

Short summary:

Conduction is the way the heat passes through solids. In order to calculate it we must consider the content of the solid, for example a wall, increasing by the time.

Fourier's Law of Heat Conduction regulates this type of transfer, defining how much anything changes with time and how much the temperature changes over the space. Thanks to Fourier's Law, we can say that heat transfer through a wall is proportional to its area and to the difference of temperature: the largest wall I have, the less heat transfer there will be.

Exercise:

$$L = 0,4 \text{ m}$$

$$A = 20 \text{ m}^2$$

$$\Delta T = 25$$

$$k = 0,78 \text{ W/mK}$$

Simple method:

$$\dot{Q} = kA \times (\Delta T/L) =$$

$$= (0,78 \times 20) \times (25/0,4) = 15,6 \times 62,5 = 975 \text{ W}$$

Resistance concept:

$$R_{\text{wall}} = L/kA =$$

$$= 0,4/0,78 \times 20 = 0,4/15,6 = 0,0256 \text{ }^\circ\text{C/W}$$

$$\dot{Q} = \Delta T/R_{\text{wall}} =$$

$$= 25/0,0256 = 976,56 \text{ W}$$