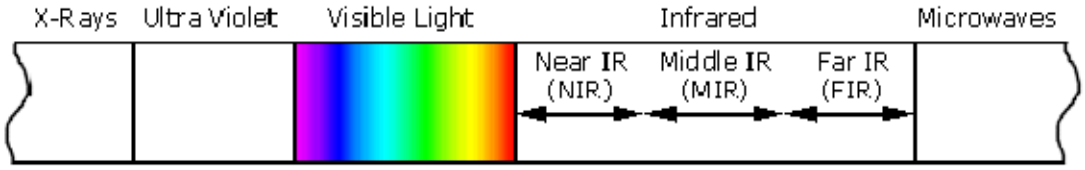
Energy Transmission Measurements

Many of our products offered to the glass, window and film market involve transmission measurements of the solar spectrum. To provide a better understanding of what these instruments are measuring, the brief explanation below discusses the various spectrums of energy created by the sun. These are the same energy spectrums that building products and windows must endure on a daily basis. Some of the characteristics are positive and ones that we want to maximize, while others are detrimental and must be reduced or controlled in some manner.

Electromagnetic energy from the sun is broken into a variety of categories or spectrums based on the wavelength of the energy. The three main spectrums that affect the building products industry and furnishings in a home are UV, Visible and Infrared energy.



Ultra Violet - UV

UV energy is not visible to human eyes. It is typically broken into three categories: UVA, UVB, and UVC. UVC energy is mostly rejected by the earth's atmosphere, never reaching the earth's surface. UVB and UVA energy pass through the atmosphere and reach the earth's surface. As it pertains to the window market, most of the UVB energy is blocked by standard float glass. Clear double pane windows will reject almost all of the UVB energy. Therefore the remaining UVA energy is the primary target of window manufacturers, and also the spectrum measured by all of EDTM's UV test equipment. UVA energy passes through standard float glass, and can only be blocked by coatings or films that are capable of reflecting or absorbing this spectrum of light. UVA energy is the primary component responsible for fading of furnishings and overall deterioration of fabric quality. The more a window product can reject or absorb the sun's UV energy, the longer the life and quality of the furnishings being protected. All window products should strive for the lowest UV transmission value possible.

Visible Light

Visible light is the only portion of the sun's spectrum that human eyes can see. This includes natural daylight and all the colors of the rainbow. Visible light has mostly good attributes associated with it. Natural light is often desired to make a home or building feel open or well lit. Large amounts of natural light will also reduce the need for lighting in a given structure, thus reducing utility costs. Window products with high visible light transmission values will result in a clearer and more natural view through the window. Windows that are tinted will have lower visible light transmission values. It should be noted that large amounts of natural light can also increase the amount of glare. This unwanted element can be aggravating in rooms with televisions or computer monitors.

Near Infrared

Infrared energy relates to the heat energy that is emitted from the sun. This is also referred to as radiant heat. Infrared energy is light that our eyes can not see, but our bodies can detect as heat. The radiant heat energy emitted by the sun in the solar spectrum is typically classified as Near Infrared (NIR) energy. This is the energy one feels as heat when standing in the sun. This is the same energy that hits a window surface and transmits through the glass to increase the temperature inside a building. Being able to "control" this near infrared energy transmission value allows a window to control the amount of heat that is added to a building by the sun. Decreasing the infrared transmission value of a window, will decrease the amount of heat energy added to a building, thus reducing over-heating effects that occur in summer months and in hot climates.

The ability of a window to reject infrared energy will be directly related to a windows Solar Heat Gain Coefficient (SHGC). The lower the Infrared Transmission Value, the lower the corresponding Solar Heat Gain Coefficient. BE CAREFUL! Do not confuse Infrared Transmission

with SHGC. These values are not the same. For instance, one cannot correctly state that a window that has an Infrared Transmission value of 20% will also have a SHGC value of 0.20. This is not correct. However it is safe to say that as the infrared transmission value of a window decreases, then so does the SHGC. Windows with high Infrared Transmission values will typically have high center-of-glass SHGC values as well.

Far Infrared

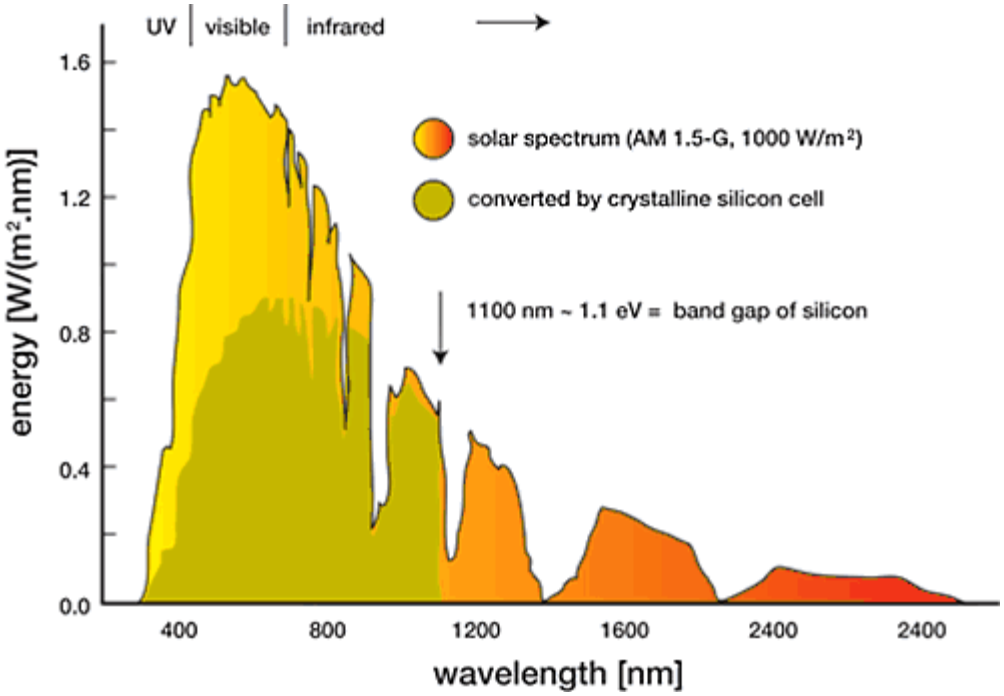
Far infrared energy (FIR) or long-wave radiation is commonly described as heat. This would be the type of heat generated by a furnace or heat pump inside a home. This could also be the heat that has been added to a home by passing the sun's NIR energy through the windows. This occurs by the conversion of the sun's Near Infrared (NIR) radiant energy into long-wave infrared energy (which one feels as warmth), after the NIR energy has entered a home and warmed the surface of a furnishing, or a person's skin.

Window Performance (Infrared)

Different coatings and films on glass will function differently regarding infrared energy. For Far Infrared (FIR), both soft coat and hard coat Low E coatings reflect this long-wave infrared energy (heat) back inside a home, thus reducing heat loss through the windows. For Near Infrared (NIR), spectrally selective soft coat Low E coatings prevent a significant portion of the NIR energy from transmitting through a window. The NIR energy is reflected away from a window, thus reducing the amount of NIR energy that is permitted into a building to be converted to long-wave (FIR) heat. The instruments currently offered by EDTM, Inc. measure the Near Infrared (NIR) spectrum.

Solar

Some of the products offered by EDTM, Inc. measure the solar spectrum. These products offered by EDTM measure the solar transmission values of the three combined spectrums mentioned above: UV, Visible and Near Infrared energy. The UV spectrum makes up a small portion of the total energy from the sun, while the visible and near infrared region contribute most of the energy. Because of this, Solar Transmission Measurements are generally dictated by the visible and near infrared region. The graphic below shows the definition of the solar spectrum. Similar to Near Infrared energy, the solar transmission value of a window is directly related to the SHGC. They are not the same value, but they are directly related as described above. In general, solar transmission values are closer to the actual center-of-glass SHGC value for a window than is the NIR transmission value.



eTime Energy Inc wishes to express special thanks to the author of this document.