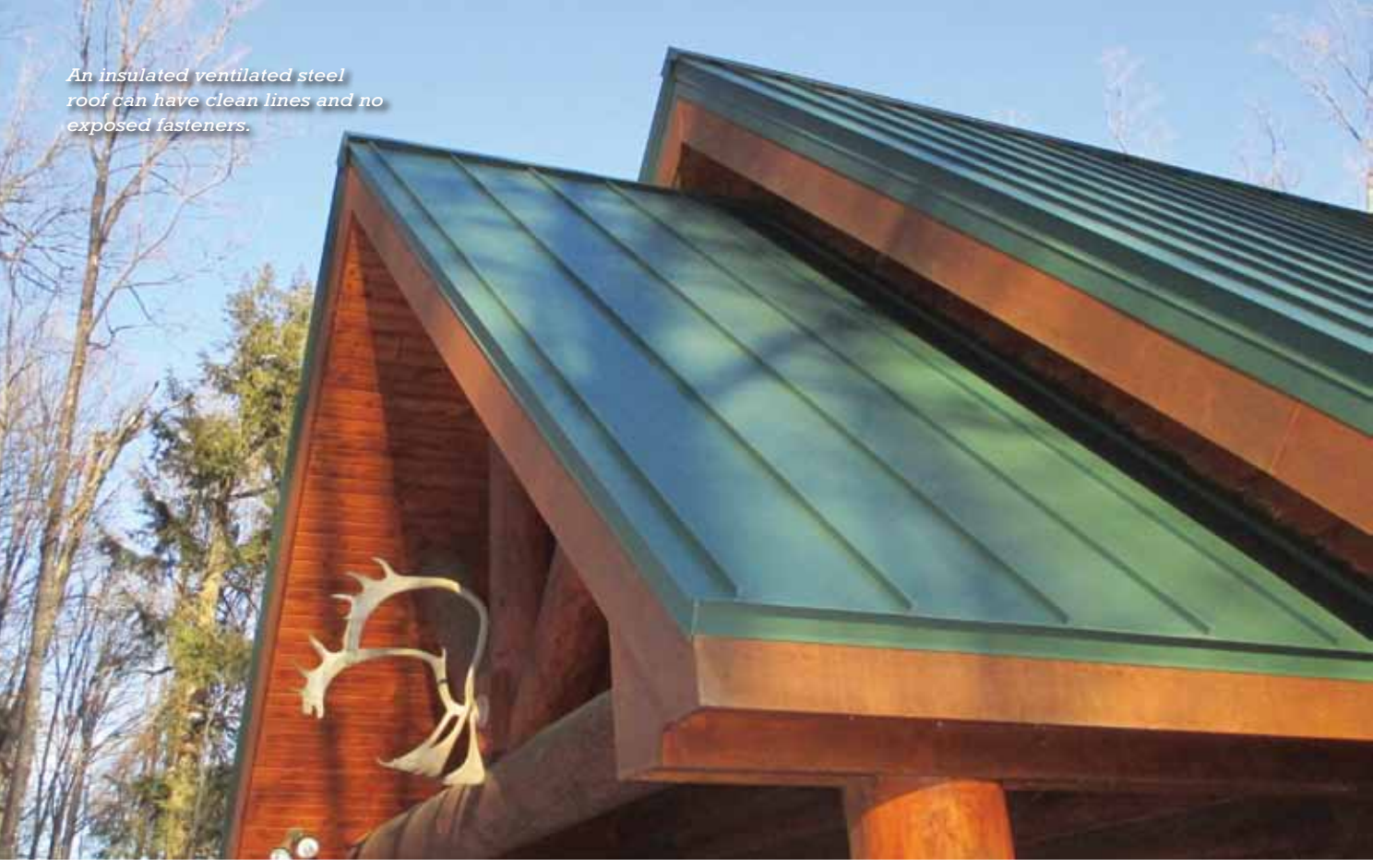


An insulated ventilated steel roof can have clean lines and no exposed fasteners.

VENTILATION
ADDRESSING ICE BUILD-UP

Michigan roofer offers his method for proper ventilation

By Dan Perkins, ***Dan Perkins Construction***

Metal roofing contractors are often called in when roofs leak due to ice dams because customers think (falsely) that a metal roof alone will solve their problem. Metal roofing contractors who have been talked into applying metal onto these problem buildings without addressing insulation or ventilation are generally called back at least once by the client when he finds out that his building still makes ice.

This has been a particularly snowy winter for us in Northern Michigan and eave ice issues have been a perpetual reminder of the importance of addressing the roof system as a whole when bidding a job, especially issues with the insulation and ventilation. It is always preferable to present and address these issues to the customer before the roofing job is done rather than to be called in afterward and asked to share the burdens of repairs associated with this oversight. Knowing and meeting code standards on insulation and ventilation will eliminate ice dams and more importantly the resulting leaking and roof damage associated with them.

There are three basic steps required to effectively guide your customer through this review.

When reroofing, remember to ask your customer if they have trouble with ice and check for the signs of ice e.g. water stains under soffits, on siding and on ceilings below eave areas. Look for physical damage on the roof eaves and at the base of valleys where heavy ice may have moved. Check the eave and ridge venting and make sure the air flow in unimpeded over a full insulation package. Make sure that air is being introduced into valley areas and allowed to flow over the roof planes above them. Look for these things in the blueprints of new construction as well because people still sometimes design buildings with these types of systemic flaws.

Have a well thought out solution for addressing the issues you see in the insulation and ventilation package even if it includes bringing in an affiliate contractor to do the work before you apply the roof.

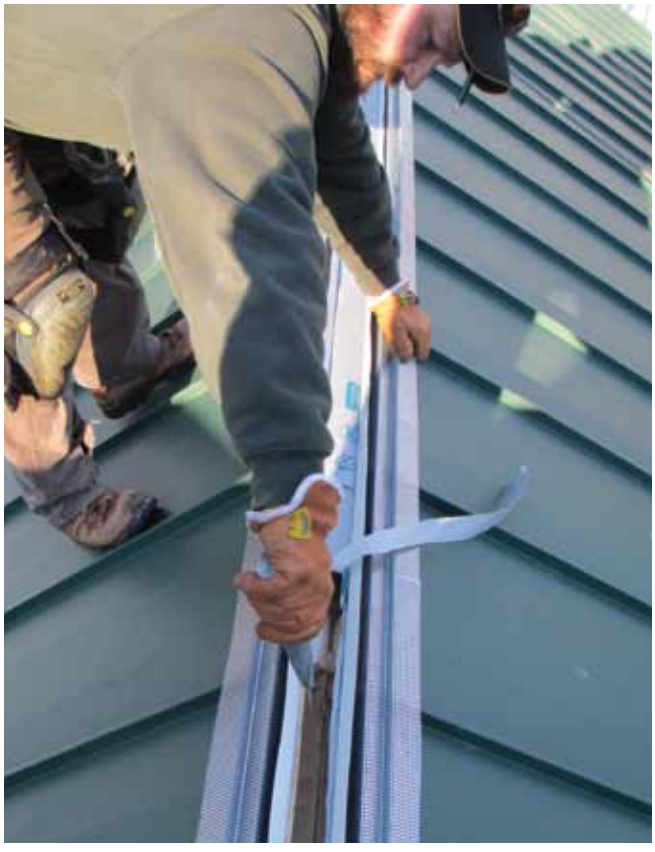
Have the materials available to effectively explain and verify your concerns. Ultimately, presenting this information to your customer is the credible and accountable approach to taking on the customer's roof project and most potential customers will recognize a level of professionalism and experience in this approach.

Understanding and implementing the ventilation code

Section R806 of the 2012 International Residential Code defines the ventilation requirements for enclosed attics and rafter spaces and the first line of the section explains that ventilation openings must be protected against the entrance of rain and snow. This sounds fairly obvious, but it has taken a good part of my career to perfect a ridge vent design that will not allow wind driven snow into the attic while still providing the Nominal Free Air (NFA) rating required to supply adequate ventilation at the ridge.

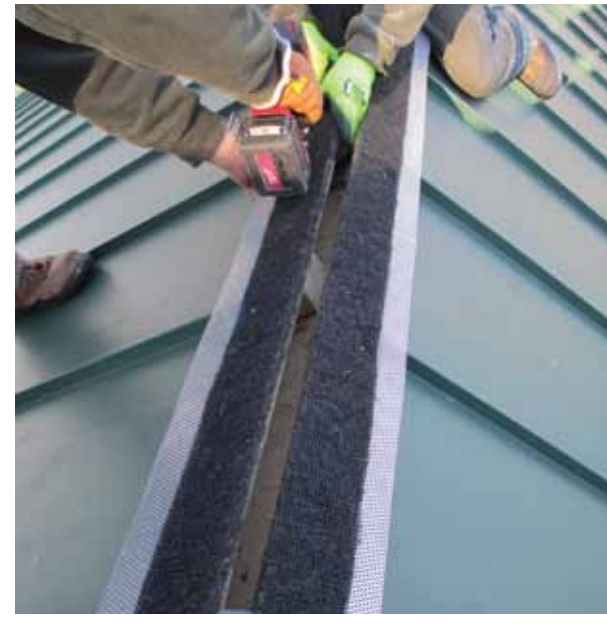
A metal ridge vent carries many job descriptions including strength, beauty and the encapsulation of safety harness anchors, but if it fails at keeping a three day snow blizzard with 50 mile per hour winds out of an attic area, you will be back to see your customer about water damage in the ceilings and ridge repairs. The ridge

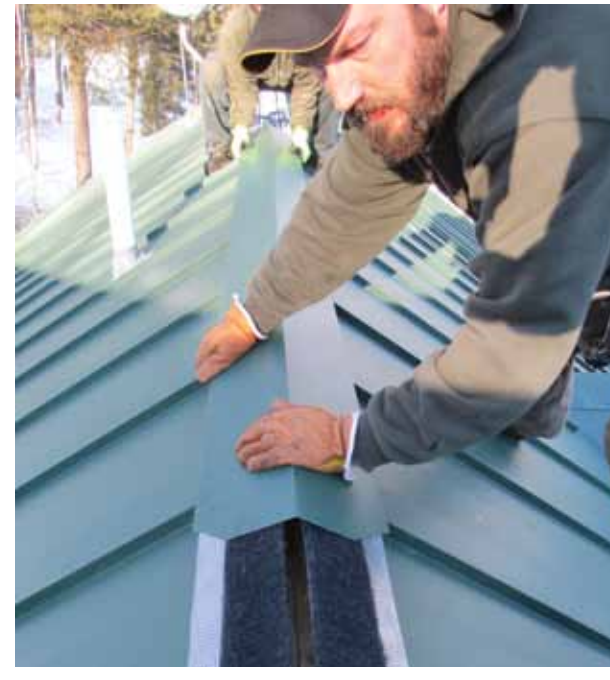
The ridge vent configuration shown has an NFA rating of 16 (16 square inches of free air per linear foot)



Left: Underlayment is removed to expose venting just before cap is installed.

Below: Venting fabric is applied into ridge with zip screws to prevent fine snow from infiltrating.





Ridge cap is applied by sliding it onto the vent assembly.

also has to effectively keep out bats, bugs and squirrels. This detail is addressed specifically in the code with air space size maximum values. It is the contractor's responsibility to keep pests out of the roof venting system.

The roof deck needs to be kept as cold as the outside air to prevent the snow on the roof from melting and refreezing at the eaves. This can only be achieved with air flow. The code required ratio of roof venting to the area below is 1/150. A simple way of rephrasing this is that you need roughly a square inch of NFA for every square foot of conditioned area (A square foot contains 144 square inches). The code mentions that this ratio can be reduced to 1/300 with the use of power ventilators or in warmer climates with the use of class I or II vapor retarders. These conditions rarely apply for us.

In a passive convection system with no power vents, the required air ventilation needs to be divided equally between the eave access and the ridge exhaust. If you take a one foot wide cross section of a standard gabled roof that is 32 feet wide from eave to opposite eave you have 32 square feet of area and you need 32 inches of NFA to vent it. This value is divided evenly between the eaves and ridge. That means that the NFA rating on the ridge cap needs to be 16 while each eave needs to be 8. This translates to 16 inches of free air per linear foot of ridge cap. Attaining the values at the eaves is easily achieved with standard full vent soffit panels, but when insulation and ventilation has to be applied over the existing deck the ventilation math needs to be done. Meeting those values at the ridge is not easy either. The ridge cap design shown is our standard profile and has an NFA rating of 16. We have to make a larger ridge caps when the building is more than 32 feet wide.

The vent stock we use for our ridge is 20-gauge perforated steel with 1/8-inch holes drilled every 3/32-inch on a stagger pattern. We buy it in 4x10 foot sheets. We use this product because it supplies 40 percent free air over its surface area while providing the strength we need as for the base of the ridge cap assembly. It also meets the code for critter infiltration with its tiny holes. Just be aware that improper assembly of the components can provide plenty of access for them and if you provide it they will come.

Our ridge design has been modified over the years to address issues of wind driven snow and critter infiltration. We now use a ¾-inch by 3-inch venting fabric and a baffle to inhibit wind driven snow and that has proven to work.

Admittedly, this is an expensive seven-piece system that amounts to approximately $7.50 per linear foot in materials. But we have arrived at it over decades of struggling with the consequences of not meeting all the required functions of a vented ridge cap and this is the most efficient and effective way we have found to do it right.

Eave venting applied over existing roof deck.

When the building has insulation deficiencies we try to address them from the attic, but if the construction contains angled or cathedral ceilings we have to provide the insulation and ventilation over the existing roof deck. This situation is actually so common that approximately half of the homes we now roof include insulated/ventilated build-ups before our new roof is installed.

A complete article on how we build a cold insulated roof can be found on my website in the articles section.

Our website can be found at www.danperkinsroof.com. ***MR***

Dan Perkins opened Dan Perkins Construction in 1986. Working and living in Marquette County, Michigan, Dan discovered the real challenge that contractors face with roofs in the harsh Upper Michigan climate: ice buildup and the subsequent leakage, excessive snow and extreme cold. It didn't take long for Dan to realize the answer to the ice and snow problems is metal! Since then, Dan Perkins Construction has installed more than 1,000 metal roofs in Upper Michigan.