructions** FL 41724 R1 II 72421 Dwg2 Verified By: Scott Wolters FLPE# 62354 Created by Independent Third Party: Yes **Evaluation Reports** FL41724 R1 AE 72421 Eval2 Created by Independent Third Party: Yes

FL #	MODEL, NUMBER OR NAME	DESCRIPTION
41724.22	DM Class 500 5V Crimp	0.032" (min) Aluminum Roof Panel, 3/8" 5V Crimp x 20" or 24" Wide, over 1/2" Plywood (min).
Limits of Use **Approved for use in HVNZ:** Yes **Approved for use outside HVHZ:** Yes **Impact Resistant:** N/A **Design Pressure:** N/A **Other:** Please see Installation Drawings and Eval Report for Limits of Use.		**Installation Instructions** FL 41724 R1 II 72422 Dwg2 Verified By: Scott Wolters FLPE# 62354 Created by Independent Third Party: Yes **Evaluation Reports** FL41724 R1 AE 72422 Eval2 Created by Independent Third Party: Yes

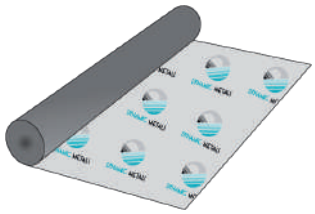
ACCESSORIES

Accessories Guide

Bubble Insulation

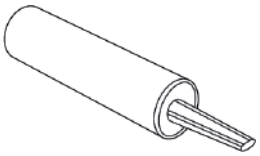


Underlayment



- **Underlayment**
  48" Wide x 250' Long Rolls
  10 Ssquares per roll

Tube Sealant



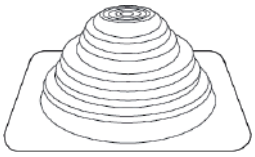
- **Geocel 2300 Tripolymer** (general use sealant)
- **Ultra 1000 Premium Sealant**
  *Special Order Item
  Colors: Translucent, Gutter Gray, Dark Bronze, White, SAndstone, Red, Green
- **Polyurthane**
  Color: Gray

Tape Sealant

- **Double Bead Butyl Tape Sealant**
  7/8" Wide x 3/16" thick x 40 foot roll
  35 rolls per box

For use under offset cleats and zee closure

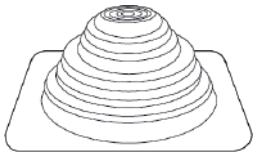
Pipe Boot



- #3 Boot - Fits 1/4" to 5 diameter (8" base)
- #4 Boot - Fits 3" ro 6" diameter (9-1/2" base)
- #5 Boot - Fits 4" to 7" diameter (11" base)
- #6 Boot - Fits 5" to 9" diameter (12-3/4" base)

Available in Black or Gray EPDM

High Temperature Pipe Boot



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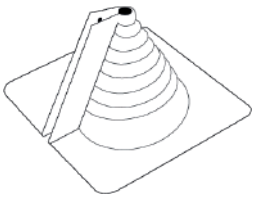
- #6 Boot - Fits 5" to 9" diameter (12-3/4" base)

High Temperature Resistant, Orange Silicone

Retrofit Pipe Boot

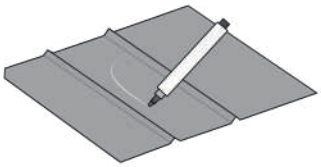


- #1 Boot - Fits 3/4" to 3-3/4" diameter
- #2 Boot - Fits 2" to 7-1/4" diameter
- #3 Boot - Fits 3-1/4" to 10" diameter

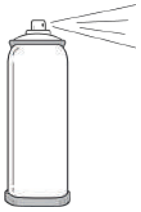
Available in Black or Gray EPDM

Boot Clamps

Touch Up Pen



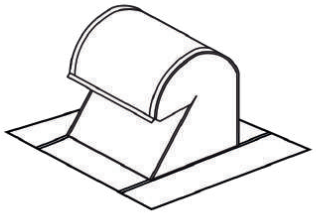
Touch - Up Paint



- 2 oz. can for Kynar colorsB
- 0.6 oz. bottle for SMP colors

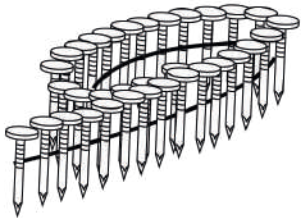
To Touch-up small scratches and abrasions
Note: Color match with roof is not guaranteed

Accessories Guide



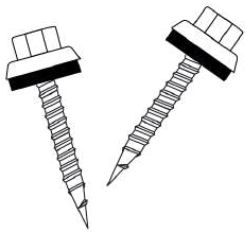
- 10" Vents
- 6" Vents

2-3/8" Coiled Nails

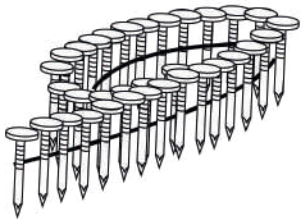


- 4,500 Per Box

1 1/2" Wood Screws

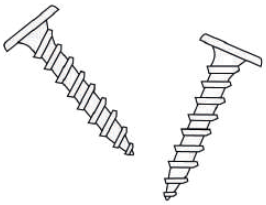


1-1/4" Coiled Ring Shank Nails



- 7,200 Per Box

Pancake Screws

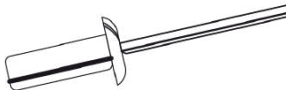


- Stainless Steel

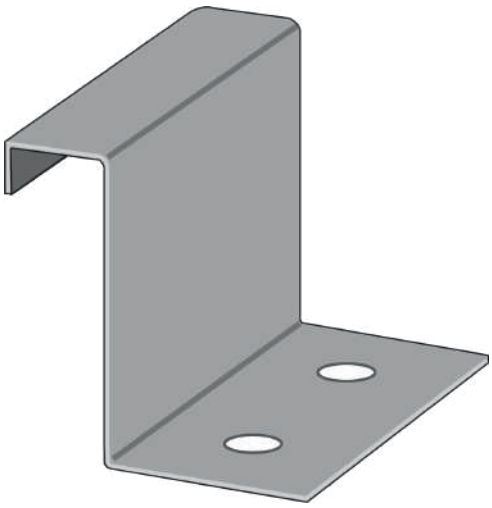
Flat Sheets

- 26 ga. Galvalume, 41-9/16" Wide x 120" Long
  Finishes: Bare or SMP Colors
- 24 ga. Galvalume, 48" Wide x 120" Long
  Finishes: Bare or Kynar Colors
- 0.032" Aluminum, 48" Wide x 120" Long
  Finishes: Kynar Colors

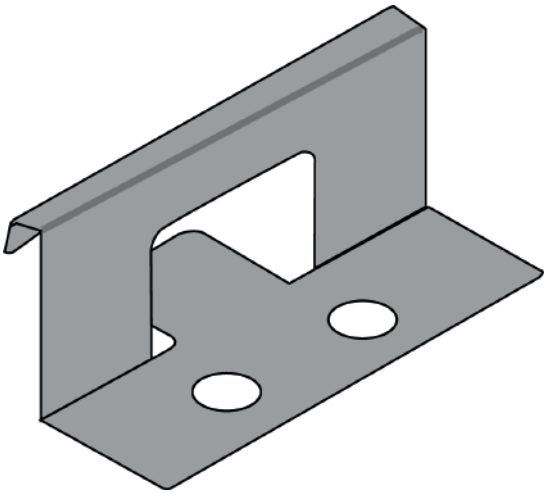
Available in matching gauge and color as roof panels. Use for fabrication of trims and flashings. Protective strippable film applied over finish side.



Clips



26 Gauge
2" Wide
Fixed Clio

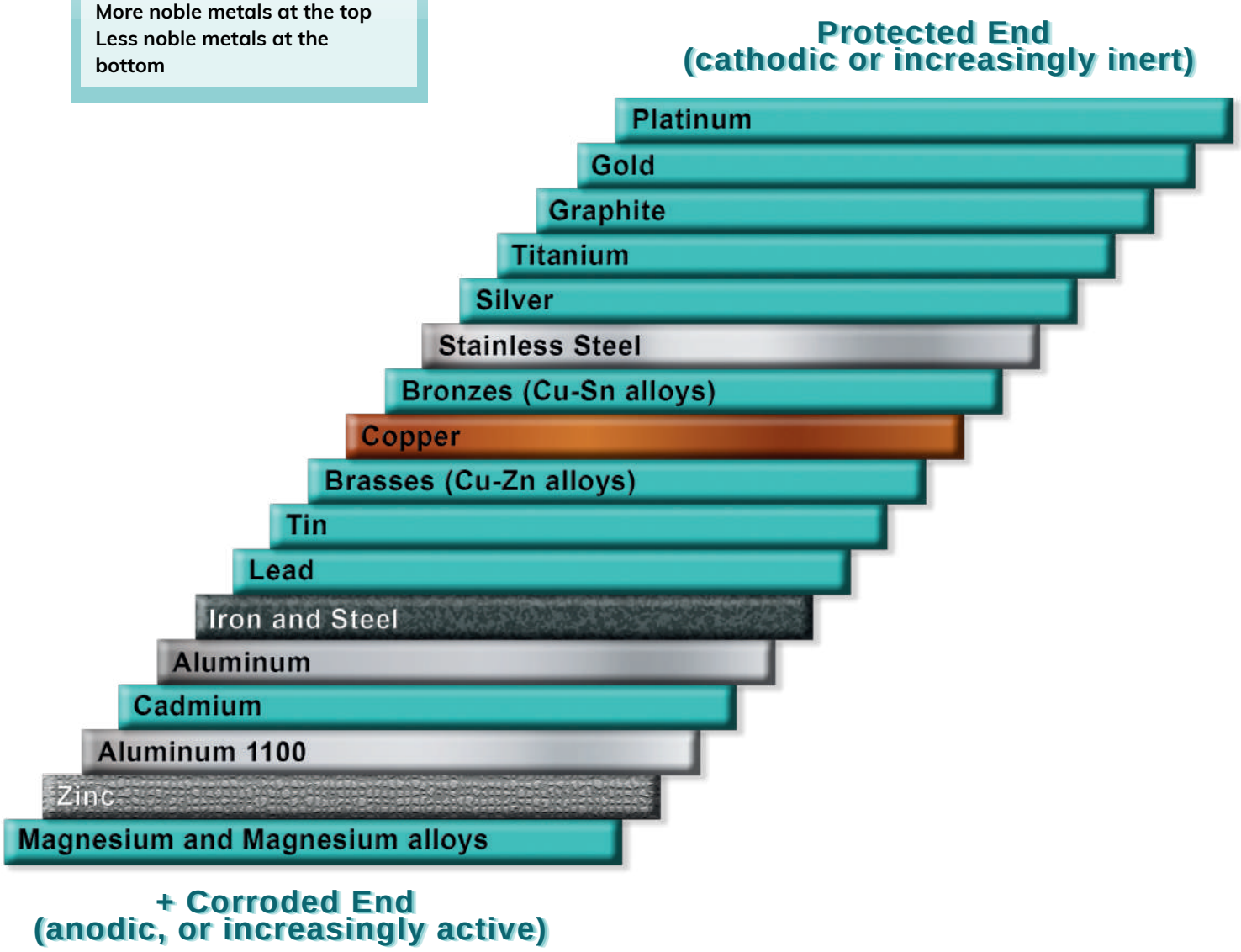


INFOGRAPHICS & ARTICLES

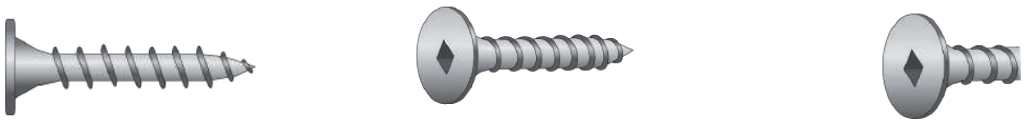
Galvanic Series of Dissimilar Metals

NOTE

More noble metals at the top
Less noble metals at the bottom



How Fasteners are Notated: An Example



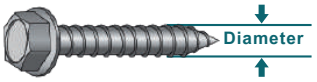
SHEET METAL FASTENER | **DRIVE TYPES** | **PAN HEAD** | **STAINLESS STEEL 18-8** | **# 10 - 9 x 1"**

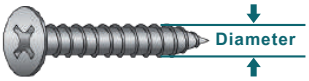
FASTENER TYPE

MATERIAL

Measuring Diameter

For most types of fasteners, the diameter is measured on the **outside of the threads.**





Note: US diameters under 1/4" are given as numbers (e.g. #12) instead of inches, in order of increasing size.

Thread Count & Thread Pitch

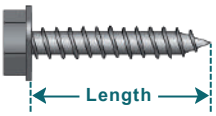
Machine threaded fasteners specify a thread density in **Threads Per Inch (US) or as a Thread Pitch in mm (Metric).**

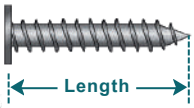
For a given diameter, a fastener may be available in **coarse** (standard), **fine** and sometimes **super** fine thread.

Measuring Length

Fastening length is usually measured from where the material is assumed to be to the end of the fastener.

Thus, countersunk fasteners are measured overall and non-countersunk fasteners are measured from under the head.





Drive Types

Phillips and **Slotted** drives are common in screws, but prone to cam-out (stripping).

Combo drives, that can be used with either driver, are available for many fastener types.

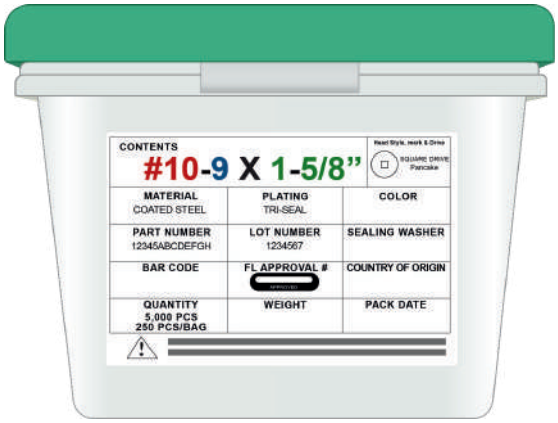
Square drive is resistant to cam-out and can be installed single-handed.

Note: Most drive types (Frearson and Slotted being notable exceptions) require the correct driver size for proper installation

Head Styles

Pan heads have a slightly domed head that sits above the surface.

Hex heads are typically used with larger bolts and screws, and tightened with a wrench.



Searching & Reading Product Approvals

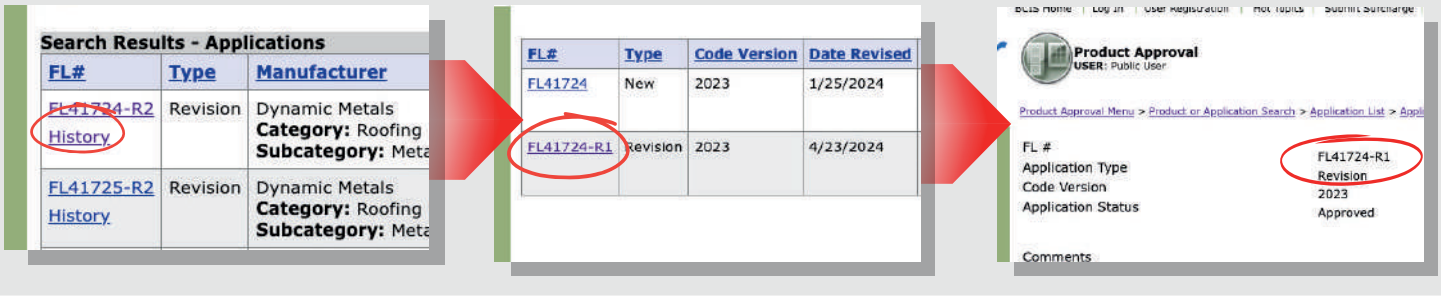
Our product approvals new re-design is slated to be our best one yet. However not all of our approvals made the cut for the latest deadline, as they required additional consideration to be part of the R2 List.

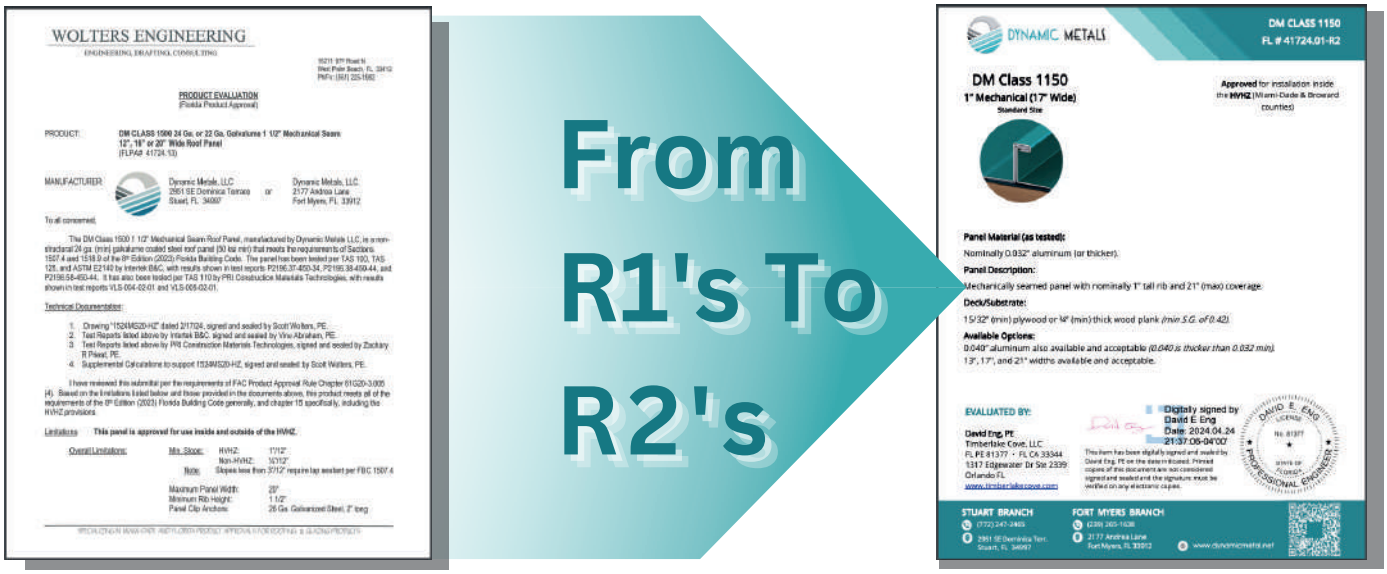
There is a total of 7 Florida Product approvals that were not ready to be placed under R2 status.

Please note our customers are still able to submit for their permits under R1 as long as they Submit the corresponding Cover Sheet.

But this is not a problems for Dynamic Metals, Please refer to R1 reports as much as possible as these are what most people already have and what they know.

HOW TO LOCATE THE R1'S UNDER THE HISTORY TAB





This chart shows the difference between the Product Approval numbers and the differences between R 1 (Revision 1) and R 2 (Revision 2) Product Approvals.

FPA'S R1 VS FPA'S R2

FPA # - R1	DESCRIPTION	FPA # R2	DESCRIPTION
41724.01 - R1	DM Class 1500 - 26Ga.		
41724.02 - R1	DM Class 1500 - .032 Alum		
41724.03 - R1	DM Class 1050 - .032 Alum		
41724.04 - R1	DM Class 1050 - 24Ga.		
41724.05 - R1	DM Class 1150 - .032 Alum	41724.01 - R2	DM Class 1150 - .032 Alum
41724.06 - R1	DM Class 1150 - .032 Alum (Non HVHZ)	41724.02 - R2	DM Class 1150 - .032 Alum (Non HVHZ)
41724.07 - R1	DM Class 1150 - 26Ga.	41724.03 - R2	DM Class 1150 - 26Ga.
41724.08 - R1	DM Class 1500 - .032 Alum	41724.04 - R2	DM Class 1500 - .032 Alum
41724.09 - R1	DM Class 1500 - 16oz. Copper	41724.05 - R2	DM Class 1500 - 16oz Copper
41724.10 - R1	DM Class 1500 - 26Ga.	41724.06 - R2	DM Class 1500 - 26Ga.
41724.11 - R1	DM Class 1500 - .032 Alum	41724.07 - R2	DM Class 1500 .032 Alum
41724.12 - R1	DM Class 1500 - 24Ga., 12" or 16" Wide	41724.08 - R2	DM Class 1500 - 24Ga., 12" or 16" Wide
41724.13 - R1	DM Class 1500 - 24Ga., 12", 16" or 20" Wide	41724.09 - R2	DM Class 1500 - 24Ga. 12", 16" or 20" Wide
41724.14 - R1	DM Class 1700 - .032 Alum	41724.10 - R2	DM Class 1700 - .032 Alum
41724.15 - R1	DM Class 1700 - 26Ga.	41724.11 - R2	DM Class 1700 - 26Ga.
41724.16 - R1	DM Class 1700 - 26Ga. (Non HVHZ)	41724.12 - R2	DM Class 1700 - 26Ga. (Non HVHZ)
41724.17 - R1	DM Class 1750 - .032 Alum	41724.13 - R2	DM Class 1750 - .032 Alum
41724.18 - R1	DM Class 1750 - 24Ga.	41724.14 - R2	DM Class 1750 - 24Ga.
41724.19 - R1	DM Class 2000 - .032 Alum	41724.15 - R2	DM Class 2000 - .032 ALum
41724.20 - R1	DM Class 2000 - 24Ga.	41724.16 - R2	DM Class 2000 - 24Ga.
41724.21 - R1	DM Class 500 - 26Ga	41724.17 - R2	DM Class. 500 - 26Ga.
41724.22 - R1	DM Class 500 - .032 Alum	41724.18 - R2	DM Class 500 - .032 Alum
41724.23 - R1	DM Class 800 - .032 Alum		
41724.24 - R1	DM Class 800 - 26Ga		

Oil Canning in Metal Roof and Metal Wall Systems

What Is Oil Canning?

Oil Canning can be defined as visible waviness in the flat areas of metal roofing and metal wall panels. In technical terms, oil canning is referred to as elastic buckling (more commonly known as “stress wrinkling”). It can occur in any type of metal panels: steel, aluminum, zinc, or copper. For purposes here, all four terms shall be considered synonymous: Waviness, elastic buckling, stress wrinkling and oil canning. The degree of waviness can be difficult to measure, but may be apparent, especially under specific lighting conditions.

Generally the period and amplitude of the wave will become more pronounced as the panel width increases (flat portion of the panel) and/or the panel thickness decreases. Reflected light may make the oil canning more prominent at certain times of day.

Conditions such as the time of year, the viewing angle, and the angle at which sunlight strikes the panel may also have an impact on the ability to discern oil canning. The eye perceives the reflection of light, and when the reflective surface is irregular the reflected light is also irregular making it more perceptible. If oil canning is present, it is usually apparent at the time of construction.

Pictured Top Left And Bottom Left, a roof with oil canning

Pictured Top Right and Bottom Right, a roof with no sign of oil canning

However, oil canning may become more (or less) apparent over an extended period of time for a variety of reasons. Oil canning can be an unintentional byproduct of the fabrication process and mill producers' tolerances. Panels with oil canning differ from panels intentionally formed with a corrugated, ribbed, or fluted design and narrower flat sections intended to provide greater bending strength.

What Causes Oil Canning?

Oil canning is caused by differential stresses within the metal itself. As the metal tries to relieve these stresses in panels with high width to thickness ratios, material buckles out of plane producing the characteristic waviness of oil canning. The stresses may be introduced at a number of stages in panel manufacturing.

1. Metal Coil Production

All fabricated metal roof and wall products begin in a "coil" form. Coil is produced in a rolling process under pressure to create very thin strips which are then "coiled" for ease in handling. Stresses induced during coil production may contribute to oil canning. Examples of these types of stresses are:

Full Center - Coil is longer in the middle of the strip which creates ripples or buckles near the mid-coil area.
Wavy Edge - Coil is longer along the edge of the strip.
Camber - Coil deviation of a side edge from a straight line.

These conditions exist to some extent in all light gauge flat rolled metal coil and tend to become more exaggerated as the material tensile strength increases. Thinner material and dimensionally wider coil is also more prone to oil canning than thicker, narrower coil.

2. Coil Processing & Panel Fabrication

Slitting - Generally several narrower coils are cut by slitting from a single (wider) master coil. The economies of producing wider coils makes this secondary process a common practice. Slitting of a master coil can release and redistribute residual forces. This redistribution of stresses can increase the occurrence of oil canning within the final product.

Forming - Stresses are introduced during forming of either roof or wall panels. Architectural panel profiles typically require more forming along the edges than in the middle of the sheet. This often necessitates more forming and bending along one side than the other and the stresses produced are not symmetrical within the sheet. Formed panel profiles require "working" (bending) of the sheet. Bending occurs along the edges and there is a tendency to "trap" uneven stresses within the center portion of the finished profile, producing oil canning. In contrast to flat, architectural profiles, corrugated ribbed profiles are most often roll formed from the center and moving outward, thereby "pushing" the differential stresses to the edges of the sheet.

Forming sheet metal inherently introduces stresses to the material. Equipment tooling, setup and operation can minimize these stresses. Proper feed rates, tooling maintenance, proper tooling design, and proper adjustment of the equipment will minimize the differential stresses that cause oil canning.

3. Support System & Substrate Suitability

Misalignment of the Support System – If the structural supports or perimeter framing system of a roof or wall panel system are not flat, "non-planar" or contoured, additional stresses can be induced into the sheet as the panels are forced to conform to this uneven surface. This can be the case even when the support structure is produced, fabricated, and installed within allowable industry tolerances.

Movement of the Primary Structure – If the primary structure moves due to differential deflection, racking, drift, settlement or other causes oil canning can occur as the panels are forced to conform to this movement. This oil canning is sometimes temporary as the support system continues to move, but could be permanent depending on the root cause of the movement.

Camber – Commercial support structural elements such as roof rafters and trusses are often designed with an intentional bow or camber, anticipating deflection under load. If the rafter, truss, or joist is fabricated with camber (crowning at mid-span) it produces a contoured substrate that can induce oil canning of the finished surface at installation or after a load is imposed.

4. Panel Installation

Over-Engagement of Panels (Roof Panels) – Roof panels are designed to a specific coverage dimension and accommodate transverse thermal expansion by flexing the rib and seam areas of side joints. When panels are not installed true to the intended coverage dimensions, these stress relief features can be minimized or eliminated altogether. In the extreme case, the over engagement process itself can generate oil canning within the flat areas of the panel.

Improper Installation (Wall Panels) – Wall panels are generally designed to a specific coverage dimension and to accommodate thermal expansion. Panels often do this by expanding/contracting at the joints located between the panels. Panels can be designed with slotted connections or extrusions that slide across each other to accommodate this movement. When panel joints are not designed or located properly, stress relief cannot take place and oil canning can be the result.

Over Driving of Fasteners – This installation error can create stresses in the panel and can cause visible oil canning along fastener lines.

Thermal Expansion – Due to the profile of panels, longitudinal expansion is generally the primary concern. Any expansion across the width of the panel is generally taken up at the raised portion of each profile. The surface temperature of exposed panels cycles throughout the year and even fluctuates daily. The range and cycle depend on many variables (e.g., project location and building orientation, cloud cover, surface finish or color, solar absorption characteristics, etc.).

As the panel surface temperature fluctuates, panels expand or contract. Surface temperature may be more than 100 degrees higher than ambient air temperature. Fasteners, clips and perimeter connections should be designed and installed to accommodate the anticipated thermal movement of the panel. If panel expansion/contraction is inhibited by perimeter flashing conditions or inadvertent “dual pinning” at other details, the result can be seen as oil canning. Waviness caused by thermal forces differs from the other forms of oil canning in that waves can appear and disappear daily as the panel temperature varies due to solar absorption or radiation.

Improper Storage & Handling – For certain types of metal panels, storing or carrying panels in a flat orientation, twisting, or buckling panels can induce a wavy appearance to a previously flat panel. Twisting can occur if one corner of a panel is used to lift a panel or to remove the panel from a bundle or pallet. Manufacturer’s recommendations should be followed.

How Can Oil Canning Be Minimized?

Certain designers regard oil canning as inherent to the material and treat it as a desired effect accentuating the material’s natural characteristic, while others do not. Coil producers and panel manufacturers generally attempt to minimize unintentional non-flat conditions. Research continues on improved production and fabrication methods.

While a number of factors are involved in panel design, there are steps that the project designer, panel manufacturer, panel fabricator and installer can take to reduce the probability, severity and visual impact of oil canning.

Coil - Tension ("stretch" or in line) precision leveling is a process that stretches the metal beyond the yield point while the metal is in coil form. Once stretched to this point, the metal will not creep back to its previous, non-level state. This provides a flatter surface less prone to oil canning and may correct inconsistencies of coil production and secondary coil operations. For this reason, tension leveling should be done after secondary operations such as slitting. The effect of oil canning can be reduced by ordering tension leveled material.

Gauge - In general, the thicker the metal (the smaller the gauge number) the less likely a panel is to oil can.

Panel Design – In general, the use of attachment systems that allow panels to move without inducing thermal stresses is another means of controlling oil canning. The addition of stiffening ribs in the panel profile "break-up" the flat surface and may make oil canning less apparent, but may also add minor shadow lines.

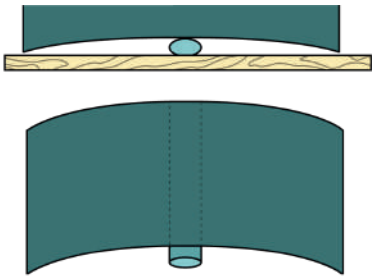
Panel Finish – The eye perceives reflection of light, which is why oil canning on a lower gloss surface is less perceptible than a high gloss surface. Low gloss finish systems or embossed surfaces, which are less reflective, may reduce the visual perception of oil canning seen in the metal.

There is less difference in the appearance of reflected light from a lighter color panel with oil canning than from a darker color panel, which makes oil canning more noticeable on darker colored panel.

Installation Issues – Stringent specifications regarding the alignment of the supporting structure or the deck would focus attention on this critical aspect. Normal trade practices and tolerances concerning the substrate may not be adequate to minimize oil canning of the finished surface. Manufacturer recommendations regarding proper handling, spacing, and fastening of panels should be part of the manufacturer's installation recommendations.

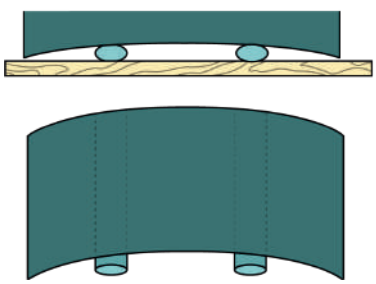
Uses of Backer Rod or Other Similar Shimming Materials – Some designers specify the use of "backer rod" or other similar types of shimming materials on the panel underside when installation is over a solid substrate. Backer rod is a compressible foam strip normally used in the concrete and masonry trades in joints to serve as a backing for a caulk joint. For certain types of metal panel systems it causes the center of the panel to "pillow" uniformly, relieving stress and reducing the visual effects of oil canning.

OPTION 1



Option 1: Description of this option

OPTION 2



Option 2: Description of this option

Forming Equipment – Deal with reputable experienced suppliers who utilize appropriate, well-tuned forming equipment.

Concluding Remarks

Many uncontrollable factors contribute to oil-canning and no panel manufacturer, fabricator, or installer can assure the total prevention of oil canning on any given project. With careful attention to the production, material selection, panel design, and installation practice, the tendency for oil canning can be minimized.

If oil canning is caused by external factors, such as detailed in “Support Systems” and “Substrate Suitability”, even replacing panels may be ineffective if the root cause is not addressed.

Oil canning is generally an aesthetic issue. Structural integrity is typically not affected. In the absence of specific contract requirements, oil canning should not be the sole grounds for panel rejection.

References

1. ASTM E 1514 – 98 Standard Specification for Structural Standing Seam Steel Roof Panel Systems.

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