



Thin Seam Installation Manual



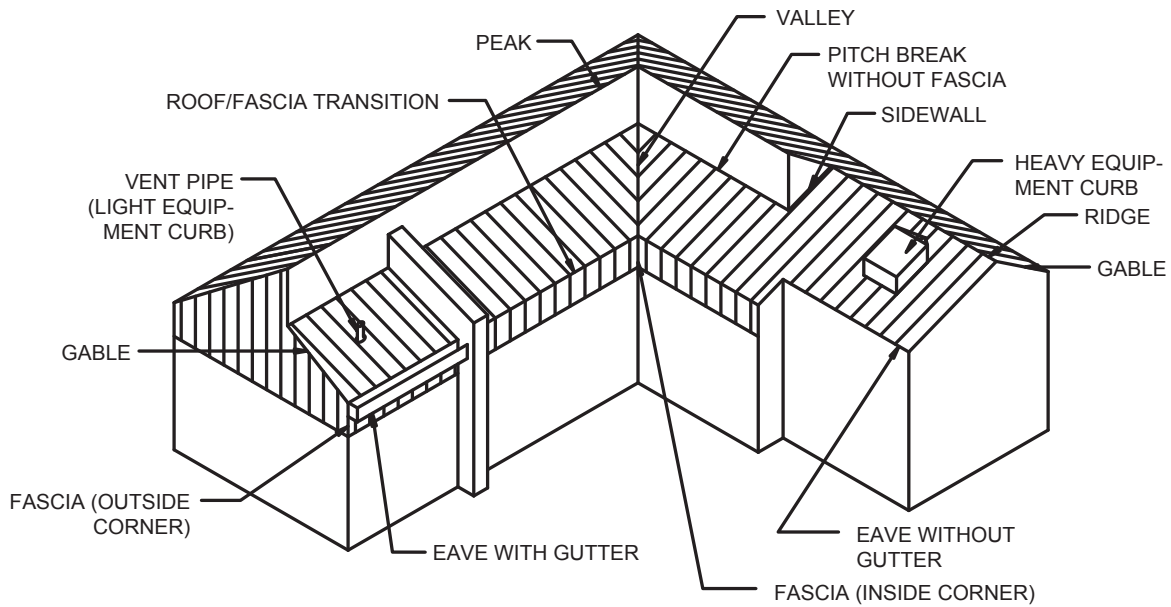
3449 Hempland Road
Lancaster, PA 17601
Phone: (800) 477-2741
Fax: (800) 283-4289

308 Alabama Blvd.
Jackson, GA 30233
Phone: (800) 884-4484
Fax: (800) 765-4484

World Wide Web: www.fabral.com
E-Mail: architecturalsystems@fabral.com

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Thin Seam

GENERAL INFORMATION

The information in this manual has been prepared to assist the designer and installer with the proper application of Fabral's Thin Seam roof system. Since each project is unique, the information is intended to be used as a guideline and in no way ensures proper application of Thin Seam panels.

BASIC DESIGN CRITERIA

The Thin Seam panel is a type of standing seam roofing panel. This means that the roof panels must be free to expand and contract with changes in temperature. Clips engage a continuous hem in the panels to permit this movement while still holding the panels down on the roof. Screws attach the clips to the substrate. The clip screws for this panel require a pancake head. Therefore, the clip screws should always be purchased from Fabral.

Because the clips permit the panels to slide, the panels must be attached to the substrate at one end so they don't slide off of the roof. Generally, Thin Seam panels are fixed at the ridge and permitted to slide at the eave. However, if there is an eave-bend down detail (where a continuous panel is used on the roof and as a fascia), the panel is fixed at the eave. Therefore, the panels must be free to slide at the ridge. The bend-down detail is shown on the last page of this manual along with the sliding ridge detail. In heavy snow areas or where snowguards are used, additional fasteners should be added to resist the snow loads.

To permit the panel to slide either at the eave or the ridge, a hem and cleat are often used. If the panels are to slide at the eave, the panel is hemmed there. A continuous cleat that is fixed to the roof fits inside the hem. When the panels are placed on the cleats, it is critical that they are not forced up the roof as far as they can go unless the panels are being installed in the coldest temperature they will experience. (The panels will contract in cold temperatures and expand in hot temperatures.) Similarly, the hem must not engage the cleat too little. In this case, the panel may expand beyond the depth of the cleat. Proper placement of the panels on the cleats will allow the system to work as designed.

Where movement occurs between the panel and roof substrate, a seal is still needed to prevent air and water infiltration. A non-curing sealant, such as tape caulk or butyl sealant, will provide this seal. If a curing sealant is used instead of a non-curing sealant, one of two things will happen: either the sealant will prevent the panels from moving, leading to oil-canning or the sealant will tear, destroying the seal. A butyl sealant prevents either problem from occurring.

Regardless if the panel is fixed at the ridge or the eave, the panels must **ALWAYS** be permitted to slide at the gables, sidewalls, and penetrations. In addition, adjacent panels must not be permitted to slide independently of one another. However, this may result when adjacent panels are of different lengths (depending on the roof layout). If you believe that your roof layout has such a case, contact the Engineering Department at Fabral (Lancaster) for suggestions on rectifying this condition.

In addition to the details shown in this manual, you may also use details from *The Handbook of Construction Details* which

is also available from Fabral. Oil canning in the panel pans is common to the industry and shall not be cause for product refusal.

PROPER STORAGE

If the material is not to be used immediately, it should be stored in a dry place where as little moisture as possible can affect it. Moisture (from rain, snow, condensation, etc.) trapped between pieces of material may cause water stains or white rust which can affect the service life of the material and will detract from its appearance. To avoid staining or white rust, store the material in a well ventilated, dry area. Break the steel strapping bands used for shipment, and store the stacks of material in an inclined position. If outdoor storage cannot be avoided, protect the material with a canvas or waterproof paper covering. Do not use plastic which can cause sweating or condensation. Keep the material off the ground in an inclined position with an insulator such as wood. It is the responsibility of the contractor to insure that all materials are properly stored at the jobsite.

PROPER HANDLING

1. Panel crates must be lifted at bundle block locations.
2. Do **NOT** lift material with ropes or wires.
3. Do **NOT** lift panels longer than 25' without a spreader bar.
4. Do **NOT** lift panels from ends while flat.
5. Panels should be lifted on edge with one worker for each 10' of panel.

INSTALLATION

1. Check the support system or roof deck to be sure all supports are installed straight, square and in plane.
2. Install specified underlayment (such as Grace Ice and Water Shield®).
3. Install the eave trim and cleat if using a sliding eave detail. Place tape sealant under the cleat as shown in the eave detail.
4. Starting at the gable end, install the first Thin Seam panel perpendicular to the eave with the overlap edge along the gable.
5. Install the Thin Seam clips at the required spacings along the length of the panel, using the specified number and type of fasteners.
6. Position the next panel over the underlap leg. Starting at the eave, apply pressure to the overlap rib until it locks into position. Continue up the slope along the entire panel.
7. Continue the above procedure across the roof.
8. When the ending gable is reached, the last panel will need to be cut. Part of the pan will need to be bent up to form a vertical leg. This leg will need to be at least as tall as the Thin Seam seam (1 3/4"). This leg will then be caught by a continuous hem.
9. To finish the ridge, first install the metal and neoprene closures. All closures should be set in sealant to insure proper weather tightness. Once closures are installed, install the ridge caps.
10. Follow similar procedures for completing gable, hip, and valley conditions.
11. Prior to the end of each work day, all panels and trim should be adequately fastened to prevent any damage due to wind uplift and/or thermal movement.

Thin Seam

SPECIFICATIONS

1.01 SUMMARY

- A. Prefinished, prefabricated, structural standing seam roof system with interlocking seams manufactured in continuous lengths up to 78' and accessories.
- B. Related Sections
 - 1. Metal decking
 - 2. Rough carpentry, plywood, and underlayment
 - 3. Insulation
 - 4. Membrane roofing
 - 5. Flashing and sheet metal
 - 6. Joint sealers: sealants and caulk
 - 7. Structural framing.

1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM A 653: Steel Sheet, Zinc-Coated by the Hot Dip Process
 - 2. ASTM A 792: Steel Sheet, Aluminum-Zinc Alloy Coated by the Hot Dip Process.
 - 3. ASTM B 209: Aluminum and Aluminum Alloy Sheet and Plate.
 - 4. ASTM E 283: Air leakage
 - 5. ASTM E 331: Water penetration
- B. Underwriters Laboratory
 - 1. UL Building Materials Directory
- C. Sheet Metal and Air Condition Contractors National Association, Inc. (SMACNA)
 - 1. SMACNA Architectural Sheet Metal Manual, 1993 Edition.
- D. American Iron and Steel Institute (AISI)
 - 1. AISI Cold Formed Steel Design Manual
- E. Metal Construction Association (MCA)
 - 1. Preformed Metal Wall Guidelines
- F. Code references
 - 1. ASCE, Minimum Loads for Buildings and Other Structures
 - 2. BOCA National Building Code
 - 3. UBC Uniform Building Code
 - 4. SBC Standard Building Code

1.03 SYSTEM DESCRIPTION

- A. Performance Requirements: Provide factory formed, prefinished, continuous interlocking, concealed clip, structural standing seam metal roof system, that has been pretested and certified by manufacturer to comply with specified requirements under installed conditions.
 - 1. Provide UL90 rated roofing system that has been tested in accordance with UL 580 test procedure.
 - 2. Resistance to air leakage: 0.009 cfm/ft. of joint leakage when tested in accordance with ASTM E 283 at static pressure differential of 6.24 psf.
 - 3. Resistance to water penetration: No leakage through panel joints when tested in accordance with ASTM E 331 at static pressure differential of 6.24 psf.
- B. Structural Requirements: Engineer panels for structural properties in accordance with latest edition of American Iron and Steel Institute *Cold Formed Steel Design Manual* using "effective width" concept and Aluminum Association's *Aluminum Design Manual*.
- C. Maximum structural spacing is 4' o.c.

1.04 SUBMITTALS

- A. Product Data: submit manufacturer's specifications, standard profile sheet, product data brochure and finish warranty.
- B. Shop Drawings: shop drawings showing roof plan with layout of panels, clips, clip attachment, underlayment and sections of each flashing/trim condition shall be submitted for approval prior to fabrication. Drawings shall contain material type, metal thickness and finish. Drawings shall distinguish between factory and field fabrication.
- C. Samples:
 - 1. Submit sample 12" long x full width panel, showing proposed metal gauge, seam profile and specified finish.
 - 2. Submit manufacturers standard colors for Architect's selection.

D. Test Reports:

- 1. Submit the test reports prepared by Underwriters Laboratory indicating wind uplift rating of proposed roof system. The manufacturer must be listed by name in the UL Directory.
 - 2. Submit test reports for air leakage per ASTM E 283 and water penetration per ASTM E 331. Actual independent laboratory certified test results must be submitted.
- E. Certification: submit manufacturer's certification that materials and finishes meet specification requirements.

1.05 QUALITY ASSURANCE

- A. Panel manufacturer shall have a minimum of ten (10) years of experience in manufacturing architectural roofing in a permanent stationary indoor facility.
- B. Panel installer shall have a minimum of two (2) years experience in the installation of concealed clip architectural standing seam metal roofing and show evidence of successful completion of at least three (3) projects of similar size, scope, and complexity.
- C. Underwriters Laboratories wind uplift resistance classification: Roof assembly shall be classified as Class 90 as defined by UL580 specification.
- D. Factory fabricated components shall be crated in cartons marked with the manufacturer's name or trademark and a UL 90 label where applicable.
- E. Field dimensions shall be taken prior to fabrication to verify jobsite conditions.

1.06 DELIVERY, STORAGE, and HANDLING

- A. Panels and flashings shall be protected and properly packaged to protect against transportation damage in transit to the jobsite.
- B. Upon delivery, exercise care in unloading, stacking, moving, storing, and erecting panels and flashings to prevent twisting, bending, scratching, or denting.
- C. Store panels and flashings in a safe, dry environment under a waterproof covering to prevent water damage. Allow for adequate ventilation to prevent condensation. Panels and flashings with strippable film shall not be stored in direct sunlight.
- D. Upon installation immediately remove strippable film from panels and flashings. Protect panels and flashings from foot traffic and from all other trades.

1.07 PROJECT CONDITIONS

- A. Field dimensions shall be taken prior to fabrication to verify jobsite conditions.

1.08 WARRANTIES

- A. Panel manufacturer shall provide a twenty (20) year warranty on the paint finish covering chalking, cracking, checking, chipping, blistering, peeling, flaking, and fading.
- B. Applicator shall furnish written warranty for a two (2) year period from date of substantial completion of building covering repairs required to maintain roof and flashings in watertight conditions.

2.01 PRODUCT DESCRIPTION

- A. Thin Seam structural standing seam roof system as manufactured by Fabral, 3449 Hempland Road, Lancaster, PA 17601, ph.: 800-477-2741; fax: 800-283-4289.
- B. Panels: the Thin Seam panel shall have a 1¼" seam height and a seam spacing of 12", 16", or 18" wide.
- C. Roof panels shall use a one-piece roof clip allowing for thermal movement of the panel system.
- D. The standing seam shall have a built in capillary break with the option of a factory applied sealant in the female leg. Concealed one piece roof clip will engage the panel seal allowing for unlimited thermal movement. The standing seam shall snap lock together without the use of or need for an electric seaming device. Roof panels shall be removable for replacement of damaged materials during and after installation is completed.
- E. The panel system shall be as a true standing seam shape requiring no trapezoidal foam closures, plugs, or fillers at eaves.

Thin Seam

SPECIFICATIONS

2.02 PRODUCT SUBSTITUTIONS

- A. Requests to use alternate systems shall be submitted in writing to the project designer at least ten (10) days prior to bid date. Request shall demonstrate proposed substitution meets or exceeds specified performance requirements. Certified statements, samples and descriptive data shall be included in this submittal request.
- B. Manufacturers listed in this section are pre-qualified manufacturers. Substitution of manufacturer's products for those specified shall not be allowed at anytime during construction.

2.03 MATERIALS AND FINISHES

- A. Panel materials
 - 1. 24 or 22 gauge, Grade 40 (40 ksi yield strength) structural steel with G90 (0.90 oz./ft.²) hot dipped galvanized coating, both conforming to ASTM A 653.
 - 2. 24 or 22 gauge, Grade 40 (40 ksi yield strength) structural steel with AZ50 (0.50 oz./ft.²) aluminum-zinc alloy coating, both conforming to ASTM A792.
 - 3. 0.032" or 0.040", 3105-H14 or equal (20 ksi yield strength) aluminum alloy conforming to ASTM B 209.
- B. Texture: panels shall be smooth or with 1" shadowlines.
- C. Finish: paint shall be full strength 70% polyvinylidene fluoride (Kynar/Hylar* fluorocarbon) baked-on coating, factory applied prior to roll forming. The treatment shall be a twocoat system consisting of a single coat of 0.2 mil. primer followed by a finish coat of 0.8 mil. Kynar* topcoat with a total dry film thickness of 1.0 mil ± 0.2 mil. The reverse side of the panels shall be treated with a back coat system consisting of a 0.2 mil. primer with a 0.3 mil. topcoat for a total dry film thickness 0.5 mil.

2.04 ACCESSORIES

- A. Concealed roof clips:
 - 1. A 4" long, 18 gauge galvanized (or stainless) steel UL90 roof clip.
 - 2. A 2" long, 18 gauge galvanized (or stainless) steel standard roof clip.
- B. Flashing and trim
 - 1. All flashing and trim shall be of the same material, gauge, finish, and color as the roof panels and fabricated in accordance with standard SMACNA procedure and details.
 - 2. Provide transition rib covers where roofing changes pitch.
 - 3. Fabricate gutters and downspouts in the same gauge, material, finish, and color as the roof panels.
- C. Fasteners
 - 1. Clips to substrate: screws shall be #10 or #12 diameter, low profile pancake head self-tapping type, zinc plated steel.
 - 2. Flashings to panels: screws shall be zinc plated with a #14 combination steel and neoprene washer, color to match panel.
 - 3. Pop rivets: #43 stainless steel, color finish to match panel.
- D. Sealants
 - 1. Shall not contain oil, asbestos, or asphalt.
 - 2. Factory applied sealant shall be applied in the seam and designed for metal to metal concealed joints.
 - 3. Field applied panel end sealant shall be mastic tape sealant.
 - 4. Exposed sealant shall be one-part polyurethane joint sealant. Coordinate color with roof panels.
- E. Closures
 - 1. Ridge and hip closures shall be protected and supported by a formed metal closure manufactured from the same material, color, and finish as the panels.
 - 2. Metal closures shall be factory fabricated and field-cut as needed.
- F. Thermal blocks
 - 1. Thermal blocks shall be:
 - a. Non-treated wood as per manufacturer's recommendation.
 - b. Extruded polystyrene block.
 - c. EPDM membrane.

G. Vapor Retarder:

- 1. Retarder with a permeance of 0.05 or less as determined by ASTM E 98.

2.05 RELATED MATERIALS

- A. Refer to other sections listed in Related Sections paragraph for related materials.

2.06 FABRICATION

- A. Roof panels shall be formed in continuous lengths. End laps will not be allowed.
- B. Panels shall be roll formed on a stationary industrial type rolling mill to gradually shape the sheet metal. Portable rollformers, rented or owned by the installer, are not acceptable.
- C. Fabricate flashings from the same material as the roof system.

2.07 SOURCE QUALITY

- A. Source Quality: obtain metal panels and accessories from a single manufacturer.
- B. Fabrication tolerances: follow tolerances in MCA's Preformed Metal Wall Guidelines.
- C. Tests and inspections
- D. Verification of performance

3.01 MANUFACTURER'S INSTRUCTIONS

- A. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions, and product cartons for installation.

3.02 EXAMINATION

- A. Installer shall:
 - 1. Inspect roof deck and/or purlins to verify that they comply with shop drawings and are smooth, even, sound, and free of depressions.
 - 2. Report variations and potential problems in writing to the architect.

3.03 INSTALLATION

- A. Conform to the standard set forth in the SMACNA architectural sheet metal manuals and the approved shop drawings detailed for the project.
- B. Install panels plumb, level, and straight with the seams parallel, conforming to the design as indicated.
- C. Install panel system so it is watertight, without waves, warps, buckles or distortions, and allow for thermal movement considerations.
- D. Abrasive devices shall not be used to cut on or near roof panel system.
- E. Apply sealant tape or caulking as necessary at flashing and panel joints to prevent water penetration.
- F. Remove any strippable film immediately upon exposure to direct sunlight.
- G. Vapor retarder: The joints, perimeter, and all openings shall be sealed per the manufacturer's instructions to provide a continuous vapor retarder.
- H. Underlayment (solid substrate):
 - 1. Provide one layer of 30# felt with horizontal overlaps and endlaps staggered between layers.
 - 2. Provide ice and water shield membrane at all valley and eave conditions as well as any area at less than a 3:12 slope.
 - 3. Lay parallel to ridge line with 2½" horizontal laps and 6" vertical laps.

3.04 CLEANING

- A. Dispose of excess materials and debris from jobsite.
- B. Remove filings, grease, stains, marks, or excess sealants from roof panel system to prevent staining.
- C. Protect work from damage from other trades until final acceptance.

* Kynar® 500 is a registered trademark of Atofina Chemicals.
Hylar® 5000 is a registered trademark of Ausimont US

Thin Seam

SPECIFICATIONS

ALLOWABLE WIND UPLIFT LOAD (PSF)

| substrate | width | 2.5' | 3.0' | 3.5' | 4.0' | 4.5' | 5.0' |
|--------------|-------|------|------|------|------|------|------|
| 24 ga. steel | 12" | 45 | 45 | 45 | 45 | 45 | 45 |
| 24 ga. steel | 18" | 30 | 30 | 30 | 30 | 30 | 30 |
| 22 ga. steel | 12" | 72 | 69 | 66 | 65 | 63 | 62 |
| 22 ga. steel | 18" | 48 | 46 | 44 | 43 | 42 | 41 |
| .032" alum. | 12" | 32 | 32 | 32 | 32 | 29 | 23 |
| .032" alum | 18" | 21 | 21 | 21 | 21 | 19 | 15 |

Notes:

1. Allowable loads are based on 1980 edition of AISI specifications.
2. Deflection is limited to L/240 of span.
3. Values are based on three or more equal spans.
4. FY = 40 ksi for steel panels.
5. Uplift values based on attachment to 16 ga. purlins with 2 #10-16 SD ST screws.

DESIGN INFORMATION

- ◆ The Thin Seam panels can be custom tapered to a minimum width of 1½" and a maximum width of 18". The maximum length of tapered panels is 40'.
- ◆ The maximum purlin spacing for Thin Seam panels is 4' on-center.
- ◆ The minimum required roof slope is 1:12.
- ◆ Minimum radius for field curving is 200 ft.
- ◆ Maximum panel length is 65'.
- ◆ Minimum panel length is 4'.

TEST REPORT SUMMARIES

AIR INFILTRATION: had 0.009 cfm/ft.2 leakage with 6.24 psf pressure differential per ASTM E 283.

WATER PENETRATION: There was no water penetration under 5 gal./hr. spray at 15 psf pressure differential per ASTM E 331.

UL90 UPLIFT RATING: 18" wide, 24 ga. panels with clips installed over ¾" plywood deck with clips spaced 3' o.c. with 2, #10-12 x 1" pancake head screws per clip. All butt and side joints in deck to be sealed with one-part urethane caulk and feathered outward from joint (Construction No. 343).

UL90 UPLIFT RATING: 18" wide, 24 ga. panels with clips installed on 16 ga. steel purlins (55 ksi yield strength) spaced 4' o.c. with 2, #10-16 x 1" self-drilling screws with wafer head per clip (Construction No. 359).

UL90 UPLIFT RATING: 18" wide, 24 ga. panels with clips spaced 4' o.c. on 22 ga. steel deck (33 ksi yield strength) with 2, #14 truss head screws with #3 Phillips drive per clip. Bearing plates, 4½" x 6" x 24 ga. need to be installed under each clip. Rigid insulation (1" to 4" thickness) may be installed between the panels and deck (Construction No. 359A).

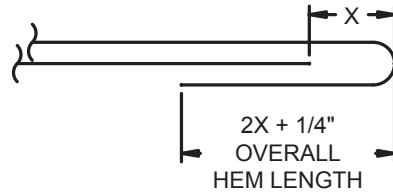
UL90 UPLIFT RATING: 18" wide, 24 ga. steel panels with clips installed 2' o.c. on ½" plywood deck with two, #10-12 x 1" pancake head screws per clip (Construction No. 417).

ASTM E1592 WIND UPLIFT TEST: 18" wide, 22 gauge steel panels installed with clips at 5' o.c. Two #10-16 x 1" screws per clip into 16 gauge purlins. Load at failure was 67 psf.

ASTM E1592 WIND UPLIFT TEST: 18" wide, 22 gauge steel panels installed with clips at 2' 6" o.c. Two #10-16 x 1" screws per clip into 16 gauge purlins. Load at failure was 80 psf.

HEM LENGTHS

The length of the hem at the end of a panel will vary with the change in temperature that the panel experiences and the length of the panel. Unless a more exact analysis of the temperature during installation compared to the maximum and minimum anticipated temperature is conducted, use the following equation and Thermal Movement Table. When installing panels, be sure to leave room at the end of the panel that will experience movement for the "starting gap" which is the required air space (X) between the panel and cleat.



THERMAL MOVEMENT TABLE

Panel movement (in.) with a 100°F temperature change in the panel and a 50°F temperature change in the substrate.

| PANEL MATERIAL | SUBSTRATE MATERIAL | PANEL LENGTH(FT.) | | |
|----------------|--------------------|-------------------|--------|---------|
| | | 10' | 50' | 100' |
| steel | rigid insulation | 3/32" | 13/32" | 25/32" |
| | wood | 1/16" | 3/8" | 5/8" |
| | steel | 1/16" | 3/8" | 13/32" |
| | concrete | 1/16" | 3/8" | 15/32" |
| aluminum | rigid insulation | 5/32" | 25/32" | 1 9/16" |
| | wood | 5/32" | 11/16" | 1 3/8" |
| | steel | 1/8" | 19/32" | 1 5/32" |
| | concrete | 1/8" | 5/8" | 1 7/32" |

ACCESSORIES

CLIPS



STANDARD ROOF CLIP, 2" WIDE, 18 GA., ONE HOLE.



HIGH PERFORMANCE ROOF CLIP, 4" WIDE, 18 GA., TWO HOLES.



BUTTERFLY BATTEN CLIP, STAINLESS STEEL.

CLIPS ARE AVAILABLE IN STAINLESS STEEL AND GALVANIZED STEEL.

USE STAINLESS STEEL CLIPS FOR EITHER STEEL OR ALUMINUM PANELS. USE GALVANIZED STEEL CLIPS FOR STEEL PANELS ONLY.

FASTENERS



10-16 x 1" PHILLIPS PANCAKE HEAD, TYPE "A", SELF-TAPPING.



10-16 x 1" PHILLIPS PANCAKE HEAD, SELF-DRILLING, SELF-TAPPING.



#12-14 x 1" PHILLIPS PANCAKE HEAD, TYPE "A", SELF TAPPING.



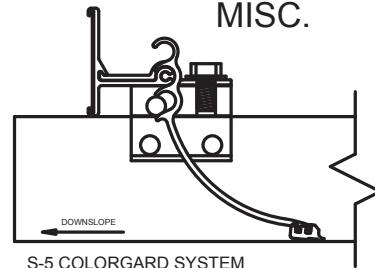
#12-14 x 1" PHILLIPS PANCAKE HEAD, SELF-DRILLING.

CLOSURE



ZEE-CLOSURE TRIM, GAUGE AND COLOR TO MATCH PANELS.

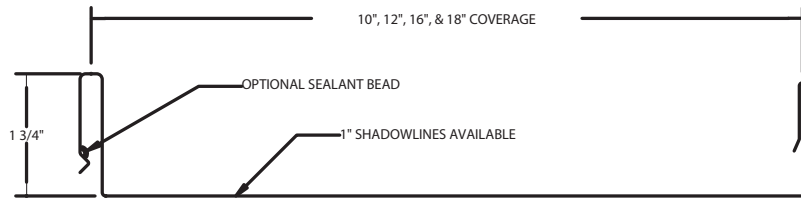
MISC.



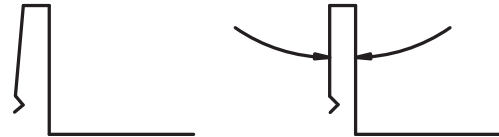
S-5 COLORGARD SYSTEM



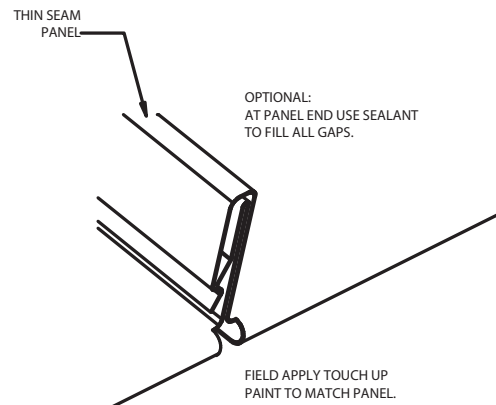
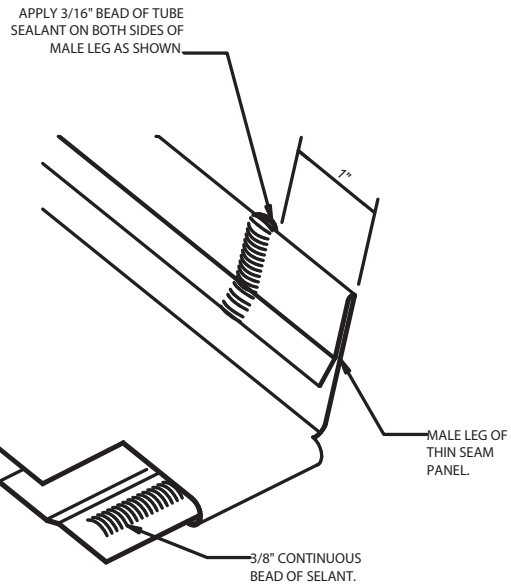
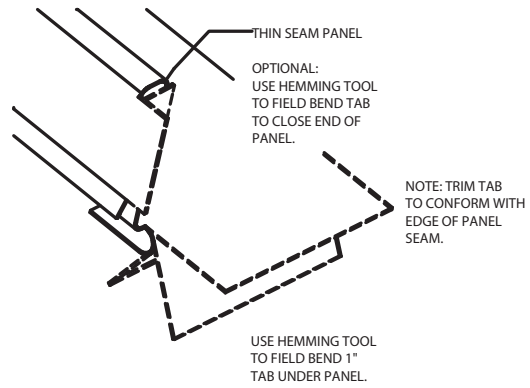
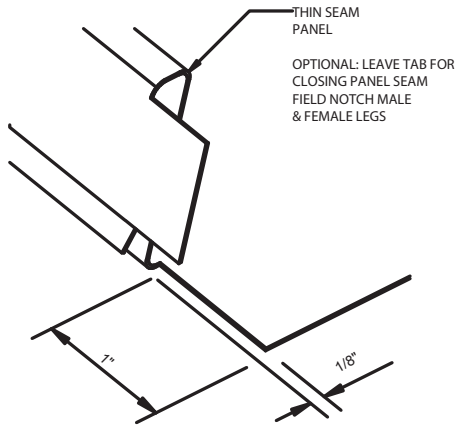
TOUCH-UP PAINT



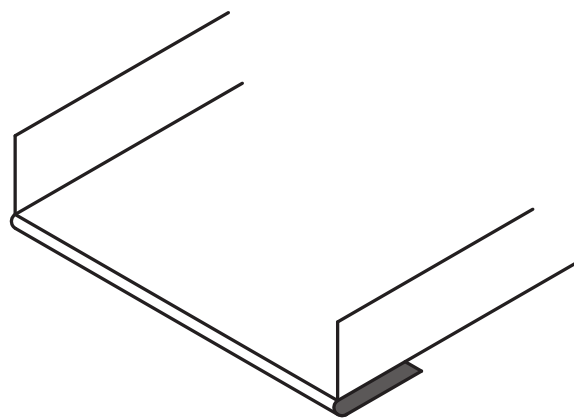
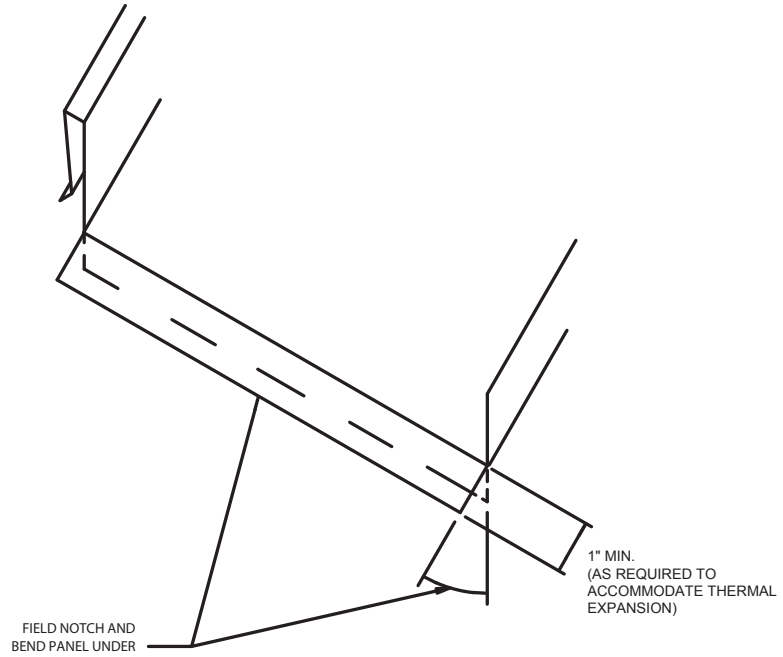
THIN SEAM PANEL PROFILE



OPTIONAL:
PINCH PANEL SEAM TOGETHER AT END
OF PANEL TO MAKE SEAM TIGHTER.



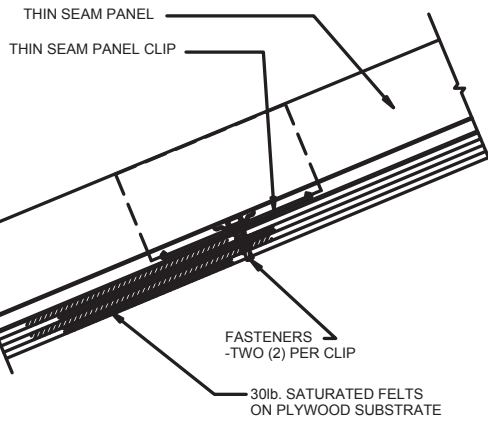
Panel boxed ends are used at the ridge, hip, peak, and end wall conditions. The bend-up at the panel end closes off the roof, preventing water penetration. Boxing the panel ends may be used in place of the EPDM closures for the details shown in this manual.



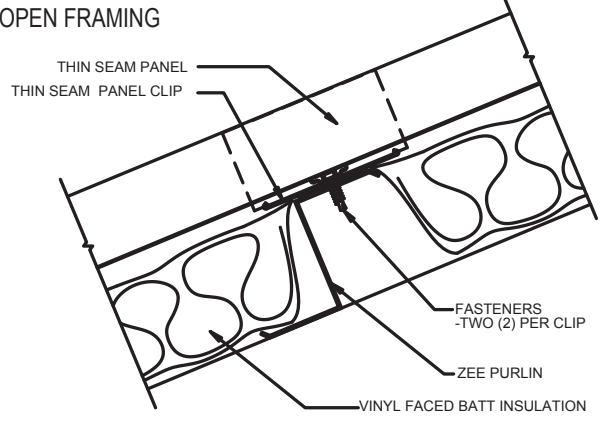
PANEL END HEM DETAIL
(AT PANEL EAVES)

Thin Seam panels can be installed over a variety of substrates and can accommodate most insulation requirements. Continuous horizontal members are required for roof clip attachment and must be spaced to meet loading requirements. The horizontal members must have a flat surface at least as wide as the clip. Two fasteners per clip are required. Because Thin-Seam is a type of standing seam roof that accommodates thermal movement, the roof panels will not act as a diaphragm for wind design. Therefore, bracing is required to resist wind loads.

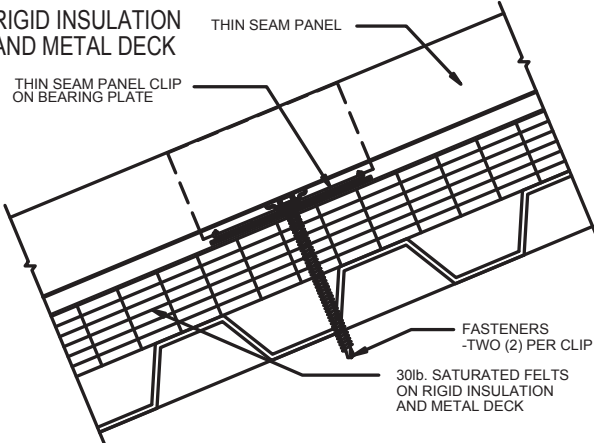
PLYWOOD



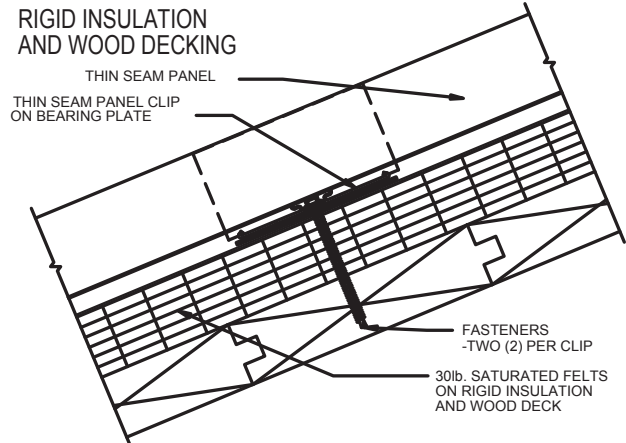
OPEN FRAMING



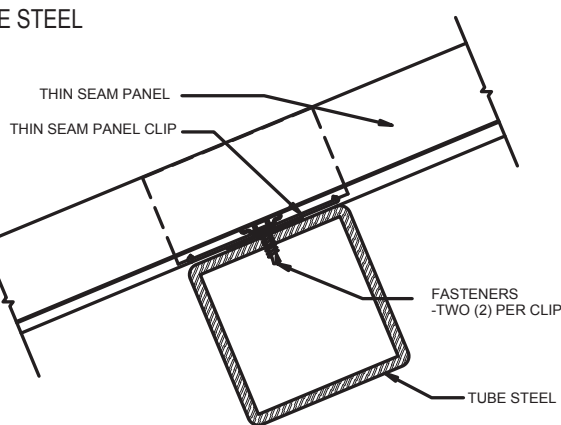
RIGID INSULATION AND METAL DECK



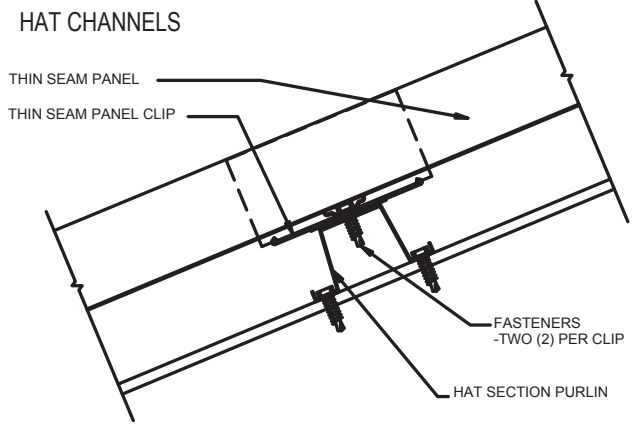
RIGID INSULATION AND WOOD DECKING

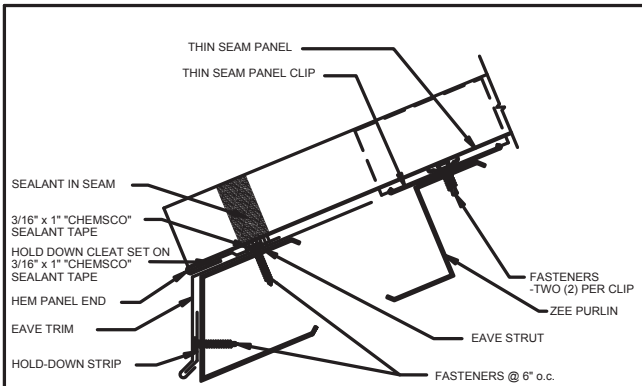


TUBE STEEL

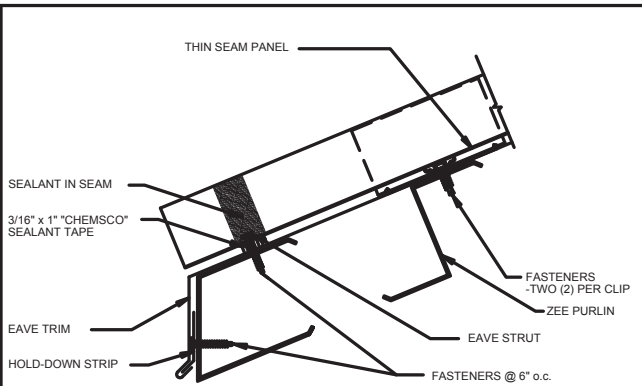


HAT CHANNELS

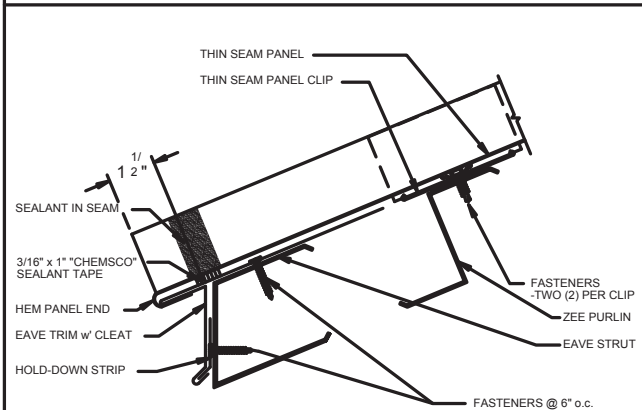




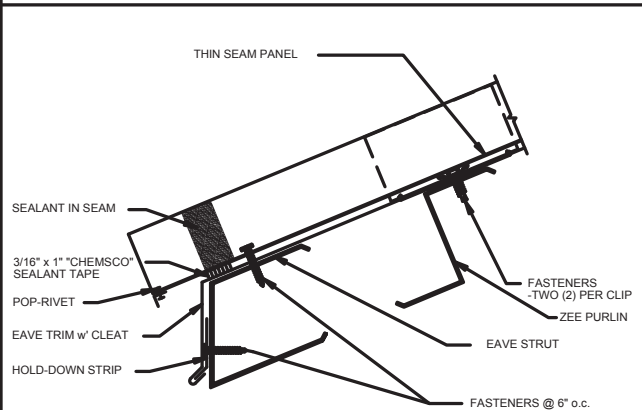
SLIDING EAVE DETAIL (USE WITH SLIDING VALLEY AND FIXED RIDGE, HIP, AND END WALL DETAILS)



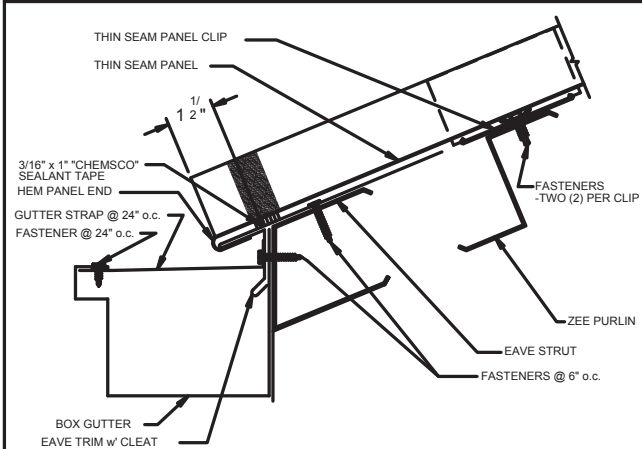
FIXED EAVE DETAIL (USE WITH SLIDING RIDGE, HIP, AND END WALL DETAILS)



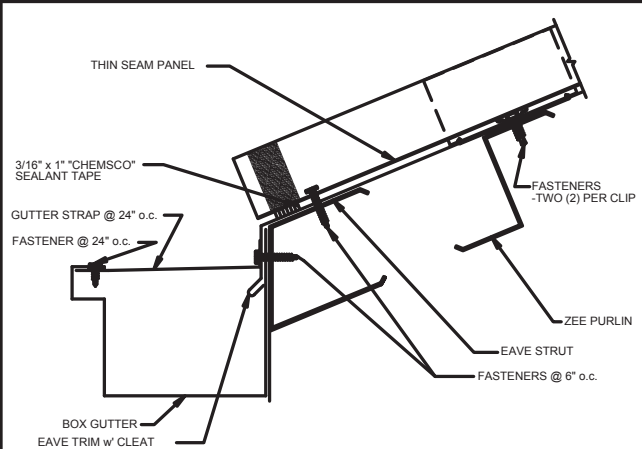
SLIDING EAVE DETAIL (USE WITH SLIDING VALLEY AND FIXED RIDGE, HIP, AND END WALL DETAILS)



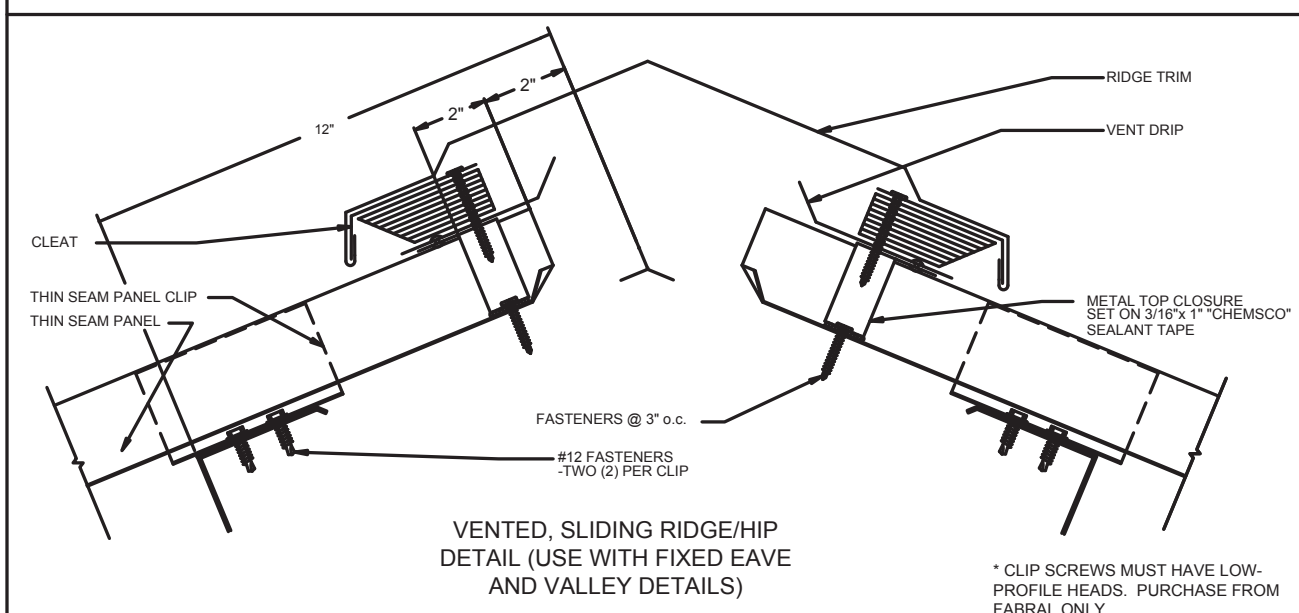
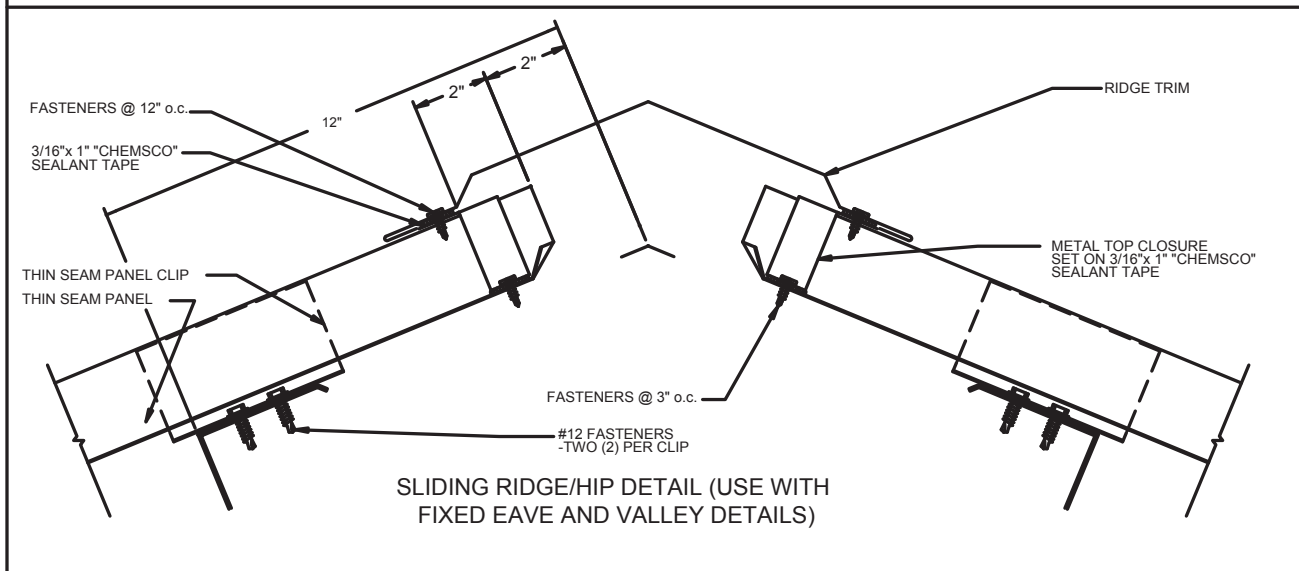
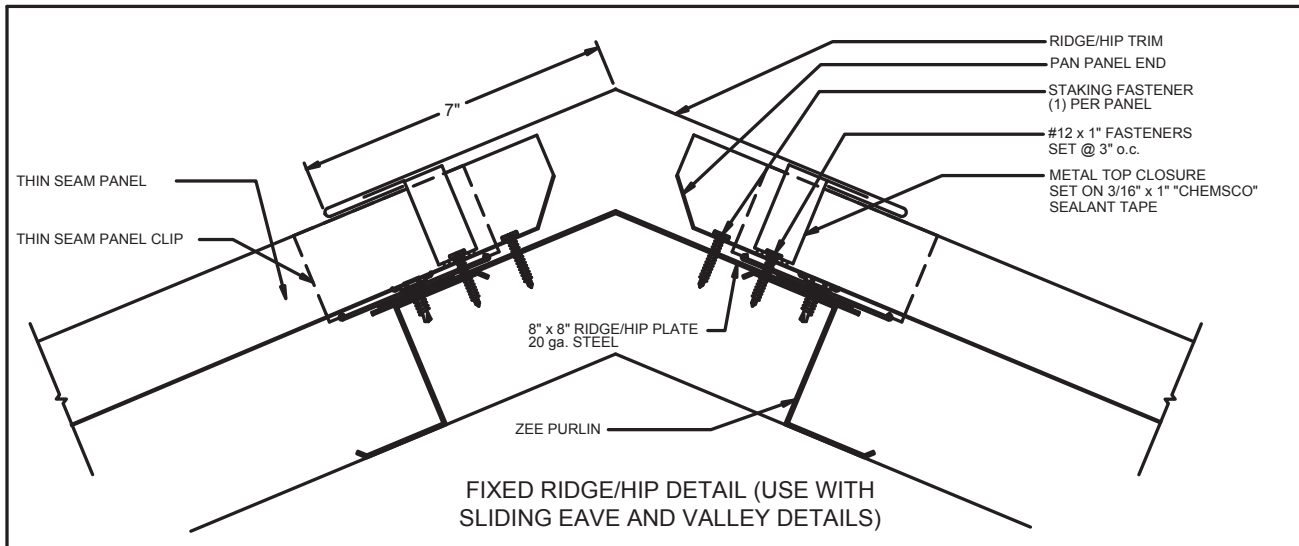
FIXED EAVE DETAIL (USE WITH SLIDING RIDGE, HIP, AND END WALL DETAILS)



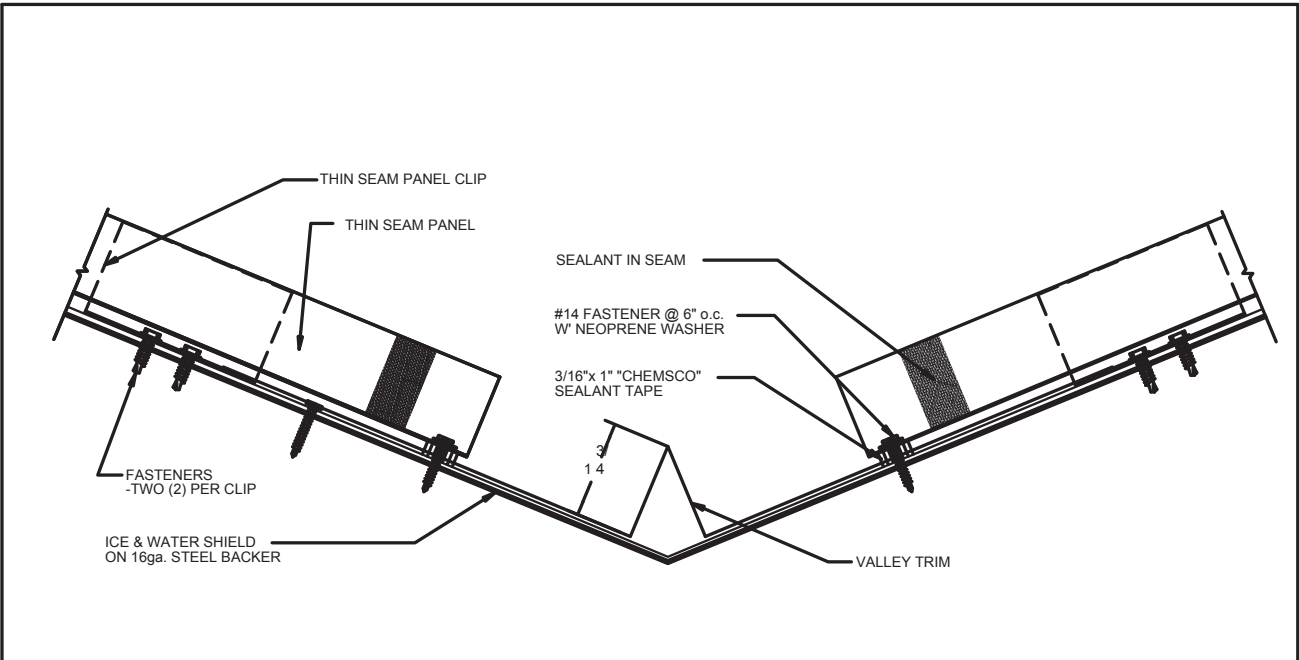
SLIDING EAVE WITH GUTTER DETAIL (USE WITH FIXED RIDGE, HIP, AND END WALL DETAILS)



FIXED EAVE WITH GUTTER DETAIL (USE WITH SLIDING RIDGE, HIP, AND END WALL DETAILS)

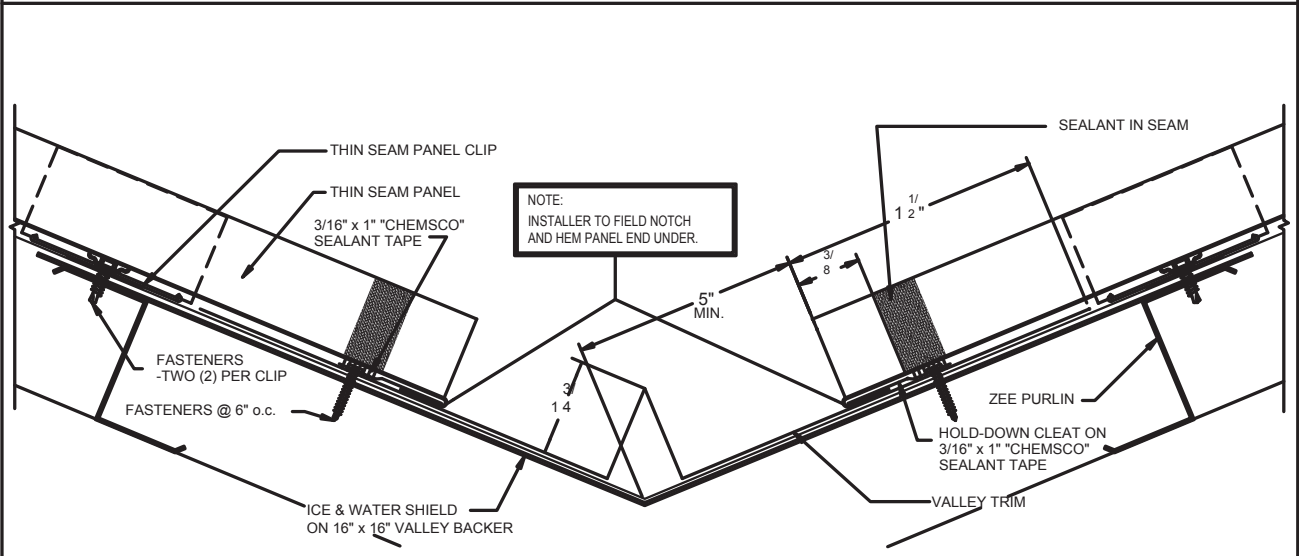


* CLIP SCREWS MUST HAVE LOW-
PROFILE HEADS. PURCHASE FROM
FABRAL ONLY.



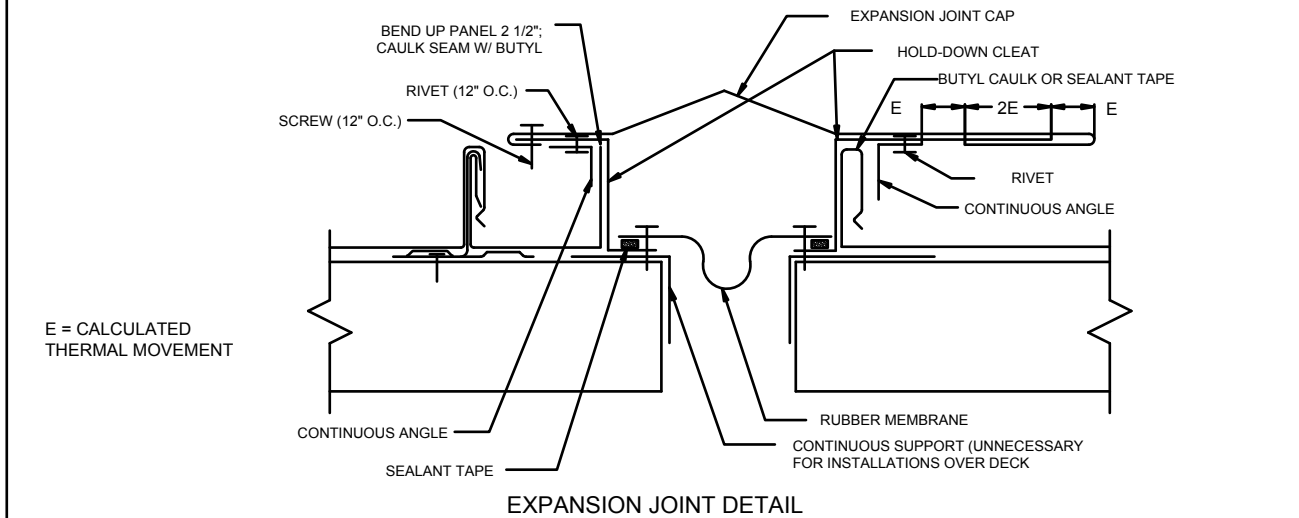
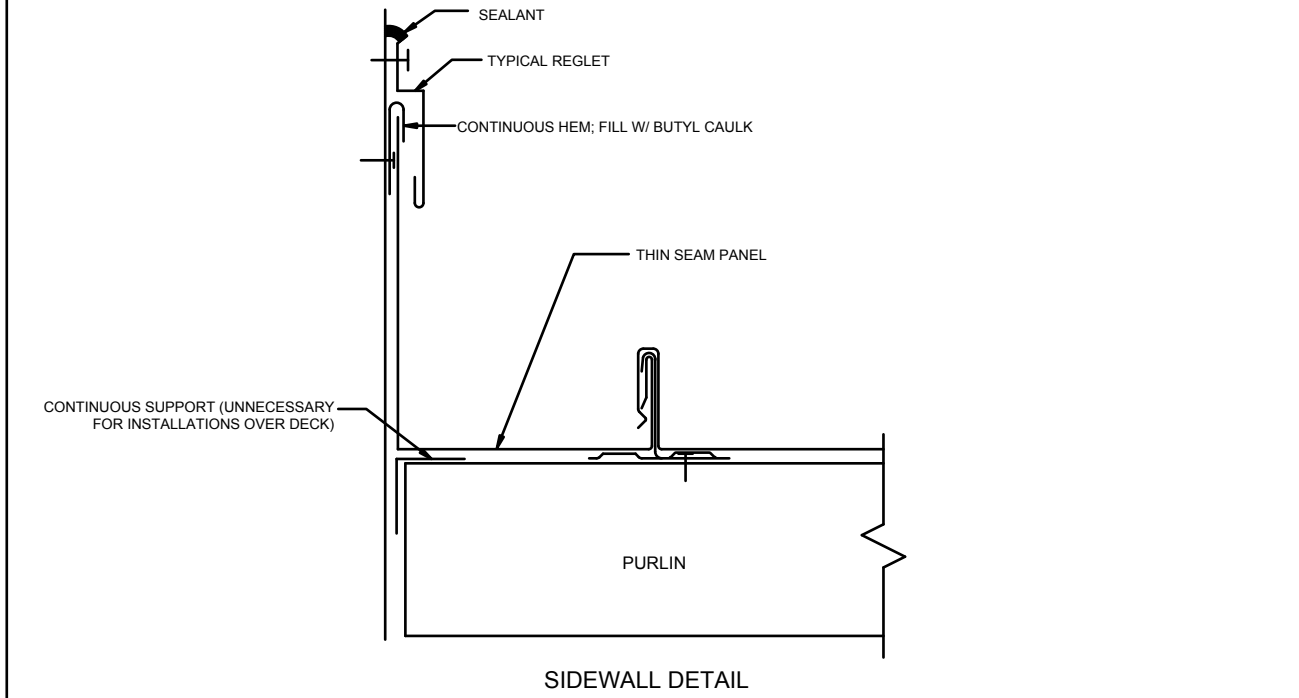
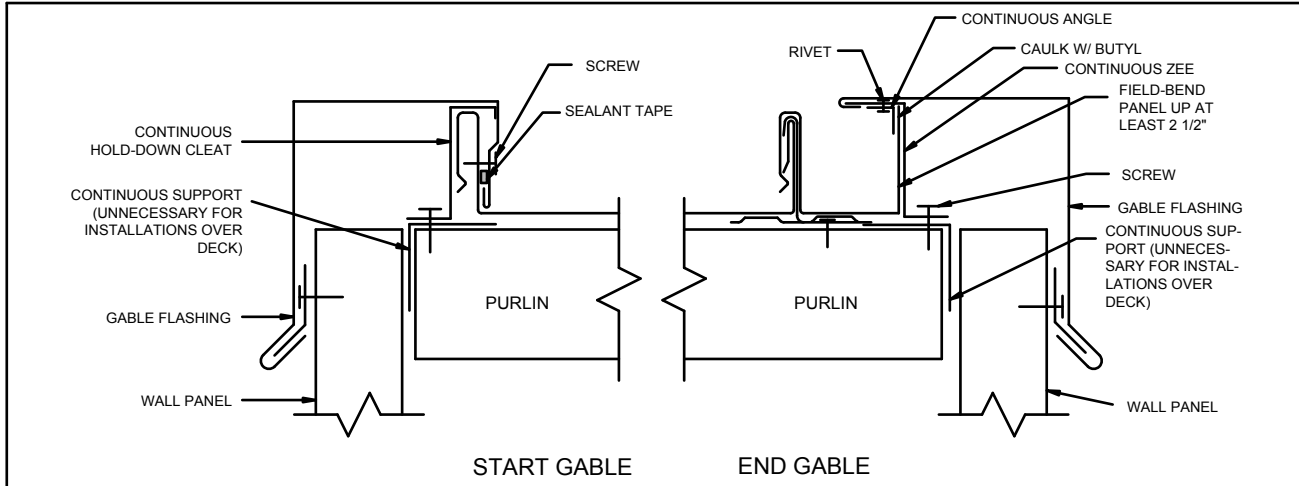
FIXED VALLEY DETAIL (USE WITH FIXED EAVE AND SLIDING RIDGE, HIP, AND END WALL DETAILS)

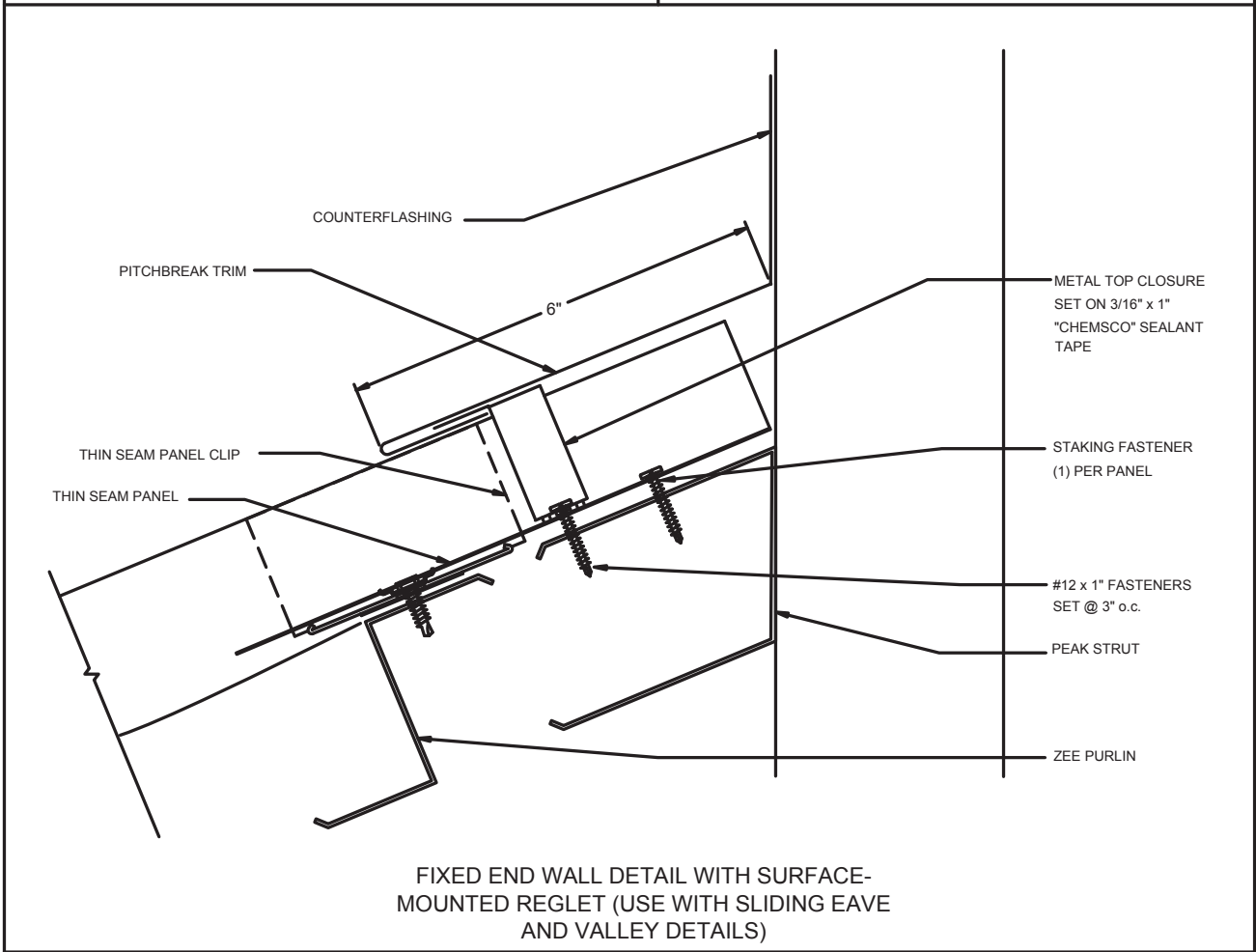
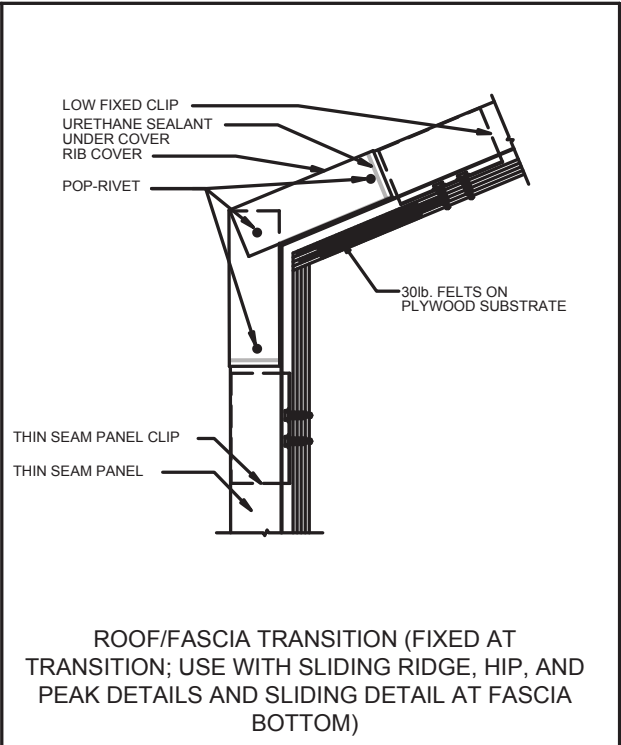
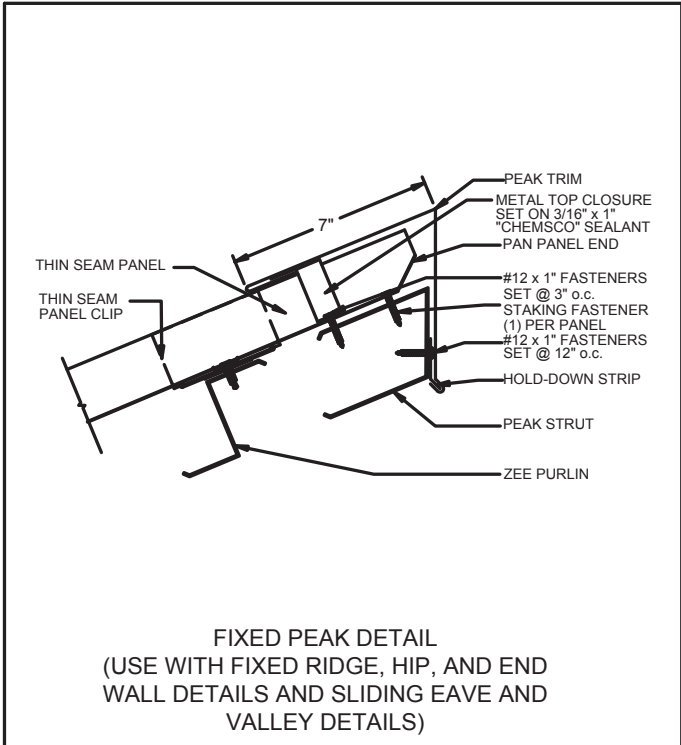
* CLIP SCREWS MUST HAVE LOW-PROFILE HEADS. PURCHASE FROM FABRAL ONLY.

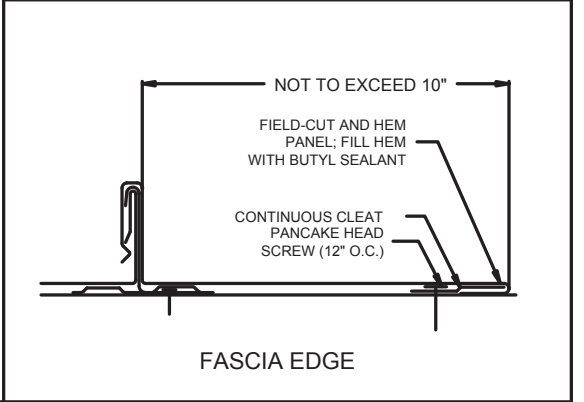
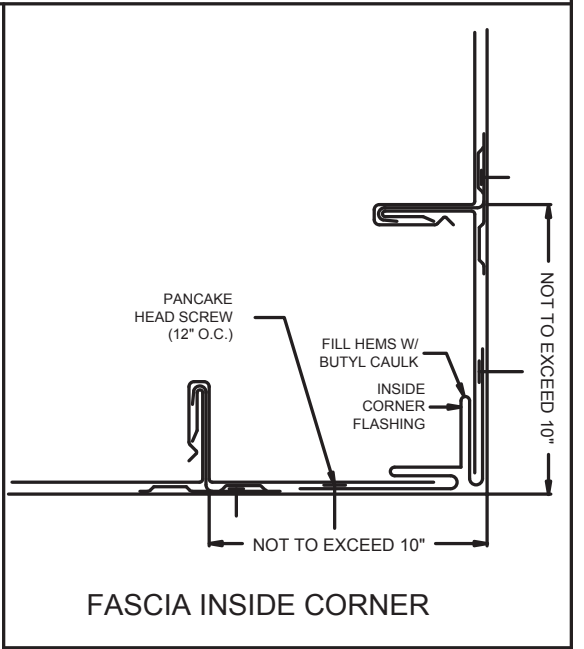
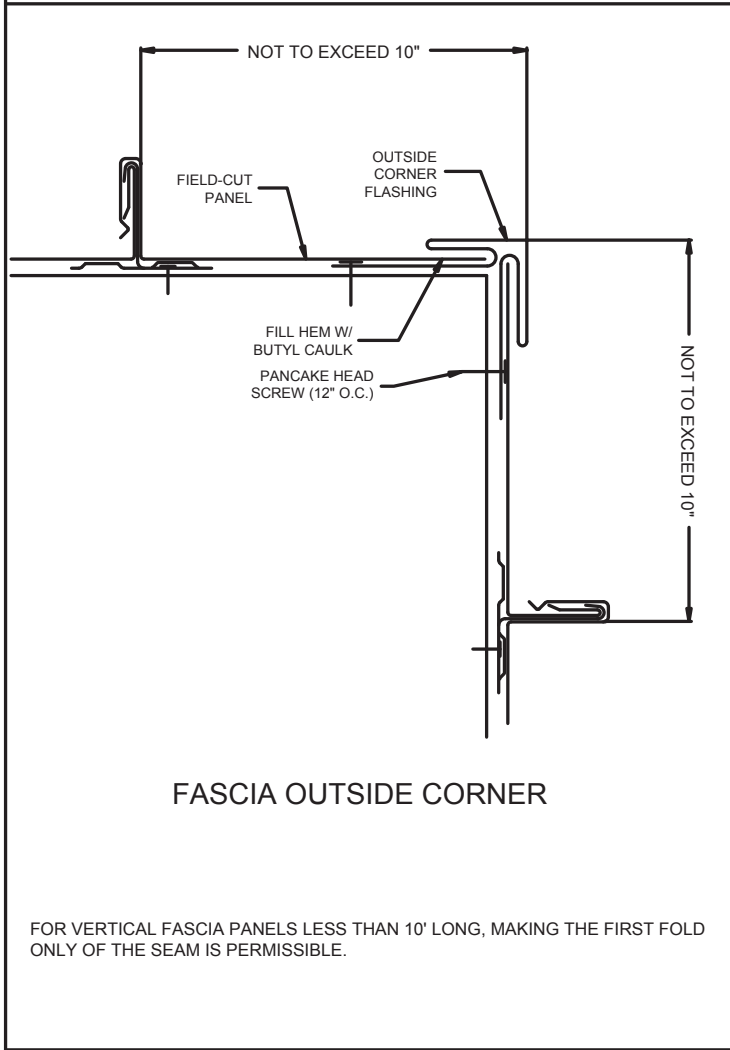
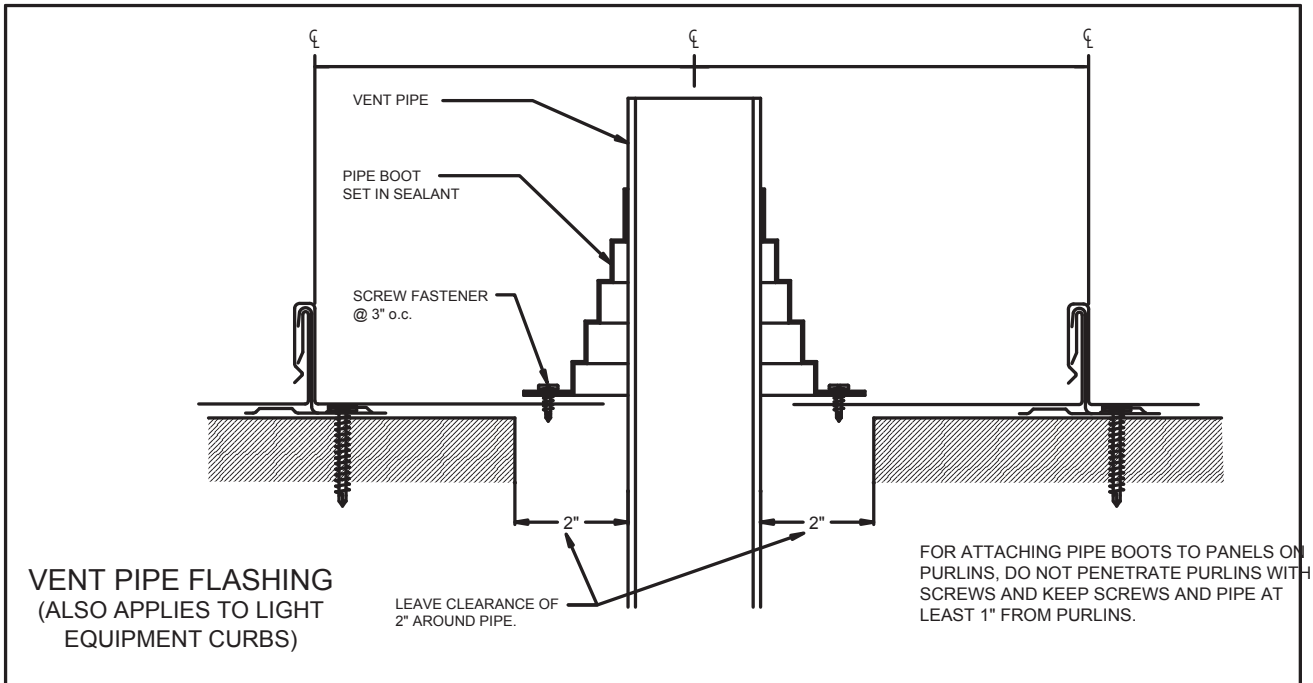


SLIDING VALLEY DETAIL (USE WITH SLIDING EAVE AND FIXED RIDGE, HIP, AND END WALL DETAILS)

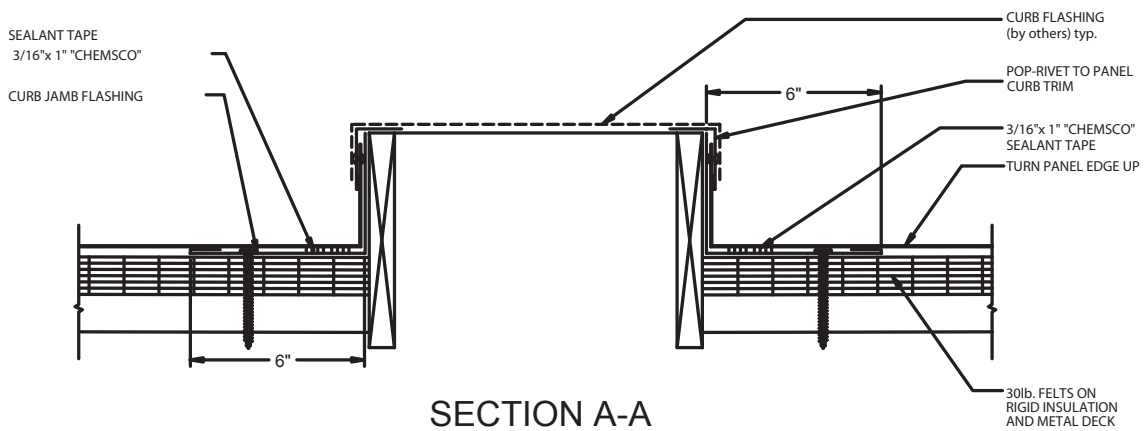
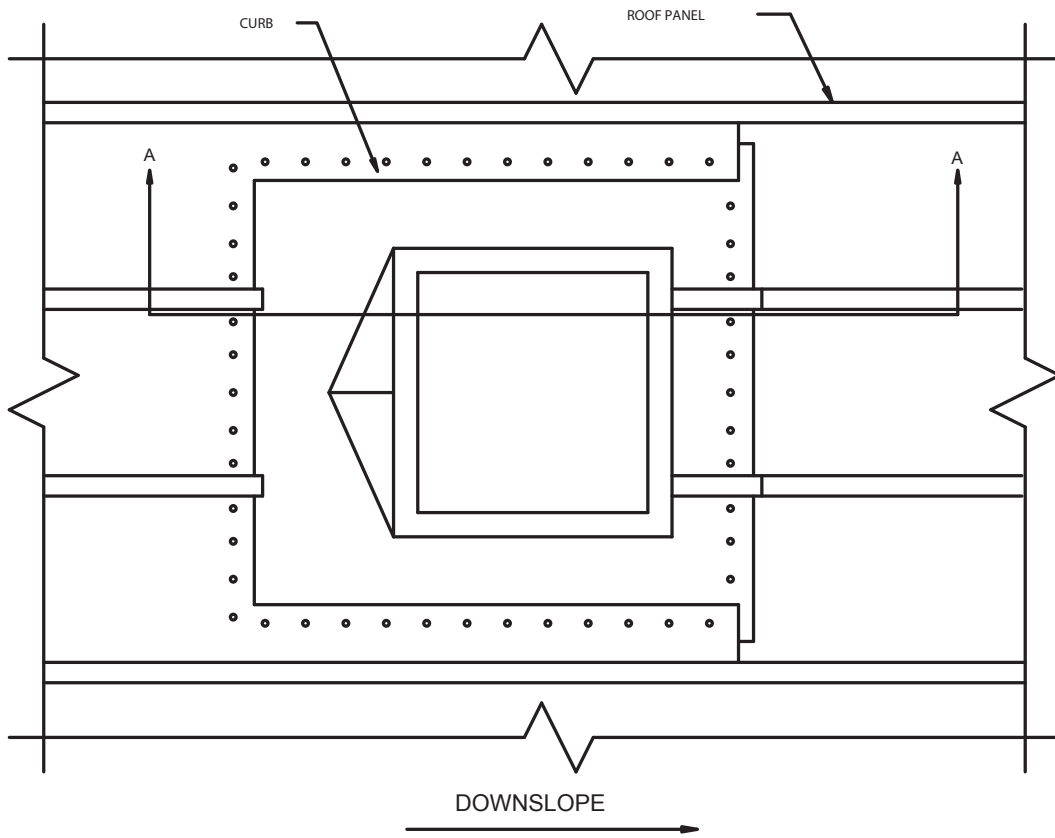
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Corporate Office:

3449 Hempland Road, Lancaster, PA 17601 (800) 477-2741

Architectural Systems:

308 Alabama Blvd., Jackson, GA 30233 (800) 884-4484

Additional Locations:

2402 Industry Way, Cedar City, UT 84720 (800) 432-2725

Route 24 West, Gridley, IL 71744 (800) 451-3974

Route 3, Box 632, Idabel, OK 74745 (800) 926-8509

658 Boekel Road, Rathdrum, ID 83858 (888) 432-2725

1820 East 26th St., Marshfield, WI 54449 (800) 528-0878

Highway 41 South & 55 Lamb Loop Road, Tifton, GA 31793 (800) 749-8144

World Wide Web address: www.fabral.com

E-Mail: architecturalsystems@fabral.com

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