

# THERMAL INSULATION

Two terms are commonly encountered when discussing the thermal insulation values of materials, the K factor and the R factor. The K factor is referred to as the thermal conductivity and has only one value for a material at a given temperature. The K factor is independent of the sample thickness. The K factor of material is determined by a laboratory evaluation. The R factor is directly related to thickness and can be calculated by using the K factor. These two factors are related by the simple equation below:

$$R = \frac{\text{Thickness (perpendicular to the heat flow)}}{K \text{ (thermal conductivity)}}$$

Example :

What is the R factor for a 1" thick piece of 2A Volara?

2A Volara has been measured to have a K factor equal to 0.25 BTU-inch/Ft(2)-Hr- deg.F

$$R = \frac{1" \text{ thick}}{0.25 \text{ BTU-inch/Ft}^2 \cdot \text{Hr} \cdot \text{deg.F}} = \frac{4 \text{ ft}^2\text{-Hr-deg.F}}{\text{BTU}}$$

Thermal conductivity is dependent on density. A rule of thumb for closed-cell foams is, the greater the density, the poorer the insulation value.

	R Factor		
	K Factor	1" Thickness	3" Thickness
Volara 2A & 2E	0.25	4.0	12.0
Volara 4A	0.30	3.3	9.9
Volara 6A	0.32	3.1	9.3
2pcf Polystyrene 0.26	3.9	11.7	
2pcf Urethane	0.17	5.8	17.4
5pcf PVC	0.26	3.4	10.2
7-10pcf Cork	0.26	3.4	10.2
4-10pcf Perlite (Expanded Silica)	0.38	2.6	7.8

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