

# Pipe and Other Penetrations in Standing Seam Metal Roofs

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With the wide variety of panel profiles, widths and finishes which are now available, plus the longevity of metal, standing seam roofs have become a popular option when designing buildings for multiple uses.

This popularity, and subsequently the increased complexity and various requirements for rooftop equipment, dictates that the design professional, general contractor, metal roofing and other trade contractors must consider the many different penetrations that a typical standing seam roof may require. This includes plumbing vents, heater flues, ducts, electrical and information cable penetrations, lightning protection, structural columns, parapet walls and just about anything else you can imagine.

Obviously, any time a standing seam roof has a penetration put into it, there is a possibility of a leak. Therefore it is critical that everyone involved in this process understand what is required to ensure that the finished roof, penetrations included, is capable of long term (20 years minimum) performance.

Some of the above referenced penetrations will be installed by the roofing contractor while others may be installed by electrical, plumbing, HVAC or other contractors. A critical item the design professional should cover, both in the specifications and in the preconstruction meeting, is that all work on a standing

seam roof that is not performed by the roofing contractor should be coordinated with both the roofing contractor and design professional to ensure that it is properly located, installed and no damage is done to the standing seam roof.

The design professional must also make sure that the materials to be used will not adversely affect the long-term performance of the standing seam roof. This will be especially critical if the roof has a weathertightness warranty that covers roof penetrations. A real world example of this issue is allowing HVAC contractors to supply roof curbs for their AC units. Most HVAC contractors, because of their lack of knowledge of special requirements for standing seam roofs, are going to provide an inferior and unwarrantable roof curb. The HVAC contractor will typically provide a galvanized curb with a 4" flange on all sides. While this curb works well in a built-up roof, it is about the worst thing you could put on a standing seam roof. It is far better to have the roofing contractor supply all curbs for a standing seam roof to ensure that the proper curbs are utilized.

Following are some additional recommendations for various types of roof penetrations that will help prevent costly mistakes on standing seam roofs.

## Pipe Penetrations

Pipe penetrations, whether they are plumbing vents or some other type of pipe should adhere to the following guidelines. Do not use residential type roof jacks or those designed for other roof types. They will not last and in the case of lead hats, can actually cause corrosion of the Galvalume® substrate.



This lead hat is causing galvanic corrosion of the Galvalume® coated panel.



This roof jack for a rubber roof will not stay glued to the metal panel.

Use only a rubber roof jack made specifically for use with metal roofs. This product combines an EPDM rubber boot (or silicone for high heat applications) with a bonded aluminum band to allow a compression seal to be formed at the roof panel. Standard EPDM roof jacks can withstand temperatures up to 212°. High-heat, silicon based roof jacks can withstand temperatures up to 437°. Also, retrofit roof jacks are available in both temperature ranges for applications in which the roof jack cannot be slipped over the top of the pipe. Further, use only roof manufacturer approved tape and caulk sealants and long-life fasteners at all exposed fastener applications.



This standard rubber roof jack is rated for temperatures up to 212°.



This silicone rubber roof jack is rated for temperatures up to 437°.

Never allow a pipe to penetrate the standing seam. It is almost impossible to seal the rubber roof jack to the panel seam in a manner that will be leak free for the life of the roof. Always install the roof jack onto a relatively flat surface.



It is almost impossible to seal a rubber roof jack to a panel seam

In Northern areas, vent pipes should be protected to prevent sliding ice and snow from damaging the roof. On roofs with slopes as low as 2:12, sliding snow, impacting an unprotected pipe, can tear the metal roof or shear the pipe off flush with the roof.



This roof jack has been ruined by sliding snow.



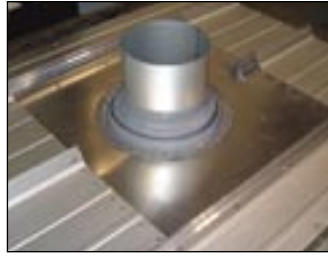
This pipe penetration has been protected from impacting sliding snow.

Also, never allow a pipe to block the water flow down the roof panel. When a pipe is encountered that is too large to fit in the flat of the panel without blocking the water flow, use an aluminum pipe curb to allow the water to flow around the pipe and to provide a large, flat area in which to seal the roof jack to the roof surface.

## Pipe and Other Penetrations in Standing Seam Roofs



This large pipe is blocking the water from draining off of the roof.



This mock-up shows how a pipe curb allows the water to flow around the pipe and also allows the roof jack to be installed to a flat surface.



Surface caulking a flashing to a parapet wall will not provide a long-term seal.



This cricket provides a complete seal at the end of the parapet wall, eliminating the need for surface applied sealant.

Two-piece pipe curbs are available when the pipe is already in place, such as at an equipment platform. The two-piece design allows for the pipe curb to be properly shingled into the roof to prevent a “back water” lap.



Improper flashing at structural pipe.

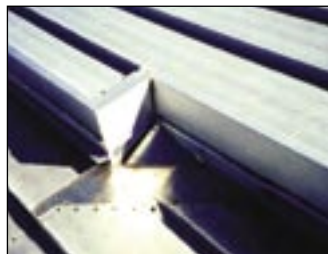


Two-piece pipe curb and retrofit rubber roof jack.

With proper upfront planning, offsets in parapets walls and other unusual design elements can be successfully implemented using welded aluminum crickets and fixtures. The key is to provide a complete seal at the corners by welding the material, which cannot be done with sheet metal crickets. Also, the welded cricket can be “shingled” into the roof to prevent “backwater laps”.



Without a welded aluminum cricket, this offset will probably not perform long-term.



This welded aluminum cricket provides a parapet wall positive seal at the corners which typically leak when fabricated from sheet metal.

Any penetration installed by a contractor other than the roofing contractor should be coordinated with the architect/owner’s representative and the roofing contractor to ensure the following criteria are met.

1. The penetration is in a location that has the least amount of water draining in the immediate area.
2. It is in a location that can be properly sealed. There are no immediate obstructions that would make the seal to the roof unnecessarily difficult, thus preventing long-term performance. Never penetrate the seam of a standing seam roof panel.
3. The materials used are not dissimilar to the standing seam metal roof, such as, copper or lead; or of an inferior quality so as to have a short service life (less than 20 years), such as galvanized metal roof jacks.
4. Use roofing manufacturer approved tape and caulk sealants and long-life fasteners in all exposed fastener applications. Zinc plated fasteners will not last for 20 years and will void finish and weathertightness warranties.
5. The penetration must allow for thermal movement of the roof. Pipes or other penetrations that are rigidly attached to the structure below may not be able to move as the roof expands and contracts. In these cases, the hole in the standing seam roof should be large enough to allow for this movement without the roof panels impinging on the penetration.
6. **If the penetrations are to be included in a manufacturer’s weathertightness warranty, the manufacturer must approve in writing beforehand, the materials and methods to be used to install the penetrations. Failure to follow**

**this guideline may result in the penetrations being excluded from the weathertightness warranty.**

As standing seam metal roofs become more complex, with more and varied types of roof penetrations, the need for better details and communication between the design professional, roof manufacturer, general contractor and the various trades working on the roof becomes extremely critical.



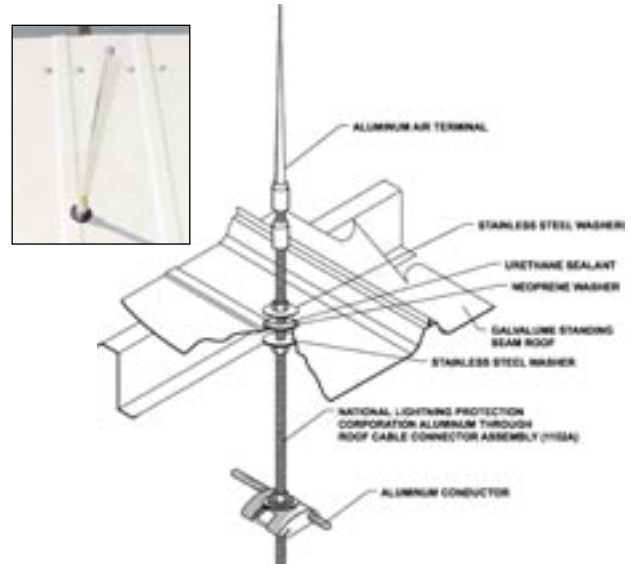
A penetration made by an electrical contractor without coordination with the roofing contractor, results in a poor penetration location which is not properly sealed.



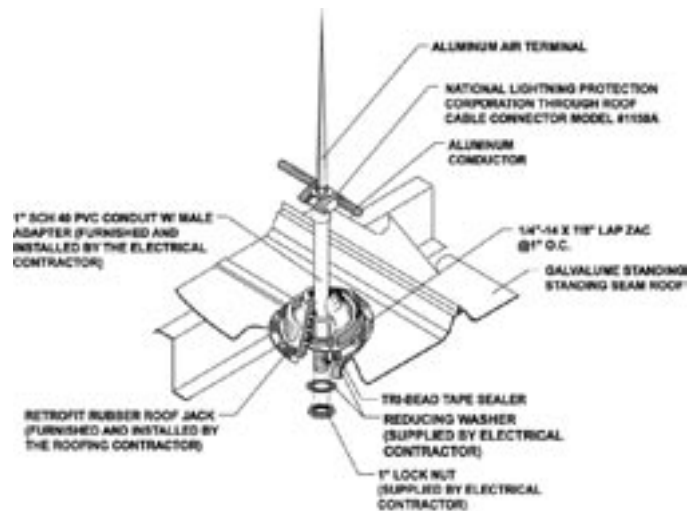
This lightning rod penetration is in the worst possible spot – in a valley where all the water is draining from the roof.

When this approach is taken seriously by all parties, everyone wins. The architect/owner representative can ensure that his or her client gets a roof that will perform long-term. The roof manufacturer is able to provide expertise that has been gained over a long period of time through working with similar details on roofs all over the country. The roofing contractor can leave the project knowing that the details are long-term and he will have little chance for leak call-backs. The general contractor is not involved in arguments over which trade contractor caused the roof leak(s).

The bottom line is: If we take the time up front to make sure everyone knows what will be required to make good roof penetrations, ensure that the correct materials are used and the proper techniques are utilized, the project will flow more smoothly and the standing seam roof will perform long-term.



This lightning rod penetration provides a long-term seal even though it could have been moved over, off of the minor rib of the standing seam panel. The detail (above right) shows the proper installation technique used to install the lightning rod in the picture at left.



This detail provides an alternate method of sealing a lightning rod penetration to a standing seam roof, which allows the electrical contractor to install the lightning rod penetration and the roofing contractor to provide the seal to the roof by using a retrofit rubber roof jack.



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