

More and more heating and cooling systems for buildings are being designed to factor in building material's resistance to the flow of heat. Many buildings include added rigid foam insulation to insulate floors and walls beneath ceramic tile and stone installations. The following are some helpful points on how Thermal Values impact ceramic tile or stone flooring or wall systems.

R – Value (Thermal Resistance)

Thermal resistance is an index of a material's resistance to the flow of heat. It is the reciprocal of the K-factor or C-value. All building materials have an R-Value. When a system is comprised of more than one building material, their R – Value is cumulative. For example a thin brick veneer installed on the exterior of a building may include the following materials:

- Thin Brick Veneer
- Cement Plaster (Mortar) – Latex Fortified Portland Cement Mortar
- Exterior Gypsum Sheathing
- Airspace

The R-Values for the above materials are as follows (Unit of Measure { $^{\circ}\text{F}\cdot\text{ft}^2\cdot\text{h}/\text{Btu}$ }):

- Thin Brick Veneer; 1.87
- Cement Plaster (Mortar) 1.25" thick (29mm) - 1.25
- Exterior Gypsum Sheathing 5/8" thick (13mm) - .67
- Airspace - .68

Total R Value of all of the above materials = 4.46

NOTE: Portland cement based mortars will have an R-Value similar to concrete. The thickness of the mortar will equal it's R-Value. (E.G. 1" {25 mm} thick mortar will have an R-Value of 1 { $^{\circ}\text{F}\cdot\text{ft}^2\cdot\text{h}/\text{Btu}$ })

Some other Values that may be encountered:

U – Value (Thermal Transmittance)

The Rate of heat flow through a building element. Reciprocal of thermal resistance ($U=1/R$)

C – Value

Thermal conductivity of K-factor when the material being tested is either non-homogeneous or not 1 inch (25mm) thick, but a specified thickness.

K – Factor (Thermal conductivity – ASTM C177-71)

The quantity of heat (BTU's) which will flow through a one-foot section of a 1-inch (25mm) thickness of a homogeneous material, during one hour when there is a 1 degree F (1 degree C) difference in the hot to cold side temperature.

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