Shopping for Wood Windows

BY CHARLES WARDELL

How to find the window that offers the energy performance, finishes, and accessories that best meet your needs

Windows have come a long way from a single or double pane of glass let into a wood frame. The last decade has seen an explosion of styles and accessories, along with more efficient frames, sashes, and glazings. These advances have made windows the most complex parts of the building shell — and the hardest to specify. To sort through all of the options, we spoke with dozens of window companies, waded through reams of product literature, and surveyed hundreds of contractors about what makes a good window. Here are the results.

Glazings

Most people want windows that are as energy efficient as possible. The two most important factors to look at are the air infiltration rate and the total window R-value.

R-value. Manufacturers used to use a center-of-glass R-value to rate the energy efficiency of their windows. But the R-value of the total window is affected by other factors, like the materials used in the frame and the way the glass is sealed at the edges. Center-of-glass R-values are still valid when comparing glazings, but windows rated by the National Fenestration Ratings Council (NFRC) have more accurate overall R-values because NFRC looks at both the glass *and* the frame (see "Windows and R-Values," page 40).

High-performance glass. Nearly all double-glazed windows are now available with low-emissivity (low-e) coatings, which raise the window's R-value. In northern climates, the low-e coating is placed on the outer surface of the inner pane (the side that faces the air space between the two panes) to reflect infrared heat radiation back into the building. "Southern" low-e windows are coated on the inner surface of the outer pane to reflect radiant heat back to the outdoors. Many low-e windows now get an additional energy boost from argon or krypton gas used to fill the space between double glazing.

Another type of low-e material, called Heat Mirror, was developed by Southwall Technologies of Palo Alto, Calif., and is used by several window manufacturers. It consists of a thin film stretched between the panes of an insulated glass unit. The film creates two air spaces which, combined with the low-e coating on the film, make for exceptionally high center-of-glass R-values. Heat mirror films can also be made for southern applications.

CAROLYN BATES

Center-of-Glass R-Values

R-Value	Type of Glazing
1.0	Single glazing
2.0	Double glazing, 3/16″ air space
2.5	Double glazing, 1/2″ air space
3.2	Triple glazing, 1/2″ air space
3.0	Triple glazing, 1″ air space
3.0	Double glazing, 1/2″ air space, low-e
4.0	Triple glazing, 1/2″ air space, low-e plastic interpane
4.0	Double glazing, 1/2″ air space, low-e, argon fill
4.5	Triple glazing, 1/2″ air space, Heat Mirror film, argon fill
8.0	Quadruple glazing, 1″ overall thickness, two low-e Heat Mirror films, proprietary gas fill

Figure 1. *The R-value of a glazing system, measured at the center of the glass, increases with additional layers of glazing, low-e coatings, gas fills, and Heat Mirror films.*

Low-e coatings and gas fills can be combined to make several varieties of high-performance windows. WeatherShield's Super Smart glass, for instance, is triple-glazed and has two low-e coatings and an argon gas fill; the company claims a center-of-glass insulating value of R-6. Hurd's doubled-glazed Insol-8 window uses two Heat Mirror sheets to create three gas-filled chambers; it has a center-of-glass value of R-8 (see Figure 1).

Yet another variation is Pella's Heat Mirror Plus window. With double glazing, a single Heat Mirror film, and either krypton or argon fill, it gets a respectable R-6 at the center of the glass; adding a removable low-e glazing panel on the inside raises the insulating value to R-8.9.

UV blockers. Ultraviolet light (UV) is a major culprit in the fading of rugs, drapes, and upholstery. While the only way to avoid all UV-caused fading is to keep sensitive items out of direct sunlight, special glazings can ease the problem. A typical low-e coating will reduce UV transmittance by up to 60%, while Hurd claims that its Heat Mirror film will block up to 99.5% of the UV rays. Special tints can also be added to ordinary glass to help reduce UV exposure, as is the case with Hurd's Solar Control Window.

Air Infiltration

The other half of the window efficiency equation is air leakage. A window's air infiltration rate measures the amount of air that seeps between the sash and frame at the perimeter; the lower the infiltration rate, the more comfortable people will feel when sitting next to the window. Infiltration is measured in cubic feet per minute per linear foot (cfm/ft.) of crack with a 25-mph wind blowing directly at the window. The American Architectural Manufacturer's Association, a trade association of window manufacturers, has set a standard of 0.375 cfm/ft. or less for all residential windows. Ratings for wood double-hungs range from 0.15 to 0.25 cfm/ft., while wood casements can get as low as 0.02 cfm/ft. Casements are tighter because double-hungs must remain loose enough to slide easily.

Finishes

The coating used to protect the frame and sash can extend the life of a wood window. While most wood windows come with a factory-applied exterior latex primer, more durable finishes are also available. Several companies (Andersen, Kolbe & Kolbe, Louisiana Pacific, Marvin, Pella, and WeatherShield) use the "Flexacron" system developed by PPG Industries of Excelsior, Minn. The wood is treated with a proprietary preservative and a polymer primer. It's then topcoated with a high-performance finish that feels as smooth as vinyl and comes with a 10-year warranty.

Cladding. The most permanent protective coating for a wood window is aluminum or vinyl cladding, either of which performs well in temperatures from -20°F to over 100°F. Despite the durability of the cladding, however, the wood frame should be treated with a waterproof preservative by the manufacturer before the cladding is applied. Although the wood can be dipped, pressure-treating is best. In the unlikely event that water does get under the cladding, the preservative will protect the wood from shrinking, swelling, warping, and decay. Before buying a window, find out which treatment the manufacturer uses.

The type of cladding also affects how you secure the window to the house. Nonclad windows are fastened through

Figure 2. *For those who have trouble opening casement locks, Andersen's optional tandem sash lock (left) makes it easy to operate both locks at the same time. Andersen's custodial sash lock (right) can prevent small children from opening a casement. It can only be unlocked with an allen wrench or a tool supplied by the company.*

JLC Reader Survey

We sent surveys to a random sampling of *JLC* readers, asking about their experiences in specifying, installing, and warranting windows. Of the more than 200 that responded, 31% listed new custom homes as their primary market, while 60% got most of their business remodeling. The average respondent built about 5 new homes per year and completed 13 to 16 remodeling projects.

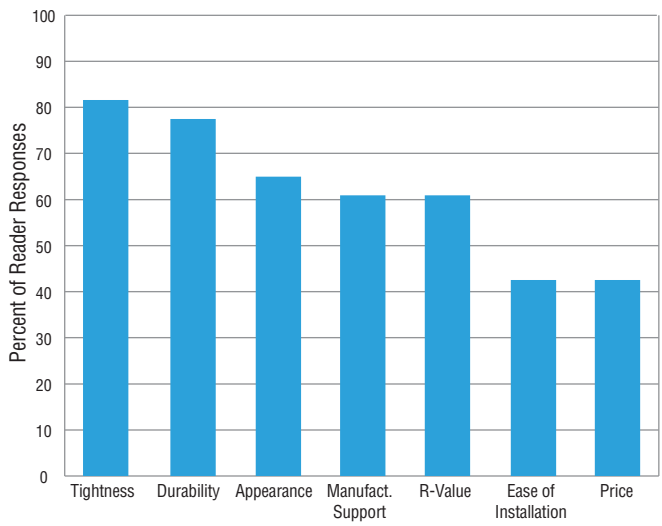
The results showed that while material and installation costs are important, our readers' first concern is quality. The survey asked respondents to rank a number of criteria for choosing a window in order of importance (Chart A, below). Tightness and durability were ranked as "very important" by 82% and 77% of respondents, respectively. Appearance was "very important" to 64% of those responding, followed by R-value and manufacturer support, with 61% each. Only 41% of respondents considered ease of installation and price an important part of their decision-making process. "I've see many window types and qualities," wrote one reader. "Money spent on good-quality windows is money well spent."

When asked to list their favorite brands, the big name companies got the lion's share of the vote. Andersen topped most lists (71%), followed by Marvin (52%) and Pella (26%); other regional and national companies were listed by fewer than 18% of respondents. "Generally speaking, if you stay with the major brands, you'll be glad you did," wrote one reader. Among the reasons people gave for brand loyalty were "good quality, availability, a large amount of sizes, and the availability of parts." There was some cynicism, however, about advertising hype. As one reader put it, "I hate companies that claim super-efficient glazing in their advertising while the window specs show a very different overall R-value."

The survey also asked respondents about problems they had experienced with windows during the warranty period (Chart B). The most common problems with double-hungs were sticking sash and sash-spring failures (13%), and fogged glazing (12%). Only a handful of respondents (7%) had seen failed weatherstripping and cracked vinyl cladding. On casements, 15% of respondents had seen hardware failures and sticking sash, 12% had seen fogged glazing, 10% weatherstripping failures, and 5% cracked vinyl cladding.

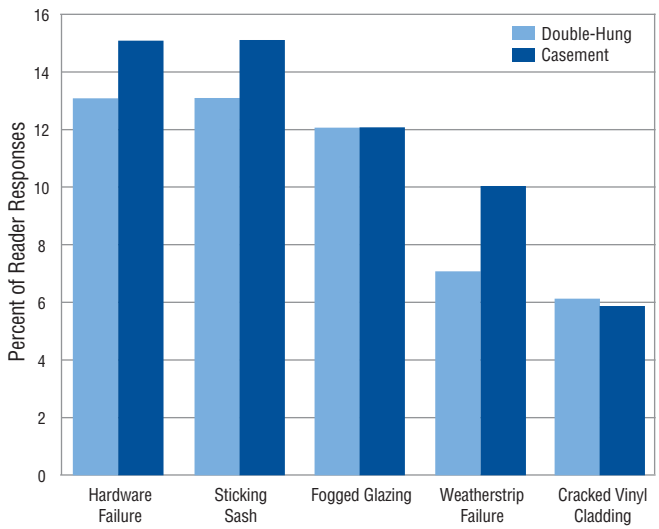
We also asked readers about the treatment they had gotten when contacting a window manufacturer for service. About 36% of respondents had done so at some point. What was surprising was the contradictory experiences that different people claimed to have had with the same company. Some manufacturers' warranty response was praised by one group of respondents and rated dismally by an equal number. Differences among local dealers may account for the disparity. "Most problems have been the result of screwups by regional distributors," explained one respondent. "The distributor in our area," another added, "is basically indifferent to our needs." The one exception was Andersen. Almost everyone who had experienced trouble with an Andersen window praised the company's quick response time. Regardless of brand, however, it's wise to scrutinize both the warranty and the company's means of making good on it. "If there are no local warranty crews," wrote one respondent, "you'll have to do the work yourself." In other words, read the fine print and ask a lot of questions.

A. Choosing a Window



When choosing a window, factors such as tightness and durability were twice as important as price to readers who responded to our survey.

B. Window Problems



According to our survey results, builders experience the same kinds of problems with both double-hungs and casements, and with almost the same frequency. Moving parts — sash and hardware — caused the most grief.

Figure 3. *Marvin's Flip Handle (top left) folds out of the way when not in use (top right). Two other casement cranks that don't interfere with blinds and shades are Andersen's Compact Operator Handle (bottom left) and WeatherShield's T Handle (bottom right).*

an applied casing or brick mold (these are standard on some windows, optional on others), while clad windows come with flanges. Nailing flanges on vinyl-clad windows give the best protection against air and water infiltration because they're usually molded into the cladding. But vinyl flanges also break more easily during installation, especially during cold weather when the vinyl is brittle. Other systems, such as Pella's site-applied aluminum flange, are more durable, but don't seal as well.

Other Options

When comparing window prices, ask the manufacturer which accessories are included in the base price. For example, some companies include screens or snap-in-place muntins in their base price, while others charge extra for these items.

Hardware. All window hardware is not created equal. Most companies offer a choice of color in their hardware finishes, but a more important quality is corrosion resistance. Some windows can be ordered with brass or stainless steel salt-resistant hardware, a good choice if you build on the sea coast. Corrosion resistance is more of an issue with casement windows, because casement hardware is exposed to the weather when the window is open, and because the window can trap dirt when closed. Pella will ship windows with polished brass hardware, while WeatherShield's Super Smart casement units feature an adjustable stainless steel hinge that's both corrosion resistant and salt resistant.

Locks and latches. Locking mechanisms also differ from one brand to the next. Pella's Designer Series casement window, for instance, comes with a convenient single lever that operates both locks. Andersen's tandem sash lock (Figure 2, page 34) does the same thing, but is offered as an option. Andersen also makes a custodial sash lock that must be opened either with an allen wrench or with a special tool furnished by the company.

Cranks. One builder we spoke with prefers Pella casements because the crank mechanism is so easy to operate. Other builders dislike cranks that stick out from the frame and interfere with blinds and shades. Low-profile solutions to this problem include Andersen's Compact Operator Handle and WeatherShield's T Handle (Figure 3). Marvin's Flip Handle lies flat when not in use, but can be folded out to operate the window.

Extension jambs. One easily overlooked item that can have a big effect on installation time is the type of extension jambs provided by the manufacturer. Some companies supply little more than square-edged pine boards, which are rarely worth the price. Other companies, however, rabbet their extension jambs for easy installation. Still others rip the jambs to width and, in some cases, predrill the jambs to accept screws or dowels.

Muntins. Window manufacturers also try to differentiate themselves from each other by the way they divide the glass into "lights." Most use a removable wood or plastic grille that clips onto the inside surface of the sash. Most grilles are shipped unpainted, but primed grilles are available in some cases and can save finishing time.

An authentic-looking grille won't call attention to itself, but a bad-looking grille can make even a good-looking window look cheap. Fortunately, most companies carry a number of different grille patterns. Others add little extras, like reinforced intersections to make the grilles stronger.

If you don't like snap-on grilles, a more traditional configuration is the true divided light (TDL). While TDLs are still popular in some markets, they're less energy-efficient than windows with clip-on muntins. Even when a TDL uses a good insulating glass, the added perimeter area of the muntins increases

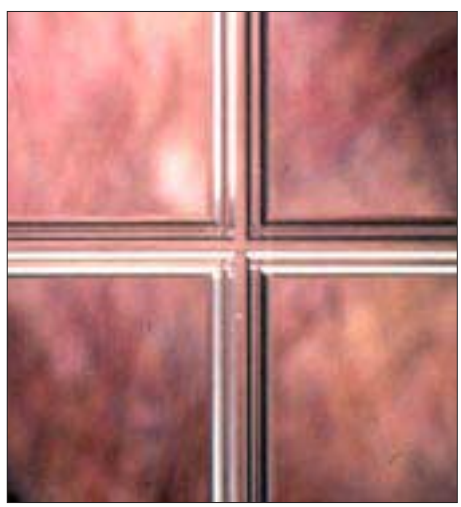


Figure 4. *Instead of true divided lights or clip-on grilles, Eagle's Decorelle 150 glazing has a clear or frosted groove cut into its face.*

Specialty Windows

Manufacturers offer specialty windows in a myriad of shapes and styles. Here are a few of the more interesting ones we found.

Norco's Teton Country Casement is a double casement without a view-obstructing center mullion. It's available in sizes up to 60x60 inches (Norco Windows, 811 Factory St., Hawkins, WI 54530; 800/826-6793). Great Lakes' French Casement Window is similarly constructed and fits up to a 20-square-foot opening (Great Lakes Windows, P.O. Box 1896, Toledo, OH 43603; 800/666-0000). Caradco also makes a double casement window without a center mullion.

Marvin's Switchable Privacy Glass changes from frosted to clear at the flip of a switch. A thin film of randomly oriented liquid crystals is sandwiched between two sheets of tempered glass. When electricity passes through the film, the crystals align and the glass turns clear. When the switch is turned off, the window returns to its frosted state. (The window consumes one watt of power per square foot of window area.) Marvin claims that when frosted, the window reduces UV penetration, a major cause of fabric fading, by 99%.

Roto's horizontal roof window gives you a choice of something besides square or vertical roof windows. The Hilight H-19 measures 44 inches wide by 27 inches tall (Roto Frank of America, P.O. Box 599, Research Park, Chester, CT 06412; 800/243-0893).

The glass in Marvin's and Pella's corner windows makes a seamless 90-degree bend. A cantilevered structural header is needed when installing the window in an unposted corner.

Velux's Round-Top Roof Window fits the company's standard GGL-410 and GGL-808 roof windows. The half-round is packaged separately and mounts to the roof deck with L-brackets. The flashing kit includes a special one-piece head flashing as well as a flashing to cover the field mullion between the round top and the roof window (Velux-America Inc., P.O. Box 5001, Greenwood, SC 29648; 803/941-4700).

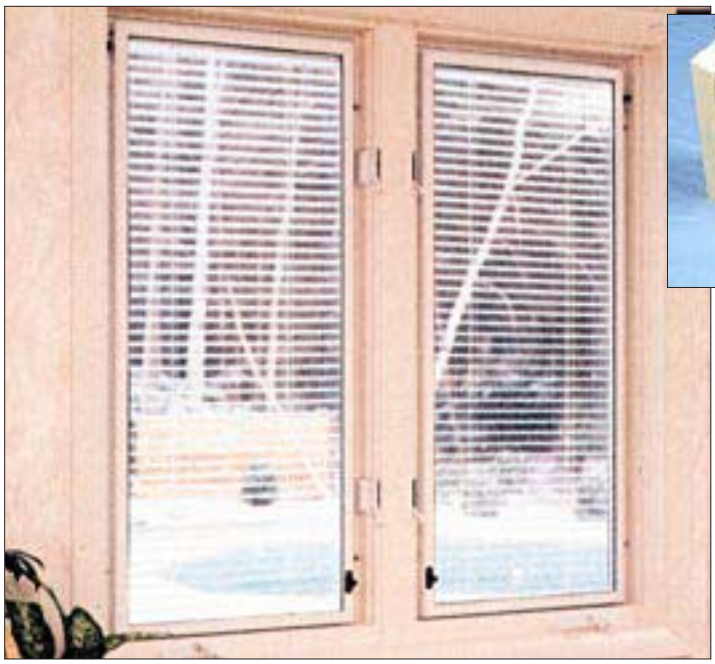


Figure 5. *Accessories like muntin grilles, blinds, and pleated shades go between the glazing and the screen in Eagle's System II glazing system (left), and between the double glazing and a removable interior panel in Pella's Smart-Sash (above).*

WINDOWS AND R-VALUES

Comparing window performance has never been easy. Manufacturers have traditionally used center-of-glass R-values to rate the energy efficiency of their windows. But since a window's overall insulating value also depends on the sash and edge seals, two windows with identical center-of-glass values may have different overall values.

Fortunately, a clear national standard is emerging. It's based on a series of tests introduced in 1989 by the nonprofit National Fenestration Ratings Council (NFRC, 1300 Spring St., Suite 120, Silver Spring, MD 20910; 301/589-6372). The NFRC tests, which look at the insulating value of the glass, the sash, and the frame, yield more accurate ratings than center-of-glass measurements. (Differences between the old and new values for selected windows are shown in the chart below.) California, Washington, and Oregon currently require NFRC labels on all new windows, while Alaska will begin doing so next year. Andersen has already decided to label all its windows, and NFRC Director Chris Mathis predicts that competition, stricter energy codes, and a growing number of utility-sponsored incentive programs will force other manufacturers to start shipping their windows with NFRC labels in two or three years. NFRC's *Certified Product Directory*, published in January of this year, provides data for apples-to-apples energy-performance comparisons for more than 5,000 windows.

R-Values: Old vs. New

	Unit R-Value	
Window Type	**Center-of-Glass**	**Whole Window**
Andersen Perma-Shield Casement	4.2	3.1
Marvin Clad Casemaster, low-e with argon	4.0	3.1
Hurd Insol-8	8.0	5.5

As recently as 1989, traditional R-values were inflated because they only measured heat loss at the center of the glass. The new NFRC values, introduced in 1990, are more accurate because they take the glazing edge seals, the sash, and the frame into account.

heat loss. And TDLs are a lot more expensive to build than standard sashes.

To overcome these shortcomings, window companies have rolled out a number of alternatives that look like a TDL, but don't have the cost or energy penalties. Some manufacturers glue muntins to the inside or outside of the glass or both, while others also fill the gap between the panes behind the muntins with aluminum spacers. An alternate solution is Decorelle 150 from Eagle Window and Door, which has a clear or frosted groove etched into the face of the glass (Figure 4, page 36).

Between the panes. Eagle and Pella can build windows that keep grilles, blinds, and shades from interferring with curtains and drapes (Figure 5). Eagle's System II blinds and shades are fastened to the window frame between the screen and the sash. Pella's Smart-Sash glazing combines insulated glass with a removable interior panel that makes room for either one or two between-the-panes options in the same window. Pella also still offers its Rolscreen window screen. Introduced 67 years ago, the rolling screen stores out of sight in a housing at the top of the window frame. When needed, it pulls down into position like a window shade.

Special orders. If you're doing custom work, you need to know how quickly you can get a special order. Many companies require significantly longer lead times for custom windows. But at least one manufacturer, Marvin, has built its reputation around custom options. Instead of stocking finished windows, Marvin stocks standard parts that can be combined into 11,000 standard sizes in 54 different Flexacron colors. (Custom sizes are also available.) This allows Marvin to claim that every window is "made to order."

Marvin also licenses a software package free of charge to architects and builders with PC computers. Called the Marvin Design System, the program runs on AutoCAD or Microsoft Windows. It lets you take full advantage of the design capabilities of the Marvin product line, but won't let you design a window that's not structurally sound. ■

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Guide to Wood Window Options

Manufacturer	Frame & Sash Finishes	Glazing Options	Whole Window R-Value* Dbl. hung	Casement
Andersen Windows Bayport, MN 55003 800/426-4261	Wood (Flexacron avail.) Vinyl clad	Low-e dbl. glazing with argon	3.00	3.00
Caradco P.O. Box 920 Rantoul, IL 61866 217/893-4444	Wood Aluminum clad	Dbl. glazing Low-e dbl. glazing with argon	1.89 – 2.94	2.00 – 3.45
Eagle Window & Door P.O. Box 1072 Dubuque, IA 52004 800/453-3633	Wood Aluminum clad	Low-e dbl. glazing with argon	2.86 – 2.94	2.86 – 3.03
Hurd Millwork Co. 575 S. Whelen Ave. Medford, WI 54451 800/433-4873	Wood Aluminum clad	Heat Mirror Insol-8 (double heat mirror)	2.00 – 2.90	2.00 – 4.60
Kolbe & Kolbe Millwork Co. 1323 S. 11th Ave. Wausau, WI 54401 715/842-5666	Wood (Flexacron avail.) Aluminum clad	Low-e dbl. glazing with argon	1.92 – 4.16	2.04 – 2.70
Louisiana Pacific Weatherseal Div. P.O. Box 48 Barberton, OH 44203 800/358-2954	Wood (Flexacron avail.) Aluminum clad	Low-e dbl. glazing Heat Mirror 88	1.92 – 3.03	2.00 – 3.03
Marvin Windows & Doors P.O. Box 100 Warroad, MN 56763 800/346-5128	Wood and wood-fiberglass composite (Flexacron avail.) Aluminum clad	Low-e dbl. glazing with argon Low-e triple glazing with argon or krypton	2.08 – 4.00	2.08 – 3.13
Milgard Windows P.O. Box 11368 Tacoma, WA 98411 206/922-6030	Aluminum clad	Low-e dbl. glazing Low-e dbl. glazing with argon Heat Mirror 66	1.85	1.85
Peachtree Doors Box 5700 Norcross, GA 30091 800/732-2499	Aluminum clad	Low-e dbl. glazing Low-e dbl. glazing with argon	3.13	2.94
Pella Corp. 102 Main St. Pella, IA 50219 515/628-1000	Aluminum clad	Low-e dbl. glazing Low-e dbl. glazing with argon Removable triple glazing	2.00 – 3.15	2.02 – 4.76
Pozzi Wood Windows P.O. Box 5249 Bend, OR 97708 800/821-1016	Wood Aluminum clad	Low-e dbl. glazing	1.96 – 3.03	1.92 – 3.33
Weathershield Manufacturing P.O. Box 309 Medford, WI 54451 800/222-2995	Wood (Flexacron avail.) Aluminum clad	Low-e dbl. glazing Low-e dbl. glazing with argon Low-e triple glazing with argon	1.75 – 3.03	1.79 – 4.00
Wenco Windows Industrial Park Mt. Vernon, OH 43050 800/458-9128	Wood Wood-fiber/resin composite Aluminum clad	Low-e dbl. glazing with argon	1.89 – 3.03	2.00 – 3.03

*Whole Window R-values are those published by the manufacturer. Independent verification of whole window R-values (as opposed to center-of-glass R-values) is currently available for some brands in the *Certified Product Directory* published by the National Fenestration Ratings Council (NFRC, 1300 Spring St., Suite 120, Silver Spring, MD 20910; 301/589-6372).

Guide to Wood Window Options Continued

Infiltration Air Rating (cfm/ft.)† Dbl. hung	Casement	Warranty‡	Comments
.17	.04	Entire window: 10 yrs. Glass: 20 yrs.	Easy-grip casement handle, compact casement handle Custodial casement sash lock, tandem lock adapter Custom maple grilles
.17	.03	Entire window: 1 yr. Glass: 20 yrs. (prorated after 10 yrs.)	Applied jamb extensions
.07	.017	Glass: 10 yrs. Wood components: 2 yrs. Hardware: 1 yr.	Step-grooved glass, 1/2-inch-wide muntins Between-the-sash blinds and shades Leaded beveled glass Prairie-style grilles
.08	.03	Entire window: 1 yr. Glass: 10 yrs.	Diamond-shaped windows & grilles
.20	.05	Entire window: 1 yr. Glass: 20 yrs. (prorated after 10 yrs.) High perf. finish: 10 yrs.	Concealed-clip grilles Fixed aluminum metal grille Custom blinds (14 colors) Curved glass
.08 – .13	.02 – .03	Entire window: 5 yrs. Glass: 20 yrs. (prorated after 5 yrs.)	Combination storm & screen Full and/or combo screens
.25	.10	Entire window: 10 yrs. on wood-fiberglass windows Glass: 10 yrs.	Hidden flip-handle, electrically-operated windows 90-degree corner glazing Triple-hung windows Switchable privacy glass
.14	.12	Entire window: lifetime warranty for original homeowner (includes labor)	Sculptured wood grille True divided lights available Tinted glass available Oak interior wood option
.17	.09	Entire window: lifetime for original homeowner	Tinted glass available Prefinished interior paint (white)
.15	.03	Cladding: 10 yrs. Glass: 10 yrs. Hardware: 1 yr.	Seacoast hardware Between-the-glass shading options Rolscreen casement screen 90-degree corner glazing
.24	.014	Wood: 1 yr. Glass: 10 yrs.	Custom color cladding
.16 – .18	.03 – .05	Glass: 20 yrs. (prorated after 10 yrs.) Finish: 10 yrs. on high perf. finish Hardware: lifetime	Multi-point casement locks Full perimeter grilles Low-profile casement handles Etched glass Oak & cherry interior wood
.05	.02	Glass: lifetime for original single-family homeowner	Marine boot glazing (added weather protection) Decorative hand-beveled glass

†Infiltration Air Rating (measured in cfm/ft. — cubic feet per minute per linear foot of window perimeter) represents the amount of air that flows between the sash and frame while a 25 mph wind blows directly at the window. A rating of zero is airtight. The values given are those published by the manufacturers.

‡Warranty covers materials only, except as noted. Check with manufacturer for more complete information.