



# DESIGN 1 SHUTTERS FOR WOOD-FRAME BUILDINGS

One of the best ways to protect a home from damage in wind storms is to install shutters over all large windows and glass doors. Shutters protect doors and windows from wind-borne objects. They also prevent damage caused by sudden pressure changes when a window or door is broken.

This design guide from APA – *The Engineered Wood Association* describes how to construct structural panel shutters for attachment to wood-frame buildings. It also includes basic design considerations for all structural panel shutters. Additional designs from APA provide details for shutters that can be attached to masonry or concrete block buildings.

## Design Considerations

### General

Most building codes currently do not include provisions for storm shutters. For those codes that do, or have had provisions in the past, the design requirements for these shutters generally call for a deflection of less than the shutter span (in inches) divided by 30 (for instance, a 40-inch span should not bend more than

40/30 = 1.33 inches when the wind blows). They also should bend less than 2 inches maximum and should remain at least one inch away from the window when under full wind force.

The easiest designs are those that simply cover the opening with a wood structural panel. In wood-frame construction, panels can be nailed over the openings when a

hurricane approaches. Buildings made with concrete blocks, however, require advance preparation.

In some cases, stiffeners may be necessary to limit deflection of the shutter against the glass. Stiffeners function best if the 2 x 4s are on the outside of the shutter and oriented with the narrow edge against the shutter.

TABLE 1

**MAXIMUM SPAN WITHOUT STIFFENERS**

APA Panel Span Rating	Approximate Weight (lb./ft. <sup>2</sup> )	Maximum Shutter Span	Approximate Deflection (in.) at 120 mph Design Wind Speed at 15-ft. Height
32/16	1.5	30	0.5
40/20	2	36	0.5
48/24	2.4	48	0.9
48 oc	3.6	72	1.5

TABLE 2

**ESTIMATED DEFLECTION AT 120 MPH DESIGN WIND SPEED AT 15-FT. HEIGHT FOR SHUTTERS WITH 2 X 4s AT 16 INCHES o.c.**

APA Panel Span Rating	Approximate Weight (lb./ft. <sup>2</sup> )	Shutter Span (in.)							
		24	36	48	60	72	84	96	
32/16	2.5	0.2	0.2	0.3	0.4	0.5	0.8	–	
40/20	2.9	0.1	0.1	0.2	0.2	0.4	0.7	1.1	
48/24	3.4	–	–	0.1	0.2	0.3	0.6	1.0	
48 oc	4.6	–	–	0.1	0.1	0.3	0.5	0.9	

*This APA hurricane shutter design is based on pressures associated with a design fastest-mile wind speed of 120 mph. Building codes are currently being reviewed for possible changes. Before constructing shutters, therefore, it is important to check with your local building department for an update on current code requirements.*

**Note:** The shutter design shown herein will provide significant protection from hurricane-force winds. This publication contains recommendations to serve as a guide only. It does not include all possible shutter, anchor and fastening systems, and the installer must adjust all dimensions to compensate for particular installations and hardware used. These shutter designs by no means represent all possible workable designs and can always be upgraded to provide even greater margins of safety and protection. All shutter designs herein are intended to be temporary, and mounted and removed from outside the building. All designs are based on wind pressure capacities only.

While the design wind pressures used are based on ASCE 7-95, the building owner/installer must still carefully evaluate each system and then, if necessary, make any modifications consistent with good design and building practices.

### Steps to Constructing Shutters

1. Review Tables 1 and 2 in the Design Considerations section to determine if stiffeners are needed. Attach stiffener as shown in Figure 2.
2. Cut APA wood structural panels with adequate edge overlap to receive nails. Orient long panel axis (strength axis) of the panel as shown in Figure 2.
3. Use a long brad or finishing nail to locate the framing behind the wood siding. The nails used to attach the shims and the shutters must hit the framing to be fully effective.
4. Nail shims to the framing with 12d nails. Use 16d nails for shims over 3/4 inch thick. For spans up to 5 feet, space the nails 6 inches o.c. at each shim. For spans over 5 feet, space nails 4 inches o.c. at each shim. (Figures 3a and 3b)
5. Attach the shutters with double-headed nails for ease of later removal. (Figures 3a and 3b) Use 12d nails for shutters up to 3/4 inch thick and 16d nails for shutters over 3/4 inch thick. For spans up to 5 feet, space the nails 6 inches o.c. at each end of the shutter panel. For spans over 5 feet, space nails

FIGURE 1  
SHUTTER STIFFENER ATTACHMENT – IF REQUIRED

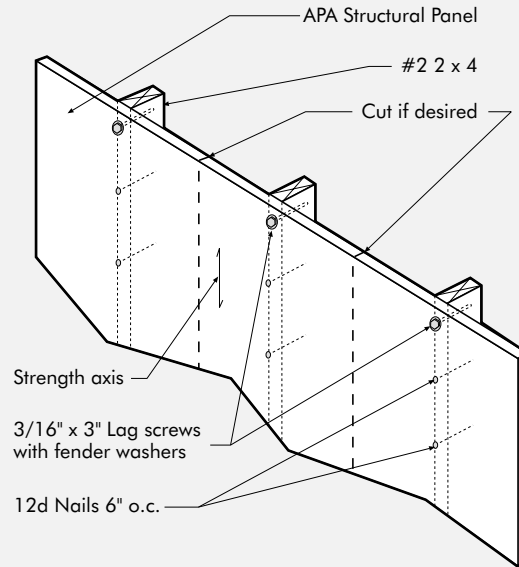


FIGURE 2  
SHUTTER ATTACHMENT – VIEW FROM OUTSIDE

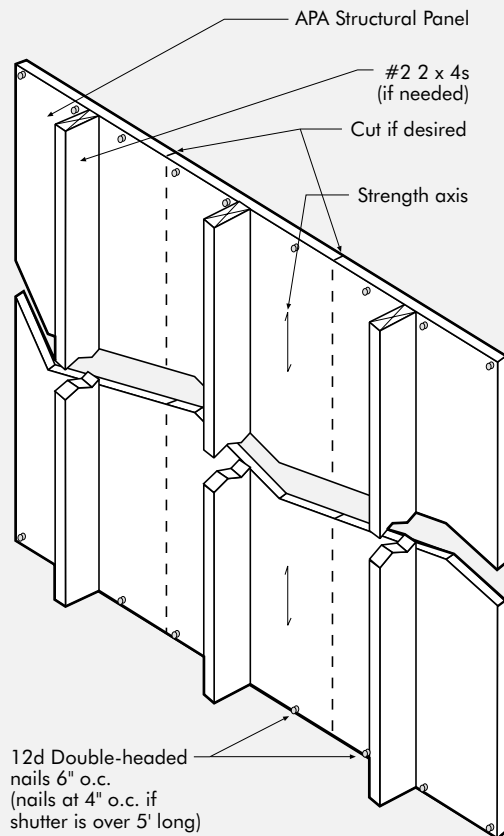


FIGURE 3A

**SHUTTER ATTACHMENT – TOP**

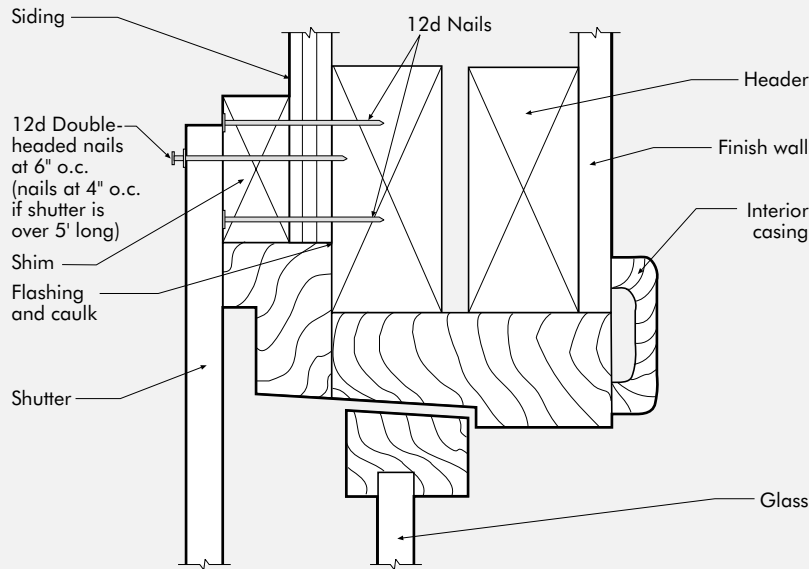
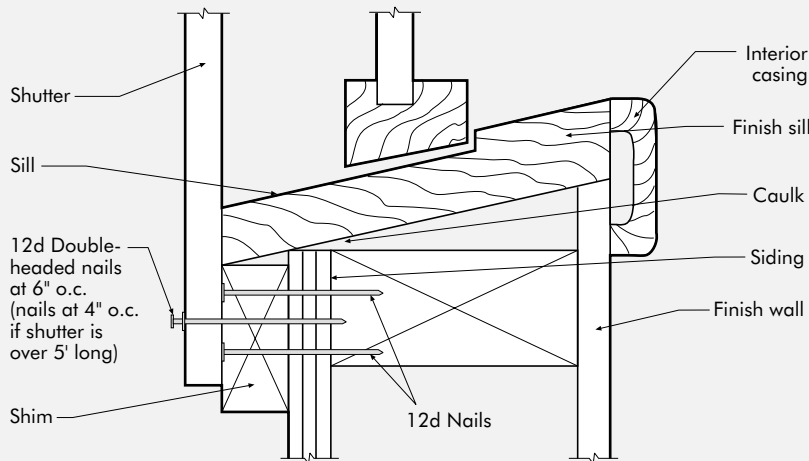


FIGURE 3B

**SHUTTER ATTACHMENT – BOTTOM**



4 inches o.c. at each end of the shutter panel. Nailing the panel on all four sides, instead of just the two ends, will further limit deflection and maximize strength.

6. Any permanently installed hardware, shims or fastening devices must be installed using standard/acceptable methods of waterproofing. All abandoned holes must be sealed.

7. After fabrication each shutter should be marked for orientation and location to simplify installation.

8. If shims are to be left in place, use galvanized nails and finish like siding or exterior trim.

**Hurricane Shutter Designs from APA – The Engineered Wood Association**

APA offers a series of Hurricane Shutter Designs. They include:

Design 1: Shutters for Wood-Frame Buildings

Design 2: Shutters for Masonry Block Structures, *Barrel Bolt Latch Supports*

Design 3: Shutters for Masonry Block Structures, *Steel or Aluminum Angle and Screw Supports*

Design 4: Shutters for Masonry Block Structures, *Shutters Attached to Outside Wall with Permanently Mounted Brackets*

Design 5: Shutters for Masonry Block Structures, *For Openings Wider than 8 Feet*

Each design is available from APA – The Engineered Wood Association for \$1.

Designs may also be ordered as a complete set for \$5. To order, contact APA – The Engineered Wood Association, P.O. Box 11700, Tacoma, Washington 98411-0700. Phone: (253) 565-6600. Fax: (253) 565-7265.

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