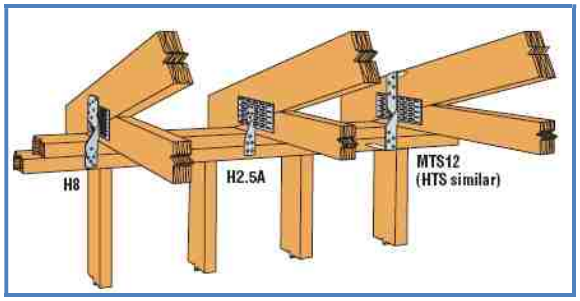
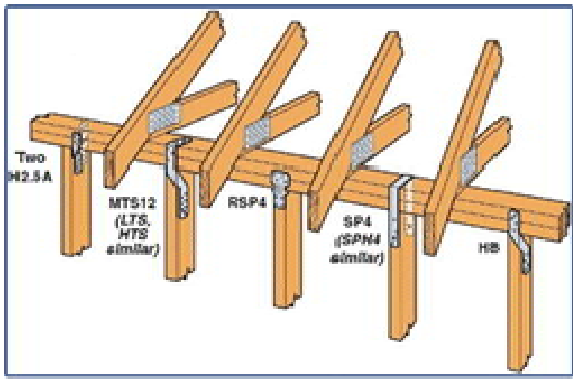
ADDITIONAL ANCHORS/TIES

If additional anchorage or wind uplift resistance is necessary, installation of metal anchors/ties (hurricane anchors) between the eave purlin and the rafter tails can be installed in order to resist uplift along the eaves. Although the addition of these anchors does not increase the resistance of the metal roof panels to wind uplift forces, it significantly increases the resistance of the overall roof system and building structure to both lateral and uplift wind forces. There are several different types of metal anchors or ties available. One manufacturer of these anchors is Simpson Strong Tie. The illustrations below show the different types of anchors and installations available.





source: Simpson Strong Tie

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Conceptual Repair Strategies for Common Wind-Related Failures of Roof Coverings of Poultry Structures

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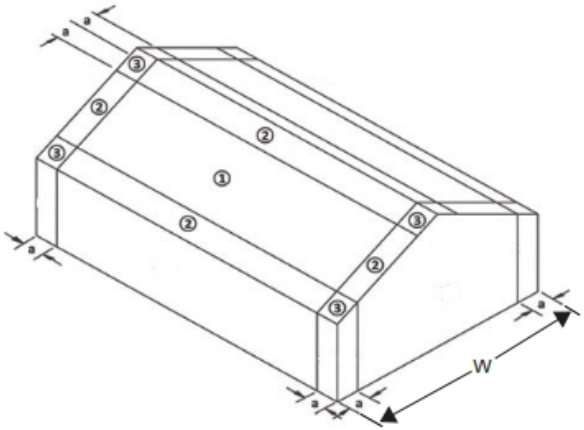
RECOMMENDED ROOF PANEL FASTENER SPACING

The existing fasteners should be replaced or increased at building corners (at both the eave and the ridge - ZONE 3 as shown in the diagram below) with fasteners spaced at, or directly adjacent to, each primary rib in the metal roof panels (or a maximum spacing of 9 inches on center) and every other primary rib along building edges (ZONE 2 as shown in the diagram below), i.e. eaves, rakes, and ridges (or a maximum spacing of 18 inches on center). For a standard building with a 4:12 roof pitch, the edge and corner zone width, a, as shown in the diagram below, is 10 percent of the building width, W.

Recommended Fastener Spacing Diagram

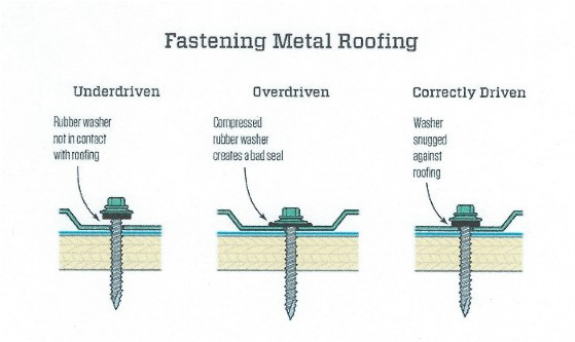


Zone	Recommended Fastener Spacing
3	9 in. On Center
2	18 in. On Center
1	18 in. On Center

Note: As screws are applied, it is important to check the surrounding nails and make sure they are properly seated. Any raised nails should be replaced with the proper replacement screw.

PROPER METAL ROOFING PANEL FASTENER INSTALLATION

Multiple sources can be referenced regarding fastener requirements for the installation of metal roof panels. The NRCA, the MBMA, as well as the Metal Construction Association's (MCA) Installation Manual, describe fastener installation similarly. Fasteners must be installed flush and tight to provide adequate anchorage and water-tightness as depicted in graphic below.



REPLACEMENT OF EXISTING NAILS WITH SCREWS

Self-piercing or self-drilling screws utilized for removal/replacement of existing nails must include a washer and neoprene grommet and be compatible with the roof covering type, i.e. aluminum versus steel, and the substrate to which it's being anchored, i.e. treated versus untreated wood purlins. Stainless steel screws must be utilized with aluminum roof panels and either stainless steel or hot-dip galvanized screws must be utilized with treated wood purlin per manufacturer's specifications. The shank diameter of the replacement screw size must be at least as large, but preferably slightly larger, than the existing nail shank diameter in order for the threads of the screw to be adequately engaged in the underlying wood framing material. The following table is provided to assist in determining the minimum replacement screw size for a given existing nail size.

Table A – Comparison of Existing Nail Size to Minimum Replacement Screw Size

Nail Size	Nail Shank Diameter, inches	Screw Size	Screw Diameter, inches	Minimum Screw Penetration, inches
8d	0.131	No. 8	0.164	1.0 (note a)
10d	0.148	No. 10	0.190	1.2 (note a)
12d	0.148	No. 10	0.190	1.2 (note a)
16d	0.162	No. 12	0.216	1.3 (note a)

Note a: The replacement screw penetration depth need not exceed the wood member thickness into which it is anchored.

Be aware that all conditions of nails that will be encountered in the field cannot be covered in this text, i.e. common, box, sinker, smooth-shank, ring-shank, spiral-shank, etc.; therefore, the shank diameter of the existing nails must be determined in the field and rounded up to the nearest shank diameter of the nail sizes noted in the table above in order to select the appropriate replacement screw. As an example, an existing nail with a shank diameter of 0.139 inches would be rounded up to 0.148 inches (10d) and be replaced with a No. 10 screw. All screws must be properly installed (flush and tight) to the minimum penetration depth as noted in the table regardless of nail penetration depth.