

# THERMAL PROPERTIES

Kerto® products can be used in the same conditions as standard conifer plywood. Kerto can constantly be used in temperatures of less than 100 °C and the maximum short term exposure temperature of 120 °C. The minimum suitable temperature is -200 °C. Kerto products mechanical values can be used for temperatures below or equal to 50 °C for a prolonged period of time.

## THERMAL CONDUCTIVITY

The thermal conductivity coefficient  $\lambda$  for wood products is moisture dependent. The thermal conductivity coefficients for Kerto products are presented in Table 1. For calculation of thermal insulation, the thermal conductivity of 0.13 W/(m K) should be used for Kerto products.

TABLE 1. THERMAL CONDUCTIVITY COEFFICIENTS FOR KERTO PRODUCTS IN DIFFERENT RELATIVE HUMIDITY

Thermal conductivity coefficient	Relative humidity [%]	Product's moisture content
0.11 W/(m K)	47 %	10 %
0.13 W/(m K)	93%	25 %

## HEAT CAPACITY

The heat capacity of Kerto products is the same as for Finnish softwoods:  $c = 1880 \text{ J}/(\text{kg K})$  when product's moisture content is 20 %.

## IGNITION TEMPERATURE

Like all wood products, Kerto is classified as a combustible material. The ignition temperature of Kerto is about 270 °C, when it is exposed to flame. Spontaneous ignition does not occur in temperatures below 400 °C. The ignition temperature of wood is also dependent on the duration of the exposure to high temperatures, see Figure 1. Ignition temperature decreases when the duration of exposure increases. After 20 hours of exposure the lower ignition temperature limit stays as constant at 120 °C.

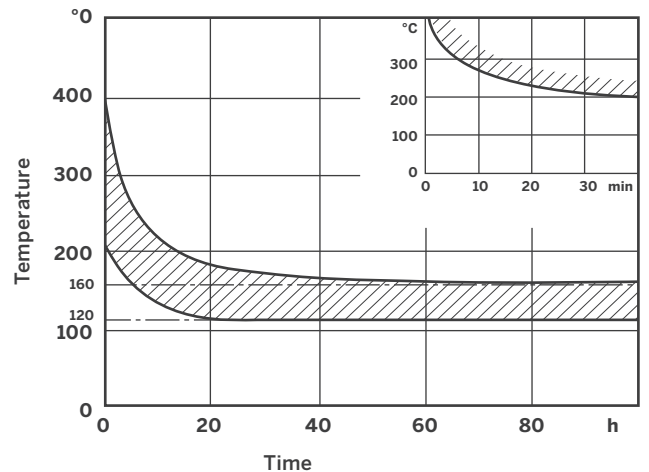


Figure 1. The ignition temperature of wood in relation to time, when it is exposed to high temperature for a longer period of time (density of wood  $\geq 400 \text{ kg}/\text{m}^3$  and moisture content about 15 %). (Source: Holzbrandschutzhandbuch)

## TEMPERATURE DEFORMATIONS

The thermal expansion of Kerto is minimal and it can generally be disregarded, unlike swelling due to moisture. The coefficient of thermal expansion in the direction of wood fibres is in the range from  $3.5$  to  $5.0 \cdot 10^{-6}/K$ .

**Example:** If temperature changes from  $15\text{ °C}$  to  $30\text{ °C}$ , the length of Kerto beam changes correspondingly:

$$10\,000\text{ mm} \rightarrow 10\,000 + (15 \cdot 4.0 \cdot 10^{-6} \cdot 10\,000) = 10\,000.6\text{ mm}$$

## THE EFFECT OF TEMPERATURE TO THE STRENGTH PROPERTIES

At normal ambient temperatures, the properties of Kerto products are not very sensitive to temperature variations. However, when the temperature rises from  $20\text{ °C}$  to  $100\text{ °C}$ , the strength of the products decreases  $50\%$ . An increase in temperature has a smaller effect on the modulus of elasticity of Kerto products than on its strength, see Figure 2.

For temperatures up to  $50\text{ °C}$ , the declared stress values for Kerto are applicable.

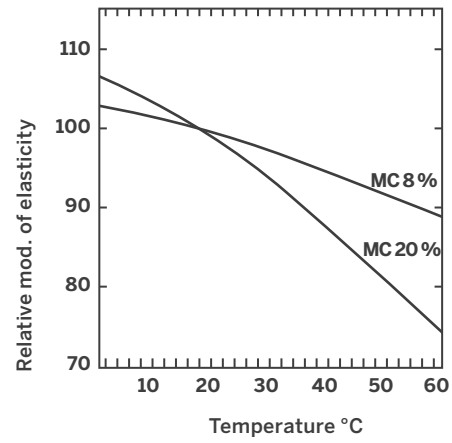


Figure 2. Effect of the temperature to the modulus of elasticity of Kerto products, moisture content 8 % and 20 % (Source: RIL 162-1 Timber structures I, 1997)

