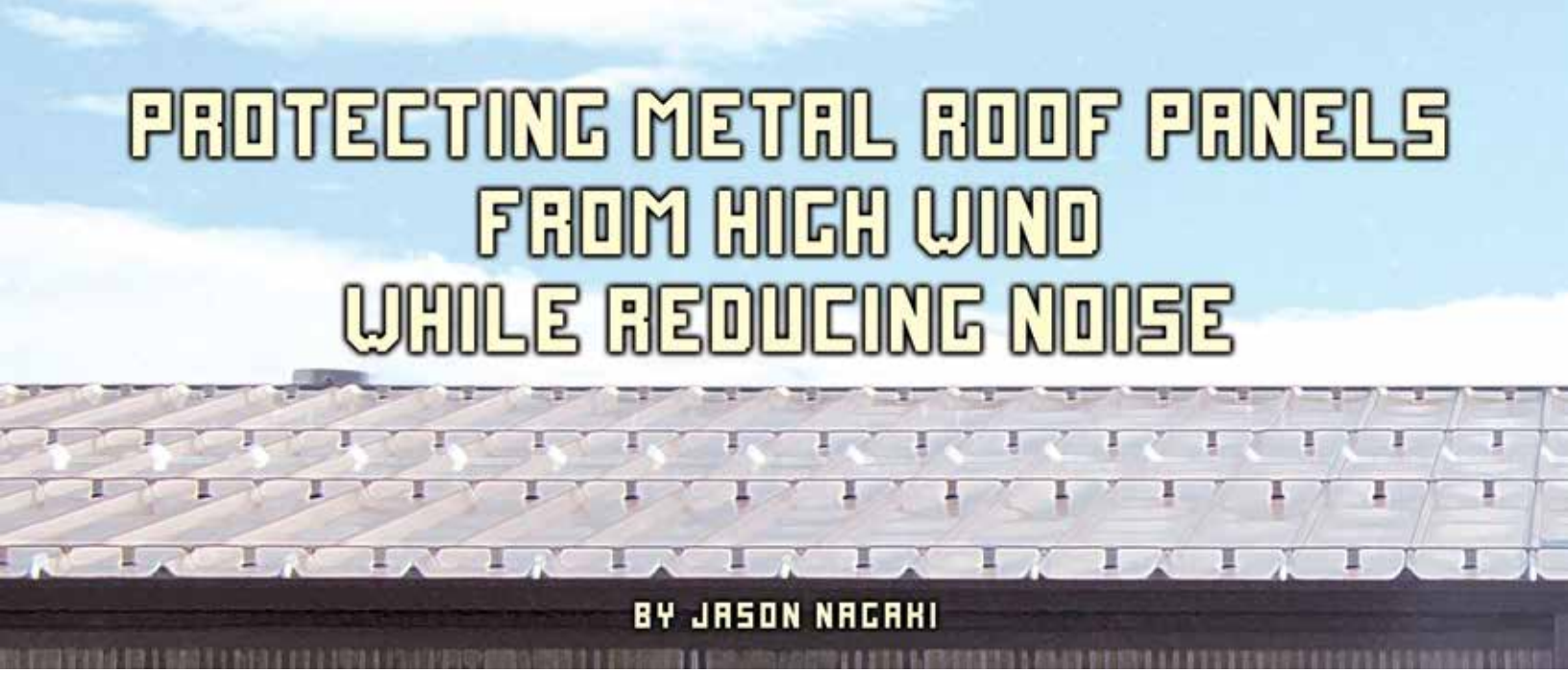
PROTECTING METAL ROOF PANELS FROM HIGH WIND WHILE REDUCING NOISE



BY JASON NAGAHI

In an area with hurricanes or high winds? Have a standing-seam metal roof that cannot meet the new wind load requirements? What about a metal building that makes lots of noise when it's windy? One product solution may be an external purlin system.

An external purlin for standing seam metal roofs, called WINDBAR, can add uplift strength to new and existing roofs. The principle behind the system is a patented Windstopper foot. A nonpenetrating clamp is placed evenly between roof clips on the standing seams, a square bar spans between clamps, and a bent metal strap attached to the bar over the middle of the panel prevents the panel from lifting. This "foot" then holds down the middle of the panel, resisting uplift under negative wind pressure.

ASTM E1592, *Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference*, is the standard that governs wind uplift. It simulates negative wind pressure on a roof panel system. During the test, the middle of the standing-seam roof panel arches upward to such a great extent that it disengages the seams, causing roof failure.

The company tested a standard 18-in.-wide, 24-gauge snap-together roof panel using the ASTM E1592 guidelines with its system and observed considerable improvements in performance with minimal seam deformation. For example, when roof clips were placed at 4 ft. on center with the external purlin system at 4 ft. spaced between the clips, the panel performance was doubled. Without the system, the panel failed (due to seam disengagement) at 41.6 psf. With the system, the panel failed (due to clip deformation) at 78 psf. Even more impressive, when the same roof panel system was tested at 1 ft., 6 in. on center, the limits of the testing chamber were reached before panel failure occurred. Without the external purlin system, the panels failed at 80.6 psf. With it attached, 250 psf—the maximum capacity of the test chamber—was reached. Thomas M. Shingler, PE, registered structural engineer and president of Design Dynamics, Inc. of Dallas, TX, observed the

External purlins prevent panel uplift (photo courtesy of Marc Boulay).

External purlin system on a standing-seam building in South Florida (photo courtesy of Marc Boulay).

The external purlin system on the Lincoln County Justice Center in Hugo, CO, reduced roof noise due to wind uplift, strengthened the building, and gave snow-retention protection.

External purlin system on a UPS building in South Florida (photo courtesy of Marc Boulay).

tests, collected and deciphered data, and prepared the structural report.

The external purlin system improves the uplift performance of all standing seam metal roofs. Most jurisdictions in North America are now using the International Building Code (IBC), which replaces the Uniform Building Code (UBC). Many existing standing-seam systems do not meet all of the current requirements for wind uplift. In several cases, only the edge zone of the roof needs additional protection. In this instance, one would use the external purlin system only in select areas.

The system has been factory tested to ASTM E1592 on several types of panels. It has also been field-tested. In Savannah, GA, external purlins were installed on a paper mill to resist wind uplift. Two years later, a hurricane blew through the area; and the mill was one of only a few buildings with standing-seam metal roofs that did not lose any of its panels.

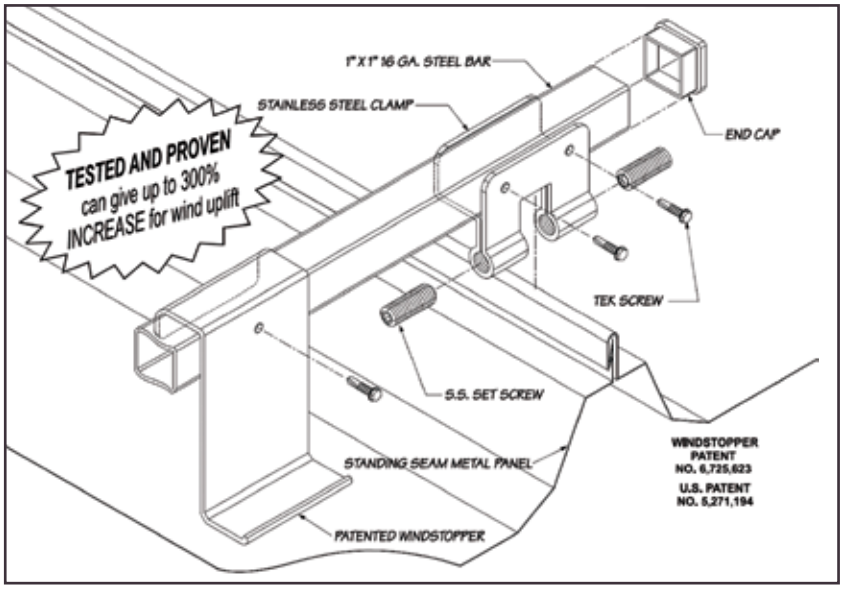
Another use for this system is for control of a "noisy" metal roof. Over the last five years, the system has solved noise issues on several projects throughout the United States, including numerous residences from Iowa to Wyoming. Recently, 3,000 linear feet of external purlin system were successfully

installed on the Rehoboth Christian School in Gallup, NM, to provide sound attenuation. Another customer used the system on a metal building where the roof made so much noise that when it was windy outside, people could not use the space inside. After installing it as a test on one section of the building, the owner reported an almost complete noise reduction due to its addition. No laboratory testing has been done for noise reduction, but it has been field proven that the system reduces metal roof noise in some cases.

On the Lincoln County Justice Center in Hugo, CO, the system served three purposes. First, it reduced roof noise due to wind uplift, which was the initial concern of the property managers. Second, it helped strengthen a metal building that had originally been underdesigned. Finally, it gave the building much-needed snow retention—an important feature in Colorado.

The system is a good investment against roof failures, especially at the eave and edge zones of standing-seam metal roofs, particularly in high-wind areas.

Since WINDBAR is based on the proven SNOBAR snow retention system, in a large part of the country, an owner/architect can solve two problems with one solution. In this case, a designer must make sure to design not only for wind uplift, but also for snow protection, using the proper layout for both.



Drawing for Windstopper patent describing use of WINDBAR system.

Jason Nagaki

Jason Nagaki, vice president of SNOBAR/WINDBAR, has been a driving force in the industry for over 17 years in various aspects of the research and development, design, and marketing for the company.