R Value for Natural Stone Veneer

Conduction is the transfer of heat energy through solid materials. Heat naturally flows from warmer to cooler areas. The thermal conductivity of natural stone can play an important design role in applications such as stone surrounds around fireplaces or cooktops.

It is also common to consider the heat transfer in heated pavement systems where the thermal conductivity of the stone affects the system's ability to melt snow/ice. The chart below provides the measured thermal conductivity (k-value) and thermal resistance (R-value) of natural stone veneers.

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Stone Type	K-Value (Terminal Conductivity) (W / MK)	R-Value Equivalent (R) (HR · ft² · °F / BTU)
Granite (High Value)	1.73	0.083
Granite (Low Value)	3.98	0.038
Granite (Barre)	2.79	0.052
Limestone (High Value)	1.26	0.114
Limestone (Low Value)	1.33	0.108
Linestone (Salem)	2.15	0.067
Marble (High Value)	2.07	0.070
Marble (Low Value)	2.94	0.049
Marble (Halston)	2.80	0.051
Sandstone (High Value)	1.83	0.079
Sandstone (Low Value - Berea)	2.90	0.050
Quartzite (Sioux)	5.38	0.027

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The center column of the table provides the thermal conductivity values for natural stone veneers. The k-value represents the rate at which heat transfers through a solid material. (For example, a material with a k-value of 1.00 indicates that 1 square meter of the material, with a thickness of 1 meter, will transfer heat at a rate of 1 watt for every degree Kelvin of temperature difference between its opposite sides).

A higher k-value means the material is more conductive, while a lower k-value indicates it is more insulating. The right column lists the R-value equivalent (R) for the stone at a thickness of 1 inch, measured in hours per square foot per degrees Fahrenheit per British thermal unit. The high value reflects the highest test result from a range of samples, and the low value represents the lowest test result. This method is the standard for measuring the insulating properties of materials.

Sources: Holman, J.P. Heat Transfer. 7th ed., New York: McGraw-Hill, 1900. and Introduction to Heat Transfer. 2nd ed. New York: John Wiley & Sons, Inc., 1990.