Characteristics	M.U.	CELENIT N CELENIT NB								CELENIT A CELENIT AB				CELENIT R CELENIT RB		CELENIT S		
		15	20	25	30	35	40	50	75	15	25	35	50	50	75	25	35	50
Medium weight	kg/m²	8	10	11,5	13	14	16	18	26	9	13	16	21	18	26	13	16	21
Thermal resistance at 10 °C	m²K/W	0,2	0,27	0,35	0,43	0,53	0,61	0,81	1,22	0,20	0,35	0,53	0,81	0,81	1,22	0,35	0,53	0,81
Average resistance to flexion (*)	N/mm²	3,51	3,33	3,15	2,55	1,94	1,82	1,71	1,16	3,51	3,15	1,94	1,71	2,5	1,5	3,15	1,94	1,71
Average resistance to compression by pressing 10%	N/mm²	0,2	0,2	0,2	0,2	0,2	0,15	0,15	0,15	0,2	0,2	0,2	0,15	0,28	0,27	0,2	0,2	0,15
Reaction to fire	class	1 (B1)								1 (B1)				1 (B1)		1 (B1)		
Resistance to vapour	μ	4-6								4-6				4-6		4-6		
Resistance to water and frost	20 cycles frost/defrost	no alteration								no alteration				no alteration		no alteration		
Temperature limit for use	°C	200								200				200		200		
Capacity of absorption of room humidity	lt/m²	2-3,5								2-3,5				2-3,5		2-3,5		
Specific heat	kJ/kgK	2,1								2,1				2,1		2,1		
Capacity for thermal accumulation	kJ/m³K	1119-726								1260-882				756-726		1092-882		
Linear dilatation thermal coefficient	mm/mK	0,01								0,01				0,01		0,01		
Resistance to traction perpendicular to the face	N/mm²	0,05								0,05				0,05		0,05		
Resistance to cutting	N/mm²	0,28								0,28				0,28		0,28		
Adhesion to concrete	N/mm²	0,05								0,05				0,05		0,05		
Resistance to mould and fungus attack		Inhibition								Inhibition				Inhibition		Inhibition		

(*) For the applications the minimum values for DIN 1101 norms apply

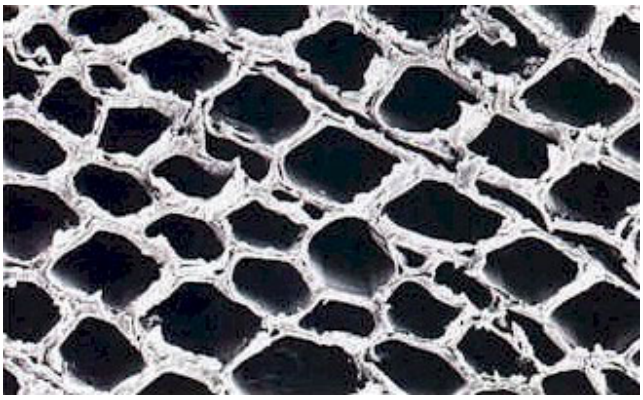
Characteristics	M.U.	CELENIT P2 CELENIT P2B					CELENIT P3				CELENIT L3		
		30	35	40	50	75	25	35	50	75	35	50	75
Medium weight	kg/m²	6,5	6,5	6,7	7,0	7,2	8,0	8,2	8,5	9,0	11	12	16
Thermal resistance at 10 °C	m²K/W	0,58	0,71	0,83	1,09	1,73	0,45	0,71	1,09	1,73	0,70	1,06	1,68
Average resistance to flexion	N/mm²	-					1,0	0,7	0,5	0,4	0,7	0,5	0,4
Average resistance to compression by pressing 10%	N/mm²	0,05					0,05				0,05		
Reaction to fire	class	1 (B1)					1 (B1)				1 (B1)		
Resistance to vapour	μ	50					50				4-5		
Temperature limit for use	°C	-					-				200		
Resistance to traction perpendicular to the face	N/mm²	0,03					0,03				0,024		
Adhesion to concrete	N/mm²	0,05					0,05				0,05		
Resistance to mould and fungus attack		Inhibition					Inhibition				Inhibition		

Performance	Description
Thermal insulation and inertia	In a context of variable heat, as would be the norm in any building, both the insulation and heat accumulation properties of the structure are of importance. Celenit, thanks to its mass and specific heat, has 20 times more capacity for thermal accumulation than common insulators.
Biophysical performance	Celenit consists of natural products: • wood, a natural product par excellence; • mineral components, of the same composition as rocks found in nature. Therefore, there is no risk of pollution, neither at the production or implementation stage, nor at any subsequent re-cycling or waste disposal stage. There is strong evidence to confirm these statements: the product does not contain harmful metals, it does not develop harmful gases, it is not radioactive and it is not flammable. Any waste for disposal can be deposited in common dumps for building materials. Celenit's physical characteristics, namely the ability to transpire, the absence of electrostatic charges, the ability to accumulate heat and the ability to regulate humidity, ensure optimum living conditions. Celenit has an unlimited lifespan, as it is not subject to biological or chemical degradation. Indeed, its performance improves through a process of carbonation, which occurs over time. Celenit has been declared eco-bio compatible by ANAB, **certificate 21/03**.
Acoustic properties	The characteristics of the Celenit panel, such as its mass, its cellular structure, its low elasticity coefficient and its internal sound-reducing property, make this a good product both to regulate noise (noise absorption) and to reduce the transmission of sounds (acoustic insulation).
Lifespan	Its lifespan is unlimited. When restoring buildings dating back to the early 1930's, panels made of mineralised fir wood-wool bound with Portland cement were found in perfect condition, so much so that it was not considered necessary to replace them. These experimental findings have now been confirmed by research carried out by Padua University. Tests carried out by electronic microscope have proved the perfect preservation of the cell structure of wood fibres, both on recently produced panels and panels which are over 20 years old. The fact that fibres are saturated with mineralising and fire retarding substances, together with the effect of the silicates existing in Portland cement, fully protect the fibre from any biological, chemical or meteorological phenomenon. Over time, the carbonation of the lime contained in Portland cement increases the product's level of resistance.
Reaction to fire	With regard to its reaction to fire, Celenit is classified as a Class 1 (B1) product. In the event of fire, it does not drip, does not create fumes or toxic gases and does not spread the fire. Swiss regulations classify products in mineralised fir wood-wool bound with Portland cement as practically incombustible (class 6q.3), just like mineral wools. French and German regulations allow their use to face the floorings of multi-storey car parks open to the public, as a dispensation to the use of fireproof materials. In accordance with DIN part 4, under the title "The reaction to fire of building materials and construction components", products made from wood-wool and cement are suitable for protecting construction components from fire. Indeed, they act as a thermal shield, substantially increasing the fire resistance of such components. This is due to the insulation properties of the material, resulting from its open cellular structure, not subject to bursting and splintering, and from the structure's ability, even when in direct contact with fire, to remain unaltered for long stretches of time, thanks to the protective action of its mineral components. Fire simulations have demonstrated that Celenit combusts slowly and without flames, forming a substantial mass of ash which protects the underneath part of the panel, reducing its speed of combustion and eventually blocking it. Covering the panels in plaster or gypsum board increases its fire resistance. The same considerations can be made in relation to **Celenit L3**, multi-layered panels with mineral wool at their core. As regards **Celenit P2** and **Celenit P3**, multi-layered panels with self-extinguishing polystyrene at their core, in the event of fire the wood-cement covering prevents the

	polystyrene from coming into the direct contact with fire and air necessary for combustion. Furthermore, at the fusion stage, the polystyrene adheres to the layer of wood-wool and Portland cement, thus reducing the speed of emission of volatile flammable compounds. French regulations allow these panels to be used in any type of building, including public areas, up to a maximum height of 50 metres.
Performance in contact with other materials	The reaction of panels when in contact with building components is neutral. With regard to concrete in particular, when used as a permanent formwork, compression resistance and the elasticity coefficient are improved. When plastered, they do not give rise to stains or efflorescence and they do not have a corrosive effect on pipes, other metallic components or plastic materials.
Resistance to water and freezing	Celenit is completely insensitive to water and freezing. Portland cement renders the panels waterproof, and close adherence to the wood-wool prevents it from coming away in cases where freezing occurs. Therefore, in humid conditions, no swelling and no crumbling occur. Celenit has passed freeze-resistance tests consisting of dipping panels into water at 35 °C for 8 hours and then placing them in conditions of -10 °C for another 8 hours. This process was repeated 20 times. At the end, the panels were perfectly intact. Indeed, they were in a better condition than when they started, due to the positive effect of water on the hydraulic binders (research carried out by Padua University). This insensitivity to water allows the panels to be used externally and in highly humid environments, as well as stored in the open.
Regulating humidity	Celenit panels act as hygrometric regulators. They absorb excess humidity and release it when normal conditions have been re-established, without any deformation occurring (see **Technical Characteristics**). Using Celenit panels on false ceilings and facings renders the environment dry, contributing, from this point of view also, to improved living comfort.

Celenit is a series of thermal and acoustic insulation panels made from mineralised fir wood-wool coated in the mineral binder, Portland cement. Further Celenit products include the important series of sandwich panels obtained by joining one or two panels with other insulating products, thus uniting the best characteristics of all the components.

65% of **Celenit** is made up of long, strong fir fibres, the remaining **35%** being made up of mineral binders, mainly Portland cement. The fibres are mineralised, a procedure which, while retaining the mechanical properties of the wood, stops the process of biological deterioration, renders the fibres completely inert and increases their level of fire resistance. The fibres are then coated in Portland cement, bound together under pressure in order to create a stable, resistant, compact and long-lasting structure.



Photograph, taken through an electronic microscope, showing a section of a thin layer of fir wood-wool taken from a standard panel. University of Padua, February 1995.

The cellular structure of the wood gives the insulation panels lightness and elasticity.
The sound absorption and the excellent ability to adhere to all forms of mortar are due to the gaps between the fibres.
The combination of wood and Portland cement, joined under pressure, determines the product's compactness and strength, two qualities always appreciated in the building trade.
These characteristics make Celenit a multi-purpose product of great adaptability in the building industry.

It is used for:

- concrete casting insulation
- flooring insulation
- roofing insulation
- internal and external facings
- the facing of fire resistant walls
- the facing of wooden, metal, etc. structures
- acoustic insulation between floors and adjacent rooms
- sound-absorbing, false ceilings

Its transpiration properties and lack of noxious elements identify it as a natural material that meets the principles of biological architecture.

Celenit has been certified as being **eco-biocompatible** by **ANAB (Italian National Association for Bioecological Architecture)**, **IBO (Österreichisches Institut für Baubiologie - Wien)**, **IBN (Institut für Baubiologie Neubeuern - Germany)**.

Celenit is produced by a firm which operates in accordance with the Quality System, in compliance with ISO 9001:2000 regulations, **certificate IT 2161**.

Celenit is a member of **ANAB-ANIT-UNI-CTI**.

FIR WOOD-WOOL - WHY

Fir is the best wood for this type of product. Its fibres are the most resistant and ductile, and result in a light, sturdy panel, like the precious wood from which it derives.

PORTLAND CEMENT - WHY

Amongst the panels made of wood-wool and mineral binders, those using Portland cement give the best levels of thermal insulation.
Furthermore, Portland cement:

- **Renders panels completely waterproof, freeze-proof and damp-proof**, making them appropriate for use in even the most severe temperature conditions. Proof of the excellent performance of panels in Portland cement is given by research carried out by the German Ministry for Public Works, which verified the cement's behaviour in humid conditions compared to that of other mineral binders.
- **Resists biological degradation** by hindering the development of mould on the panels, even in the worst conditions. Indeed, such panels taken from old buildings, which had been in contact with the

ground, contain less mould than healthy wood! This was the finding of research carried out at a qualified laboratory.

- **Renders the fibres fire-resistant**. Indeed, in the event of fire, they do not create toxic gases or fumes, they do not drip, and they prevent the spreading of flames. It is classified as a Class 1 (B1) product, though strict Swiss regulations classify products in fir wood-wool and Portland cement as practically incombustible, class 6.q.3.
- **Ensures a progressive petrifaction** of the product, due to the process of carbonation of the lime contained in Portland cement, which takes place over time. This process has allowed our architectural heritage, from ancient villages to the most notable monuments, to survive until today!
- **Allows us to produce, thanks to the low temperature, all the multi-layered panels** (coupled with other insulators) that make up the most innovative products on the European market.

The combination of wood and Portland cement forms a light, porous structure made up of numerous cavities, and it is these that deaden sound waves, turning the panels into excellent sound-absorbers and acoustic insulators when placed between walls, under floors, etc.

Research findings are as follows: panels with Portland cement were the only ones to demonstrate a totally intact state, with "sharp corners and fibres fully adherent to one another, thanks to the binder" (Portland cement in this case). In this regard, Padua University carried out some important studies, with excellent results, on panels subjected to freezing and defrosting cycles.