Design 2
Shutters for Masonry Block Structures

Barrel Bolt Latch Supports

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 masonry block buildings, using barrel bolt latch supports. It also includes basic design considerations for all structural panel shutters. Additional designs from APA provide details for shutters that use alternative attachment systems and shutter designs for wood-frame buildings.

The unique features of this design are the barrel bolt latches that support the shutter at either end. Once made, the shutters can be mounted or removed without any additional hardware or tools. The barrel bolt latches should be mounted to the panels with bolts, rather than the screws that usually come with them. Use a washer under the nuts and heads of the bolts. Place the nut-end of the bolts to the outside (latch side) of the shutter to allow for final adjustment of the latches.

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.

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.

TABLE 1

MAXIMUM SPAN WITHOUT STIFFENERS

APA Panel Span Rating	Approximate Weight (lb./ft.^{2})	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.^{2})	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

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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.

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. Use Tables 1 and 2 in the Design Considerations section to determine if stiffeners are needed. Attach stiffeners as shown in Figure 1.

2. Cut the panel 1/8 inch smaller than the window opening. The long-panel axis (strength axis) must be oriented perpendicular to the supported ends (sides of the shutter with the barrel bolts), regardless of which shutter dimension is longer.

FIGURE 1

SHUTTER STIFFENER ATTACHMENT – IF REQUIRED

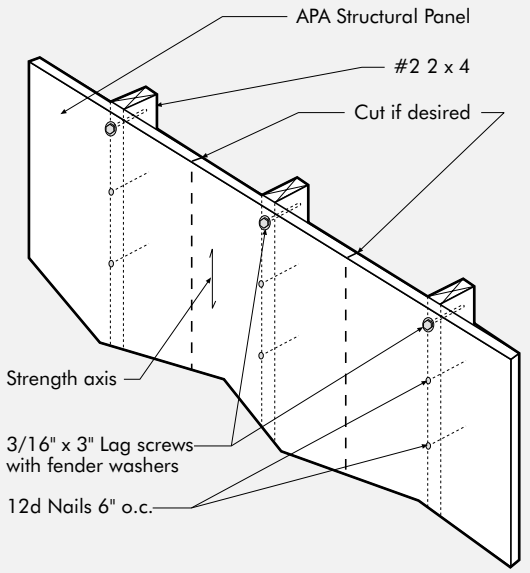


FIGURE 2

LATCH-BOLT PLACEMENT DETAILS

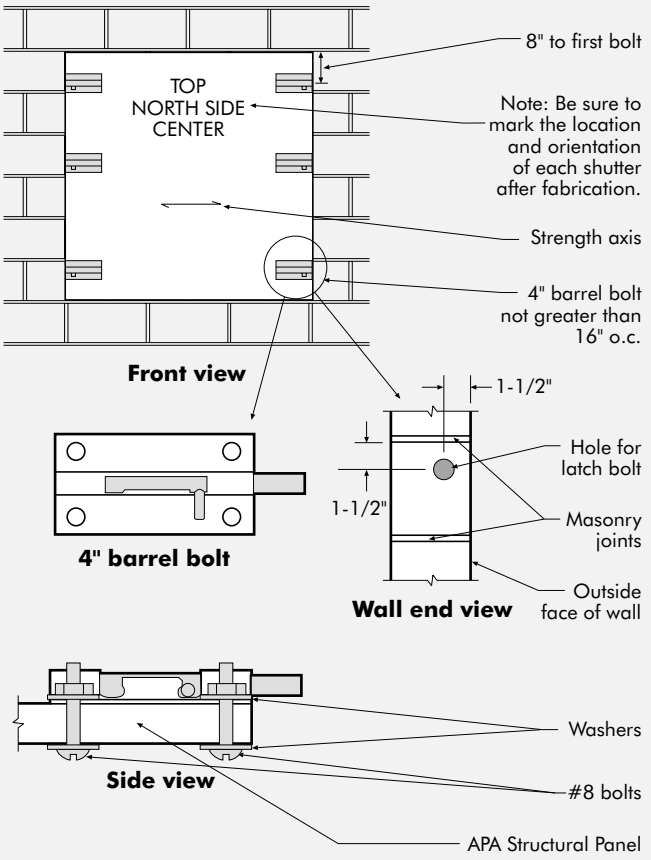


FIGURE 3

LATCH-BOLT HOLE IN SIDE OF WINDOW OPENING

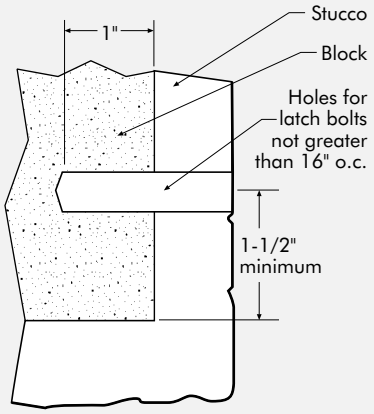
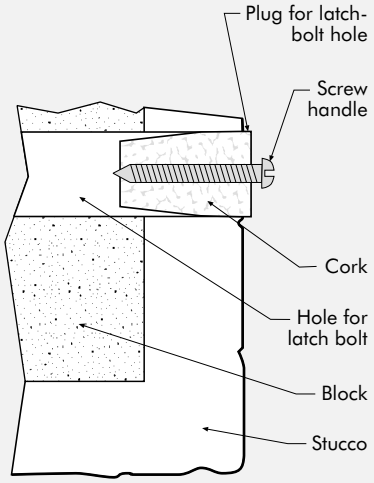


FIGURE 4

TEMPORARY PLUG FOR LATCH-BOLT HOLE



3. Make two templates that will help in mounting the latches and drilling the barrel bolt latch holes in the concrete blocks – one for each side of the window. The top and bottom holes should be no more than 8 inches from the window top and bottom and spaced equal distances from each other, but no greater than 16 inches o.c. and should miss the mortar joints between the blocks by 1-1/2 inches or more. (Figure 2)

4. Mount 4-inch barrel bolts. The nuts go on the latch side (outside) of the shutter. Make the nuts only finger tight because the latches will be adjusted in the final fitting.

5. Drill latch-bolt holes in blocks. (Figure 3)

6. Mount the shutter in the window frame and insert the barrel-bolt latches into the holes in the concrete blocks. Tighten bolts holding barrel bolts in place.

7. The barrel-bolt holes in the concrete blocks may be filled with a removable plug when not in use. (Figure 4)

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

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

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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