

# Metal Roofing in Snow Country

Designing a System to Withstand Winter Weather

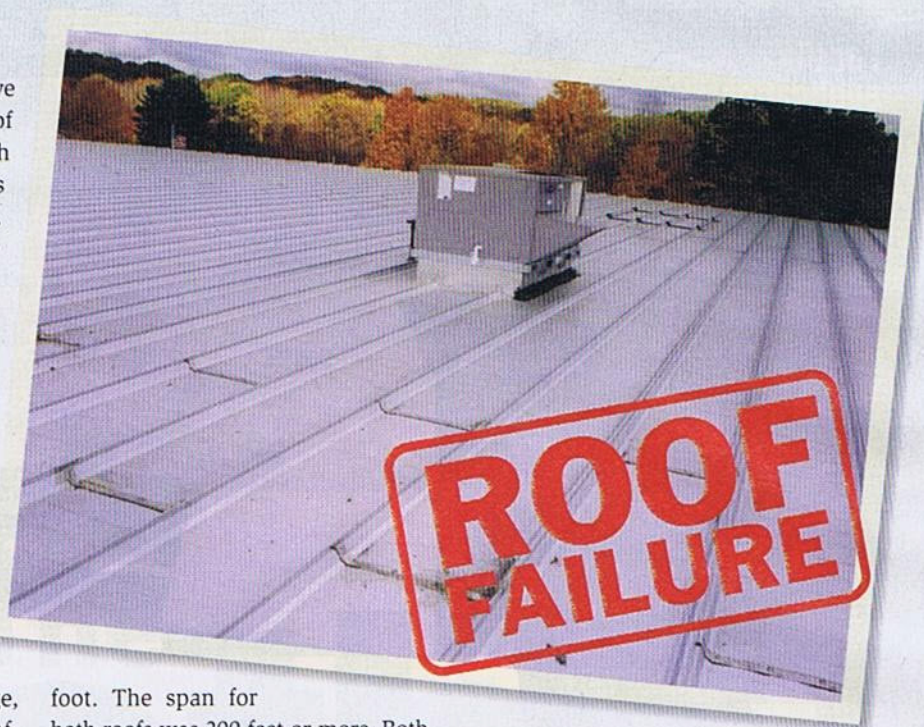
by William A. Lotz, P.E.

**M**etal roofing systems have a good track record of performance in harsh winter environments, as long as they are properly designed. The key factors are usually snow loading requirements, adequate slope, and the use of snow guards when needed. If these issues are addressed during the design stage and the roofing contractor does his job, these systems will almost always perform as intended.

However, of the hundred or so metal roofing projects we have consulted on, a good percentage suffered from the design flaws mentioned above. If these inadequacies are not corrected during the design stage, there are a number of solutions roofing contractors can take advantage of when retrofitting these structures.

## Low-Slope Standing Seam Roofs

Presently, we are consulting on a couple of metal roofs where the architect designed a slope of  $\frac{1}{4}$  inch per



foot. The span for both roofs was 200 feet or more. Both are located in Southern New England — not serious snow country for a Mainer like myself — but problems developed nonetheless.

It was February and the building owners didn't like the drips all over the floors. One building was an ice hockey rink and the other was an

electronics warehouse. We counted 90 stalagmites on the surface of the ice rink from drips coming from the leaking roof.

When the snow piled up on the roof, melting occurred and ice dams resulted in water ponding 3 inches deep. Metal roofs leak under these circumstances.

Some metal building manufacturers will not warranty a roof with a ¼-inch slope. Others allow a ¼-inch slope. A ¼-inch slope may work in Alabama, but one can expect leaks in Minnesota or Connecticut. We cannot think of any circumstance where we would recommend a standing seam roof with a slope of less than 1 inch per foot.

So how do you add slope to a metal roof that is leaking?

One solution that has worked for us is the Roof Hugger retrofit framing system that adds a new, sloped roof above the existing roof. The company produces sub purlins for all existing metal roof profiles that allow reroofing with your choice of any supplier's new metal panel. Wind loading can also be enhanced, purlin spacing decreased, roof steps removed and extra insulation added. Visit [www.roofhugger.com](http://www.roofhugger.com) for more information.

Another second approach involves installing EPS insulation between the flutes, polyiso insulation over the top and a single-ply roof membrane over the insulation. We have used the Duro-Shield metal retrofit system from Duro-Last Roofing Inc. ([www.duro-last.com](http://www.duro-last.com)) with success, and there are probably others.

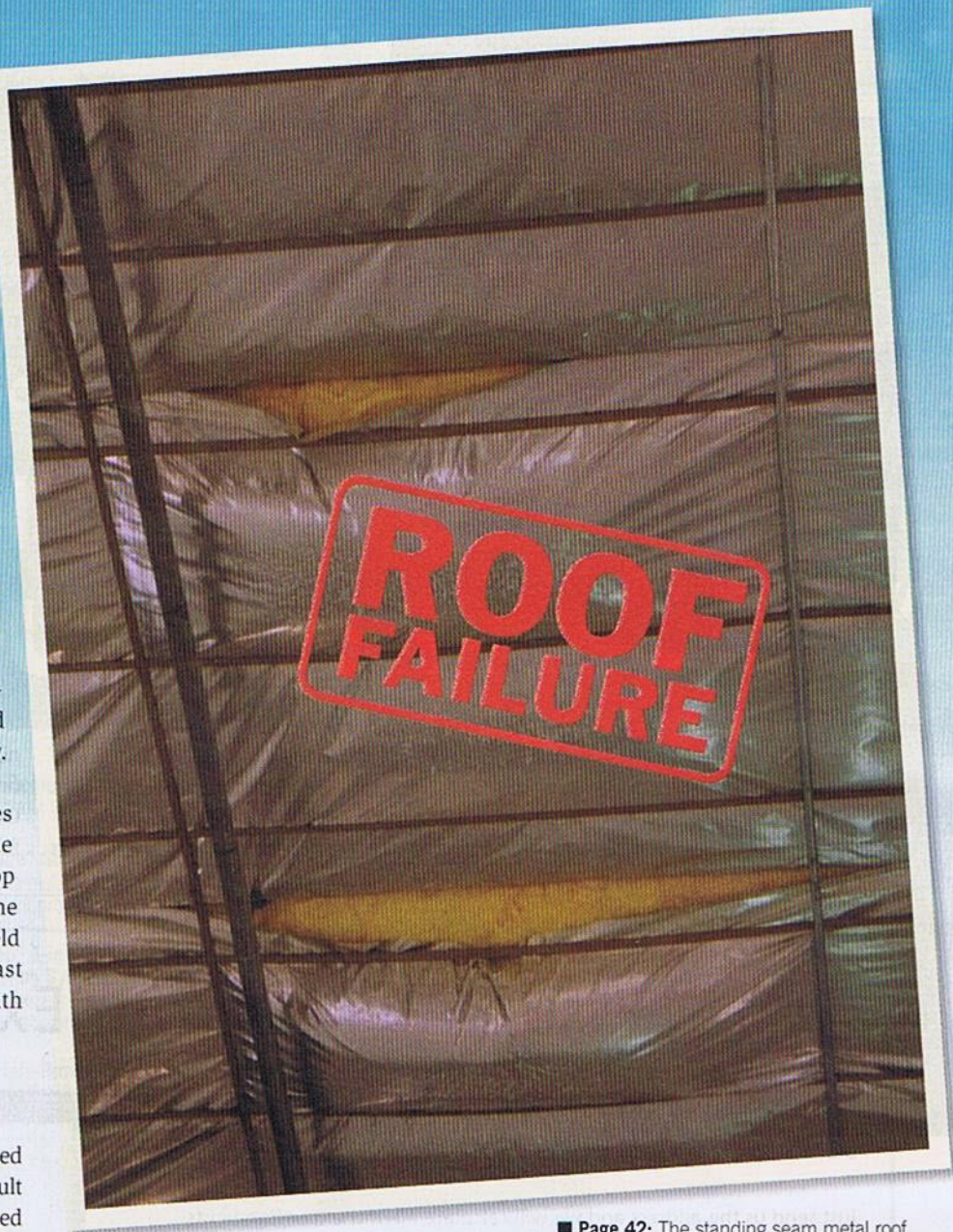
## Battling Condensation Problems

In both of the problem roofs mentioned above, some of the dripping was the result of condensation due to overlapped or rolled and stapled vapor barrier seams.

Where there is any significant humidity (over 30 percent relative humidity) inside a building in a cold — or even cool — climate, there will be condensation and dripping when the fiberglass facer is only overlapped, or folded and stapled.

The vapor barrier must be sealed and airtight in its entirety. The seams and penetrations must be sealed at the floor-wall juncture, at the wall-roof intersections, etc.

Because getting an adequately airtight seal can be difficult to achieve in the field, foam insulated panels are a good choice in cold climates for buildings with high interior humidity such as pools, printing plants, trash plants, etc.



There are several good pressure-sensitive tapes on the market to match the insulation vapor barrier facer. However, the tape will not seal to damp or dusty surfaces. Also, the tape must be pressed into place for a long-lasting seal. When properly installed, a quality tape will last the life of the building.

The metal building industry needs to address the issue of low-slope roofs in areas where it snows. Again, we suggest a minimum slope of 1 inch per foot. Unfortunately, it is frequently the contractor, not the architect, who gets sued when ice dams cause leaks.

Low-slope roofs are certainly good for my consulting business dealing with mois-

■ **Page 42:** The standing seam metal roof on this ice hockey rink leaked like a sieve a few weeks after the first snow arrived. The ¼-inch per foot slope was not adequate. A minimum slope of 1 inch per foot is recommended in snow country. **Above:** This photo from inside the rink shows ceiling insulation filled with water, with ice and water forming on the insulation facer.

ture problems. But they are not good for *Roofing Contractor's* readers, so issues of slope must be addressed early on.

## Snow Loading on Metal Roofs

We recently consulted on a Quonset building where the sales contract stated the structure could withstand a snow load of 80 pounds per square foot (psf). When the building collapsed, we estimated the

