



Advanced
Building
System

**Resistance
Thermal Insulation
Energy Saving**



Rev. 13 of 31.08.21

**PANEL
SPECIFICATIONS**

1. INTRODUCTION

This document has the purpose of illustrating the main elements that compose the EMMEDUE Building System.



2. DESCRIPTION OF THE EMMEDUE BUILDING SYSTEM

2.1 ESSENTIALS OF THE EMMEDUE SYSTEM

The EMMEDUE Building System is based on a combination of foam polystyrene sheet and galvanized steel wire meshes. The EPS shape has been specifically designed for the application of traditional plaster or shotcrete during on-site panels installation.

EMMEDUE provides a system of industrialized modular panels allowing a faster assembly compared to conventional systems. The EMMEDUE System fulfils the required structural and load-bearing functions, offering high thermal and sound resistance and a wide range of shapes and finishes to provide versatility in the design compaction process.

2.2 COMPOSITION OF THE EMMEDUE PANELS

Here below are the basic components of the EMMEDUE panels.

- A) **Foam polystyrene core** which is non-toxic, non-hazardous, self-extinguishing and chemically inert with varying density and thickness, depending on the panel type according to the construction needs.
- B) **Electrowelded steel wire meshes** made of galvanized drawn steel wires placed on both sides of the polystyrene panel and connected by means of joints of the same material. The wire gauge steel net varies according to the panel type and to the mesh direction.

2.3 PLASTERING

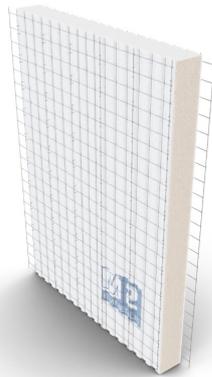
After the panel assembly, traditional plaster or shotcrete should be sprayed and/or poured on the panel - depending on the panel type.

2.4. ADVANTAGES OF THE EMMEDUE BUILDING SYSTEM

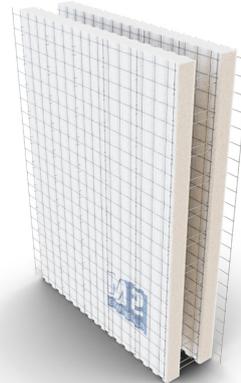
- High thermal insulation;
- Versatility & diversity of panels to accommodate different architectural and design features;
- Easy to move, rapid assembly with little or no need for lifting equipment, and high durability;
- Structural capacity and resistance to earthquakes and hurricanes;
- No skilled labour required;
- Lower costs and lower construction time;
- Lower foundations costs compared with conventional systems;
- Complete construction system;
- Excellent integration with traditional systems;
- Highly fire-proof material;
- Easy and quick installation of the plumbing, heating, electric, telephone systems, etc.;
- Panels of customised length and thickness;
- Solid panel connection;
- Panel surface and EMMEDUE plastering machines are especially designed for a smooth plaster spraying;
- EMMEDUE panels' meshes also include connection flanges;
- The polystyrene core can avoid the thermal bridges;
- Made of ecological components.

3. CLASSIFICATION OF THE EMMEDUE PRODUCTS

The EMMEDUE panels, applications, standard sizes and complementary products are described below. Panel thickness and length of the panels may be customized according to the different project requirements and customer's demands. Initially, the panel's thickness is determined by the required thermal insulation level and by the required structural resistance.



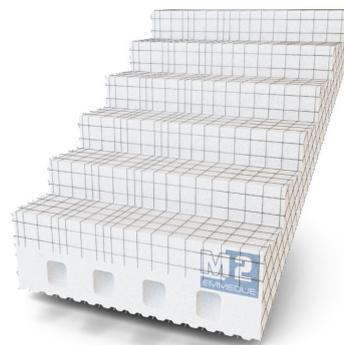
Single panel PSM / PST / PSS



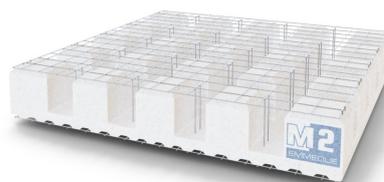
Double panel PDM



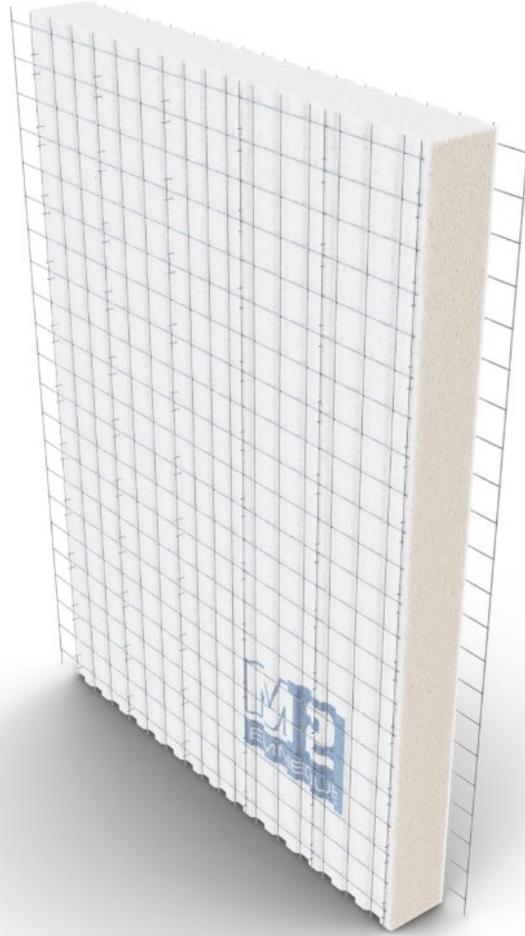
Floor panel PS2 / PS3



Staircase panel PSCA

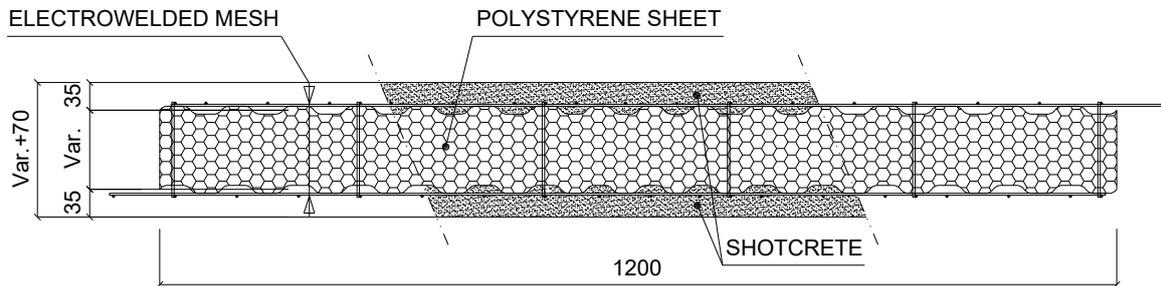


Landing panel PNR



Single panel PSM / PST / PSS

3.1 EMMEDUE SINGLE PANEL PSM



Galvanized steel wire mesh:

- **Longitudinal wires:** Ø 2,5 mm every 77,5 mm
- **Transversal wires:** Ø 2,5 mm every 75 mm
- **Cross steel wire:** nr. 2 Ø 3 mm every 150 mm (approx. 70 per m²)

Steel wire yield: $f_{yk} > 600 \text{ N/mm}^2$

Steel wire failure: $f_{tk} > 680 \text{ N/mm}^2$

Polystyrene density: 15 or 25 Kg/m³

Polystyrene thickness: between 6 cm and 16 cm

Finished wall thickness: between 13 cm and 23 cm

For the use of this panel as structural wall a shotcrete with a compressive strength of at least 250 daN/cm² should be applied.

Type of panel	Finished wall thickness (cm)	Density 15 kg/m ³			Density 25 kg/m ³		
		Thermal transmittance U (W/m ² K)*	Panel weight (kg/m ²)	Wall weight with shotcrete** (kg/m ²)	Thermal transmittance U (W/m ² K)*	Panel weight (kg/m ²)	Wall weight with shotcrete** (kg/m ²)
PSM60	13	0,574	3,5	157,5	0,521	4,1	158,1
PSM80	15	0,443	3,8	157,8	0,401	4,6	158,6
PSM100	17	0,361	4,2	158,2	0,327	5,2	159,2
PSM120	19	0,305	4,6	158,6	0,275	5,8	159,8
PSM140	21	0,264	5,0	159,0	0,238	6,4	160,4
PSM160	23	0,232	5,3	159,3	0,209	6,9	160,9

Soundproofing index: 45 dB ***

Fire resistance: REI 90****

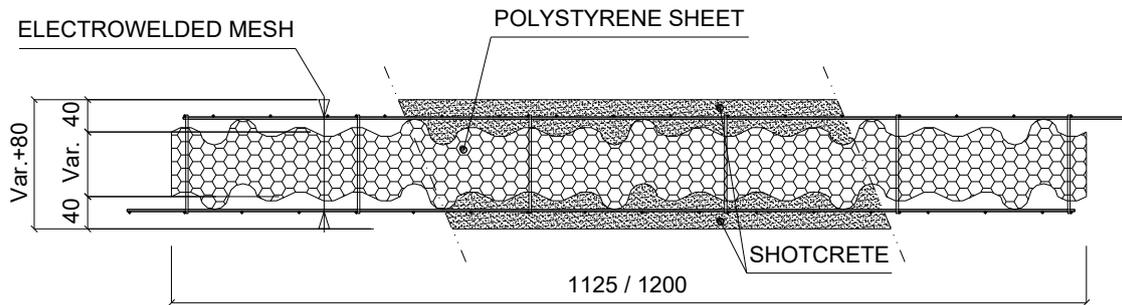
* value obtained by analytical calculation, considering only the thickness of the layers that make up the element

** considered density for the shotcrete: 2200 kg/m³

*** test carried out on PSM90 at the University of Santiago de Chile

**** test carried out at C.S.I., Milan, Italy

3.2 EMMEDUE SINGLE PANEL PSME



Galvanized steel wire mesh:

- **Longitudinal wires:** Ø 2,5 mm every 70,3 mm / 77,5 mm
- **Transversal wires:** Ø 2,5 mm every 70 mm / 75 mm
- **Cross steel wire:** nr. 2 Ø 3 mm every 140 mm / 150 mm (approx. 70 per m²)

Steel wire yield: $f_{yk} > 600 \text{ N/mm}^2$

Steel wire failure: $f_{tk} > 680 \text{ N/mm}^2$

Polystyrene density: 15 or 25 Kg/m³

Polystyrene thickness: between 8 cm and 16 cm

Finished wall thickness: between 16 cm and 24 cm

This panel is used for load bearing walls. For the use of this panel with a structural function a shotcrete with a compressive strength of at least 250 daN/cm² should be applied .

This panel is in accordance with the M2 European Approval.

Type of panel	Finished wall thickness (cm)	Density 15 kg/m ³			Density 25 kg/m ³		
		Thermal transmittance U (W/m ² K)*	Panel weight (kg/m ²)	Wall weight with shotcrete** (kg/m ²)	Thermal transmittance U (W/m ² K)*	Panel weight (kg/m ²)	Wall weight with shotcrete** (kg/m ²)
PSME 80	16	0,442	3,9	179,3	0,401	4,7	180,7
PSME100	18	0,360	4,3	180,3	0,326	5,3	181,3
PSME120	20	0,304	4,7	180,7	0,275	5,9	181,9
PSME140	22	0,263	5,0	181,0	0,238	6,4	182,4
PSME160	24	0,232	5,4	181,4	0,209	7,0	183,0

Soundproofing index: 45 dB ***

Fire resistance: REI 90****

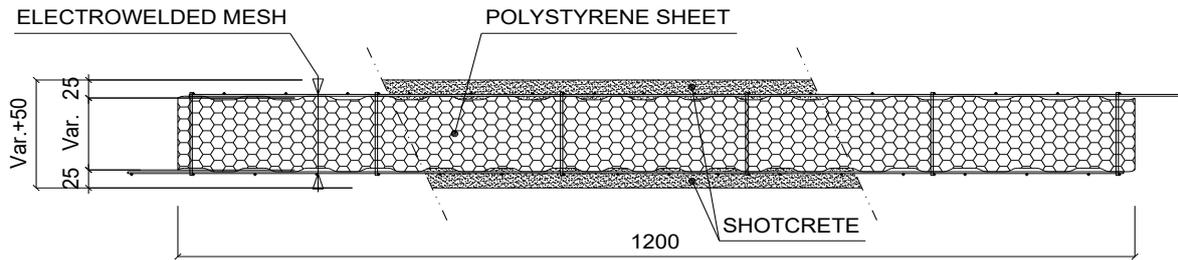
* value obtained by analytical calculation, considering only the thickness of the layers that make up the element

** considered density for the shotcrete: 2200 kg/m³

*** test carried out on PSM90 at the University of Santiago de Chile

**** test carried out at C.S.I., Milan, Italy

3.3 EMMEDUE SINGLE PANEL PST



Galvanized steel wire mesh:

- **Longitudinal wires:** Ø 2,5 mm every 77,5 mm
- **Transversal wires:** Ø 2,5 mm every 112,5 mm
- **Cross steel wire:** nr. 2 Ø 3 mm every 225 mm (approx. 45 per m²)

Steel wire yield: $f_{yk} > 600 \text{ N/mm}^2$

Steel wire failure: $f_{tk} > 680 \text{ N/mm}^2$

Polystyrene density: 15 or 25 Kg/m³

Polystyrene thickness: between 5 cm and 20 cm

Finished wall thickness: between 10 cm and 25 cm

The PST panel can be used as internal partition, external curtain wall, insulating wall etc. It is similar to the PSM panel, except for its polystyrene core outline that is thinner and requires less plaster for its finishing.

Type of panel	Finished wall thickness (cm)	Density 15 kg/m ³			Density 25 kg/m ³		
		Thermal transmittance U (W/m ² K)*	Panel weight (kg/m ²)	Wall weight with shotcrete** (kg/m ²)	Thermal transmittance U (W/m ² K)*	Panel weight (kg/m ²)	Wall weight with shotcrete** (kg/m ²)
PST50	10	0,669	2,8	102,8	0,610	3,3	103,3
PST60	11	0,571	3,0	103,0	0,519	3,6	103,6
PST80	13	0,442	3,4	103,4	0,400	4,2	104,2
PST100	15	0,360	3,7	103,7	0,326	4,7	104,7
PST120	17	0,304	4,1	104,1	0,275	5,3	105,3
PST140	19	0,263	4,4	104,4	0,237	5,8	105,8
PST160	21	0,232	4,7	104,7	0,209	6,3	106,3
PST180	23	0,207	5,1	105,1	0,187	6,9	106,9
PST200	25	0,187	5,4	105,4	0,169	7,4	107,4

Soundproofing index: 41 dB ***

Fire resistance: REI 120****

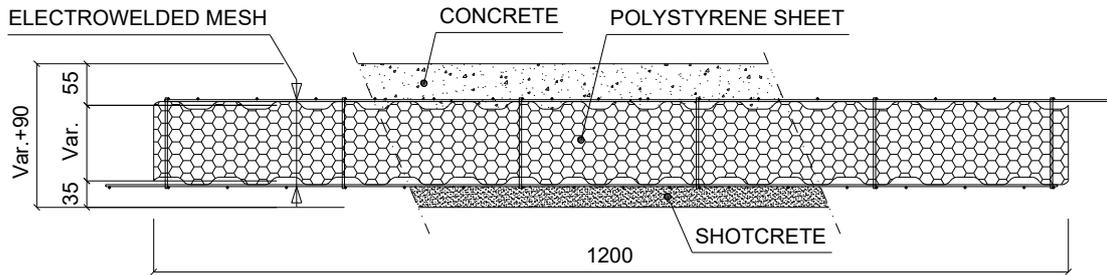
* value obtained by analytical calculation, considering only the thickness of the layers that make up the element

** considered density for the shotcrete: 2000 kg/m³

*** test carried out on PST40 at the Santiago de Chile University

**** test carried out at C.S.I., Milan, Italy,

3.4 EMMEDUE SINGLE FLOOR PANEL PSS



Galvanized steel wire mesh:

- **Longitudinal wires:** Ø 2,5 mm every 77,5 mm
- **Transversal wires:** Ø 2,5 mm every 75 mm
- **Cross steel wire:** nr. 2 Ø 3 mm every 150 mm (approx. 70 per m²)

Steel wire yield: $f_{yk} > 600 \text{ N/mm}^2$

Steel wire failure: $f_{tk} > 680 \text{ N/mm}^2$

Polystyrene density: 15 or 25 Kg/m³

Polystyrene thickness: between 8 cm and 16 cm

Finished slab thickness: between 17 cm and 25 cm

This type of panel is used for slab and roof systems.

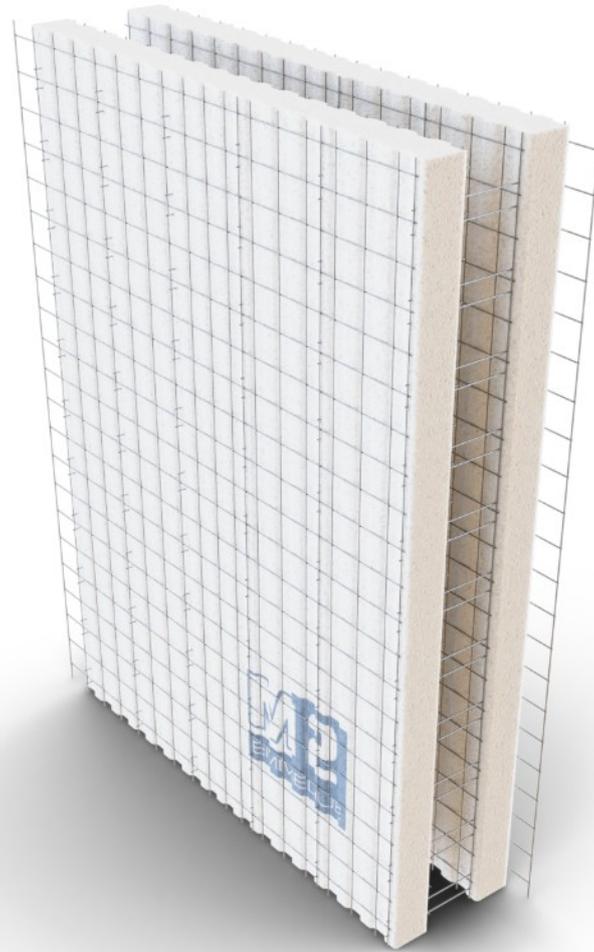
The panel must be completed on site with the casting of conventional concrete and spraying of shotcrete, according to the structural calculation.

Panel specifications rev. 13 08/21

Type of panel	Finished slab thickness (cm)	Density 15 kg/m ³			Density 25 kg/m ³		
		Thermal transmittance U (W/m ² K)*	Panel weight (kg/m ²)	Slab weight with Shotcrete and concrete** (kg/m ²)	Thermal transmittance U (W/m ² K)*	Panel weight (kg/m ²)	Slab weight with Shotcrete and concrete** (kg/m ²)
PSS80	17	0,448	3,8	212,8	0,406	4,6	213,6
PSS100	19	0,367	4,2	213,2	0,332	5,2	214,2
PSS120	21	0,309	4,6	213,6	0,279	5,8	214,8
PSS140	23	0,265	5,0	214,0	0,239	6,4	215,4
PSS160	25	0,235	5,3	214,3	0,211	6,9	215,9

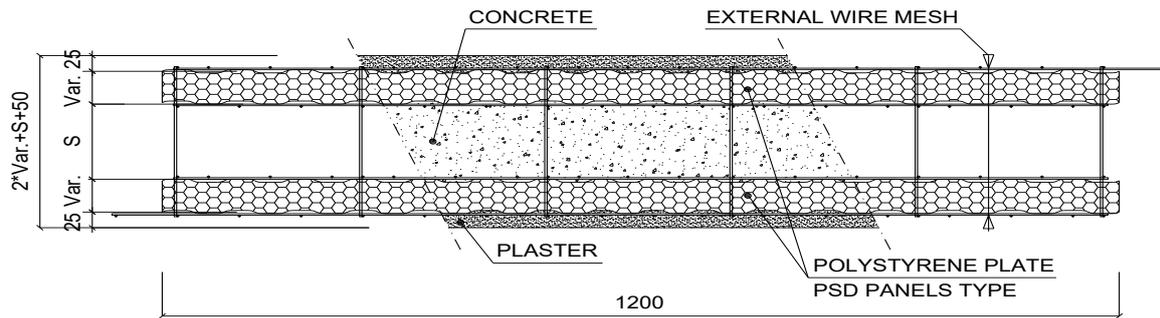
* value obtained by analytical calculation, considering only the thickness of the layers that make up the element

** considered density for shotcrete: 2200 kg/m³; considered density for concrete: 2400 kg/m³



Double panel PDM

3.5 EMMEDUE DOUBLE PANEL PDM



Galvanized steel wire external mesh:

- **Longitudinal wires:** Ø 2,5 mm every 77,5 mm
- **Transversal wires:** Ø 2,5 mm every 75 mm
- **Cross steel wire:** nr. 2 Ø 3 mm every 150 mm (approx. 70 per m²)

Steel wire yield: $f_{yk} > 600 \text{ N/mm}^2$

Steel wire fracture $f_{tk} > 680 \text{ N/mm}^2$

Polystyrene density: Approx. 25 Kg/m³

Polystyrene thickness: from 5 cm to 8 cm

Polystyrene inter-plate distance: from 15 cm to 20 cm

The double panel PDM consists of two panels facing each other and joined by connectors at a distance established for the structure requirements. The panel must be completed on site with the casting of conventional concrete. Externally, the panels are sprayed with conventional cement based plaster. PDM panel is constituted by the union of two single

Type of panel	EPS core thickness (cm)	Finished wall thickness (cm)	Thermal transmittance U (W/m ² K)*	Panel weight (kg/m ²)	Wall weight with concrete and shotcrete** (kg/m ²)
PDM150	5+5	30	0,320	8,3	470,3
	7+7	34	0,234	9,5	471,5
	8+8	36	0,207	10,1	472,1
PDM180	5+5	33	0,319	8,4	542,4
	7+7	37	0,234	9,6	543,6
	8+8	39	0,206	10,2	544,2
PDM200	5+5	35	0,318	8,5	590,5
	7+7	39	0,233	9,7	591,7
	8+8	41	0,206	10,3	592,3

Fire resistance: REI 150***

Sound proofing index: $D_{2m,nT,w} = 40 \text{ dB****}$

* value obtained by analytical calculation, considering only the thickness of the layers that make up the element

** considered density for shotcrete: 2000 kg/m³; considered density for concrete: 2400 kg/m³

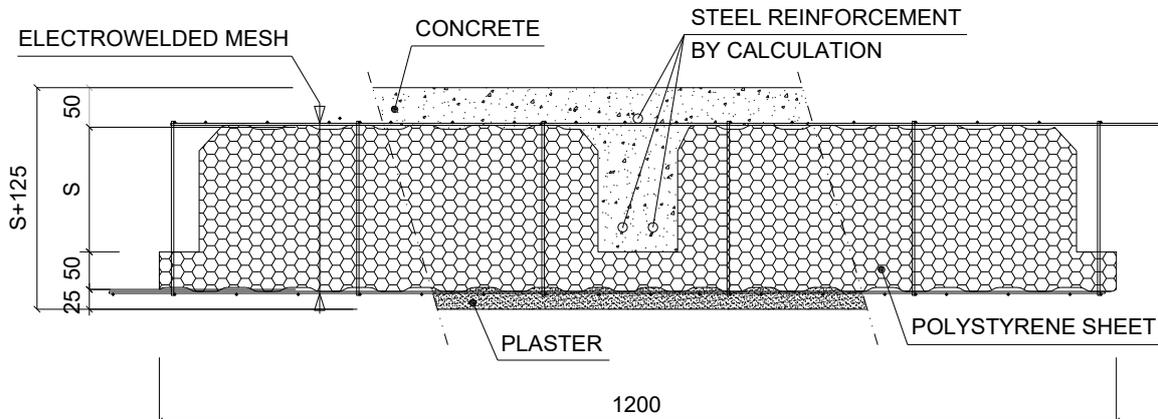
*** test carried out on PDM80 at Giordano Institute in Rimini

**** test carried out on PDM150 (5+5) at Giordano Institute in Rimini



Floor panel PS2 / PS3

3.6 EMMEDUE FLOOR PANEL PS2 / PS3



Galvanized steel wire mesh:

- **Longitudinal wires:** Ø 2,5 mm every 77,5 mm
- **Transversal wires:** Ø 2,5 mm every 112,5 mm
- **Cross steel wire:** nr. 2 Ø 3 mm every 225 mm (approx. 45 per m²)

Steel wire yield: $f_{yk} > 600 \text{ N/mm}^2$

Steel wire failure: $f_{tk} > 680 \text{ N/mm}^2$

Polystyrene density: Approx. 15 Kg/m³

This type of panel is used for floor and roof systems.

The panel must be completed on site with additional steel reinforcement and casting of conventional concrete, according to the structural calculation.

Center distance between joists: PS2 = 600 mm, PS3 = 400 mm

Type of Panel****	Plaster thickness cm.2,5 Polystyrene plate cm.5 Concrete slab cm.5	Thermal transmittance $U \text{ (W/m}^2 \text{K)}^*$	Panel weight (kg/m ²)	Slab weight with concrete and shotcrete** (kg/m ²)
	Rib height (S)*** (cm)			
PS2100	10	0,277	4,3	215,3
PS2120	12	0,248	4,6	223,6
PS2140	14	0,224	4,9	231,9
PS2160	16	0,204	5,2	240,2
PS2180	18	0,188	5,5	248,5
PS2200	20	0,174	5,8	256,8
PS2220	22	0,162	6,1	265,1
PS2240	24	0,151	6,4	273,4

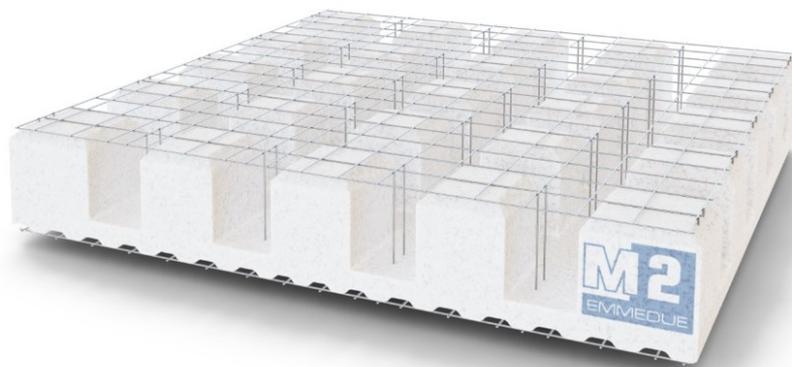
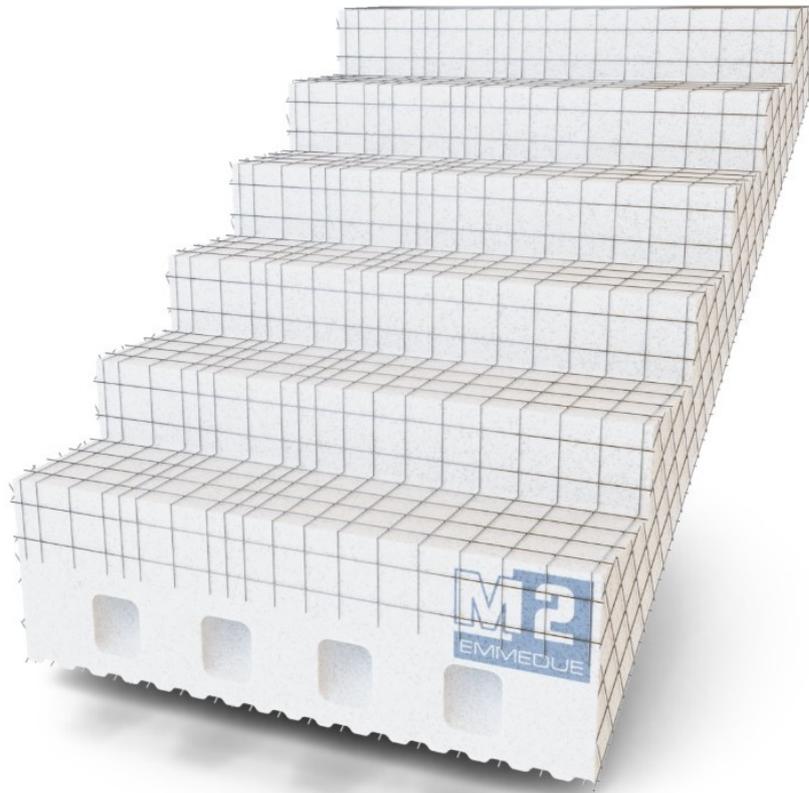
The soundproofing insulation level requested, can be obtained, as for the conventional floor system, by applying a layer of insulating material between the structure and the overstructure.

* value obtained by analytical calculation, considering only the thickness of the layers that make up the element

** considered density for shotcrete: 2000 kg/m³; considered density for concrete: 2400 kg/m³

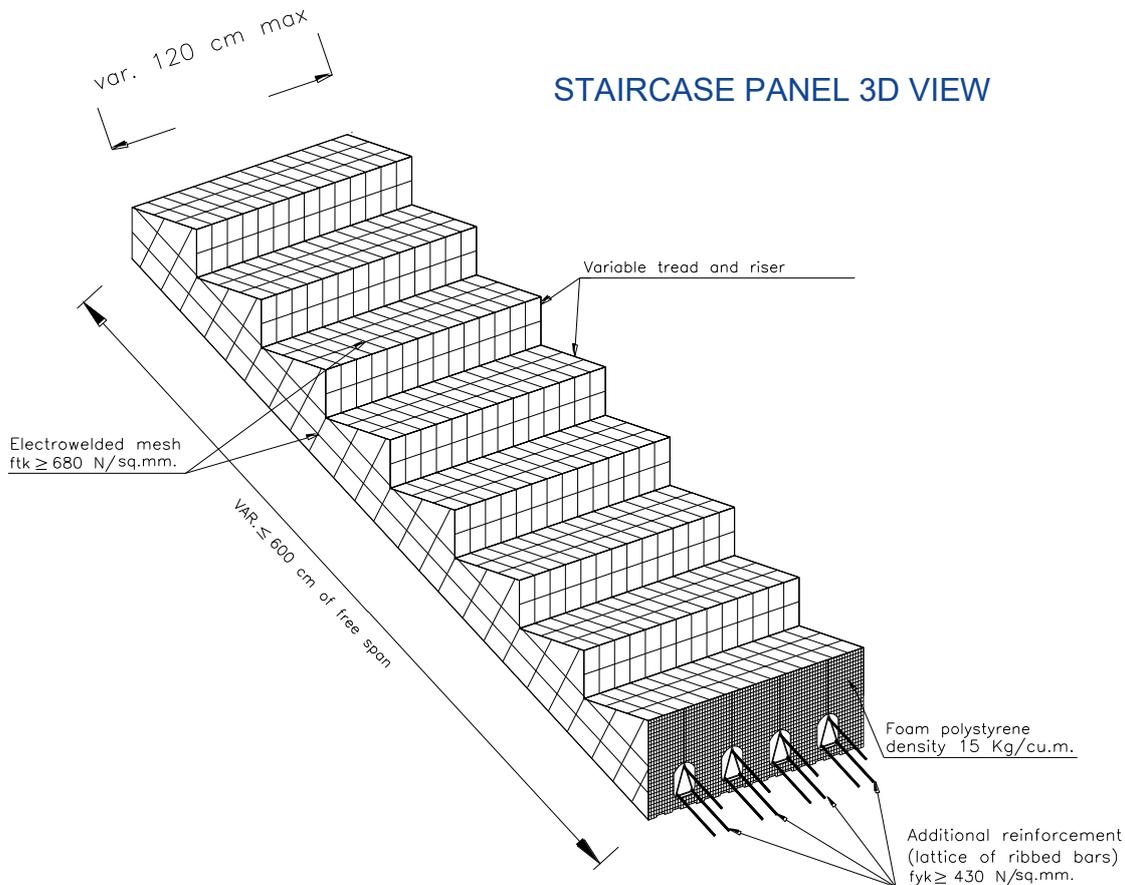
*** maximum rib height (S) is 30 cm

**** PS2 means a panel with 2 ribs per panel. PS3 means a panel with 3 ribs per panel. .



Staircase panel PSCA and Landing panel PNR

3.7 STAIRCASE PANEL PSCA AND LANDING PANEL PNR



Galvanized steel wire mesh:

- **Longitudinal wires:** \varnothing 2.5 mm
- **Transversal wires:** \varnothing 2.5 mm
- **Cross steel wire:** \varnothing 3 mm

Steel wire yield: $f_{yk} > 600$ N/mm²

Steel wire failure: $f_{tk} > 680$ N/mm²

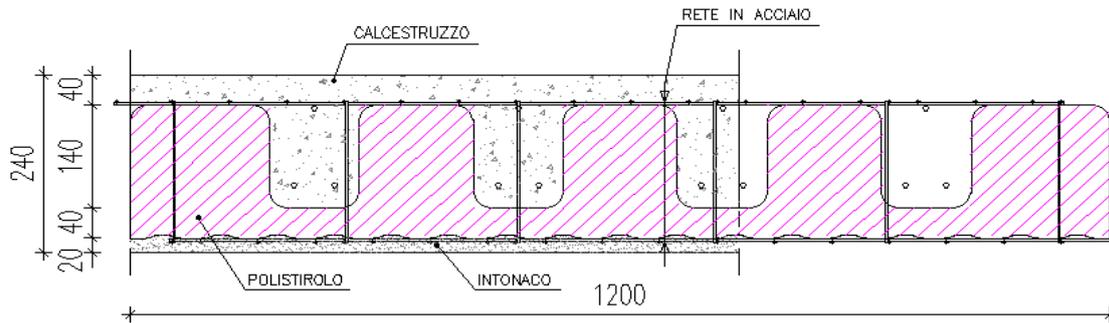
Polystyrene density: Approx. 15 Kg/m³

Fire resistance: 120 minutes*

* test carried out at the University of Santiago de Chile

This panel is made of a foam polystyrene block shaped according to design requirements, and then coated with two layers of steel wire mesh assembled with electro-welded steel wires. The stair panel must be reinforced on site with steel bars and then filled with concrete.

LANDING PANEL TYPICAL SECTION



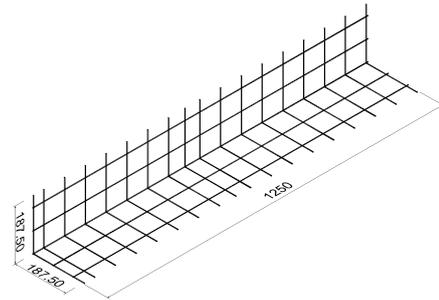
3.8 REINFORCEMENT MESHES

Made with galvanized steel wire (\varnothing 2.5 mm).

The meshes are used to reinforce all the openings and corner-joints between the panels in order to obtain a monolithic behaviour of the structure.

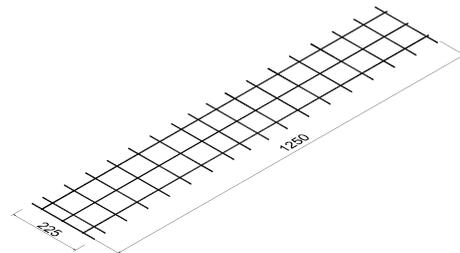
CORNER MESH RG1

- used on every wall intersection
- used on every wall and ceiling intersection



FLAT MESH RG2:

- used on every opening corner
- used on every discontinuity of the mesh



“U” SHAPED MESH RU:

- used around any opening
- used to complete the top side of the wall panels, such as parapet and garden walls

