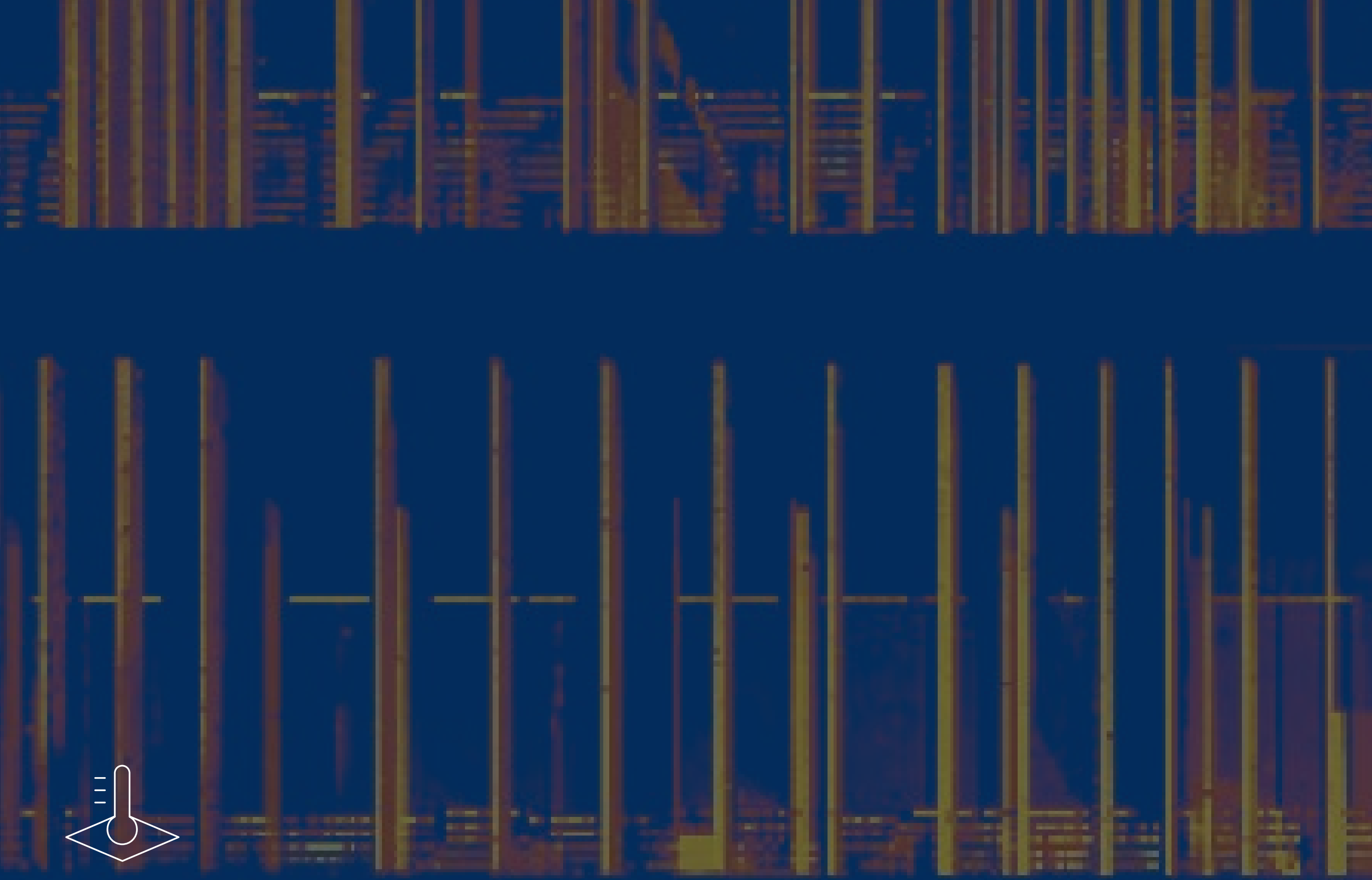
THEURL
AUSTRIAN PREMIUM TIMBER®



THERMAL PROTECTION WITH CLTPLUS? IT WORKS.

For users in the timber construction, architecture and engineering sectors

THERMAL INSULATION

The thermal insulation of buildings is a crucial aspect of building climate planning and construction. The minimum requirements aim to minimize the energy consumption of a building in summer and winter while providing thermal comfort and insulation against extreme temperatures.

The bulk density of CLTPLUS ensures a long phase shift from outside to inside, which is particularly important for thermal insulation in summer, as the interior remains cool even when outside temperatures are high. For thermal insulation in winter, this principle works in exactly the opposite way.

THE U-VALUE

The U-value, also known as the thermal transmittance coefficient, measures the ability of a component to conduct and transfer heat. CLTPLUS is calculated with an average wood moisture content of 12% with a thermal conductivity of 0.12 W/m²K in accordance with EN ISO 10456.

WINTER THERMAL INSULATION

Using an unclad CLTPLUS exterior wall with a thickness of 100 mm and taking into account the internal and external heat transfer resistance, the following values are obtained: U=0.997 W/m²k, phase shift 5.5 h
Calculating the U-value of a CLTPLUS solid wood panel insulated with mineral wool with a thickness of 160 mm and a thermal conductivity of 0.035, yields the following results: 100 mm CLT+160 mm mineral wool: U-value = 0.179 W/m²k, phase shift = 9.5 h

Thermal transmittance coefficient	$U = \frac{1}{R_{si} + \Sigma\frac{di}{\lambda i} + R_{se}}$
Thermal transfer resistance	$R_{si} = 0.13m^2\,K/W$ $R_{se} = 0.04m^2\,K/W$
Thermal conductivity of CLT	$\lambda_{CLT} = 0.12W/mK$
Thermal transmittance coefficient	$U_{CLT,100} = \frac{1}{0.13m^2\,K/W + \frac{0.1m}{0.12W/mK} + 0.04m^2\,K/W} = 0.997W/m^2K$

SUMMER THERMAL INSULATION (PHASE SHIFT)

One of the most important advantages of solid wood construction is the higher phase shift. The phase shift describes the time that passes until the temperature on the cold side of a component has increased by 1°C. The higher the phase shift, the longer it takes for the heat to penetrate from the outside to the inside. Ideally, the phase shift should be longer than 12 hours, as the building will then not heat up during the day and the external components can cool down again at night. Due to the higher mass of the solid wood elements, solid wood construction achieves a higher phase shift than timber frame construction. This promotes thermal insulation in summer, as the building takes longer to warm up and the interior spaces therefore remain cooler.
In addition, solid wood has a higher heat storage capacity than other building materials, such as concrete or brick. This means that solid wood is able to absorb heat and release it again when the ambient temperature drops. Due to this property, solid wood can help the building stay cooler in summer and warmer in winter.

Thermal transmittance coefficient	$U = \frac{1}{R_{si} + \Sigma\frac{di}{\lambda i} + R_{se}}$
Thermal transfer resistance	$R_{si} = 0.13m^2\,K/W$ $R_{se} = 0.04m^2\,K/W$
Thermal conductivity of CLT	$\lambda_{CLT} = 0.12W/mK$
Thermal conductivity of mineral wool	$\lambda_{insulation} = 0.035W/mK$
Thermal transmittance coefficient	$U_{CLT,100} = \frac{1}{0.13m^2\,K/W + \frac{0.1m}{0.12W/mK} + \frac{0.16m}{0.035W/mK} + 0.04m^2\,K/W} = 0.179W/m^2K$