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TECHNICAL INFORMATION

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How to calculate "R" Values

"R" value is used to designate the thermal resistance of an object. The higher the R-value, the higher thermal resistance and thus, insulating value.

Flat Objects

R-values for flat objects such as for sheet insulation are easy to calculate. It is simply the thickness of the insulation in inches divided by the thermal conductivity of the insulation. For example, a two inch thick sheet of insulation with a thermal conductivity of 0.25 Btu•in/h•ft²•°F has an R-value equal to 2 divided by 0.25 or 8.0.

This simple equation is true for any flat, homogeneous material with parallel surfaces and means the R-value increases proportionally to the thickness.

Cylindrical Objects

The simple equation for R-value does does not hold true for cylindrical objects like pipe insulation. For these objects, the heat flow is not the simple straight-through heat flow found with flat objects. Instead, the heat flow is radial because the inner surface area is much smaller than outer surface area and the R-value calculation must take this into account. As a result, the equation for the R-value of cylindrical objects is as follows:

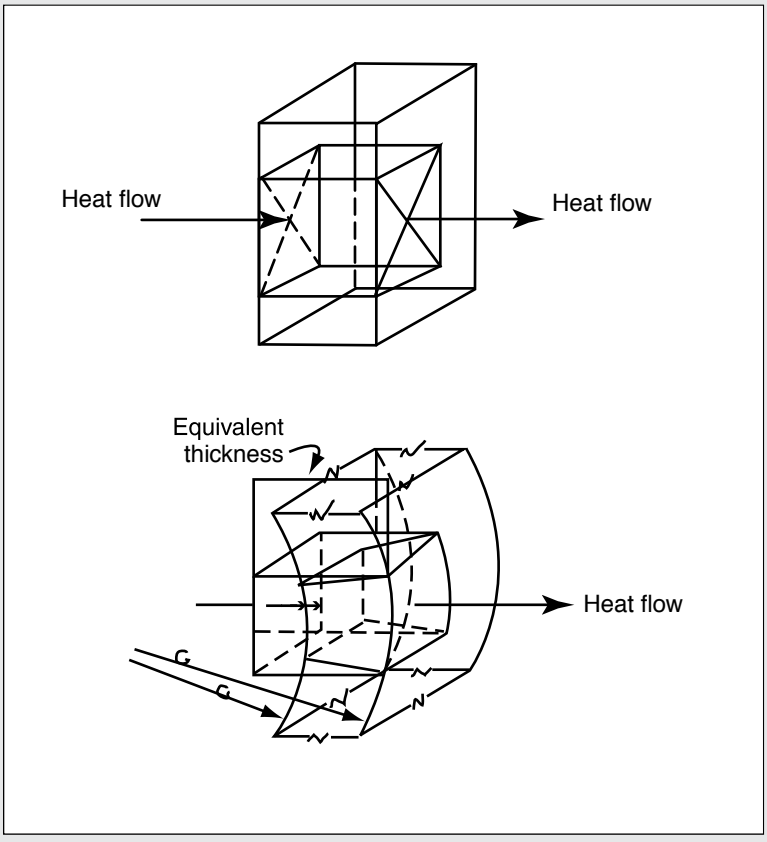
Where r_1 = uninsulated pipe radius in inches

r_2 = insulated pipe radius in inches

k = thermal conductivity

$$R = \frac{r_2 ln\ (\frac{r_2}{r_1})}{k}$$

Based on this equation, the R-value gets larger as the insulation thickness increases but also as the pipe sizes gets smaller. For example, 1" thick insulation will have a higher R-value on a 1" pipe than it will on a 3" pipe. As a result, one must always consider the pipe size and insulation thickness to determine the R-value of insulation on a pipe.



For More Information:
Phone: (919) 304-3846
Email: info.us@armacell.com
Website: www.armacell.us