MR-24® ROOF SYSTEM PANEL CLIP & ENDLAP

MR-24® ROOF CLIP

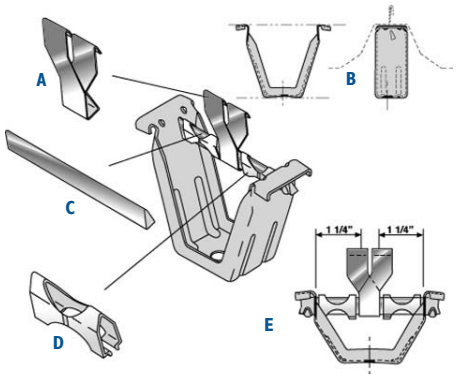
The MR-24 roof clip securely holds the panels to the supporting structural system while still allowing the entire roof to expand and contract as thermal conditions change. Roof clips securely attach the roof panels to the supporting structurals by stainless steel tabs which are roll formed into the panel seam. Stainless steel tabs are more than 50% stronger than other steel tabs.

A. Made of high strength 304 stainless steel, the tab is wrapped around the bar to ensure secure attachment to the clip. The stainless steel material folds tightly into the seam for weathertightness. The MR-24 roof clip tab is more than 50% stronger than most other carbon steel standing seam tabs.

B. The yoke design includes a heavy 16-gage galvanized steel base with stiffening ribs for added strength. The panels rest securely on the broad top of the yoke. The ears are turned down and every edge is smooth to eliminate gouging and allow smooth movement.

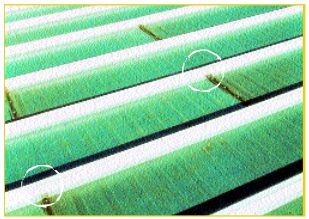
C. A special triangular-shaped bar lets the tab slide easily. A thin cadmium coating provides a smooth lubricated surface for tab movement. The bar is positioned high in the clip (only 1/8" below the panel) to help eliminate binding as the roof moves.

D. The centering sleeves keep the tab perfectly positioned in the middle of the clip. As the entire roof begins to move, the sleeves snap away to allow the tab and roof to move a full 2-1/2". This negates the need for an expansion joint in double slope roofs up to 500' wide. The centering sleeves break away at less than 8 pounds of force but easily withstands the handling associated with shipping and installation.

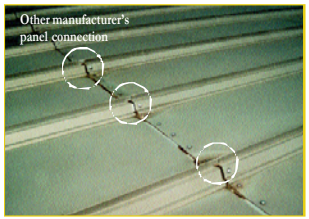


E. The clip allows for 1-1/4" in movement in either direction to accommodate expansion and contraction forces.

MR-24 ROOF SYSTEM ENDLAP



Butler staggers the panel endlaps to avoid the four-corner condition - another design feature to assure weathertightness and longer roof life.



Most manufacturers locate panel splices at exactly the same position across the entire roof. This creates a condition where four panel corners must be joined at the same location. That four-corner condition is very difficult to seal and keep weathertight.

BUTLER QUALITY

Every material, coating and process used in your new Butler® building is tested to ensure strict compliance with rigorous performance standards. Butler tests every supplier on a continuous basis. Butler is the only manufacturer in the industry committed to this level of quality.

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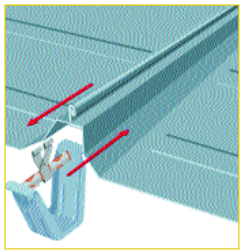
Form No. 4253-9/04

MR-24® ROOF SYSTEM

The most specified standing seam roof system on the market since 1969.

The MR-24® roof system is like a monolithic steel membrane, covering your entire building. Panels are joined together with a Pittsburgh double-lock standing seam and fastened to the structural members with the unique clip formed into the seam.

ROOF MOVEMENT



All roofs expand and contract with daily and seasonal temperature changes. Unless your roof is designed to accommodate this movement, all metal, built-up or single ply roofs will eventually fail.

The MR-24 roof system is uniquely designed to accommodate up to 2 1/2" of roof movement. The system is attached to the building's structure with a special clip and tab assembly formed into the double-lock seam. Because the tab can move within the clip, the entire roof can expand and contract freely without sacrificing structural integrity.

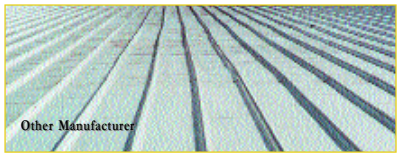
WEATHERTIGHTNESS

Butler's exclusive Pittsburgh double-lock standing seam assures you of consistent weathertight performance. During installation, the edges of each roof panel are joined and mechanically roll-formed 180 degrees, completing a full 360 degree Pittsburgh double-lock seam. Inside the seam, a factory-applied sealant eliminates the chance for even tiny capillary leaks.

CONSTRUCTION

Factory punching of all roof structurals and panel eaves, end splices, ridges and flashings ensures precise alignment during erection. Precise alignment is critical to proper roof movement during thermal changes.

A unique factory-punched panel endlap features a two-piece clamped connection. A bottom reinforcing plate with four stainless steel studs is placed into the factory-punched panels. A corrosion-resistant aluminum top panel strap then clamps the panel endlaps together. This eliminates any attachment to support structurals, allowing the entire roof to move as a single membrane. Staggering the endlaps permits a full 360 degree seam to be used throughout this critical joint.



Without factory punching, these misaligned panels bind on clips, strain seams and compromise the life and weathertightness of the roof.

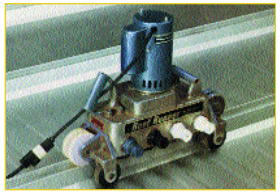
THE MR-24® ROOF SYSTEM

Consider The Difference

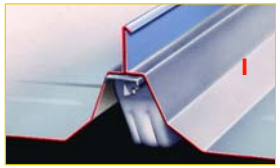
- **Specified twice as often as any other standing seam roof system**
- **Over 1 billion square feet installed since its introduction**
- **Exclusive field formed 360 degree Pittsburgh double-lock seam**
- **Seam is sealed with two tons of force**
- **25-year weathertightness warranty**
- **Installed exclusively on factory punched structural members**
- **Available with factory engineered accessories**
- **Offers a complete roof system**

BUTLER®
A BlueScope Steel Company

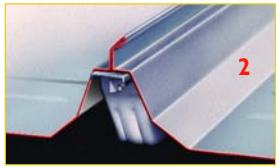
MR-24® ROOF SYSTEM SPECIFICATIONS



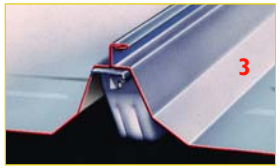
The seaming process uses a heavy-duty, four-stand, electric, portable Roof Runner® roll forming machine.



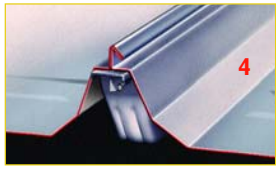
Butler's exclusive Pittsburgh double-lock standing seam assures consistent weather-tightness with virtually maintenance free performance for many years.



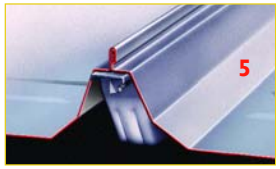
During installation, (left - 1-5) the edges of each roof panel are joined and field roll-formed 180 degrees by machine, completing a full 360 degree seam. Inside the seam, a factory-applied sealant eliminates the chance for even tiny capillary leaks.



The MR-24 roof system is available in 24 and 22 gage aluminum/zinc coated steel. The paint coating is Butler-Cote® (a fluoropolymer containing 70% Kynar 500® or Hylar 5000® resin).



The MR-24 roof system includes a complete line of fully engineered accessories (seamed-in curbs, stainless steel gutters, etc.) designed to fit perfectly with the MR-24 system.



1. GENERAL

The roof shall be covered with the MR-24® roof system as furnished by Butler Manufacturing Company and installed in accordance with the manufacturer's instructions.

2. COMPONENT DESCRIPTION

2.1 Roof Panels

2.1.1 Roof panel shall be factory roll-formed MR-24 roof system panel as manufactured by Butler Manufacturing Company; 24" wide, with 2 major corrugations, 2" high (2-3/4" including seam). 24" on center. The flat of the panel shall contain cross flutes 6" on center perpendicular to the major corrugations the entire length of the panel to reduce wind noise and improve walkability.

2.1.2 Panel material as specified shall be 24 gage aluminum-zinc alloy-coated steel (AZ55) with mill-applied acrylic surface treatment (GALVALUME Plus® or ACRYLUME™). Minimum 0.55 ounce coated weight per square foot (approximately 55% aluminum 45% zinc applied by the continuous hot dip method) as determined by the triple-spot test per ASTM A792.

OR

24 gage galvanized (G-90 coating), per ASTM specification A653 (G90), and painted with exterior colors of Butler-Cote® finish system, a full strength, 70% Kynar 500® or Hylar 5000® fluoropolymer coating. Manufacturer warrants that coating shall not blister, peel, crack, chip, or experience material rust through for 25 years. For a period of 25 years chalking shall not exceed #8 - ASTM and fading shall be 5Δ E Color Difference Units or less.

OR

Special materials, gages or colors as applicable for custom designs.

2.1.3 Panel of maximum possible length shall be used to minimize endlap; eave panel shall extend beyond the structural line of the sidewall.

2.1.4 Panel shall be factory punched at panel end to match punched holes in the eave structural member. Panel end splice shall be factory punched and prenotched. Panel end splice shall be floating and allow the roof panel to expand and contract with roof panel temperature change.

2.1.5 Ridge assembly shall be designed to allow roof panels to move lengthwise with expansion/contraction as the roof panel temperature changes. Parts shall be factory punched for correct field assembly. Panel closure and interior reinforcing strap shall be installed to seal the panel end at the ridge. The attachment fasteners shall not be exposed on the weather side. A lockseam plug shall be used to seal the lockseam portion of the panel. A hi-tensile steel ridge cover shall span from panel closure to panel closure and flex as the roof system expands and contracts.

3. SYSTEM DESIGN

3.1 All components of the MR-24 roof system paneling shall be designed in accordance with sound engineering methods and practices.

3.2 MR-24 roof system panel shall be designed in accordance with AISI "Specifications for the Design of Light-Gage, Cold-Formed Steel Structural Members" or CAN/CSAS136 "Cold-Formed Steel Structural Members" - latest edition.

3.3 Panel system shall be designed to support design live load.

3.4 All endwall trim and roof transition flashing shall allow the roof panel to move relative to the wall panel and/or the parapet as the roof expands and contracts with temperature change.

3.5 The MR-24 roof system panel shall not be considered to be a safe work platform until completely secured to the structural system. Therefore, walkboards or other safety equipment as required by safety standards shall be provided by the erecting contractor to provide for worker safety during panel installation.

4. SYSTEM INSTALLATION

4.1 Panel clips shall be positioned by matching the hole in the clip with the factory punched holes in the secondary structural members.

4.2 Panel shall be positioned and properly aligned by matching the factory punched holes in the panel end with the factory punched holes in the eave structural member and by aligning the panel with the panel clip.

4.3 Panel sidelap shall be field-seamed by a self-propelled and portable electrical lock seaming machine. The machine field forms the final 180 degrees of a 360 degree Pittsburgh double-lock standing seam; all sidelap sealant shall be factory applied.

4.4 Panel endlap, when required, shall be at least 6", sealed with Butler sealant and fastened together by clamping plates. Sealant shall contain hard nylon beads which prevent it from flowing out due to clamping actions. The panel lap shall be joined by means of a two-piece clamped connection consisting of a bottom reinforcing plate and a top panel strap. The panel endlap shall be located directly over, but not fastened to, a supporting secondary roof structural member and be staggered, so as to avoid a four panel lap splice condition.

4.5 A minimum blanket insulation thickness of two inches is required for all MR-24 roof system applications.

5. FASTENERS

5.1 Connection of MR-24 roof system panel-to-structural member, except at eave, shall be made with clips with movable stainless steel tabs that are seamed into the standing seam sidelap.

5.2 Panel clip shall be fastened to structural member with Scrubolt™ fastener as per manufacturer's erection drawings, using factory prepunched hole in structural member. Scrubolt fastener shall contain a metal backed rubber washer which serves as a torque indicator.

5.3 MR-24 roof system panel-to-panel connection shall be made with a positive, field-formed standing double-lock seam, formed by a special seaming machine. The machine field forms the final 180 degrees of a 360 degree Pittsburgh double-lock standing seam; all sidelap sealant shall be factory applied.

5.4 Fasteners penetrating the metal membrane at the following locations shall not exceed the frequency listed:

Fastening System	Frequency	Fastening System	Frequency
Basic Panel System	0 per square foot	High Eave (No Parapet)	2 per linear foot
Exterior Eave Gutter	2 per linear foot	Panel Slices	2 per linear foot
Gable Trim (no parapet)	2 per linear foot	High Side Transition	1 per linear foot
Ridge	1 per linear foot		

5.5 In lieu of prepunched secondaries and panels, predrilling of the structural members is mandatory in order to maintain proper alignment of the roof system.

6. ACCESSORIES

6.1 Accessories (i.e., ventilator, skylight, gutter, fascia) shall be as standard with Butler Manufacturing Company, unless otherwise noted and furnished as specified.

6.2 The color coating on all gutter, downspout, gable trim and eave trim to be Butler-Cote finish system.

6.3 Location of standard accessories shall be as shown on erection drawings as furnished by Butler Manufacturing Company.

6.4 Material used in flashing and transition parts and furnished as standard by Butler Manufacturing Company may or may not match the roof panel material . Parts shall be compatible and shall not cause a corrosive condition. Copper and lead material shall not be used with GALVALUME or optional aluminum coated panels.

7. PERFORMANCE TESTING

7.1 Underwriters Laboratories - The roof system shall carry a U.L. wind uplift resistance classification of 90 to ensure structural integrity and possible reduction of insurance rates (Construction No's Construction No. 62 , 62A & 178).

7.2 U. S. Army Corps of Engineers Guide Specification 07416.
The roof system has been tested and certified in accordance with the Army Corps of Engineers Guide Specification 07416 (Test Method for Structural Performance of Standing Seam Metal Roof Systems By Uniform Static Air Pressure Difference).

7.3 Air Infiltration shall not exceed .007 cfm per square foot of roof area when tested in reference to ASTM E 1680, latest edition at a static pressure differential of 12.0 psf.

7.4 There shall be no uncontrolled water penetration through the panel seams when tested in reference to ASTM E 1646, latest edition at a static pressure differential of 12.0 psf.

7.5 FM Global - The roof system shall qualify for Approval as Class 1 Panel Roof (FMRC Standard 4471) and be listed in Factory Mutual Approval Guide - latest edition.

7.6 Fire Classifications for Roof Assemblies - The MR-24 roof system with fiberglass blanket insulation has been certified by Underwriters' Laboratories as a Class A roof covering assembly in accordance with UL 790 (ASTM E108 / NFPA 256) for exterior fire exposure. It shall be considered acceptable where Class A, B or C roofing assemblies are required by S.B.C., U.B.C., B.O.C.A or International Building Code (IBC).

8. PROVISION FOR EXPANSION/CONTRACTION

8.1 Provision for thermal expansion movement of the MR-24 roof system panel shall be accomplished by the use of clips with a movable tab. The stainless steel tab shall be factory centered on the roof clip when installed to assure full movement in either direction. A force of no more than 8 pounds will be required to initiate tab movement. Each clip shall accommodate a minimum of 1.25" in either direction.

8.2 The roof shall provide for thermal expansion/contraction without detrimental effect to the roof panel when there is a ±100°F. temperature difference between the inside structural framework of the building and the temperature of the roof panels.

9. ENERGY CONSERVATION

9.1 Purlins shall be insulated (optional) so as to eliminate "thermal short circuit" between purlin and roof panel. The heat loss (thermal short circuit) caused by compression of the blanket insulation between structural and panel is minimized by the use of a spacer block at each purlin location.

WARRANTY

The MR-24 roof system is available with a 25-year warranty, not just against perforation, but weathertightness as well. With reasonable care and maintenance, it is your 25-year solution to roof problems.

WIND UPLIFT

As winds blow over the roof of a building, a suction is created which exerts an upward force called wind uplift. Tested in accordance with the Corps of Engineers and the CEGS 07416/ASTM E 1592 tests, the MR-24 roof system carries the highest wind uplift ratings (Class 90) awarded by Underwriters Laboratories. It has been fully tested and approved by the Factory Mutual Research Corporation as a Class 1 panel roof and is available with wind-storm classifications 1-60 through 1-165. (Heavier gage material or decreased purlin spacing may be required.)

These ratings may result in lower insurance premiums for your new building.

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