



# **FLEETWOOD** WINDOWS AND DOORS

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## **What do the terms U-Factor, SHGC, CR, VT, and Air Infiltration mean?**

### **What is the U-factor?**

U-factor, commonly referred to as the "U-Value" gives the rate of heat transfer through the window. This is measured from inside to outside when it is cold, and from outside to inside when it is hot and is based on per unit area and per unit temperature difference. The lower the U-factor, the less heat energy escapes your home in the winter. In other words, U-Value is NOT a value to consider if you want direct heat from the sun or if you want to avoid that direct heat (short wave radiation.) The SHGC is the value to be considered in such matters.

### **How is the heat transferred?**

There are basically three ways heat is transferred.

1. **Conduction** is heat transfer through a material.
2. **Convection** is heat transfer between a fluid (like air) and a solid surface (like a piece of glass).
3. **Radiation** is heat released by other objects. All things continually release radiation. The warmer the object, the more radiation is released. Therefore, a warm object exchanging radiation with a cold object will give off more heat than the cold object gives back, suffering a net heat loss. For example: If the sun is directly over a house (noon) the sun will heat up the car, street, etc. and that heat will release into the air and therefore toward the house.

### **How do these apply to U-factor?**

All three types of heat transfer are lumped into the computer modeling that produces u-values. Then, a physical test in a device called a "hotbox" is carried out to confirm the model. Most people are unaware HOW the testing is done to achieve a u-value. An operable window, for example, is not installed as it would be in your home. Rather, the cracks and weep slots are all sealed off so ONLY the heat loss through the material is measured. Keep this in mind when evaluating the real importance of u-value for your home.

Many have mistakenly chosen windows with high u-values at a compromise to architectural style, only to be disappointed by the "savings" of energy.

### **How come Fleetwood does not give an R-Value for its windows?**

Fleetwood offers NFRC (National Fenestration Registration Council) certified products. The NFRC uses the U-factor because R-value does not accurately reflect the interaction with solar radiation and airflow around the window. Therefore, the window industry measures the energy efficiency of their products in terms of thermal transmission, or U-factor. If somebody quotes an R-value to a customer, the customer should insist on knowing the NFRC-certified U-factor. Some in the business have been known to try to further mislead customers by using center-of-glass R-values instead of whole window values, which makes the product appear better than it really is.

## **What is Solar Heat Gain Coefficient?**

The SHGC represents the fractional amount of the solar energy that strikes the window that ends up warming the house. As radiant heat from the sun comes from a surface at 11,000 degrees Fahrenheit, different calculation techniques are needed to account for the heating effect. The solar heat gain coefficient (SHCG) is defined for this purpose. When sunlight hits a window, some of it goes right through the window, some is reflected back and some is absorbed, heating up the various parts of the window. The absorbed heat can either flow to the inside of the house or the outside. A lower SHGC means that window reflects/deflects more direct heat from the sun. Homeowners must also weigh the value of reduced light when simply choosing a window with a lower SHGC, so make sure to consider the visual light transmittance values too.

## **What is visual light transmittance (VT)?**

Visible transmittance is the fraction of visible light that comes through the product. This is influenced by glass selection, as well as the amount of opening taken up by non-transparent components such as the frame and sash. The greater the VT, the better the potential for day lighting.

## **How is air infiltration measured?**

Air leakage is measured by a physical testing of a standard sized window. The test window is installed on a large wall. On one side, a vacuum of 1.57 psf is applied. This corresponds to approximately a 25 mph wind blowing perpendicularly to the window. Flow meters measure the rate of air leakage. This is divided by the total window area to get a reading to the nearest tenth; the best possible rating by the NFRC is 0.1, as they won't round to 0.

## **Are some window designs better than others for air infiltration?**

Yes. Casement and awning windows offer excellent air infiltration performance because pressure from the wind tightens up the seals. Additionally, some window materials expand and contract more than others. Vinyl, for example will allow more air to pass through the window seams than aluminum. This is another reason why the u-value "test" should not be given too much attention.

## **What is condensation resistance (CR)?**

The condensation resistance is an optional NFRC rating that helps consumers see which products better resist condensation. The rating goes from 0 to 100. Values around 50 are average and 60 or better are above average.

## **What influences condensation resistance?**

The glazing system has perhaps the largest impact. To reduce the potential for condensation choose dual-glazed or insulating glass units. Select a high performance glass and thermally broken or thermally improved framing materials.

## **Will a window with a value of 50 or better ever have condensation?**

Perhaps. If the humidity in the house is high enough, and the outside air is cold and windy, any window can have condensation. Window treatments can make matters worse. Calculations show that keeping the relative humidity in a house below 30% at 70 degrees Fahrenheit will prevent most condensation problems.