



METAL ROOFING

S y s t e m s , I n c

Faster. Smarter. Better. Period.

General Product Submittal

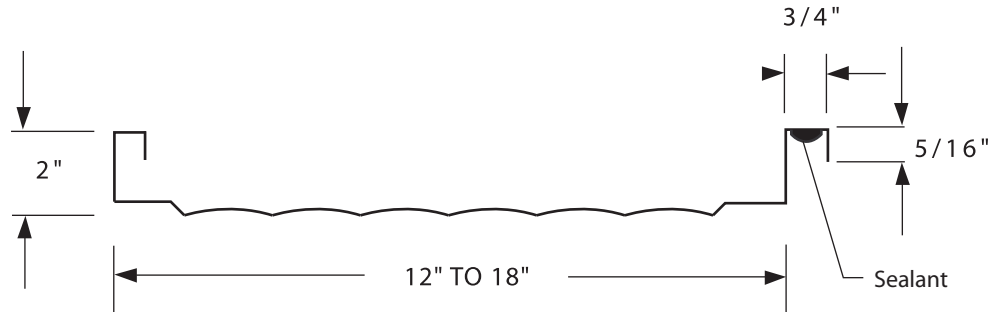
MRS System 2500

Roofing Panel

MRS System 2500

12" - 18" o.c.
2" high
Mechanical Seam
Single or Double Lock

.032 or .040 aluminum
22 or 24 gauge steel



U.L. 580 Class 90 Certified ASTM E1592, E1646, E1680 Tested

Ideal for low slope conditions in commercial or residential applications

Material: .032 or .040 Aluminum, 22 or 24 gauge Steel
12" to 18" o.c.

Features: Striations (Recommended)
Flat
Stress Ribs
Curved
Optional Sealant in Female Leg

Requirements: Solid Substrate, Open Framing
Ice & Water Shield or Synthetic Underlayment
Minimum Roof Pitch: 1/2" on 12"

Finish: Hylar 5000[®] or Kynar 500[®]

Locations:

7670 Mikron Drive
Stanley, NC 28164
Tel: 704-820-3110
Fax: 704-820-0113

2451 Bulk Plant Road
Conway, SC 29526
Tel: 843-365-6673
Fax: 843-365-6683

5512 Fort Henry Drive
Kingsport, TN 37663
Tel: 423-239-0013
Fax: 423-447-7150



METAL ROOFING
Systems, Inc

Website: www.metalroofingsystems.biz



Metal Construction Association

OIL CANNING POSITION PAPER

INTRODUCTION

"Oil canning" can be defined as a perceived waviness in the flat areas of roofing and siding panels. Generally the period and amplitude of the wave depend on the continuous width of the flat.

Oil canning is an inherent part of light gauge cold formed metal products, particularly those with broad flat areas. Profiles having wide flat surfaces are often referred to as "architectural" roofing and siding panels. Such panels are distinguished from corrugated shapes as the latter are more fluted in design, have much narrower flats, and are less likely to exhibit oil canning.

BACKGROUND

Oil canning has a number of causes:

1. Metal Coil:

Residual stresses induced during coil production can contribute. Examples of other contributing features are:

- a. Full center -- the coil is longer in the middle of the strip: This is the most common example. (The gradation manifests as ripples or buckles near mid coil.)
- b. Wavy edge -- the coil is longer on the edge of the strip.
- c. Camber -- the deviation of a side edge from a straight line. (This is not always a problem.)

These conditions exist to some extent in all metal and tend to become more exaggerated as the strength level of the rolled sheet product increases and also for thinner and wider sheet product. When excessive, each circumstance can cause oil canning after roll forming by the manufacturer.

2. Fabrication:

- a. Slitting -- the slitting of a master coil can release and redistribute residual forces. The coil's response can create or increase oil canning. The economics of rolling and coating wider coils makes slitting almost mandatory.
- b. Forming -- New residual stresses can be created during some forming operations. Architectural panel profiles typically require more forming along sides than in the middle, and more often require more forming along one side than the other. This dictates that forming com-

mences along the sides. This sequential "working" of the sheet will have a tendency to "trap" uneven metal contained within the coil in the panel central areas (corrugated ribbed profiles are most often worked from the center out, thereby "pushing" the uneven metal to the edges).

3. Installation:

- a. Misalignment of the support system -- structural supports that are produced, fabricated and installed within allowable tolerances can create a "non-planar" or contoured bearing surface. Stresses induced when panels conform to this surface can contribute to oil canning.
- b. Over engagement of panels -- Most panels accommodate transverse thermal expansion by flexing of webs and by "take up" at side joints. When panels are over engaged, these relief features are hindered or eliminated. In the extreme the "over engagement" process itself can generate waviness. Either cause can contribute to oil canning.
- c. Over driving of fasteners -- This operation creates stresses in the panel and provides a "reading line" at the fasteners.
- d. Longitudinal Expansion -- The surface temperature of exposed panels cycles throughout the year and even fluctuates daily. The temperature and the cycle depend on many variables, e.g. project location and orientation, cloud cover, panel inclination, surface finish or color, system thermal insulation characteristics. The panels' physical response is to expand or contract. If panels are restrained by "thru-fasteners", clips, or perimeter details, they try to accommodate or relieve thermal forces through several mechanisms, i.e. "slotting" around fasteners, out-of-plane "bowing", local distortion of flat areas -- "waviness". The magnitude of thermal force depends on the restraint provided (hence the panel stiffness and support stiffness), on the base materials' physical properties, and on the temperature differential between the support structure and the external skin.

Waviness can be amplified when there is uneven fastener restraint along the panel. Such restraint is common on "concealed fastener" systems having fasteners along one edge and an interlock along the other. Waviness caused by thermal forces differs from other forms of oil canning in that waves can appear and

disappear as the sun rises and moves around the building.

e. Movement of the primary structure -- Excessive differential deflection, racking, drift, or settlement within the primary structure can cause noticeable waviness within panel flats. This distortion can be temporary or sustained.

f. Handling -- Carrying of panels in the flat or twisting of panels can induce a wavy appearance to a previously flat panel. Twisting can occur if one corner of a panel is used to lift a panel or to remove the panel from a bundle.

Coil producers and panels manufacturers attempt to minimize these conditions and produce quality products. On going research seeks improved production methods. Regardless all of the above factors can and do occur and can cause oil canning in architectural roofing or siding product. While a number of factors are dictated by the panel design, there are steps that the designer, panel manufacturer, and erector can take to reduce the chances of oil canning:

1. Coil:

Tension or stretcher leveling, a process whereby the metal is "stretched" in coil form beyond its yield point, will provide a flatter surface less prone to oil canning. In general the heavier the gauge the less likely a product is oil can. The possibility of oil canning can be reduced by ordering tension leveled and resquared material.

2. Design:

The addition of stiffening beads or other configuration "breaks-up" the flat surface and makes oil canning less apparent. Embossing will also help hide surface waviness in the metal. The selection of lower gloss coatings and lighter colors tend to minimize the visual effect of oil canning.

3. Installation:

More stringent specification regarding the alignment of the supporting structure will focus attention on this critical aspect. Instructions to the erection forces regarding proper handling, spacing and fastening should be a part of the manufacturer's delivery packet.

CONCLUSION

Oil canning is an aesthetic problem. Normally structural integrity is not affected. However, structural integrity must be reviewed if the distortion results form an extreme external influence. Since many uncontrollable factors are involved, no manufacturer can realistically assure the total elimination of oil canning. With careful attention to the production and selection of material, to the panel design, and to installation practice, oil canning can be effectively minimized.

Unless specified tolerance have been accepted by the panel provider and panel manufacturer and are incorporated into the contract documents prior to fabrication, and if reasonable precautions have been taken, oil canning is not grounds for panel rejection.

BIBLIOGRAPHY

1. American Iron & Steel Institute, "Sheet Steel Coils & Cut Lengths". Steel Products Manual, October 1979.
2. USS "USS Sheet & Strip Handbook" July 1983.

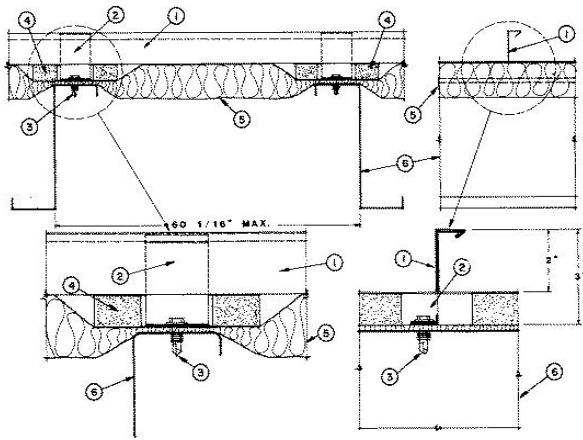
Note: This position paper was written and furnished by the Metal Construction Association (MCA).



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(312) 201-0193 i Fax (312) 201-0214
or P.O. Box 697 Chicago, IL 60690-0697

U.L. Constructions

Construction No. 90
 Uplift — Class 90
 Fire Not Investigated



1. Metal Roof Deck Panels* — No. 24 MSG min gauge coated steel, max width 16 in. Panels continuous over two or more spans. End lap to occur over purlins and to include End Lap Back-up Plate (Item 2B or 2C.) Ends of panels overlapped 6 in. Side laps to be tightened and crimped with a special motorized crimping machine at a minimum 45 degree angle with crimping process to include tabs of Panel Clips (Item 2). A bead of sealing compound may be used at panel end and side laps.

METAL ROOFING SYSTEMS INC — "MRS System 2500"

2. Roof Deck Fasteners* (Panel Clips) — Two part assembly: Base, 1 in. wide approximately 1-1/4 in. long with upper segment folded over lower end of tab. Fabricated from 0.050 in. thick coated or stainless steel. Upper tab 3 in. wide, maximum tab height 3-1/2 in. with lower end formed to engage base. Fabricated from 0.023 in. thick coated or stainless steel. One piece assembly; 3 in. wide, approximately 2 in. high with two or three guide holes in base. Fabricated from No. 22 MSG coated steel. Two piece assembly; base approximately 2 in. wide, 1-11/16 in. long formed to engage upper tab. Fabricated from No. 16 MSG coated steel. Tab approximately 4-5/16 in. wide; 2-3/8 in. or 2-7/8 in. high, formed to engage base. Fabricated from No. 22 MSG coated steel. Base to have two guide holes.

3. Fasteners — (Screws) — For attaching panel clips to purlins- 1/4 - 14 by 1 in. long shoulder or stand off type, self-drilling, self-tapping, hex-head plated steel screws. One screw per clip to be used. As an alternate fastener for panel clip to purlin attachment a No. 12-14 by 1 in. long self-drilling, self-tapping, hex-head plated steel screw may be used. Fasteners used at end laps-1/4 - 10 by 1 in. long self-drilling, self-tapping, hex-head plated steel screws with 1/2 in. OD metal backed sealing washer, spaced on a 1, 3, 3-1/2, 3-1/2, 3, 1 in. pattern.

4. Thermal Spacer Block — Used over purlins. Expanded polystyrene 1 in. thick, 5 in. wide, 48 in. long with cutout to accommodate panel clips.

5. Insulation — (Optional) — Any compressible blanket type 4 in. max thickness before compression. An additional 2 in. max thickness of compressible blanket insulation may be used between purlins. The additional insulation shall not be sandwiched between the upper

flange of the Purlin and the Metal Roof Deck Panel. As an alternate method of installation, a max of 6 in. of compressible blanket insulation may be used. The insulation is to be laid over the purlins and slit along the purlins to a depth of 5 in. (1 in. above the purlin) in such a manner that no material in excess of 4 in. is sandwiched between the purlins and the Roof Deck Panels.

6. Purlins — Z-shaped, 0.056 in. min thickness steel (40,000 psi min yield strength) or min "H" series open web steel joists. Maximum spacing 60-1/4 in.

7. Building Units — * (Optional) — Prefabricated assemblies of a Skylight Panel, (Item 7B), mounted in a Perforated Metal Roof Deck Panel, (Item 1), with Flashings, (Item 7C). Assembly continuous over two spans erected in the same manner as for Metal Roof Deck Panels.

7A. Perforated Metal Roof Deck Panels — No. 24 MSG min gauge coated steel perforated in the flat portion.

7B. Plastic Skylight — * (Translucent, glass fiber reinforced plastic panel) — Thickness 0.04 in. (nom) formed to fit the Perforated Metal Roof Deck Panel, (Item 7A).

7C. Flashing — No. 20 MSG min gauge coated steel. Attached to the Building Unit to retain and flash the Plastic Skylight to the Perforated Metal Roof Deck Panel.

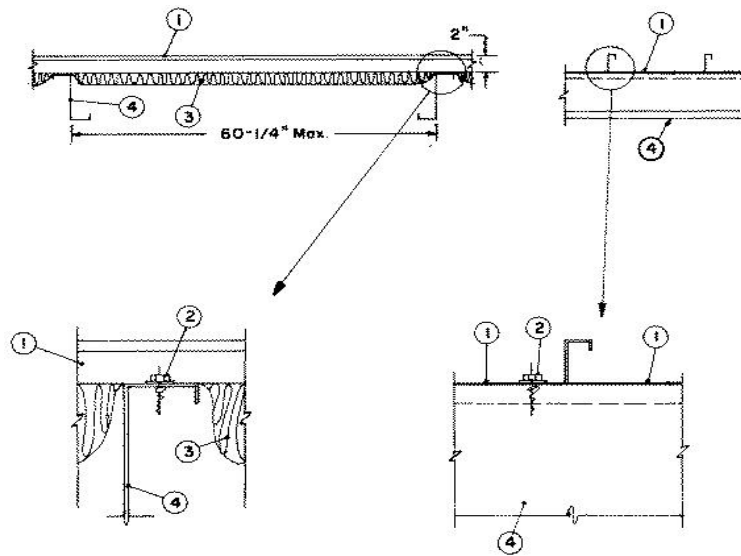
8. Insulating Units — (Optional) — Prefabricated assemblies of a Plastic Insulating Skylight Pan, (Item 8B), mounted in an Aluminum Frame, (Item 8A). Assembly spans between adjacent Purlins beneath a Building Unit only.

8A. Aluminum Frame — Extruded aluminum alloy, 0.055 in. min thickness, shop assembled.

9. Insulation Trim — No. 24 MSG min gauge coated steel. Used at the sides of the Building Unit.

10. Reinforcing Plate — (Not Shown) — Min 0.05 in. thick coated steel. Max length 15-1/2 in., width 5-1/4 in. Used at downslope end lap of Building Unit to Metal Roof Deck Panel. Refer to General Information, Roof Deck Constructions (Roofing Materials and Systems Directory) for items not evaluated.

*Bearing the UL Classification Mark



1. **Metal Roof Deck Panels*** — No. 24 MSG min gauge coated steel, 16 in. max width. Panels continuous over two or more spans. End lap to occur over purlins with panels overlapped 6 in. with lap beginning 1 in. from purlin rib and extending across purlin flange. Side joints to be crimped with a special motorized crimper to a minimum 45 degree angle. A bead of sealing compound may be used at panel end and side laps. For Morin Corp., seams may be 45°, 90°, or 180°.

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2. **Fasteners** — For panel to purlin connections to be No. 12-14 by 1 in. self-drilling, self-tapping, hex-head plated steel screws with a separate 1/2 in. OD plated steel washer and a neoprene sealing washer. Spacing to be 16 in. OC with one fastener located 2 in. from the female side of each panel. Spacing at end lap to be in a 1-1/2, 3, 3-1/2, 3-1/2, 1 in. pattern beginning from the female side rib.

3. **Insulation** — (Optional) — Any compressible blanket insulation, 4 in. max thickness before compression.

3A. **(Optional)** — An additional 2 in. max thickness of compressible blanket insulation may be used between purlins. The additional insulation shall not be sandwiched between the upper flange of the purlin and the roof deck panel.

4. **Purlins** — 0.056 in. min thickness steel (40,000 psi min yield strength).

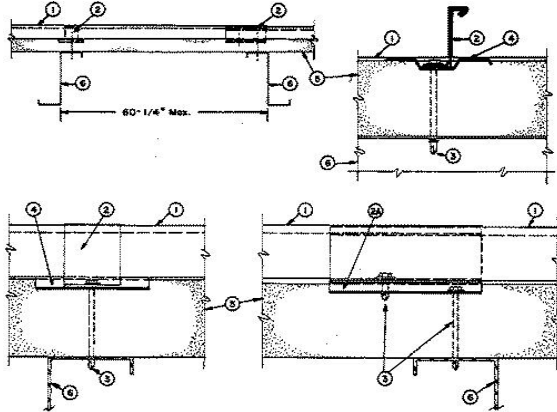
Refer to General Information, Roof Deck Constructions (Roofing Materials and Systems Directory) for items not evaluated.

*Bearing the UL Classification Mark

Construction No. 180

Uplift — Class 90

Fire Not Investigated



1. **Metal Roof Deck Panels** — * — No. 24 MSG min gauge coated steel, 16 in. max width. Panels continuous over two or more spans. End lap to occur over purlins and to include End Lap Back-Up Plate (Item 2A or 2B). Ends of panels overlapped 6 in. beginning 1 in. from purlin web and extending across purlin upper flange. Side laps to be tightened and crimped with special motorized crimping machine to a minimum 45 degree angle with crimping process to include tabs of panel clips (Item 2). A bead of sealing compound may be used at panel laps and side joints. For Morin Corp., seams may be 45°, 90°, or 180°.

METAL ROOFING SYSTEMS INC — "MRS System 2500"

2. **Roof Deck Fasteners* (Panel Clips)** — Two part assembly: Base, 1 in. wide approximately 1-1/4 in. long with upper segment folded over lower end of tab. Fabricated from 0.050 in. thick coated or stainless steel. Upper tab 3 in. wide, maximum tab height 3-1/2 in. with lower end formed to engage base. Fabricated from 0.023 in. thick coated or stainless steel.

Spacing for clip to be 5 ft 0-1/16 in. OC with clips located over purlins (Item 6).

3. **Fasteners (Screws)** — For attaching panel clips to purlins-to be 1/4-14 shoulder or stand-off type; self-drilling, self-tapping, hex-head, plated steel screws. Fastener length to vary with thickness of insulation and to be min of 3/4 in. longer than nom thickness of rigid insulation. One fastener per clip to be used at each purlin. As an alternate fastener for panel clip to purlin attachment, a No. 12-14 self-drilling, self-tapping, hex-head plated steel screw may be used. Same length detail as for 1/4-14 screws to apply. Fasteners used at end laps to be 1/4-10 by 1 in. long self-drilling, self-tapping, hex-head plated steel screws with 1/2 in. OD metal backed sealing washers. Spaced in a 1, 3, 3-1/2, 3-1/2, 3, 1 in. pattern.

For Building Unit-to-Panel side lap connections — No. 18-9 by 1 in. long self-drilling, self-tapping, hex-head plated steel screws with a separate 1/2 in. OD plated steel washer and a neoprene sealing washer. One fastener required at each end and one at midspan of each rib of the Building Units.

For Reinforcing Plate-to-Building Unit end lap connection — No. 18-9 by 1 in. long self-drilling, self-tapping, hex-head plated steel screws with a separate 1/2 in. OD. plated steel washer and a neoprene sealing washer.

4. **Roof Deck Fastener * (Bearing Clip)** — No. 18 MSG min gauge coated steel; 3 in. wide by 3-1/4 in. long with 3/8 in. legs. Used under Panel Clips (Item 2) over purlins and rigid insulation. Three 1/4 in. dia guide holes located in base.

5. **Foamed Plastic* (Rigid insulation)** — Rigid type. Supplied in 4 ft wide sheets. Min thickness 1 in., max thickness 3 in. Butt joints to occur over purlins.

6. **Purlins** — 0.056 in. min thickness steel (min yield strength 40,000 psi) or min "H" series open web steel joists. Maximum spacing 60-1/4 in.

7. **Building Units** — * — (Optional) — Prefabricated assemblies of a Skylight Panel, (Item 7B), mounted in a Perforated Metal Roof Deck Panel, (Item 7A), with Flashings, (Item 7C). Assembly continuous over two spans erected in the same manner as Metal Roof Deck Panels.

8. **Insulating Units** — (Optional) — Prefabricated assemblies of a Plastic Insulating Skylight Pan, (Item 8B), mounted in an Aluminum Frame, (Item 8A). Assembly spans between adjacent purlins beneath a Building Unit only.

9. **Insulation Trim** — No. 24 MSG min gauge coated steel. Used at the sides of the Building Unit.

10. **Reinforcing Plate** — Min 0.05 in. thickness coated steel. Max length 15-1/2 in., width 5-1/4 in. Used at downslope end lap of Building Unit to Metal Roof Deck Panel.

Refer to General Information, Roof Deck Constructions (Roofing Materials and Systems Directory) for items not evaluated.

11. **Liner Panel** — (Optional) — The following liner panel types may be used:

- A. No. 27 MSG min coated steel; .7 in. deep with major ribs having a 2 in. wide crest and spaced 8 in. O.C. cover width 32 in. Panel to be installed with major ribs down. (Min. yield strength to be 40,000 psi.)
- B. No. 29 MSG min coated steel; 9/16 in. deep with ribs having a 3/4 in. wide crest and spaced 2.667 in. O.C. (Min. yield strength to be 80,000 psi.)
- C. 0.018 in. min thickness aluminum (3105 H 194 alloy). 9/16 in. deep with ribs having a 3/4 in. wide crest and spaced 2.667 in. O.C. (Min. yield strength 30,000 psi)

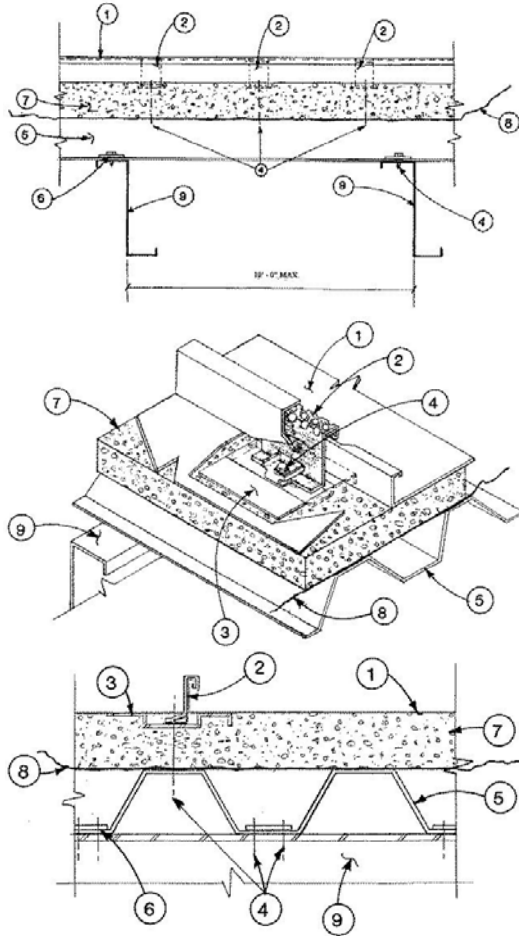
All types to have adjacent widths overlapped min. of one corrugation at sides. End laps to be located over purlins with min. overlap to be 3 in. Liner panels to be fastened to purlins using No. 18-9 by 1 in. self-drilling, self-tapping, hex-head plated steel screws with an optional 1/2 in. O.D. plated steel washer and a neoprene sealing washer. Fasteners to be located one at each side lap and one in the approximate center of each panel width.

Refer to General Information, Roof Deck Constructions (Roofing Materials and Systems Directory) for items not evaluated.

*Bearing the UL Classification Mark

Construction No. 238

Uplift — Class 90
Fire Not Investigated



1. **Metal Roof Deck Panels*** — No. 24 MSG min coated steel. Panels 16 in. wide, 2 in. high at side ribs. Panels continuous over two or more spans. End laps to occur near panel clip locations and to include end lap back up plate (Item 2A). Ends of panels overlapped 6 in. Side laps to be tightened and crimped with a special motorized crimping machine at a maximum 45 degree angle unless indicated in the individual panels in this item. Crimping process to include tabs of panel clips (Item 2). A bead of sealing compound may be used at panel end laps and side joints.

METAL ROOFING SYSTEMS INC — "MRS System 2500"

2. **Roof Deck Fasteners (Panel Clips)** — Two part assembly: Base, 1 in. wide approximately 1-1/4 in. long with upper segment folded over lower end of tab. Fabricated from 0.050 in. thick coated or stainless steel. Upper tab 3 in. wide, maximum tab height 3-1/2 in. with lower end formed to engage base. Fabricated from 0.023 in. thick coated or stainless steel.

2A. **Roof Deck Fasteners (End Lap Back-Up Plate)** — (Not Shown) — No. 18 MSG min gauge coated steel. Max length 48 in., width 6-1/2 in.

2B. **Roof Deck Fasteners** — (Panel Clips) - Two types, both two piece assemblies. Type 330 base approximately

1.88 in. by 1.70 in.; Type 330B base approximately 1.11 in. by 2.00 in. Both types fabricated from No. 16 MSG coated steel and formed to fold over upper tab. Type 330 upper tab 4.30 in. wide and 2.91 in. high max. Type 330B upper tab 4.30 in. wide and 3.34 in. high max. Both types formed to engage base. Clips spaced 48 in. maximum.

3. **Roof Deck Fastener* (Bearing Clip)** — No. 18 MSG min gauge coated steel; 3 in. wide by 3-1/4 in. long with 3/8 in. legs. Used under Panel Clips (Item 2) over purlins and rigid insulation. Three 1/4 in. dia guide holes located in base.

4. **Fasteners (screws)** — Fasteners used to attach the bearing plates to the liner panels to be No. 11 by 3-3/4 in. long self-drilling, stand-off plated steel, flat torx-head screws. Three fasteners per bearing plate used, driven into liner panel. Fasteners used to attach panel clips (Item No. 2) to the bearing plates (Item 3) to be No. 18 by 1 in. long self-drilling, self-tapping, hex-washer-head, plated steel screws. One screw used for each panel clip. Fasteners used to attach the liner panels to the purlin supports to be No. 12-14 by 1-1/4 in. self-drilling, self-tapping, hex-head, plated steel screws with a separate 5/8 in. diameter steel washer and a neoprene sealing washer. Two fasteners to be used at each support with fasteners located in every valley. Fasteners used at liner panel side laps to be the same type as liner panel screws and spaced 20 in. OC. Fasteners used at end laps to be 1/4-10 by 1 in. long self-drilling, self-tapping, hex-head, plated steel screws with 1/2 in. OD. metal backed sealing washers. Spacing to be in a 1, 3, 3-1/2, 3-1/2, 3, 1 in. pattern.

5. **Liner Panel** — The liner panel to be 3 in. deep and fabricated from No. 22 MSG min steel. Top of crests to be 5-1/2 in. wide, valleys to be 2-1/2 in. wide at top. Yield strength to be min 33,000 psi. Liner panel to be fastened to supports with screws indicated under Item 4 or with welds and weld washers of type indicated by manufacturer of liner panel. Welds to be located in every valley.

6. **Fastener Reinforcement (Bearing Plate)** — The reinforcements used with the screws attaching the liner panels to the purlins to be 0.125 in. min thick and to have an area of approximately 2 sq in.

7. **Foamed Plastic** — (Rigid Insulation) — Supplied in 4 ft wide sheets. Min thickness to be 1 in. Density to be min of 2.0 PCF or see products Classified under TJBX.

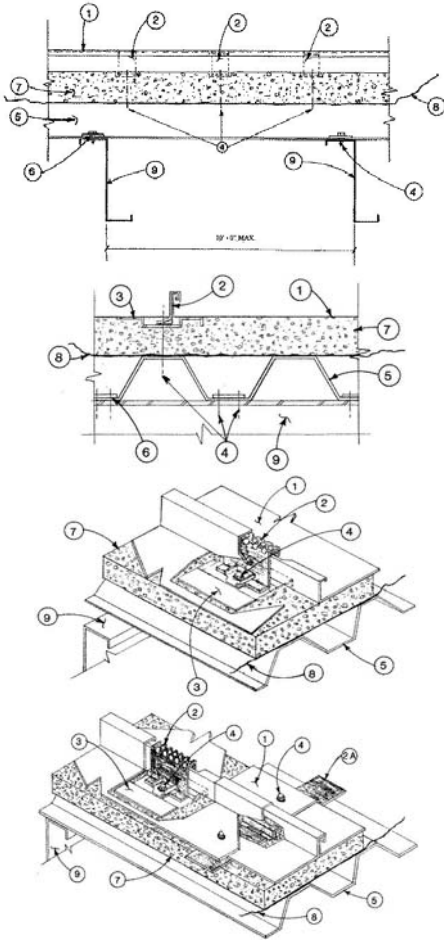
8. **Vapor Barrier** — Used between the liner panel and the foamed plastic to be a 6 mil plastic sheeting.

9. **Purlins** — No. 12 MSG min gauge steel (min yield strength 40,000 psi) or min type H open web joists.

Refer to General Information, Roof Deck Construction, (Roofing Materials and Systems Directory) for Items not evaluated.

*Bearing the UL Classification Mark

Construction No. 238A
 Uplift — Class 90
 Fire Not Investigated



1. **Metal Roof Deck Panels*** — No. 24 MSG min coated steel. Panels 16 in. wide, 2 in. high at side ribs. Panels continuous over two or more spans. End laps to occur near panel clip locations and to include end lap back-up plate (Item 2A). Ends of panels overlapped 6 in. Side laps to be tightened and crimped with a special motorized crimping machine at a maximum 45 degree angle unless indicated in the individual panels in this item. Crimping process to include tabs of panel clips (Item 2). A bead of sealing compound may be used at panel end laps and side joints.

METAL ROOFING SYSTEMS INC — "MRS System 2500"

2. **Roof Deck Fasteners* (Panel Clips)** — Two part assembly: Base, 1 in. wide approximately 1-1/4 in. long with upper segment folded over lower end of tab. Fabricated from 0.050 in. thick coated or stainless steel. Upper tab 3 in. wide, maximum tab height 3-1/2 in. with lower end formed to engage base. Fabricated from 0.023 in. thick coated or stainless steel. Clips spaced 30 in. OC.

2A. **Roof Deck Fasteners* (End Lap Back-Up Plate)** — No. 18 MSG min gauge coated steel. Max length 48 in., width 6-1/2 in.

2B. **Roof Deck Fasteners* (Panel Clips)** — (Not Shown) — Two part assembly. A base fabricated from No. 16 MSG min thick coated steel and a tab fabricated from No. 22 MSG min thick coated steel. Clips spaced 30 in. OC maximum. Clips fastened to liner panel (Item 5). Two screws used per clip. (See Item 4 for description of screws).

As an alternate the following described clip may be used: Two part assembly consisting of a base with a vertical leg 5 in. long and

either 2 in. or 3 in. high and a tapered upper tab maximum 3 in. long formed to interlock with the base. Base fabricated from No. 18 MSG coated steel and to have two 1/4 in. guide holes. Upper tab fabricated from No. 24 MSG coated steel.

2C. **Roof Deck Fasteners* (Back-Up Plates)** — (Not Shown) — Used with AEP-Span "SL-216" panels. No. 16 MSG coated steel length 10-1/2 in., width 15-3/4 in. slipped under lower panel at end-lap. Panels fastened together at end-lap using four No. 1/4 - 14 by 1-1/8 in. long self-drilling self-tapping, hex-washer-head, plated steel screws with a 5/8 OD steel washer and a sealing washer. Screws spaced 4 in. OC beginning 2 in. from ribs.

2D. **Roof Deck Fasteners* (Panel Clip)** — (Not Shown) — Two part assembly: A base fabricated from No. 16 MSG min coated steel and an upper tab fabricated from No. 22 MSG min coated steel. Clips fastened to purlins using two fasteners per clip. See Item No. 3 for description of fasteners.

2E **Roof Deck Fasteners*** — (Panel Clips) (Not Shown) — No. 22 MSG min coated steel. Clips located at panel sides. Guide Holes in bottom clip to accommodate two screw fasteners (Item 4).

3. **Roof Deck Fastener* (Bearing Clip)** — No. 18 MSG min gauge coated steel; 3 in. wide by 3-1/4 in. long with 3/8 in. legs. Used under Panel Clips (Item 2) over purlins and rigid insulation. Three 1/4 in. dia guide holes located in base.

3A. **Roof Deck Fasteners* (Bearing Plate)** — (Not Shown) — No. 18 MSG min gauge coated steel. 4 in. wide, 8 in. long used under each panel clip (Item 2B).

4. **Fasteners (Screws)** — Fasteners used to attach panel clips (Item No. 2) to the liner panels (Item No. 5) to be No. 11 by min 3-3/4 in. long self-drilling, plated steel flat Phillips head screws. One screw used for each panel clip. Fasteners used to be No. 12-14 by 1-1/4 in. self-drilling, self-tapping, hex-head, plated steel screws with a separate 5/8 in. diameter steel washer and a neoprene sealing washer. Two fasteners to be used at each support with fasteners located in every valley. Fasteners used at liner panel side laps to be the same type as liner panel screws and spaced 20 in. OC. Fasteners used at metal roof deck panel end laps to be 1/4-10 by 1 in. long self-drilling, self-tapping, hex-head, plated steel screws with 1/2 in. OD metal backed sealing washers. Spacing to be in a 1, 3, 3-1/2, 3-1/2, 2, 1 in. pattern.

5. **Liner Panel** — The liner panel to be min 1-1/2 in. deep Type A, B, F, or N Deck fabricated from No. 22 MSG min gauge steel. Yield strength to be min 33,000 psi. Liner panel to be fastened to supports with screws indicated under Item 4 or with welds and weld washers of type indicated by manufacturer of liner panel. Welds to be located in every valley.

6. **Fastener Reinforcement (Bearing Plate)** — The reinforcements used with the screws attaching the liner panels to the purlins to be 0.125 in. thick and to have an area of approximately 2 sq/in.

7. **Foamed Plastic (Rigid Insulation)** — Supplied in 4 ft wide sheets. Min thickness to be 1 in. Density to be min of 2.0 lb/cu ft or see products Classified under TJBX.

8. **Vapor Barrier** — Used between the liner panel and the foamed plastic to be a 6 mil plastic sheeting.

9. **Purlins** — No. 12 MSG min gauge steel (min yield strength 40,000 psi) or min Type H Open web joists.

Refer to General Information, Roof Deck Construction, (Roofing Materials and Systems Directory) for Items not evaluated.

*Bearing the UL Classification Mark



Construction No. 238B TGKX.238B Roof Deck Constructions

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Roof Deck Constructions

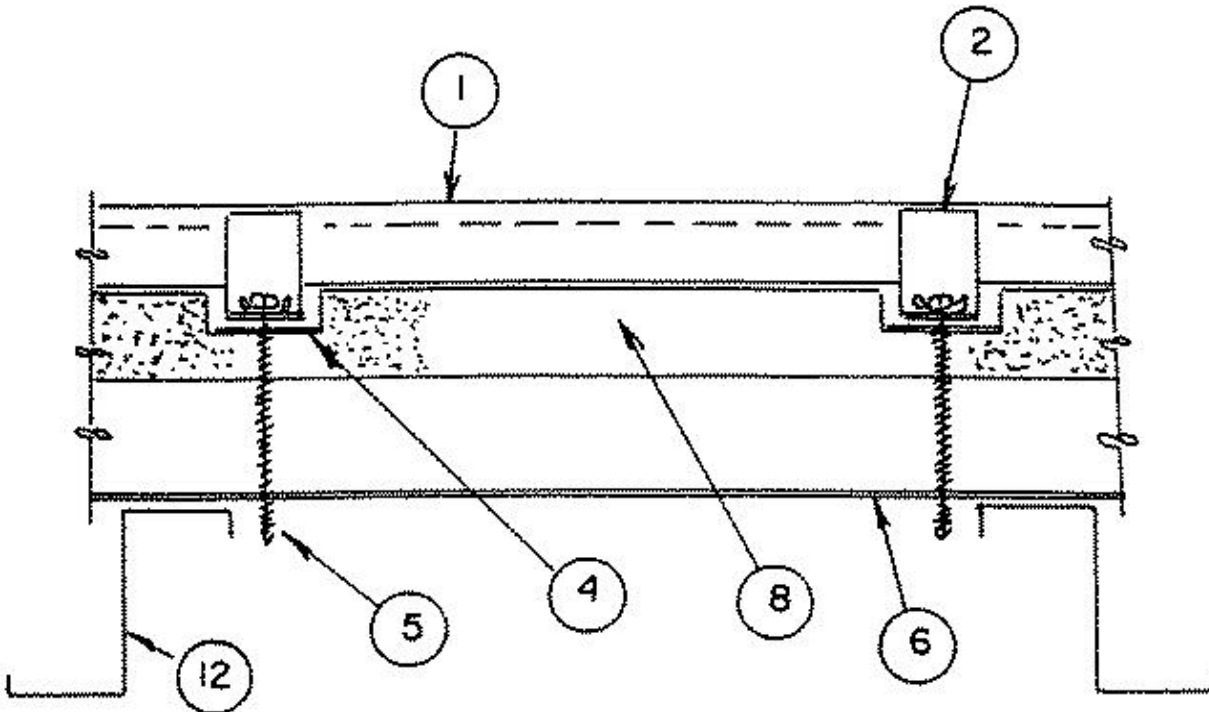
[See General Information for Roof Deck Constructions](#)

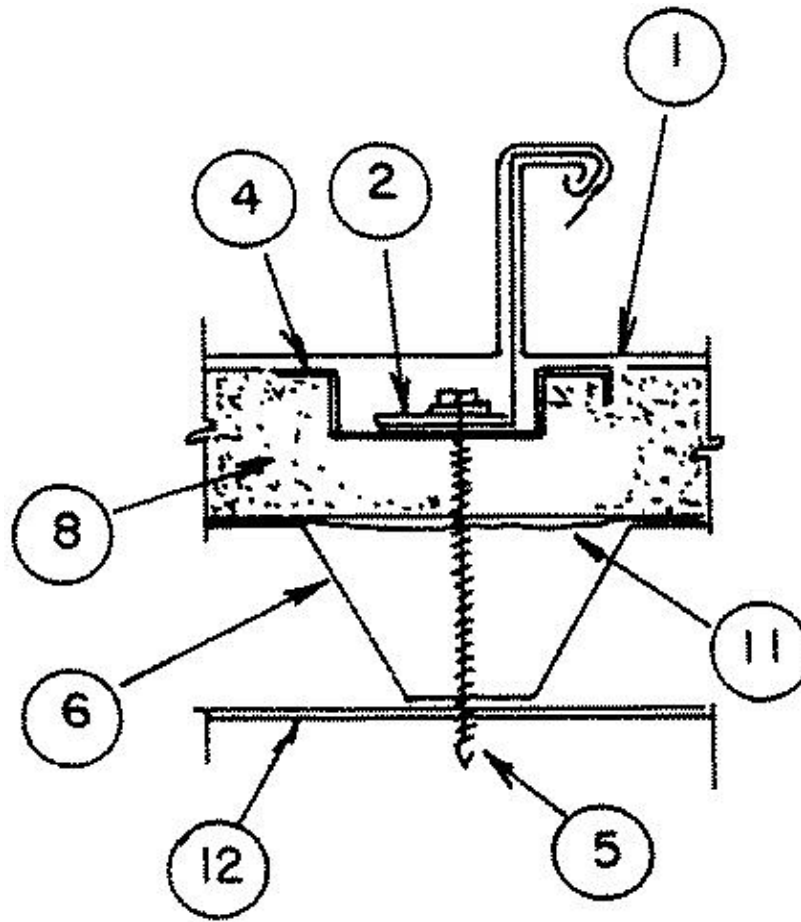
Construction No. 238B

October 09, 2013

Uplift – Class 90

Fire Not Investigated





1. **Metal Roof Deck Panels*** — No. 24 MSG min coated steel. Max panel width 16 in. and rib height 2 in. Panels continuous over two or more spans. Endlap for "BattenLok" or "Super-Lok" panels to be 6 in. and to include back up plate (Item 3). Endlap for "Master-Span" and "KA2000" panels to be 2 in. and to include back up plate (Item 3A). A bead of sealant may be used at panel ends and side joints. Side laps to be tightened and crimped with an electric crimping machine to an angle of 45 degree maximum unless indicated in the individual panels in this item. Crimping process to include the upper portion of panel clips (Items 2 or 2A).

METAL ROOFING SYSTEMS INC ([View Classification](#)) — "MRS System 2500"

2. **Roof Deck Fasteners* (Panel Clips)** — Either of the following:

Fixed Clip or Utility — One piece assembly fabricated from No. 22 MSG min steel, 3 in. wide. Floating Clip — two piece assembly with a base fabricated from No. 22 MSG min steel, 4-1/4 in. wide, and a top fabricated from No. 22 MSG steel, 4-1/4 in. wide. Clip spacing to be 48 in. O.C. max. Sealant may be used in the top of the clips.

2A. **Roof Deck Fasteners*** — (Panel Clip) — (Not Shown) — Two part assembly; A base fabricated from No. 16 MSG min coated steel and upper tab fabricated from No. 22 MSG min coated steel. Clips fastened to purlins using two fasteners per clip. See Item No. 3 for description of fasteners.

2B. **Roof Deck Fasteners* (Panel Clips)** — (Not Shown)

One piece assembly; 3 in. wide, approximately 2 in. high with two or three guide holes in base. Fabricated from No. 22 MSG coated steel.

2C. **Roof Deck Fasteners (Panel Clips)** — (Not Shown) — No. 24 MSG min gauge coated steel with a separately formed base fabricated of No. 18 MSG min gauge coated steel. One clip to be used per panel at each purlin.

3. **Endlap Back-Up Plate*** — (Not Shown) No. 16 MSG min coated steel, 15-1/2 in. wide with two 1 in. wide by 3/4 in. long tabs for sliding over end of panels.

4. **Bearing Plate** — (Optional) No. 20 MSG min coated steel, 4 in. wide by 5 in. long. Used under panel clip (Item 2, 2A, 2B and 2C) over rigid insulation (Item 8).

5. **Panel Fasteners** — (Screws) Screws used to attach the panel clips (Items 2 or 2A) to liner panel (Item 6) to be No. 14 Truss Head with No. 3 Phillips drive. Length to be a min of 1/2 in. longer than the combined thickness of the liner panel (Item 6), rigid insulation (Item 8), gypsum wallboard (Item 10) and plywood or oriented strand board (Item 10). Two screws per clip. Screws used to attach liner panel (Item 6) to purlins (Item 12) to be No. 12 x 1-1/4 in. self-drilling, Hex Head with 5/8 in. O.D. washer. Two screws to be used at each valley. Screws at liner panel side laps to be the same type as liner panel to purlin screws. Spacing to be 20 in. OC.

Screws used at endlap to be one of the following: 14 x 1 in. Type AB, Hex Washer Head self-tapping, 14 x 1-1/4 in. Hex Washer Head, self-tapping; 14 x 1 in. Type AB Phillips Stainless Steel, Self-tapping. Five screws per panel in a 1, 3, 4, 4, 3 in. pattern.

6. **Metal Deck** — No. 22 MSG min steel. Min yield strength 30 KSI. Min depth 1-1/2 in. Panel type to be A, B, F or N Deck. As an alternate metal deck, 22 MSG min steel, min yield strength 80 KSI, min depth 15/16 in. designated Type HD may be used; Liner panel to be fastened to supports with screws as indicated in Item 4 or with welds and weld washers of type indicated by manufacturer of liner panel. Welds to be located in each valley.

7. **Fastener Reinforcement** — (Not Shown) Reinforcements used with the screws attaching the liner panels to the purlins. Thickness to be 0.125 in. with an area of approx 2 sq/in.

8. **Foamed Plastic (Rigid Insulation)** — (Optional) Min thickness 1 in. Any rigid type having a minimum compressive strength of 25 psi or minimum density of 2 pcf or see products Classified under TJBX. Supplied in 4 ft wide sheets.

9. **Plywood or OSB** — (Optional) (Not Shown) Min APA Rated plywood, nom 3/8 in or 1/2 in. thick or oriented strand board (OSB), nom 3/8 in or 7/16 in. thick, 4 x 8 ft. Sheets to be installed on top of Foamed Plastic (Item 8) in lieu of bearing plates (Items 4 or 4A).

10. **Gypsum Board** — (Optional) (Not Shown) Any 5/8 in. thick gypsum wallboard supplied in sheets 2 x 4 to 4 x 12 ft. Applied perpendicular to steel roof deck direction with adhesive. End joints to occur over crests of steel roof deck and be staggered 2 ft in adjacent rows. As an alternate, any 1/2 in. thick gypsum board can be placed on top of the foamed plastic rigid insulation (Item 8). The total cumulative thickness of the rigid board (Item 8) and gypsum board may not exceed 4-1/2 in.

11. **Vapor Barrier** — (Optional) Used between liner panel and foamed plastic. Min 6 mil plastic sheeting.

12. **Supports (Purlins)** — Purlins used for liner panels to be cold formed steel sections. As alternates: structural steel components (hot rolled beams, channels, etc.) may be used. Min gauge and yield to depend on design considerations. Max spacing to depend on design considerations.

Refer to General Information, Roof Deck Constructions, for Items Not Evaluated.

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Last Updated on 2013-10-09

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Construction No. 238C TGKX.238C Roof Deck Constructions

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Roof Deck Constructions

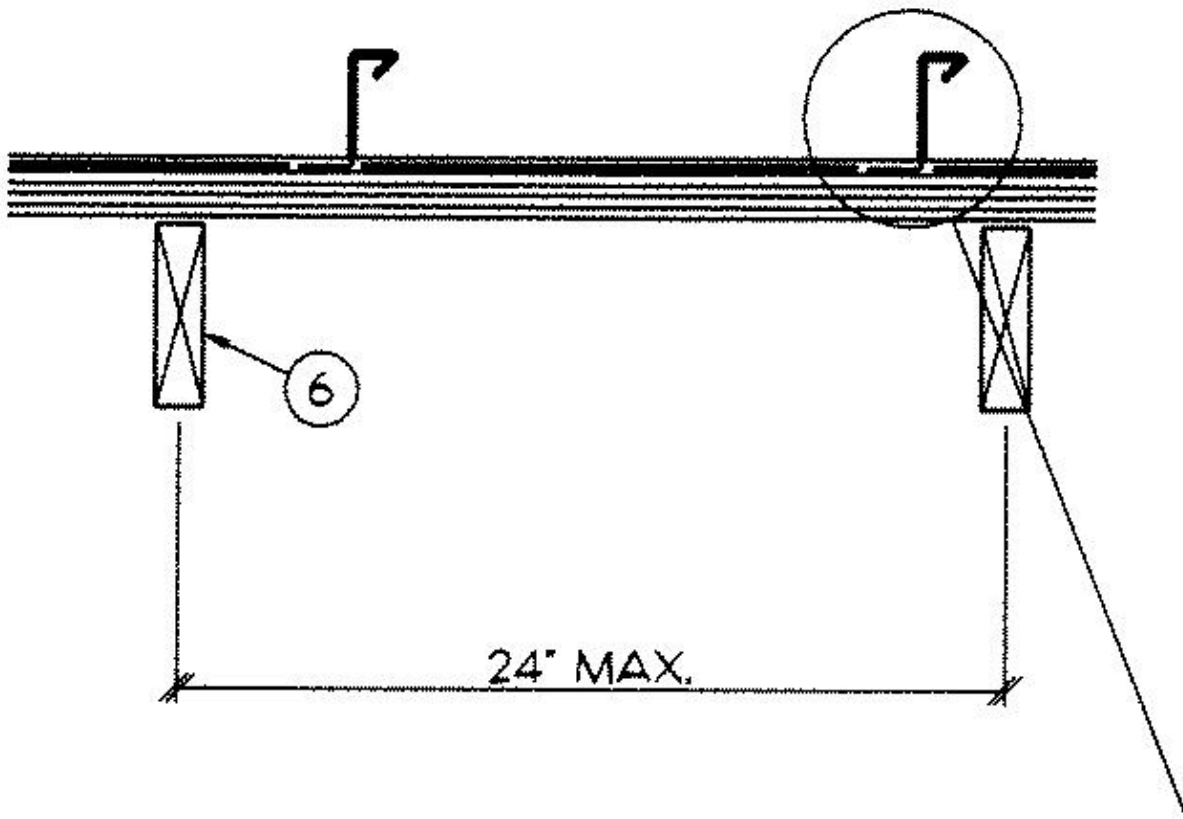
[See General Information for Roof Deck Constructions](#)

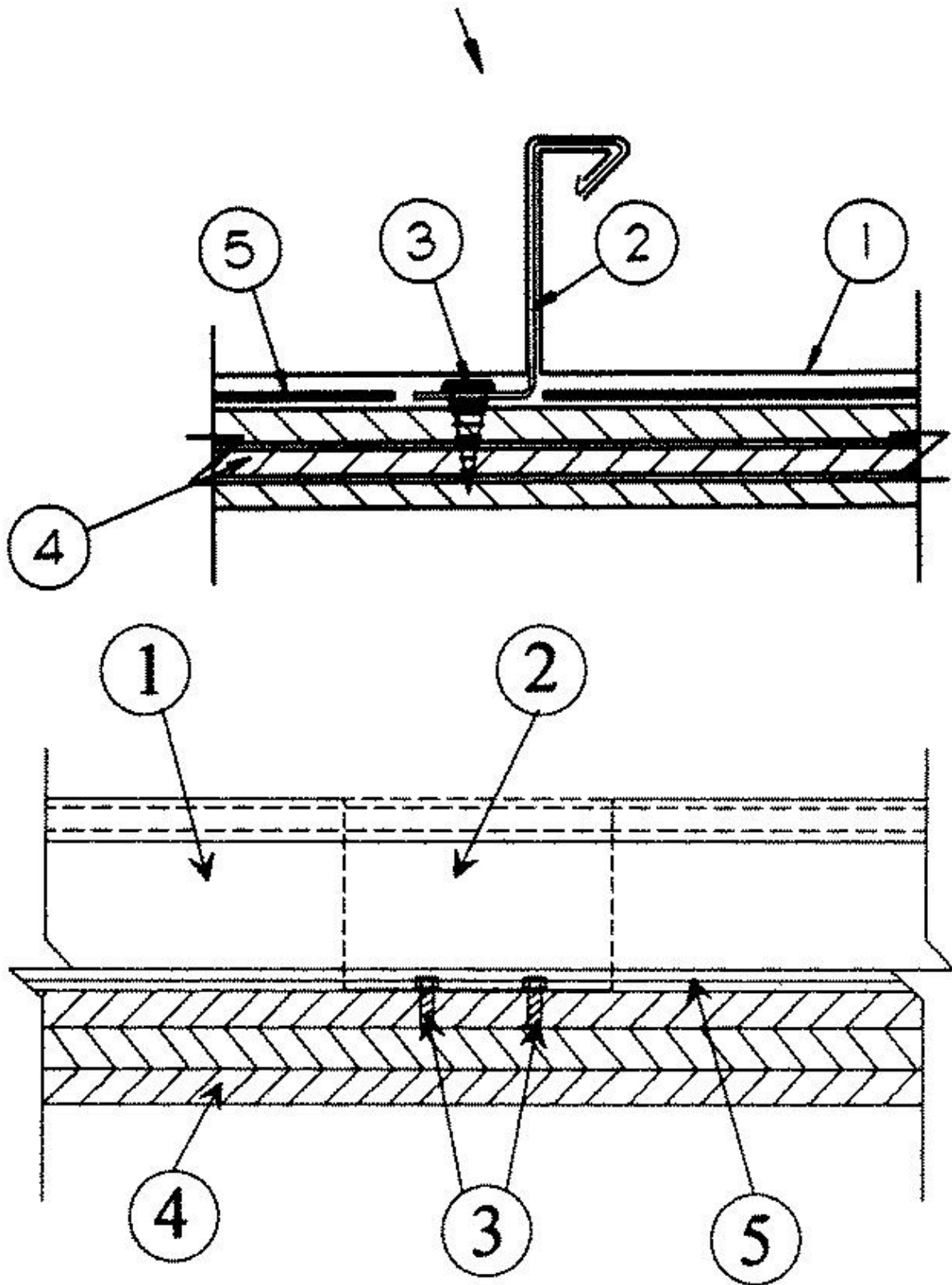
Construction No. 238C

May 14, 2013

Uplift Class 90

Fire Not Investigated





1. **Metal Roof Deck Panels*** — No. 24 MSG or No. 22 MSG min coated steel. Panels 16 in. wide, 2 in. high at side ribs. Side laps to be tightened and crimped with a special motorized crimping machine at a maximum 45 degree angle unless indicated in the individual panels in this item. Crimping process to include tabs of panel clips (Item 2). A bead of sealing compound may be used at panel side joints.

2. **Roof Deck Fasteners*** — (Panel Clips) — (Not Shown) — One part assembly, No. 20 MSG min. coated steel. Height, 2-5/32 in., Width, 3 in.

2A. **Roof Deck Fasteners*** — (**Panel clips**) — Used with Architectural Building Components, Inc. JSM-200 Panel, fixed clip fabricated from No. 22 MSG min coated steel. Floating clip, two part assembly; base fabricated from No. 14 MSG coated steel, clip tab fabricated from No. 22 MSG min coated steel. Sliding clip, two part assembly; base fabricated from No. 16 MSG coated steel, clip tab fabricated from No. 22 MSG coated steel. Clips spaced max. 30 in. OC along length of panel ribs.

2B. **Roof Deck Fasteners*** — (**Panel clips**) — Used with American Buildings Inc. "Loc-Seam" or "Loc-Seam 360" Metal Roof Deck Panel. Clips spaced max. 30 in. OC along length of panel ribs.

2C. **Roof Deck Fasteners*** — (Panel Clip) — (Not Shown) — Two part assembly; A base fabricated from No. 16 MSG min coated steel and upper tab fabricated from No. 22 MSG min coated steel. Clips fastened to purlins using two fasteners per clip. See Item No. 3 for description of fasteners.

2D. **Roof Deck Fasteners** — (Panel Clips) - Two types, both two piece assemblies. Type 330 base approximately 1.88 in. by 1.70 in.; Type 330B base approximately 1.11 in. by 2.00 in. Both types fabricated from No. 16 MSG coated steel and formed to fold over upper tab. Type 330 upper tab 4.30 in. wide and 2.91 in. high max. Type 330B upper tab 4.30 in. wide and 3.34 in. high max. Both types formed to engage base. Clips spaced maximum 30 in.

3. **Fasteners (screws)** — Fasteners used to attach panel clips (Items No. 2, 2A, 2B, 2C) to the plywood deck to be No. 12-8 by 1 in. long No. 1 Phillips drive, flat recess-head, steel wood screw. Two screws used per clip.

4. **Plywood Decking** — Plywood decking to be graded per PS83 specifications, 19/32 in. (nom 5/8 in.) thick, exposure 1 APA rated sheathing, span C-D 40/20 plywood, square edged. Butt ends not blocked.

5. **Underlayment (Optional)** — Type 15 or 30 organic felt. Side laps, end laps and attachment per manufacturers standard.

6. **Supports** — Spaced max of 24 in. OC. Any of the following types may be used to support the plywood decking:

- a) Nom 2 by 6 in., min No. 2 grade A.F.P.A. S-P-F Hemlock Fir, Douglas Fir or Southern Pine or equivalent.
- b) Wood trusses with a nom 2 by 4 in. upper chord of the same grade as Item a.
- c) No. 22 MSG min cold formed coated steel (min yield to be 33,000 psi).

7. **Plywood Fasteners (Not Shown)** — Fasteners used to attach the plywood deck to the supports to be as follows:

- a) For plywood-to-wood supports No. 8-18 by 1-7/8 in. long bugle-head steel screws with a No. 2 Phillips drive, a "Hi-Low" thread pattern and an "S-Point" .
- b) As an alternate to Item a, 8d by 2-1/2 in. long deformed shank common nails may be used.
- c) For plywood-to-steel supports for a steel thickness less than No. 20 MSG No. 7-19 by 1-1/4 in. long bugle-head steel screws with a No. 2 Phillips head drive "Hi-Low" threads and an "S-Point" . For a steel thickness greater than No. 20 MSG to No. 16 MSG, No. 6-20 by 1-1/4 in. long bugle-head steel screws with a No. 2 Phillips drive and an S12 (TEKS/3) ® point.

Spacing: Fastener spacing for all fastener types to be 6 in. OC at the plywood butt edges and 12 in. OC in the interior.

Refer to General Information, Roof Deck Construction (Roofing Materials and Systems Directory) for items not evaluated.

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Construction No. 435 TGKX.435 Roof Deck Constructions

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Roof Deck Constructions

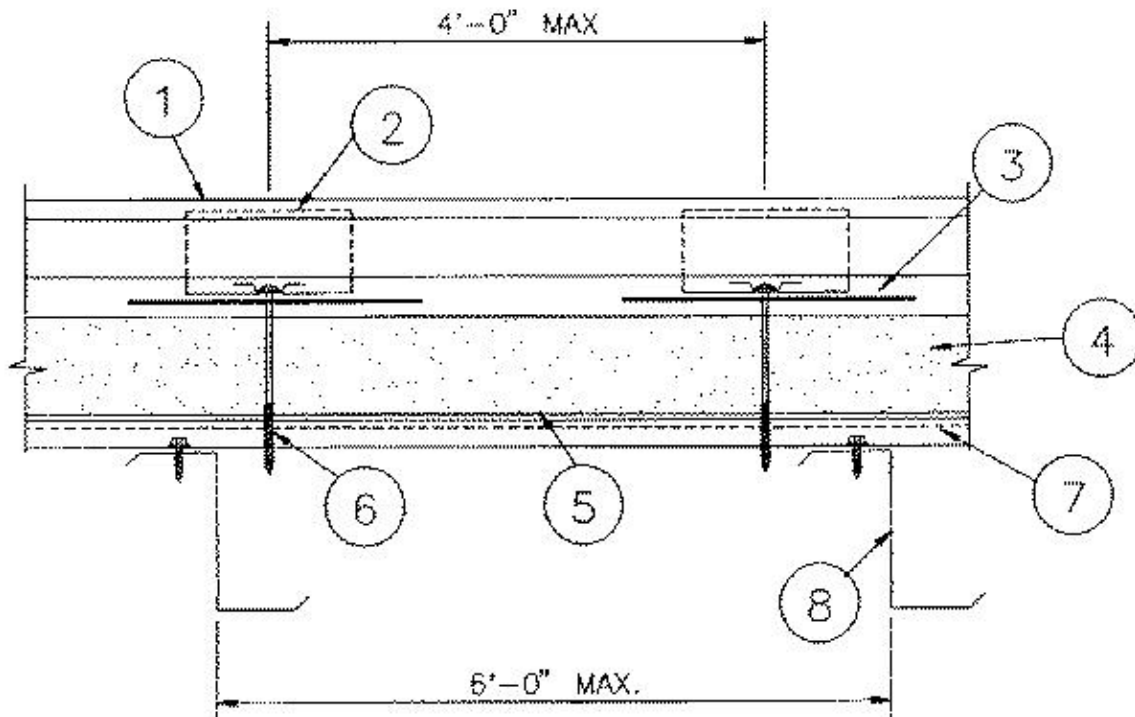
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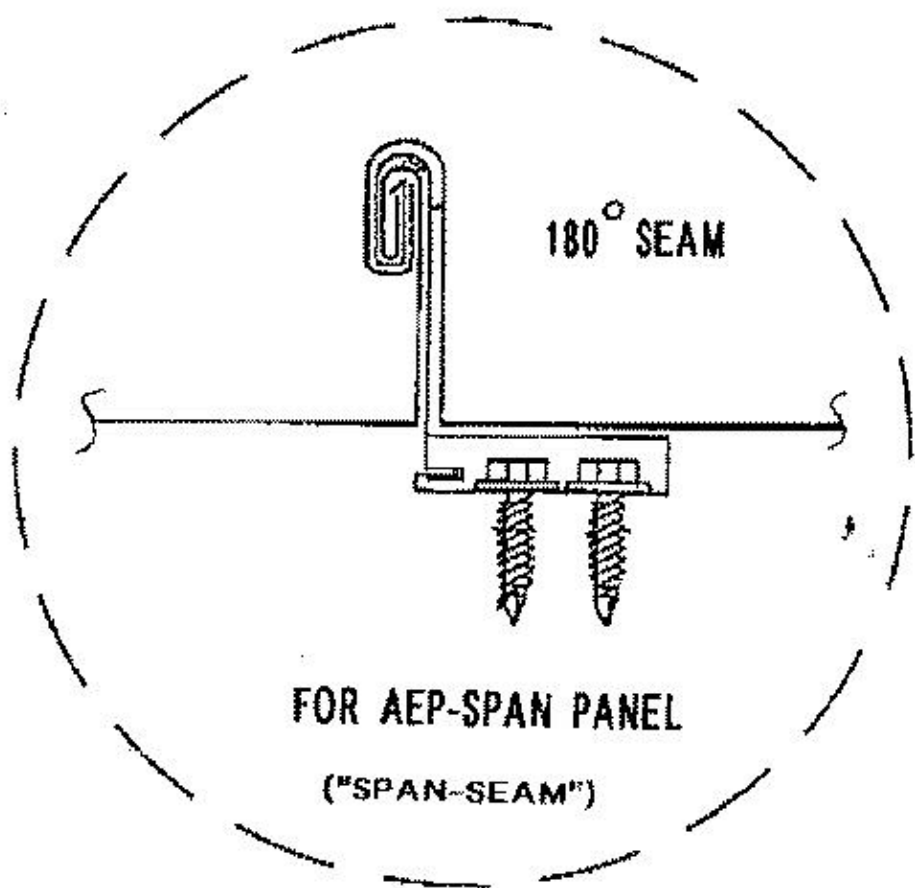
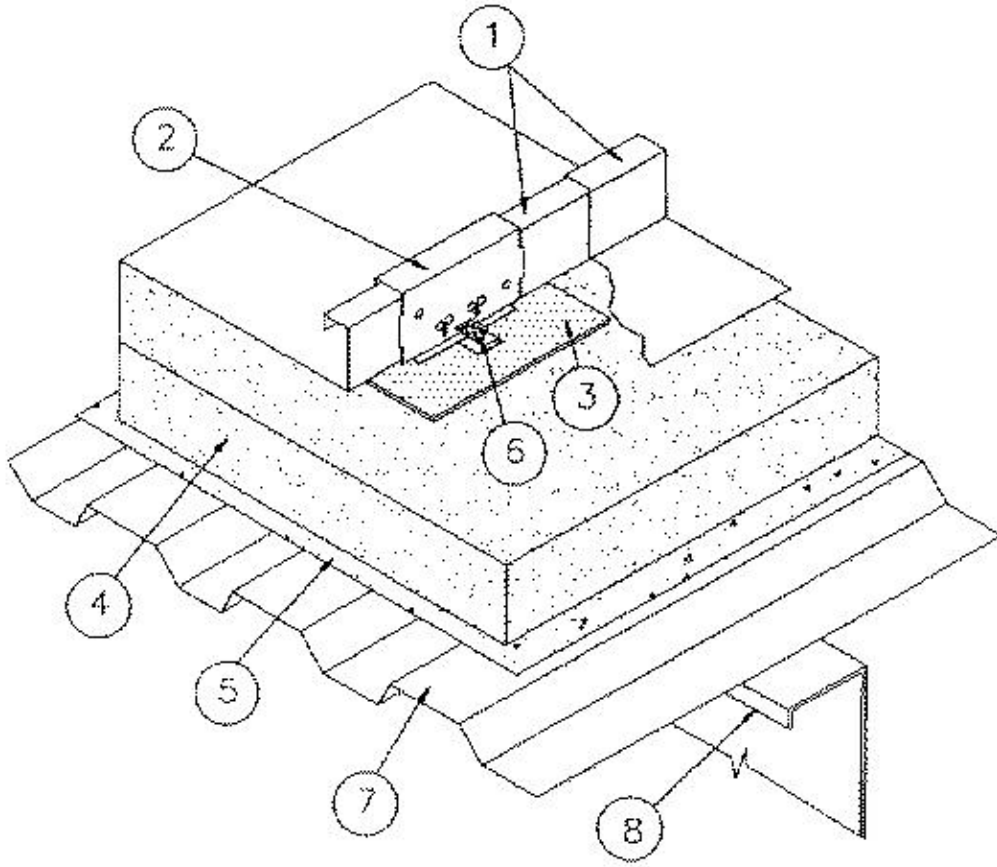
Construction No. 435

October 09, 2013

Uplift — Class 90

Fire Not Investigated





1. **Metal Roof Deck Panels*** — No. 24 MSG min. coated steel; 16 in. wide, 2 in. high at female rib. Panels continuous over two or more spans. End laps to occur near purlin supports with end lap back-up-plate (Item 2A) slipped under lower panel,

resting on purlin and with a 5 in. lap on up slope side of panel. Up slope panel to have swedged end. Sealant may be used at end lap and side ribs. Adjacent panels seamed with an electric seamer with seaming operation to include the upper tab of the panel clip (Item 2).

METAL ROOFING SYSTEMS INC ([View Classification](#)) — "MRS System 2500"

2. Roof Deck Fasteners* (Panel Clips) — Two part assembly; base 1-11/16 in. wide, length 1-5/8 in. Fabricated from No. 16 MSG min. steel and formed to engage lower section of tab. Tab 4-1/4 in. wide and 3-3/8 in. high formed to engage clip base and panel rib. Fabricated from No. 22 MSG min. coated steel. Spaced max of 48 in. OC.

2A. Roof Deck Fasteners* (Back-Up Plates) — (Not shown) — No. 16 MSG min coated steel, length 10-1/2 in., width 15-3/4 in. Slipped under lower panel at end-lap. Panels fastened together at end-lap using four No. 1/4-14 by 21-1/8 in. long self-drilling, self-tapping, hex-washer-head, plated steel screws with a 5/8 in. OD steel washer and a sealing washer. Screws spaced 4 in. OC beginning 2 in. from ribs.

2B. Roof Deck Fasteners (Panel Clips) — (Not Shown) — No. 24 MSG min gauge coated steel with a separately formed base fabricated of No. 18 MSG min gauge coated steel. One clip to be used per panel at each purlin.

3. Bearing Plate — No. 24 MSG min. coated steel, 4-5/8 in. wide, 6 in. long. Located under each panel clip (Item 2 and 2B) over rigid insulation (Item 4).

4. Rigid Insulation — (Optional) — Any foamed plastic Classified by UL under the TJBX category. Maximum thickness 4 in.

5. Vapor Retarder — One ply 30 lb felt.

6. Fasteners (Screws) — Fasteners used to attach panel clips (Item 2) to liner panels (Item 7) to be No. 14-13, No. 3 Phillips drive, truss head, painted steel screws. Length to penetrate liner panel min. 1/2 in. Two screws used per clip.

7. Liner Panel — Fabricated from No. 22 MSG min. coated steel; 1-1/2 in. deep, max pitch 6 in. (minimum yield strength 33,000 psi). Liner panels attached to structural supports with screws or welds per liner panel manufacturer's instructions for uplift loading.

8. Supports (Purlins) — Purlins used for liner panel supports to be cold formed sections or structural steel components (hot-rolled beams, channels, open web joists, etc.). Minimum gauge and yield to depend on design considerations for uplift loading. Maximum spacing 6 ft, 0 in. OC.

Refer to General Information, Roof Deck Constructions for items not evaluated.

*Bearing the UL Classification Mark

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Construction No. 487 TGKX.487 Roof Deck Constructions

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Roof Deck Constructions

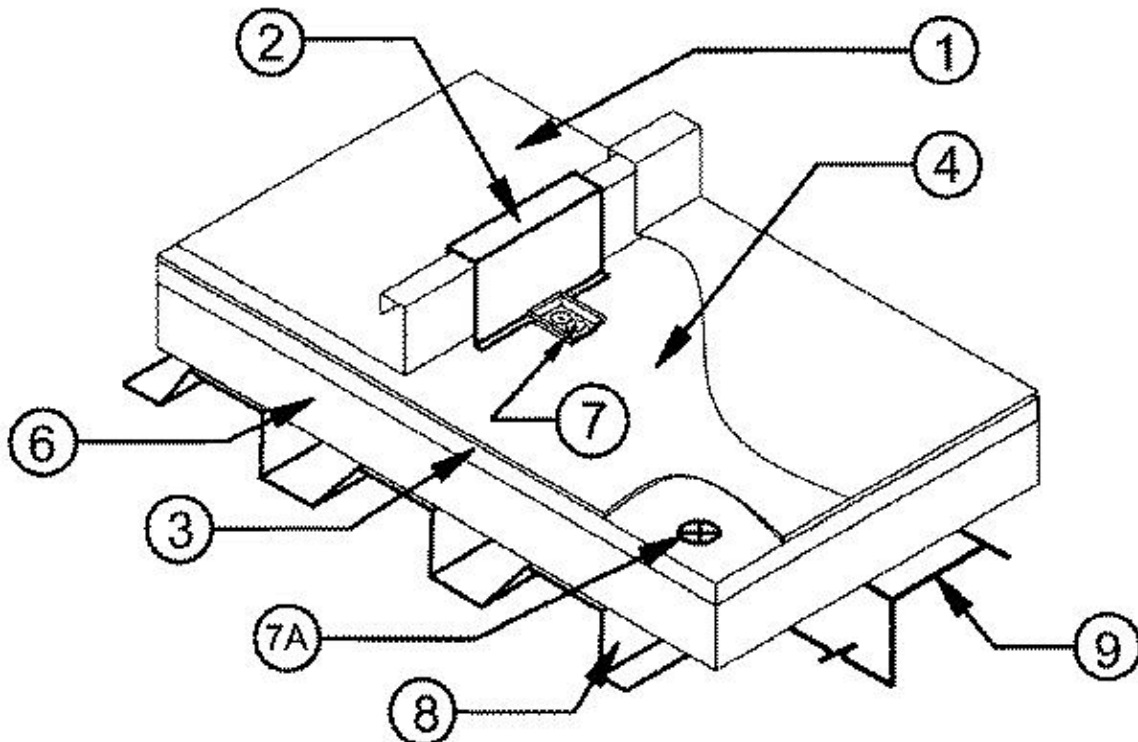
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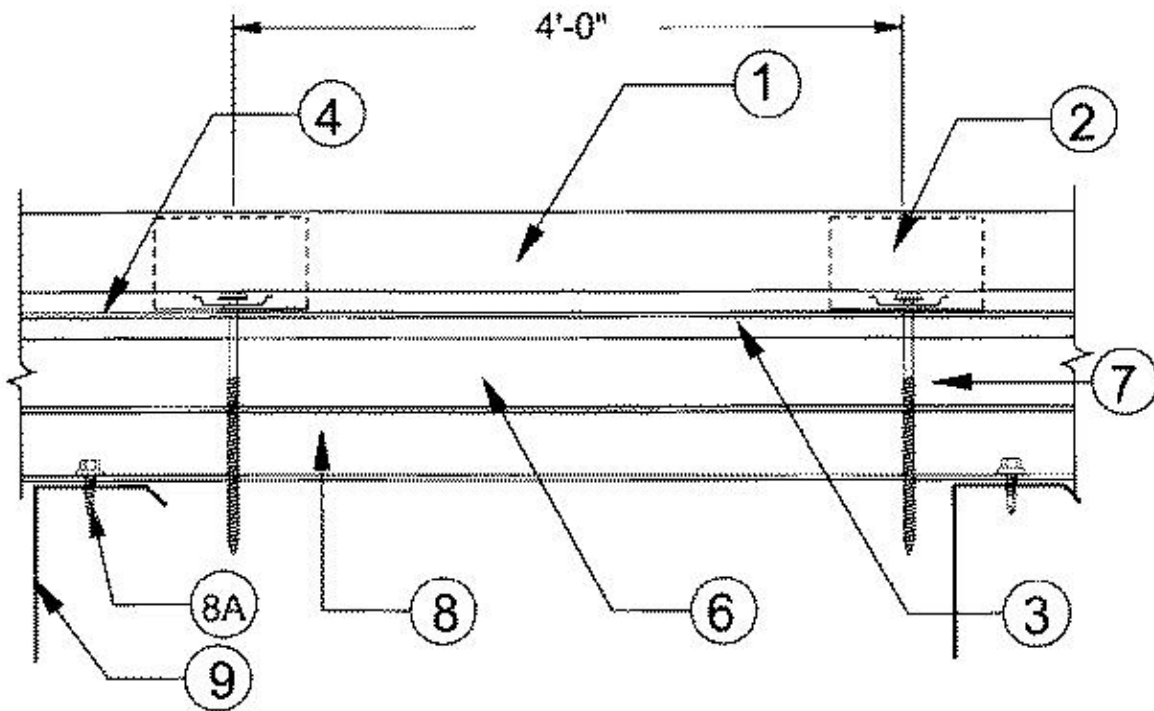
Construction No. 487

October 09, 2013

Uplift — Class 90

Fire Not Investigated





1. **Metal Roof Deck Panels*** — No. 24 MSG min coated steel, 16 in. max width. Panels continuous over two or more spans. Endlaps to occur adjacent to purlin with panels overlapped 6 in. and to include endlap back-up plate (Item 2A). A line of sealant may be used at panel ends and sidelaps. Sidelap to be tightened and crimped with an electric seaming machine to an angle of 45 degree maximum unless indicated in the individual panels in this item. Crimping process to include the upper portion of the panel clip (Item 2).

METAL ROOFING SYSTEMS INC (View Classification) — "MRS System 2500"

2. **Roof Deck Fasteners*** — To be either of the following: Fixed Clip - one piece assembly fabricated from No. 22 MSG coated steel, 3 in wide. Floating Clips - Two piece assembly with a base fabricated from No. 16 MSG min coated steel, 1-5/8 in. wide, and a top fabricated from No. 22 MSG min coated steel, 4-1/2 in. wide. Utility Clip — one piece assembly fabricated from No. 22 MSG coated steel, 3 in. wide. Clip spacing to be 4 ft, 0 in. O.C. maximum.

2A. **Endlap Back-Up Plate** — (Not Shown) — No. 16 MSG min coated steel. 15-1/2 in. wide with two 1 in. wide by 3/4 in. long tabs for sliding over end of panels.

2B. **Roof Deck Fasteners*** — (Panels) — (Not Shown) — Two part assembly; A base fabricated from No. 16 MSG min coated steel and upper tab fabricated from No. 22 MSG min coated steel. Clips fastened to purlins using two fasteners per clip. See Item No. 3 for description of fasteners.

2C. **Roof Deck Fasteners*** — (Panel Clips) — (Not Shown)

One piece assembly; 3 in. wide, approximately 2 in. high with two or three guide holes in base. Fabricated from No. 22 MSG coated steel.

One piece assembly; 3 in. wide, approximately 2-3/8 in. or 3 in. high, with three guide holes in base. Fabricated from No. 22 MSG coated steel.

Two piece assembly; base approximately 2 in. wide, 1-11/16 in. long formed to engage upper tab. Fabricated from No. 16 MSG coated steel. Tab approximately 4-5/16 in. wide; 2-3/8 in. or 2-7/8 in. high, formed to engage base. Fabricated from No. 22 MSG coated steel. Base to have two guide holes.

3. **Gypsum Board*(Mineral Board)** — Min thickness 1/2 in. Opposite side edges have a tongue and groove configuration. Butt (end) joints to be staggered and occur over steel deck crests. Wallboard installed perpendicular to steel deck corrugations.

4. **Vapor Barrier** — Single ply used between the wallboard (Item 3) and the metal roof deck panels (Item 1).

5. **Joint Tape** — (Not Shown) — 2-1/2 in. wide tape supplied by manufacturer to be used at all wallboard joints.

6. **Foamed Plastic (Rigid Insulation)** — (Optional) — Expanded polystyrene or polyisocyanurate supplied in 4 by 8 ft sheets, min thickness 13/16 in. min density 1.0 pcf. All end joints to be staggered with respect to adjacent rows. All joints to be offset from joints in mineral board (Item 3).

7. **Fasteners** — Screws used to fasten panel clips (Item 2) to steel deck (Item 8) to be No. 14 Truss head with No. 3 Phillips drive. Length to be min 1/2 in. longer than thickness of wallboard, rigid insulation and metal deck. Two screws per clip. Fasteners used at endlaps to be one of the following: 14x1 in. Type AB self-tapper; 14x1-1/4 in. Hex washer head self-driller; 14x1 Type AB Phillips stainless steel self-tapper.

7A. **Fasteners** — For attaching in wallboard to steel deck to be min 0.140 in diam threaded shank Phillips, bugle or trumpet head, self-drilling, self-tapping, corrosion resistance coated steel screws supplied by manufacturer. Screws are installed into top corrugations of steel deck through nom 3 by 3 in. corrosion resistant steel roof deck plates, spaced in a pattern as determined by the pitch of the steel deck with a min of 21 fasteners per 4 by 8 ft sheet (Item 3).

8. **Steel Deck** — Fabricated to various profiles, min yield strength 33,000 psi. Steel deck profile, thickness, support spacing and method of positioning (end and side laps) and fastening deck to supports to be per deck manufacturers requirements for uplift loading.

8A. **Deck Fasteners** — Steel deck panels to be fastened to structural supports and at laps using puddle welds with weld washers or screw fasteners per deck manufactures requirements for uplift loading.

9. **Purlins** — 16 MSG min coated steel, min yield strength 50,000 psi or Type H open web joists.

Refer to General Information, Roof Deck Constructions for Items Not Evaluated.

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American Test Lab, Inc.
1656 Calvert Road, Brevard, N. C. 28712
Phone (828) 884-3700 Fax (828) 884-3710
Web www.atlnc.com E-Mail atli@citcom.net

ATLNC # 0522.01-12

Report Date: 6/21/12

Test Date: 05/22/12

ATLNC Certification # 08-0227.14

FL Organizational # TST 1555

Test Requested By: Metal Roofing Systems
7687 Mikron Drive
Stanley, NC 28164
Phone 704-820-3110

Test Standards: ASTM E 1592-05

Test Conditions: 70-80 degrees F

Description of product tested:

Specimen A, 24 gauge (.026") Galvalume Metal Roof Panels over 3-1/2" x 8" x 16 ga. (.061") Z purlins as shown in MRS System 2500 dwg 1 - 4. Seams were mechanically crimped together. The edge and the ends of the panels were attached to the purlins with self drilling screws.

Specimen B, 24 gauge (.026") Galvalume Metal Roof Panels over 3-1/2" x 8" x .061" Z purlins as shown in MRS System 2500 dwg 1 - 4. Seams were mechanically crimped together. The edge and the ends of the panels were attached to the purlins with self drilling screws.

Configuration: Specimens Mounted vertically in steel test chamber
Specimen A, (2) 5' purlin spans, 4 panels wide
Specimen B, (4) 1' purlin spans, 4.5 panels wide

Description of Units:

Specimens A, B

Panel Construction- 24 ga (.026") Galvalume steel roof panels 16" wide x 138" long with 2" single lock with 92 degree standing seams per MRS System 2500 dwg 1 - 4. Specimen A -138" long, Specimen B - 72" long

Purlin Construction- 3-1/2" x 8" x 16 ga (.061") Z purlins

Purlin Spacing- Specimen A 2 spans 60" OC with 12" overhang.
Specimen B 4 Spans 12" OC with 12" over hang.

Screws and Method of Attachment-

Purlins- 3" wide x 2" high x 22 ga fixed clips as shown in drawing attached to purlins with 2 self drilling screws.

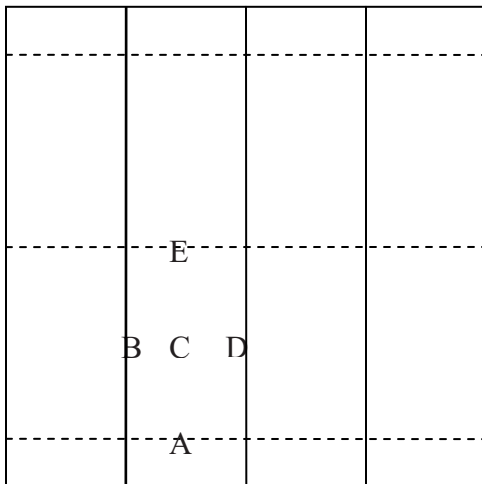
Panel Standing Seams- Overlaps were 15-7/8" OC and panels were joined with 22 ga fixed clips at each purlin as shown in drawing.

Purlin Attachment- Each purlin was attached the chamber.

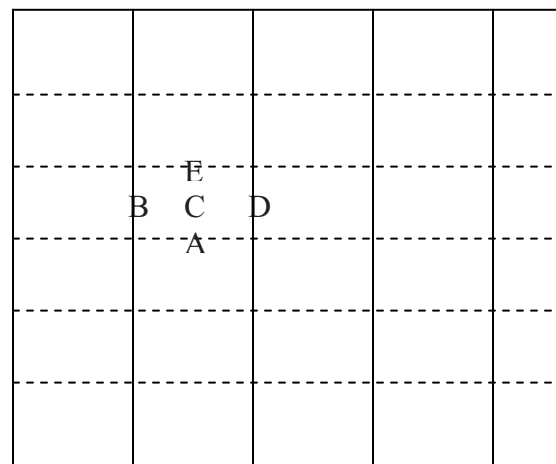
Test Specimens

Indicator Locations

Specimen A



Specimen B



*Drawings not to scale.

Specimen A

Deflections in inches

Pressure Increments psf Positive	Time (sec)	End Purlin Between Ribs (A)	Perm. Set	Mid-Span (B)	Perm. Set	Mid-Span (C)	Perm. Set
RZ 5.6	60						
7	60	.02	0.0	.02	0	.13	.00
14	60	.03	.01	.03	0	.23	.00
21	60	.04	.00	.04	0	.27	.01
28	60	.05	.00	.05	0	.32	.01
35	60	.06	.01	.06	0	.37	.01
42	60	.06	.00	.07	0	.41	.01

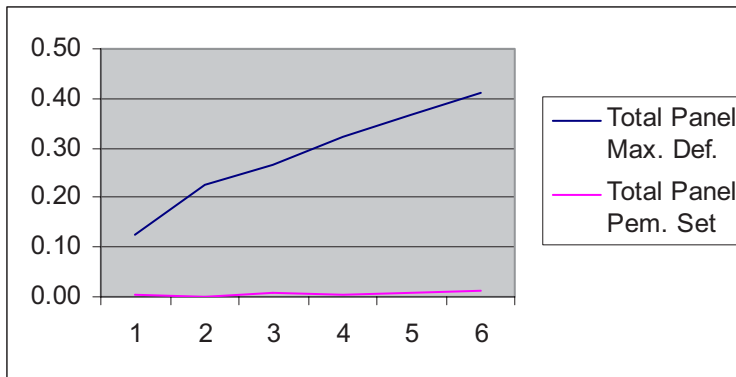
Deflections in inches

Pressure Increments	Time (sec)	Mid Span (D)	Perm Set	End Span Purlin mid panel (E)	Perm. Set	Total Panel Deflection	Total Panel Perm. Set
RZ 5.6	60						
7	60	.02	.0	.02	.0	.13	.00
14	60	.04	.0	.03	.0	.23	.00
21	60	.04	0	.04	.1	.27	.01
28	60	.05	0	.05	0	.32	.01
35	60	.06	0	.07	.0	.37	.01
42	60	.07	0	.10	.02	.41	.01

***Note:** RZ (Reference Zero pressure) is to compensate for vertical test position.

Note: C indicator reading is used as Total Panel Deflection and Permanent Set.

Positive Side Graph



Observations: Deflections increased as pressure increased. No fastener failure occurred.

Deflections in inches

Pressure Increments psf Negative	Time (sec)	End Purlin Between Ribs (A)	Perm. Set	Mid-Span (B)	Perm. Set	Mid-Span (C)	Perm. Set
*RZ 5.6	60	0					
7	60	.01	0.0	.08	.05	.34	.10
14	60	.01	.00	.17	.07	.68	.13
21	60	.01	.01	.25	.10	.88	.19
28	60	.04	.03	.32	.14	1.08	.22
35	60	.06	.04	.40	.17	1.2	.23

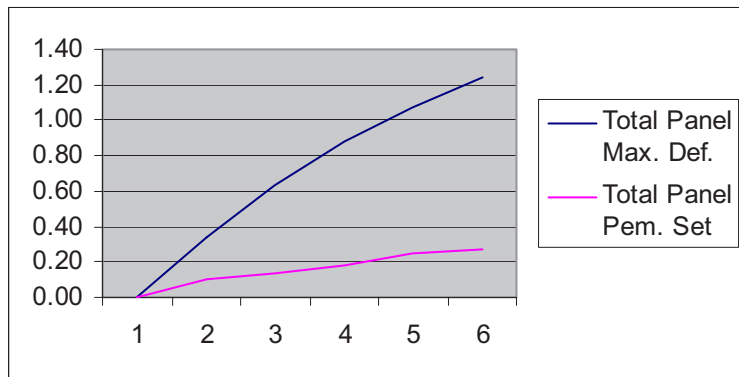
Deflections in inches

Pressure Increments psf Negative Pressure Increments	Time (sec)	Mid Span (D)	Perm Set	End Span Purlin mid panel (E)	Perm. Set	Total Panel Deflection	Total Panel Perm. Set
*RZ 5.6	60	0.0"	0.0"	0.0"	0.0"	0.0"	0.0"
7	60	.10"	.04"	.40"	.10"	.34	.10"
14	60	.21"	.02"	.82"	.26"	.68	.13"
21	60	.31"	.12"	1.10	.32"	.88	.19"
28	60	.40"	.16"	1.34"	.39"	1.08	.22"
35	60	.47"	.14"	1.52"	.42"	1.2	.23"

*Note: RZ (Reference Zero pressure) is to compensate for vertical test position.

Note: C indicator reading is used as Total Panel Deflection and Permanent Set.

Negative Side Graph



Observations- Deflections increased as pressure increased. The panels failed while starting to raise pressure to 42 psf. The panels separated from the clips and the screws along the edge of the specimen pulled through the panel.

Specimen B

Deflections in inches

Pressure Increments psf Positive	Time (sec)	Purlin Mid Panel (A)	Perm. Set	Mid-Span (B)	Perm. Set	Mid-Span (C)	Perm. Set
*RZ 5.6	60						
12	60	.04	.02	.01	.01	.05	.02
24	60	.05	.02	.02	.01	.07	.02
36	60	.05	.01	.02	.01	.09	.02
48	60	.06	.02	.03	.01	.10	.02
60	60	.07	.01	.03	.01	.11	.02
72	60	.07	.01	.04	.01	.13	.02

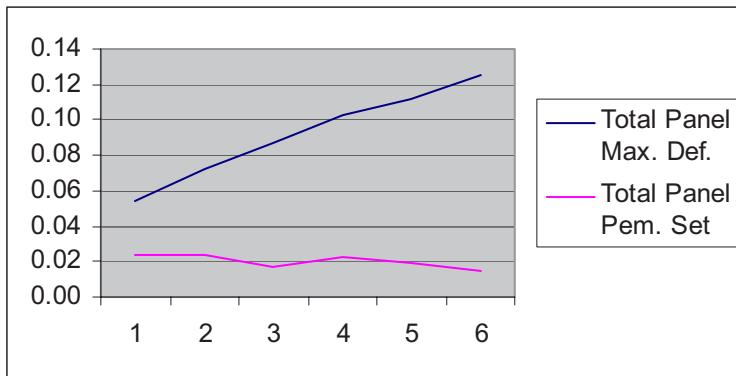
Deflections in inches

Pressure Increments psf Positive	Time (sec)	Mid Span (D)	Perm Set	Purlin Mid Panel (E)	Perm. Set	Total Panel Deflection	Total Panel Perm. Set
*RZ 5.6	60						
12	60	.00	.00	.07	.04	.05	.02
24	60	.01	.00	.10	.04	.07	.02
36	60	.01	.00	.11	.04	.09	.02
48	60	.02	.00	.12	.05	.10	.02
60	60	.02	.00	.13	.05	.11	.02
72	60	.03	.00	.13	.04	.13	.02

*Note: RZ (Reference Zero pressure) is to compensate for vertical test position.

Note: C indicator reading is used as Total Panel Deflection and Permanent Set.

Positive Side Graph



Deflections in inches

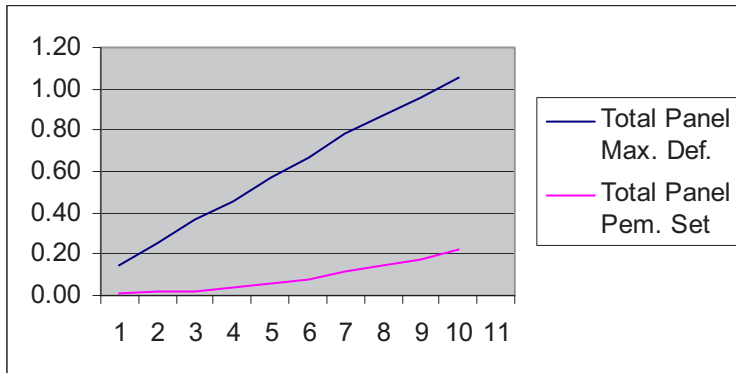
Pressure Increments psf Negative	Time (sec)	Purlin Mid Panel (A)	Perm. Set	Mid-Span (B)	Perm. Set	Mid-Span (C)	Perm. Set
*RZ 5.6	60						
21	60	.16"	.04"	.02"	.02"	.14"	.01"
42	60	.28"	.06"	.04"	.02"	.26"	.02"
63	60	.40"	.08"	.08"	.02"	.37"	.03"
84	60	.49"	.10"	.12"	.04"	.46"	.04"
105	60	.60"	.11"	.16"	.05"	.57"	.06"
126	60	.69"	.13"	.20"	.06"	.67"	.08"
147	60	.81"	.17"	.24"	.08"	.78"	.12"
168	60	.89"	.20"	.28"	.09"	.87"	.15"
189	60	.97"	.21"	.32"	.10"	.96"	.17"
210	60	1.07"	.25"	.37"	.12"	1.06"	.22"

Deflections in inches

Pressure Increments psf Negative	Time (sec)	Mid Span (D)	Perm Set	Purlin Mid Panel (E)	Perm. Set	Total Panel Deflection	Total Panel Perm. Set
*RZ 5.6	60						
21	60	.02"	.01"	.13"	.01	.14"	.01"
42	60	.06"	.02"	.24"	.02"	.26"	.02"
63	60	.16"	.03"	.34"	.03"	.37"	.03"
84	60	.17"	.05"	.42"	.05"	.46"	.04"
105	60	.24	.09"	.53"	.07"	.57"	.06"
126	60	.34"	.11"	.63"	.08"	.67"	.08"
147	60	.40"	.14"	.74"	.12"	.78"	.12"
168	60	.44"	.15"	.83"	.15"	.87"	.15"
189	60	.48"	.17"	.90"	.18"	.96"	.17"
210	60	.53"	.19"	1.00"	.22"	1.07"	.22"

***Note:** RZ (Reference Zero pressure) is to compensate for vertical test position.
Note: C indicator reading is used as Total Panel Deflection and Permanent Set.

Negative Side Graph



Observations- Deflections increased as pressure increased. No fastener failure occurred.

Note: 2 mil polyethylene film was used for the ASTM 1592 test, it is the opinion of the undersigned that it had no influence on the results of the test.

Observers-

Keith Owen / ATL
Eddie Lance, Josh Thomas / ATL
Jeremiah Buecher / Metal Roofing Systems
Andy Sigmon / Metal Roofing Systems
Brian Thompson / Metal Roofing Systems
David W. Johnson, P.E

Keith Owen, Lab Manager
American Test Lab, Inc.

Keith Owen
6/21/12

All Tests Witnessed and Certified by:

David Johnson P. E.
1656 Calvert Rd.
Brevard, NC 28712
Florida P.E. # 00061915

Engineer Seal And Signature

David Wesley Johnson
4/21/12



Certificate of Independence: The witnessing engineer has no equity interest in American Test Lab of North Carolina, Metal Roofing or their parts vendors. Witnessing engineer is in complete compliance of Florida Statue 9B-72, Section 72.110

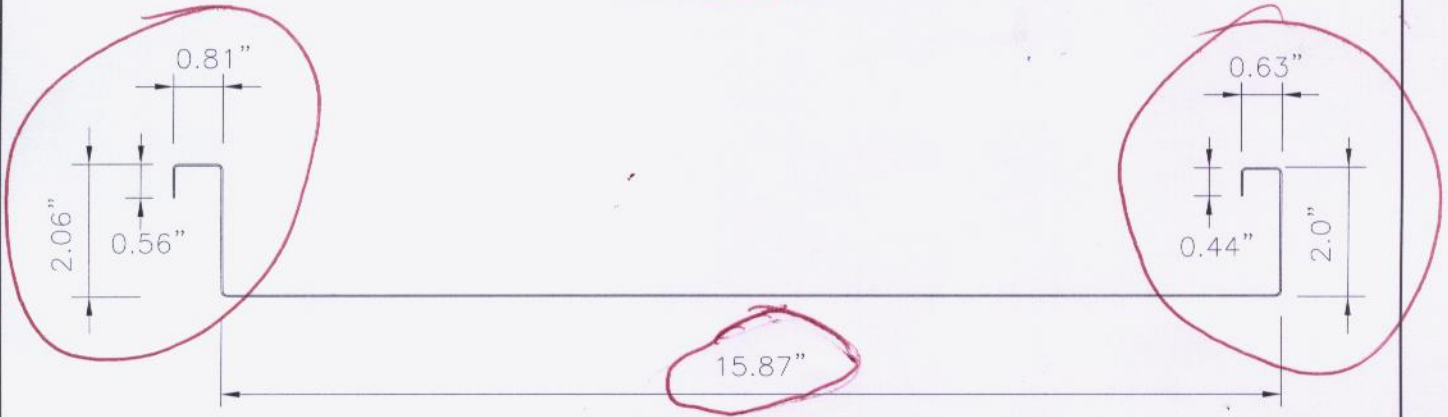
Disclaimer:

ATL and its staff have no equity interest in any product tested or installed. This test report was prepared by American Test Lab, North (ATL) for the exclusive use of the above named client; it does not constitute certification of this product. The results are for that particular specimen tested and does not imply the quality of similar or identical products manufactured or installed from specifications identical to the tested product. ATL is a testing lab and assumes that all information provided by the client is accurate and does not guarantee or warranty any product tested or installed. This report may not be reproduced except in full, and only under expressed permission from American Test Lab or Metal Roofing System. Reproduced reports in hard copy must be labeled "Copy".

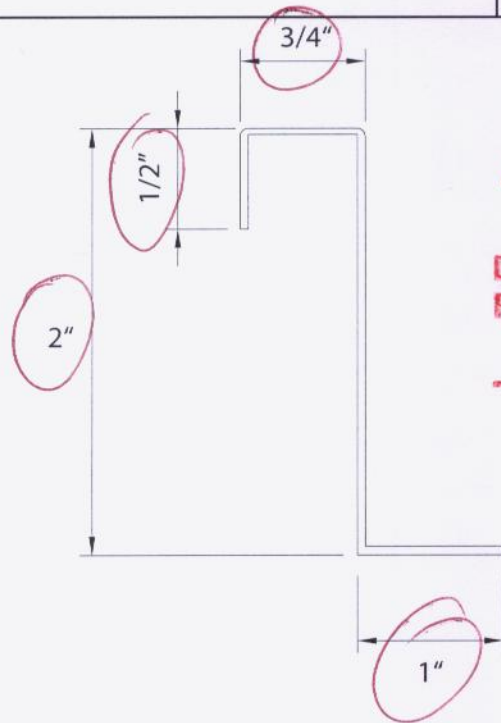
**AMERICAN TEST LAB
NORTH**

DATE 6/21/12
REPORT NO. ATLNC 0522.01-12

Keith Owen
ATL INSPECTOR



24 GA. SYSTEM 2500 SSMR PANEL

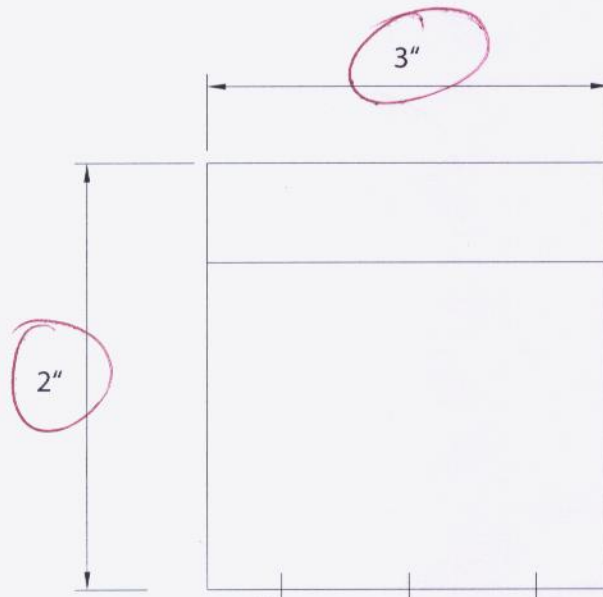


**AMERICAN TEST LAB
NORTH**

DATE 6/22/12
REPORT NO. ATLNC 052201-12

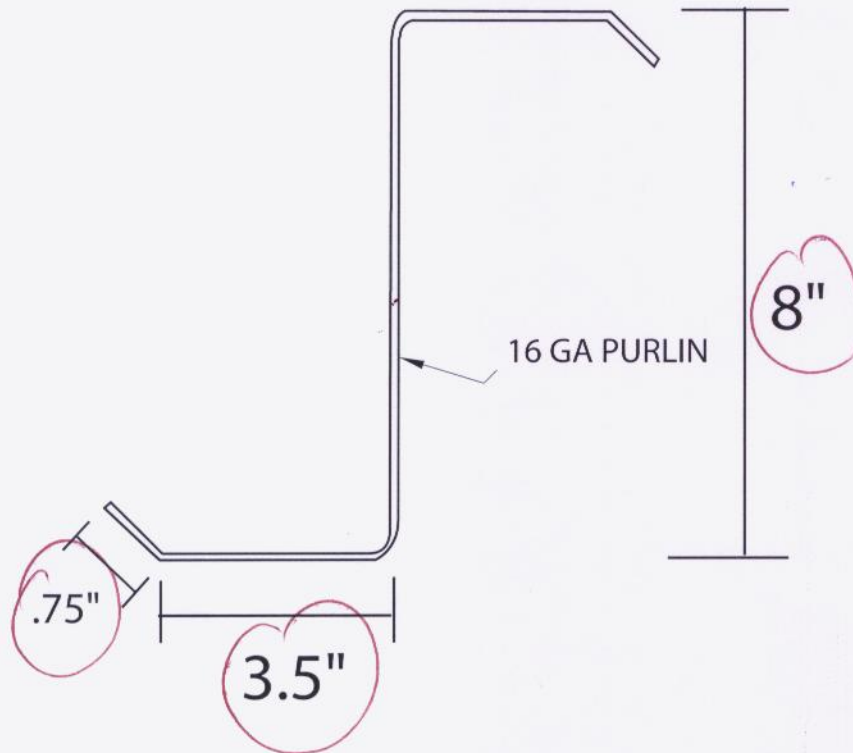
Keith Owen
ATL INSPECTOR

CLIP, SIDE VIEW



FASTENER HOLES

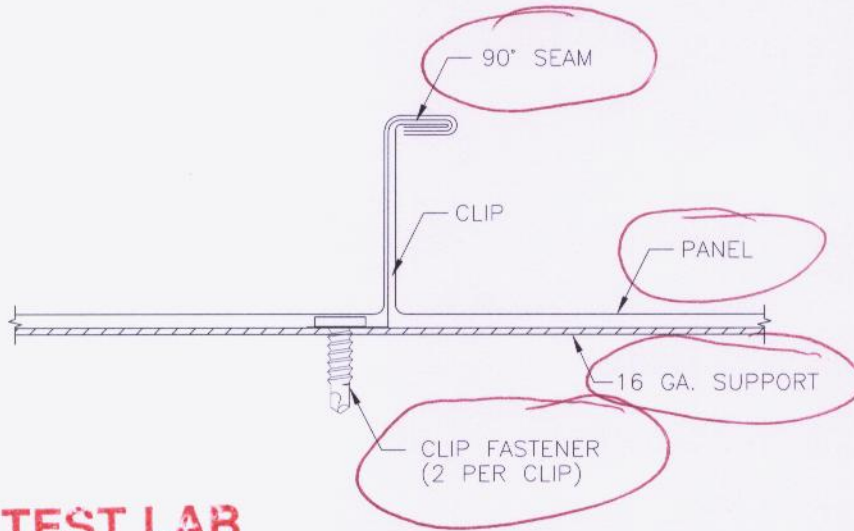
CLIP FRONT VIEW
SYSTEM 2500 CLIP



**AMERICAN TEST LAB
NORTH**

DATE 6/21/12
REPORT NO. ATLNC 0522.01-12

Kurt Owen
ATL INSPECTOR



AMERICAN TEST LAB

NORTH

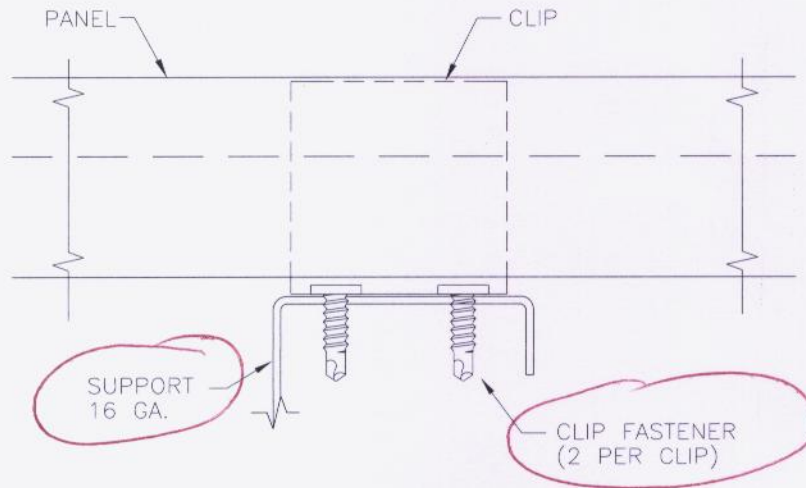
DATE 6/21/12

CLIP SECTION VIEW

REPORT NO. ATLNC 0522.01-12

Keith Owen

ATL INSPECTOR



CLIP SIDE VIEW

Attachment Clips

Roof Panel Clips

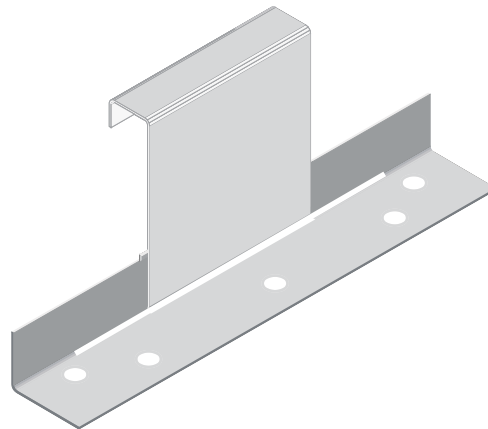
THE STRUCTURAL INTEGRITY OF THE SUPPORTING STRUCTURE AND/OR SUBSTRATE'S CAPACITY TO RECEIVE IMPARTED LOADS BY THE METAL ROOFING SYSTEM IS NOT ANALYZED BY METAL ROOFING SYSTEMS, INC. AND IS THE RESPONSIBILITY OF THE OWNER, OWNER'S REPRESENTATIVE, OR DESIGN PROFESSIONAL, WHICHEVER IS APPLICABLE.

IMPORTANT NOTE:

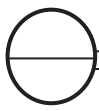
ALL FLASHING AND TRIM TO BE FORMED PER "MRS" APPROVED SHOP DRAWINGS IN ORDER TO VALIDATE WEATHERTIGHT WARRANTY.

Floating Panel Clip

Base fabricated from 18 ga Galvanized Steel.
Upper tab fabricated from 22 ga Galvanized Steel.



Fasteners



Roof Fastener Usage

#10 Type A: Pancake Head
2/2 Quadrex Drive
Metal to wood



#10 Self-Drill: Pancake Head
2/2 Quadrex Drive
Metal to metal
Min projection: 3/8" of threads
below substrate



Head Height: .080 – .068
Head Dia: .447 – .423
Thread Major Dia: .194 – .188
Thread Minor Dia: .133 – .126

Strength (lbs ult.):	Carbon	Stainless
Tensile:	1825	1653
Torsional:	48 in-lbs	50 in-lbs
Shear:	1535	1587

#10 Type A, Pull-out (lbs ult.):

SPF wood:
1" penetration: 821

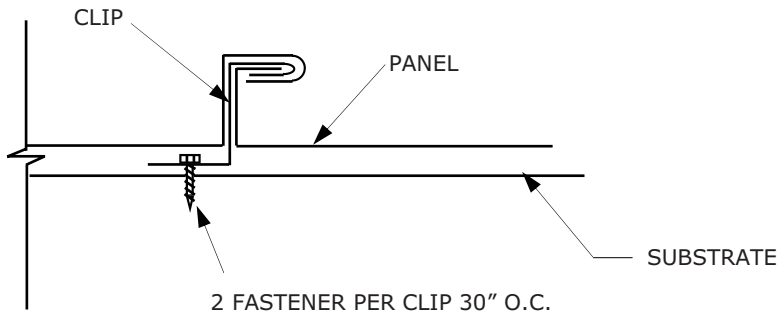
#10 Self Drill, Pull-out (lbs ult.):

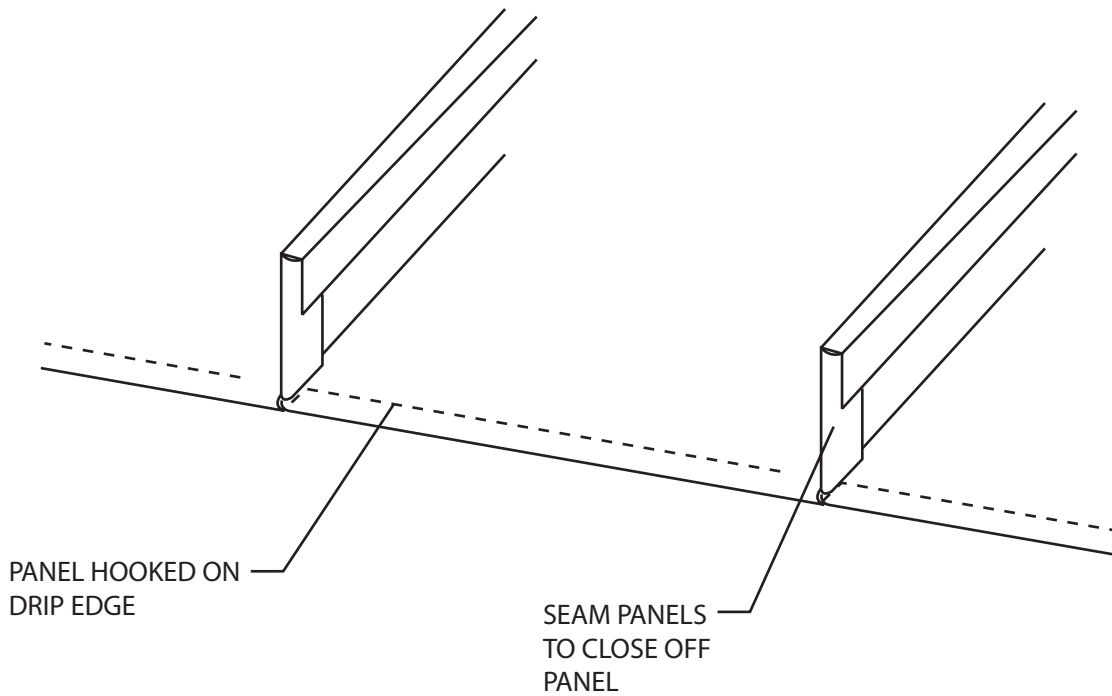
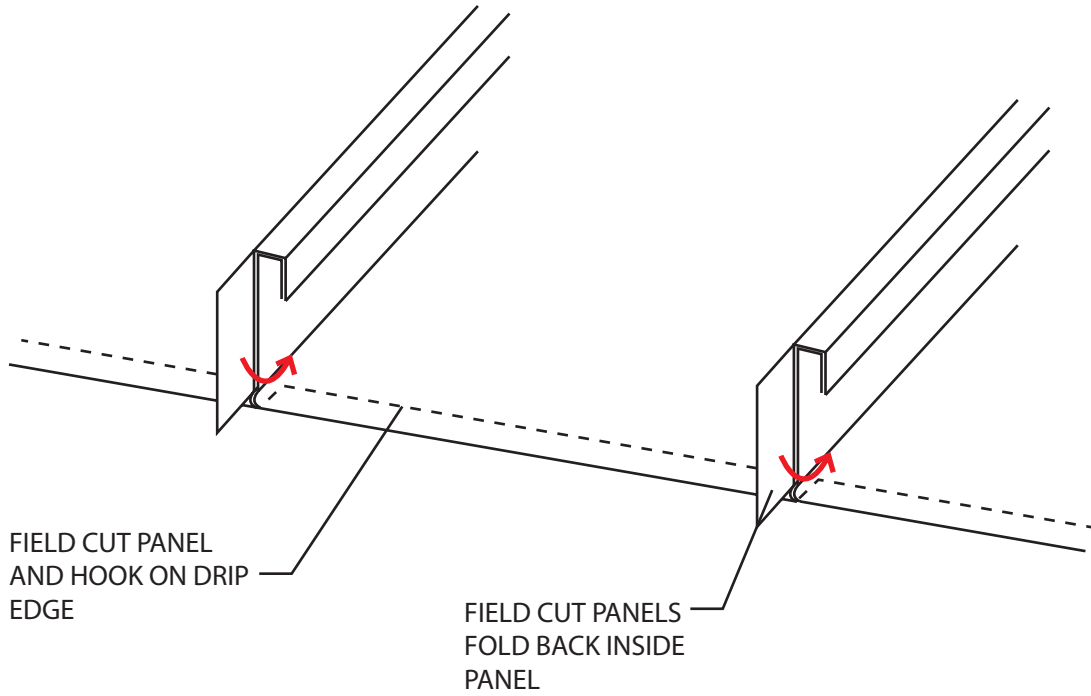
12 ga (.105): 1782
14 ga (.075): 1072
16 ga (.060): 782

Typical Details



WITH STRESS RIBS





7670 Mikron Drive
Stanley, NC 28164
704-820-3110

SUBJECT: PANEL SEAM EAVE CLOSE OFF

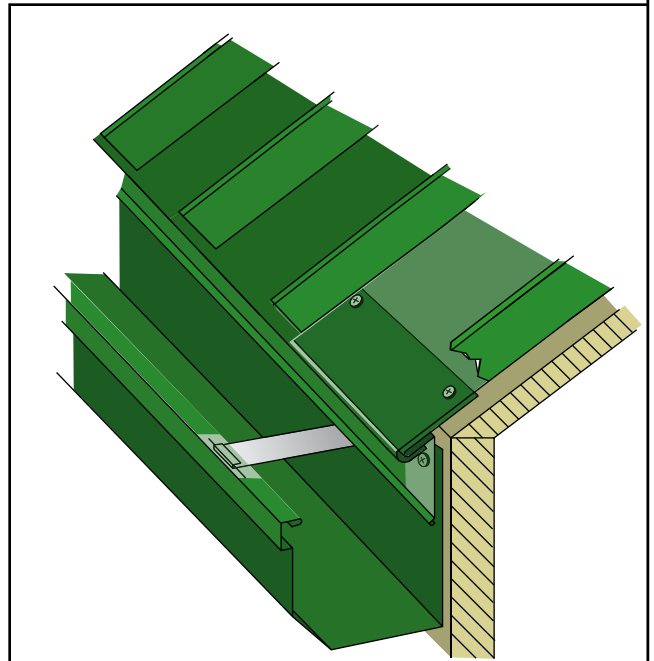
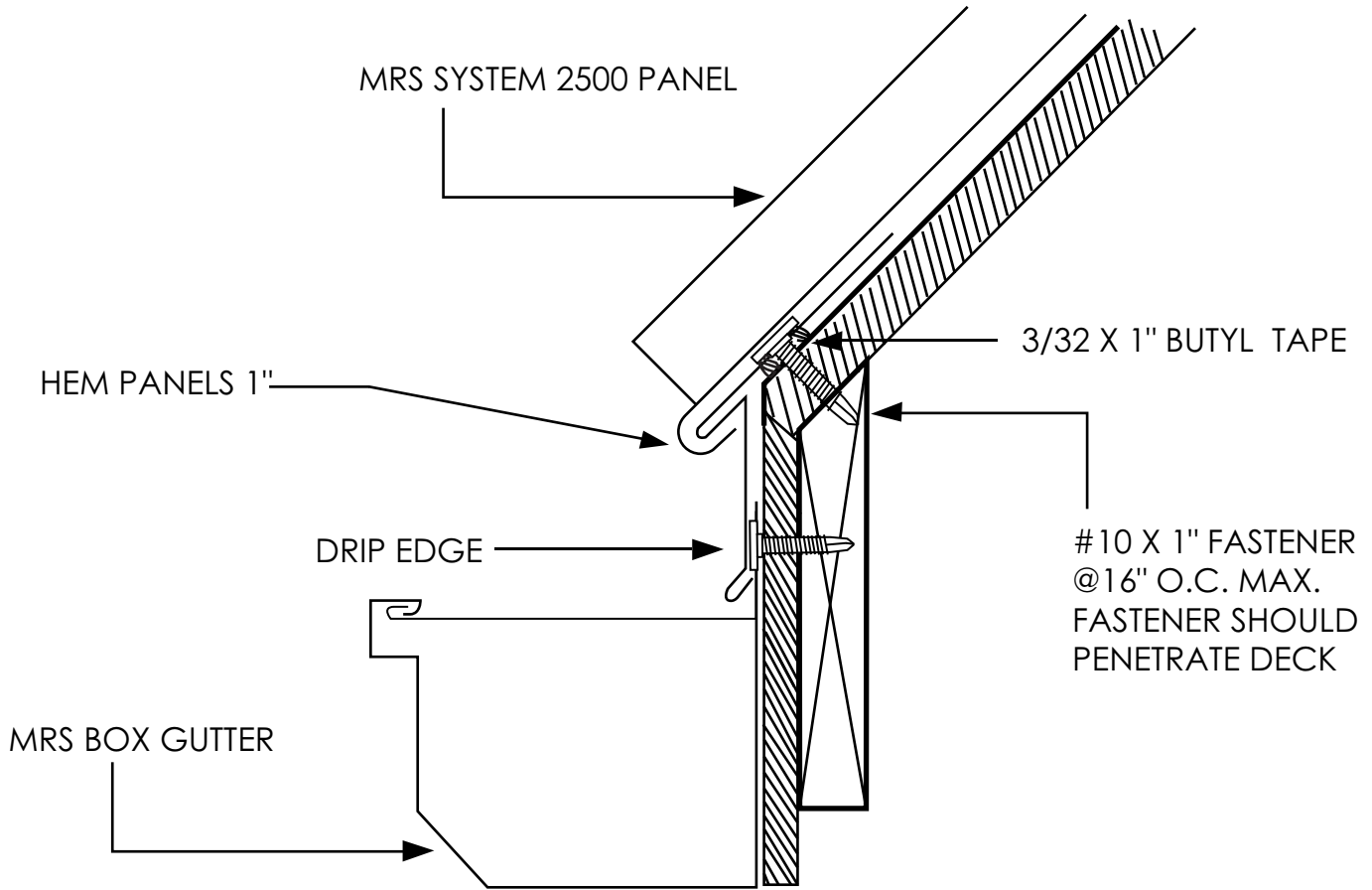
SYSTEM:


DATE:

SCALE: NONE

REV:

DRAWING NO.



	7670 Mikron Drive Stanley, NC 28164 704-820-3110		SUBJECT: LOCKING EAVE FLASHING		DRAWING NO. 3
			SYSTEM: MRS SYSTEM 2500		
	DATE:	SCALE: NONE	REV:		

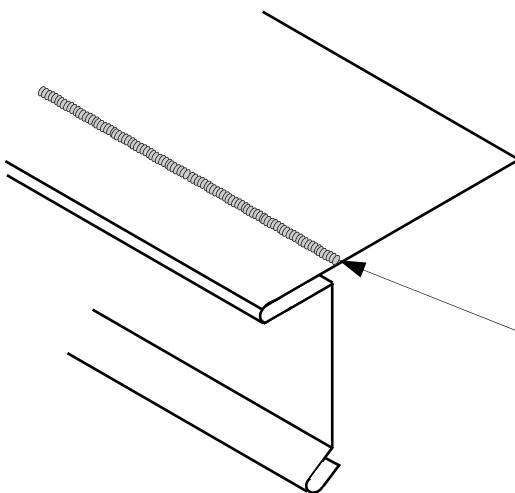
EAVE FLASHING. SEE
DETAIL BELOW FOR
CAULKING PATTERN

HAND CRIMP &
CAULK 10". SEE
DRAWING 2

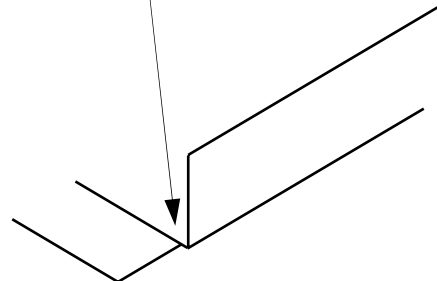
CLEAT IF EAVE FLASHING
FACE IS MORE THAN 4" OR
EXTREME CONDITIONS.

#10-13 X 1"
FASTEN 12" O.C.

FIELD NOTCH 1" AND HEM
UNDER DRIP.



1 BEAD OF CONTINUOUS SEALANT OR TAPE ON DRIP



7670 Mikron Drive
Stanley, NC 28164
704-820-3110

SUBJECT: LOCKING EAVE FLASHING

SYSTEM: **MRS SYSTEM 2500**

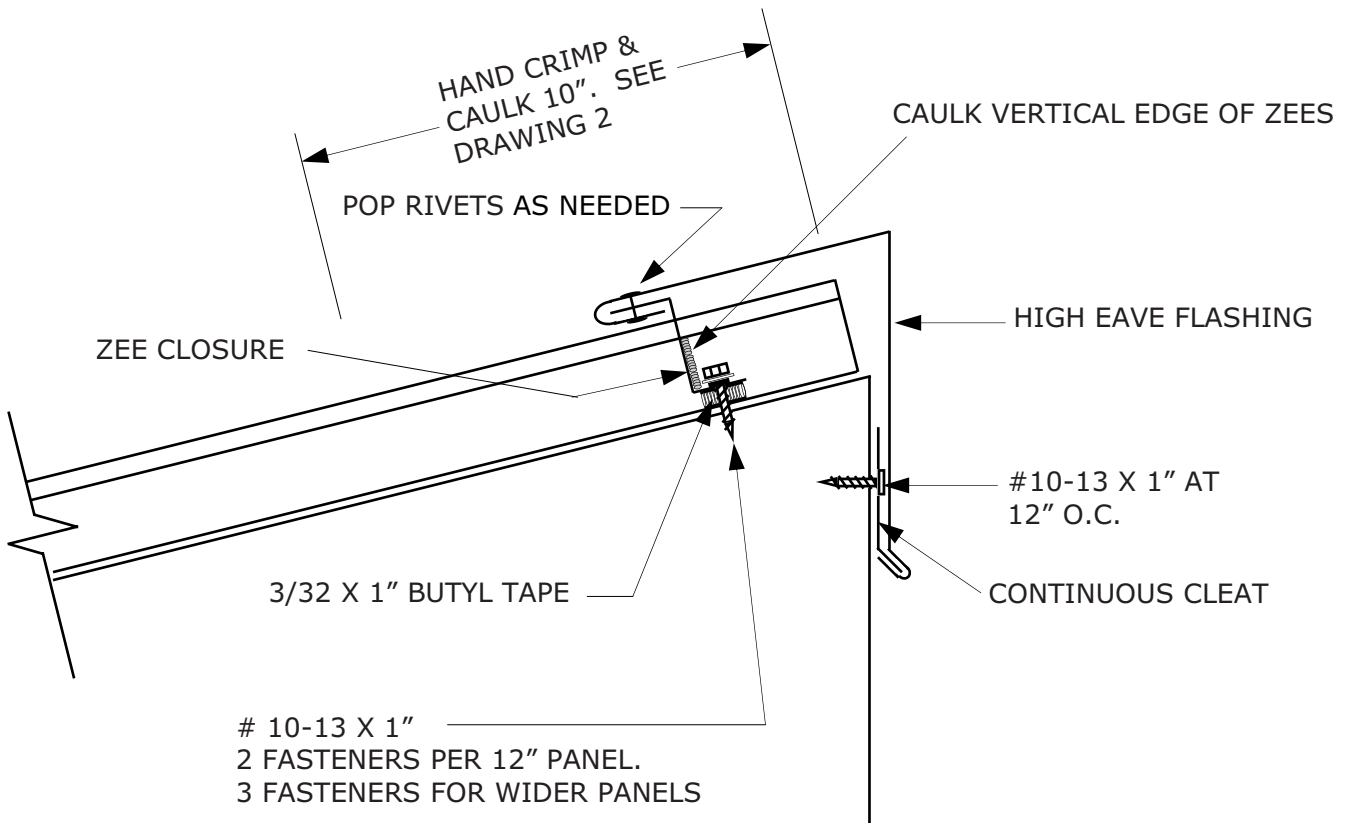
DATE:

SCALE: NONE

REV:

DRAWING
NO.

4



METAL ROOFING
 Systems, Inc

7670 Mikron Drive
 Stanley, NC 28164
 704-820-3110

SUBJECT: HI— EAVE FLASHING

SYSTEM: **MRS SYSTEM 2500**

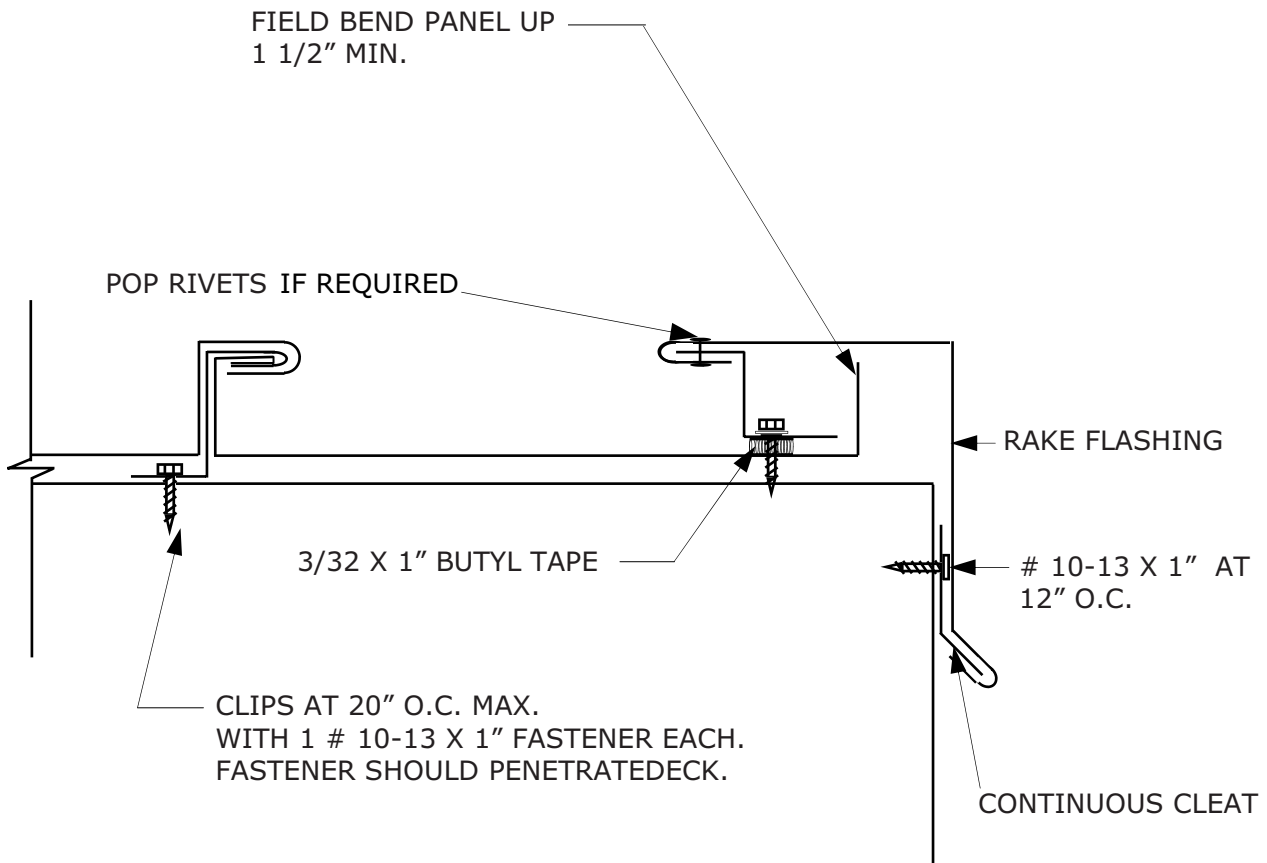
DATE:

SCALE: NONE

REV:

DRAWING
 NO.

5



METAL ROOFING
Systems, Inc

7670 Mikron Drive
Stanley, NC 28164
704-820-3110

SUBJECT: RAKE — GABLE FLASHING

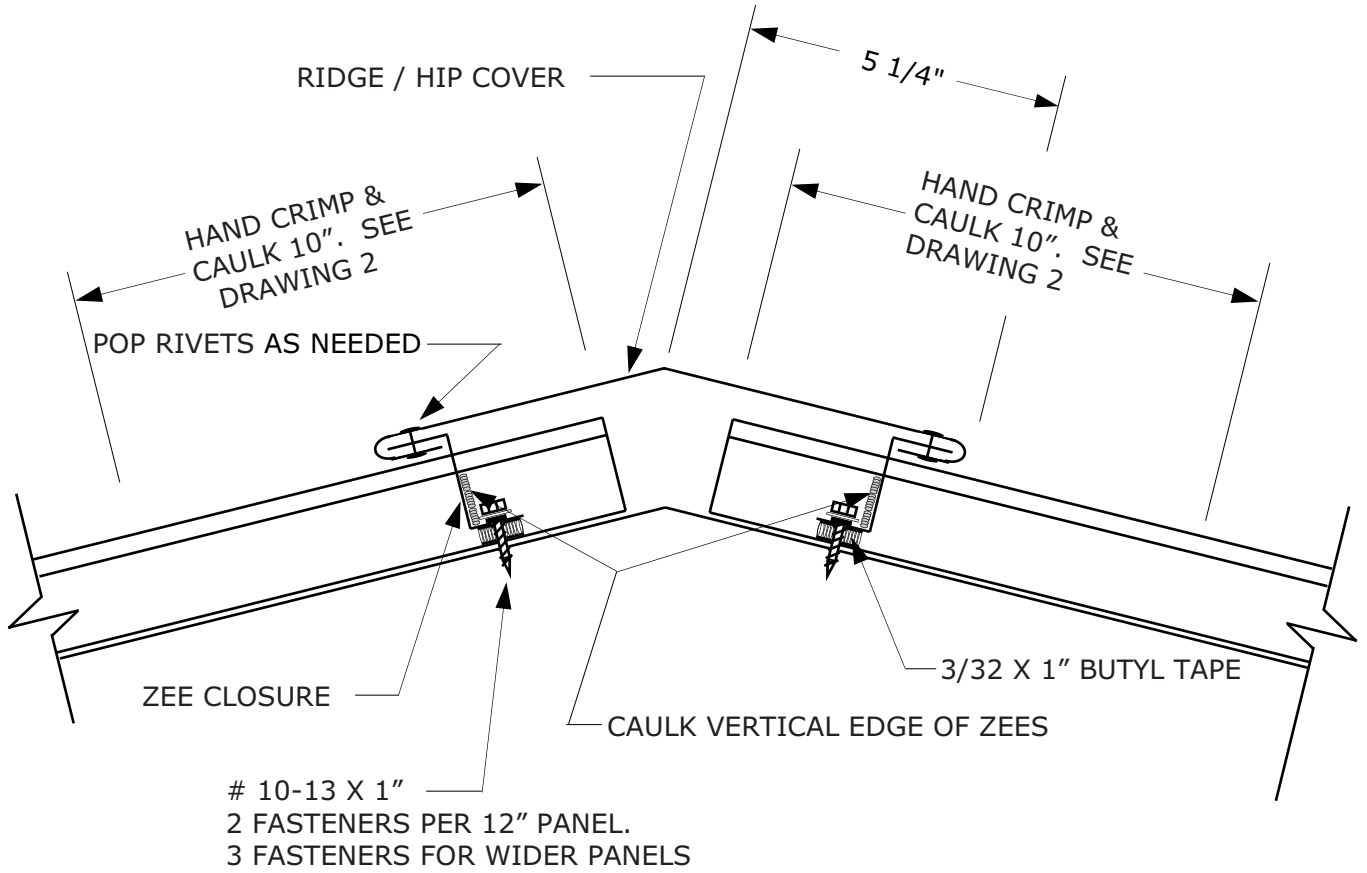
SYSTEM: **MRS SYSTEM 2500**

DATE:

SCALE: NONE

REV:

DRAWING
NO
6



METAL ROOFING
Systems, Inc

7670 Mikron Drive
Stanley, NC 28164
704-820-3110

SUBJECT: RIDGE / HIP COVER

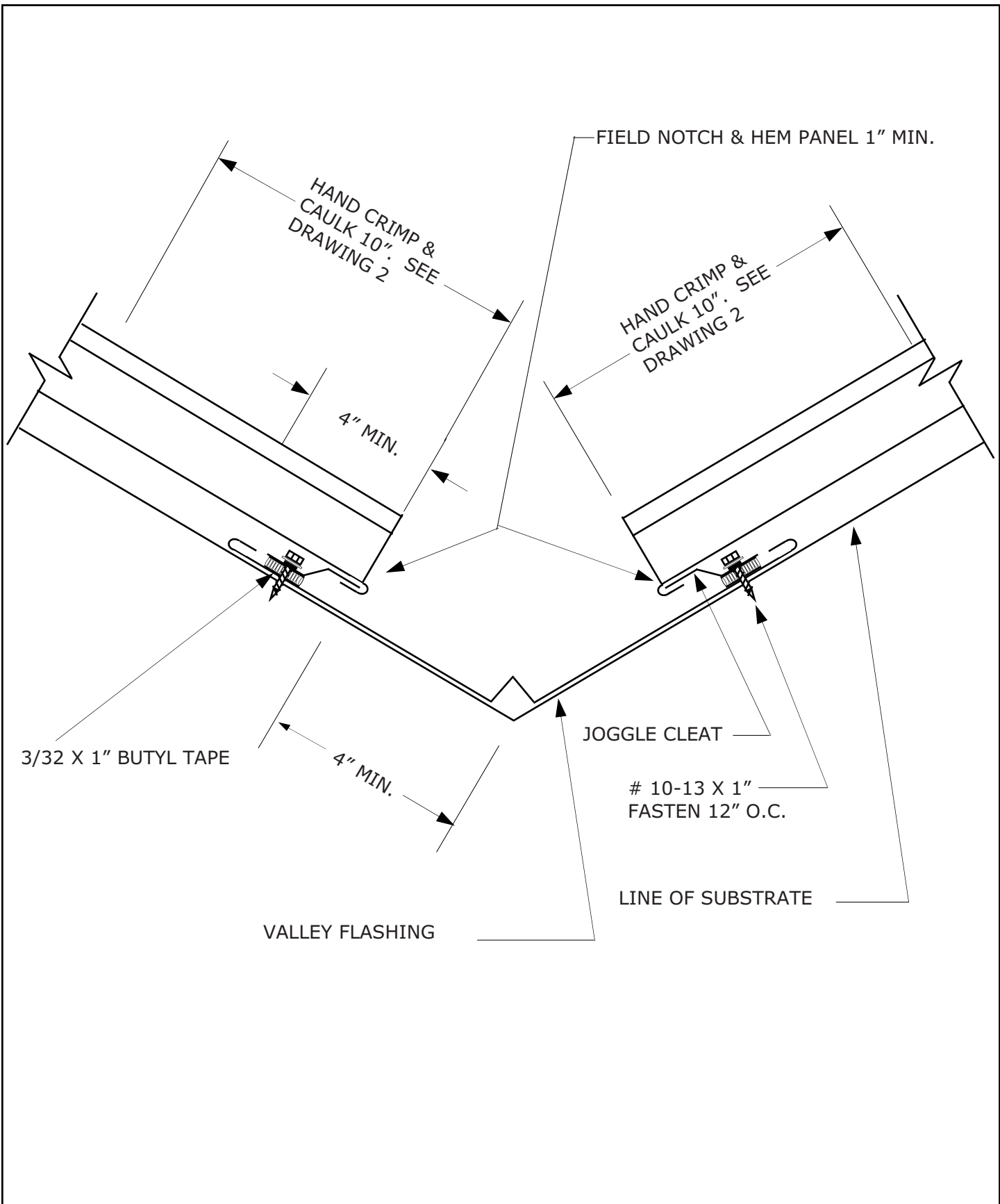
SYSTEM: **MRS SYSTEM 2500**

DATE:

SCALE: NONE

REV:

DRAWING NO.
7



7670 Mikron Drive
 Stanley, NC 28164
 704-820-3110

SUBJECT: FLOATING VALLEY

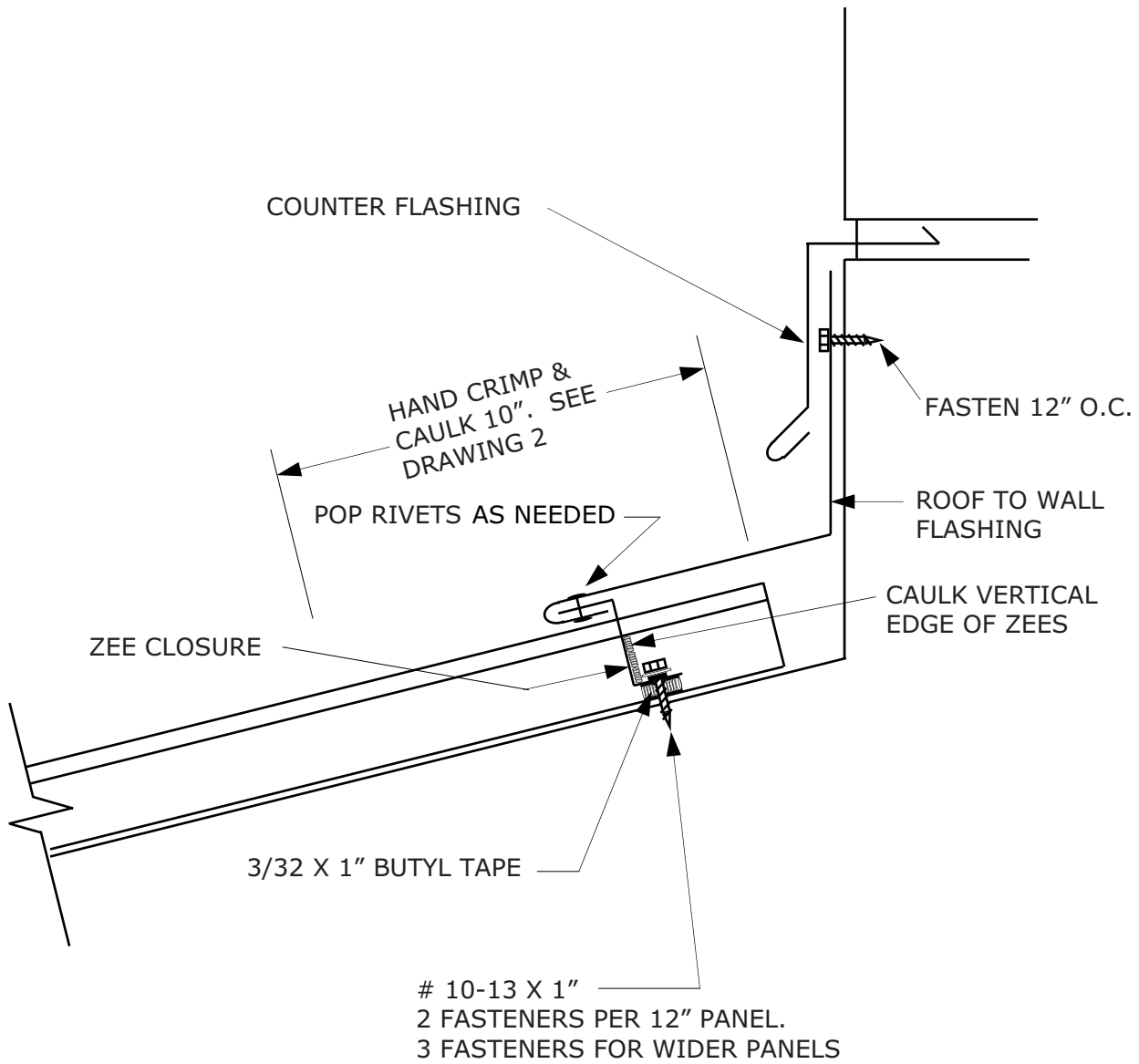
SYSTEM: **MRS SYSTEM 2500**

DATE:

SCALE: NONE

REV:

DRAWING NO.
8



METAL ROOFING
Systems, Inc

7670 Mikron Drive
Stanley, NC 28164
704-820-3110

SUBJECT: HEADWALL FLASHING

SYSTEM: **MRS SYSTEM 2500**

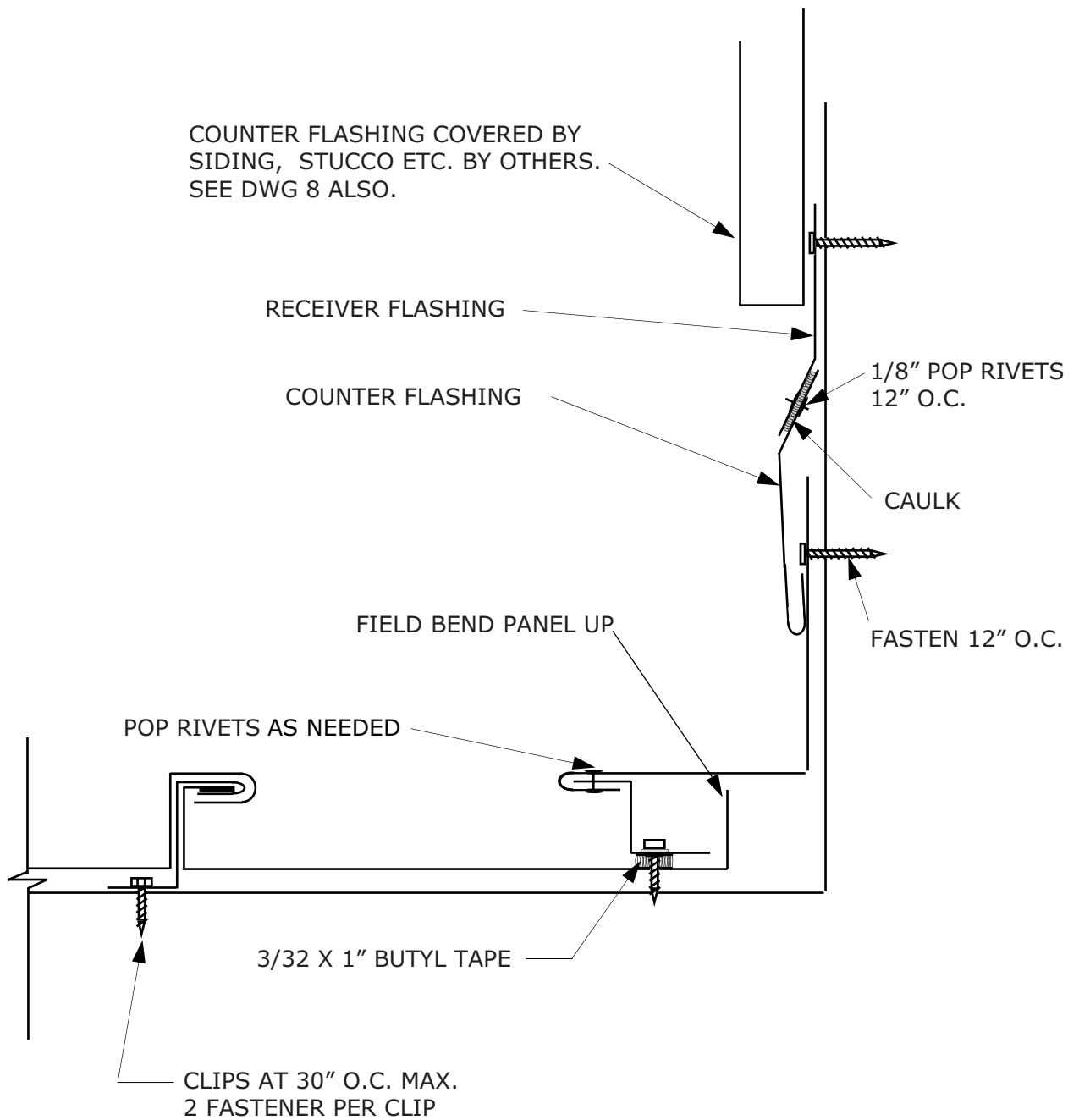
DATE:

SCALE: NONE

REV:

DRAWING NO.

9



METAL ROOFING
Systems, Inc

7670 Mikron Drive
Stanley, NC 28164
704-820-3110

SUBJECT: SIDEWALL FLASHING

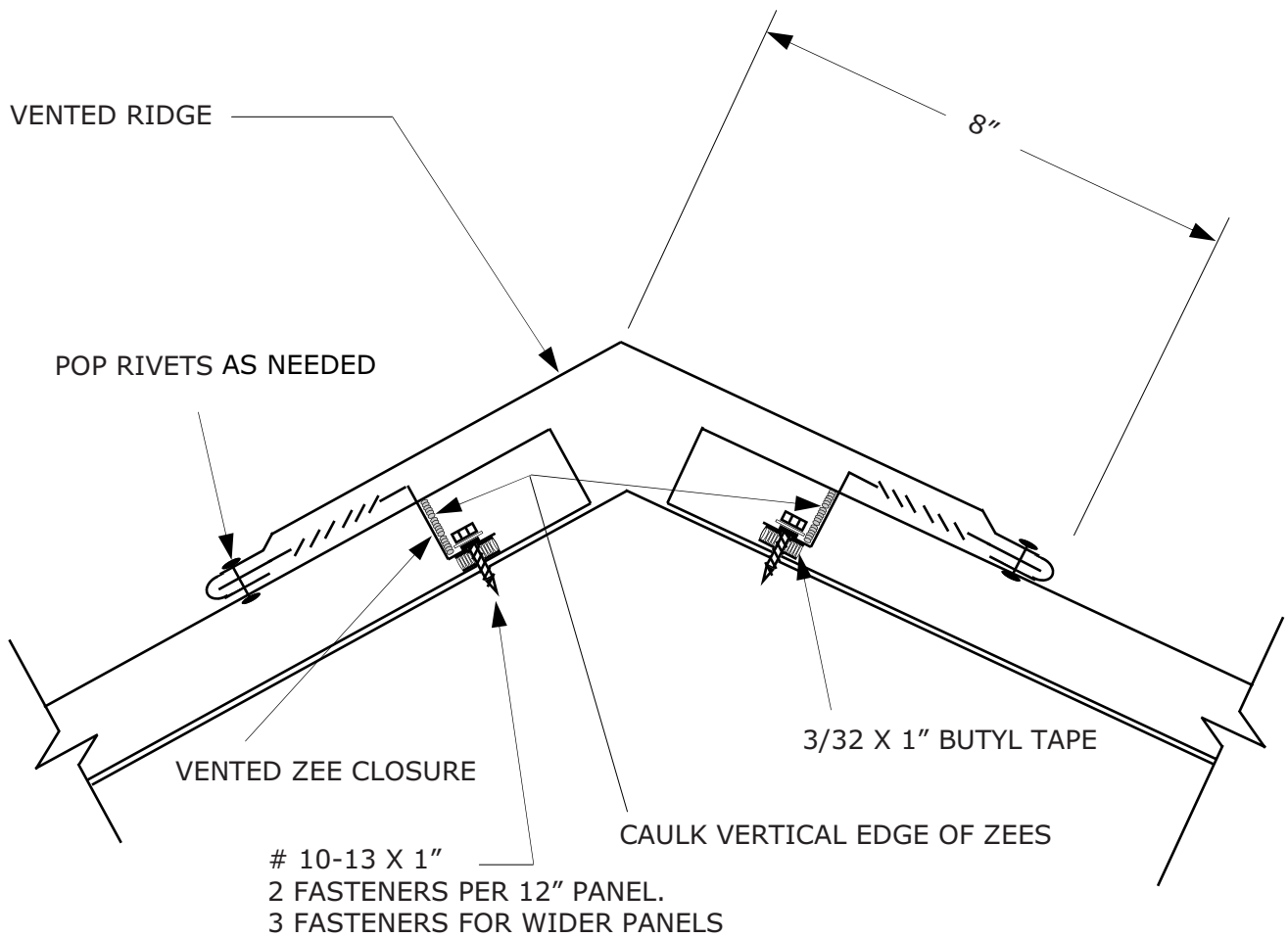
SYSTEM: **MRS SYSTEM 2500**

DATE:

SCALE: NONE

REV:

DRAWING
NO
10



METAL ROOFING
Systems, Inc

7670 Mikron Drive
Stanley, NC 28164
704-820-3110

SUBJECT: VENTED RIDGE

SYSTEM: **MRS System 2500**

DATE:

SCALE: NONE

REV:

DRAWING
NO.

11

Sealants



WeatherMaster Metal Roof Sealant

Titebond® WeatherMaster™ Metal Roof Sealant is specifically formulated to outperform all other sealant technologies, including silicones, tri-polymers, and polyurethanes. This superior polymer formula provides a waterproof seal against water, wind, dust and dirt. It offers exceptional adhesion to Kynar™ coated metal materials, along with standard metal, aluminum, steel, galvanized bonderized surfaces, plastics and glass. The product is ideal for use on a wide variety of metal roof, trim, architectural metal siding, aluminum, galvanized steel, galvanized gutters, flashing and downspouts. It also provides unbeatable adhesion to wood, brass and other common building substrates.

Titebond WeatherMaster Metal Roof Sealant is available in over 50 colors, all of which match today's popular metal roof and metal siding colors, regardless of the material or manufacturer. If touch-ups are necessary, it is paintable in one hour after application. It extrudes in extreme weather conditions (down to zero degrees Fahrenheit) and is UV-resistant, making it the ideal choice for exterior applications. It will expand and contract with the change of weather and temperature and will not crack. This sealant contains no solvents or isocyanates and is VOC-compliant.

Meets or exceeds the requirements of:

Passes ASTM C920, Type S, Grade NS, Class 50, Use NT, M, T, G and A

ASTM C510, ASTM C639, ASTM C661, ASTM C679, ASTM C717, ASTM C719, ASTM C793, ASTM C794, ASTM C1183, ASTM C1193, ASTM C1246, ASTM D412, ASTM D624 and ASTM G155.

Passes Federal Specification TT-S-00230C, Type II, Class A

Passes CAN/CGSB-19 13-M87, Classification MCG-2-25-A-N, No.81026

AAMA 808.3-92 Exterior Perimeter and AAMA 802.3-92 Type II Back-Bedding Compound and

USDA approved for use in meat and poultry areas



Product Features

- Outperforms VOC solvent, silicone, tripolymer and polyurethane sealants
- Adheres to Kynar™ coated metals
- Applies easily in extreme weather conditions
- Excellent adhesion to most common building materials
- Permanently flexible and watertight seal
- UV-resistant / non-yellowing
- VOC-compliant

Physical Properties

Type: Advanced polymer (reactive) **Calculated VOC (less water):** 9 g/L (<2% wt.)
State : Medium-viscosity caulk **Weight/gallon :** 13.85 lbs.
Color : Over 50 colors **Flashpoint :** > 200°F.
Solids : 99% **Freeze/thaw stability :** Stable
Viscosity : 500,000 **Storage life :** More than 12 months in tightly closed containers @ 75°F (24°C)

Coverage (maximum): Approximate length of bead according to bead diameter:

Container	1/4" bead	3/8" bead	1/2" bead
10.1 oz. Cartridge	31 ft.	13.5 ft.	7.5 ft.
20 oz. Sausage Pack	61 ft.	27 ft.	15 ft.

Application Guidelines

Application Temperature Above 0°F.

Service Temperature Range -75°F. to 300°F.

Method of Application Cartridge/caulking gun, bulk/sausage gun

Tooling Time For a 1/4" bead, approximately 20-40 minutes, depending on temperature and humidity.

Working Surfaces Surfaces must be clean down to the original substrate and free from any material that may deter adhesion. It is the sole responsibility of the user to thoroughly test any proposed use with all substrates to determine project suitability. To ensure neat sealant lines, mask areas adjacent to joints. Remove masking tape immediately once bead is tooled.

Cleanup Clean tools with isopropyl alcohol before it dries. Scrape dried excess. Follow solvent vendor's precautions.

Limitations

Air, caulk and surface temperature should be above 0°F (-18°C). WeatherMaster Metal Roof sealant may be painted anytime after one hour with exterior water-based paint. For other types of paints, a compatibility test is recommended. If joint depth exceeds 5/16", use backing material. Not designed for continuous submersion or use below the waterline. For questions, please call our Help Line 1-800-347-4583 or visit us at titebond.com.

Caution Statements

CAUTION: EYE AND SKIN IRRITANT. Do not swallow. Do not allow eye contact or prolonged skin contact. **First Aid:** If swallowed, do not induce vomiting; contact physician. If eye contact occurs, flush with water for 15 minutes. Wash skin contact areas with soap and water. If irritation from eye or skin contact areas persists, contact physician. Product releases methanol during cure. For additional information, refer to Material Safety Data Sheet. **KEEP OUT OF THE REACH OF CHILDREN.**

Tacky Tape®

SM5227

Metal Building Sealant

TECHNICAL DATA

PRODUCT DESCRIPTION:

Tacky Tape® is a 100% solids, asbestos-free butyl tape sealant that is a highly rubbery, tacky, reinforced compound designed for sealing metal lap joints in the metal building industry. It is easy to apply and compress during installation. It exhibits excellent application and performance characteristics over a wide temperature range and will not become brittle, crack or flow during service. It is available in various sizes supplied in ready-to-use rolls and pre-cut endlap pads for standing seam roof (SSR) applications. It is also available in double and triple bead rolls and endlap pads.

TYPICAL USES:

Tacky Tape® is designed to seal and prevent the entry of dust, air and moisture and assure a weather tight seal in metal building details.

- Metal rib and end joints
- Standing seam roof endlaps
- Sealing roof curbs roof jacks and skylights
- Sealing polyethylene sheeting
- Sealing air conditioning equipment
- Window and door flanges

ADVANTAGES:

- Excellent for sealing Galvalume, Galvalume Plus, Zinalume and KNAR 500
- Adheres to oily Galvalume
- Will not corrode Galvalume, Galvalume Plus and KYNAR 500
- Meets ASTM and Federal Standards
- Non-staining
- Permanently flexible
- Resistant to ultraviolet and infrared radiations, precipitation atmospheric hydrocarbon contamination and extremes in temperature

APPLICATION:

Optimally, a clean dry uncontaminated surface is desired to obtain intimate adhesion, but realistically there are field situations that prevent complete control of surface conditions. Obviously, excessive oil, caked-on dirt, free standing water and ice or snow

must be removed before sealant tape is applied. This sealant tape can be applied in cold temperatures. Temperatures below 40°F (4.44°C) often promote the formation of condensation and frost substrates. These should be removed before the sealant tape is applied in order to achieve optimum performance. Remove condensation and other moisture with a clean dry cloth and isopropyl (IPA) alcohol. Follow this with a dry cloth wipe.

A light film of lubricant used in roll forming is usually present on unpainted surfaces, such as Galvalume and should not adversely affect the sealant tape performance. If excess lubricant is present wiping with a clean cloth should minimize it.

Position tape sealant on required seal area with release backing paper on top. The tape sealant should be positioned on the “wet”, or entry sides of the fasteners to prevent passage of dynamic weather elements. Using a smooth even hand motion; press the tape to the surface to make intimate contact without distorting the tape sealant. Avoid lapping the tape by butt joining tapes at transition points. Remove release-backing paper prior to mating adjoining surface and fastening. IF SEALANT TAPE IS IN DIRECT CONTACT WITH ANY OTHER SEALANT OR ELASTOMER, A COMPATIBILITY TEST MUST BE CONDUCTED PRIOR TO USE.

SM5227 is compatible with the following Schnee-Morehead products:

- Acryl-R SM5430 Non-Skinning SSR Sealant
- ACRYL-R SM5504 Narrow Joint Sealant
- ACRYL-R SM5522 Acrylic Sealant
- Permathane SM7100 and SM7108 Polyurethane Sealants

LIMITATIONS:

Not recommended for:

- For applications requiring continuous water submersion, consult Schnee-Morehead field sales representative.
- Joints that are not mechanically fixed.
- Do not apply sealant to wet or frost bearing surfaces. See application paragraph

TYPICAL PROPERTIES		
Property	Typical Values	Test Method
Specific Gravity:	1.47	ASTM D 792
Density:	13.54 Lbs./Gal. 1.62 Kg/Liter	SM Lab Test
Percent Solids:	100%	SM Lab Test
Peel Adhesion PIW (N/mm ²) / % Cohesive Separation		AAMA 800
Galvalume	16 (2.8) / 100	1/16" (0.158cm) thick
Anodized Aluminum	16 (2.8) / 100	
Mill Finish Aluminum	16 (2.8) / 100	
Polyvinylidene Fluoride	17 (2.8) / 100	
PVC Plastisol	17 (2.8) / 100	
Polyester	16 (2.8) / 100	
Siliconized Polyester	16 (2.8) / 100	
Tensile Adhesive Strength PSI (kPa) % Cohesive Separation	20 (138) 95	ASTM C 907
Yield Strength PSI (kPa)	8 (55)	ASTM C 908
% Elongation	>1000	ASTM C 908
Sag	None	AAMA 800
Vehicle Migration	Pass, <1/8" (<3.175mm)	AAMA 800
Water Resistance	No Effects	AAMA 800
Hardness (Shore 00)	50-60	AAMA 800
Crazing to Acrylic plastics	None	MIL-S-11030C
Cone Penetration (0.1mm) @77°F (25°C) @120°F (48.8°C) @0°F (-17.7°C)	85-100 125-135 45-55	ASTM D 217 300 g cone (5 Sec)
Application Temperature Range	-5°F to 120°F (-20°C to 49°C)	SM Lab Test
Service Temperature Range	-40°F to 200°F (-40°C to 93°C)	SM Lab Test
Color	Gray	Visual SM Test
Weatherability QUV, 340A lamp 1000 Hrs	Excellent, no cracking, chalking, wash-off or flow (sag)	SM Lab Test
6" Static Water Pressure	Pass – No Leakage	ASTM Proposed Test Method
Water Penetration	Pass – No leakage	ASTM E 1646
Air Leakage At 1.57 PSF	0.051 CFM/FT ² 0.068 CFM/FT ²	ASTM E 1680
At 6.24 PSF	0.1024 CFM/FT ² 0.1365 CFM/FT ²	
Shelf Life	18 months when stored at or below 100°F (38°C)	

SPECIFICATION COMPLIANCE:

AAMA 804.3
AAMA 807.3
Federal Specification TT-C-1796A, Type II, Class B
USDA Acceptable
UL Approval for SM5227 has been granted on sizes
up to and including 3/4" width x 1/4" thick

- Galvalume and Galvalume Plus are registered trade marks of BIEC International
- Zincalume is a registered trademark of BHP Steel
- KYNAR 500 is a registered trademark of Elf Atochem North America, Inc.
- Tacky Tape and Acryl-R are registered trademarks of Schnee-Morehead, Inc.

Refer to Material Safety Data Sheet (MSDS) for further information

For medical emergency only,
call Chem Trec 1-800-424-9300

EXCLUSION OF WARRANTIES: AS TO THE HEREIN DESCRIBED MATERIALS, SCHNEE-MOREHEAD®, INC. MAKES NO WARRANTIES, WHETHER EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. SINCE THE USE OF THE HEREIN DESCRIBED MATERIALS INVOLVES MANY VARIABLES IN METHODS OF APPLICATION, HANDLING AND/OR USE, THE USER IN ACCEPTING AND USING THESE MATERIALS ASSUMES ALL RESPONSIBILITY FOR THE END RESULT. THE PURCHASE OF THIS SCHNEE-MOREHEAD®, INC. PRODUCT IS SUBJECT TO THE TERMS AND CONDITIONS OF AN "AS IS" SALE, AND IF THE PRODUCT IS PROVED TO BE DEFECTIVE, THE EXCLUSIVE REMEDY, AT SCHNEE-MOREHEAD®, INC.'S OPTION, SHALL BE TO REPLACE THE DEFECTIVE SCHNEE-MOREHEAD®, INC. PRODUCT. SCHNEE-MOREHEAD®, INC. SHALL NOT OTHERWISE BE LIABLE FOR LOSS OF DAMAGES, WHETHER DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL, REGARDLESS OF THE LEGAL THEORY ASSERTED, INCLUDING NEGLIGENCE, WARRANTY OR STRICT LIABILITY.

Complete technical information is available from Schnee-Morehead® Inc. For technical assistance, customer service and general information, call **1-800-878-7876, 1-800-TRUSTSM**

SCHNEE-MOREHEAD®, INC.

An ITW Company
111 N. Nursery Road
Irving, TX 75060

972-438-9111 Fax: 972-554-3939

www.trustsm.com

Warranty



20-Year Watertightness Limited Warranty

Building Owner : _____ MRS Work Order Number _____

Building/Job Name: _____ Date Roof Completed _____

Building Location: _____ Contract Amount (MRS Materials): _____

Metal Roofing Systems, Inc. (hereinafter referred to as "MRS") and the Roofing Contractor/Installer whose signature appears below (hereinafter referred to as "Roofer") severally warrant [Roofer only for any matter arising during the first two years after completion of installation of the subject roof on the above referenced Building and MRS only for any matter first arising after the second anniversary of successful completion of installation of the subject roof but arising not later than the twentieth anniversary of such completion] to the above named Building Owner (hereinafter referred to as "Owner") that subject to each and every term(s), condition(s), limitation(s), allocation(s) of warranty, and responsibility(ies) stated herein, Roofer's workmanship on the above named building will be adequate to prevent leaks for 20 years commencing with the date of completion of Installation of the Roofing System. This warranty will be fully satisfied by repair of the Roof, and any such repairs shall carry a warranty against leaks for any then remaining balance of the original 20-year warranty period.

MRS'S AND ROOFER'S AGGREGATE TOTAL CUMULATIVE LIABILITY UNDER THIS 20 YEAR WATERTIGHTNESS LIMITED WARRANTY IS LIMITED TO THE AMOUNT OF THE OWNER'S ORIGINAL PAYMENT MADE TO THEM FOR MATERIALS FURNISHED BY MRS ONLY AND FOR THE INSTALLATION OF THOSE MATERIALS ONLY, NEITHER MRS NOR ROOFER MAKES ANY OTHER WARRANTY WHATSOEVER, EXPRESS OR IMPLIED, ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND ALL IMPLIED WARRANTIES OF FITNESS FOR ANY PARTICULAR PURPOSE WHICH EXCEED OR DIFFER FROM THE WARRANTIES HEREIN EXPRESSED ARE DISCLAIMED BY EACH AND ALL OF SAID PARTIES AND EXCLUDED FROM THIS 20 YEAR WATERTIGHTNESS LIMITED WARRANTY. MRS DOES NOT IN ANY WAY WARRANT THE MERCHANTABILITY OF THE GOODS SOLD HEREBY. NO WARRANTIES EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF.

IN NO EVENT SHALL ANY ONE OR MORE OF MRS AND ROOFER HAVE ANY LIABILITY FOR ANY COMMERCIAL LOSS, CLAIMS FOR LABOR, OR CONSEQUENTIAL DAMAGES OF ANY OTHER TYPE WHETHER OWNER'S CLAIM BE BASED IN CONTRACT, TORT, WARRANTY, STRICT LIABILITY, OR OTHERWISE, IT IS EXPRESSLY AGREED THAT OWNER'S REMEDIES EXPRESSED IN THIS 20 YEAR WATERTIGHTNESS LIMITED WARRANTY ARE OWNER'S EXCLUSIVE REMEDIES.

TERMS, CONDITIONS, LIMITATIONS

1. Owner shall provide MRS and Roofer with written notice within thirty days of the discovery of any leak(s) in the Roof. Failure of the Owner to do so shall automatically relieve both MRS and Roofer of any and all responsibility and/or liability under the 20 year Watertightness Limited Warranty.
2. In the event a roof repair is necessary during the first two-year period or any extension thereof, the Roofer's responsibility [which shall be in lieu of any and all MRS liability during this period and any such extensions] shall be extended for a two-year period from the date of the last such repair. In any such case, MRS will be responsible only for the balance remaining after the end of such a period and any and all extension(s) of the original twenty-year period from the date of completion or installation of the Roofing System.
3. Following MRS's inspection, MRS determines that the leak(s) in the Roof are caused by defects in MRS materials or in the workmanship of the Roofer, Roof repair obligations shall then arise in accordance herewith, but Owner's remedies and MRS's liability shall in any event be limited to repair of the Roof, subject to the cost limitations set forth above. Otherwise, neither MRS nor Roofer shall have any liability. The Roofer's two year liability (which is in lieu of any and all MRS liability for such period) shall be extended an additional two years from date of last repair, should such repairs be necessary during the first two years of the Roofer's liability or during any extension thereof.

4. Neither MRS nor Roofer shall have any liability or responsibility under or in connection with either this 20-Year Watertightness Limited Warranty or the Roof if any one or more of the following shall occur:
 - a) Deterioration caused by marine(salt water) atmosphere or by regular spray of either salt or fresh water.
 - b) Corrosion caused by heavy fallout or exposure to corrosive chemicals, ash or fumes from any chemical plant, foundry, planting works, kiln, fertilizer manufacturing, paper plant, and the like.
 - c) Deterioration caused by any corrosive substance or any condensate of any condensate or any harmful substance contained, generated or released inside the building.
 - d) Damage caused by worker(s) on the roof.
 - e) Any other cause beyond MRS's control.
 - f) Damage to the Roof caused by natural disasters, including but not limited to, lightning, or any strong gale, hurricane, tornado, or earthquake.
 - g) Failure by any contractor or subcontractor to follow MRS's recommended installation instructions for the layout design and installation of the Roof.
 - h) If, after installation of the Roof by Roofer, there are any alterations, such as, but not limited to, structures, fixtures, or utilities being place upon or attached to the roof without prior written authorization from MRS, or
 - i) If there is any failure by the Owner or lessee or other occupant or user to use reasonable care in maintaining the Roof, or
 - j) If Owner fails to comply with every term and/or condition stated in this 20-Year Watertightness Limited Warranty, or
 - k) If any panels or other parts are installed in a manner that does not permit drainage of water from all surfaces.
 - l) MRS shall not have any liability or responsibility with leakage caused by ridge vents.
 - m) MRS shall not have any liability or responsibility with failure of gutters and gutter accessories.
 - n) Failure of roofing installation and the materials supplied by MRS for the flashing and metal roofing due to reaction of dissimilar metals will not be the responsibility of MRS, nor will MRS be held liable for any claims due to failures caused by dissimilar metals.
5. MRS shall not have any liability or responsibility under or in connection with either this 20-Year Watertightness Limited Warranty or the Roof in the event of a failure by any contractor or subcontractor to use approved installation details for roof curbs, roof jacks, sealants, sub framing, and flashing furnished by MRS, [or to substitute therefore only products approved in writing in advance by MRS as equal (if provided by the contractor)].
6. During the term of this Warranty, MRS, its Sales Representative and employees, shall have free access to the roof during regular business hours
7. MRS shall not have any obligation under this 20-Year Watertightness Limited Warranty until final drawings of the completed roof are submitted by MRS to the Roofer and accepted in writing by MRS. Such drawings must show the exact number, size and location of all roof penetrations and rooftop equipment. Photos of the roof showing these items must accompany the drawings.
8. MRS shall not have any obligation under this 20-Year Watertightness Limited Warranty until all invoices for installation, supplies and services have been paid in full to each of MRS and Roofer and each material supplier.
9. Neither MRS nor Roofer shall be responsible for any consequential damages or loss to the building its contents or other materials.
10. Neither MRS nor Roofer's failure at any time to enforce any of the terms or conditions stated herein shall be construed to be a waiver of such provision or of the right to exercise any right in the future.
11. This 20-Year Watertightness Limited Warranty supercedes and is in lieu of any and all other warranties (whether express or implied) that are either in addition to or in conflict with the term(s) and condition(s) stated herein. ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND ALL IMPLIED WARRANTIES OF FITNESS FOR ANY PARTICULAR PURPOSE WHICH EXCEED OR DIFFER FROM THE WARRANTIES HEREIN EXPRESSED ARE DISCLAIMED BY EACH AND ALL OF SAID PARTIES AND EXCLUDED FROM THIS 20-YEAR WATERTIGHTNESS LIMITED WARRANTY.
12. If the subject roof is covered by products of more than one roofing products manufacturer, this 20-Year Watertightness Limited Warranty applies only to those portions of such roof which are covered solely by MRS manufactured products.
13. Notwithstanding any other provision of this 20-Year Watertightness Limited Warranty, MRS shall not have any liability or responsibility at any time for or as a consequence of any condensation or underside corrosion which is or was caused at any time in part or wholly by any condensation resulting from either or both of the following:
 - a) The use of an inadequate vapor barrier where the insulation is installed immediately beneath the roof panels. An adequate vapor barrier is defined as one which has a perm rating of .05 or less with sealed joints and perimeter.

- b) Inadequate ventilation of the attic space between a roof panel and insulation.
- 14. Roofing installation must be supervised by an authorized MRS installer or an individual that has been factory trained in the installation of MRS roofing products.
- 15. MRS roof panels must be made of a material which carries a 20-year durability warranty from manufacturer, such as a 20-year warranty Kynar 500 painted panel.

WARRANTY RESPONSIBILITY:

ROOFER:

- First through second Year, plus any applicable extension period(s) as describe hereinabove.

MRS:

- The thereafter remaining balance of the first 20 years from date of completion of installation of the subject Roof.

This 20-Year Watertightness Limited Warranty is tendered for the sole benefit of the original purchaser as named below is not transferable or assignable. It becomes valid only when signed by each of Roofer, Owner, and MRS.

EXCEPT ONLY AS EXPRESSLY PROVIDED HEREIN, MRS MAKES NO REPRESENTATION(S) OR WARRANTY(IES) OR MERCHANTABILITY AND WARRANT(IES) OF FITNESS FOR ANY PARTICULAR PURPOSE, ALL OF WHICH ARE EXPRESSLY DISCLAIMED WITH RESPECT TO THE GOODS AND OR SERVICES COVERED HEREBY, NOR DOES MRS MAKE ANY WARRANTY OR RESUME ANY RESPONSIBILITY WITH THE RESPECT TO THE VALIDITY OF ANY PATENT(S), DESIGN(S), COPYRIGHT(S), OR TRADEMARK(S) WHICH MAY COVER ANY OF SUCH GOODS. THE CONDITIONS OF LIABILITY, RIGHTS, OBLIGATIONS AND REMEDIES OF THE PARTIES RELATING TO CLAIMS ARISING FROM ANY DEFECTIVE GOODS AND/OR WORKMANSHIP SHALL BE GOVERNED EXCLUSIVELY BY THE TERMS HEREOF. THIS 20-YEAR WATERTIGHTNESS LIMITED WARRANTY MAY NOT BE CHANGED ORALLY.

This 20-Year Watertightness Limited Warranty shall be governed by and construed and enforced in accordance with the laws of the State of North Carolina.

Roofing Contractor/Installer: _____

Owner: _____

By: _____

Title: _____

Date: _____

Metal Roofing Systems, Inc.: _____

Date: _____



35-Year Limited COOLR "Paint" Warranty AZ50 Galvalume®, G90 Galvanized, or Aluminum

EXCLUSIVE WARRANTY

This Warranty (collectively, the "Warranty") is issued by Metal Roofing Systems, Inc. (hereinafter referred to as "MRS"), to the customer identified in this Certificate (hereinafter referred to as "Customer") and applies to the finish on AZ50 Galvalume®, G90 Galvanized, or Aluminum flat sheet and coil products (hereinafter referred to as the "Product") with PVDF based coating consisting of KYNAR 500® or Hylar 5000® resin (hereinafter referred to as the "Coating") if erected anywhere within the Continental United States including Alaska, Hawaii and Canada.

1. Subject to the provisions contained herein, MRS warrants that during the Thirty-Five (35) Year Warranty Period, MRS COOLR stock Coatings will not chip, crack, peel, flake or check (except for such slight crazing or cracking as may occur on tightly roll-formed edges or break bends at the time of roll forming or other fabrication of pre-painted sheet or coil and which is accepted in the industry as standard). Subject to the provisions contained herein, MRS warrants that for twenty-five (25) years, when installed vertically or not more than eighty-six (86°) from the vertical, the Coating will not chalk in excess of ASTM D-4214-89 method D659 number eight (8) rating, or change color more than Five (5.0) Hunter AE units as determined by ASTM method D-2244-2. Color change will be measured on an exposed painted surface that has been cleaned of surface soils and chalk, and the corresponding values measured on the original or unexposed surface. It is understood that fading or color change may not be uniform, if the surfaces are not equally exposed to the sun and elements.
2. This Warranty does not apply to circumstances beyond MRS control, including:
 - a. Fire or other casualty or physical damage;
 - b. Unusual harmful fumes, foreign substances in the atmosphere or standing water;
 - c. Improper treatment of or defects in the metal or in the fabrication;
 - d. Intermittent or continual submersion in water or any other liquid or solid material;
 - e. Damage from wind, deliberate damage, improper handling by erectors; and
 - f. Mishandled Products, e.g., ANY PRODUCT WHICH HAS BEEN ABUSED, ALTERED, MODIFIED, USED IN A MANNER NOT ORIGINALLY INTENDED, OR STORED CONTRARY TO OUR INSTRUCTIONS.
 - g. Stored or installed in a way that allows for poor air circulation, contact with animals or animal waste.
 - h. Embossing that fractures or severely stretches the film (i.e. film is diminished at the point of emboss by greater than 0.2 mils).
3. This Warranty does not cover damage or deterioration resulting from moisture contamination or entrapment or any other contamination detrimental to the coating, which occurs prior to installation of the Products, including, without limitation, contamination occurring during shipment of the Product to the jobsite or during storage at the jobsite. This Warranty does not cover failure due to corrosion of substrate. Other MRS warranties address corrosion issues.
4. All Warranty work will be performed by MRS, or any company, dealer, contractor, applicator, or distributor selected by MRS. Since there may be a color variance between the replacement or repainted Product and the originally installed Product due to normal weathering (i.e. exposure to sunlight and extremes of temperature and weather) of the originally installed Products, this condition shall not be indicative of a defect.
5. NOT WITHSTANDING ANYTHING TO THE CONTRARY CONTAINED HEREIN, MRS LIABILITY SHALL NOT EXCEED THE LESSER OF THE FOLLOWING: (I) THE CUSTOMER'S LIABILITY DIRECTLY ATTRIBUTABLE TO A BREACH OF THIS WARRANTY, OR (II) THE REFINISHING OR REPLACEMENT OF THE FAILED COATED MATERIAL, OR AT MRS OPTION, REFUND OF THE PURCHASE PRICE WHICH SHALL NOT EXCEED AN AMOUNT EQUAL TO ONE HUNDRED PERCENT (100%) OF THE AMOUNTS PAID TO MRS BY THE CUSTOMER FOR THE PURCHASE OF THE DEFECTIVE PRODUCT. MRS SHALL NOT BE LIABLE FOR INJURY TO PROPERTY OTHER THAN THE FLAT SHEET AND/OR COIL PRODUCTS COATED WITH FLUOROCARBON PAINT SYSTEMS, IN THE CONDITION AND AS PURCHASED BY CUSTOMER FROM MRS. MRS, IN ALL INSTANCES, SHALL HAVE THE SOLE AND EXCLUSIVE RIGHT TO DETERMINE WHETHER OR NOT REFINISHING OR REPLACEMENT OF THE FAILED AREAS IS REQUIRED, AND TO FULFILL ITS OBLIGATION UNDER THE WARRANTY, MRS RESERVES THE RIGHT TO NEGOTIATE AND APPROVE ANY FINAL CONTRACT LET FOR REFINISHING AND REPLACEMENT AS THE CASE MAY BE.

6. This Warranty applies only to products manufactured by the customer within six (6) months from shipment thereof by Metal Roofing Systems, Inc.
7. Claims under this Warranty must be presented by the customer to MRS in writing during the warranty period and within thirty (30) days after Customer becomes aware that any warranted condition has occurred. Time is of the essence and failure to give notice within the specified time shall discharge MRS from any obligations under this Warranty. MRS must be given a reasonable opportunity to do an on-site inspection to determine if there is a coating failure.
8. The laws of the State of Ohio shall exclusively govern the rights and duties of the parties to this Warranty. Any controversy or claim arising out of or related to this Warranty, or the breach thereof shall be brought before a court of competent jurisdiction in Cleveland, Ohio under the substantive and procedural laws of the State of Ohio.
9. Customer acknowledges that MRS is not the manufacturer or applicator of the coating warranted herein and agrees that all issues arising from or related to the exceptions set forth herein shall be determined finally and conclusively as to Customer, by the original manufacturer.
10. Due to pigment limitations, Regal Red, Matte Black and US Antique Black are covered by a number eight (8) rating for chalk and five (5) AE units for fade for a period of ten (10) years from installation. Copper and other metallic colors have no rating available for color change.
11. This Warranty applies solely to MRS "inventoried stock" colors. Custom matched colors and non-inventoried items may have different Warranty terms, or not be warranted.
12. For this Warranty to apply, the Customer must retain certain records. In order for MRS to process a claim, we will need to be told the original coil or skid tag number.
13. THIS WARRANTY IS GIVEN AS THE SOLE AND EXCLUSIVE WARRANTY AND EXCLUSIVE REMEDY BY OR AGAINST MRS, AND NO OTHER WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR PURPOSES, ARE MADE, AND ANY SUCH OTHER WARRANTIES ARE EXPRESSLY DISCLAIMED. THERE ARE NO WARRANTIES THAT EXTEND BEYOND THE DESCRIPTION CONTAINED IN THIS INSTRUMENT. CUSTOMER WAIVES THE BENEFIT OF ANY RULE THAT THE DISCLAIMERS OF WARRANTY SHALL BE CONSTRUED AGAINST THE SELLER, AND AGREES THAT THE DISCLAIMERS IN THIS INSTRUMENT SHALL BE CONSTRUED LIBERALLY IN FAVOR OF MRS. MRS SHALL NOT BE LIABLE FOR ANY SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES. MRS HEREBY DISCLAIMS ALL LIABILITIES FOR DAMAGES BASED ON THEORIES OF NEGLIGENCE AND STRICT PRODUCT LIABILITY. THIS WARRANTY IS EXTENDED TO CUSTOMER ALONE AND NO OTHERS, IS NON-TRANSFERABLE AND NON-ASSIGNABLE, AND MAY NOT BE ENLARGED IN ITS SCOPE BY ANY REPRESENTATIVE, SALES PERSON, AGENT OR OTHER EMPLOYEE OF MRS. THE CUSTOMER SHALL NOT PERMIT ANYONE TO CLAIM OR IMPLY THAT THIS WARRANTY EXTENDS OR CAN BE "PASSED THROUGH" TO ANYONE OTHER THAN THE CUSTOMER. THIS PROVISION IS A MATERIAL TERM OF THIS WARRANTY AND ITS VIOLATION OR BREACH BY CUSTOMER OR ANY OF CUSTOMER'S AGENTS OR REPRESENTATIVES, SHALL VOID AND CANCEL THIS WARRANTY FOR ALL PURPOSES.

THE LIABILITY OF SELLER MRS SHALL NOT EXTEND TO PERSONAL INJURY, PROPERTY DAMAGE, LOSS OF PROFIT, DELAY OR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM THE FAILURE OF ANY PRODUCT OR COATING TO CONFORM WITH THE PROVISIONS OF THIS LIMITED WARRANTY.

MRS SHALL NOT IN ANY EVENT BE LIABLE TO THE CUSTOMER OR ANY OTHER PERSON OR ENTITY FOR ANY ACTIONS, CLAIMS, CAUSES OF ACTION, DAMAGES, EXPENSES AND/OR LIABILITIES ARISING FROM OR RELATED TO THE DESIGN, USE OR FAILURE OF THE PRODUCT OR COATING, FOR THE INTERRUPTION OF THE CUSTOMER'S OPERATIONS OR BUSINESS, FOR THE COST OF LABOR EXPENDED BY OTHERS ON ANY DEFECTIVE PRODUCT OR COATING OR FOR ANY SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES WHATSOEVER OR LOSS OF PROFIT OR OTHER FINANCIAL LOSS ARISING OUT OF THE USE OR FAILURE OF THE PRODUCT OR COATING, EVEN IF MRS HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH ACTIONS, CLAIMS, CAUSES OF ACTION, DAMAGES, EXPENSE, LOSS AND/OR LIABILITIES, WHETHER ARISING FROM BREACH OF CONTRACT BREACH OF WARRANTY, TORT, INCLUDING NEGLIGENCE, STRICT LIABILITY OR OTHERWISE TO ANYONE BY REASON OF THE FACT THAT SUCH PRODUCT OR COATING SHALL HAVE BEEN DEFECTIVE.

Finish



METAL ROOFING
Systems, Inc

30
YEAR
WARRANTY

SEE REVERSE SIDE FOR MATERIAL AVAILABILITY



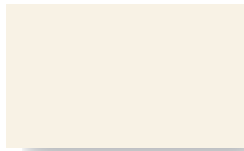
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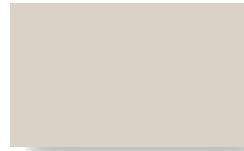
TERRA COTTA



AGED COPPER



BONE WHITE



SANDSTONE



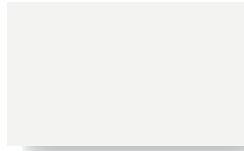
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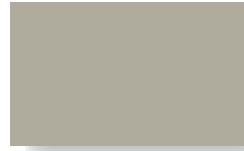
COLONIAL RED



PATINA GREEN



REGAL WHITE



ASH GRAY



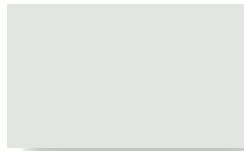
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REGAL RED



HEMLOCK GREEN



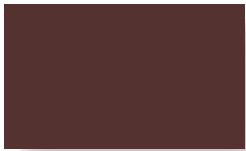
STONE WHITE



DOVE GRAY



MEDIUM BRONZE



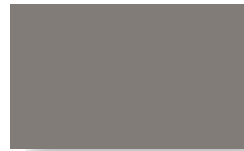
BURGUNDY



HARTFORD GREEN



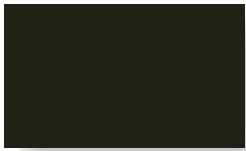
SLATE BLUE



SLATE GRAY



MANSARD BROWN



MATTE BLACK



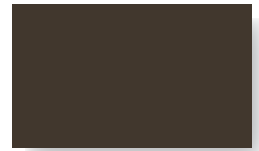
EVERGREEN



REGAL BLUE

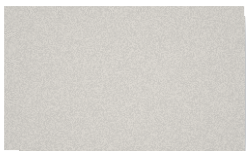


CHARCOAL GRAY



DARK BRONZE

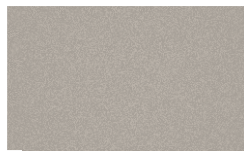
METALLIC COLORS



*SILVER



*COPPER



*CHAMPAGNE



*PRE-WEATHERED GALVALUME®

NON-PAINTED



ACRYLIC COATED GALVALUME®

*** CONTACT YOUR REPRESENTATIVE FOR EXACT COLOR CHIP SAMPLE**



LOCATIONS

7687 Mikron Drive
Stanley, NC 28164
P: 704.820.3110
F: 704.820.0113

370 Allied Drive
Conway, SC 29526
P: 843.347.6673
F: 843.347.6693

3214 Hanover Drive
Johnson City, TN 37604
P: 423.434.0535
F: 423.434.0537



*Available at a slight price premium.

Colors shown are matched as accurately as possible, but may vary slightly from finished product. These rich and vibrant colors are produced with either Kynar 500® or Hylar 5000® resins, which provide superior color retention, and allow us to offer non-prorated coating warranties for most applications. Coating warranty varies for Regal Red, Matte Black, Copper, Silver, Champagne, and Pre-Weathered Galvalume. Metallics are warranted for chip, crack, and peel only. Please contact your representative for more information.

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Faster. Smarter. Better. Period.

STOCK AVAILABILITY MATRIX

							GALVALUME	ALUMINUM				
							24 ga.	.032	.040	.050	.063	
			ISR	EMI	3yr.	SRI						
Aged Copper	★	L	0.47	0.85	0.46	53	●	●				
Ash Gray	★	L	0.39	0.84	0.39	41	●					
Bone White	★	L	0.47	0.83	N/A	58	●	●	●	●	●	
Burgundy	★		0.25	0.85	0.23	23	●					
Champagne Metallic	★	L	0.37	0.80	0.35	37	●					
Charcoal Gray	★		0.29	0.84	0.28	28	●					
Colonial Red	★	L	0.30	0.85	0.29	30	●	●	●	●		
Copper Metallic	★	L	0.49	0.86	0.47	56	●	●				
Dark Bronze	★		0.26	0.84	0.25	24	●	●	●	●	●	
Dove Gray	★	L	0.49	0.86	N/A	56	●					
Evergreen	★		0.27	0.86	0.26	26	●	●	●	●		
Hartford Green	★		0.26	0.85	0.25	24	●	●	●	●		
Hemlock Green	★	L	0.29	0.86	0.29	29	●					
Mansard Brown	★		0.27	0.86	0.25	26	●	●	●	●		
Matte Black	★		0.29	0.83	0.27	27	●	●	●	●		
Medium Bronze	★	L	0.30	0.87	0.28	31	●	●	●	●	●	
Patina Green	★		0.28	0.87	0.28	28	●					
Pre-weathered Galvalume®	★		0.30	0.79	0.28	27	●					
Regal Blue	★		0.26	0.85	0.25	24	●					
Regal Red	★	L	0.42	0.83	0.41	45	●	●		●		
Regal White	★	L	0.67	0.86	0.67	81	●	●	●	●		
Sandstone	★	L	0.54	0.86	0.53	63	●	●	●	●		
Sierra Tan	★	L	0.35	0.86	0.34	37	●	●	●	●		
Silver Metallic	★	L	0.59	0.79	0.60	67	●	●	●	●		
Slate Blue	★		0.29	0.85	0.28	28	●					
Slate Gray	★	L	0.33	0.84	0.33	33	●	●	●	●		
Stone White	★	L	0.60	0.86	0.56	71	●	●	●	●	●	
Surrey Beige	★	L	0.42	0.85	0.41	46	●					
Terra Cotta	★	L	0.35	0.86	0.35	37	●	●	●			
Acrylic Coated Galvalume®	★	L	0.67	0.14	0.55	56	●					

*** IF DESIRED COLOR IS NOT LISTED ON MATRIX PLEASE CONTACT METAL ROOFING SYSTEMS FOR AVAILABILITY**

NOTES
<ul style="list-style-type: none"> All metal is painted with a .20 mil primer and .70 - .90 mil Top Coat of 70% Kynar 500 or Hylar 5000. The reverse side has a .20 primer and .30 - .40 backer coating. 22 gauge steel available upon request. For low slope roofing to meet Energy Star requirements the ISR must be ≥ 0.65. After 3 years, the solar reflectance must be ≥ 0.50. For steep slope roofing to meet Energy Star requirements the ISR must be ≥ 0.25. After 3 years, the solar reflectance must be ≥ 0.15. For low slope roofing to meet LEED 2009 requirements the SRI must be ≥ 78. For steep slope roofing to meet LEED 2009 requirements the SRI for 100% of the roof must be ≥ 29. Low slope is defined as $\leq 2:12$. Steep slope is defined as $>2:12$.

KEY	
●	Stocked Item
★	Energy Star Compliant
L	LEED 2009 Compliant
ISR	Initial Solar Reflectance
EMI	Emissivity
SRI	Solar Reflectance Index



METAL ROOFING
Systems, Inc



Oil canning is an aesthetic issue and is an inherent part of light gauge cold formed metal products. By using coil that has been processed properly, designing for thermal movement, following stringent specifications for installation and proper handling most oil canning can be eliminated. Oil canning is not grounds for coil/panel rejection.

Galvalume® is a registered trademark of BIEC. Hylar 5000 is a registered trademark of Solvay Solexis, Inc. Kynar 500 is a registered trademark of Atofina, Inc.