



Standing Seam Roof Systems – General Information Guide

This guide can be used in conjunction with the McElroy Metal Installation Manuals to help plan and organize the installation of the McElroy Metal standing seam roof systems. The Installation Manuals will help identify parts, establish the installation sequence, demonstrate correct assembly, and point out areas or procedures requiring special emphasis or attention.

Custom roof conditions, including custom details and instructions, should be included in the erection drawings. In case of conflict between the installation manuals and the erection drawings, the erection drawings will take precedence.

Customer's Responsibility

Suitability of details

It is the responsibility of the customer (or designer) to ensure that the details meet particular building requirements to assure adequate water-tightness. It is also the customer's responsibility to determine suitability of supplemental details. Although McElroy Metal makes recommendations regarding roof slopes, the use of sealants and certain fasteners, it is common and acceptable to deviate from these recommendations as long as the customer (or designer) has reviewed and approved those deviations. However, McElroy will not be held responsible for any deviations or omissions.

Suitability of substrate or structure

It is the responsibility of the customer (or designer) to determine suitability of structure, or substrate for the standing seam metal roof system. It should be code-compliant and properly engineered and constructed for a structural standing seam roof system. It must be true and aligned to avoid panel distortion. Standing seam panels offer little or no diaphragm stability to the structure, and may not be relied upon for diaphragm support unless sufficient test data is provided.

Suitability of roof accessories

McElroy may pass along vendor information to its customers for insulation, pre-formed roof curbs, hatches, vents, pipe flashings and other ancillary items or roof accessory items as well as tools and specialty fasteners. This is done as a convenience to the customer and is not to be construed as an approval of any particular roof accessory item for any given application. It is the responsibility of the customer (or designer) to qualify other vendors and products with respect to quality and suitability for any particular application. McElroy assumes no responsibility for suitability or performance of materials and accessory items furnished by other vendors.



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Subcontractor Selection

All McElroy Metal roofing systems should be installed by a competent installer that is qualified and experienced in the installation of standing seam metal roof systems.

The installer should take time to study, understand, and follow the installation instructions. McElroy Metal does not guarantee and is not liable for the qualifications of installers. McElroy Metal is not responsible for defects that may be attributed to improper installation or the negligence of other parties, suitability of structure, substrates, adjoining work or adjacent materials. Although McElroy maintains a list of trained installers, McElroy will not guarantee or warrant an installer's performance.

Compliance with codes, standards, and sound industry practices

The customer is responsible for proper installation of the roof in accordance with the erection drawings and the installation manual for the roof system chosen. The installer is also responsible for sound construction practices as well as code compliance. In the case of tested and rated panel systems, it is the responsibility of the customer to see that actual construction complies with the tested and rated assembly in every detail.

- Panels should be installed straight and accurately.
- Roof clips shall allow for thermal movement and must be installed in strict accordance with McElroy Metal erection drawings and installation manuals with respect to type and quantity of fasteners as well as clip spacing along the panel seam.
- Thermal movement of panels must be considered when attaching to adjacent materials.
- All areas of roof must have positive drainage (See installation manuals for minimum recommended pitch) and not allow ponding in any area of the roof.
- Owner/designer is responsible to verify adjacent or existing structures are compatible with McElroy Metal products and details.
- No penetrations whatsoever shall be placed in the panel system by fasteners or other roof ancillaries except as shown on the erection drawings or installation manuals.
- Cutting panels and driving fasteners will create metal shavings. These metal shavings must be swept or removed from the panel surface. Failure to do so will cause rust stains on the panel surface and will void any warranty.
- Only McElroy Metal furnished or approved sealants shall be used, and only as shown on drawings and within the installation manuals.
- Some field cutting and fitting of panels and flashings is expected and considered part of normal installation.
- "Oil Canning" of the flat portion of metal panels is inherent to metal panels and a common industry phenomenon. It shall not be considered cause for rejection.
- McElroy Metal should provide all flashings, closures, and accessories shown on the erection drawings or installation manuals, unless noted otherwise. Installation



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procedures shall be in accordance with McElroy Metal printed instructions, details, and approved shop drawings.

Checking the Structure

Prior to installation, roof structural members should be checked for overall dimensions and evenness of plane. Unevenness in plane may cause excessive oil canning or other deformity of panels. Also, roof structural members nearest the panel end laps, ridge or high eave should be checked against panel length for correct location to properly accommodate the roof components, e.g. proper lap dimensions and overhangs, etc.

Allowable tolerances

To ensure the roof system's integrity and designed weather tightness, the structure must be aligned within the following tolerance:

- The allowable out of square of the rake line to the eave line and ridge line is 1/8" for each 20' foot of rake run.
- Structure Length and Rake Straightness - The roof system is designed to accommodate $\pm 2"$ of overall structure length error, or $\pm 1"$ of rake straightness error at each rake.

Although these structure alignment tolerances will allow for ease of installation, the extremes of these tolerances may be aesthetically objectionable. For instance, if the rake flashing is perfectly aligned, and the above 2" error is exhibited in the panel seam adjacent to the rake flashing, the eye may detect such error quite easily. For this reason, on steep-sloped or architectural roofs, discretion should always be exercised, and closer tolerances may be necessary in some instances.

To ensure that the accumulation of structure length and rake straightness does not exceed the roof system's tolerance, the structure length should be measured from rake line to rake line at each eave, at the ridge, and at each point where there is a significant change in rake straightness.

To ensure that the structure width and eave straightness does not exceed the roof system's tolerance, the structure width should be measured from eave to ridge at each rake, and at each point where there is a change in eave straightness.

Any structure alignment error, which exceeds the above stated tolerances, must be corrected before roof installation can begin. If uncorrected, errors that exceed those stated may require special details, additional materials, modified parts (with additional cost, fabrication and



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delivery time), additional installation time, and modified construction details. McElroy Metal may not guarantee the performance of such modified details.

Receiving and Handling Roof Materials

Equipment for Unloading and Lifting

Hoisting equipment is necessary to unload and position the panels and accessory crates for site storage and installation. The equipment must have sufficient capacity and reach to place the materials where it is required for efficient installation. A forklift should be handy for unloading and placing shorter panel and accessory crates.

Nylon slings will be required to avoid panel damage. Slings should be 8" minimum width and 6'-10' long to accommodate the panel bundle girth. Sling capacity should be at least 6000 pounds. Never use wire rope slings.

A spreader may be required for panel crates over 25' in length to assure correct sling spacing and uniform lifting. The spreader must be sized to handle the panel crate weight.

Handling Roof Panel Bundles

Under normal conditions, panel crates over 25' long should be lifted with two slings spaced at greater distance than third points. Panel crates less than 25' long may be lifted with a forklift only if the forks are spread at least 5' apart.

Slings should be located near the cross boards.

Loads should always be checked for secure hook-up, proper balance, and lift clearance.

Tag lines should be used if necessary to control the load during lifting, especially if operating in the wind.

When moving panel bundles, extreme caution should be taken to prevent damage to the panel edges. Un-crated panels should be supported at each end and at 8' spaces.

Some panels are designed to install from either left-to-right or right-to-left, while others may be installed in either direction. Care should be taken to determine which direction the panel system must be installed.



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Material Inventory

All material is carefully inspected and crated before leaving the plant and accepted by the transportation company as being complete and in satisfactory condition. It is the carrier's responsibility to deliver the shipment intact. It is the consignee's responsibility to inspect the shipment for damages and shortages when it is delivered.

Conducting a material inventory at the time of delivery is essential. By conducting the materials inventory, the installer is able to identify any material shortage or damage and avoid delays to installation later because of such shortage or damage. In the case of packaged components (such as clips, fasteners and sealants, etc.), the quantities are marked on their container and should be checked against the bill of materials.

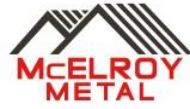
Shortage or damage of the delivered materials must be noted and clearly marked on the bill of lading before signature of acceptance. Notify McElroy Metal immediately of any conflicts. McElroy Metal will not be responsible for shortages or damages unless they are noted on the bill of lading. Signature on the bill of lading is acknowledgement that the shipment is complete and undamaged.

Field Storage of Roof Materials

Upon acceptance of the shipment, the customer or his representative is responsible for proper handling storage and security of the roof materials.

Roof materials should be stored on the jobsite as follows:

- Store panels in a protected area, out of standing water and drifting snow, etc.
- Elevate panels with blocking to allow air circulation under the bundle.
- Slope panels for drainage of moisture from the panels.
- As necessary, cover panels with waterproof tarp, allowing for air circulation (do not wrap tarp under panel crate or restrict air movement).
- Inspect panels daily for moisture accumulation.
- If panel bundles contain moisture, the panels should be dried and re-stacked. Use care in restacking to avoid damage to panels.
- Opened or restacked panel crates should be secured to prevent wind damage.
- Trim and accessories should be stored in a secure area and protected from damage, weather, and theft.
- Fasteners, sealants, closures, etc. should be stored out of the weather and protected from contamination.



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Roof Installation Basics

Tools and Equipment

Before beginning installation, be sure that the proper equipment and tools are on hand. The tools required for installing McElroy Metal Standing Seam Roof Systems are standard for the metal construction industry. The tools must be in good operating condition and operators should adhere to safety precautions at all times.

The following tools and equipment should be considered for efficient installation of the McElroy Metal standing seam panels. Actual tools and equipment required may vary due to variations in building type, construction, crew size, etc. This list should not be interpreted as a limitation to your inventory of installation equipment.

Screw Guns...1800-2000 RPM designed for use with self-drilling screws

Hex Socket Heads...5/16" and 3/8", magnetic

Drill...1/4" capacity

Drill Bits

Power Shears & Nibbler

"C" Clamps

Pop Rivet Tool

Sheet Metal Hand Snips...center, left and right cut

Hack Saw

Steel Measuring Tapes

Caulk Guns

Power Source and Extension Cords

String Lines

Brooms

Marking Pen

Chalk lines

Roof Clip & Thermal Spacer Application Guide

The following guidelines should be used when selecting the appropriate roof clips and thermal spacers for the Maxima, MLFS, and ML90 Roof systems. The Maximum insulation listed is based on the UL-90 ratings for these panels.



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Insulation/Thermal Spacer Selection Guide			
Insulation Thickness	Low Clip System	High Clip System	Tall Clip System
No Insulation	3/8" thermal Spacer	Not recommended	Not recommended
3" Insulation	No Thermal Spacer	1" Thermal Spacer	Not recommended
4" Insulation	No Thermal Spacer	5/8" Thermal Spacer	Not recommended
6" Insulation	Not recommended	3/8" Thermal Spacer	1" Thermal Spacer
8" Insulation	Not recommended	No Thermal Spacer	5/8" Thermal Spacer
10" Insulation	Not recommended	Not recommended	3/8" Thermal Spacer
12" Insulation	Not recommended	Not recommended	No Thermal Spacer

Thermal Spacer Disclaimer

The above chart is only a guide. There are many blanket insulation manufacturers and as such the densities of the insulation vary from manufacturer to manufacturer. This needs to be considered when selecting the appropriate clip system and thermal spacers. The different densities may affect the appearance of the metal roof system. In the end it is the installer's responsibility to make the correct selection. McElroy Metal does not require the use of thermal spacers with its metal roofs systems however, the building owner or architect may. In certain climates the lack of a thermal spacer may cause a thermal break to occur which could lead to condensation. If a thermal spacer is not used on un-insulated building a rumbling to "thunder" type noise may be observed to be more pronounced. If a thermal spacer is not used, panel modularity may be more difficult to hold. Using too much or too dense insulation may result in purlin read through, may be more difficult to install, and/or may cause difficulty in holding panel modularity.



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Sealants

Temperature extremes must be considered during installation of the roof due to the sensitivity of sealants. Temperatures below +20° F may cause the tape and tube sealants to stiffen resulting in loss of adhesion and compressibility. On cold days it is a good idea to keep sealants in a heated place until immediately prior to use. At very high temperatures (+120°F or more), the sealant may become too soft for practical handling. On very hot days, keep sealants in the shade when possible, or in an ice chest or cool place.

To assure proper adhesion and seal, the tape sealant must be compressed between the panel and the flashing surfaces with firm and uniform pressure. The required pressure is typically applied by the clamping action of screws pulling the adjoining surfaces together.

Contamination and Release Paper

To assure proper adhesion and sealing, the sealant must have complete contact with the adjoining surfaces. Butyl sealants will adhere over minor evaporating oils and light presence of moisture. Under normal conditions, no surface preparation is necessary for these sealants. Excessive contaminant's, water, oil, drilling residues and dirt may prevent good sealant adhesion and should be removed prior to placing sealant. Panel and flashing surfaces must be reasonably dry and reasonably clean for a good sealant bond.

Tape sealant is provided with a protective paper to reduce contamination. Paper should be left in place until just prior to engaging the sealant. If tape sealant surfaces become excessively contaminated, it should not be used. Incomplete removal of the protective paper will prevent the sealants adhesion to the panel or flashing surfaces. Always check that the release paper is completely removed immediately before the panel or flashing is installed over the sealant.

Thermal Expansion and Contraction

The standing seam roof design should take into account that the roof panel will expand and contract with change in temperature. Although very little change could be happening in the ambient air temperature, the roof panel could experience great differences in temperature. Aluminum panels will expand and contract about twice as much as steel panels, so even greater care should be taken when utilizing aluminum roof panels. Care should be taken at termination points such as eave and ridge to accommodate the expansion and contraction. McElroy Metal



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has developed details and clip systems for standing seam roofs that will accommodate these extreme movements.

Roof Panel Noise

Because the panel is expanding and contracting, utilizing in most cases, a floating clip, noise from the clip sliding and or the panel flat distorting can be heard through the roof system during the expansion or contraction of the roof panel. This noise can be magnified through a common construction practice utilizing rigid insulation and metal deck. The metal deck will act like a drum skin and transmit any noise the roof is causing through the system and into the interior space. This sound can be lessened by the use of insulation such as in the case of an attic space and drop-in ceiling with blanket insulation.

Roof noise can also be caused by wind fluttering or chattering of the roof panel against the deck. Again this can be lessened by the use of insulation directly under the panel and over the deck or by utilizing an attic space type construction.

Lightning

Although many have concerns over the susceptibility a metal roof has to being struck by lightning, this concern is unwarranted. The fact that a roof is covered by metal does not increase the structures vulnerability to lightning strikes. The probability of a lightning strike is determined by the structures size, height, and the height of the surrounding structures, landmarks, or trees. Lightning is attracted to the highest structure regardless of the type of construction material. Metal roofing is actually a preferred material since if it is struck by lightning, it is non-combustible, and will not contribute as a fuel source to any fire resulting from a lightning strike.

Strippable Film

In order to protect certain areas of the panel system from abrasion during packaging, transit, or construction, a strippable film is applied prior to manufacturing. This film must be removed as soon as possible after construction. Leaving this film exposed to sunlight (UV) for any extended period of time will cause the film to begin to break down causing the removable to become very difficult. The UV causes the film to break up into very small pieces instead of being able to peel off in a large sheet. The additional time required to effectively remove this film can be exponential in nature.



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Condensation

Any air space underneath a metal roof, regardless of size, must be either insulated or ventilated, or both. Condensation occurs when warm moist air reaches a cool surface. In the summertime this is observed as dew on the roof and is not harmful to the roof system or the structure. However, in the wintertime, the warm air from inside the heated living space will rise to the roof and condensate on the bottom of the cool metal roof. In order to prevent this, insulation with a vapor barrier must be installed underneath the metal panel, or the air space should be ventilated to replace the warm moist air with cool dry air. In some instances both insulation and ventilation might be required. The customer should contact an HVAC expert to determine the requirements for the area in which the structure is located.