# Snow Retention on Standing Seam Metal Roofs

by KEN BUCHINGER, *Vice President, Corporate Warranties & Certifications, MBCI*

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*The use of snow retention devices on metal roofs is certainly not a new practice. However, it seems that in many instances, the use of a snow retention system is not given adequate consideration before projects are released for bid. It is important to specify the type of snow retention device required for the project....*

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Many different systems are used. Some are effective, while many are not. For instance, never use a snow retention device that is attached with screws. This not only perforates the roof panels but it can also pin the roof and prevent it from floating as designed. Snow retention systems which utilize clamps that attach to the standing seams of the roof panels are typically the best choice. These clamps have been tested and can be engineered for the specific roof to which they will be attached, allowing for the snow load, roof slope, panel run length and other roof details. These clamps do not penetrate the roof membrane, do not hinder roof expansion and are easily installed with a screw gun.

S-5! ColorGuard snow retention system installed at the building eave utilizes clamps that attach to the panel seam without penetrating it.

It is also critical to determine the areas on the roof which require protection from sliding ice and snow. Oftentimes, the only areas that are considered for snow retention are building entrances or areas of pedestrian traffic, such as sidewalks, adjacent to a building sidewall. While these are indeed the most critical areas, other areas that require protection, often overlooked, include the following.

This picture shows how sliding snow reacts when encountering an obstacle such as a pipe penetration or gutter.

• If a gutter is used that has a face higher than the pan of the roof panels, the gutter must be protected from sliding ice and snow. Gutter is designed for one purpose – to channel the water to a downspout. It does not serve a secondary function as a snow retention device. Designers often assume that this "Southern style" gutter will hold ice and snow on the roof.

Gutter left unprotected cannot resist sliding ice and snow.

• Pipe penetrations should also be protected from sliding ice and snow. As ice and snow slides down a roof and encounters a pipe penetration, the force can cause the pipe to move down slope and damage both the roof jack and the roof, or shear the pipe at the roof surface. This can happen with PVC or cast iron pipe.

These pipes were left unprotected and have suffered damage due to sliding ice and snow.

Typically, only a short section of the snow retention system is needed to protect pipe penetrations. It is much less expensive to provide protection for penetrations such as vent and flue pipes than to replace them when sliding ice and snow shear them off of the roof.

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This pipe penetration has been protected from sliding ice and snow by installing a small section of S-5! ColorGuard to the panel seams immediately upslope from the pipe.

• Upper roofs that drain onto lower roofs also present problems due to sliding ice and snow. The upper roof should have a snow retention system installed to prevent ice and snow from falling onto the roof below which can cause extensive damage to the roof membrane and to equipment on the lower roof.

Snow falling from the upper roof has caused severe damage to this lower roof.

• Roof areas in which the panel seams are perpendicular to the main roof slope can also be damaged. Connector roofs or dormers are typical examples of this type of roof area. The main roof slope provides a surface for ice and snow to slide toward the eave. If it then encounters a roof surface that is perpendicular to this main slope, damage to the roof panels and trim on these roof areas can occur.

Ice and snow sliding down the main roof has damaged the roof panels and the valley trim on this connector roof.

A close-up of this dormer roof illustrates how the impact of sliding ice and snow can damage panel seams.

When the potential for damage to roof surfaces perpendicular to the main roof slope exists, it would be wise to protect these roof surfaces by installing a snow retention system immediately up slope from these areas.

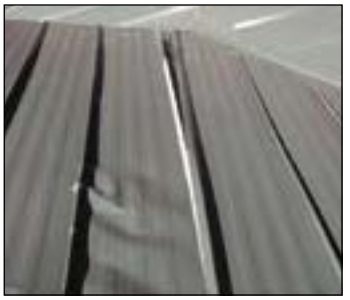
• Valleys in high snow load areas must also be protected from the effects of sliding ice and snow. Valleys allow for snow to slide down a surface that is perpendicular to the panel seams. This offers the potential to bend panel seams down or shear them from the panel.

The front of this church has snow retention and is undamaged by ice and snow.

The back side of the church has no snow retention. The result is severe roof damage due to sliding ice and snow.

It is critical that the snow retention system be engineered to withstand the snow design loads. Improperly engineered snow retention systems can result in failure of the system, and in some cases, major roof damage, serious personal injury or loss of life.

The snow retention system on this roof was not engineered for the snow loads. The sliding snow impacted the retention system, tearing it from the panel seams.



As the snow moved down slope in the valley area, the panel seams tried to force the snow to compact denser. Eventually the force of the snow put enough lateral pressure on the roof system to push the panels sideways. The panels buckled at mid slope, unseaming the panel at the end of the valley and...

...forcing the roof approximately 6" out of plane laterally.

As you can see, it is incumbent upon the design professional to give serious consideration to all areas of the roof when dealing with snow retention. The specifications should give direction as to what retention system to use and that it is designed by a registered, professional engineer, to meet the specified snow loads for the project. In addition to areas in which sliding ice and snow could harm a pedestrian or cause damage on the ground, all areas of the roof, subject to potential damage from sliding ice and snow, should be protected.

Ken Buchinger is Vice President of Corporate Warranties and Certifications for Houston based NCI Building Systems which owns MBCI. He is in charge of the company's Erector Certification Program, which trains erectors in the proper installation techniques of MBCI's metal roofing systems. He also is in charge of inspecting and approving projects for Weathertightness Warranties. In addition he is responsible for product testing, improvements, and development. Prior to joining MBCI in 1988, Ken erected metal buildings, architectural roofing systems and structural steel for 12 years. MBCI is a leading manufacturer of metal roofs, walls, soffits, and fascias.

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14031 West Hardy • Houston, TX 77060 • P.O. Box 38217 • Houston, TX 77238 • 281-445-8555 • www.mbci.com