Choose a material that's durable—and a look that fits

These replacement windows, made of wood, duplicate the original muntin arrangement and were stained to match the existing woodwork.

Shopping for Replacement Windows

by Marylee MacDonald

At the Small Homes Council, we get many calls from homeowners looking for information about replacement windows. They want to cut their energy bills and eliminate outside maintenance. Many callers are planning for their retirement years and want to eliminate the yearly trip up the stepladder to hang storms and screens.

First, we ask them to consider whether replacement is necessary.

- Do the existing windows stop air and water infiltration?
- Are the existing windows falling apart (or just a little loose)?
- Will the replacement windows reduce energy costs?

If it's clear new windows are needed, they need to decide what kind of replacement system and glazing to use. You can help your client make that decision. It's not easy since there are hundreds of choices.

Many Choices

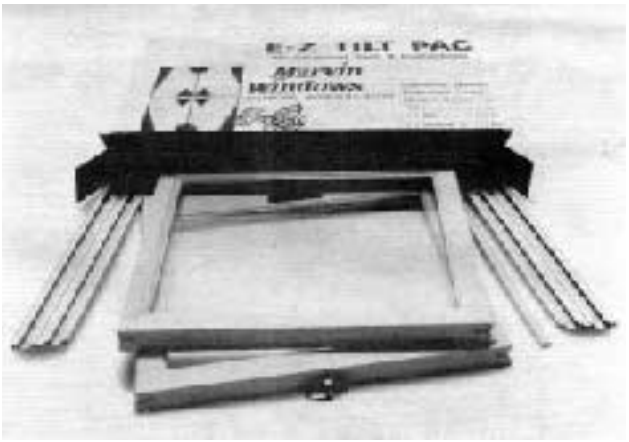
Replacement windows are designed to fit existing openings. Some use accessories so the window will fit well without modifying the opening.

Some windows made for the replacement market are not much different from windows sold for new construction. Sold as "replacements," these windows come in 4-inch-wide increments. To install them, you have to remove the existing window, frame, and exterior and interior trim. You pick the replacement with the frame size closest to the frame you took out. Because the new window frame won't exactly match the frame size of the window being removed, there will be gaps around the new frame. The manufacturer provides aluminum or vinyl panning strips to fill these gaps and may also provide matching exterior trim and spacers. Caradco and Andersen sell such window "kits" for the replacement market. For inexpensive rental units, these may be the right choice.

Other companies custom make

Pella Window Co.

Figure 1. *These windows were custom-made to fit the rough opening. They required the removal of the exterior and interior trim.*



Marvin Window Co.

Figure 3. *Sash-only replacements let you remove loose existing sash and slip in a jamb liner and new sash. Improved weatherstripping and tilt-in features are available in wood and vinyl window units.*

Figure 2. *Vinyl (PVC) windows replaced single-pane aluminum windows in this tract home. In cold climates, this thermal upgrade makes sense.*

replacements to fit your rough opening. You remove the exterior and interior trim, but you don't have to use panning strips to trim out the window. This means you can come close to duplicating the original glass size (see Figure 1). Pella, Trimline, and Philips Industries fabricate wood replacements in this way.

The windows most often marketed as "replacement windows" are sash-only units. A jamb liner and new window sash are inserted into an existing opening (see Figure 2). None of the trim is disturbed. And all work can usually be done from inside the house. The contractor measures the sash opening, sends measurements to the manufacturer, and in two to three weeks receives the windows. Glass size may be slightly reduced because an additional jamb (the jamb liner) is inserted.

One big franchise outfit heavily selling sash-only units in the Midwest is Nu-Sash. Because builders aren't part of the franchise network, they can't get these windows in the local lumberyard. Vinyl and aluminum replacement windows of comparable quality are available to builders, and these windows will still allow them to complete handily with the franchise companies. These windows are sold by Certainteed (Valley Forge, Pa.); Tempco (Robinson, Ill.); Traco (Warrendale, Pa.): and Season-All (Indiana, Pa.). If you want a wood window instead, Marvin is now offering jamb liners and replacement units (see Figure 3).

Material Options

Which window system will work best will depend on the house, the customer, and the budget. Within each of these "replacement systems," you can find windows made of many different materials.

Wood windows. Many customers prefer the look of a wood widow on the interior if you can guarantee it won't ever have to be painted again on the exterior. Vinyl or aluminum cladding might be right for them. Tilt-in features are also in demand. Customers don't want to climb ladders to wash windows or hang storms. They frequently want to get rid of wood double-hungs to reduce maintenance. Consider using wood sash-only replacement kits, which include the tilt-in hardware. These look good when the windows are surrounded by attractive wood trim.

Wood windows are also known for their better insulation value, compared to metal windows. The wood gives windows lower U-values. The only window material with comparable U-values is vinyl. (A U-value is the inverse of an R-value: U = 1/R. So the lower the U-value, the higher the R-value.) Watch for low U-values in window brochures.

On the down side, wood windows are a pain in the neck to maintain, and dimensional or seasonal change can increase air infiltration. Make sure the wood has been kiln-dried to a 10- to 12-percent moisture level before milling. With dry wood, the window will stay tighter and shrink less. To reduce dimensional change and ensure the wood will last, choose a window that is treated with a water repellent. The treatment method should be approved by the National Wood Door and Window Association (NWDWA). Generally, this involves a 15-second immersion in a treatment chemical after milling. If the window is assembled before it is treated, the joined edges of the window will still be vulnerable to decay. Information on lumber quality, kiln drying, and treatment

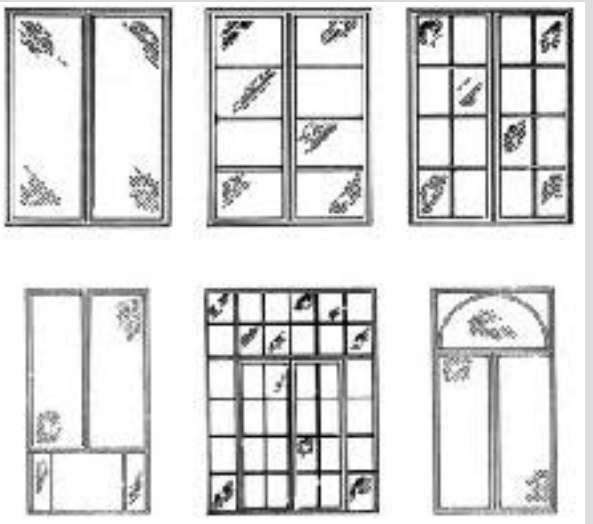
Steel Window Upgrades

Because replacing steel windows is costly, and because vinyl replacements may look out of character on houses originally built with steel windows, you should consider offering a thermal upgrade option. Many of the original manufacturers still make these windows in the same sizes and with the same parts, so you can often find a clip-on storm pane that will improve thermal performance. To reduce heat loss through the frame, you can provide inside storm windows. Magnetized storms are ideal because they grab on to the steel frame. In moderate climates, this may be all the improvement needed.

If the prime windows are badly rusted or have caked layers of paint, suggest a gradual rehab. The first step is to remove all the paint, take out the glass, and prime the windows with rust-inhibiting primer. Then replace the glass and, eventually, install inside storm sash. In the long run, this is likely to be more cost-effective and preserve the character of the house.

If parts are missing or broken, don't give up. One shop-by-mail hardware store carries "hard to find, obsolete parts for windows"—Stry-Buc, 546 Church Lane, Yeadon, PA 19050; 800/352-0800.

Before you suggest the rehab option, however, check to make sure the windows are solid steel with welded frames. One company did make break-metal steel windows in the 1950s and '60s. These windows were made out of hollow metal. When they corrode, they rust all the way through.



Only a few companies make residential casement steel windows. Window Associates, Inc. (Glendale, N.Y.) offers this selection.

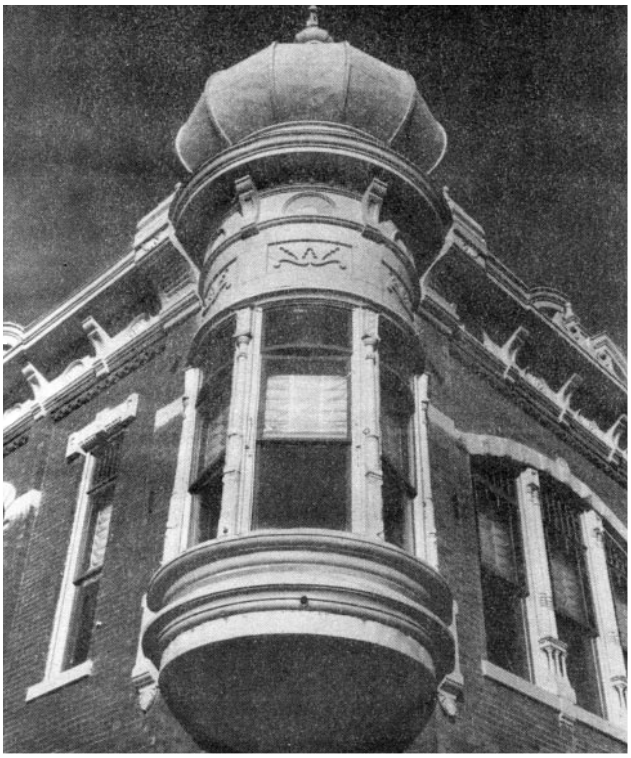


Figure 4. *Don't ruin a historic facade when you replace windows. The tower should have had a curved glass window installed. But the replacement windows on the side facade look okay.*

methods can usually be found in company technical reports.

Custom-made wood windows are also available for use in historic preservation projects where it is important to retain the original appearance of the facade (see Figure 4).

Aluminum windows. Aluminum used to be synonymous with "cheap." Not any more. Contractors can find aluminum windows for low-budget and high-priced jobs—single-pane aluminum windows, double-pane windows, windows with special extrusions to match historic profiles, and windows with factory finishes.

Aluminum windows are a better option in moderate or hot climates than in cold ones. Heat loss through the frame has plagued aluminum from the start, but good thermal breaks help. A thermal break is a non-conductive material, such as polyurethane, placed between the inside and outside of the frame (see Figure 5). If there's no thermal break, condensation will be a problem. Check the condensation Resistance Factory (CRF) of the window and make sure it's high enough for your climate. (CRF factors and tables are available from AAMA, 2700 River Rd. Suite 118, Des Plaines, IL 60018; 312/699-7310.) Replacing single-pane aluminum windows with double-pane windows with good thermal breaks provides a significant energy improvement.

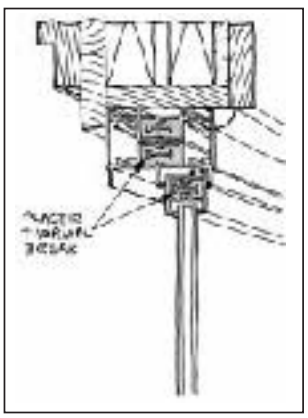


Figure 5. *Look closely at the section drawings in the manufacturer's brochure. Aluminum windows should provide thermal separation between the outside and the inside of the window.*

Replacement aluminum windows offer many color choices. Most contractors are familiar with the standard "mill" finish of aluminum, or with "anodized" finishes. These aluminum finishes stand up to the exterior environment for a very longtime. Some companies offer other factory-applied finishes that can add bright colors to the window. Baked-on acrylic and silicone-polyester finishes, however, do not last as long as an anodized finish and may get chalky over time. Another finish (Kynar), made of fluoropolymer, seems to hold up better. The finish places bright-colored paint (even red or green) on the surface of the aluminum. The patented finish is a soft coating, similar to Teflon, and the coating resists ultra-violet deterioration.

Steel windows. The thin sight lines and elegant appearance of steel windows made them popular in residential construction of the 1920s and '30s. Single-pane casements are still found on homes of this period, and many homeowners view them as candidates for replacement. However, replacement is not the only option.

Steel windows can be hard to remove. You usually have to remove the window and dig out the frame. You can't simply add a sash-only replacement because the frame embedded in the wall still transmits heat and cold. Also, the steel frames don't always work with jamb liners and replacement sash. One option with steel windows is to leave them in place and offer a thermal upgrade (see "Steel Window Upgrades").

Sometimes you may be able to rehab most of the windows in the house and

Measure Twice, Order Once

by Loren Adams

When you order replacement windows, you have to get the measurements right and give them correctly to the manufacturer. If you don't get the terms right or if you measure wrong, you may end up with a lot of replacement windows sitting in your garage.

Daylight opening. Many companies ask for the size of the daylight opening. Measure the width and height of the visible glass. This measurement is especially important if you are replacing only one window in the house.

When you order replacement parts for double-hung or single-hung windows, state the daylight opening of one sash only. Specify which sash (top or bottom). When sash sizes are different, specify the daylight opening height of each sash. Be sure to identify both measurements (see Figure A).

Glass size. Measure the actual glass size, not jut the visible glass area. The glass size includes the glass beneath the glazing stops.

Masonry opening. Measure the opening in a brick, stone, or cement block wall to receive a window unit. The opening should be 1/2-inch wider than the outside width of the window unit. It should be 1/4-inch taller than the overall height of the unit. This extra room is needed in case the opening is slightly out-of-square. The brick mold measurement is included when you calculate the dimensions of a unit for a masonry opening (see Figure B).

Outside measurement. The outside measurement (OSM) is the width and height of the unit, including the exterior casing (see Figure C). This measurement is not the same as the "outside measurement of the frame."

Outside measurement of the frame. This measurement is the width and the height of the unit, not including the casing.

Rough opening size. Measure the size of the opening in the framing where the window is to be installed. Openings should be large enough to allow room for insulation and to square the unit.

Sash width. Measure horizontally across the face of the sash.

Sash thickness. Measure the depth of the sash.

Loren Adams is with Marvin Windows, Box 100, Warroad, MN 56763; 800/346-5128.

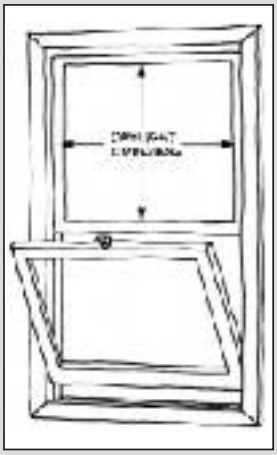


Figure A. *The daylight opening is the glass size visible in its frame.*

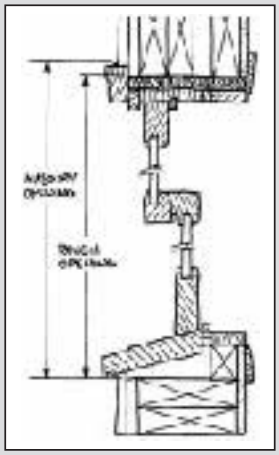


Figure B. *The rough opening and masonry opening are shown.*

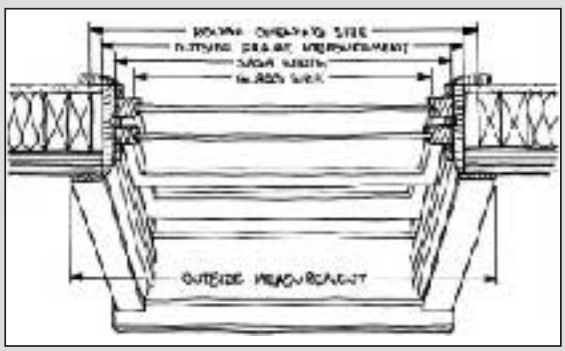


Figure C. *Horizontal window measurements are shown.*

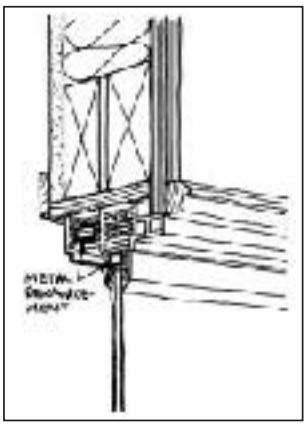


Figure 6. *PVC windows will be stronger if they have metal reinforcement in the sash.*

replace only one. If you want to replace steel with steel, you'll find that today's colored urethane and vinyl coatings will give the window a longer life expectancy.

Plastic windows. Although extruded vinyl (PVC) window frames have been used in Northern Europe for 20 years, they don't have a long track record in this country. Unfortunately, our North American climate has temperature swings that are twice as large as those in Europe. Research in Scandinavia on long-term performance of solid vinyl windows indicates that vinyl deforms because one side of the window is warmer than the other. Researchers report that windows with aluminum or steel channels inside the vinyl extrusion deform less than vinyl-only windows (see Figure 6). And, they say that heavier profiles (2.33 mm) have less tendency to deform than thinner profiles (1.33 mm). The heavier profiles cost more and may price high-quality PVC out of the residential market.

If you're selecting a low-end product, go for white PVC. Put it in a small opening, and select your clients with care. White PVC is less prone to deformation than brown, though elderly clients who don't engage the sash lock properly can create an instant and permanent deformation. White PVC with embedded metal channel eliminates this problem.

For brown or bronze PVC, you'll need to be picky and select a thicker extrusion. The thicker extrusions cost more, but contain ultraviolet inhibitors in the PVC formulation.

The same precautions about dark colors apply to vinyl-clad windows. Andersen Windows, for example, is using an entirely different cladding system for their white- and their brown-clad wood windows. The brown cladding is much thicker.

Don't put inexpensive solid PVC windows in large openings, especially where windows face the sun. Unreinforced PVC sash can sag, and the window will expand and contract with temperature change. The larger the opening, the greater the deformation. For large openings, you'll have better luck with wood or aluminum.

Higher priced PVC windows have ultraviolet inhibitors that make the vinyl perform with fewer problems. Rehau, Trocal, and Vekaplast all offer heavy-duty extrusions with reinforced frames. These companies also have windows with tilt-turn hardware (see

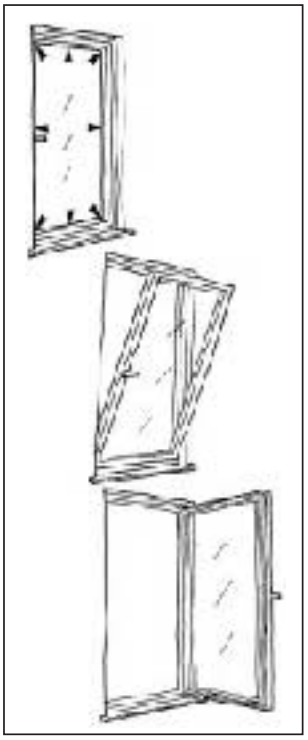


Figure 7. *Tilt-turn hardware lets you operate the window as both a hopper and a casement. It's sometimes sold as "European" hardware.*

Figure 7). Tilt-turn hardware makes the window work two ways. Like a hopper window, the top of the window tips into the room for night ventilation. But a 180° turn of the handle lets you open it like an inward swinging casement. Marvin also offers this option on its wood windows. Tilt-turn windows are good for basement remodeling because the full window area can be used for egress.

The Final Selection

The only way to really decide what works is to see the windows for yourself. We've had calls from contractors who want to know why the sash at the meeting rail is sagging, only to discover they've put the window in a 5-foot wide opening and used reinforced PVC. And we've gotten calls from senior citizens who report that the upper and lower sash stick together and move in unison so that the window can't be shut. We're also finding that many elderly people are having trouble with the tilt-in mechanism. Make sure the spring mechanism won't be too hard for an elderly client to operate, that a double-hung won't be too heavy to lift, or a casement too heavy to crank open.

On commercial jobs, you may want to install a sample window. This will give you a chance to verify field conditions that can slow the job down. These can include hidden clips, nailing flanges embedded in masonry or hidden by stucco (watch out for these on steel windows), trim demolition and replacement, and touch-up of wall finishes.

Replacement windows have a strong niche in the remodeling market. If you develop criteria that help your customers make the best selection, your work will stand out from the rest. ■

Marylee MacDonald is editor of the Midwest edition of JLC.