



Roof Hugger Completes Purlin Enhancement Testing



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For many years reports from the field have come in insisting that roofs retrofitted with Roof Huggers felt "more solid" or "stiffer". Due to our similar experiences, we have long suspected that Roof Hugger structural sub-purlins could be enhancing the strength of the

existing metal building purlins. Testing conducted this year at the independent laboratories of Force Engineering and Testing in Humble, Texas, concluded that standard non-modified Roof Hugger sub-purlins, once installed over the existing building purlins, increase their gravity load carrying and wind uplift capacities significantly. In theory, the Roof Hugger sub-purlins increase the effective depth of the existing building purlins by the depth of the Hugger sub-purlin. In layman terms, if you have an existing purlin that is 8" deep and you add a 2" deep Hugger sub-purlin, the result is similar to a depth of 10". Refer to Table No. 1 for the percentage of increase.

The importance of this testing is that by using Roof Hugger Sub-Purlins, the increased loads on the existing purlins caused by the added weight of the sub-framing and new metal roof is offset. In fact additional capacity is typically realized. Retrofitting usually adds approximately 1.5 to 2.5 pounds per square foot (PSF), depending on material gauges and sub-purlin spacing. This has always been a concern in the engineering community because building engineers know that when adding weight in this type of retrofit application, the building's original design loads will be reduced. In other words, if you have a building that was initially designed for a 20 PSF live load plus a 2 PSF dead load, the 22 PSF combined total of these loads could be reduced to about 19.5 PSF when retrofitted. This could essentially cause the building's design to fall below minimum building code requirements. In this example retrofitting the pre-engineered metal building with the Roof Hugger sub-framing system can be shown to increase the original 22 PSF purlin capacity up to 31.24 PSF as shown in Table No. 1 (42% increase for a 16-gauge purlin).

All testing was conducted in accordance with the American Iron & Steel Institute's (AISI) Cold-formed Steel Specifications for Base Load Testing. The specifications included a series of tests that utilized 8-inch deep purlins spaced at 5'-0" on center, spanning 25'-0" as in a 25'-0" metal building bay (frame to frame). Purlin gauges tested were 16, 14 and 12. All purlins were standard Light-Gauge Steel Institute (LGS) shapes. The standard Roof Huggers were lapped as shown in Figure A

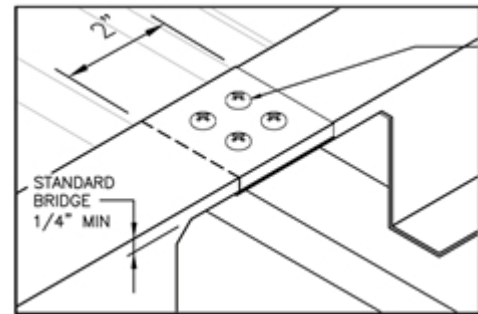


Figure A - Standard Huggers

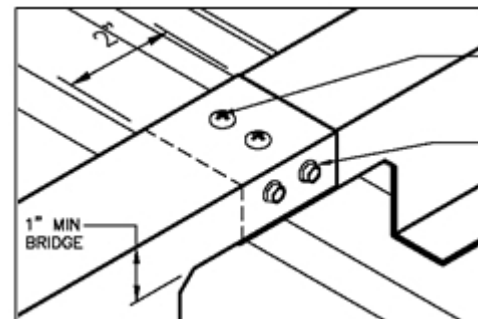


Figure B - Existing 16 and 14 GA Purlins

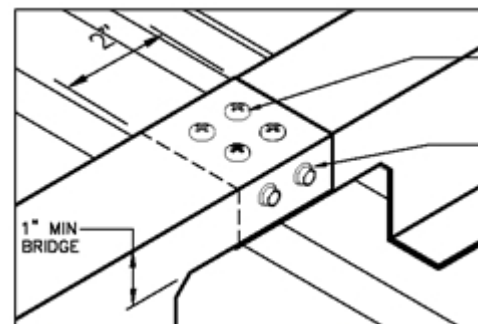


Figure C - Existing 12 GA Purlins



A Roof Hugger project under construction. Click image to enlarge.

As mentioned, other benefits to using Roof Huggers are found along coastal areas where the wind speeds have been upgraded in recent years due to catastrophic hurricane damage. The fact remains that there are millions of square feet of metal buildings in these areas that were initially designed to withstand wind speeds from 90 to 110 miles per hour (MPH), but now due to new building code requirements, must be upgraded to 120 MPH and greater speeds mandatory when the building has to be re-roofed. One case in point is a building in Houston, Texas, that was recently retrofitted to withstand 130 MPH. When the building was built in 1980, the then in adopted Uniform Building Code required a 100 MPH design wind speed. Another example is several buildings for the Port of New Orleans were recently upgraded from 90 MPH to 130 MPH.

TABLE 1 – PURLIN STRENGTH INCREASE WITH STANDARD ROOF HUGGERS

Existing Purlin Size	Maximum Purlin Span	Wind Uplift Increase	Gravity Load Increase
8 X 2.5 Zee x 16 GA	25'-0"	85%	42%
8 X 2.5 Zee x 14 GA	25'-0"	50%	37%
8 X 2.5 Zee x 12 GA	25'-0"	0.2%	25%

This recent series of testing is the third generation of research conducted by Roof Hugger for determining the overall potential improvement to existing building purlins. Previous tests were conducted in 2004 and 2008. However, these tests used special Hugger sub-purlins with one-inch of material over the existing panel rib cut-out as shown in Figures B and C. What was concluded from these tests, as illustrated in Table No. 2, was the increase in load capacity can be even greater if needed.

TABLE 2 – PURLIN STRENGTH INCREASE WITH MODIFIED ROOF HUGGERS

Existing Purlin Size	Maximum Purlin Span	Wind Uplift Increase	Gravity Load Increase
8 X 2.5 Zee x 16 GA	25'-0"	94%	79%
8 X 2.5 Zee x 14 GA	25'-0"	65%	66%
8 X 2.5 Zee x 12 GA	25'-0"	22%	37%

It is important to note that even though Roof Hugger sub-purlin systems increase the building's purlin capacities, they do not help the existing rigid frames. When retrofitting an existing building it is recommended that a structural engineer analyze the frames for accepting the added weight of the new retrofit metal roof system and its additional weight.

About Roof Hugger

Roof Hugger is the most tested retrofit re-roofing systems for Metal-over-Metal applications available. The systems have been tested using a multitude of metal roof manufacturer systems that have Roof Hugger assemblies that are in accordance with ASTM E-1592, Florida Product Approval and Factory Mutual 1-75 & 1-195. For more information on Roof Hugger Re-roofing solutions, visit www.roofhugger.com or call 1-800-771-1711.



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