

TERMAL PROPERTIES

Protan SE/G/GG/FP

Produkt	Thermal conductivity $\lambda(\text{W/mK})$	Heat capacity $C_p (\text{J/kg/K})$	Mass density $\rho(\text{kg/m}^3)$	Thickness $d(\text{mm})$	Heat resistance $R(\text{m}^2\text{K/W})$
SE 1.2	0.15	1500	1250	1.2	0.008
SE 1.6	0.15	1500	1250	1.6	0.011
FP	0.35	1650	1200	1.2	0.003
G 1.5	0.15	1500	1200	1.5	0.010
GG 2.0	0.15	1500	1200	2.0	0.013

Thermal conductivity

Thermal conductivity is the quantity of heat, ΔQ , transmitted during time Δt through a thickness x , in a direction normal to a surface of area A , due to a temperature difference ΔT , under steady state conditions and when the heat transfer is dependent only on the temperature gradient.

In physics, thermal conductivity, k , is the property of a material that indicates its ability to conduct heat. It appears primarily in Fourier's Law for heat conduction. First, we define heat conduction by the formula:

$$H = \frac{\Delta Q}{\Delta t} = k \times A \times \frac{\Delta T}{x}$$

$$\frac{\Delta Q}{\Delta t}$$

where $\frac{\Delta Q}{\Delta t}$ is the rate of heat flow, k is the thermal conductivity, A is the total surface area of conducting surface, ΔT is temperature difference and x is the thickness of conducting surface separating the 2 temperatures.

Thus, rearranging the equation gives thermal conductivity,

$$k = \frac{\Delta Q}{\Delta t} \times \frac{1}{A} \times \frac{x}{\Delta T}$$

$$\frac{\Delta T}{x}$$

(Note: $\frac{\Delta T}{x}$ is the temperature gradient)

Heat capacity

Definition: (Physics / General Physics) the heat required to raise the temperature of a substance by unit temperature interval under specified conditions, usually measured in joules per kelvin. Symbol: C_p (for constant pressure) or C_v (for constant volume)

In accordance with the first law of thermodynamics, heat capacity at constant pressure C_p is equal to the rate of change of enthalpy with temperature at constant pressure $\partial H/\partial T)_p$. Heat capacity at constant volume C_v is the rate of change of internal energy with temperature at constant volume

$(\partial U/\partial T)_v$. Moreover, for any material, the first law yields the relation

$$C_p - C_v = \left[P + \left(\frac{\partial P}{\partial V} \right) \right]_T \left(\frac{\partial V}{\partial T} \right)_P$$

Heat capacity expresses the ability of a material to store heat.

Heat resistance

Definisjon: A measure of a body's ability to prevent heat from flowing through it, equal to the difference between the temperatures of opposite faces of the body divided by the rate of heat flow. Also known as thermal resistance.

Definition: thermal resistance (R value) = L/k , measured in $K \cdot m^2 \cdot W^{-1}$;

Heat resistance or thermal resistance measured in $m^2 K/W$ defines the insulation efficiency of a material.