

VINYL - The Most Popular Window In The U.S.

Over the past twenty years, vinyl windows have quickly replaced wood and aluminum as the most popular material used in residential windows. This popularity is due in part to vinyl's intrinsic characteristics that improve thermal performance and reduce maintenance.

Vinyl is a Natural Insulator

All materials used in making windows conduct heat. The material's thermal conductivity properties affect the amount of heat that is allowed to transmit through the material itself. If the material allows the transfer of large amounts of heat, the overall insulating properties of the window unit will be greatly affected.

Thermal conductivity can be stated in a K-value (BTU/hr/ft²/oF/in). The K-value of any material basically describes the amount of heat that moves through a material over time. The higher the K-value the more heat is transferred. A material with a lower K-value is a better insulator.

Material	K-Value
Aluminum	1505
Wood	0.76
Vinyl	0.97

Source: Aluminum Extruders Council.

The chart above shows the amount of heat transferred through aluminum is almost 2000 times greater than that of vinyl. This fact is easily demonstrated in everyday cooking. Metal frying pans are used on a cook top because they conduct the heat of the burner and surround the food inside. Stir the food inside the pan with a metal spoon and one can quickly feel the heat from the burner come through the utensil. Use a wood or plastic spoon and one can easily stir the food without being burned.

To offset this flaw, many aluminum manufacturers use "thermal breaks" when designing their windows. Thermal breaks utilize a PVC or high density polyurethane barrier inserted between the portions of the aluminum frame that are exposed to the interior of the home and the exterior of the home. This "break" is intended to create a barrier to heat flow through the material. However, many aluminum window designs, especially in double hung systems, allow some portion of the interior aluminum component to be exposed to the outside elements. These design flaws "short circuit" the thermal break and create the same heat loss seen in solid aluminum frames. Also, thermal breaks are typically used only in the frame of the window. Aluminum window sashes use a continuous aluminum extrusion, which directly connects the exterior and interior temperatures.

On a winter day, cold aluminum window frame members may create unwanted condensation on the interior of the window. This is due to the fact that cold air can hold less moisture than warm air. The room moisture can collect on the cold frame and eventually drip from the window. This can damage other materials around the window and lead to added repairs. Vinyl's natural insulating characteristics greatly reduce the risk of interior room condensation.

Vinyl is Maintenance Free!

Aluminum windows require paint and wood windows require some type of sealant (paint, stain, etc.). Without it, these materials will deteriorate over time. Exposed wood will rot over time and swell when exposed to moisture. Swelling and warping are major factors in the failure of old wood windows.

Exposed aluminum will corrode and discolor. This corrosion could affect the integrity of the fasteners used to hold the unit together. During stormy or windy conditions, debris may nick or chip away the paint of an aluminum window exposing the raw metal underneath. Without additional maintenance, these chips can eventually affect the look and performance of the window unit.

Vinyl never needs painting or staining. It does not absorb water and it has no surface treatment layer (paint or coating to scratch away). These characteristics mean that the material is virtually maintenance free. Exterior factors that mar or disrupt of the exterior vinyl surface won't affect its aesthetics. The color goes all the way through the material. When exposed to salt air or water in seaside communities, vinyl windows retain their integrity and appearance.

With its many advantages, it's no wonder than vinyl is the new leader in the residential window industry. Not only has vinyl replaced aluminum and wood windows, but also it is beginning to take the place of other products typically made from wood and metal. New vinyl building products continue to emerge to capitalize on the weathering properties and maintenance free aspects of vinyl. These products include decking, boat docks, fencing, railings, garden components, park benches, mailbox posts, and porch posts.

Summary Chart of Material Characteristics

This material ...	Vinyl	Aluminum	Wood
...has welded corners	X		
...has intricate shapes	X	X	
...has integral interlock	X	X	
...has integral lift rail	X	X	
...has weather seal channels	X	X	
...has interior dead air chambers	X		
...is a natural insulator	X		X
...never needs painting.	X		
...won't absorb moisture	X	X	
...won't rot.	X	X	
...won't warp.	X	X	
...won't corrode	X		X
...reduces condensation	X		X
...is not affected by salt air or water.	X		
...has color throughout.	X		
...is the most popular material used.	X		