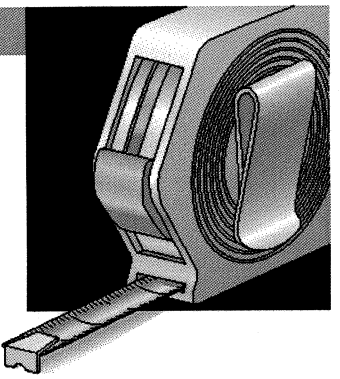

Roof Sheathing Fastening Schedules for Wind Uplift

Introduction

This Data File provides recommended nailing schedules for wood structural panel roof sheathing – plywood and oriented strand board (OSB). These schedules were calculated to provide resistance to wind uplift pressure as required by most codes.

Recommendations were developed through engineering analysis and by full-scale laboratory testing. Wet and dry specimens of plywood and OSB panels were tested for full panel withdrawal under uniform pressure. The results of this testing were compared in accordance with the design provisions of ASCE 7-02, *Minimum Design Loads for Buildings and Other Structures, The International Building Code* (IBC), *The International Residential Code* (IRC), and the *Wood Frame Construction Manual for One- and Two-Family Dwellings* (WFCM).

Recommended Fastening Schedules

The fastening schedules presented in Table 1 reflect the differences in wind uplift pressures that may be anticipated over various portions (zones) of roof systems. Higher pressures at eaves, corners, ridges and gable-ends often require more restrictive schedules than at interior portions of the roof system. Figure 1 illustrates the location of these zones in hip roofs and gable-end roofs. Low slope roofs are not covered in this publication.

Three wind-speed fastening schedules are provided in Table 1 for roof applications with framing spaced at 24 inches on center or less and a specific gravity (G) of 0.42 or more. These schedules assume the use of wood structural panels 5/8-inch thick or less and are appropriate for enclosed buildings with a mean roof height of up to 35 feet in Exposure B locations. Fasteners listed in the tables are minimum 8d (0.131 x 2-1/2 inches) common nails with smooth or ring shanks, depending on the basic wind speed and fastener location. All recommendations are based on the use of full-length nails meeting the requirements of ASTM F1667.

The schedules provided give nailing recommendations for **90 mph, 120 mph** and **150 mph** wind conditions.

90 mph Winds

These are the basic uplift fastening schedules appropriate for buildings located in areas where the basic wind speed, as determined by your local building department, is 90 mph (3-second gust wind speed) or less. These areas are normally included under the prescriptive sections of building codes. As such, the nailing schedule is typically the familiar 6 inches on center at supported panel edges, including gable-end walls and 12 inches on center over intermediate panel supports. Note, however, that *minimum 8d nails (0.131 x 2-1/2 inches) are recommended* for all panels 5/8 inch thick or less.

120 mph Winds

These fastening schedules are appropriate in areas with a basic wind speed of 120 mph and below.

150 mph Winds

These schedules are appropriate for *most hurricane oceanline regions* (Atlantic and Gulf of Mexico coastal areas).

Contact your local building department for basic wind speed used for design in your area.

For conditions that are not addressed by these general guidelines, such as the "special wind regions" and "topographic factors" identified in ASCE 7, engineered design is recommended.

The ability of a roof sheathing panel to resist high winds is directly related to how well it is secured to the roof framing. The type and number of fasteners required for a specific application is obviously an

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TABLE 1

ROOF SHEATHING FASTENING SCHEDULE[a,b,c,d,e]
8d Common (0.131 x 2-1/2 inches) or Ring-Shank (0.135 x 2-1/2 inches) (Except Where Noted) for Exposure B, Enclosed Buildings, Roof Framing Spaced 24 inches o.c. or Less

Wind Velocity (3-Second Gust)	Panel Location[i]	Roof Fastening Zone: Main Roof 1	Main Roof 2	Main Roof 3	Sheathing-to-Gable-End-Wall Framing[g] 2	Sheathing-to-Gable-End-Wall Framing[g] 3	Overhang (eaves) 2	Overhang (eaves) 3
		Fastening Schedule (inches on center)						
150 mph[f,g]	Supported panel end and edges	6	6	6	3[h]		6	6
	Panel field	6	4	3			4	3
120 mph[f,g]	Supported panel end and edges	6	6	6	3		6	6
	Panel field	12	6	4			6	4
90 mph	Supported panel end and edges	6	6	6	6		6	6
	Panel field	12	12	6			6	6

a. Specific gravity (G) of lumber and panels shall be 0.42 or greater.
b. For Exposure B and a 2-foot overhang.
c. For median roof height 35 feet or less.
d. Gable wall height of 8 feet or less from top floor ceiling to roof peak.
e. Provide adequate uplift hardware at truss-to-wall connections. Such connections are beyond the scope of this publication.
f. When wind speed is 110 mph or greater and when median roof height is between 25 and 35 feet, use 8d ring-shank nails (0.135 x 2-1/2 inches) within 48 inches of gable end walls. (IRC Table R602.3(1), footnote f)
g. When wind speed is 100 mph or greater, block panel edges perpendicular to gable-end-wall framing members in the first two bays of framing. Blocking shall be spaced a maximum of 4 feet o.c. (*Wood Frame Construction Manual*, Section 3.5.5)
h. 10d ring-shank nails (0.148 x 3 inches).
i. Blocking not required.

important consideration. Another important consideration is the wood species of the roof framing members into which the sheathing fasteners are driven. Wood of more dense species such as Douglas-fir or southern pine provides greater nail withdrawal resistance and significantly improves the performance of the sheathing nailing.

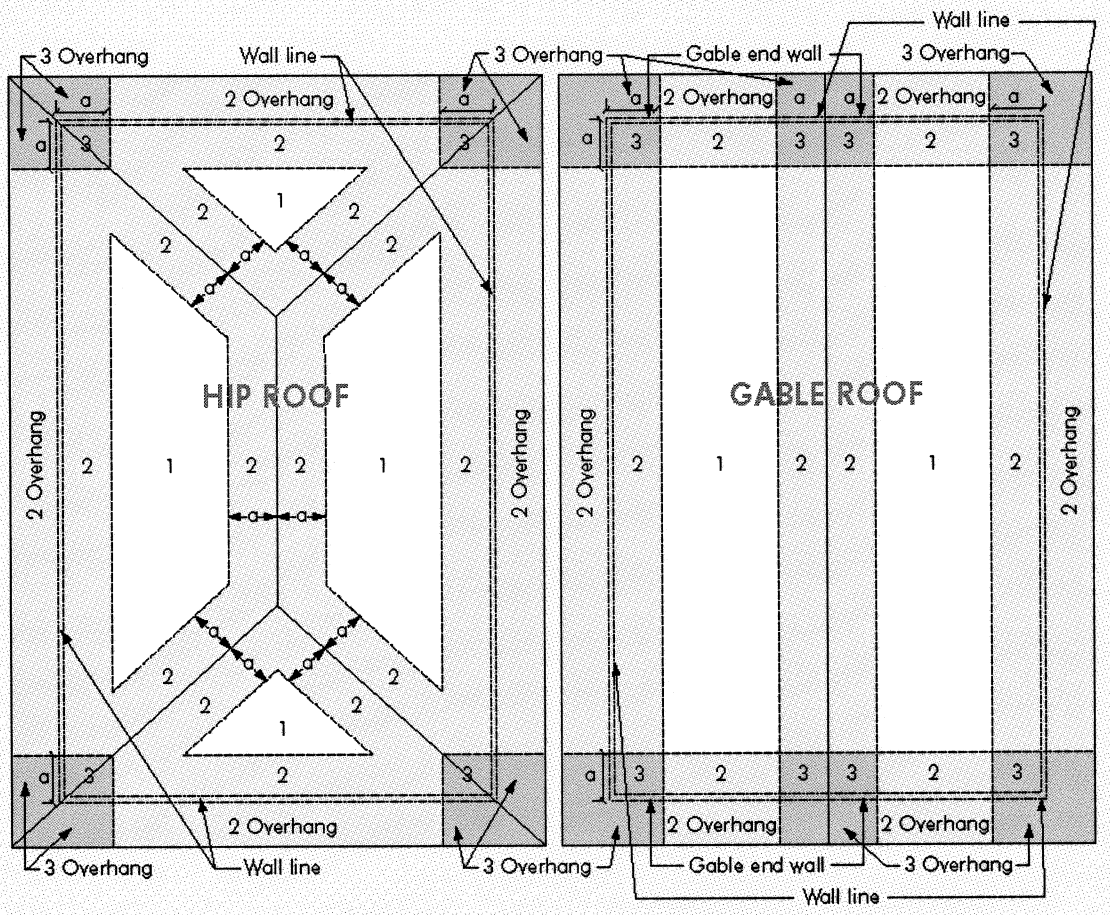
Another consideration relates to the condition of the building envelope during the high wind event. If the building envelope remains intact during the storm, the destructive forces of the wind are considerably less than experienced if a large window, sliding glass door or garage door is breached, or if there are permanent openings. Breaching of the building envelope can be prevented by the use of impact-resistant glazing or shutters.

Generally speaking, well designed and installed shutter systems are intended to keep the building envelope intact during high wind conditions. In addition to maintaining the building envelope intact and lowering the wind forces on the structure, shutters also serve to protect the interior of the building from water damage caused by failed doors and glass.

FIGURE 1

ROOF FASTENING ZONES FOR WIND UPLIFT

Zones 1, 2 and 3 shown below indicate areas of the roof that may have different fastening requirements.



Distance a = 4 ft in most cases (10% of least building width or 0.4 times building height, whichever is smaller, but not less than either 4% of least building width or 3 ft).

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