

Resistance

Thermal insulation

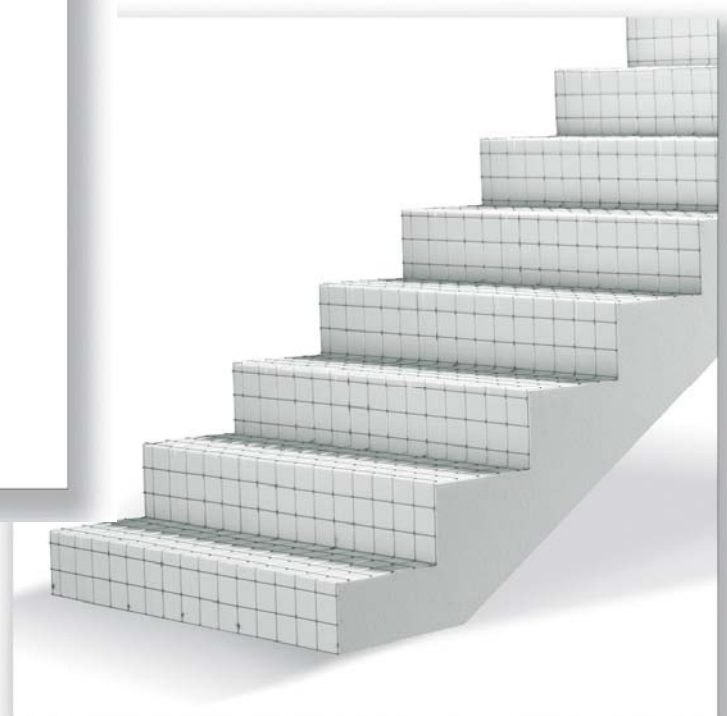
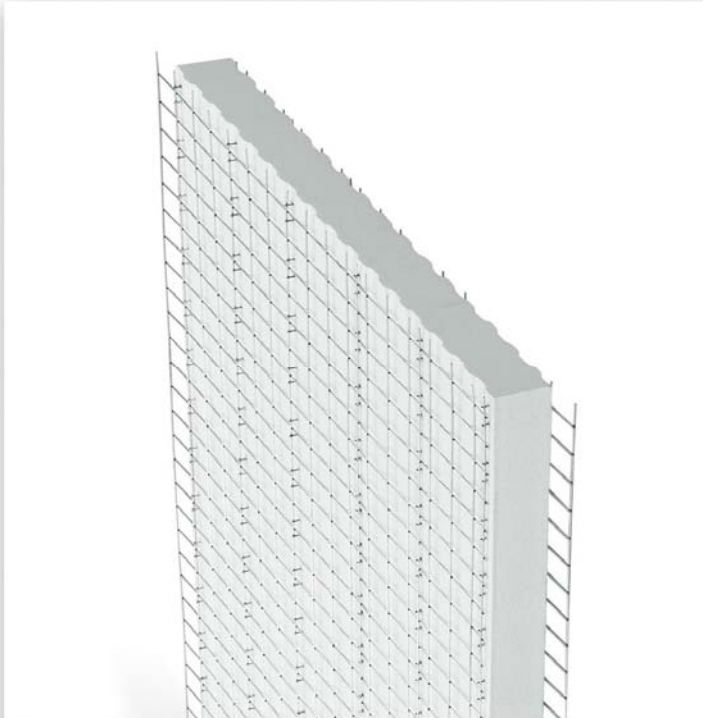
Energy saving

# M2

EMMEDUE

Advanced  
Building  
System

## PANEL SPECIFICATIONS

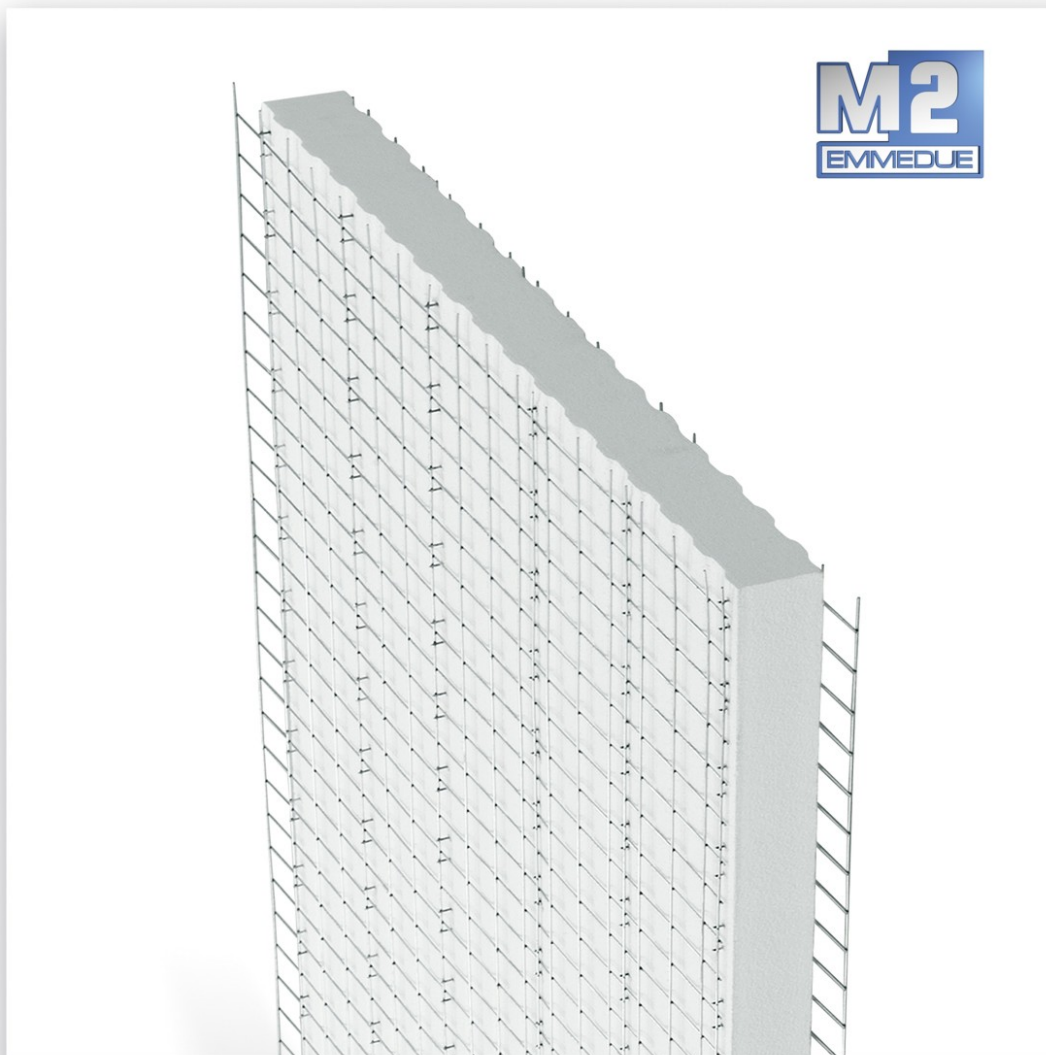




## 1. INTRODUCTION

The purpose of this Technical Manual is to provide guidance and direction for the most suitable method to install the Emmedue building system, in accordance with an acceptable design.

These pages will enable the erection of buildings having standard features using panels and other elements that are normally employed in the Emmedue building system. For more complex uses, the system must be addressed in a specific design.



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## 2. DESCRIPTION OF THE EMMEDUE BUILDING SYSTEM

### 2.1. FUNDAMENTALS OF THE EMMEDUE SYSTEM

The Emmedue construction system is based on a series of foam polystyrene panels and galvanized steel wire meshes. The shape has been especially designed for the introduction of traditional or structural plaster (spritz beton) during on-site panel installation. Emmedue provides a system of industrialized modular panels allowing for faster assembly than 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

**The following are the basic components:**

- A) A foam polystyrene core** which is non-toxic, non-hazardous, self-extinguishing and chemically inert with varying density and thickness depending on panel type.
- 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 panel type and mesh direction.

### 2.3. PLASTERING

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

## 2.4. ADVANTAGES OF THE EMMEDUE BUILDING SYSTEM

- **Versatility & diversity of panels to accommodate differential architecture and design features**
- **High heat/cold and sound resistance**
- **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 is required**
- **Lower costs and erection time**
- **Lower foundations costs compared with traditional systems**
- **Full utilisation within the same building system**
- **Emmedue system well integrates with traditional systems**
- **Highly fire-proof material**
- **Easy and rapid 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**
- **Emmedue panel does not change following exposure to weather conditions**
- **Ecological in all its parts.**

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### 3. CLASSIFICATION OF THE EMMEDUE PRODUCTS

The Emmedue panels, applications, standard sizes and complementary products are described below.

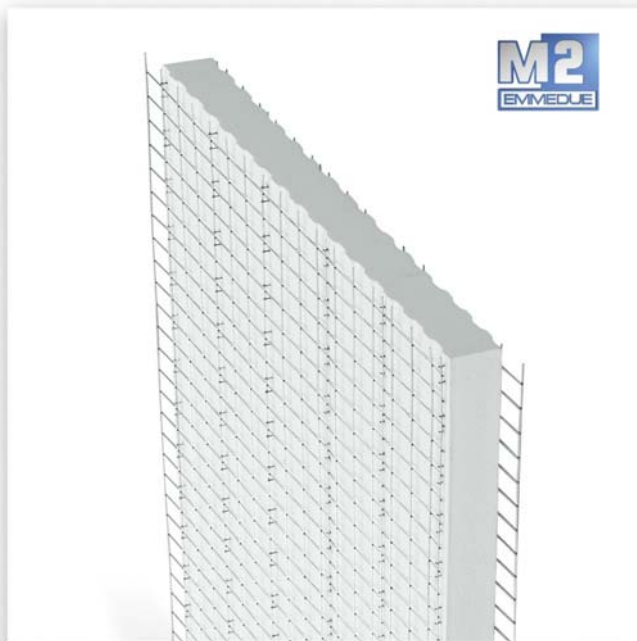
The panel thickness and the length of the panels may be customized, according to the different project requirements and customer's demands.

Initially, the thickness of a panel is determined primarily according to its different conditions of heat insulation and required structural behaviour. A greater moment of inertia may be achieved by increasing spacing between the two concreted or plastered surfaces.

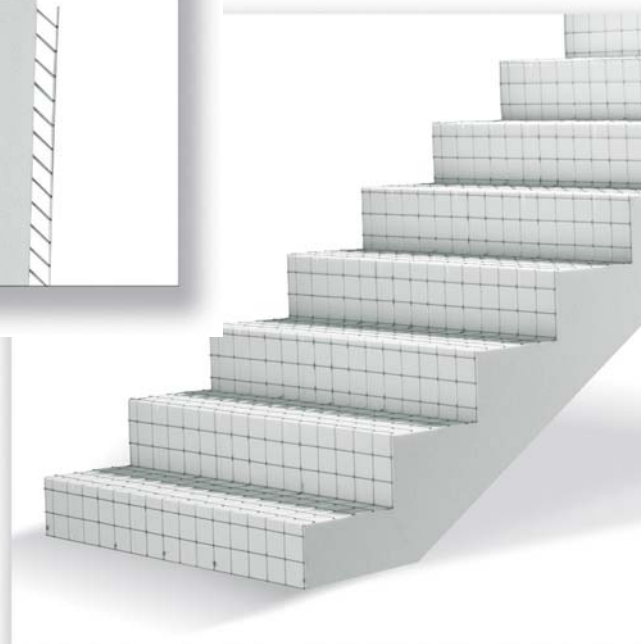
The typical insulation of polystyrene is for a finished panel of 4 in. thickness with 2 in. thick polystyrene core (density 0.936 lbs/ft<sup>3</sup> or 15 kg/m<sup>3</sup>) corresponds to the insulation properties of an ordinary brick wall 25 in. thick.

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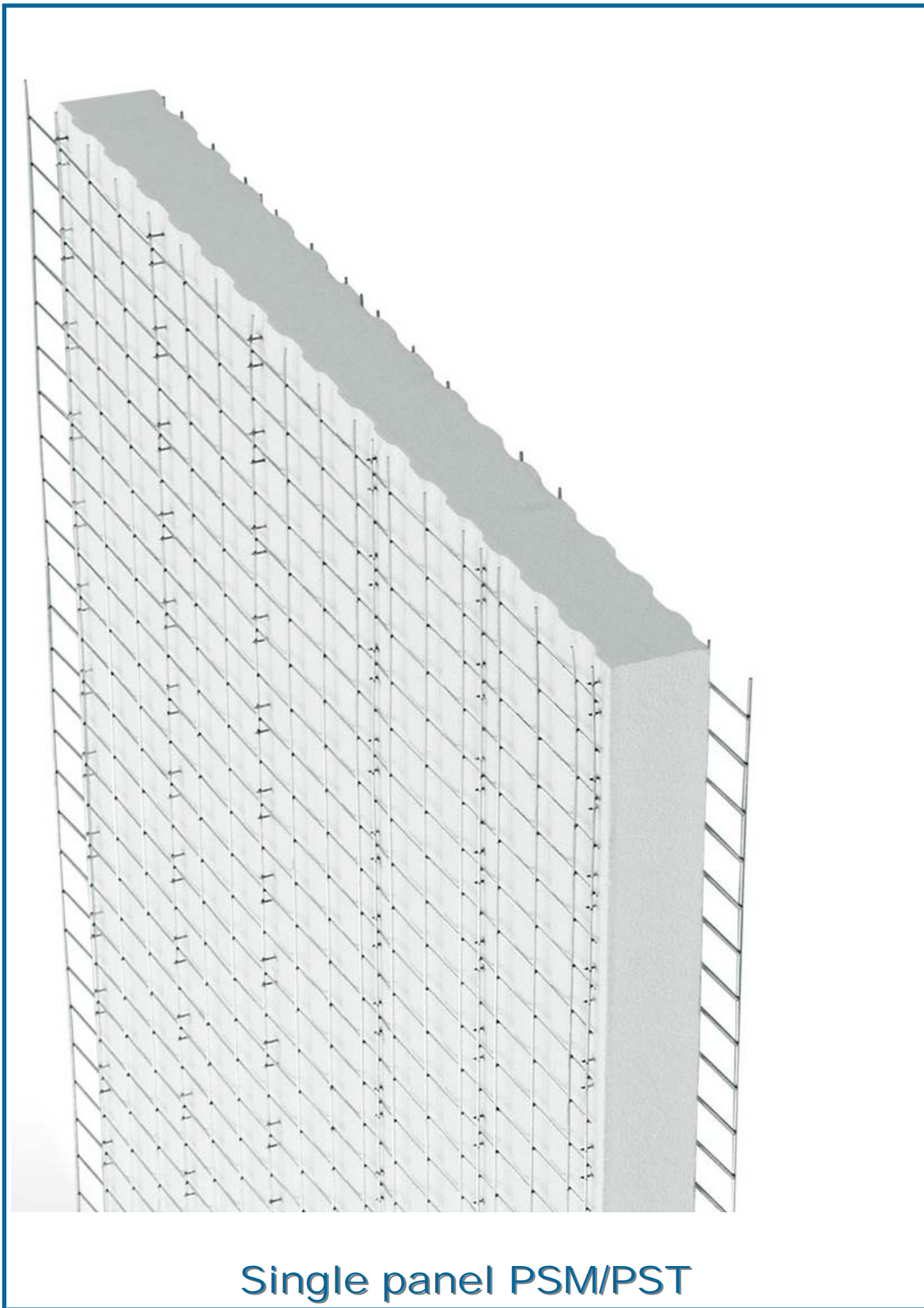


**Single panel PSM**



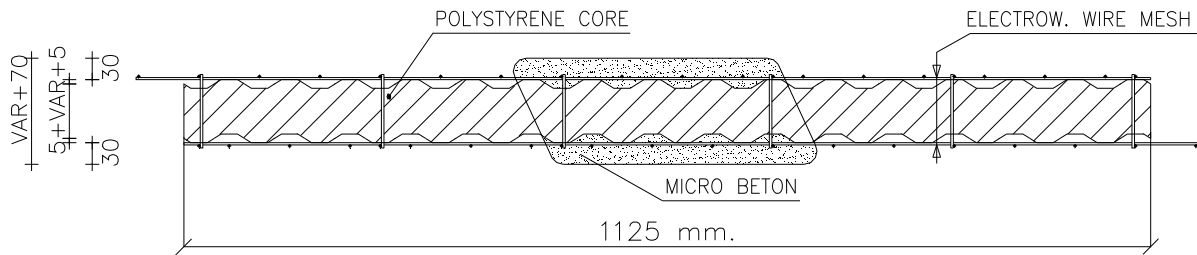
**Staircase panel PSSC**

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Single panel PSM/PST

### 3.1 EMMEDUE SINGLE PANEL PSM



**Galvanized steel wire mesh:**

- Longitudinal wires: Ø (gauge 12) (2,5 mm.) or gauge 9 (3,5 mm) every 2.56 in. (65 mm.)
- Transversal wires: Ø gauge 12 (2,5 mm) every 2.56 in. (65 mm)
- Cross steel wire: Ø gauge 11 (3 mm) (approx. 6 per ft<sup>3</sup> - 68 per sq.m.)
- Steel wire yield:  $f_{yk} > 87082 \text{ PSI (600 N/mm}^2\text{)}$
- Steel wire fracture:  $f_{tk} > 98692 \text{ PSI (680 N/mm}^2\text{)}$

- Polystyrene slab density:** Approx. 1 lb/ft<sup>3</sup> (15 Kg/m<sup>3</sup>)
- Polystyrene slab thickness:** from 1.57 in.
- Finished masonry thickness:** variable, from 4.33 in.

For the structural use of this panel, the polystyrene core should be at least 2 in. 6cm thick and an average quantity of traditional or pre-mixed cement based plaster (lime < 5% on cement weight) of about 1.38 in. (about 1 in. over the mesh) should be sprayed on each side having structural features of at least 3621 PSI (250 daN/cm<sup>2</sup>) of compressive strength.

This panel is generally used for buildings of no more than 4-6 storeys, also in seismic areas, for floor slabs and covering slabs with maximum spans of 13 ft. at.

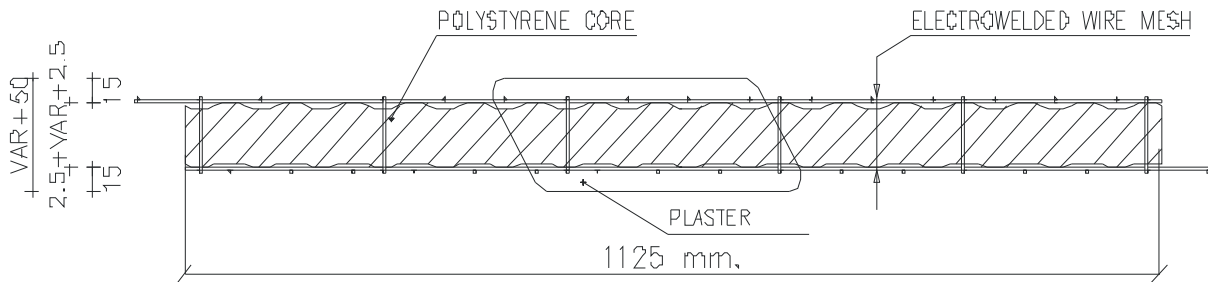
Kind of panel	Thickness of finished panel (cm)	Thermal transmittance U (W/m <sup>2</sup> K)*	
		(in brackets values in BTU/h ft <sup>2</sup> F)	
		density 15 kg/m <sup>3</sup> (0,94 pound/ft <sup>3</sup> )	density 25 kg/m <sup>3</sup> (1,56 pound/ft <sup>3</sup> )
		Double connector	Double connector
PSM60	13	0,570 (0,101)	0,520 (0,091)
PSM80	15	0,440 (0,078)	0,400 (0,070)
PSM100	17	0,360 (0,063)	0,330 (0,057)
PSM120	19	0,300 (0,054)	0,270 (0,048)
PSM140	21	0,260 (0,046)	0,240 (0,042)

- Sound proofing index:** 45 dB \*\*
- Fire resistance:** REI 120\*\*\*

\* value obtained by analytical calculation  
 \*\* test carried out on PSM90 at the Santiago del Chile università  
 \*\*\* test carried out on PSM80 at C.S.I., Milan, Italy

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### 3.2 EMMEDUE SINGLE PANEL PST



**Galvanized steel wire mesh:**

- Longitudinal wires: Ø gauge 12 (2,5 mm.) every 2.56 in. (65 mm.)
- Transversal wires: Ø gauge 12 (2,5 mm) every 2.56 in. (65 mm)
- Cross steel wire: Ø gauge 11 (3 mm) (approx. 6 per ft<sup>3</sup> - 68 per sq.m.)
- Steel wire yield:  $f_{yk} > 87082$  PSI (600 N/mm<sup>2</sup>)
- Steel wire fracture:  $f_{tk} > 98692$  PSI (680 N/mm<sup>2</sup>)

- Polystyrene slab density:** Approx. 1 lb/ft<sup>3</sup> (15 Kg/m<sup>3</sup>)
- Polystyrene slab thickness:** from 1.57 in (4 cm) to 12,60 in (32 cm).
- Finished masonry thickness:** variable, from 3.54 in (9cm) to 14.57 in (37 cm).

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

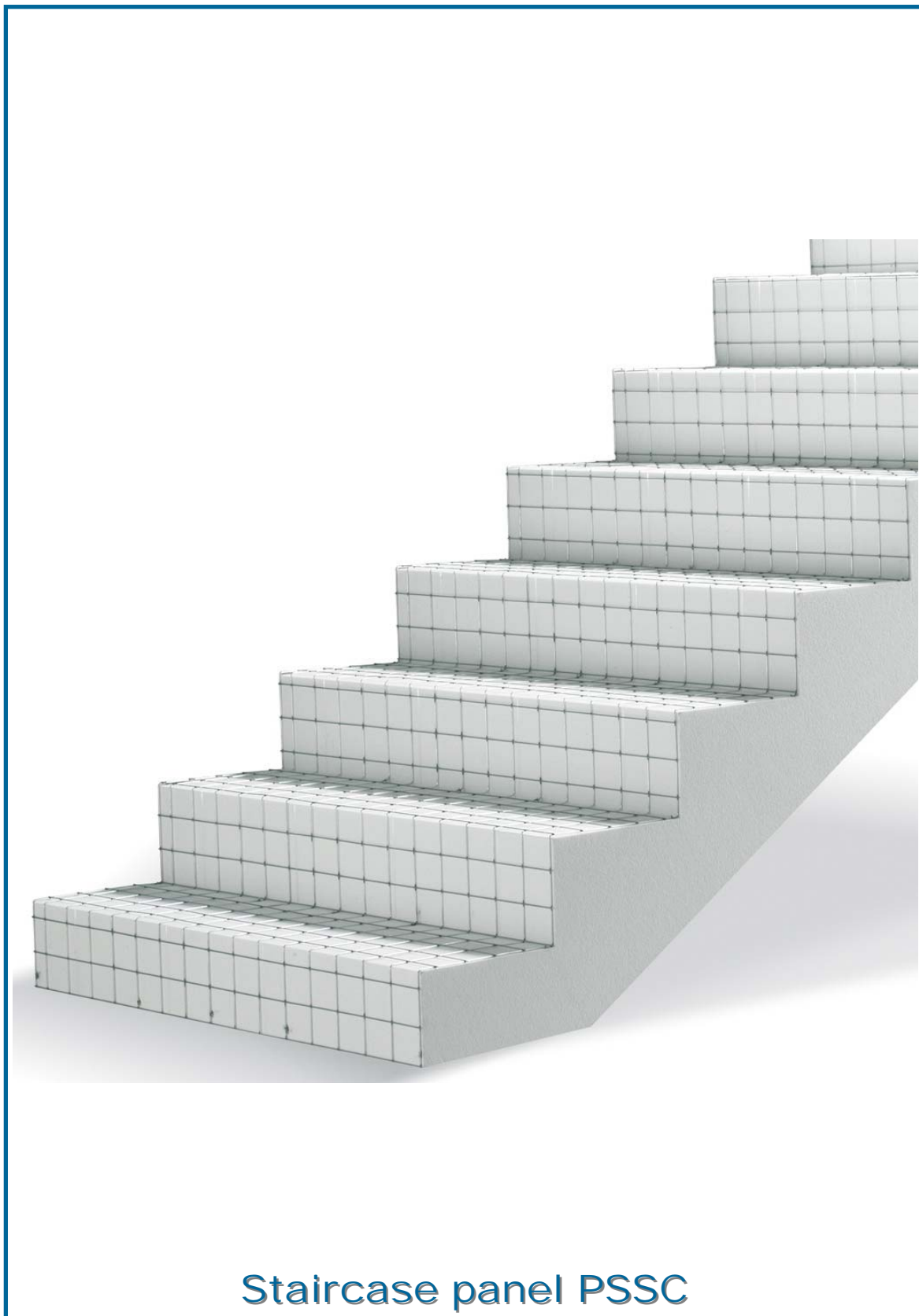
Kind of panel	Thickness of finished panel (cm)	Thermal transmittance <b>U</b> (W/m <sup>2</sup> K)* (in brackets values in BTU/h ft <sup>2</sup> F)	
		Density 15 Kg/m <sup>3</sup> (0,94 pound/ft <sup>3</sup> )	Densità 25 kg/m <sup>3</sup> (1,56 pound/ft <sup>3</sup> )
PST40	9	0,814 (0,143)	0,743 (0,130)
PST50	10	0,674 (0,118)	0,613 (0,107)
PST60	11	0,574 (0,101)	0,522 (0,091)
PST80	13	0,444 (0,078)	0,402 (0,070)
PST100	15	0,361 (0,063)	0,327 (0,057)
PST120	17	0,305 (0,054)	0,347 (0,048)
PST140	19	0,264 (0,046)	0,275 (0,042)
PST160	21	0,232 (0,041)	0,209 (0,037)
PST180	23	0,208 (0,036)	0,187 (0,033)
PST200	25	0,188 (0,033)	0,169 (0,030)

**Sound proofing index: 41 dB \*\***

\* value obtained by analytical calculation  
 \*\* test carried out on PST40 at the Santiago del Chile università

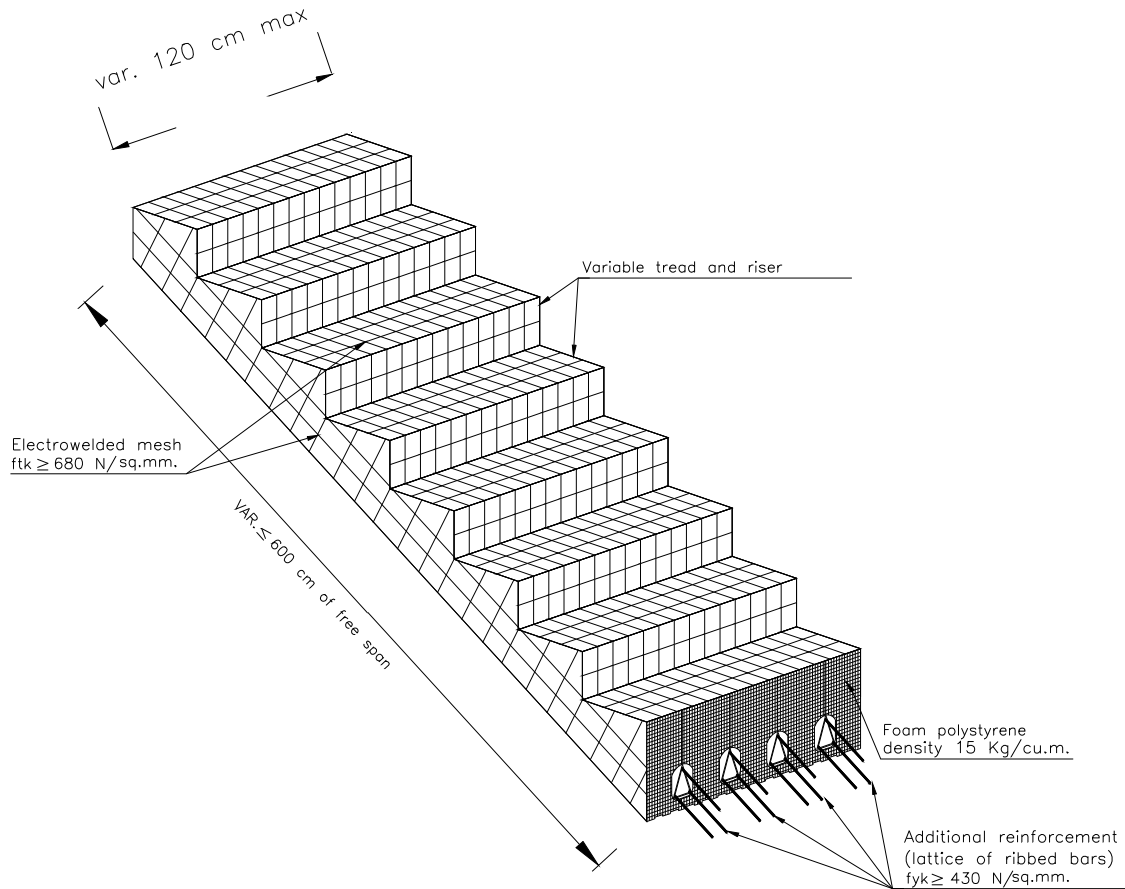
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Staircase panel PSSC

### 3.5 EMMEDUE STAIRCASE PANEL PSSC



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**Galvanized steel wire mesh:**

- Longitudinal wires: Ø gauge 12 (2,5 mm.)
- Transversal wires: Ø gauge 12 (2,5 mm)
- Cross steel wire: Ø gauge 11 (3 mm)
- Steel wire yield:  $f_{yk} > 87082 \text{ PSI (600 N/mm}^2\text{)}$
- Steel wire fracture:  $f_{tk} > 98692 \text{ PSI (680 N/mm}^2\text{)}$

**Polystyrene slab density:** Approx. 1 lb/ft<sup>3</sup> (15 Kg/m<sup>3</sup>)

**Fire resistance REI 120\*:**  
 \* test carried out at Santiago del Chile University

This panel consists of an expanded polystyrene block shaped according to designing requirements and reinforced by a steel mesh. The block is joined by steel wire connectors welded in electro-fusion across the polystyrene core.

Suitable reinforced and finished with casting on site in the suitable spaces, it is used, for the construction of flight of stairs up to a maximum span of 20 ft. having a live load of 82 lb/ft<sup>2</sup> (400 Kg/m<sup>2</sup>).

The reinforcement steel bars have to be placed inside the holes.

### 3.6 BRACING MESHWORKS

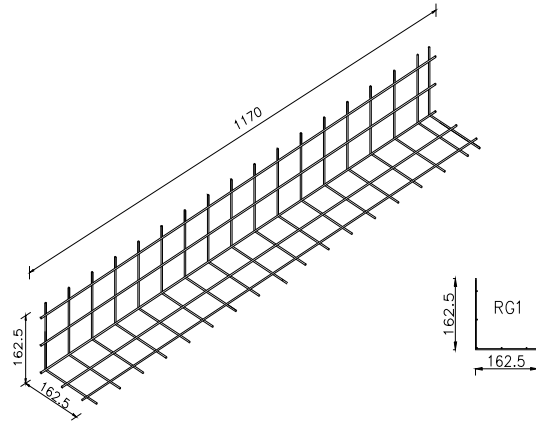
Designed with 1 in. galvanized steel wire, the meshwork is used to reinforce openings and corner-joints between panels so to confer continuity to the structural mesh. Joints or cramps are used to attach the mesh to the panels.

#### ANGULAR MESHWORK RG1:

\* reinforces angle-connections.

#### Estimated efficiency:

4 units per angle (2 internal and 2 external) on average

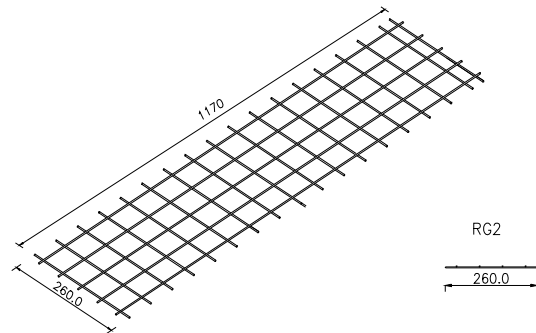


#### FLAT MESHWORK RG2:

- \* reinforces (at 45°) openings angles
- \* restores meshwork that had been previously cut
- \* for any joints between panels

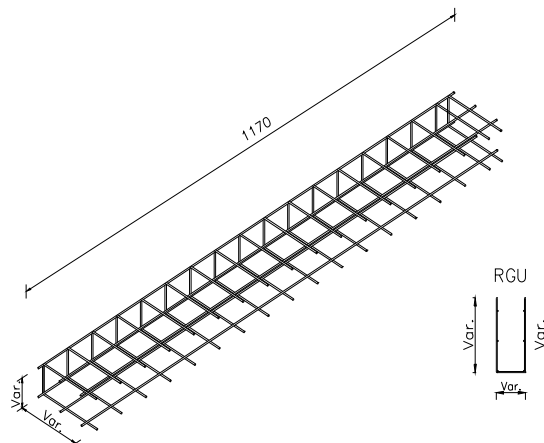
#### Estimated efficiency:

2 units per door.  
4 units per window.



#### “U” SHAPED MESHWORK RU:

- \* restores the continuity of the panels along the perimeter of doors and windows



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### 3.7 EMMEDUE PLASTER SPRAYERS FOR WALLS & CEILINGS

The use of these devices easily enables a time saving by 50% and with no need for skilled labour. Thanks to Emmedue sprayers, the plaster may be applied with a degree of adherence that could not be achieved manually.

In one hour, one worker using a plaster sprayer with a continuous flow of material placed nearby can apply a plaster layer of about 1 cm. over an area of up to 646 ft<sup>2</sup> (60 m<sup>2</sup>). Emmedue plaster sprayers are available in two versions: W for walls and C for ceilings. Both models feature four holes for different types of plaster and come with all the necessary tools to clean the machine after use.

#### User's instructions

1. The air pressure should be kept constant within a 70-120 pound (500-800 kPa) range.
2. No special plastering-machines are needed and the panel to be plastered requires no previous preparation.
3. For the plaster to be applied to the wall, the container should be placed at a distance of 10-20 cm.
4. For the plaster to be applied to the ceiling, the upper edge of the container should almost touch the panel at a maximum distance of 2-3 cm.

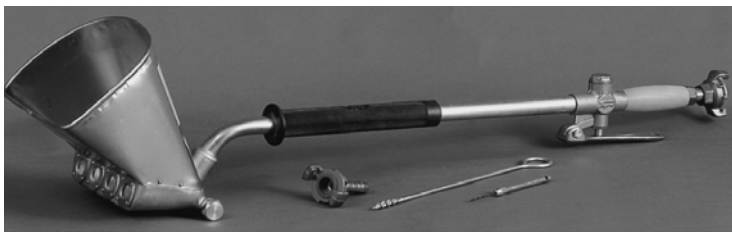
#### Plaster Sprayers Maintenance

1. During the usual interval between the application of two layers of plaster, we recommend to place the empty container in a bucket filled with water and make it work two or three times.
2. Remove lateral bolts and wash the inside of the machine at least once a week.

#### Compressors:

Either electrical or internal-combustion engine compressors may be used keeping in mind the following data:

Engine power (HP)	Air production (l/min)	No. machines
From 3 to 4	350-400	1
From 5 to 6	600-700	From 2 to 3
From 8 to 10	900-1000	From 3 to 4



Plaster sprayer for ceiling

**Note 1:** We recommend the use of high-pressure 1/2" hoses not exceeding 30 linear metres.



Plaster sprayer for wall

**Note 2:** When only one plastering-machine is used, the ideal cubic capacity of the compressor container is 220 litres (not lower than 130 litres, but with pressure regulator).

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Panel cards -single- rev. 02-05/10

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