Measuring & Controlling Heat Transfer through Windows

The severity of heat loss or heat gain through windows depends on the window type, size and orientation. The fact is if you have windows you have heat gain and or heat loss every day of every year. Heat transfer into or out of buildings determines the amount of energy consumed to maintain a level of comfort within a building. The typical control of interior comfort is maintained by heat and air conditioning systems combined with thermostat settings.

The degree of discomfort resulting from heat transfer through glass can be understood by knowing how much heat passes through different window types. The amount of heat that is transferred through windows is controlled by factors such as the number of panes of glass, low-e coatings, plus the replacement of the air between the windows with an inert gas. Additionally, heat transfer through windows can be controlled by installing a heat reflective interior shading system.

In order to validate the effectiveness of such a system one first needs to know the:

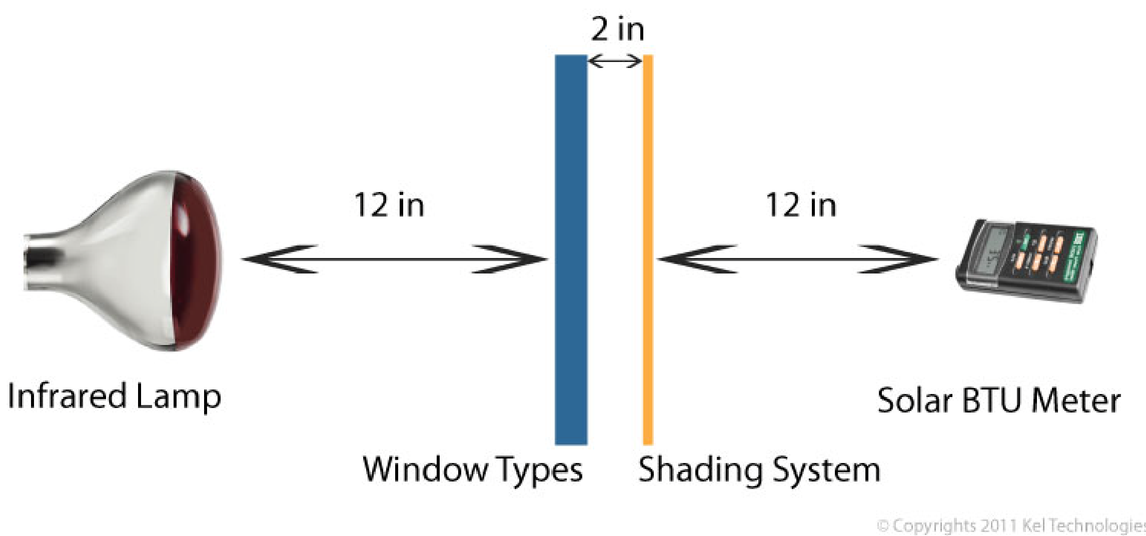
- Amount of heat that is transferred through different window types
- Amount of heat that is transferred through the interior heat reflective shading system
- Difference in heat transfer through various types of windows after installing the shading system

Administration of Test

The equipment used to measure the heat transfer includes:

- A heat source (infrared lamp)
- Samples of various window types (see Window Types Tested)
- A Solar BTU Meter (measures heat reaching the meter in British Thermal Units)

The initial set-up and calibration of the solar BTU meter was achieved by setting the distance between the heat source and the solar BTU meter so the meter received and measured 100% of the infrared heat. Positioning the various window types plus a Kel Technologies heat reflective interior shading system in the heat path (as shown below) was then executed.



Kel Technologies heat reflective interior shading system Tested:

- Max Reflections Glare Reducer (MRGR)

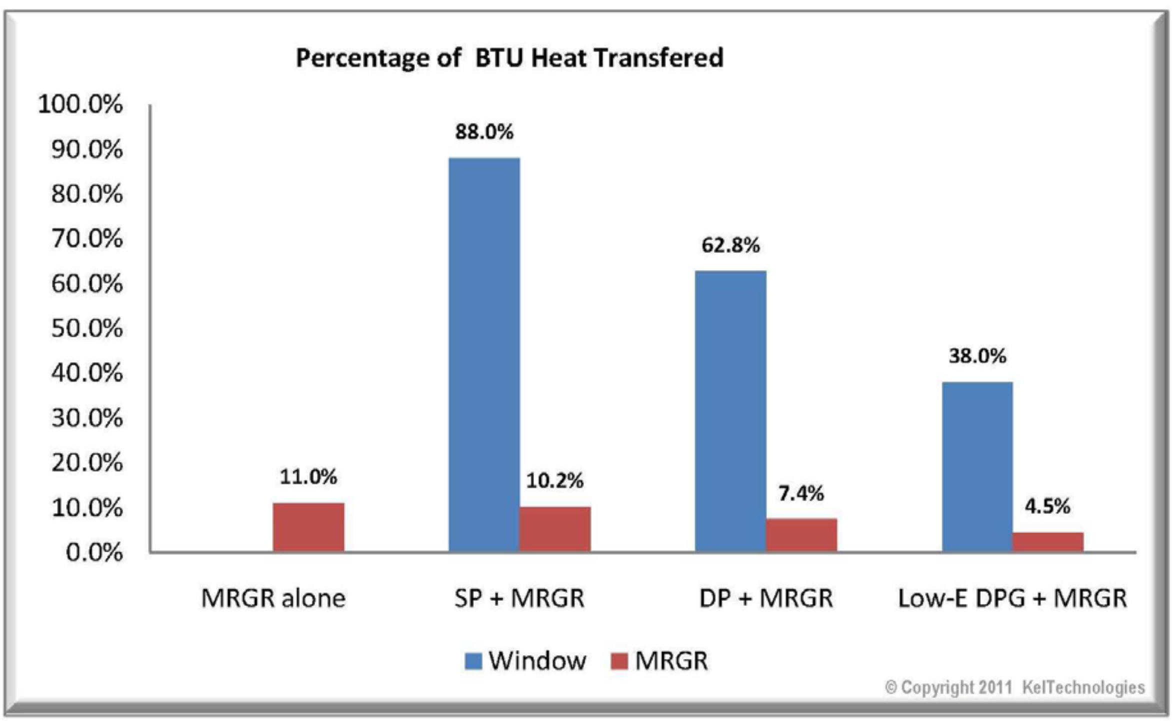
Window Types Tested:

- Single Pane (SP)
- Double Pane (DP)
- Low-E Double Pane Argon gas filled (Low-E DPG)

Reading the Results

Columns From left to right on graph below:

- Maroon (MRGR alone) only 11% of the heat striking the Max Reflections Glare Reducer is transferred through to the solar BTU meter.
- Blue (SP) 88.9% of the heat striking a single pane window is transferred through to the solar BTU meter
- Maroon (SP + MRGR) the heat transferred through the single pane window with MRGR is reduced to 10.2% reaching the solar BTU meter
- Blue (DP) 62.8% of the heat striking the double pane window is transferred through to the solar BTU meter
- Maroon (DP + MRGR) the heat transferred through the double pane window with MRGR is reduced to 7.4% reaching the solar BTU meter
- Blue (Low-E DPG) 38% of the heat striking the Low-E argon gas filled double pane window is transferred through to the solar BTU meter
- Maroon (Low-E DPG + MRGR) the heat transferred through the Low-E argon gas filled double pane window with MRGR is reduced to 4.5% reaching the solar BTU meter



Note: Max Reflections Glare Reducer by itself transfers less heat than a Low-E argon gas filled double pane window. The installation of Max Reflection behind all three window types tested proved dramatic increases in performance increasing energy efficiency and restoring comfort.