



Thermal Properties

Thermal Expansion : Wood (and plywood) expand upon heating as do practically all solids. The thermal expansion of plywood is quite small. The average co-efficient of thermal expansion of plywood is $4.5 \times 10^{-6} \text{mm/mm/}^{\circ}\text{C}$.

Thermal Conductivity : The ability of a material to conduct heat is measured by its thermal conductivity, k. The higher the k value, the greater the ability of the material to conduct heat; the lower the k, the higher the insulation value. k varies with timber species, however an average value of $k=0.1154 \text{ W.m/(m}^2 \text{ }^{\circ}\text{C)}$ for softwood timbers is sufficiently accurate for determining the overall co-efficient of heat transmission (U value) of a construction assembly.

Thermal Resistance : The thermal resistance or insulating effectiveness of plywood panels based on $k=0.1154 \text{ W.m/(m}^2 \text{ }^{\circ}\text{C)}$ is, $R=8.67 \text{ (m}^2 \text{ }^{\circ}\text{C)/(W.m)}$. The higher the R value, the more effective the insulation. For example, the R value for 12mm plywood = $(12/1000) \times 8.67 = 0.10 \text{ m}^2 \text{ }^{\circ}\text{C/W}$. Similarly, the R value for 25mm thick pine plywood is $(25/1000) \times 8.67 = 0.22 \text{ m}^2 \text{ }^{\circ}\text{C/W}$.

Exposure to Extreme Heat

For plywood used in typical residential and commercial building applications, the relevant thermal performance criteria are usually "fire resistance" and "early fire hazard indices".

However there may applications where plywood is required to perform under conditions of extreme heat.

There is little effect on plywood used in temperatures below 93°C and any strength loss due to temperature is recovered when the temperature is reduced.

Plywood exposed to temperatures in the range 93 to 150°C will undergo slow exothermic decomposition evidenced by charring of the wood surface and weight loss. The rate at which this occurs depends upon the temperature and air circulation. Where the appearance of the plywood is important, it should not be used unprotected in temperatures above 93°C .

In applications involving periodic exposure to temperature ranges from 93 to 150°C , the amount of exposure should be based on the amount of decomposition that can be tolerated before the serviceability requirements above 150°C will result in increased charring rates and greater possibility of spontaneous combustion if the heat is not dissipated. At temperatures above 200°C spontaneous combustion is probable in a short period of exposure time.

Extract from the EWPAAs Publication "Facts About Plywood", courtesy of the EWPAAs.