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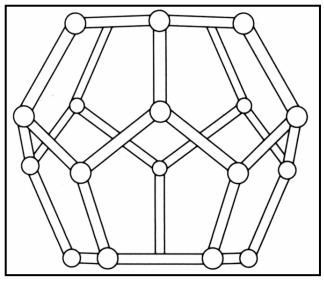

Technical Information Sheet – TIS 10
(previously T14)
Thermal Conductivity of Azote Foams

INTRODUCTION

Thermal Conductivity (k) is a property of matter defined as the rate of heat flow through unit thickness of material over unit area, with unit difference in temperature. It is normally expressed as Watts per metre per degree Kelvin (W/ m.K).

The coefficient of Heat Transmission (K) is also used and may be defined as the rate of heat flow through a specific thickness of material over a unit area, with unit difference in temperature. Units are normally W/m² K. It is related to k by the expression given below (neglecting surface effects):

$$K = \frac{k}{t}$$

where t = thickness

The coefficient of Heat Transmission can also be referred to as the thermal transmittance (U).

Also in use is Resistivity to Heat (R) which is the inverse of K, i.e.

$$R = \frac{1}{K} = \frac{t}{k}$$

Thermal conductivity values can be measured according to various national and international standards. These standards can be divided into two groups, the heat flow meter method and the guarded hot plate method. The table below contains a listing of standards which have been used to determine the thermal conductivity of various grades of Plastazote® foam and Evazote® foam. (For values please refer to the tables below)

Method	Standards
Heat flow meter	ISO 8301, EN 12667, ASTM C518
Guarded hot plate	ISO 8302, EN 12667, ASTM C177, BS 874-2, DIN 52612

K and R values can be calculated from k as shown above if sample thickness is known.

DEFINTIONS

Thermal Conductivity (k-value)
Rate of heat flow (watts) through 1 m^2 of material at 1 m thickness maintained under a temperature difference of 1 degree Kelvin (= 1 ℃). This provides the unit W /m^2 / m/ K which can be shortened to W/ m.K. A lower the k-value indicates better insulating performance.

Thermal Resistance (R-value)
This is the property of a defined thickness of material (or combination of materials). Thus it is the area in m^2 through which a heat flow rate of 1 watt would occur under a temperature difference of 1 degree Kelvin. This is calculated using the material thickness and the thermal conductivity of the material:

$$R = \frac{t}{k}$$

The unit for thermal resistance is m^2.K / W. A higher R-value indicates better insulating performance.

Thermal Transmittance (U-value)
This is also a property of a defined thickness of material (or combination). It is defined as the rate of heat flow through am area of 1 m^2 under a temperature difference of 1 degree Kelvin. This is the reciprocal of thermal resistance (1/R) and the unit is W /m^2.K.

$$U = \frac{1}{R} = \frac{k}{t}$$

A lower U-value indicates better the insulating performance.

The thermal transmittance coefficient (U) can also be referred to as the coefficient of Heat Transmission (K).

Thermal conductivity is a property that changes slightly with temperature. Azote foam materials have a increased thermal conductivity (poorer insulation properties) at elevated temperatures. Higher densities of the same material also show a higher thermal conductivity when tested at the same mean temperature.

The table below gives a summary of measurements taken at a mean temperature of 10 ℃ according to ISO 8302. For some materials measurements have been recorded according to another of the standards listed above or at a different mean temperature. If you require information on these test results please contact our technical support team.

Grade	Thermal Conductivity	
	W/ m.K	Btu.in /ft^2.h.°F
Plastazote® LD15	0.0387	0.2683
Plastazote® LD18	0.0446	0.3092
Plastazote® LD24	0.0392	0.2718
Plastazote® LD33	0.0405	0.2808
Plastazote® LD45	0.0420	0.2912
Plastazote® LD60	0.0518	0.3592
Plastazote® LD70	0.0500	0.3467
Plastazote® HD30	0.0471	0.3266
Plastazote® HD60	0.0572	0.3966
Plastazote® HD110/115	0.0769	0.5332
Evazote® EV30	0.0402	0.2787
Evazote® EV50	0.0404	0.2801
Evazote® VA25	0.0374	0.2593
Evazote® VA35	0.0394	0.2732
Supazote® EM26	0.0370	0.2565

Note 1 Btu.in /ft^2.h.°F = 6.93 W/m K

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