Choosing the Right Windows

A high-performance window is only as good as the material used in its construction

BY MARVIN® WINDOWS AND DOORS

MARVIN Windows and Doors

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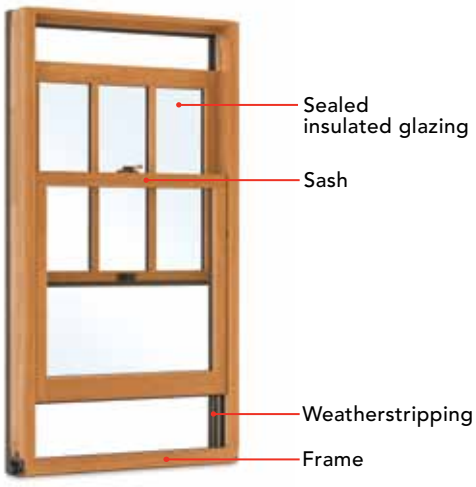
Windows have one of the toughest jobs in any building.



Like all construction components that are exposed to the outdoors, they face a ceaseless onslaught of water, wind, sun, and drastic temperature changes. Unlike siding, roofing, and trim, however, windows include double and sometimes triple panes of glass. In most cases, they are asked to open and close, too—and to do it smoothly for decades.

In many ways, a window's success or failure over the long haul comes down to the quality of the materials used in its construction. Windows are broken into two main parts. The sash is the part of the window that holds the glass, and the frame attaches to the house and holds the sash in place. The frames are fixed, but the sashes are not, and therefore they have the toughest job to do performance-wise.

For example, if the sash material warps over time, or expands and contracts at a different rate than the glass within, the window's performance can be compromised in almost every significant way. For one, the seals around the glass could be damaged, letting in air and moisture. The weather- and airtightness between the sash and frame can also be compromised, as can the smooth operation of the window.

The sash and frame material is also what differentiates most window brands from each other. Window and door glass has come a long way in recent decades—with two panes now the norm, and high-tech coatings, gas fills, and additional panes available to improve performance even further. Window manufacturers can provide almost any glass customers demand. With high-performance glass

now the norm, low-performance materials or poor design are often the weak thermal link in today's windows.

Last but not least, the frame and sash material is what determines how a window looks—from the profiles to the colors and finishes offered, and how long those colors last.

The market before composites

For many years, the materials available for residential windows and doors were limited to wood, roll-form aluminum, and vinyl. Aluminum-clad wood windows then emerged, for those wanting better insulating values and greater durability with a traditional look.

As expectations for energy efficiency and interior comfort began to climb—in cool climates as well as sun-blasted zones—roll-form aluminum windows dipped in popularity and vinyl took over. Like roll-form aluminum, PVC/vinyl windows are low-cost and low-maintenance, but many offer a significant step up in initial thermal performance. Improved manufacturing gives many of today's vinyl models even higher energy efficiency.

But the initial performance of vinyl windows is only part of the value equation. Due to the instability of the material, the performance of vinyl windows tends to degrade over time, especially in areas with wide temperature ranges.

Multiple cycles of expansion and contraction in the heat and cold tends to compromise the seals around the glass, as well as the smooth operation of the window. The experts at the well-known industry resource, GreenBuildingAdvisor.com (GBA), agree: "Vinyl has a tendency to expand and contract to a high degree with temperature changes. While [vinyl] window manufacturers claim that their designs minimize this issue, consumers should be aware of this potential downside."

Last, while vinyl windows simulate the look of traditional window frames, the bumpy heat-welded corner joints are off-putting to some.

When it comes to classic beauty, a wood window is hard to beat. With clean joints, crisp architectural profiles, and a warm glow under a clear finish, wood has held its own in the marketplace, despite being the oldest window-frame material by a few centuries. However, without regular sanding and repainting, all-wood windows are vulnerable to the elements.

All-wood windows are used most often in historical restorations, where their classic lines are valued, despite the additional maintenance required.

That brings us to the premium end of the market: extruded aluminum-clad wood, which boasts all of the benefits of wood windows with a low-maintenance exterior. With stable wood cradling the glass, the seals stay sound and the insulation values are high. On the inside, whether painted or stained, wood exudes unmistakable authenticity. Armoring the exterior is thick, weatherproof aluminum, with crisp profiles and a wide range of durable powder-coated colors that require nothing more than the occasional cleaning. Not all aluminum cladding is the same, however. The American Architectural Manufacturers Association governs the standards applied to window and door components. Quality clad windows should come with an AAMA 2605 verification—the highest in the industry. In addition to paying attention to the specific AAMA rating, consider the manufacturing process of the cladding itself when selecting windows. An extruded cladding is typically thicker than alternative roll-formed cladding. A thicker aluminum component is going to offer better performance over the lifespan of a window.

Certified factory mulls from Integrity lend high-performance flexibility in window arrangement and design.

Integrity from Marvin made with Ultrex fiberglass offers two complete lines of standard and custom-size windows and doors available with design and installation options that make them perfectly suited for replacement, remodels, and new construction projects.

The Ultrex fiberglass in Integrity windows and doors has a thermal expansion rate that is nearly the same as glass, which means seals within the windows last longer. Further, fiberglass windows have a 38% longer useful life expectancy than vinyl while still delivering maintenance-free performance.

Fiberglass changes the game

The window market changed in the early 1990s when Marvin Windows and Doors introduced Ultrex, a pultruded fiberglass material, created and formed in the company's own factory.

With unmatched stability and strength, and a patented acrylic color layer, Ultrex fiberglass promised longer life and less maintenance than any other window and door material, offering builders and homeowners what Susan Marvin has described as "quite possibly the perfect building material."

Experts in building science continue to push builders and homeowners toward fiberglass windows and doors. "Fiberglass has distinct advantages over wood, vinyl, and metal for window frame and sash construction," says a GBA article on composite windows. "As high-quality wood resources become scarce, fiberglass is likely to become more common because of its energy performance and durability."

Marvin made the new product available in its all-fiberglass windows and doors and, at a higher price point, fiberglass-clad-wood windows and doors, all under the same new brand, Integrity Windows and Doors. This gave builders two design options. "In New England, interior trim is often painted, so fiberglass looks fine against it," says Steve Baczek, an architect and builder outside Boston. "But if my clients want stained trim, they want a wood window."

Simply put, fiberglass windows changed the game. Not surprisingly, other window manufacturers followed suit with their own composite windows, and a new window and door category was born. However, the products in this new category vary widely.

WINDOW MATERIALS AT A GLANCE

Choosing a window package for a particular project can be a complicated process, but clearly articulating the differences between material types to clients and building partners doesn't have to be. Here's a basic breakdown of the need-to-know attributes of the window materials currently on the market.

VINYL

Low cost, low maintenance, good insulating/thermal performance, poor stability and prone to fading and chalking. Expansion and contraction with temperature changes tends to degrade performance over time. Premium models offer more robust frames, better stability, and improved insulating qualities.

VINYL-WOOD COMPOSITE

A blend of wood chips and vinyl, offers low maintenance and very good insulating/thermal performance, but strength and stability is much closer to all-vinyl windows than fiberglass or wood.

FIBERGLASS

Unmatched strength, durability, and stability. Excellent insulating/thermal performance, low maintenance inside and out. High strength allows thinner frame profiles in larger windows. Durability and clarity of color layer differs by manufacturer.

FIBERGLASS-CLAD WOOD

Low maintenance, with the strength and durability of fiberglass on the exterior, and the classic look of wood and traditional window profiles on the interior. High stability and excellent insulating/thermal performance.

ROLL-FORM ALUMINUM

Strong, durable, low cost, and low maintenance. Poor insulating/thermal performance.

ALL WOOD

High stability and insulating/thermal performance, with classic looks inside and out. Needs regular exterior maintenance to ensure durability.

ALUMINUM-CLAD WOOD

Crisp, classic profiles outside and in, natural wood interior, low maintenance, high strength and durability, excellent insulating/thermal performance. Extruded claddings are more durable than roll-formed claddings.

Strength and stability equal long-term performance

One of the main challenges window manufacturers face is temperature change. Fiberglass expands and contracts at a rate almost identical to glass, which is to say, extremely little. Vinyl (and the vinyl-based products under the composite umbrella) expand and contract at much higher rates, compromising the all-important air-seals between glass and frame, literally pulling the window apart. There is little point in paying for today's vastly improved double-paned glass units if they begin to leak air after a few years.

The fiberglass used in Integrity windows is rated eight times stronger than vinyl and is especially durable in areas with extreme weather. The Impact Line of Integrity Windows, which combines Ultrex fiberglass with laminated glass, robust hardware, and design enhancements to face the harshest of weather, earned the coveted IZ3 rating for use in the Atlantic and Gulf Coast hurricane zones.

That strength has other benefits, too. While pultruded fiberglass windows are not available with as many profile options as wood or (aluminum-clad wood), their great strength allows narrower frames and a cleaner look—attributes that are especially sought after on contemporary house styles.

When it comes to insulating properties, all composite windows offer a big upgrade, but because of how windows and doors made with fiberglass are designed and manufactured, fiberglass used with well-insulated glass helps lower heating bills and provides better comfort for decades longer. Rob Moody, a builder based in Asheville, North Carolina, uses only Integrity windows. "Fiberglass is better than any other window-frame material. You can't beat vinyl for cost, but fiberglass looks, performs, and operates better, and the long-term stability is like glass so the seals stay good," he says. "I used vinyl windows on the first house I built, but not after that."

Composite Clarification

Not all composite window materials are of the same quality. A closer look at the composite window market reveals critical differences in material and performance—not always evident at first glance but obvious as the window ages. For much of the market, "composite" means some amount of wood chips blended with a hot plastic resin like PVC vinyl, and extruded into various shapes.

Although considered part of the composite window category, pultruded fiberglass windows are a considerably different product. At its heart, pultrusion involves pulling while extrusion means pushing. That distinction makes all the difference. While most manufacturers simply push a hot mix of crushed material and plastic through a form (called a "die") to create composite window parts, companies like Marvin pull a dense matrix of braided, twisted glass fibers lengthwise through hot resin, creating parts with unmatched strength and stability.

Just as important, pultruded fiberglass is a thermoset material, as opposed to vinyl and vinyl-based composites, which are thermoplastic. Like concrete, a thermoset material's shape is permanent, while thermoplastics, like any plastic, are always at risk of melting, warping, expanding, contracting, or deforming in some way.

In fact, other manufacturers' composites are so fundamentally different from Ultrex that they were recently dropped into a new category by the leading third-party ratings body for construction materials in North America, the Construction Specifications Institute. "Thermoplastic" mixes of wood chips and vinyl now live in CSI MasterFormat Section 08 54 73—Composite Windows, while Ultrex, recognized as a "thermoset" fiberglass, remains in its original category (Section 08 54 13–Fiberglass Windows).

To drill a little deeper, a thermoplastic composite can be heated and melted, while a thermoset material like pultruded fiberglass can't, except at extremely high temperatures. In every way that matters, fiberglass windows are in a class all their own.

Ultrex windows have a patented acrylic-based finish that is designed to resist fading, chalking, cracking, and peeling through the full spectrum of color offerings.

Ultrex offers an unmatched finish

The Ultrex fiberglass used in Integrity windows and doors offers a uniquely durable and color-fast finish: a thick acrylic cap applied with heat as the part is being formed, fusing it to the fiberglass. This patented process creates a smooth surface, available in a range of rich hues.

The acrylic cap on Ultrex fiberglass is why Integrity offers the only fiberglass windows and doors to have earned an AAMA 624 verification, for "high performance."

By contrast, many composite windows have color applied cold, like paint. Other manufacturers tint their composite mix instead of capping it, which leaves the colors muddy and the surface rough. With Integrity windows, you get rich color that resists chalking, chipping, or fading for 10 years or more in the most intense sun and weather, even with dark colors like bronze and ebony. There's no need to paint, or to compromise on color. You buy Integrity windows in the color you want, knowing they'll look as good tomorrow as they do today.

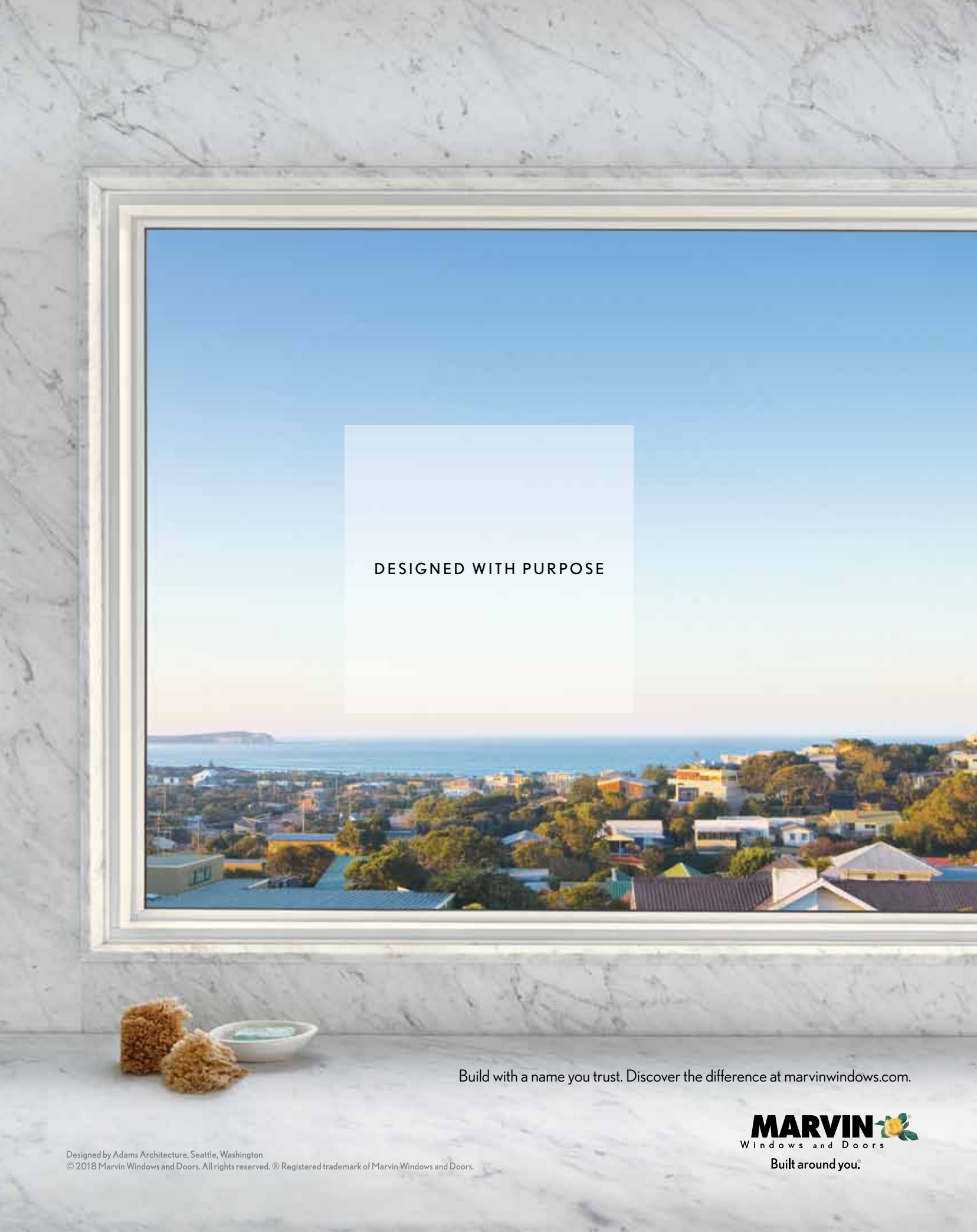
For Dave Veldhuizen, who builds energy-efficient homes in Eugene, Oregon, the extremely low maintenance of products like fiber-cement siding and Integrity windows is a major selling point. "Our key clients are people who still have kids at home, or they are retired and downsizing. In both cases, they don't want to be out on the ladder repainting their windows."

For those who want a custom color that Ultrex doesn't offer, fiberglass takes paint very well, and many builders take advantage of that. Vinyl-wood composites, on the other hand, like all-vinyl windows, cannot be painted due to the instability of the substrate. Paint can't adhere well when the material beneath it is in a frequent state of expansion and contraction

Two choices: wood-fiberglass or all-fiberglass

When it comes to true fiberglass windows, Integrity offers two options. All-Ultrex windows offer the best combination of performance and durability on the market, dominating the long-term value discussion in residential construction. For customers who want the traditional look of wood on the interior, Integrity offers Wood-Ultrex windows, with Ultrex fiberglass delivering durability, low maintenance, and long-lasting color on the outside, where the window meets the harsh elements.

All Integrity® windows have been thoroughly engineered to perform and are built by hand by Marvin employees—some of them fourth-generation Marvin craftsman. Learn more at Marvin.com.



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