



2 1/2" SSR Roofing System

Installation Manual



US Patent #4

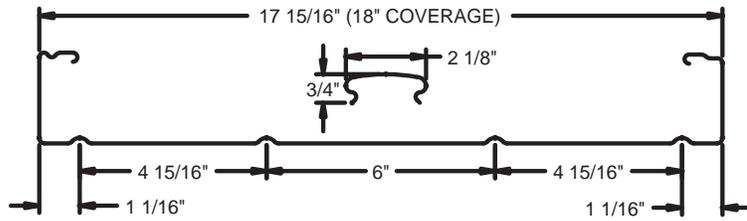
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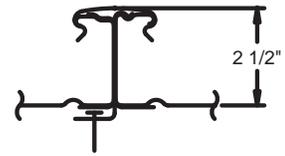
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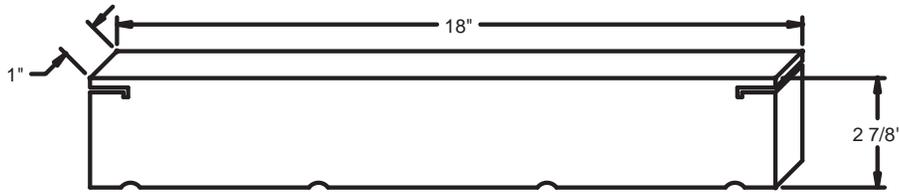
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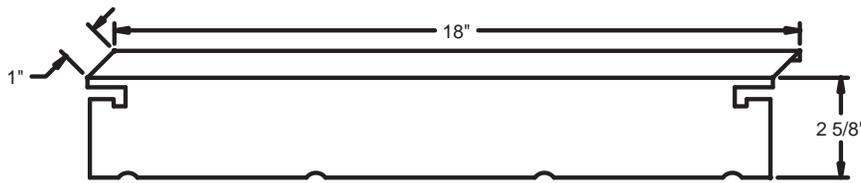
2 1/2" SSR SEAM

ACCESSORIES

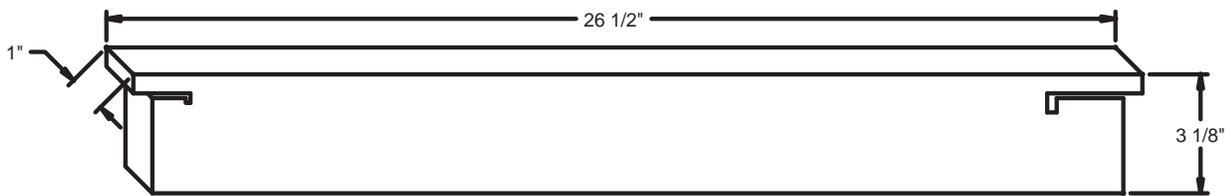
CLOSURES



POLYETHYLENE CLOSURE

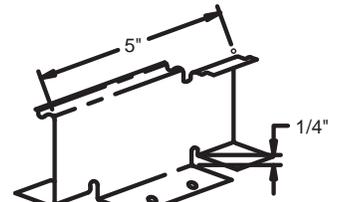


METAL CLOSURE

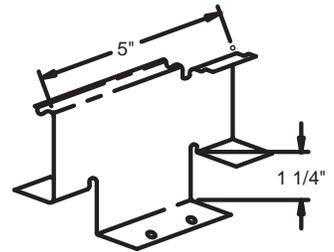


POLYETHYLENE CLOSURE (45° BEVEL)

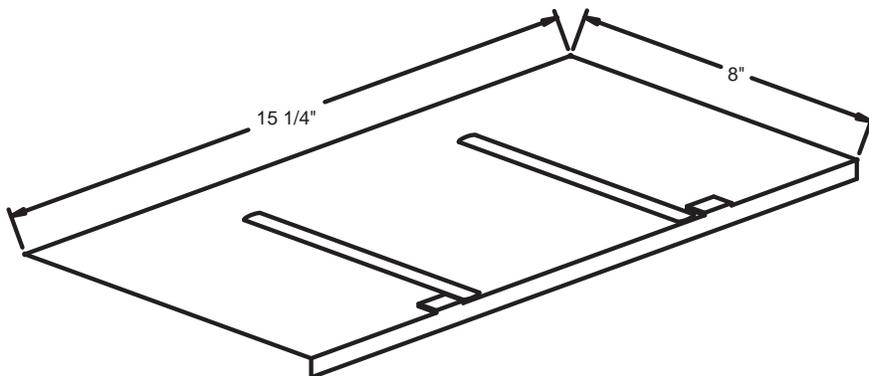
CLIPS



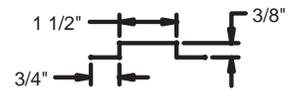
CLIP (TYPE A)



CLIP (TYPE B)



BACKUP PLATE



18 GA. SUBGIRT
(20' LONG)



END CAP

2 1/2" SSR SYSTEM

General notes and Installation Recommendations

(Refer to the photographs on the following page and the details.)

A. GENERAL NOTES

1. This booklet has been prepared to assist the designer and installer with various recommended details and installation procedures. Each project usually requires its own specially designed details. The details included can be used as a guide in designing project details.
2. Fabral's 2 1/2" SSR system has been designed based on the use of glass fiber blanket insulation between the panels and the roof structural members. Although elimination of the glass fiber blanket insulation will not affect the installation procedure or the overall suitability of this product, installations without insulation can produce noise caused by wind acting on the roof panels, causing them to have intermittent contact with the roofing support members. When using Fabral's 2 1/2" SSR system without insulation, it is recommended that a damper (such as 1/4" thick sealant tape) be applied to each purlin member to diminish the noise effects. Fabral recommends the use of glass fiber blanket insulation with its 2 1/2" SSR system to eliminate this noise.
3. The main ribs on Fabral's 2 1/2" SSR system panels are NOT IDENTICAL OR SYMMETRICAL. Therefore, it is important that care be taken to orient all roof panels in the same direction during the preparation of field erection drawings and during installation. These roof panels cannot be reversed or turned end for end once installation has been started on a particular roof. **INSTALLATION REQUIRING PANEL ENDLAPS MUST SPECIFY THE DIRECTION OF INSTALLATION.**
4. Fabral's 2 1/2" SSR system panels are available in lengths up to 75'. For longer roof slopes, the roof panels can be endlapped. The lower panel at each endlap must be shop-or-field-coped, as shown in the endlap detail. Fabral will shop-cope the panels so they may be installed either left to right or right to left. **IT IS IMPORTANT WHEN ORDERING TO NOTIFY FABRAL WHICH DIRECTION THE PANELS WILL BE INSTALLED (LEFT TO RIGHT OR RIGHT TO LEFT) SO THAT THE APPROPRIATE PANEL END WILL BE COPED.** The direction of installation is determined on the ground looking up at the roof. When endlaps are required, Fabral recommends that the endlaps be staggered. If endlaps are all on the same line, panel alignment cannot be maintained.
5. Each roof panel is manufactured with four (4) minor stiffening ribs in the flat area to minimize oil canning. However, due to the limitations of commercially available metals, some oil canning should be anticipated and is not cause for rejection.
6. To prevent damage from excessive foot traffic, type B clips should not be used with the 26 ga. panels.
7. Whenever possible, workers should walk on the panel ribs rather than the flat of the panel. Boards or plywood should be placed over the panels in areas, which receive excessive foot traffic (such as top equipment, skylights, etc.).
8. Flashings must lap a minimum of 6". Treat flashing endlaps similar to a panel endlap detail using two rows of sealant tape with stitch screws 4" o.c. Maximum.
9. Sealants:
 - a) Quality long-life butyl sealants work best as a gasket sandwiched between two pieces of metal.
 - b) Non-acetic acid-cured silicone sealants are recommended when voids must be filled.
10. Jobsite handling:
 - a) Panel crates must be lifted at bundle block locations.
 - b) Do NOT lift material with ropes or wires.
 - c) Do NOT lift panels greater than 25'-0" long without a spreader bar.
 - d) Do NOT lift panels from ends while flat. DO lift panels on edge.

B. PROPER STORAGE

If the material is not to be used immediately, it should be stored in a dry place where little moisture can contact 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 material stacks in an inclined position. If outdoor storage cannot be avoided, protect the material with a canvas or waterproof paper cover. Do not use plastic, which can cause 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 the materials are properly stored at the jobsite.

C. INSTALLATION PROCEDURES

1. Check the structural support system to be sure it is straight and square and that the tops of all members are in the same plane. Vertical camber in roof supports can cause water to pool on low pitched roofs. Misaligned structures can greatly increase the amount and degree of oil canning.
2. Install blanket insulation over an area that can be safely covered with roof panels before the end of the workday or time period.
3. Starting at the gable end of the roof, lay the first roof panel in place with ribs running perpendicular to the eave or ridgeline. The panels should be oriented so that the long top flange faces away from the panel (see photo 1). If thermal blocks will be used, place one over each roof support member between the roof panel and blanket insulation.
4. Install a Type A clip (Type B clip if thermal blocks are used) on roof panel rib at each roof support member. Clips are installed by hooking each one over roof panel rib (see photo 1) and then rotating it into place so that its vertical leg is flush with the vertical leg of the roof panel rib (see photo 2).
5. Fasten each clip to the roof support member with the appropriate screw fastener. Clips are furnished pre-drilled to accept #12 screws (see photo 3).
6. For applications requiring endlaps, install the first panel (down-slope panel) like a normal panel. Prior to installing the upslope panel, place the back-up plate onto the installed downslope panel. Position the endlap sealant tape and place the upslope panel into position. Install the upslope panel as outlined in the endlap details. Secure the endlap with four (4) self-drilling, self-tapping screws, as shown on the detail. Connect all beads of sealant prior to placement of the cap-lock at panel endlaps. For ease of installation, install the clip at the endlap prior to installing the remaining clips on the upslope panel.
7. For applications not requiring endlaps, install the next adjacent panel by sliding the panel sideways so that it engages the top and bottom flanges of each previously installed clip (see photos 4 and 5). Be sure it fits snugly up against the clips and adjacent roof panel.
8. Repeat steps 4 and 5.
9. Install the cap-lock by engaging one side of cap-lock on one side of the standing seam joint and rotate downward until the free side of the cap-lock snaps into place over the opposite side of the standing seam joint (see photos 6, 7, and 8). Sections of cap-lock should be lapped two (2) inches. Seal cap-lock laps with silicone caulk. All panel joints must be capped before the end of each workday to prevent the possibility of wind forces disengaging roof panels from clips. Fasten the cap-lock to the panel at the eave using a sheet metal screw. This will prevent cap-lock movement due to thermal forces.
10. Repeat steps 6 through 9 as roof panels are installed across the roof.
11. Before the end of each workday, install four (4) fasteners in each roof panel at each eave and endlap to prevent wind uplift of panels (see eave and endlap details). Connect factory caulk beads with silicone at downslope end of all cap-locks to form continuous seal.

2 1/2" SSR SYSTEM SPECIFICATION

<p>1.01 SUMMARY</p> <p>A. Section includes: all material, labor, and equipment to complete installation of 2 1/2" SSR roofing as shown on the drawings and herein specified. Include all copings, gutters, and flashings contiguous with the panels.</p> <p>B. Related Sections:</p> <ol style="list-style-type: none"> 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. <p>1.02 REFERENCES</p> <p>A. American Society for Testing and Materials (ASTM)</p> <ol style="list-style-type: none"> 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. <p>B. Underwriters Laboratories</p> <ol style="list-style-type: none"> 1. ULS80 wind uplift test (Class 90) <p>C. Sheet Metal and Air Condition Contractors National Associates, Inc. (SMACNA)</p> <ol style="list-style-type: none"> 1. SMACNA Architectural Sheet Metal Manual, 1993 Edition. <p>D. American Iron and Steel Institute (AISI)</p> <ol style="list-style-type: none"> 1. AISI Cold Formed Steel Design Manual <p>E. Aluminum Association</p> <ol style="list-style-type: none"> 1. Aluminum Design Manual <p>F. Metal Construction Association (MCA)</p> <ol style="list-style-type: none"> 1. Preformed Metal Wall Guidelines <p>G. Code References</p> <ol style="list-style-type: none"> 1. ASCE, Minimum Loads for Buildings and Other Structures 2. BOCA National Building Code 3. UBC Uniform Building Code 4. SBC Standard Building Code <p>1.03 SYSTEM DESCRIPTION</p> <p>A. Performance Requirements: Provide factory formed, prefinished, snap-together, concealed clip, structural standing seam metal roof system, that has been pretested and certified by manufacturer to comply with specified requirements under installed conditions.</p> <ol style="list-style-type: none"> 1. The metal roofing system including required trim members shall meet the specified requirements for snow loads, wind loads, air infiltration, and water penetration. 2. The panels shall have a 2 1/2" high finished joint, 18" o.c. including a factory-caulked, snap-on cap. Mechanical crimping or sealing of the standing seam joint or cap is prohibited. 3. The anchorage system shall be concealed. The panels' clips shall permit the panel unlimited thermal movement. 4. Roof panels shall be a maximum possible length to minimize endlaps but shall be limited to 45'. Exposed fasteners are not permitted except at eaves, gables, valleys, and roof panel endlaps. 5. The 2 1/2" SSR panel system shall carry a UL Wind Uplift Class 90 rating to insure structural integrity and possible reduction in insurance rates. 6. The 2 1/2" SSR panels shall have no air infiltration when tested in accordance with ASTM E 1680 with an air pressure difference of 6.24 psf and 0.02 cfm/ft.² leakage at 6.24 psf, 0.04 cfm/ft.² leakage at 12.0 psf, and 0.08 cfm/ft.² leakage at 20.0 psf. 7. The 2 1/2" SSR panels shall have no air exfiltration when tested in accordance with ASTM E 1680 with an air pressure difference of 4.0 psf and 0.02 cfm/ft.² leakage at 6.24 psf, 0.04 cfm/ft.² leakage at 12.0 psf, and 0.08 cfm/ft.² leakage at 20.0 psf. 8. The 2 1/2" SSR panels shall have no air exfiltration when tested in accordance with ASTM E 1646 with 20.0 psf pressure differential and 5 gal./hr. spray. 9. The 2 1/2" SSR panels shall have no water leakage when tested in accordance with ASTM E 1646 with 20.0 psf pressure differential and 5 gal./hr. spray. <p>B. Structural Requirements: Engineer panels for structural properties in accordance with latest edition of American Iron and Steel Institute's <i>Cold Formed Steel Design Manual</i> using "effective width" concept and Aluminum Association's <i>Aluminum Design Manual</i>.</p> <p>1.04 SUBMITTALS</p> <p>A. Product Data: submit manufacturer's specifications, standard profile sheet, product data brochure and finish warranty.</p> <p>B. Shop Drawings: shop drawings showing roof plan with layout of panels, screws, 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.</p> <p>C. Samples:</p> <ol style="list-style-type: none"> 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. <p>D. Certification: Submit manufacturer's certification that materials and finishes meet specification requirements.</p> <p>1.05 QUALITY ASSURANCE</p> <p>A. Panel manufacturer shall have a minimum of ten (10) years of experience in manufacturing architectural roofing in a permanent stationary indoor facility.</p> <p>B. Panel installer shall have a minimum of 5 years experience in installation of metal roofing of similar size and scope.</p> <p>1.06 DELIVERY, STORAGE, and HANDING</p> <p>A. Panels and flashings shall be protected and properly packaged to protect against transportation damage in transit to the jobsite.</p> <p>B. Upon delivery, exercise care in unloading, stacking, moving, storing, and erecting panels and flashings to prevent twisting, bending, scratching, or denting.</p> <p>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 stripable film shall not be stored in direct sunlight.</p> <p>D. Upon installation immediately remove stripable film from panels and flashings. Protect panels and flashings from foot traffic and from all other trades.</p> <p>1.07 PROJECT CONDITIONS</p> <p>A. Field dimensions shall be taken prior to fabrication to verify jobsite conditions.</p> <p>B. Minimum recommended pitch for this panel is 1/2:12.</p> <p>1.08 WARRANTIES</p> <p>A. Panel manufacturer shall provide a twenty (20) year warranty on the paint finish covering chalking, cracking, checking, chipping, blistering, peeling, flaking, and fading.</p> <p>B. Applicator shall furnish written warranty for two (2) year period from date of substantial completion of building covering repairs required to maintain roof and flashings in watertight conditions.</p> <p>2.01 PRODUCT DESCRIPTION</p> <p>A. 2 1/2" SSR structural standing seam roof system as manufactured by Fabral, 3449 Hempland Road, Lancaster, PA 17601, ph: 717-397-2741; fax 717-397-1040.</p> <p>B. The 2 1/2" SSR panel shall have coverage of 18". Seams shall be 2 1/2" tall.</p> <p>C. Panels shall be attached to the substrate with one-piece concealed clips that permit unlimited thermal movement.</p> <p>D. The panels shall use snap-on batten caps that will be manufactured in 16'-0" lengths. Caps shall be roll-formed to a width of 2 1/4" and a depth of 1 1/8". The top surface shall be curved to provide a springback action when installed. Caps shall be furnished with two beads of factory-applied caulk on the interior side.</p> <p>E. There shall be four small stiffening beads in the flat of the panel.</p> <p>F. Inside and outside closures will be supplied and used as recommended in Fabral's details.</p> <p>2.02 PRODUCT SUBSTITUTION</p> <p>A. Requests to use alternate systems shall be submitted in writing to the project designer at least ten (10) days prior to bid date. Requests shall demonstrate proposed substitution meets or exceeds specified performance requirements. Certified statements, samples and descriptive data shall be included in this submittal request.</p> <p>B. Manufacturers listed in this section are prequalified manufacturers. Substitution if manufacturer's products for those specified shall not be allowed at anytime during construction.</p> <p>2.03 MATERIALS AND FINISHES</p> <p>A. Panel material</p> <ol style="list-style-type: none"> 1. 26, 24, 22, 20, or 18 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. 26, 24, 22, 20, or 18 gauge, Grade 40 (40 ksi yield strength) structural steel with AZ50 (0.50 oz./ft.²) aluminum-zinc alloy coating, both conforming to ASTM A 792. 3. 0.032, 0.040, or 0.050", 3004-H36 or equivalent (28 ksi yield strength) aluminum alloy conforming to ASTM B 209. <p>B. Cap materials</p> <ol style="list-style-type: none"> 1. 26 or 24 gauge, Grade 40 (4 ksi yield strength) structural steel with G90 (0.90 oz./ft.²) hot dipped galvanized coating, both conforming to ASTM A 653 (used with panels made of thicker metal). 2. 26 or 24 gauge, Grade 40 (40 ksi yield strength) structural steel with AZ50 (0.50 oz./ft.²) aluminum-zinc alloy coating, both conforming to ASTM A 792 (used with panels of thicker metal). <p>3. 0.032, 3004-H36 or equivalent (28 ksi yield strength) aluminum alloy conforming to ASTM B 209 (used with panels made of thicker metal).</p> <p>C. Texture: panels shall be smooth.</p> <p>D. Finish: refer to manufacturer's standard color card to determine appropriate finish and color. All panels shall receive a factory-applied (siliconized polyester) (Kynar® 500/Hylar 5000®) (vinyl plastisol) conforming to the following:</p> <ol style="list-style-type: none"> 1. Metal preparation: all metal shall have the surfaces carefully prepared for painting on a continuous process coil coating line by alkali cleaning, hot water rinsing, application of chemical conversion coating, cold water rinsing, sealing with an acid rinse, and thorough drying. 2. Prime coating: a base coat of epoxy paint, specifically formulated to interact with the top-coat, shall be applied to the prepared surfaces by roll coating to a dry film thickness of 0.20 ± 1.05 mils. This prime coat shall be oven cured prior to application of finish coat. 3. Exterior coating: a finish coating (see above) shall be applied over the primer by roll coating to a dry film thickness of 0.80 ± 0.05 mils (3.80 ± 0.05 mils for vinyl plastisol) for a total dry film thickness of 1.00 ± 0.10 mils (4.00 ± 0.10 mils for vinyl plastisol). This finish coating shall be oven-cured. 4. Interior coating: a washcoat shall be applied on the reverse side over the primer by roll coating to a dry film thickness of 0.30 ± 0.50 mils for a total dry film thickness of 0.50 ± 0.10 mils. The washcoat shall be oven-cured. 5. Color: the color of the exterior finish shall be _____ as chosen from the manufacturer's standard color chart. 6. Physical properties: the coating shall conform to the manufacturer's standard performance criteria as listed by certified test reports for fade, chalk, abrasion, humidity, adhesion, pollution resistance, and others as required and standard within the industry. <p>2.04 ACCESSORIES</p> <p>A. Screws</p> <ol style="list-style-type: none"> 1. All exposed fasteners shall have combination metal and neoprene washers. For preprepared roof panels, all exposed fasteners shall be preprepared to match the roof panel. 2. All fasteners shall be concealed except as shown on the drawing. 3. Fasteners for the following locations shall be: <ol style="list-style-type: none"> a. Clips to purlins: zinc plated (#12-14 x 1 1/2" self-drilling, self-tapping screws) (#14 HHB x 1" self-tapping screws). b. Roof panels to eave support: (zinc-plated) (305 stainless steel) (#12-14 x 1 1/2" or 2" self-drilling, self-tapping screws) (#14 HHB x 1" or 2" self-tapping screws). c. Roof panel endlaps: (zinc-plated) (305 stainless steel) #14 x 1 1/4" self-drilling, self-tapping screws. d. Subgirts to roof panel ribs and flashings to subgirts: zinc plated (#12-14 x 1" self-drilling, self-tapping screws) (#14 HHA x 3/4" sheet metal screws). e. Flashings to roof panel ribs: (zinc plated) (305 stainless steel) (zinc-aluminum alloy plated) (#14 HHA x 3/4" sheet metal screws) (#14 milpoint x 1" self-drilling slotted screws). f. Screws for flashings and sidelaps shall be #14 HHA x 3/4" sheet metal slotted screws. All accessories, flashings, and sidelaps shall be fastened 12" o.c. <p>B. Back-up plates shall be die-punched from 18 gauge zinc-aluminum alloy coated steel and used to stiffen the panels at endlaps. The plates shall have two guide lances to align and hold the panels during installation.</p> <p>C. Clips shall be die punched and shall have both a purlin bearing flange and two (2) roof panel support flanges. The purlin bearing flange shall be pre-punched for two (2) #12-14 self-drilling, self-tapping screws. Clips shall provide (1/4") (1 1/4") clearance between the purlin bearing flange and the roof panel support flanges. Clip Material shall be 18 gauge zinc-aluminum alloy coated steel.</p> <p>D. Insulation shall be glass-fiber blanket with a density of (0.6) (0.75) pcf and maximum thickness of 4". The insulation shall be faced on one side only with an approved vapor barrier facing sealing tabs. Insulation shall be supplied in rolls of sufficient length to permit a tight application from ridge to eave. When installed, the assembled system shall provide a maximum "U" value of 0.09 with 4" of insulation and a "U" value of 0.08 with 4" of insulation and 1" thermal blocks.</p> <p>E. Thermal blocks shall be 1" thick by at least 3" wide by 17 15/16" long Styrofoam or approved equal applied over the blanket insulation at each purlin under each roof panel.</p> <p>F. Closures</p> <ol style="list-style-type: none"> 1. Polyethylene closures shall be pre-molded to match the assembled panel system and in lengths as supplied by the panel manufacturer. 2. Metal closures shall be 26 or 24 gauge (G90 galvanized steel per ASTM A 653) (AZ50 zinc-aluminum alloy coated steel per ASTM A 792) or 0.032" (thick aluminum alloy 3004 or equivalent per ASTM B 209) to match the assembled panel system and in lengths as supplied by the panel manufacturer. <p>G. Flashings shall be shop fabricated by the panel manufacturer from material that is the same thickness and finish as the panels to which they are attached. Where practical, flashings shall be furnished in maximum 10' lengths. Exposed flashings shall be lapped 6".</p> <p>H. Subgirts shall be used under all flashings that span from rib to rib of the 2 1/2" SSR panels. Subgirts shall be rollformed from 18 ga. G90 galvanized steel and shall be hat-shaped sections 3/8" deep x 3" wide with 3/4" wide flanges. Subgirts shall be furnished in 20' lengths.</p> <p>I. Sealant tape used at roof panel endlaps shall be a butyl type roll as supplied by the manufacturer.</p> <p>J. Caulking shall be a polyurethane where it is exposed and there is no thermal movement. All caulking or sealing shall be done in a neat manner with excess caulking or sealant removed from exposed surfaces.</p> <p>K. Caulking shall be non-skinning, non-hardening gun grade butyl sealant or butyl sealant tape with a minimum thickness of 1/8" where it is concealed and where thermal movement must be accommodated. All caulking or sealing shall be done in a neat manner with excess caulking or sealant removed from exposed surfaces.</p> <p>L. Flashings shall be shop-fabricated from material that is the same thickness and finish as the 2 1/2" SSR panels to which they are attached. Where practicable, flashings shall be furnished in maximum 10' lengths. Exposed flashings shall be lapped 6".</p> <p>2.05 RELATED MATERIALS</p> <p>A. Refer to other sections listed in Related Sections paragraph for related materials.</p> <p>2.06 FABRICATION</p> <p>A. Endlaps will be allowed though swaging is required. Contact factory for details.</p> <p>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.</p> <p>C. Fabricate flashings from the same material as the roof system.</p> <p>2.07 SOURCE QUALITY</p> <p>A. Source quality: obtain metal panels and accessories from a single manufacturer.</p> <p>B. Fabrication tolerances:</p> <ol style="list-style-type: none"> 1. Rib height: 2 1/2" ± 1/8" ■ 2. Panel shearing length: ± 1/4" maximum 3. Follow tolerances in MCA's Preformed Metal Wall Guidelines. <p>C. Tests and inspections</p> <p>D. Verification of performance</p> <p>3.01 MANUFACTURERS INSTRUCTIONS</p> <p>A. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions, and product cartons for installation.</p> <p>3.02 EXAMINATION</p> <p>A. Installer shall:</p> <ol style="list-style-type: none"> 1. Inspect purlins or deck to verify that it complies with shop drawing and is smooth, even, sound, and free of depressions. 2. Report variations and potential problems in writing to the architect. <p>3.03 INSTALLATION</p> <p>A. Conform to standard set forth in the SMACNA architectural sheet metal manuals and the approved shop drawings detailed for the project.</p> <p>B. Install panels plumb, level, and straight with the seams parallel, conforming to the design as indicated.</p> <p>C. Install panel system so it is watertight, without waves, warps, buckles or distortions, and allow for thermal movement considerations.</p> <p>D. Abrasive devices shall not be used to cut on or near roof panels system.</p> <p>E. Apply sealant tape at necessary at flashing and panel joints to prevent water penetration.</p> <p>F. Remove any stripable film immediately upon installation.</p> <p>G. Vapor Retarder: The joints, perimeter, and all openings shall be sealed per the manufacturer's instructions to provide a continuous vapor retarder.</p> <p>H. Underlayment (solid substrate):</p> <ol style="list-style-type: none"> 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. <p>3.04 CLEANING</p> <p>A. Dispose of excessive materials and debris from jobsite.</p> <p>B. Remove filings, grease, stains, marks, or excess sealants from roof panel system to prevent staining.</p> <p>C. Protect work from damage from other trades until final acceptance.</p>	<p>3. 0.032, 3004-H36 or equivalent (28 ksi yield strength) aluminum alloy conforming to ASTM B 209 (used with panels made of thicker metal).</p> <p>C. Texture: panels shall be smooth.</p> <p>D. Finish: refer to manufacturer's standard color card to determine appropriate finish and color. All panels shall receive a factory-applied (siliconized polyester) (Kynar® 500/Hylar 5000®) (vinyl plastisol) conforming to the following:</p> <ol style="list-style-type: none"> 1. Metal preparation: all metal shall have the surfaces carefully prepared for painting on a continuous process coil coating line by alkali cleaning, hot water rinsing, application of chemical conversion coating, cold water rinsing, sealing with an acid rinse, and thorough drying. 2. Prime coating: a base coat of epoxy paint, specifically formulated to interact with the top-coat, shall be applied to the prepared surfaces by roll coating to a dry film thickness of 0.20 ± 1.05 mils. This prime coat shall be oven cured prior to application of finish coat. 3. Exterior coating: a finish coating (see above) shall be applied over the primer by roll coating to a dry film thickness of 0.80 ± 0.05 mils (3.80 ± 0.05 mils for vinyl plastisol) for a total dry film thickness of 1.00 ± 0.10 mils (4.00 ± 0.10 mils for vinyl plastisol). This finish coating shall be oven-cured. 4. Interior coating: a washcoat shall be applied on the reverse side over the primer by roll coating to a dry film thickness of 0.30 ± 0.50 mils for a total dry film thickness of 0.50 ± 0.10 mils. The washcoat shall be oven-cured. 5. Color: the color of the exterior finish shall be _____ as chosen from the manufacturer's standard color chart. 6. Physical properties: the coating shall conform to the manufacturer's standard performance criteria as listed by certified test reports for fade, chalk, abrasion, humidity, adhesion, pollution resistance, and others as required and standard within the industry. <p>2.04 ACCESSORIES</p> <p>A. Screws</p> <ol style="list-style-type: none"> 1. All exposed fasteners shall have combination metal and neoprene washers. For preprepared roof panels, all exposed fasteners shall be preprepared to match the roof panel. 2. All fasteners shall be concealed except as shown on the drawing. 3. Fasteners for the following locations shall be: <ol style="list-style-type: none"> a. Clips to purlins: zinc plated (#12-14 x 1 1/2" self-drilling, self-tapping screws) (#14 HHB x 1" self-tapping screws). b. Roof panels to eave support: (zinc-plated) (305 stainless steel) (#12-14 x 1 1/2" or 2" self-drilling, self-tapping screws) (#14 HHB x 1" or 2" self-tapping screws). c. Roof panel endlaps: (zinc-plated) (305 stainless steel) #14 x 1 1/4" self-drilling, self-tapping screws. d. Subgirts to roof panel ribs and flashings to subgirts: zinc plated (#12-14 x 1" self-drilling, self-tapping screws) (#14 HHA x 3/4" sheet metal screws). e. Flashings to roof panel ribs: (zinc plated) (305 stainless steel) (zinc-aluminum alloy plated) (#14 HHA x 3/4" sheet metal screws) (#14 milpoint x 1" self-drilling slotted screws). f. Screws for flashings and sidelaps shall be #14 HHA x 3/4" sheet metal slotted screws. All accessories, flashings, and sidelaps shall be fastened 12" o.c. <p>B. Back-up plates shall be die-punched from 18 gauge zinc-aluminum alloy coated steel and used to stiffen the panels at endlaps. The plates shall have two guide lances to align and hold the panels during installation.</p> <p>C. Clips shall be die punched and shall have both a purlin bearing flange and two (2) roof panel support flanges. The purlin bearing flange shall be pre-punched for two (2) #12-14 self-drilling, self-tapping screws. Clips shall provide (1/4") (1 1/4") clearance between the purlin bearing flange and the roof panel support flanges. Clip Material shall be 18 gauge zinc-aluminum alloy coated steel.</p> <p>D. Insulation shall be glass-fiber blanket with a density of (0.6) (0.75) pcf and maximum thickness of 4". The insulation shall be faced on one side only with an approved vapor barrier facing sealing tabs. Insulation shall be supplied in rolls of sufficient length to permit a tight application from ridge to eave. When installed, the assembled system shall provide a maximum "U" value of 0.09 with 4" of insulation and a "U" value of 0.08 with 4" of insulation and 1" thermal blocks.</p> <p>E. Thermal blocks shall be 1" thick by at least 3" wide by 17 15/16" long Styrofoam or approved equal applied over the blanket insulation at each purlin under each roof panel.</p> <p>F. Closures</p> <ol style="list-style-type: none"> 1. Polyethylene closures shall be pre-molded to match the assembled panel system and in lengths as supplied by the panel manufacturer. 2. Metal closures shall be 26 or 24 gauge (G90 galvanized steel per ASTM A 653) (AZ50 zinc-aluminum alloy coated steel per ASTM A 792) or 0.032" (thick aluminum alloy 3004 or equivalent per ASTM B 209) to match the assembled panel system and in lengths as supplied by the panel manufacturer. <p>G. Flashings shall be shop fabricated by the panel manufacturer from material that is the same thickness and finish as the panels to which they are attached. Where practical, flashings shall be furnished in maximum 10' lengths. Exposed flashings shall be lapped 6".</p> <p>H. Subgirts shall be used under all flashings that span from rib to rib of the 2 1/2" SSR panels. Subgirts shall be rollformed from 18 ga. G90 galvanized steel and shall be hat-shaped sections 3/8" deep x 3" wide with 3/4" wide flanges. Subgirts shall be furnished in 20' lengths.</p> <p>I. Sealant tape used at roof panel endlaps shall be a butyl type roll as supplied by the manufacturer.</p> <p>J. Caulking shall be a polyurethane where it is exposed and there is no thermal movement. All caulking or sealing shall be done in a neat manner with excess caulking or sealant removed from exposed surfaces.</p> <p>K. Caulking shall be non-skinning, non-hardening gun grade butyl sealant or butyl sealant tape with a minimum thickness of 1/8" where it is concealed and where thermal movement must be accommodated. All caulking or sealing shall be done in a neat manner with excess caulking or sealant removed from exposed surfaces.</p> <p>L. Flashings shall be shop-fabricated from material that is the same thickness and finish as the 2 1/2" SSR panels to which they are attached. Where practicable, flashings shall be furnished in maximum 10' lengths. Exposed flashings shall be lapped 6".</p> <p>2.05 RELATED MATERIALS</p> <p>A. Refer to other sections listed in Related Sections paragraph for related materials.</p> <p>2.06 FABRICATION</p> <p>A. Endlaps will be allowed though swaging is required. Contact factory for details.</p> <p>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.</p> <p>C. Fabricate flashings from the same material as the roof system.</p> <p>2.07 SOURCE QUALITY</p> <p>A. Source quality: obtain metal panels and accessories from a single manufacturer.</p> <p>B. Fabrication tolerances:</p> <ol style="list-style-type: none"> 1. Rib height: 2 1/2" ± 1/8" ■ 2. Panel shearing length: ± 1/4" maximum 3. Follow tolerances in MCA's Preformed Metal Wall Guidelines. <p>C. Tests and inspections</p> <p>D. Verification of performance</p> <p>3.01 MANUFACTURERS INSTRUCTIONS</p> <p>A. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions, and product cartons for installation.</p> <p>3.02 EXAMINATION</p> <p>A. Installer shall:</p> <ol style="list-style-type: none"> 1. Inspect purlins or deck to verify that it complies with shop drawing and is smooth, even, sound, and free of depressions. 2. Report variations and potential problems in writing to the architect. <p>3.03 INSTALLATION</p> <p>A. Conform to standard set forth in the SMACNA architectural sheet metal manuals and the approved shop drawings detailed for the project.</p> <p>B. Install panels plumb, level, and straight with the seams parallel, conforming to the design as indicated.</p> <p>C. Install panel system so it is watertight, without waves, warps, buckles or distortions, and allow for thermal movement considerations.</p> <p>D. Abrasive devices shall not be used to cut on or near roof panels system.</p> <p>E. Apply sealant tape at necessary at flashing and panel joints to prevent water penetration.</p> <p>F. Remove any stripable film immediately upon installation.</p> <p>G. Vapor Retarder: The joints, perimeter, and all openings shall be sealed per the manufacturer's instructions to provide a continuous vapor retarder.</p> <p>H. Underlayment (solid substrate):</p> <ol style="list-style-type: none"> 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. <p>3.04 CLEANING</p> <p>A. Dispose of excessive materials and debris from jobsite.</p> <p>B. Remove filings, grease, stains, marks, or excess sealants from roof panel system to prevent staining.</p> <p>C. Protect work from damage from other trades until final acceptance.</p>
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Kynar® 500 is a registered trademark of Elf Atochem North America, Inc.
Hylar® 5000 is a registered trademark of Ausimont USA, Inc.

LOAD SPAN TABLES FOR 2 1/2" SSR PANELS OVER VARIOUS SUBSTRATES

All loads below are allowable loads. See the notes below for additional details.

substrate		allowable wind uplift loads (psf) for 2 1/2" SSR panels, clips, and screws																
		1.00'	1.25'	1.50'	1.75'	2.00'	2.25'	2.50'	2.75'	3.00'	3.25'	3.50'	3.75'	4.00'	4.25'	4.50'	4.75'	5.00'
24 ga. steel	16 ga. purlins ¹	274	219	183	156	137	122	110	100	91	84	78	73	68	64	61	58	55
	22 ga. deck ²	168	134	112	96	84	75	67	61	56	52	48	45	42	39	37	35	34
	3/4" plywood ³	77	62	51	44	39	34	31	28	26	24	22	21	19	NR	NR	NR	NR
	1/2" plywood ³	41	33	28	24	21	18	NR										
.032" alum.	16 ga. purlins ¹	274	219	183	156	137	122	110	100	91	84	78	73	68	64	61	58	55
	22 ga. deck ²	168	134	112	96	84	75	67	61	56	52	48	45	42	39	37	35	34
	3/4" plywood ³	77	62	51	44	39	34	31	28	26	24	22	21	19	NR	NR	NR	NR
	1/2" plywood ³	41	33	28	24	21	18	NR										

Screw and clip ultimate loads were determined. A safety factor of 1.875 was used for the clips. A pry factor of 2 was used for the screws in addition to a pullout safety factor. See below for additional information for each respective system.

1. Two #12 x 1" self-drilling screws per clip were accounted for above. A safety factor of 1.875 was used for the screws.
2. Two #12-13 Dekfast screws per clip were accounted for above. A safety factor of 1.875 was used for the screws.
3. Two #12 x 1" wood screws per clip were accounted for above. A safety factor of 4.5 was used for the screws.

WIND UPLIFT, AIR INFILTRATION, AIR EXFILTRATION, WATER PENETRATION, AND THERMAL TRANSMITTANCE TEST SUMMARIES

WIND UPLIFT (UL90 rating): 24 ga. steel or 0.032" aluminum panels over steel purlins spaced a maximum of 5'-0" o.c. for steel and 4'-0" for aluminum. Clips were attached with 2 #12 self-drilling screws. (UL Construction No. 190)

WIND UPLIFT (UL90 rating): 24 ga. steel or 0.032" aluminum panels over 22 ga. steel deck with up to 4" of 2.0 pcf rigid insulation with clips spaced 5'-0" o.c. for steel panels and 4'-0" for aluminum panels. Clips were supported by 24 ga. 6" x 6" bearing plates and fastened to the deck with 2 #12 self-drilling Dekfast screws. (UL Construction No. 190B)

AIR INFILTRATION: When tested in accordance with ASTM E 283, there was no leakage when tested to 20.0 psf pressure differential.

AIR INFILTRATION: When tested in accordance with ASTM E 1680, there was no leakage at 6.24 psf, 0.02 cfm./ft.² of leakage at 12.0 and 20.0 psf.

AIR EXFILTRATION: When tested in accordance with ASTM E 1680, there was no air leakage at 4.0 psf, 0.02 cfm./ft.² at 6.24 psf, 0.04 cfm./ft.² at 12.0 psf, and 0.08 cfm./ft.² at 20.0 psf.

WATER PENETRATION: When tested in accordance with ASTM E 331, there was no leakage when tested to 20.0 psf pressure differential with a 5 gal./hr. spray.

WATER PENETRATION: When tested in accordance with ASTM E 1646, there was no leakage when tested to 20.0 psf pressure differential with a 5 gal./hr. spray.

THERMAL TRANSMITTANCE: When tested in accordance with ASTM C 236 with 4" x0.6 pcf fiberglass insulation and Type A clips, the tested thermal resistance (R value) was 11.66 hr. ft.² °F/BTU and the corrected thermal resistance when corrected to ASHRAE winter design with 15 mph outside wind and still inside air was 10.78 hr. ft.² °F/BTU.

THERMAL TRANSMITTANCE: When tested in accordance with ASTM C 236 with 4" x0.6 pcf fiberglass insulation and Type B clips and thermal blocks, the tested thermal resistance (R value) was 13.51 hr. ft.² °F/BTU and the corrected thermal resistance when corrected to ASHRAE winter design with 15 mph outside wind and still inside air was 12.08 hr. ft.² °F/BTU.

RAIN-CARRYING CAPACITY (MAXIMUM RUN LENGTH IN FEET)

roof pitch	1/2:12	3/4:12	1:12	1 1/2:12	2:12	2 1/2:12	3:12	4:12	5:12
run length	117	129	139	155	167	178	188	207	225

1. Values indicate point when water will reach top of rib during storm of 4"/hour intensity.
2. Slopes less than 1/2:12 are recommended.
3. Penetrations can greatly reduce the rain carrying capacity.

THERMAL MOVEMENT TABLE

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

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

FASTENER USAGE TABLE

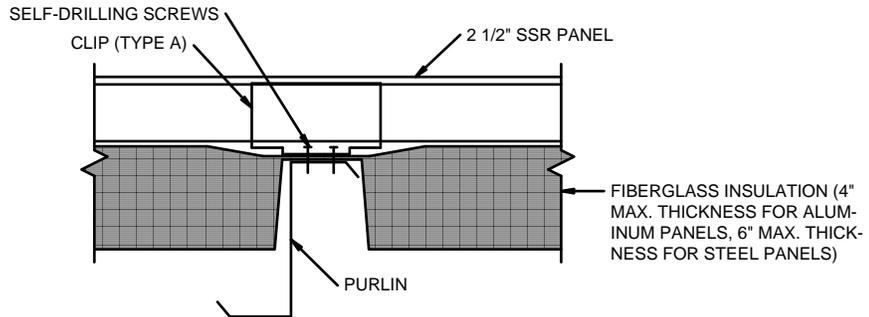
substrate	clip screw	panel material	exposed screw
cold-formed steel	#12 zinc-plated SDST	galvanized steel	#12-14 zinc-plated SDST
		aluminum	#14 stainless steel HHA
		zinc-aluminum coated steel	#12-14 SDST ZAC-head
hot-rolled steel	#14 zinc-plated HHB	galvanized steel	#14 zinc-plated HHB
		aluminum	#14 stainless steel HHB
		zinc-aluminum coated steel	#14 stainless steel HHB
steel deck	#12-13 Dekfast	galvanized steel	#14 zinc plated mill point
		aluminum	#14 stainless steel HHA
		zinc-aluminum coated steel	#14 ZAC-head mill point
solid wood	#12 zinc-plated A-point	galvanized steel	#14 zinc plated mill point
		aluminum	#14 stainless steel HHA
		zinc-aluminum coated steel	#14 ZAC-head mill point
plywood	#12 zinc-plated A-point	galvanized steel	#14 zinc plated mill point
		aluminum	#14 stainless steel HHA
		zinc-aluminum coated steel	#14 ZAC-head mill point

PROFILE AVAILABILITY TABLE

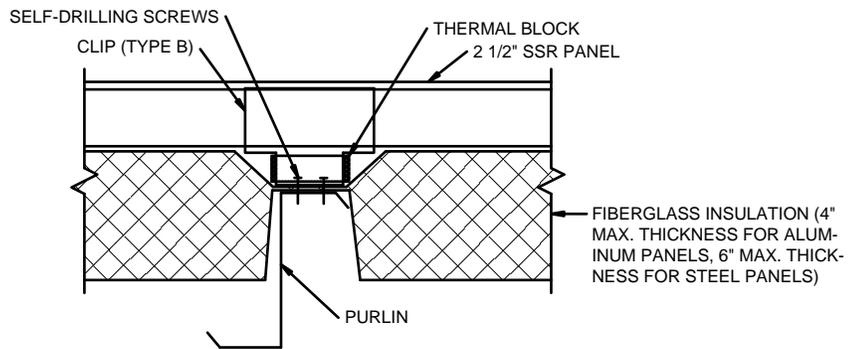
COMPONENT	MATERIAL	THICKNESS	WT./SQ. PLAIN	WT./SQ. PAINTED	
panel	aluminum	0.032"	63.6 lb.	65.2 lb.	
		0.040"	79.5 lb.	80.9 lb.	
		0.050" ^a	99.3 lb.	100.7 lb.	
	galvanized steel	26 ga.	127.0 lb.	128.6 lb.	
		24 ga.	162.0 lb.	163.3 lb.	
		22 ga.	197.0 lb.	198.6 lb.	
		20 ga.	232.0 lb.	233.8 lb.	
		18 ga. ^a	302.0 lb.	303.9 lb.	
	aluminum-zinc alloy coated steel	26 ga.	122.1 lb.	124.0 lb.	
		24 ga.	156.7 lb.	158.5 lb.	
		22 ga.	191.8 lb.	193.7 lb.	
		20 ga.	227.0 lb.	228.8 lb.	
		18 ga. ^a	297.2 lb.	299.1 lb.	
	cap-lock (weights are for four pieces, 16'-10" long each) ^d	aluminum	0.032" ^b	10.0 lb.	10.4 lb.
		galvanized steel	26 ga.	20.0 lb.	20.3 lb.
24 ga. ^c			25.5 lb.	25.8 lb.	
aluminum-zinc alloy coated steel		26 ga.	19.2 lb.	19.5 lb.	
		24 ga. ^c	24.7 lb.	25.0 lb.	

- a. 18 ga. steel and 0.050" aluminum panels cannot be endlapped. b. Use this cap-lock for all aluminum panels.
c. Cap-lock used for 24 ga. and thicker steel. d. Quantity of cap-lock required per square of panel.

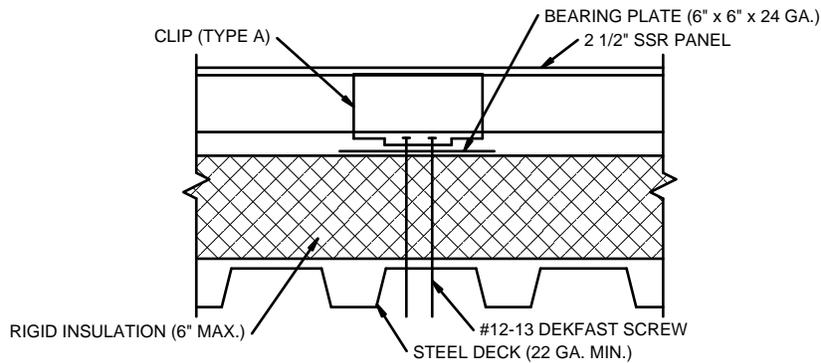
ATTACHMENT DETAILS



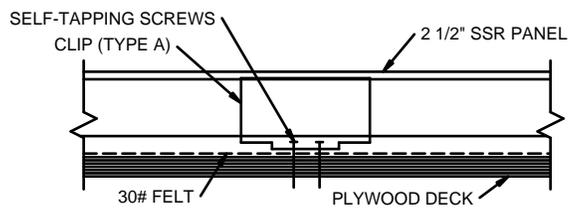
INSTALLATION OVER STEEL PURLINS (WITHOUT THERMAL BLOCKS)



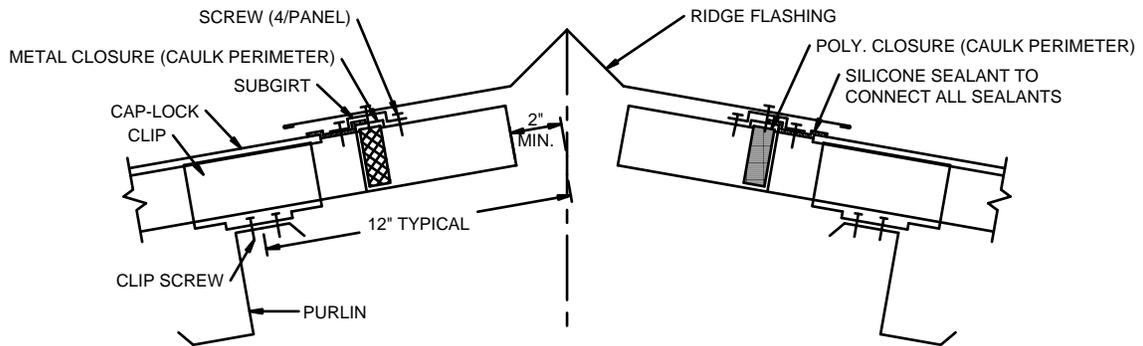
INSTALLATION OVER STEEL PURLINS (WITH THERMAL BLOCKS)



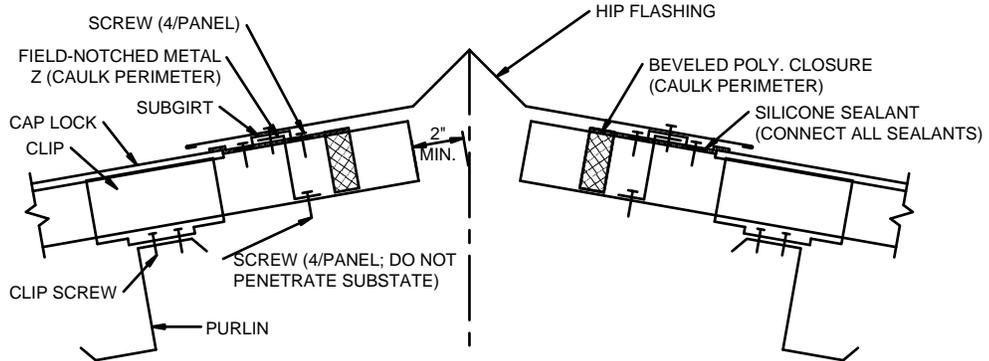
INSTALLATION OVER STEEL DECK



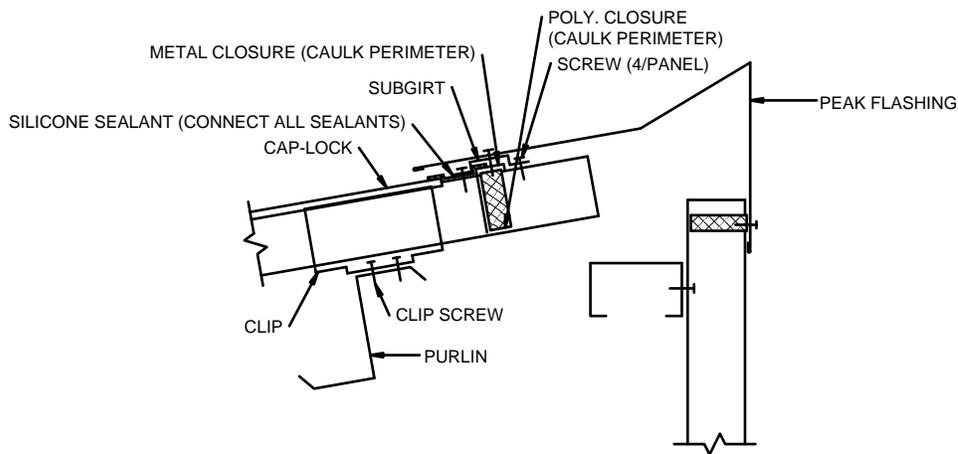
INSTALLATION OVER PLYWOOD DECK



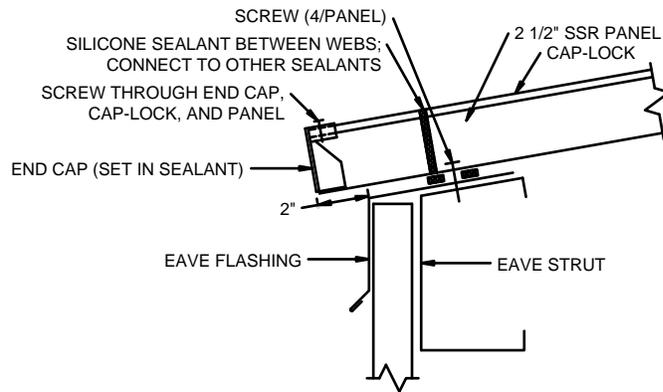
RIDGE DETAIL



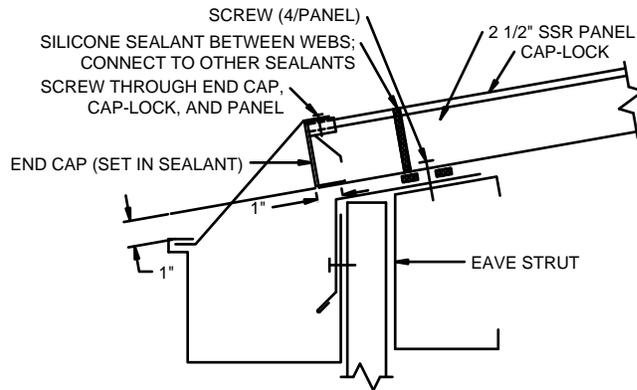
HIP DETAIL



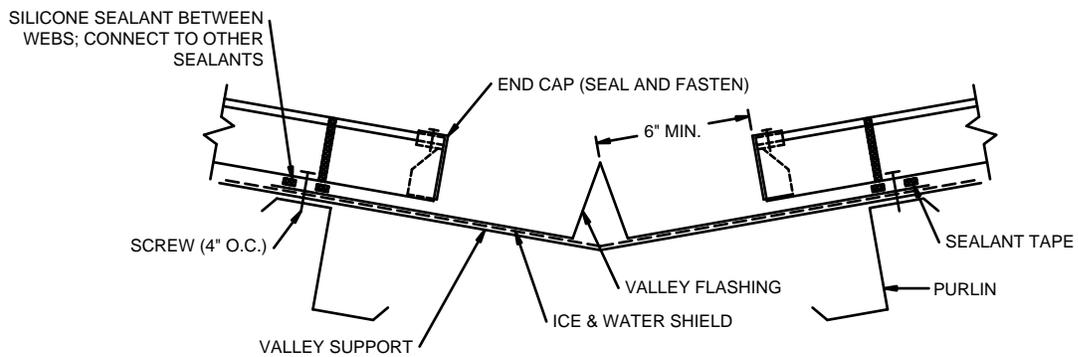
PEAK DETAIL



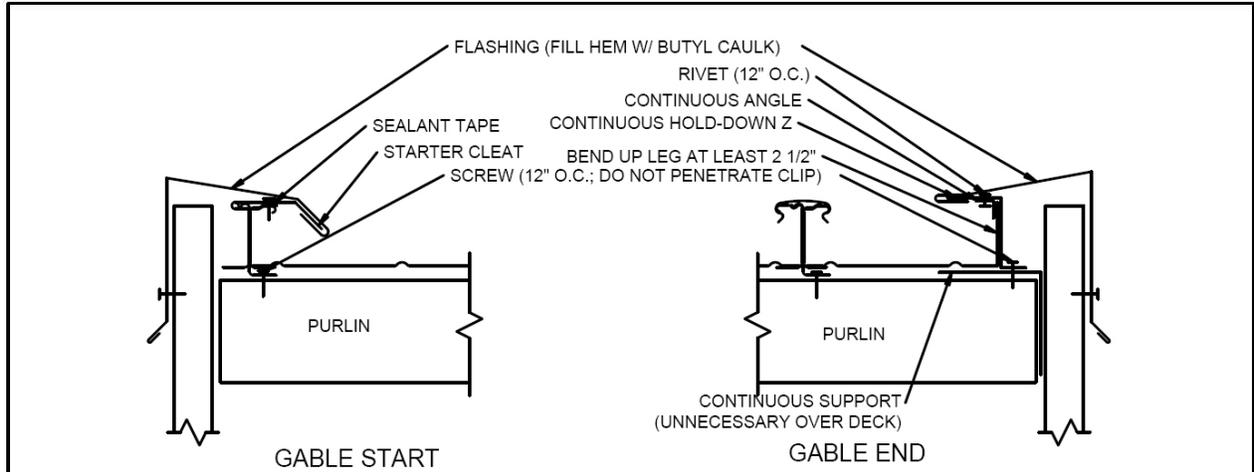
EAVE WITHOUT GUTTER DETAIL



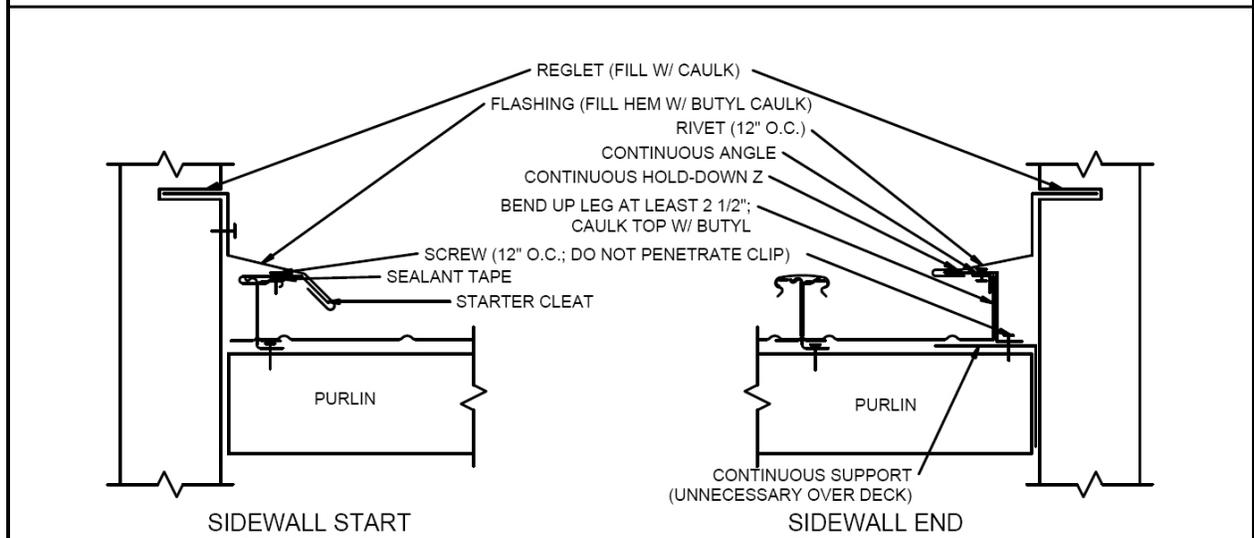
EAVE WITH GUTTER DETAIL



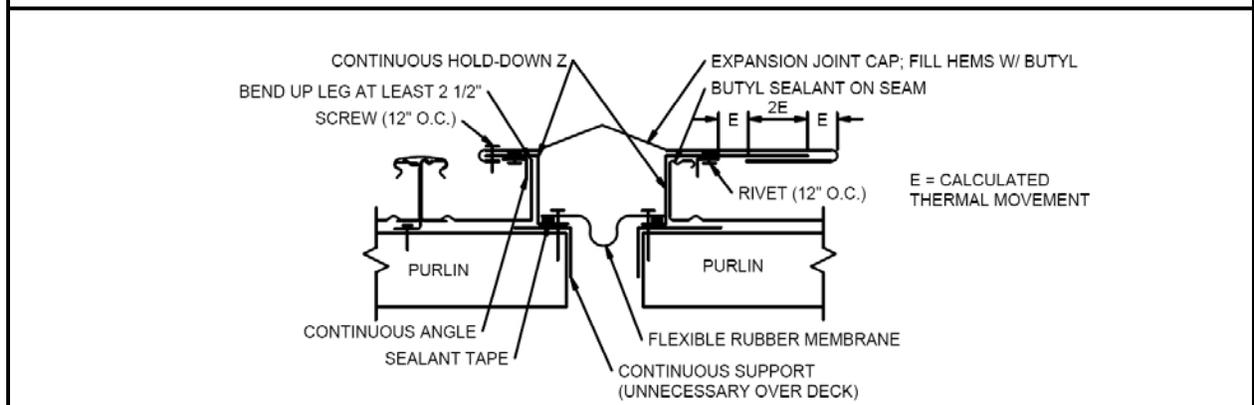
VALLEY DETAIL



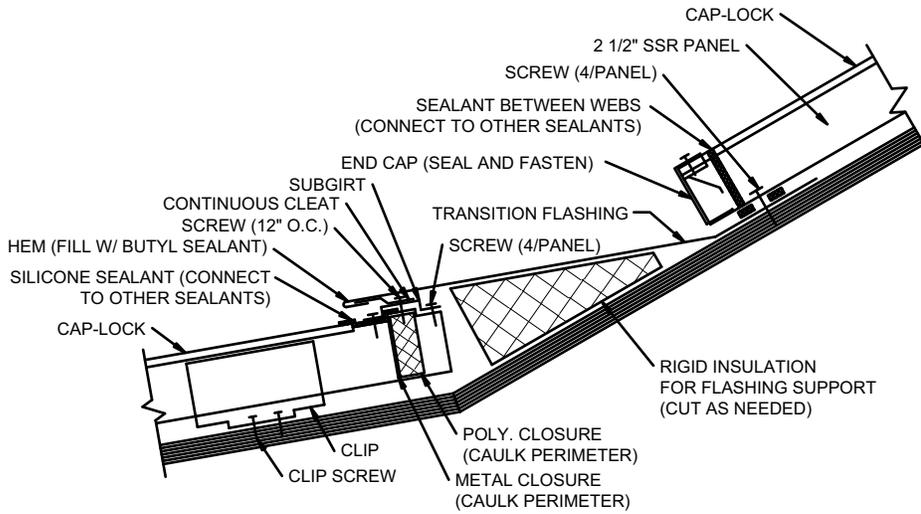
GABLE DETAILS



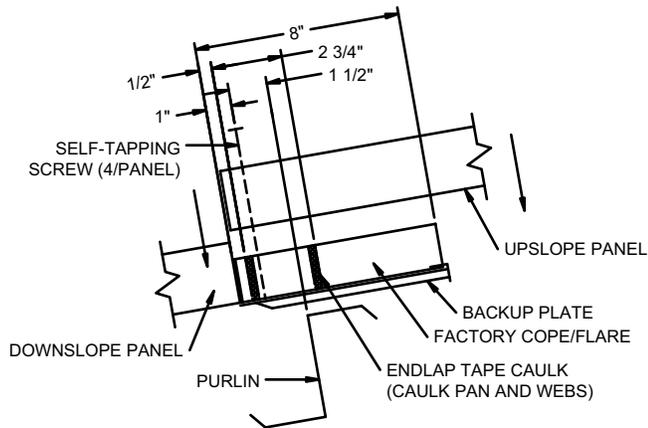
SIDEWALL DETAILS



EXPANSION JOINT DETAIL



TRANSITION DETAIL



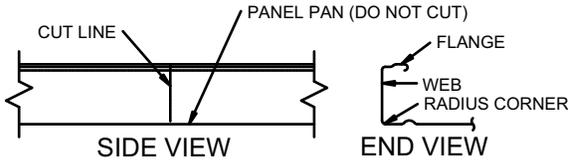
CLIP NOT SHOWN FOR CLARITY

ENDLAP DETAIL

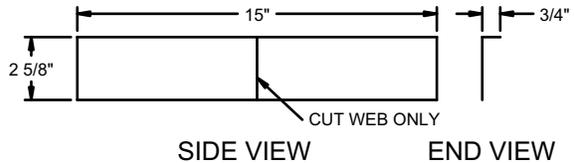
OUTSIDE BEND DETAILS

1. Measure and mark the distance from the end of the panel to the bend point.

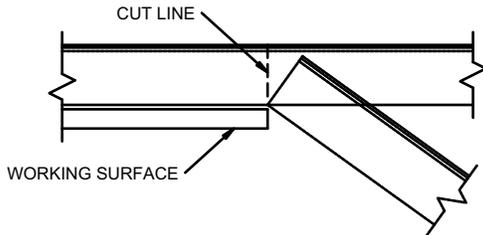
2. Cut the panel flanges and webs to the radius corner. It may be necessary to make V-notches at the flanges to cut the webs.



5. Cut two filler plates to a length of 15". Cut the filler plates' webs at their midpoints. Bend the filler plates to the desired angle with the webs of the upslope portion inside the webs of the downslope portion. Apply the filler plates between adjacent panels' webs. Caulk between the filler plates and panel webs. Apply caulk to the top of the filler plates' flanges.



3. Set the panel on a firm, flat, working surface. Apply downward pressure at the bend line. Bend the panel beyond the desired angle. Then, return the panel bend to the desired angle to set the crease.

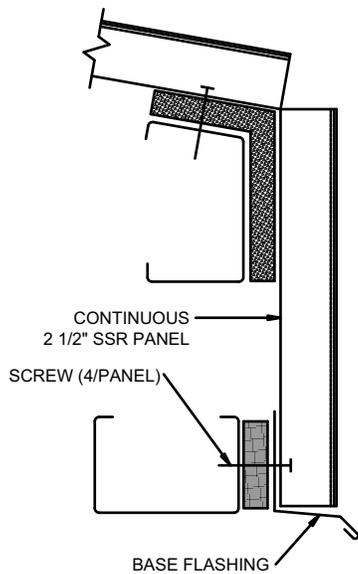
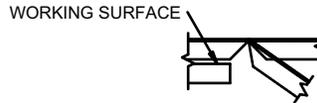


7. Measure and mark the distance from end of the cap-lock to the desired bend point. V-notch the cap-lock webs at 45° angles to the top bend line.



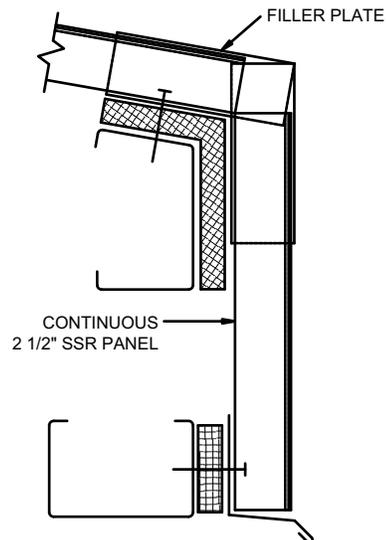
4. Even if the project is uninsulated, it is still necessary to place 4" thick insulation continuously over the eave and base structural members. Place the base flashing over the insulation to prevent water siphoning. Place the panel into position. Attach the panel to the girt with four screws per panel. Seal the ends of the webs at the base with caulk.

8. Place the cap-lock on a firm, flat, working surface. Bend the cap to the desired angle.



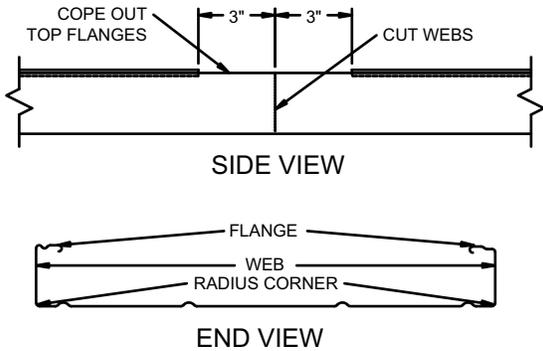
9. Apply the cap-lock to the panel starting at the base and working toward the ridge.

10. Seal all cuts with clear caulk.

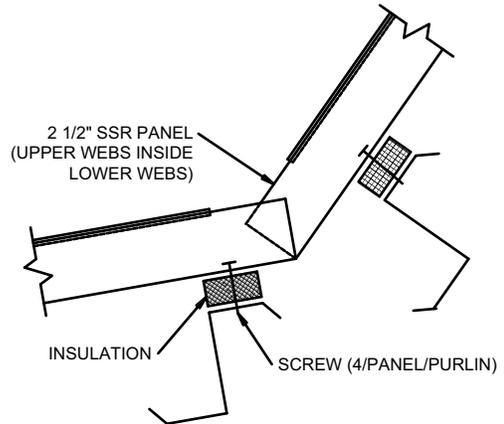


INSIDE BEND DETAILS

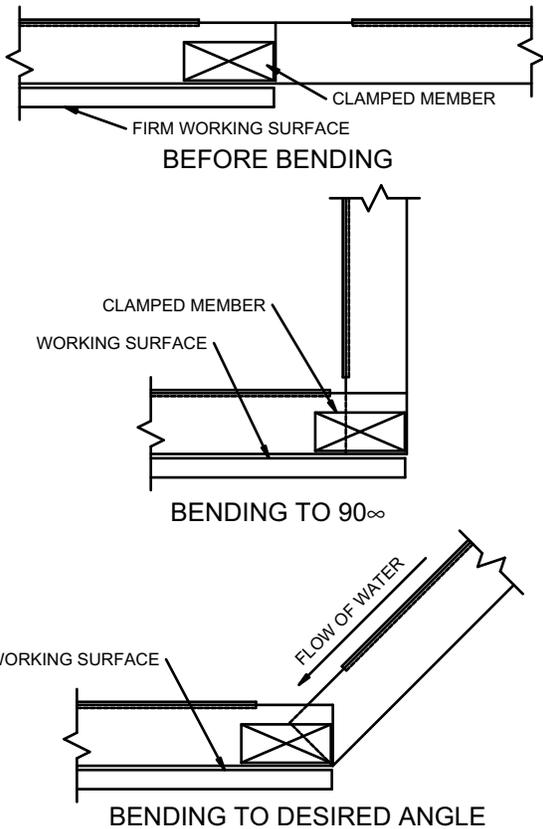
1. Mark the distance from the end of the panel to the desired bend line.
2. On each side of the panel, cut the flange and web to the radius corner of the pan.
3. On each side of the panel, remove the flanges for 3" on either side of the bend line for clearance when the panel is bent.



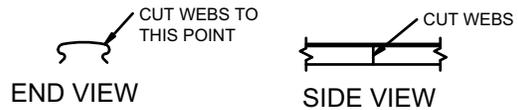
5. Place 4" insulation over the purlins at the pitch change, even if the rest of the roof is uninsulated. Attach the panel to the purlins with four screws per panel width per purlin.



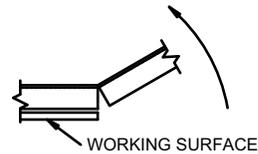
4. Place the panel on a firm, flat working surface. Clamp a rigid member at the bend line. Bend the panel 90 degrees to set the crease with the upslope panel webs inside the downslope panel webs. Then, bend the panel to the desired angle.



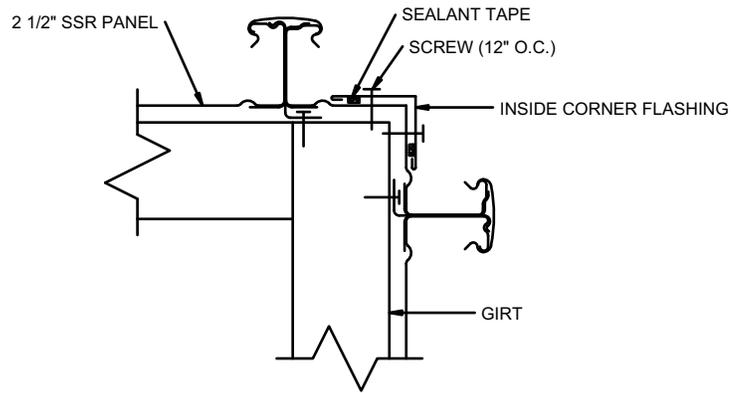
6. Measure and mark the distance from the end of the cap-lock to the desired bend point. Cut the cap-lock webs.



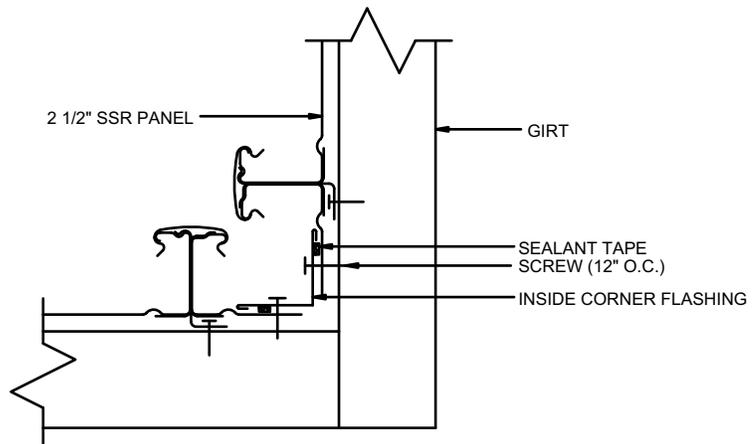
7. Place the cap-lock on a firm, flat, working surface and bend it to the desired angle.



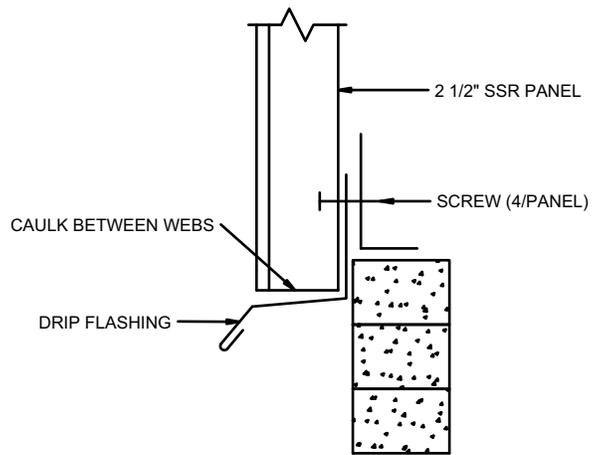
8. Apply the cap-lock to the panel starting at the eave.
9. Seal all cuts at the bends with clear caulk.



FASCIA OUTSIDE CORNER DETAIL

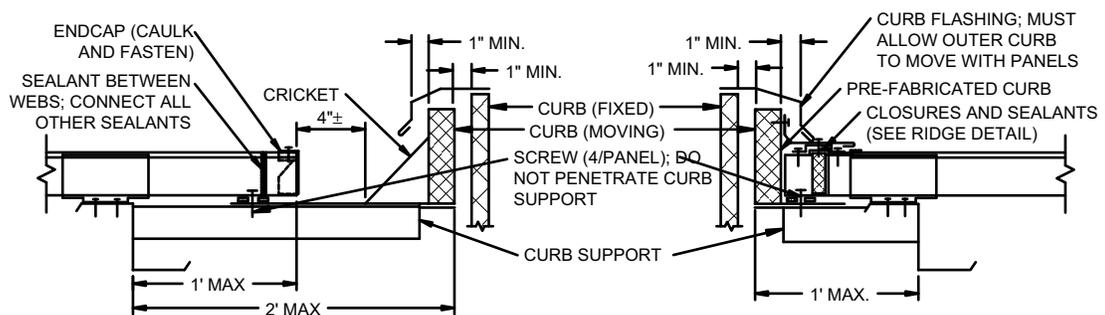
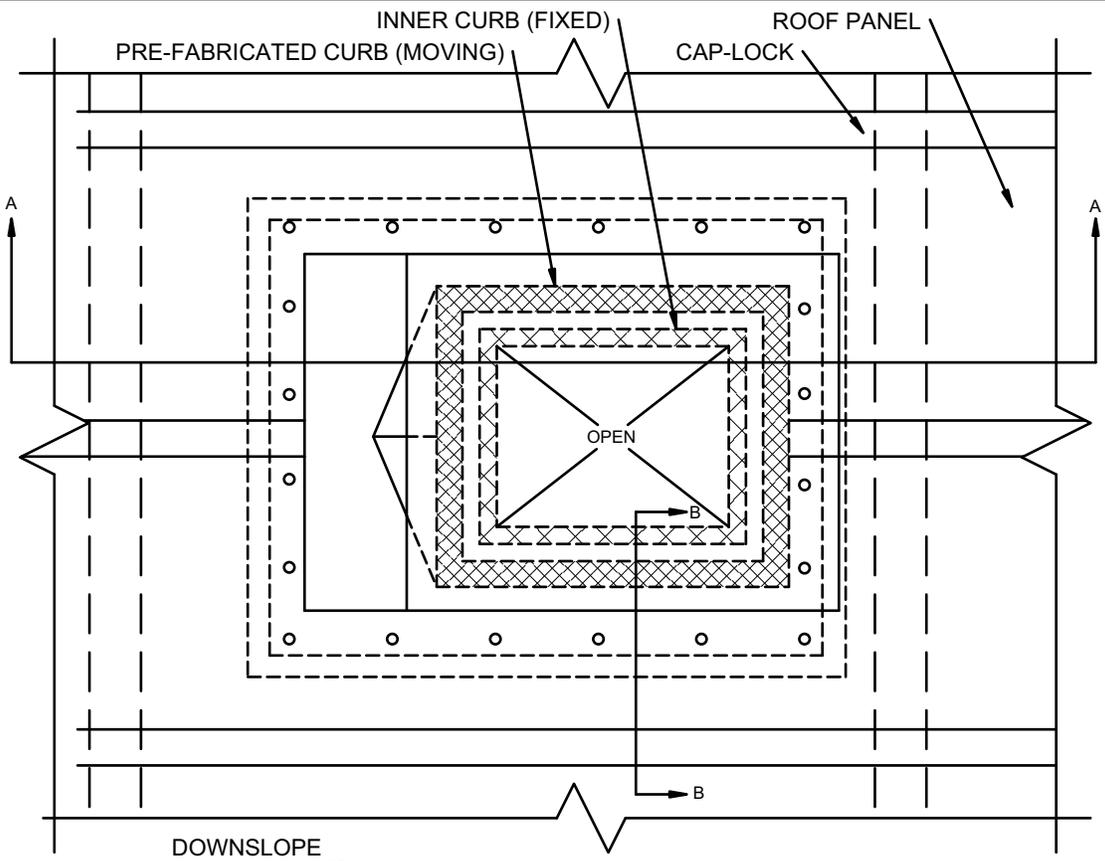


FASCIA INSIDE CORNER DETAIL

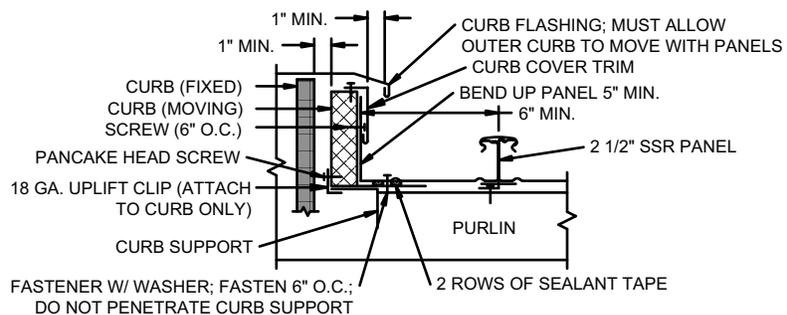


BASE DETAIL

CURB OVER PURLINS



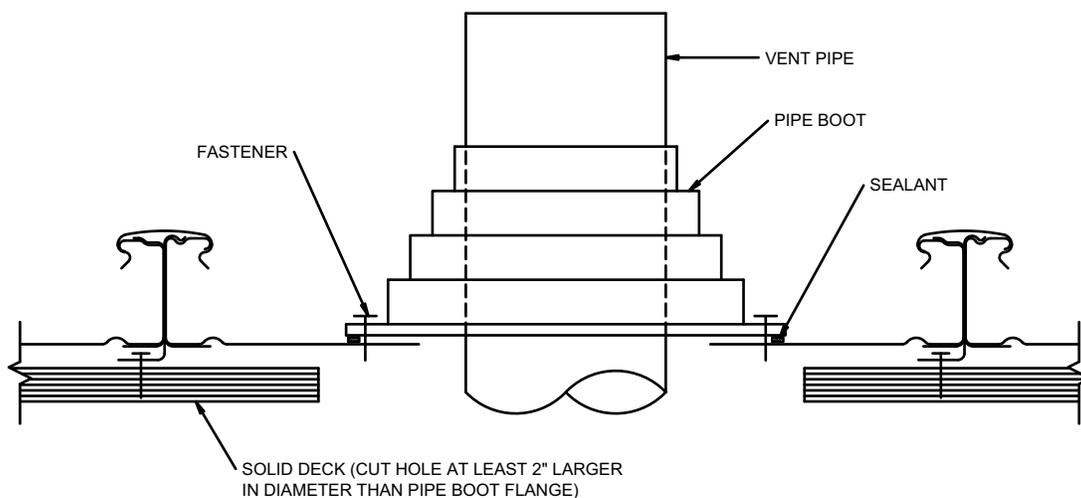
SECTION A-A



SECTION B-B

NOTES FOR CURB DETAILS

1. Prior to placement of curbs and panels, check to see that adequate structural support exists. Since the panels are supporting the weight of the curb and design loads and the purlins are supporting the additional weight of the equipment, the purlins must be designed and spaced so that these loads can be safely distributed to the main frame.
2. Place the curb at the desired location on the roof. Lap the panels over the upslope and downslope curb flanges by at least 8". Lap the panels over the side curb flanges by at least 4".
3. Location, placement, and design of curbs should be such that at least 6" of panel width exists between the curb side and web as shown in the drawings. This will prevent funneling water into a narrow path which may result in a flooded web and a potential leak source.
4. Install the lower curb over the supporting members and weld or fasten the curb with flat-head fasteners. A flat surface is required because the upper curb slides on the lower curb flange.
5. Downslope flanges should be field-notched to slide around the vertical webs.
6. Panel-to-curb fasteners must not penetrate or interfere with structurals below the curb.



PIPE PENETRATION DETAIL

THE HOLE IN PANEL (AND DECK, IF PRESENT) SHOULD BE CUT AT LEAST 2" LARGER IN DIAMETER THAN PIPE BOOT FLANGE.

ATTACH THE PIPE BOOT BASE TO PANEL WITH SCREWS 2" O.C. DO NOT PENETRATE ANY STRUCTURAL MEMBERS WITH THE SCREWS. SCREWS SHOULD BE SPACED AT LEAST 1" FROM STRUCTURAL MEMBERS.

PIPE PENETRATIONS SHOULD BE CENTERED IN THE WIDTH OF THE PANELS AS SHOWN.



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