SHOPPING FOR Clad-Wood Casement Windows

A hands-on evaluation of ten leading casement windows

by Martin Holladay & Don Jackson

Every builder installs windows at one time or another. Maybe the architect specs them or the homeowner chooses them. Or, most often, you install the familiar brands carried by your local lumberyards. Rarely do you get a chance to shop brands, and almost never is it possible to compare one brand side by side with another.

We thought it would be useful to do just that, so we ordered and paid for ten clad-wood casement windows from leading national manufacturers. We ordered all of the windows in a similar frame size — 24 by 36 inches, or as close to that as possible — and specified white cladding and right-hand operation. Prices for our windows averaged $274, ranging from $210 for the Andersen 400 Series window to $380 for the Pozzi Premium. We asked the sales reps for the manufacturer's top-of-the-line product, but that wasn't what we got in every case. We examined the windows closely, installed them in a test wall, and compared their features.

Construction

We noted a variety of materials used for frame construction, including finger-jointed lumber, laminated strand lumber (a type of OSB), and a rough version of laminated veneer lumber that looks like CDX plywood. All of the frames seemed plenty strong. All of the manufacturers use clear pine lumber for the sash.

Cladding

Most of the manufacturers use aluminum cladding. Two manufacturers, Anderson and MW, use vinyl. Weather Shield makes both an aluminum-clad and a vinyl-clad product, so we ordered one of each.

Aluminum has several advantages over vinyl: It's available in a wider variety of colors; unlike vinyl, it's unaffected by long exposure to UV light; and it won't crack or shatter under impact when cold, the way vinyl can.

Vinyl also has its strengths: The seams are easy to weld, making for watertight joints; it holds up better in a salt-spray environment than aluminum; and it contributes to a more energy-efficient product. The R-factor for our windows, all of which were ordered with low-E argon-filled insulated glass, averaged 2.9 for the vinyl-clad windows compared with 2.6 for the aluminum-clad windows.

Aluminum thickness varies from manufacturer to manufacturer. Pella and Pozzi use thin roll-formed aluminum (0.024 and 0.019 inch, respectively) for sash cladding, while Eagle, Hurd, Marvin, Norco, and Weather Shield use extruded aluminum measuring 0.045 to 0.055 inch. Extruded aluminum, unlike roll-formed aluminum, adds structural rigidity to window frames and sash.

Weather Protection

One of the most obvious problems with casement windows in general is that they typically get drenched when they're left open during a rainstorm. According to a local window dealer, this is one of the main reasons casements are not sold as widely in the New England market as they were several years ago. Energy-conscious builders, attracted to casements because of their tightness, used them widely in the 80s, but were rarely including the protection of wide roof overhangs in their designs. Consequently, homeowners experienced paint problems, swollen sash, and rot, and casements fell

from favor. New window technologies, including claddings, have improved the durability of casements, but we wanted specifically to see how this "weak link" was treated in the new designs.

We also looked closely at weatherstripping. Some manufacturers use only one strip where the sash meets the frame; others have a second backup strip. We note this in the chart below.

Weight

We put the windows on a scale mainly to confirm our own impressions of their relative weight. One might assume that a window's weight is a rough indicator of its strength, since a heavier window usually has thicker lumber or cladding than a lighter window. On the other hand, good engineers know how to design strong components from light materials. And in casement windows, a lighter sash may be less likely to develop "sash fatigue" (see sidebar, page 10).

Design Pressure Rating

A better indication of a window's strength is its design pressure, or DP, rating, reported in the

CLAD-WOOD WINDOW SPECS

	Price	Weight	Type of cladding	Cladding thickness in inches	Design pressure rating	Number of standard cladding colors
Andersen 400 series	$210	32 lbs.	Vinyl	.047	DP 40	3
Eagle	$279	40 lbs.	Extruded aluminum	.050 on frame, .045 on sash	DP 45	10
Hurd	$255	50 lbs.	Extruded aluminum	.050	DP 50	6
Marvin	$245	42 lbs.	Extruded aluminum	.050	DP 40	5
MW	$219	37 lbs.	Vinyl	.030	DP 50	3
Norco Siteline	$229	35 lbs.	Extruded aluminum	.050 on frame, .045 on sash	DP 40 or 50, depending on size	7
Pella	$252	37 lbs.	Extruded aluminum on frame; roll-formed aluminum on sash	.045 on frame, .024 on sash	DP 50	3
Pozzi Premium	$381	40 lbs.	Extruded aluminum on frame; roll-formed aluminum on sash	.063 on frame, .019 on sash	DP 45 to 70, depending on size	6
Weather Shield aluminum-clad	$298	37 lbs.	Vinyl	.055	DP 40	4
Weather Shield vinyl-clad	$315	37 lbs.	Extruded aluminum	.050	DP 40	1

HARDWARE

	Number of sash locks on 36"-high window	Type of latch	Sash latch handle location	Sash latch location(s)	Hinge arm material	Can sash be removed without removing screws?
Andersen 400 series	1	Concealed	Center	Center	Stainless steel	No
Eagle	1	Exposed	Center	Center	Painted zinc alloy	Yes
Hurd	1	Concealed	Low	High	Painted zinc alloy	Yes
Marvin	2	Concealed	Low	High and low	Painted zinc alloy	Yes
MW	1	Exposed	High	High	Painted zinc alloy	Yes
Norco Siteline	1	Exposed	High	High	Painted zinc alloy	Yes
Pella	2	Concealed	Low	High and low	Stainless steel	No
Pozzi Premium	2	Concealed	Low	High and low	Painted zinc alloy	Yes
Weather Shield aluminum-clad	1	Exposed	High	High	Painted zinc alloy	Yes
Weather Shield vinyl-clad	1	Exposed	High	High	Painted zinc alloy	Yes

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chart. The higher a window's DP rating, the better able it is to withstand a wind load. Builders in coastal areas, where the codes often specify a minimum design pressure, are used to checking DP ratings before buying windows. Most of the windows we looked at have a DP rating of 40 psf, but a few have higher ratings: The Eagle window is rated at 45 psf, the Hurd and MW windows at 50 psf.

Hardware

Hardware quality varies from manufacturer to manufacturer. Two manufacturers, Andersen and Pella, use stainless-steel crank mechanisms; the rest use a painted zinc alloy.

On a 36-inch-high casement — the size we sampled — most manufacturers install a single sash latch, while Marvin, Pella, and Pozzi install two. Those same three manufacturers, as well as Hurd, locate the sash latch handle near the bottom of the frame, where it's easy to reach when leaning over a kitchen counter. The other manufacturers locate the handle higher up — some halfway up, some a little higher.

There are two types of sash latches, exposed and

CLAD-WOOD WINDOW SPECS (continued)

	Thickness of insulated glazing	Triple glazing available?	Weatherstripping	Sash thickness	Thinnest portion of interior stool	Does cladding cover top of upper sash rail?
Andersen 400 series	5/8 inch	No	1 layer	2 inches	3/8 inch	Yes
Eagle	5/8 inch	No	2 layers	1 1/2 inches	1/4 inch	Yes, mostly
Hurd	1 inch	No	2 layers	1 7/8 inches	1/2 inch	Yes
Marvin	3/4 inch	No	2 layers	1 11/16 inches	1/4 inch	No, mostly not
MW	5/8 inch	No	1 layer	1 7/16 inches	1/4 inch	No, mostly not
Norco Siteline	3/4 inch	No	1 layer	1 7/16 inches	1/8 inch	Yes, mostly
Pella	5/8 inch	No	2 layers	1 3/4 inches	1/4 inch	No
Pozzi Premium	15/16 inch	Yes	2 layers	2 1/16 inches	1/4 inch	No, mostly not
Weather Shield aluminum-clad	1 inch	Yes	2 layers	1 7/8 inches	7/16 inch	Yes, mostly
Weather Shield vinyl-clad	1 inch	Yes	2 layers	1 15/16 inches	7/16 inch	Yes, mostly

OPTIONS

	Extruded aluminum flat casing available?	Extruded aluminum brickmold available?	True divided lights available?	Simulated divided lights (muntin bars glued to the glass) available?	Removable muntin grilles available?
Andersen 400 series	No, vinyl-clad LVL only, 3 1/2 and 5 1/2 inches wide	No, vinyl-clad wood brickmold only, 1 3/16 inches wide	No	Yes	Yes
Eagle	Yes, 3 1/2 and 5 1/2 inches wide	Yes	No	Yes	Yes
Hurd	Yes, 1 7/8, 2 5/16, and 3 1/8 inches wide	Yes, 1 7/8 inches wide	No	Yes	Yes
Marvin	Yes, 3 inches wide	Yes, 1 5/16 inches wide	No	Yes	Yes
MW	No	No	No	No	Yes
Norco Siteline	No	Yes, 1 1/2 inches wide	No	Yes	Yes
Pella	Yes, 2 1/2 inches wide	No	No	Yes	Yes
Pozzi Premium	Yes, 3 1/2 inches wide	Yes, 1 3/8 inches wide	No	Yes	Yes
Weather Shield aluminum-clad	Only for the Legacy series	Yes, 2 inches wide	Yes	Yes	Yes
Weather Shield vinyl-clad	No	No	Yes	Yes	Yes


Casement windows have either exposed (left) or concealed (right) sash latch mechanisms.

concealed (see photos, above). While concealing the latch typically looks nice, it requires routing a channel in the jamb, which can result in thin sections — some as thin as 1/8 inch (see photos, below). Concealing the crank arm also results in a thin stool section — a potential weak spot. We measured the thinnest lumber sections on each window sill and reported the results in the chart.

Installation Instructions

Leaky windows and window installations have gotten a lot of press over the past several years, playing a role in building disasters from the Wilmington, N.C., EIFS failures to the condo crises in California. And when it comes to warranty investigations, some manufacturers take installation instructions seriously. For example, Pella's instructions warn, "Failure to install as recommended will void any warranty, express or implied."

Yet, based on our sample, many manufacturers provide skimpy installation instructions at best, some none at all. This lack is no accident, according to Scott Griswold, window specialist at Huttig Sash and Door, a Weather Shield distributor in Sharon, Vt. "If there is a problem with leakage, and it is between the frame and the sash — which is very rare — that is our problem," says Griswold. "But if it is between the frame and the building, I walk away. We sell product only; I'm not an installation expert."

Among the manufacturers we looked at, only two — Marvin and MW — provided complete instructions that explain how a finned window should be integrated with a building's housewrap or asphalt felt, and how to install peel-and-stick flashing.

Many of our windows came with small peel-and-stick patches for installation at the corners of the nailing fins. These closed-cell foam gaskets help seal the corners of the windows against water penetration. In some cases, the patches arrived in

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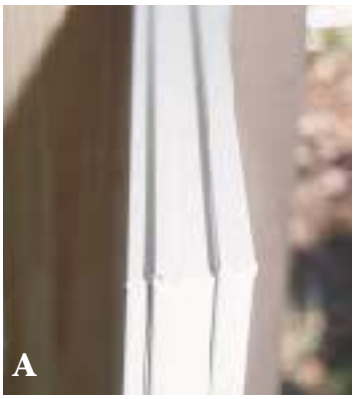
Routing the jamb and stool for the hardware leaves thin sections of wood in these locations on some windows.

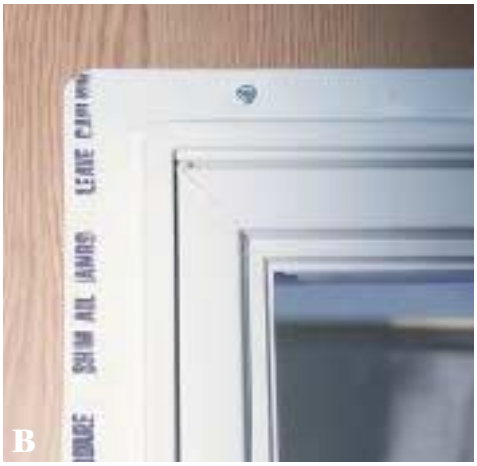
Andersen 400 Series

The undisputed giant of the national window market, Andersen (800/426-4261) shows its strength with the best moisture-protection package of any window we looked at. The wood sash is completely wrapped in vinyl, inside and out, with welded seams at the corners. Cranked out in the rain, it should shed water like a duck's back (A). The frame itself is tightly encased in a single-piece vacuum-formed vinyl cover that includes the nailing flange. There are no corners needing additional flashing patches. Stainless-steel hardware completes the impression of a casement designed to successfully weather the elements.

On the other hand, the vinyl treatment comes with some aesthetic cost. On the outside (B), Andersen leaves the corner welds proud and untooled, making no bones about the fact that this is a vinyl product. From the inside, there's no wood visible on the sash, which could be an issue for clients wanting the wood-window look.

The interior woodwork of the window we looked at was of good quality, except for three finish nails left proud by the assembler (C). According to Andersen customer service, that was an oversight, though nothing a finish carpenter couldn't take care of in a minute. Speaking of carpentry, the jamb extensions come uninstalled, something to keep in mind when considering the unit's relatively nice price of $210 — a "truckload" price, according to the lumberyard.


A


B


C

Eagle

Eagle uses a relatively thick (0.045-inch) extruded aluminum cladding, offered in ten colors — more than any other manufacturer we looked at. The corner miters on the sash were very tight (A) and had a small amount of sealant "squeeze-out," indicating they would most likely be watertight as well. The full $2\frac{5}{16}$-inch width of the sash's rails and stiles (as compared, for example, with Andersen's $1\frac{1}{2}$-inch-wide sash frame) gives a "solid" appearance to the window when viewed from outside.

The top rail of the sash is mostly unprotected by cladding, leaving the sash wood vulnerable when the window is left open in the rain. Although the instructions recommend installing a drip cap above the frame, Eagle (800/453-3633) did not supply one.

The overall assembly quality of the window we checked was lower than average. The weatherstripping had been carelessly installed and was bunched up at one corner (B), and one of the screws holding the exterior cladding to the frame had a stripped head and was left proud (C). Many staple heads were visible on the interior of the frame, which means a lot of filling and sanding to achieve even a paint-grade finish.


A


B


C

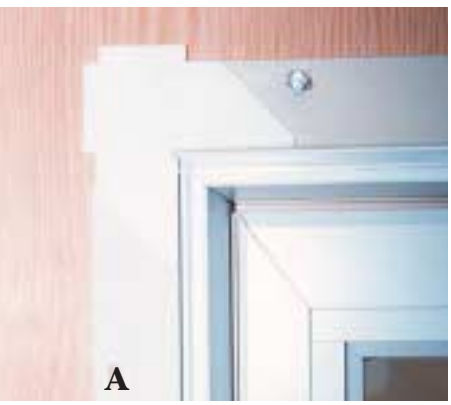
Hurd

The Hurd window was the heaviest window we looked at and has a particularly beefy frame. At 1 7/8 inches, the sash is also thicker than average. The heavy construction results in a relatively high design pressure rating of 50 psf. The extruded aluminum cladding is a thick, 0.050-inch material and completely protects the top and sides of the sash when it's open (A). Hurd (800/433-4873) uses a butt joint on the sash cladding, which creates a vertical shadow line and reads like a traditional rail-stile joint from a distance (B).

The window is solidly built, with no portion of the stool thinner than 1/2 inch (C). However, the frame itself is built partially of a stranded material, which raises a concern of irreversible swelling if water ever leaked into the installation. In fact, some of the stranded material is exposed inside the hardware recess when the sash is open.

The interior woodwork we saw was mostly good quality, ready for stain. On the nitpicky side, the jamb extension was installed with a couple of 6-inch-long dime-thick gaps and a blind, angled finish nail visible in one spot.

The price of the Hurd window was lower than average.



Marvin Clad Casemaster

Marvin also uses a heavy 0.050-inch-thick extruded aluminum. The exterior cladding joints were tight except for hairline cracks at the outside corners of the miters. Marvin's design also features a nice-looking coped inner stop around the glass (A). When the window is closed, the sash sits 1 1/4 inches in from the outer edge of the frame, in a seamless protective recess. However, when the window is open, the top of the sash is exposed (B).

On the inside, the woodworking is of high quality, with all mill marks largely sanded out and no exposed fasteners. The sash lock handle, placed conveniently low, operates two latches, one low and one high. Marvin (800/346-5044) has come up with a unique way to avoid routing the jamb for the sash lock hardware. Instead of solid wood, the latch-side jamb is strong veneer-wrapped plastic and is indistinguishable from solid wood.

At a cost $32 below the average, this is a good value. Except for the unprotected top of the sash, we had to look hard for warts, turning up only one sign of careless assembly: a proud screw beneath one of the weatherstrip beads (C). Marvin's installation instructions are the best of all of the windows we looked at.

MW Freedom

MW's Freedom casement is a basic unit and appears to be the product of less sophisticated manufacturing processes than the other windows we looked at. The MW is built mainly from square-edged, rather than molded, stock and has a utilitarian appearance on the inside. On the other hand, the simple, rugged construction (a full-thickness 2-by frame, for example) results in a DP rating of 50. At $219, the price was also well below our average — actually, this is the least expensive window when you add the labor cost of installing the jamb extensions to the cost of the Andersen.

Like Andersen, MW (800/999-8888) clads its window with vinyl, although the cladding is thinner (0.030 inch, compared with Andersen's 0.047 inch). Unlike an Andersen sash, however, which is completely encapsulated with vinyl, the MW sash has pine visible on the interior, creating the true wood-window look from the inside. Unfortunately, the top of this sash rail also is exposed to the weather when open (A). The welded seams on the sash and nailing fin of our window were rough and somewhat unsightly (B), and one of the nailing fin corner seams broke apart during our handling. Our inspection also turned up a deformed weatherstripping (C).

Norco Siteline

Although we asked the local dealer for the top-of-the-line clad casement, he sold us a Norco Siteline window instead of the Teton, which is Norco's premium line and costs 10% to 15% more.

The Norco Siteline (800/826-6793) has heavy (0.045-inch) extruded aluminum cladding. The cladding extends over the top of the sash, providing better than average weather protection but not completely concealing the wood (A). The miters on the front of the sash we examined were generally good (B). Like that of the Marvin casement, the Norco sash is recessed when closed. The inside corners of the frame cladding were sealed with too-heavy beads of caulk, which were picking up dust (C).

The nailing fins on the unit we bought were an unusual hybrid: Two of the fins (top and one side) were aluminum, and two (bottom and side) were vinyl. In a call to Norco, we learned that the bottom fin is always vinyl, so that it can be folded back for safe shipping. Ordinarily, there would be aluminum fins on the remaining three sides, but the unit we ordered was intended to be mulled and so had a vinyl fin on the side to be mulled. (We didn't order a mulling unit.) A separate vinyl drip cap is included.

The Norco had the thinnest stool section of any window. On the inside, the woodwork is plain; four staple heads were visible. The design includes an unattractive plastic trough to hold the top of the screen at the interior head of the window.

Compared with the others, the main attraction of this window is its relatively low price; ours cost about $45 less than average.

Pella Architect Series

Pella uses .045-inch-thick extruded aluminum on its frame, while the sash is clad with 0.024-inch-thick roll-formed aluminum, about half the thickness of the cladding on most of the other aluminum-clad windows. The joints on the sash cladding are overlapping miters, with the top rail overlapping the stiles and the stiles overlapping the bottom rail — a clean detail (A). The inside edge is shaped with an ovolo, like the muntins in a traditional wood window. Unfortunately, the top of the sash is left largely exposed (B). We noted unsanded end grain at the top of the sash, as well as a buildup of yellow glue. The weatherstripping installation was also a bit sloppy, with excess sealant at the corners.

The nailing flanges are a stiff-gauge aluminum, shipped flat and then folded out for installation. An integral nailing flange-drip-edge runs across the top. The cranking mechanism on the Pella, like that on the Andersen window, is stainless steel.

With a cove molding running around all four sides, the interior woodwork looks good and was nicely finished, with no exposed fasteners. Pella's foldaway crank handle (C) is elegant and convenient. Like Marvin, Pella (800/547-3552) uses one handle, placed low, to operate two catches. At a cost well below the average, we would consider this a good value.


A


B


C

Pozzi Premium

Pozzi, like Pella, uses thin (0.019-inch) roll-formed aluminum for its sash cladding, creating an authentic-looking rail-and-stile joint with the thin material (A). The top of the sash is not clad (B). The sash itself is the thickest of any window we looked at.

The frame is clad with a heavy, .063-inch-thick aluminum. The top nail fin doubles as a drip cap; the side fins are a very rugged vinyl.

The woodwork on the Pozzi unit is of average quality. Both the stool and the latch jamb have been deeply routed to make room for the hardware, leaving little more than 1/8 inch of supporting wood across the bottom and up the side (C). Viewed from the inside, the milling is nice but simple. Several exposed fasteners hid behind the screen edge of our window, and 20 or so tiny brad holes were visible around the glass stop. Pozzi (800/547-6880) uses one handle to operate two latches, as do Marvin and Pella.

The Pozzi Premium was the most expensive window we looked at — a fact that would exclude it from contention if we were pricing a house tomorrow. For the price, we would have expected a stainless-steel mechanism and a higher-quality interior finish.


A


B


C

Weather Shield Aluminum

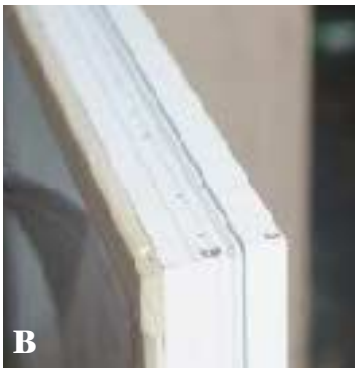
Weather Shield makes both vinyl-clad and aluminum-clad casements, and we bought one of each. Except for the cladding and the nailing fins, the windows were identical. Weather Shield casements have sturdy sash, measuring at least 1 7/8 inches thick.

Although we asked for the highest-quality clad casement window from our local Weather Shield dealer, we were sold clad windows from the standard line. Weather Shield (800/222-2995) also makes a premium line of aluminum-clad casement windows, the Legacy line, for 15% to 20% more.

Weather Shield uses a heavy, .050-inch-thick extruded aluminum. The miters on the sash cladding, which has a slight bevel, were clean and tight (A). The nailing fins, made from the same stock and integral with the frame cladding, were the heaviest of any window we looked at.

The cladding covers all but 5/16 inch of the top of the 2-inch-thick sash — offering almost complete weather protection (B). Unfortunately, five unnecessary holes (drilled standard, according to a contact at Weather Shield, so that the hinge can be easily mounted on either side) provide an entry point for water in an otherwise fairly well-protected sash.

The woodwork on the inside is simple and was nicely finished in our unit, with no visible fasteners (C). Weather Shield uses a single exposed latch handle, mounted high on the frame — not ideal for a sink installation. The Weather Shield cost $24 above the average.



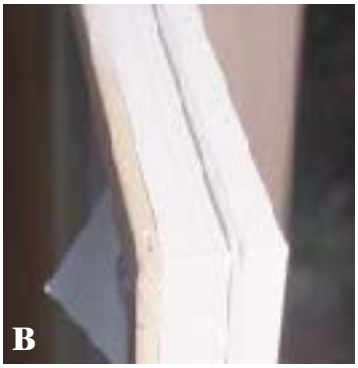
Weather Shield Vinyl

Weather Shield's vinyl-clad window gives proof that vinyl welds don't have to look rough and globby (A). The corners on our unit had been tooled so that most of the vinyl squeeze-out at the weld was gone — a nice improvement over the appearance of the Andersen and the MW. As on the Weather Shield aluminum-clad unit, the top of the sash was almost — but not quite — protected from the weather (B). We noted another detail: a joint in the bottom IGU spacer 5 inches from one edge and right where it was easily seen (visible in photo A). Not a big deal, but it seemed like an odd use of scrap material.

The unit has vinyl nailing fins on the sides and bottom and an extruded-aluminum combination top fin and drip cap.

As on the Weather Shield aluminum-clad unit, the interior woodwork was nicely finished. On both units, Weather Shield uses a molded latch assembly that matches the profile on the interior stops — a neat detail (C).

At $315, the Weather Shield vinyl-clad window cost $41 more than the average.



Sash Fatigue

Casement windows are often preferred over double-hung windows because of the tight seal they provide. But casement windows also have a common weakness — a tendency to sag over time, a problem called "sash fatigue." Once a casement sash sags out of square, it becomes difficult to close. When the crank no longer draws the sash all the way back to the frame, it may take two people to close the window — one inside, operating the latch, and another outside, pushing against the window. Hardly a picture of convenience.

Sashes are more likely to rack if they are often left open. "Sash sag is not common with Andersen products," says Steve Johnson, a materials engineer at Andersen Windows. "But it is more likely with very large units that have been left open for long periods of time."

The service reps of most window manufacturers are familiar with sash fatigue. "If the sash is not too far racked, you can compensate for it," says Paul Emmerich, service representative at Hurd Millwork. "Usually, you insert shims under the operating track to raise the window as you close it."

Another trick is to adjust the hardware. According to Jay Barry, customer service representative at Marvin Windows, "If the sash racks, depending on the amount of settlement, fixing it might be as simple as taking the arm of the roto-gear mechanism and bending it up slightly. That will direct the sash upwards as it closes. If things have really dropped down, then a person is probably going to have to replace the sash."

Del Zahurones, customer service manager with Norco Windows, knows a few other tricks. "You can take the sash out, remove the top hinge, fill the screw holes, and move the hinge toward the center of the sash a little bit," says Zahurones. "There's also a more permanent repair: When you take the top glazing bead off the sash, you'll find that the glass is touching the rail on the latch side of the sash. You almost close the window, and then you get a Wonder bar under the sash and onto the frame, and put some upward pressure on it, and you'll see the sash start to lift off the glass. Then, to square up the sash, you put a shim between the glass and the top rail on the latch side. A popsicle stick will work, or you can stack two popsicle sticks."

— *M.H.*

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poor condition and without instructions. Those from Hurd, Marvin, and Pozzi, however, were neatly packaged and easy to install.

If We Were Buying

Because the chain of responsibility for product installation typically ends at the GC's desk, most builders buy windows that have a record of proven performance, from a dealer who gives them great service and backup when things go awry. That's worth far more in the long run than saving a few hundred bucks off the price of a window package, and will determine what you buy.

But there is really no way to shop without looking at the price. The prices stated in this article reflect our local northern New England marketplace. The price you pay for any of these windows may vary substantially from what we paid. For us, the best values were the Andersen, Hurd, Marvin, and Pella windows. We also liked the Weather Shield aluminum-clad unit, though it was a little more expensive.

Andersen. For the customer who doesn't object to the appearance of a sash that is completely wrapped in vinyl, Andersen is a good window with competitive pricing. The integral nailing flange should speed installation, while the stainless hardware and the attention paid to protecting the sash from moisture increase durability.

Hurd. This is a solidly built window with nice exterior detailing and, alone among the aluminum-clad products, a well-covered sash.

Marvin. Marvin's workmanship, inside and out, is among the nicest of the lot. Considering the quality, the price is excellent.

Pella. This is perhaps the nicest-looking window overall, both inside and out. Thoughtful hardware design, crisp aluminum details, and nicely finished woodwork make this a good buy.

Weather Shield. Though in our local market it cost $24 more than the average, the Weather Shield aluminum-clad window is well built and attractive. It has a sturdy, well-protected sash — though we would recommend sealing those redundant screw holes in the top.