

Wood Wool Cement Boards

Properties, applications and production technology

Wood Wool Cement Board (WWCB) is a versatile building material made from wood wool and cement. WWCB has been available in certain countries in Europe for some seventy years now, but it was in the 1950's that demand began to increase rapidly, both in European and other countries throughout the world.

The worldwide acceptance of Wood Wool Cement Board proves its versatility and, not least important, its durability in any climatic condition.

The main characteristics are:

- Fire resistance
- Wet and dry rot resistance
- Termite and vermin resistance
- Thermal insulation
- Acoustic performance – sound absorption
- Acceptance of a wide range of finishes

Fire resistance

WWCB has been tested and classified B1 (non-readily ignitable) according to the German DIN 4102 standard. As an example: when a 50 mm thick unfinished WWCB is fixed directly to a steel reinforced concrete floor of 50 mm thick, the fire resistance of this floor is increased from less than 30 minutes to 3 hours.

Wet and dry rot resistance

Because the wood wool has been mineralized by the cement, moisture loses its effect on the board. The boards can even be applied in moist conditions like ceilings in indoor swimming pools.

Thermal insulation

Because of its relatively low density, WWCB has good thermal properties. The maximum thermal conductivity (λ_z) for boards of 25 mm thickness is 0.090 W/(m.K). For 2- or 3-layer composite panels, λ_z will not exceed 0.040 or 0.045 W/(m.K), when a core of respectively rigid foam (e.g. polystyrene) or mineral fibre has been applied.

Acoustic performance

The unfinished WWCB has very good acoustic properties since the open surface structure allows for a high level of acoustic absorption. This is illustrated in Figure A for different board types and different constructions.

Line A of this graph represents a 25 mm board fixed directly to a concrete substructure. Line B is a 25 mm board fixed with 24 mm space between the board and the substructure. The board for line C is a composite panel of 50 mm wood wool and 40 mm mineral wool fixed with a 40 mm space between the board and the substructure.

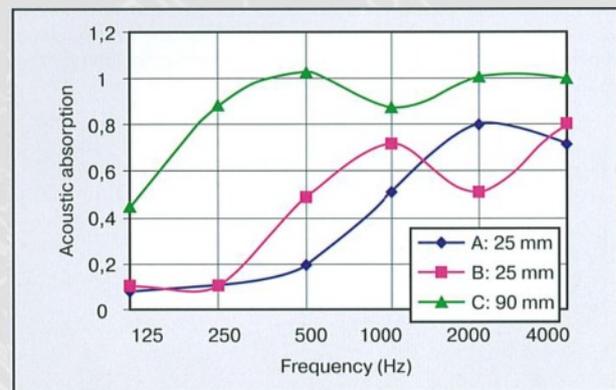


Figure A: acoustic performance of WWCB ceiling panels

Finishes

Wood Wool Cement Board accepts all kinds of conventional rendering, plastering, decorative materials and mastics. Acoustic ceilings can be spray- or roll-painted to retain the acoustic properties of the board.

Standard thicknesses and densities

The standard thicknesses and densities of WWCB have been defined as in Table 1 (according to DIN 1101):

Thickness (mm)	Mass (kg/m ²)	Density (kg/m ³)
15	8,5	570
25	11,5	460
35	14,5	415
50	19,5	390
75	28	375
100	36	360

Table 1: Board densities

Board sizes and types

In most European countries WWCB has been produced according to the German DIN 1101 standard, which advises a width of 500 mm and a length of 2000 mm. Nowadays in Europe most commonly boards of 600 mm wide are produced, with lengths from 2000 to 2500 mm. Outside Europe also widths of 610 mm (2') and lengths of 2440 mm (8') are common. In fact, each WWCB plant is designed to produce a fixed width whereas the length and thickness of the boards produced can be varied. It should be noted that for each board size and thickness a separate set of moulds is required. The number of moulds needed depends on the number of boards and the variety of board sizes to be produced per day.

The following types of Wood Wool Cement Boards are common:

1. **Normal WWCB**
2. **Acoustic WWCB**
3. **Composite WWCB**
4. **High Density WWCB (EltoBoard)**

The *normal WWCB* slabs are produced from 3-5 mm wide wood wool, using grey cement as a binder. They are mainly used for various kinds of thermal insulation, roofing and stuccoed partitioning walls.



Figure B: Acoustic WWCB ceilings in a City Hall

Because *Acoustic WWCB* tiles or panels remain visible, they are usually produced with fine wood wool (1 - 2 mm) to enhance the appearance. Furthermore, the boards are spraypainted in colours matching the interior and/or produced with white cement instead of grey cement to give the boards a natural look.

The composite panel is a 2- or 3-layer panel with a core of a thermal insulating material, e.g. rigid foam or mineral fibre ('Rockwool'). The thickness of the core usually varies from 15 to 140 mm, while the outer layer(s) of WWCB have a thickness from 5 to 20 mm. This way the thermal insulation value improves considerably.

High Density WWCB (EltoBoard) is a board which has been pressed to a density of approx. 1100 kg/m³. This results in a board with a higher strength and an increased resistance to climatic conditions. Unlike normal WWCB, HD-WWCB (EltoBoard) does not necessarily require a mortar (stucco) base for several interior and exterior applications.

Applications

The versatility of WWCB is illustrated by the wide range of applications worldwide. These include:

- Permanent shuttering of concrete
- Thermal insulation
- Flat and shallow pitch roof decking
- Long span (up to 6 m) roof decking
- Walling for all types of structures
- Acoustic ceilings
- Low Cost Housing

In certain countries the board, in combination with other materials, offers an economic and fast method for the construction of Low Cost Houses. Especially High Density WWCB has its main application in Low Cost Housing projects. Generally it is used with a timber, steel or concrete frame in which WWCB provides the external walling and partitioning. With a finish of roofing felt normal WWCB boards can also be used for roofing. Alternatively roofing shingles of HD-WWCB (EltoBoard) may be applied.

More information about Low Income Housing systems and other applications is available on request.