Thermal Performance

Thermal Transmission Terms

The following terms are used in describing thermal properties of building products:

BTU - The BTU (British Thermal Unit) is the amount of heat needed to raise the temperature of one pound of water one degree Fahrenheit. The BTU is used to measure the amount of heat just as the inch or foot is used to measure length.

K-Factor - The measure of thermal conductivity or amount of heat transferred (measured in BTU's) in one hour through one square foot of a single material which is one inch thick for a difference of one degree Fahrenheit between the two surfaces. THE LOWER THE "K" FACTOR, the more effective the insulation of the material.

U-Factor - The total or overall transmission of heat through a combination of materials assembly measured in BTU's per hour per square foot of area for a difference in temperature of 1 °F between the air on one side to the air on the other side. THE LOWER THE "U" VALUE, the more effective the insulation of the material.

R-Factor - The resistance or ability to retard heat flow (as opposed to ability to transmit heat) of any single material determined by the reciprocal of its conductivity. R=1/U or t/K, where t is the thickness of the material involved. THE GREATER THE "R" FACTOR (or resistance), the more effective the insulation of the material.

All "K" and "U" factor values are expressed in BTU's/hr-ft^2-°F (W/m^2-°K). Materials possessing low "K" and "U" factor values are more efficient insulators than those with higher values.

Helpful conversion factors:

$$\text{"R"} = \frac{1}{\text{"U"}} = \frac{t}{\text{"K"}}$$ (where t is the material thickness in inches and the products are of uniform composition)

$$\text{"U"} = \frac{1}{R1+R2+...+etc.}$$ (Rx is for each material layer)

Energy Efficient Solutions

Similar to most other building products manufacturers, the Steel Door Institute has encouraged the practice of citing a calculated value for thermal performance of the cores in the doors (U and R Values). While this remains the industry standard, we are seeing more specs with the latest standards for thermal transmittance (ASTM C1363) and air infiltration (ASTM E283). Note, ASTM C1363 is the most current test standard for thermal transmittance and replaces ASTM C236.

You will see significant differences between the calculated core values (ASTM C518) and the operable door assembly values as door and frame construction varies. Design professionals are beginning to see these variances in other building products such as wall partitions (an industry that has already begun to move from calculated to operable values). We believe it's important you and your customers understand the operable performance levels of the opening assemblies you purchase along with the calculated core values.

Door Assembly Operable U-Factor and R-Value Ratings

Door Series/Core	Test Method: ASTM C518 Calculated		Test Method: ASTM C1363 * Operable	
	U-Factor	R-Value	U-Factor	R-Value
707 / Polystyrene	0.16	6.4	0.37	2.7
707 / Polystyrene Kerf	0.16	6.4	0.45	2.2
607 / Polystyrene	0.16	6.4	0.39	2.6
707 / Polyurethane	0.10	10.0	0.35	2.9
777 / Polyurethane	0.09	11.0	0.42	2.4
777E (Trio-E)/Polyurethane	0.09	11.0	0.29	3.4
777E (Trio-E)/Polyurethane Kerf	0.09	11.0	0.36	2.7
707 / Honeycomb	N/A	N/A	0.54	1.9
747 / Fiberglass	0.15	6.8	0.55	1.8

Air Infiltration Testing

What is air infiltration?
Air infiltration: A measurement of the air leakage around the perimeter of a door opening.
CFM: Cubic Feet per minute

Door Series/Core	Test Method: ASTM E283*	
	CFM / SQ FT	CFM / LN FT
All CURRIES door construction with CURRIES Thermal Break Frame	0.04	0.06

* *Tested with hardware from other ASSA ABLOY Group brands including Corbin Russwin, Pemko, McKinney, Sargent and Yale in a CURRIES Thermal Break Frame*

NOTE: Information included in this data sheet is subject to revision without notification.