Installing Vinyl Replacement Windows

Sealant is the key to a leak-free installation

by Gene Summy

Experienced contractors sometimes tell me that replacement windows are a poor substitute for "real" windows, and that their installation does little more than earn the salesman a quick commission and the installer all kinds of headaches. And it's true that my company — which specializes in solving rain-related building-envelope problems — has investigated hundreds of leaking retrofit window installations over the past decade or so. But in every case, the problem has been caused by a tradesman who did not understand how to correctly install the window, and not by the window itself.

While there are obviously lots of different types of replacement windows of varying levels of quality, I think that in general they are a terrific alternative to traditional new-construction windows. One of the tools my company uses to test leaky walls and windows is a calibrated spray rack. We've sprayed replacement windows from Milgard, Anlin, Alpine, Alside, CertainTeed, Silver Line, and other manufacturers to simulate heavy rain and sustained winds of up to 49 mph. Most of these units exceed their AAMA performance ratings. Like full-frame windows, AAMA-certified replacement windows are performance-tested and meet minimum standards for resistance to water penetration, air leakage, and wind pressure.

For the project shown in this article, a window-replacement company I often work with replaced all of a home's old aluminum single-pane windows with new vinyl flush-fin insulated-glass units in less than a day. Flush-fin (sometimes called Z-bar) replacement windows have a large flange — the Z-bar — that covers the old window frame and stucco siding; they're probably the most common type of retrofit window in California, if not the entire country. Block-frame windows, the other main type of replacement window,

Figure 1. When a finned unit is trimmed to fit a recessed opening, an equal amount should be removed from each fin to ensure that the unit is centered in the opening (top). Vinyl fins can be cut with a utility knife, but a saw is more accurate (center). Rounding off the corners (above) makes it easier to fit the window into the recessed opening.

are basically new-construction windows without the nailing fin, and they're used where wood windows are common.

Limitations

Replacement windows can't be used on every project. If an existing window has a history of rain-related leakage, I always recommend a thorough investigation to determine whether the water is coming through the window itself or through the flashings around the window. If the existing flashing or surrounding building materials leak, they will continue to leak after the new retrofit window is installed. This problem can be solved only with a new full-frame window. If the house has stucco siding (common here in California), the project will require breaking back the exterior wall surface**,** installing new flashings and building-envelope materials, and choosing a full-frame unit that can be integrated with the drainage plane.

Measurement

Good measurements are the key to a successful window replacement, so I don't recommend leaving this step to a window salesman. Whoever is measuring the window opening must understand what will remain of the window frame after the old sash or glass is removed, and many salesmen don't have the necessary experience.

I measure the width of the opening at the top, middle, and bottom, typically from jamb to jamb. I then subtract ½ inch from the narrowest of those three measurements to get the required width for the replacement unit.

To find the height, I measure from where the replacement window will rest on the sill to the underside of the head jamb, again at the two sides and in the middle. I take the shortest of those three measurements and subtract another ½ inch to determine the height of the replacement unit. If the opening is square (determine this by measuring the diagonals), ¼ inch of wiggle room on all four sides should be sufficient for the unit to fit into the opening. If the opening is not square, a smaller window — or even reframing — may be required.

If a window opening has been mismeasured and the new window is too big for the opening, don't be tempted to simply "collapse" the old window to find extra room. Doing that — cutting through the jambs with a reciprocating saw and pulling the frame out of the wall system — will tear the old flashings and dislodge them from the weather-resistive barrier underneath the siding. I've seen collapsed-window jobs leak as badly as if the rain were pouring in through an open window, so it's better to simply order a new window that's been correctly sized. Most replacement windows are available in increments as small as ⅛ inch.

Installation

Flush-fin windows can be installed so that they lap over stucco siding, but sometimes they have to fit into a recessed opening and the flange has to be trimmed to fit the opening. After removing the glass, I measure the frame and double-check the diagonals to verify that it's square. When I mark the flange with these measurements, I take an equal amount off each side so that the unit will be centered in the opening when it's installed (**see Figure 1, previous page**). I cut the flange down to size with a saw, then round the corners over to make fitting easier. While dry-fitting the unit, I use a sharp utility knife to cut back the vinyl flange and fine-tune the fit as necessary. If I'm installing a flush (not recessed) window that has fins, I mark the fin outline right on the wall with a pencil, so that I can accurately mask off the wall with tape.

Sealant. Sealant is another important ingredient in any retrofit window installation: You need to use the right amount of the right kind, and you need to use it in the right locations. Sealant should be durable and paintable, adhere well to the substrate, and have good elongation characteristics, which generally rules out silicone. I've had the best success with polyurethane and other sealants that meet ASTM C920 standards, like Moistop (800/773-4777, fortifiber.com), OSI Quad or WinteQ TeQ:Seal (800/624-7767, osipro.com), RainBuster 450 or 900 (800/473-1617, topindustrial.com), and Schnee-Morehead 7100 (800/878-7876, schneemorehead.com).

Once I'm satisfied with the dry fit, I pull out the unit and apply a fat ½-inch-diameter bead of sealant to the old window frame (**Figure 2**). Water can penetrate and travel behind the exterior cladding and may want to exit the wall cavity at the window frame, especially at the top, so I pump additional sealant upward into the upper frame corners of the old window. Sealant application around the frame is especially critical — I call it the "primary" seal — because it provides the first line of defense against water intrusion.

I also pump extra sealant into the lower corners, but I leave a pair of open gaps just below the weep holes of the old window as I apply the sealant to the sill. That way, any incidental water that gets behind the cladding and into the old window frame can drain out the weep holes and through the gaps in the sealant, rather than get trapped in the new window assembly.

Before installing the window, I mask off the fin with blue painter's tape. On a flat (not recessed) wall installation, I also mask off the wall, using the marks I made when I dry-fit the unit as a guide. I install the tape about ¾ inch outside of these marks. Then I apply another continuous ½-inch-diameter bead of sealant to the window fins (**Figure 3, next page**), again

Figure 2. Before the window is installed, the old window frame gets a ½-inch-diameter continuous bead of polyurethane sealant (top). Extra sealant pumped into the upper (center) and lower corners (above) prevents water that may have leaked behind the stucco from exiting the wall cavity at the old window frame.

Figure 3. Another fat bead of sealant is applied to the fin before the window is installed (top left). When the diagonals are equal, the window is square in the opening (top right). The window is fastened to the wall framing with 3-inch deck screws driven through the jambs (above); plastic shims prevent the vinyl frames from distorting.

leaving voids for the weeps at the base of the window.

Sealant needs compression and tooling to be effective. Many of the leakage problems I investigate are the result of sealant that doesn't completely fill the gap between the window frame and the wall. When the window is installed, squeeze-out should be visible around the entire perimeter of the window (except at the two small locations under the weep holes of the old window). By masking off the fin and the wall (or trim) with tape, I'll be able to tool the sealant after I've installed the window and still get clean, straight lines (**Figure 4, next page**).

Fasteners. Once the window is fully compressed in the sealant (this is a two-man job), I check it a final time for plumb, level, and square, then drive fasteners through its frame into either the wall framing or the old window frame. I never drive fasteners through the sill, though, because this can damage the old window's weep system. To keep the frame from distorting, I shim the window with plastic shims, which — unlike wood shims — won't compress, decay, or hold water.

Some window manufacturers supply the screws required to hold the window in place, but when they don't, I like to use 3-inch-long exterior-grade deck screws. If the window manufacturer specifies a fastening schedule, I use it; otherwise I space fasteners no more than 18 inches apart.

After the window is secured, I tool the sealant smooth with my finger, using a little water to smooth out and feather the bead over the tape. Then I remove the tape before the sealant cures, taking care not to mess with the beads. Painter's tape seems to be equally effective at sealing off both smooth, painted trim and rougher stucco finishes, and the joint becomes almost invisible if a color-matched sealant like OSI Quad is used.

Figure 4. Sealant should be compressed as the window is installed, and tooled after the window is fastened in place, to remove small voids and air bubbles (far left). With a flush window, applying painter's tape to the wall and window fin gives the sealant a straight edge and speeds cleanup (left).

Finish

Before applying interior trim, I fill voids between the new frame and the wall with low-expansion foam (**Figure 5**). High-expansion foam shouldn't be used here because it would distort the frames of most windows. I like OSI's WinteQ TeQ:Foam. It expands completely in about 20 minutes, at which point the excess can be trimmed off. I also like the company's foam gun, which has little plastic tips that can get into tiny spaces and around corners. The foam seals the air space between the window and the wall and provides additional support for interior trim around the window.

After the window has been installed, there's always a little interior trimwork needed to finish up the job. Most window-replacement contractors opt for the quick and easy approach, and apply flat vinyl trim with adhesive backing around the unit. A good finish carpenter, however, can earn a little extra revenue by upgrading with new jamb extensions and casings. Many homeowners are willing to spend the extra cash for the look of wood trim.

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Figure 5. Low-expansion foam sprayed between the frame and the wall air-seals the window (above) and provides backing for self-adhesive vinyl trim tape (above right). A smooth bead of caulk finishes the installation (right).