



Metal Roof Installation Manual

Chapter 15: Seam Joining

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BUILD LEGACIES
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Chapter 15: Seam Joining

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15. INTRODUCTION

Metal panels are designed not to leak when used in the appropriate application and installed properly. The joining of roof panels to each other and to trim and flashing pieces is a major and critical part of any installer's work.

Important Note: Different types of seams require specific installation techniques. The information provided in this manual does not supersede installation instructions provided by the manufacturer. Always consult the manufacturer's instructions and/or detailed shop drawings for information specific to each project.

Additional important and necessary seam joining information for the installer can be found in other sections of this manual:

- Chapter 4, *Panel Types*
- Chapter 5, *Side Joint Configuration*
- Chapter 7, *Panel Connections*
- Chapter 12, *Tools and Field Operations*
- Chapter 13, *Sealants*
- Chapter 14, *Fasteners*
- Chapter 16, *Panel Installation*

Every installer should understand this additional material prior to attempting the seam joining mentioned in this chapter.

There are many methods of joining adjacent sections of sheet metal. The following information will focus on the most commonly used types of seams, and key points for installers to remember in performing their work.

15.1. Overlaps

The simplest and most basic seam is the lap joint. This style joint is commonly used for flashings and end joints in long panels which are not located at the eave or ridge sections of the roof. The basic lap joint is nothing more than a portion of the up-slope panel lying on top of, or "over-lapping," a lower, downslope panel. This is illustrated in Figure 15-1. The best practice on this type of joint includes the application of an appropriate sealant at each joint.



Figure 15-1
The Basic Lap Joint

A variation of the lap joint is the *nested* lap, which is utilized by many types of ribbed metal panels. A nested lap joint overlaps the adjacent panel, but also covers or "nests" the lower panel rib within the rib of the lapping panel. This is the seam joint shown in Figure 15-2.



Figure 15-2
The Nested Lap Joint

The important thing to remember when using a lap joint is that water doesn't always run downhill. Capillary action may also take place. Whenever two surfaces are adjacent to each other, the small gap of the joint changes the properties of the runoff liquid. The liquid may be siphoned up-slope, between the panels as illustrated in Figure 15-3.

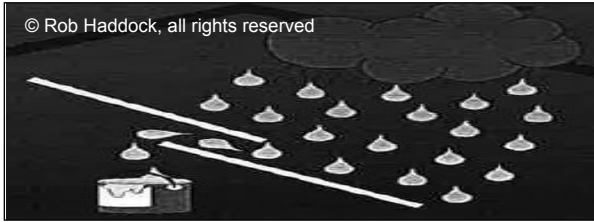


Figure 15-3
Capillary Action Between Roof Panels

This capillary action will cause water to run upslope and beneath the roof panel if corrective action is not taken. One corrective action involves a design change in the panel profile and is added during the manufacturing of the panel. Two other possible corrective actions are taken during installation of the panel.

Panels designed to be installed with a nested lap joint may have a capillary groove formed into the upper portion of the rib as illustrated in Figure 15-4. This groove is designed to "break" the capillary action of the water and provide a channel for the water to drain away from the protected area.



Figure 15-4
Addition of a Capillary Groove to a Nested Seam

When these nested panel seams use external fasteners, EXTREME CARE SHOULD BE USED during the installation of these panels to prevent damage to the panel and leakage after installation. Often these panels will require fasteners, nails, or screws to be installed off-center on the rib. While this appears unusual, it is necessary

in order to prevent puncturing or damaging the drainage channel within the seam. This can be clearly seen in the examples shown in Figure 15-5. Following the manufacturer's installation patterns will avoid damage, leakage, and warranty issues in this area.

<p>Example a</p> <p>Nail the sheet securely in position nailing through the top of every major rib. Roofing nails should be placed in the crown (high point) of the ribs only.</p>	<p>Example b</p> <p>Nail the sheet securely in position nailing through the top of every major rib. DO NOT FASTEN IN THE CENTER OF THE RIB, rather nail toward the side, THIS IS VERY IMPORTANT!</p>
<p>Example c</p> <p>Nail the sheet securely in position nailing through the top of every major rib. DO NOT NAIL IN THE CENTER OF V, NOR IN CENTER OF DRAIN RIB AT THE SIDE LAP.</p>	<p>Example d</p> <p>Nail the sheet securely in position nailing through the top of every major rib. IMPORTANT; nail perpendicular to slanted surface as indicated.</p>
<p>Example e</p> <p>Nail the sheet securely in position nailing through the top of every major rib. Roofing nails should be placed in the crown (high point).</p>	

Figure 15-5
Fastener Pattern Examples for Nested Seam Panels

There are also two corrective actions which can be taken *during installation* to prevent leakage of the lap joint, both of which involve the use of sealant.

The basic lap joint is usually given a layer of sealant between the panels, slightly up-slope of the panel edge, as illustrated in Figure 15-6.

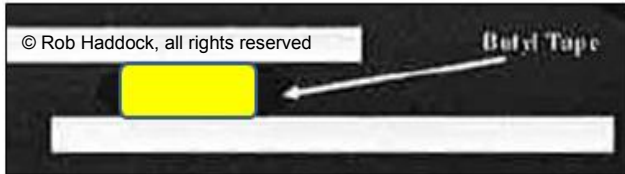


Figure 15-6
Sealant Application within a Basic Lap Joint

This sealant is usually applied in tape format, and is applied in such a way as to avoid outside exposure to the sun and environment. It is also installed so the joint and sealant are compressed by the fasteners holding the panels. When fasteners are installed in a sealed lap joint, it is critical that the fasteners be installed on the dry side of the sealed joint, usually so the fastener goes through, and is surrounded by, the compressed sealant as shown in Figure 15-7.

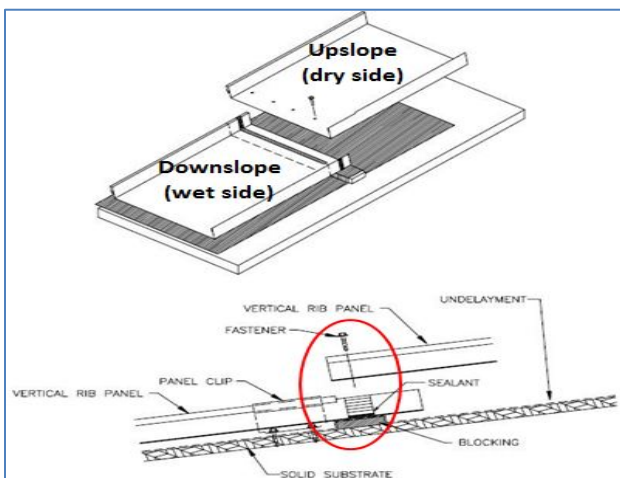


Figure 15-7
Typical Panel Endlap Joint Showing Sealant and Fastener Details

When sealant is used on a nested lap joint with no capillary groove, it is installed as shown in Figure 15-8. Note that the sealant is applied on the side of the fastener closest to the outside edge of the top panel.



Figure 15-8
Sealing of Nested Seam Lap Joint

When a nested lap joint is located in an area that may experience standing water or flooding above the joint seam, the joint is often sealed, even when the panel has a capillary groove as part of its design. The sealant is applied in the same location as previously mentioned, and is illustrated in Figure 15-9.



Figure 15-9
Sealing of Grooved Nested Lap Joint When There Is Potential Flooding of Seam

Always use the manufacturer's recommended sealant during an installation, as well as the locations and spacing requirements called out on plans and instructions.

Installer Precaution

As detailed in Chapter 13, *Sealants*, alternate sealant procedures are used when lap joints used additional cinch straps. Always follow Manufacturer's instructions for sealant and fastener placement.

15.2 Snap Seams

Snap seams are usually simple to install and come in a variety of profiles. Some profile varieties are displayed in Figure 15-10.

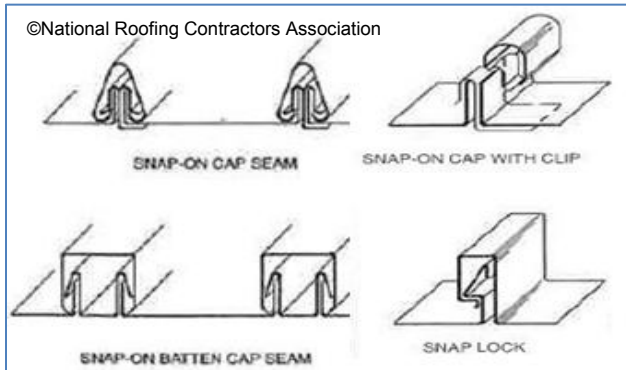


Figure 15-10
Snap Seam Profile Examples

Traditional fasteners and clips are used to secure the panel to the deck or roof system, but the between-panel seams are "snapped" together as shown in Figure 15-11. The snap seam is usually used on standing seam or batten-style panes, and may use separately attached caps, or integrate caps for covering the seam.

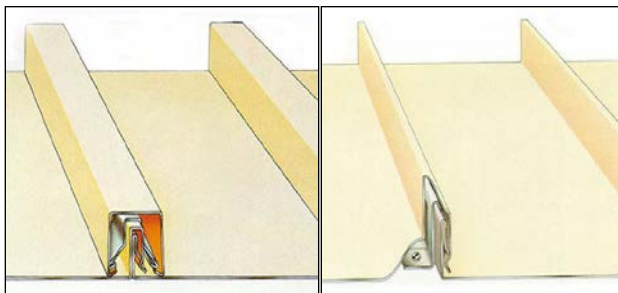


Figure 15-11
Snap Seams on Standing Rib
and Batten-Style Panels

This cap, or batten, snaps on to an adjacent panel's rib or clip to complete the seam. Male and female legs, as shown in Figure 15-12, are joined to secure the seam in place. Installers should note that some panel designs snap into place easier than others. It is critical that the entire panel seam is securely snapped and engaged in place.

Individual battens must also be secured to avoid sliding, normally under the ridge cap.

Some snap-cap or batten-cap seaming systems have relatively poor water resistance. This often restricts their use to steep-slope, architectural applications.

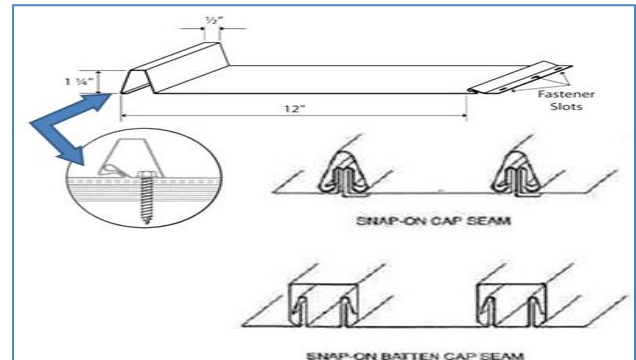


Figure 15-12
Proper Engagement of Snap Seam Joint

15.3 Mechanical Seams

Mechanical seams are joined together by using hand-seamers, tongs, or electrical seaming devices. These tools, as discussed in Section 12.9 *Seaming Tool*, can turn a seam completely over itself, producing a weatherproof seam similar to a traditional double-locked seam. Other seam configurations may be partially crimped or folded to produce the desired result. See Figure 15-13.

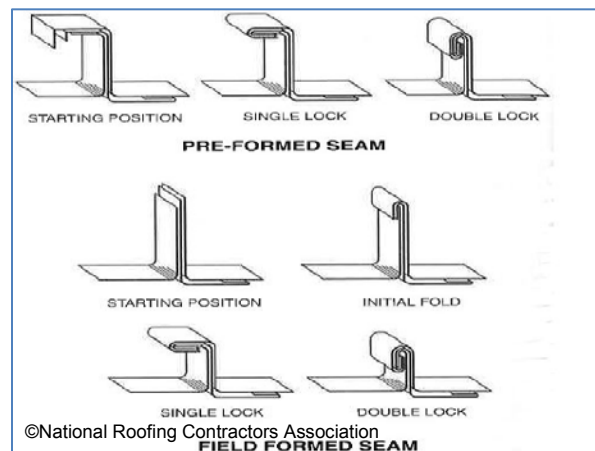


Figure 15-13
Mechanically Formed Seams

Mechanically formed seams tend to remain firmly attached to the roof structure. This is because, in many cases, the panel clip is also folded over and becomes part of the rolled seam. This is illustrated in Figure 15-14.

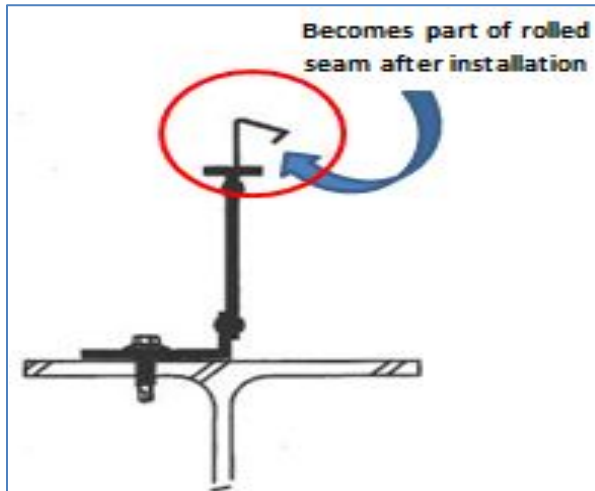


Figure 15-14
Steel Beam Mounted Panel Clip for
Use with a Mechanical Seam

15.4 Critical Components

The critical components discussed in this section, sealant and stitching, are critical to each installation. No matter which seam joining method is used, the same key points of each of these components apply.

15.4.1 Sealant

When sealant is used during the seam installation, the sealant type, amounts, and location are key factors for the installer to consider. Sealant is detailed in Chapter 13, and should be reviewed as part of understanding this critical component. Some sealant highlights will be repeated here for clarity.

When required, most metal panel seams will use a butyl-type sealant. This sealant remains sticky, does not harden, nor "skin-over." It should always be installed between

the metal surfaces and never externally applied as shown in Figure 15-15.

When sealant is used in a seam joint, it is often compressed by the fasteners and clips used to secure the panel. The installer should make sure that, when the joint is compressed, no sealant is squeezed out and is exposed on the roof surface. Butyl sealant quickly deteriorates when exposed to the ultraviolet rays of the sun. Exposed butyl sealant will also smear, gather dust and dirt, and mar the appearance of the roof surface.



Figure 15-15
Butyl Sealant Should NOT be Externally Applied

The amount of sealant used must also be controlled by the installer. This is easily done when a tape format sealant is used, but more challenging when tube-format sealant is required. Excess sealant may be squeezed onto the roof surface or distort the roof surface. During any sealant application, any excess sealant should be quickly removed, and the surface cleaned using approved cleaning materials.

Sealant location is important, especially when fasteners are used. Fasteners must be located and installed in the correct relationship to the applied sealant. This relationship is illustrated in Figure 15-16 and follows most installation and manufacturer recommendations.

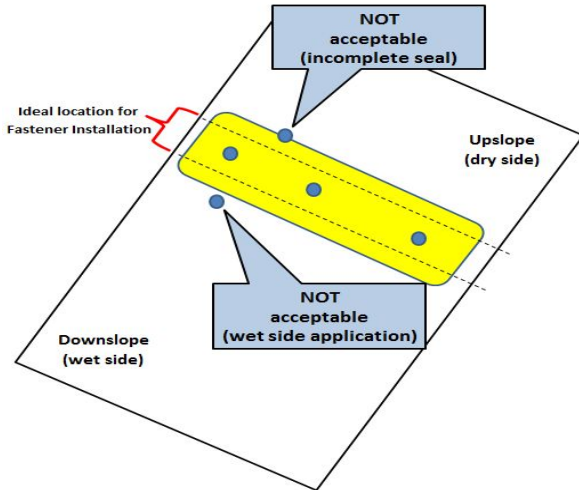


Figure 15-16
Fastener and Sealant Orientation at the Seam

15.4.2 Side Lap Fastening

On through-fastened type panels, joining is the process of attaching, or seaming, thin sheet metal panels to other thin sheet metal panels, or to thin metal trim or flash pieces. Short "sheet metal screw"-style fasteners, called lap screws, are used. These fasteners are often referred to as "stitching" screws. While primary fasteners are used to secure the panels, plus withstand various roof loads, stitch fasteners are only used to secure the thin sheet metal components to each other. This difference and typical fastener locations are illustrated in Figure 15-17.

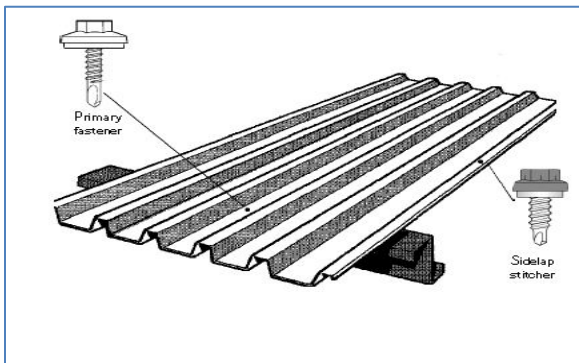


Figure 15-17
Locations of Primary and Stitch Type Fasteners

Caution should be used when installing stitch fasteners. They are easily stripped, and must be replaced with a different size fastener when this occurs.

Summary

The joining of roof panels is a major and critical part of any installer's work. Proper joining of the roof seams allows the roof membrane to act as a single unit, protect the area beneath the roof, and perform as designed.

Installer Note

The information provided in this manual does not supersede installation instructions provided by the manufacturer. Always consult the manufacturer's instructions and/or detailed shop drawings for information specific to each project.

Notes:
