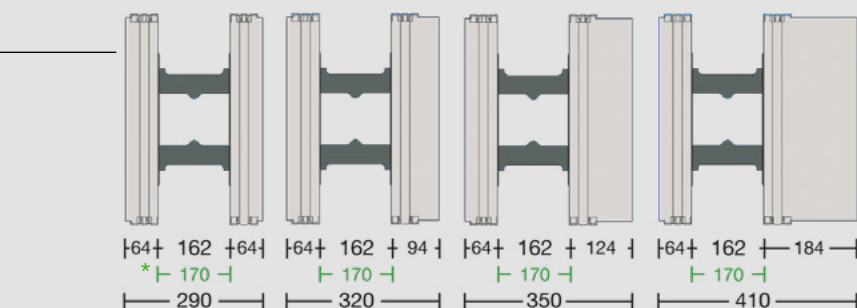




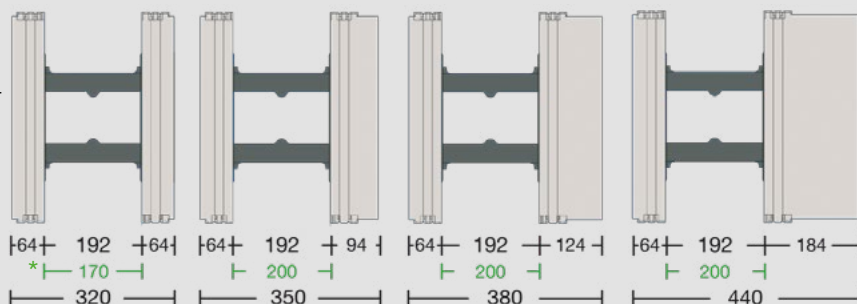
Insulating formwork in EPS TWINPOR[™] for anti-seismic buildings with high thermal insulation

Sustainable, energy saving small and large buildings made of reinforced concrete.

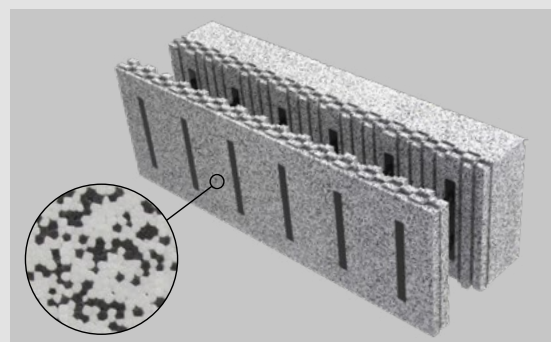
Section of the Climablock with 16,2cm RC wall



Section of the Climablock with 19,2cm RC wall



* Nominal values referring to the average thickness of the concrete wall due to the presence of dovetail grooves on the internal surface of the formwork.



Linear elements

Linear Climablock is a permanent installation formwork consisting of two 120 x 40 cm panels in sintered expanded polystyrene (EPS) TWINPOR™ facing each other and connected by recycled plastic spacers which determine the size of the RC wall, available in the dimensions of 16,2 - 19,2 - 25,2 cm.

The two panels have different thicknesses: on the side facing inside of the house the thickness is fixed 6,4 cm, while on the outside it can be 6,4 - 9,4 - 12,4 - 18,4 cm.

External corner element with thermal bridge correction for change of direction

Element in EPS TWINPOR™ consisting of two panels whose dimensions depend on the external thickness and with a height of 40 cm, forming a 90° angle. The thickness of the internal insulation is 6,4 cm, while that of the external insulation can be 6,4 - 9,4 - 12,4 - 18,4 cm.

Available with both 16,2 cm and 19,2 cm RC wall thickness and 25 cm in the modular version.

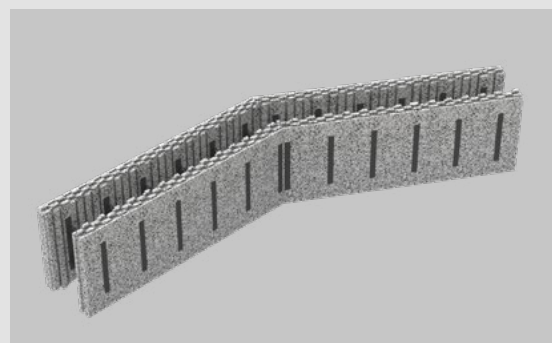
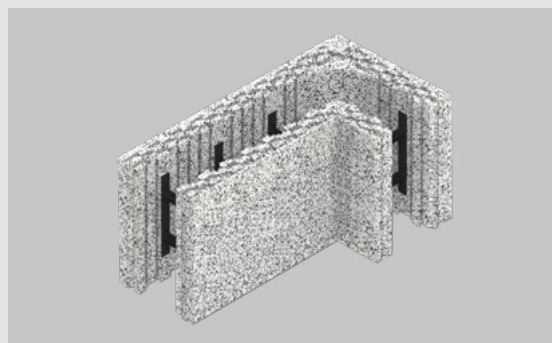
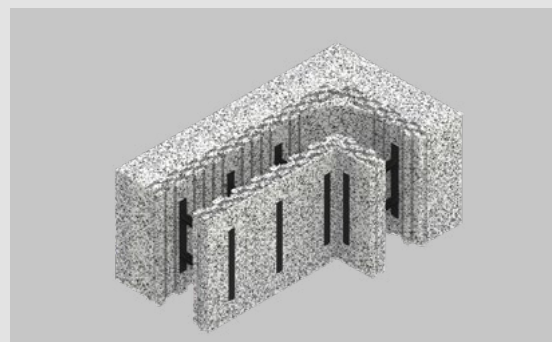
Internal corner element with thermal bridge correction for change of direction

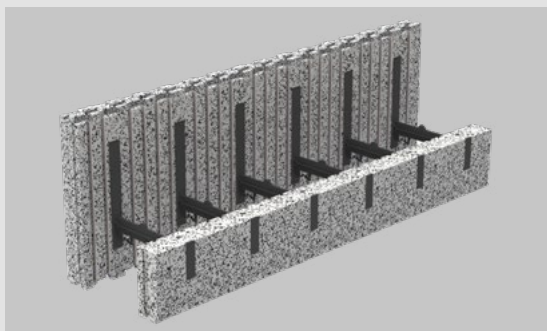
Element in EPS TWINPOR™ consisting of two panels, whose dimensions depend on the internal thickness and with a height of 40 cm, forming a 90° angle. The thickness of the insulation inside the building is 6,4 cm while that of the insulation facing the outside can be 6,4 - 9,4 - 12,4 - 18,4 cm.

Available with both 16,2 cm and 19,2 cm RC wall thickness and 25 in the modular version.

Variable corner element

With Climablock you can create walls with angles of any size. The elements can be ordered on request and with a charge for the work according to the design requirements or can be made directly on site. Also with the Climablock corner elements from 0° to 90° it is possible to have different thicknesses between the internal and external sides of the formwork. Available with both 16,2 cm and 19,2 cm RC wall thickness and in Climablock assemblable with 14,2 - 16,2 - 19,2 and 25 cm RC wall thickness.

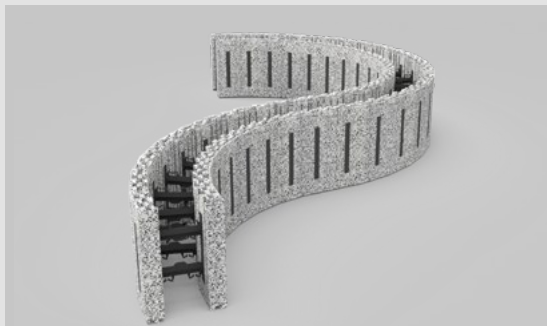




Slab edge

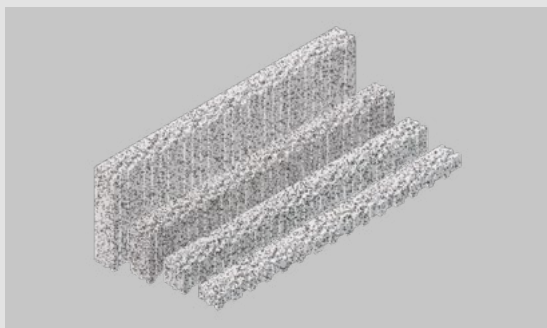
EPS TWINPOR™ element for the construction of the perimeter beam of the slab which helps maintain the continuity of the external insulation. The element can be ordered upon request and with a charge for the work according to the design needs or made directly on site.

Available with both 16,2 cm and 19,2 cm RC wall thickness and in Climablock assemblable version with 14,2 – 16,2 – 19,2 and 25 cm RC wall thickness.



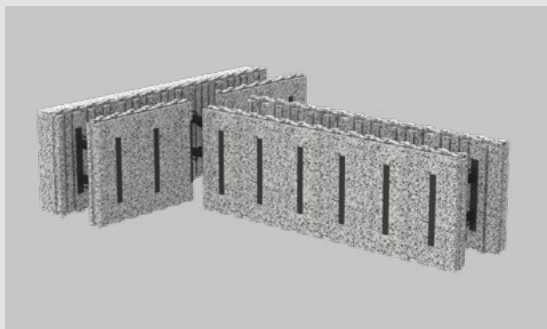
Curved elements

Walls of any radius of curvature can be created with Climablock. The elements can be ordered on request and with a charge for the work according to the design requirements or can be made directly on site. Even in the curved Climablock elements it is possible to have different thicknesses between the internal and external sides of the formwork.



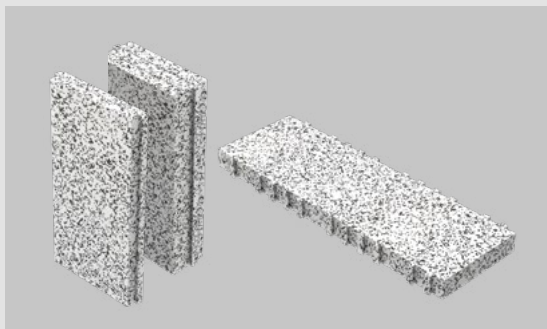
Height adjusters

Elements in EPS TWINPOR™ for the compensation of design heights different from those obtainable with Climablock module 40 cm. The height adjusters are available with heights of 5 - 10 - 20 and 40 cm, they avoid waste and save money and time.



“T” element

EPS TWINPOR™ element for the creation of the “T” intersection between Climablock walls. The elements are easily made directly on site by cutting the linear elements according to requirements. The intersection is also possible between elements with different concrete and polystyrene thicknesses. The elements, once shaped, must be suitably fixed to guarantee the tightness of the casting.



Cap and Horizontal closure

The combined use of the closure Cap and Horizontal closure, both made of EPS Twinpor CAM, allows for the vertical (Cap) and horizontal (Horizontal closure) sealing and insulation of the wall openings. These elements are equipped with joints that enable them to slide smoothly into the dovetail grooves of the Climablock formwork.

The Climablock® assistance service

The company provides a complete assistance service to help you use the Climablock system. Send us plans and fronts of the building in .ifc, .pln, .pdf .dwg or .dxf format to the e-mail address: assistenza@pontarolo.com.

Our technical office will help you choose the block that best suits your needs and will assist you in the design and construction phases, thanks to our on-site assistance service.

We remind you that Pontarolo makes available the free software for the calculation of the transmittance and the verification of the Glaser diagram: www.calcolodellatrasmissione.com

The Climablock® system

Satisfying the needs of comfort, safety, health and energy saving is the goal of our research for innovative solutions.

With the anti-seismic, acoustic and energy certification regulations for buildings in force, also in Italy, the EPS Climablock block becomes essential to obtain high-performance results.

The system is based on a complete range of formworks consisting of two EPS panels arranged facing each other and kept apart by recycled plastic (PP) brackets co-moulded with the EPS panels. The blocks, mutually connected to each other like "Lego" toy bricks, form a formwork capable of receiving the concrete casting and, once it has matured, to form load-bearing walls that integrate, in a single solution, the high thermal insulation of the EPS and the mechanical resistance of the concrete.

Building with EPS blocks is the ideal system for "sustainable" construction; consider that EPS consists of 2% material and 98% air.

Considering the energy cost, on which sustainability depends, Climablock is the winner over other construction systems. Furthermore, Climablock is produced in black and white EPS TWINPOR™, an innovative EPS formula that improves insulation performance and prevents reverberation and deterioration of the completely black material.

Climablock is easy to use, speeds up installation including finishing and plant engineering and reduces maintenance, guaranteeing real economic savings, not only due to lower consumption, but also in terms of construction and management.



Well-being, safety and sustainability

Significant reduction of energy consumption both in summer and in winter: buildings built with Climablock have both passive and inertial behaviour.

PASSIVE: large thicknesses of insulation, excellent in winter to contain heating consumption;

INERTIAL: masonry of considerable mass which, in our case, is guaranteed by the presence of concrete. Excellent behaviour during the summer season when consumption for cooling is reduced thanks to an excellent value of periodic transmittance, i.e. the combined action of the phase shift and damping of the thermal wave, exerted by the masonry by virtue of its stratigraphy;

ANTISEISMIC: the Climablock walls are reinforced concrete structures and comply with the anti-seismic regulations;

ACOUSTIC: masonry made with Climablock guarantees noise reduction values of **52,3 dB** respectively for partition walls between housing units, higher than the 50 dB required by the law, and for the façades, considering an opening area equal to 18% of the total and windows of medium acoustic performance ($R'w = 39dB$), a value of **45,1 dB** higher than the 40 dB required by the law.

Climablock® winning system

With Climablock it is possible to create small and large buildings, such as condominiums and towers, as the internal thickness of the load-bearing wall in reinforced concrete, to meet the requirements of the structural calculations, is available in various sizes.

QUALITY: high performance of the structure guaranteed over time;

EASY: no specialist manpower is required and even the execution of the systems does not require assistance;

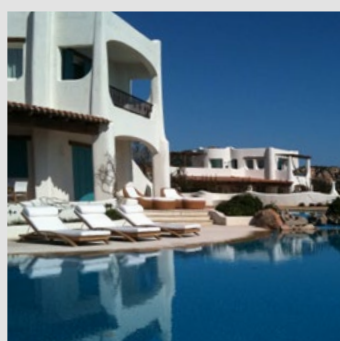
PRACTICAL: it does not require large-scale equipment or special tools;

FAST: one m2 of finished wall requires 30 to 60 minutes of labour. The time is determined by the complexity of the construction;

SAFE: building with Climablock is safe and non-wearing. Each block weighs approximately 3 kg;

ECONOMICAL: no system ensures thermal, acoustic and seismic resistance performance at the costs of Climablock;

INCREASED LIVING SPACE: The thickness of the walls is so reduced that, compared to other construction systems and with the same insulation, it allows for the recovery of surface that is walkable and therefore usable by the end user.



Ease and speed of construction of the Climablock® system

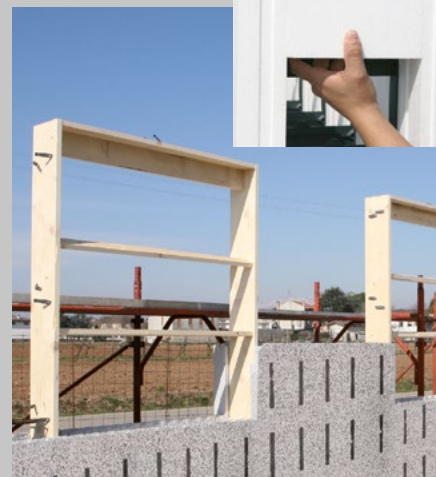


Start the first section starting from the corners and continue with the installation of the linear blocks.



Position the reinforcement which, as a final result, will form a mesh consisting of horizontal and vertical rods similar to electro-welded mesh.

If necessary, install the closing caps.



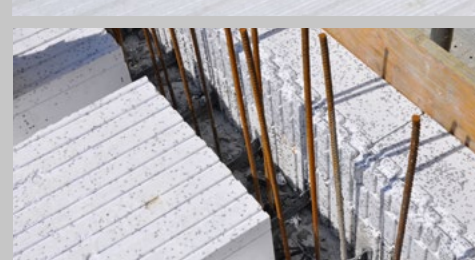
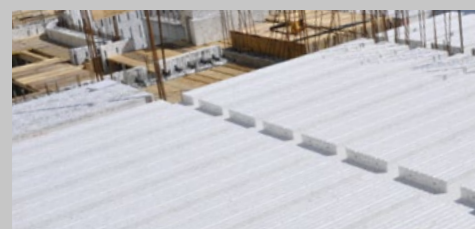
Or install counterframes.



Proceed up to the envisaged height and fix the alignment and plumb line measuring system to the Climablock.



Adjust the alignment and plumb line measuring just before casting. Cast using S4 concrete (thixotropic type, max aggregate granulometry 20 mm).



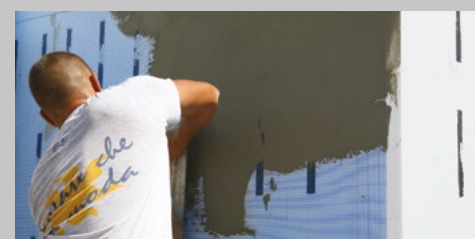
When creating the slab, the continuity of the external insulation is not interrupted, thus avoiding thermal bridges; moreover, the edge of the slab has already been made.



The installers autonomously mark out the area safely and quickly using a hot knife.



The brackets of the block allow fastening of the internal finishing cladding without creating the dedicated structure.



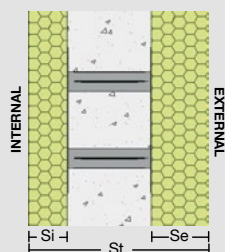
The external finishing can be the same as for the "insulation" systems, or made by applying any other cladding.

Performance of the Climablock® System

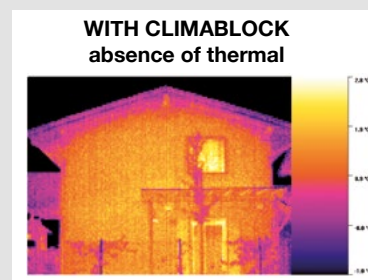
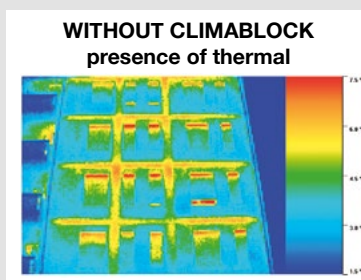
TRANSMITTANCE VALUES AND THICKNESS OF CLIMABLOCK WALLS

The U thermal transmittance values shown in the table refer only to the EPS panels of the Climablock formwork and were calculated considering the declared thermal conductivity (λ_p) of the material.

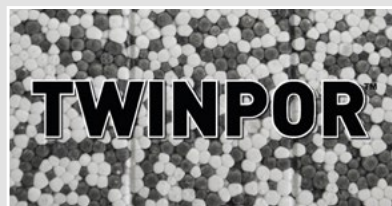
BLOCCO CLIMABLOCK IN EPS TWINPOR™				
Internal (S _i) + external (S _e) EPS thickness	6,4 + 6,4	6,4 + 9,4	6,4 + 12,4	6,4 + 18,4
Declared thermal conductivity (λ_p) [W/mK]	0,031	0,031	0,031	0,031
U Transmittance [W/m²K]	0,242	0,196	0,165	0,125
Total thickness (S _t) with septum 14,2	270	300	330	390
Total thickness (S _t) with septum 16,2	290	320	350	410
Total thickness (S _t) with septum 19,2	320	350	380	440
Total thickness (S _t) with septum 25,0	378	408	438	498



Si = Internal Climablock EPS Thickness (mm)
 Se = External Climablock EPS Thickness (mm)
 U = TRANSMITTANCE: The amount of energy (heat) that passes through, in one second, a square meter of wall subjected to a temperature difference of one degree centigrade. Transmittance is linked to the characteristics of the materials that compose the wall and not to its thickness: the lower the transmittance value, the more thermally insulated the wall is
 St = Total wall thickness (mm)



Caratteristiche tecniche dei materiali



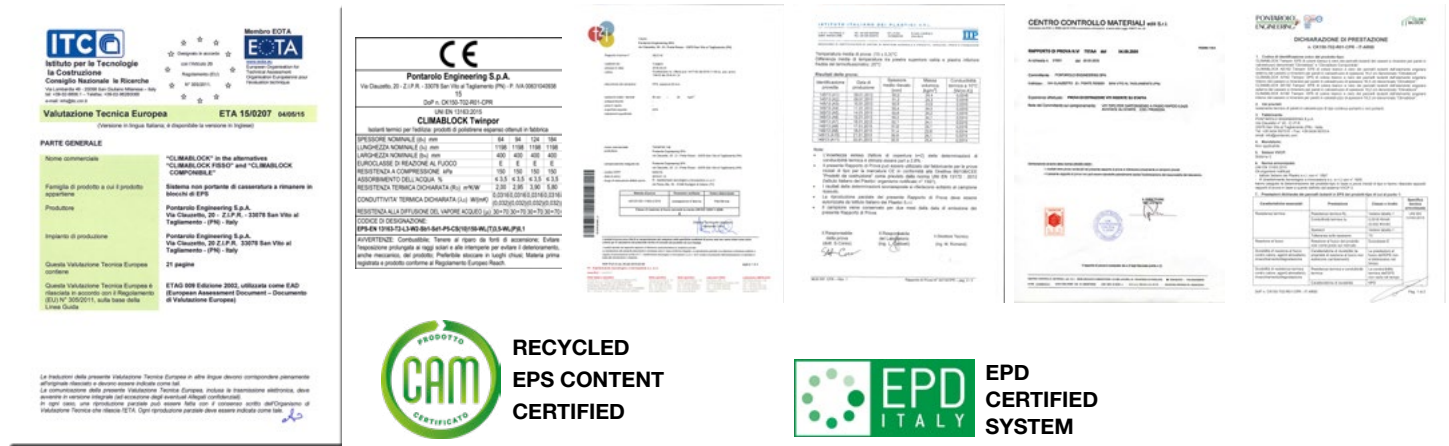
TWINPOR™ is the composition of EPS (Sintered Expanded Polystyrene) with high insulating performance identified by the researchers of Pontarolo Engineering. The particular mix of white and graphite pearls, in fact, gives it a **high insulating property (up to $\lambda=0.031$ W/m²K)** and at the same time solves the problems of light reflection and crystallisation of the material due to sun exposure on site.

	Characteristics	Coding according to the UNI EN 13163	Value	Unit of measurement	Standard
Requirements according to the UNI EN 13163	Thermal conductivity λ_p declared at 10°	λ_p	0,031	W(m·K)	EN 12667
	Thermal resistance R _D	R _D	2,05 3,00 4,00 5,90	(m²·K)/W	EN 12667
	Length	L	± 3	mm	EN 822
	Width	W	± 2	mm	EN 822
	Thickness	T	± 2	mm	EN 823
	Orthogonality	S	± 1/1000	mm/mm	EN 824
	Planarity	P	5	mm	EN 825
	Reaction to fire		E	Euroclasse	EN 13501
	Compressive stress at 10% of deformation	CS(10)	≥ 150	kPa	EN 826
	Long-term water absorption by total immersion	WL(T)	≤ 5,0	%	EN 12087
Other	Resistance factor to water vapour diffusion	μ	30÷70	–	EN 12086
	Limit temperature of use		75	° C	
	Coefficient of linear thermal expansion		0,065	mm/mK	

Spacer brackets: brackets in black recycled plastic co-moulded in the block, recyclable.

The bracket is used as a screwable holder with self-tapping screws with a tensile strength of 100 kg.

A guaranteed and certified high quality system



A system without condensation

WHY SHOULD THE EXTERNAL INSULATION BE THICKER THAN THE INTERNAL ONE?

To make sure you don't have mould and condensation in your home!

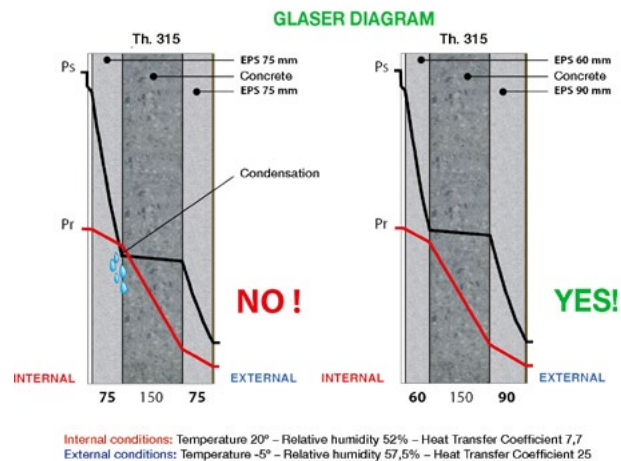
Condensation and widespread mould form in a wall due to the incorrect placement of insulation in the wall.

HOW CAN YOU UNDERSTAND WHAT THE CORRECT POSITIONING OF THE INSULATION SHOULD BE?

With the Glaser diagram (www.pontarolo.com/ITA/pro-cbk03ca.html).

The Glaser diagram consists of two lines called the "relative humidity curve" (Pr) and the "saturation pressure curve" (Ps). These curves, positioned on the stratigraphy of the wall, must never intersect. If this were to happen, condensation would form at the intersection point. The Climablock walls are checked with this excellent tool and, almost always (depending on the climatic zones), the external thickness of the insulation must be greater than the internal one.

Our technical department is available for in-depth advice on this matter.



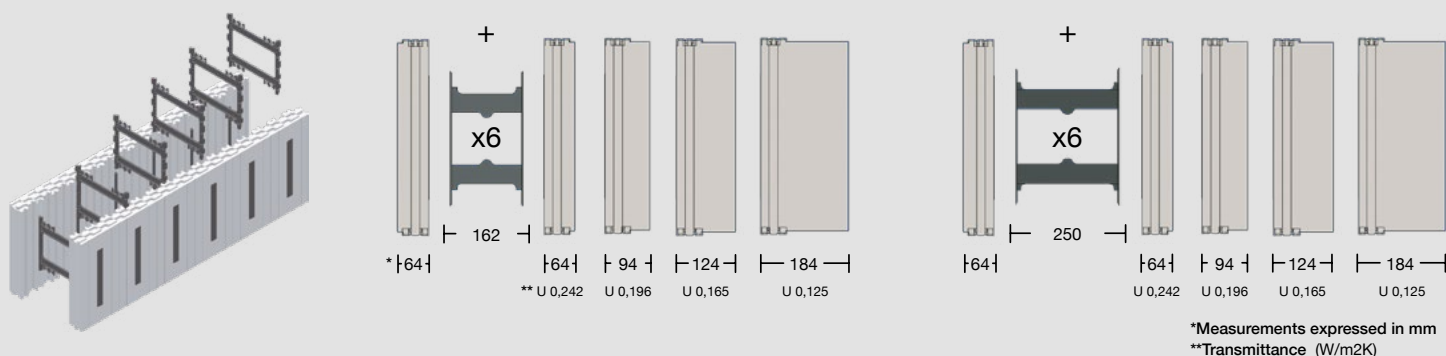
Glaser diagram created on walls of equal thickness with different distribution of the insulation.

Warnings and advice for installation/maintenance

- Cover Climablock with appropriate finishes, minimizing the number of days of exposure of the EPS to UV rays of the sun. This attention will help avoid the natural disintegration of EPS beads with the formation of powdery layers on the surface and limit any thermal expansion phenomena (only 0.065 K*mm/m). Any contraction within the specified margin are entirely natural and do not compromise achievable performance.
- To prevent the ageing and yellowing of Climablock, do not expose them to direct sunlight for extended periods. In this case it is recommended to cover the blocks with scaffolding sunshades.
- In case of yellowing, it is necessary to clean the outer surface of Climablock with a pressure washer, making sure the pressure is not too high.
- Install the system according to the instructions.
- Check the plumb and alignment of the walls to ensure their correct position. It is essential to perform this operation just before the pouring phase, as if too much time passes between the plumb phase and the pour, the temperature fluctuations that occur during the day can cause further misalignment and out-of-square compared to what was checked too early.
- Repeat the plumb and alignment check after pouring.

Modular Climablock®

Modular execution of concrete casting inside the Climablock formwork



For a correct and effective execution phase of the concrete casting inside the Climablock formworks in the modular version, it is advisable to:

- Use thixotropic concrete with mechanical resistance indicated by the project, type S4 (i.e. belonging to the class of consistency defined as fluid and such that, in the concrete slump test, the values of the cone lowering, should be between 160 and 180 mm). The diameter of the aggregates must contemplate a maximum value of 16 mm;
- Do not add water in order to avoid altering the characteristics of mechanical resistance and increasing the degree of fluidity;
- Use an extension consisting of a casting tube or braid with a circular section having an adequate diameter such as to allow insertion inside the formwork without striking the connecting polypropylene brackets;
- Using the extension, pour a casting flow closer to the starting height of the masonry, and then proceed by lifting the latter as the casting operation is completed.

The concrete vibration operation inside the formwork can take place in two ways:

EXTERNAL VIBRATION

Vibration generated from the outside using a wooden board or shim with a percussion instrument, performed at the visible web of the formwork.

INTERNAL VIBRATION

Vibration inside the formwork by means of a specific immersion needle, with the use of a needle with a diameter not exceeding 5 cm

However, this operation must be performed with the appropriate warnings, proceeding with care and caution, making use of all the necessary time



Climablock® is also suitable for swimming pools!

The Climablock system can also be used for the construction of residential and public swimming pools.

With the use of Climablock it is possible to obtain a continuous reinforced concrete structure of any shape and size with high mechanical resistance values and, thanks to the insulating properties of the polystyrene, to obtain a better temperature of the water in the pool (improvement of approximately 3-4°C in water temperature) compared to swimming pools built with traditional systems.