M2 EMMEDUE Advanced Building System

Cladding and partition walls with
EMMEDUE ADVANCED BUILDING SYSTEM

INTEGRAL
system

MOST FREQUENTLY USES OF
EMMEDUE SYSTEM

COMBINED
system

INTERNAL ELEMENTS
PARTITION WALLS

EXTERNAL ELEMENTS
CURTAIN WALLS

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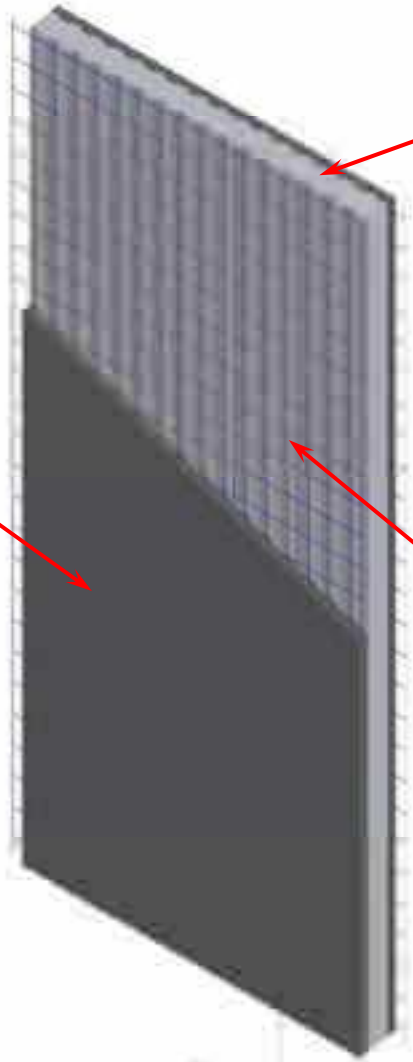
Basic Elements of the system



Polystyrene plate

EPS
(Expanded Polystyrene Sintered)
Variable thickness
Variable density

Structural shotcrete

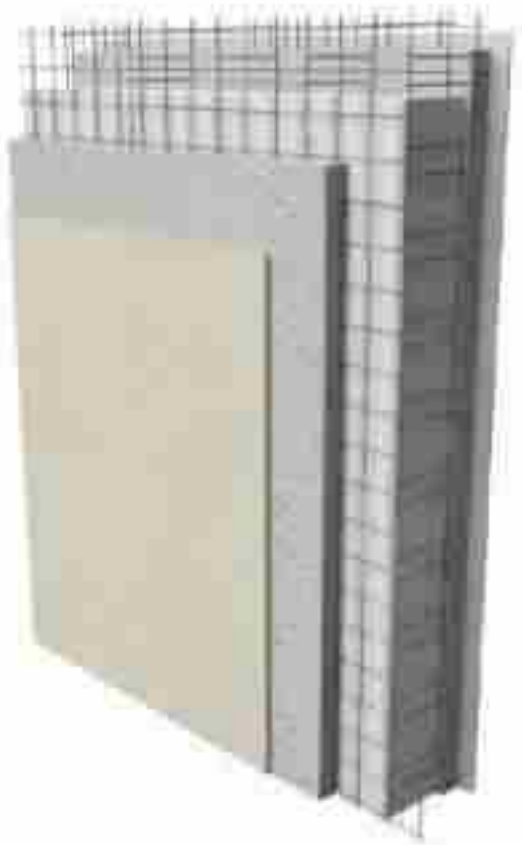
Cement Mortar

Mesh of galvanized steel

Electrowelded cross connectors of ϕ3 mm

SOME ADVANTAGES

- ✓ FAST
- ✓ LIGHT
- ✓ STRONG
- ✓ INSULATING
- ✓ VERSATILE
- ✓ MONOLITIC BEHAVIOUR
- ✓ WIDE CHOICE OF FINISHING



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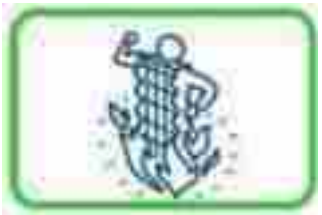
PERFORMANCES OF EMMEDUE PANELS

- ✓ Thermal resistance

- ✓ Fire resistance



- ✓ Acoustic resistance

- ✓ Integration with other building system

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Thermal resistance

PERFORMANCES OF EMMEDUE PST PANEL

Panel type	Finished wall thickness (cm)	Thermal transmittance **U** (W/m² K)*	
		Density 15 Kg/m³	Density 25 kg/m³
PST50	10	0,754	0,693
PST60	11	0,653	0,600
PST80	13	0,521	0,478
PST100	15	0,438	0,328
PST120	17	0,380	0,351
PST140	19	0,339	0,313
PST160	21	0,307	0,284
PST180	23	0,282	0,262
PST200	25	0,262	0,244

* values obtained by analytical calculation reported in the following slide

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Thermal resistance

Transmittance of PST140 panel

Transmittance calculation of EMMEDUE panels			
Polystyrene density = 15 kg/m³			
	Thickness variable	Thermal Conductivity	Thermal Resistance
	m	W / mK	m² K / W
Shotcrete	0,0250	1,4800	0,0169
Polystyrene layer of 15 kg/m³ (considering steel connectors)	0,1400	0,0510	2,7451
Shotcrete	0,0250	1,4800	0,0169

Thermal Resistance	2,947	m²K / W
Rsi	0,125	m²K / W
Rse	0,043	m²K / W
Transmittance U	0,339	W / m²K

NO THERMAL BRIDGE

Thanks to the layer of continuous polystyrene on every surface making up the construction, insulation is extremely effective and offers elimination of heat channels and a consequent noteworthy energy saving.
In fact, thanks to the polystyrene, the walls realised with EMMEDUE panels act as uniform cladding, permeable to steam, which do not absorb water and supply indisputable advantages also in the maintenance phase.

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Thermal resistance

Transmittance of Mansonry

Transmittance calculation of masonry
Thickness = 30 cm

	Thickness variable	Thermal Conductivity	Thermal Resistance
	m	*W / mK*	*$m^2 K / W$*
Plaster	0,0050	1,4800	0,0034
Brick (thk = 30 cm)	0,3000	0,7000	0,4286
Plaster	0,0050	1,4800	0,0034

Thermal Resistance	**0,604**	**m^2K / W**
Rsi	**0,125**	**m^2K / W**
Rse	**0,043**	**m^2K / W**
Transmittance U	**1,656**	**W / m^2K**

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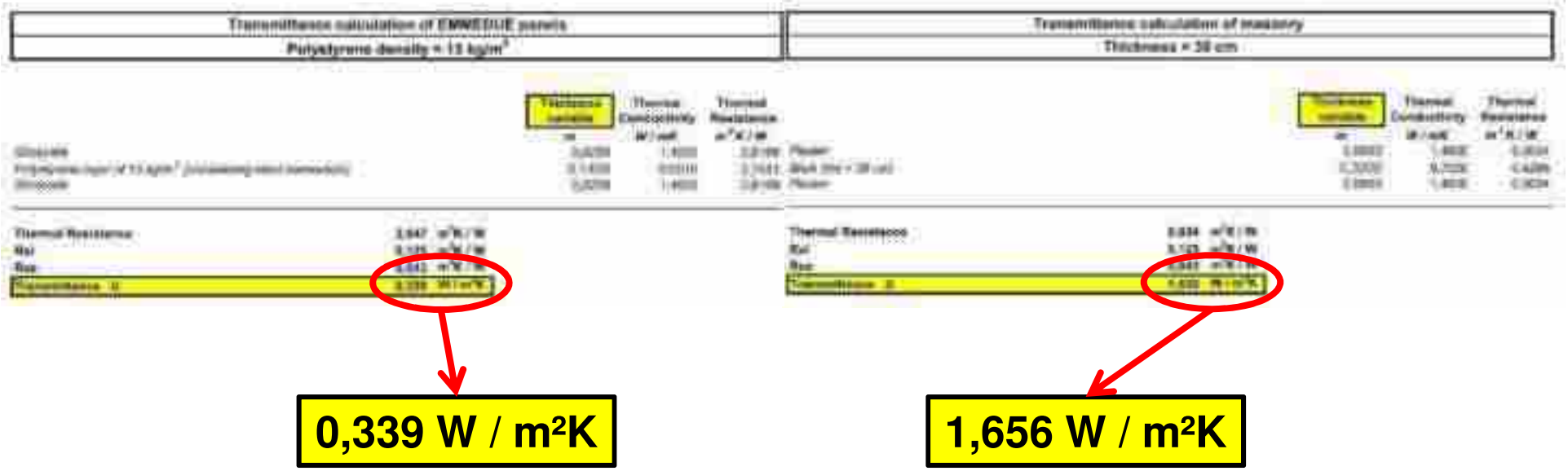
Thermal resistance

Comparison of Transmittance



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Heat Flux

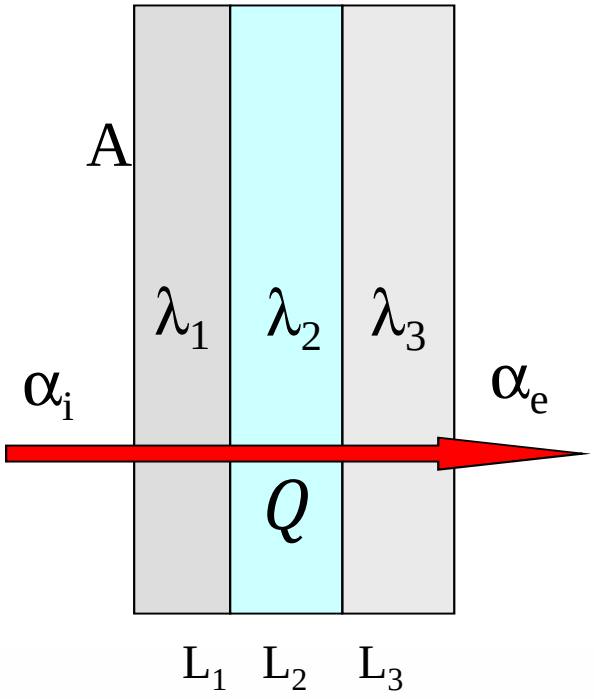
Comparison Analysis

THERMAL TRANSMITTANCE

$$U = G_{u,tot} = \frac{1}{R_{u,tot}} = \frac{1}{\frac{1}{\alpha_i} + \sum_{n=1}^{N} \frac{L_n}{\lambda_n} + \frac{1}{\alpha_e}}$$

HEAT TRANSFER

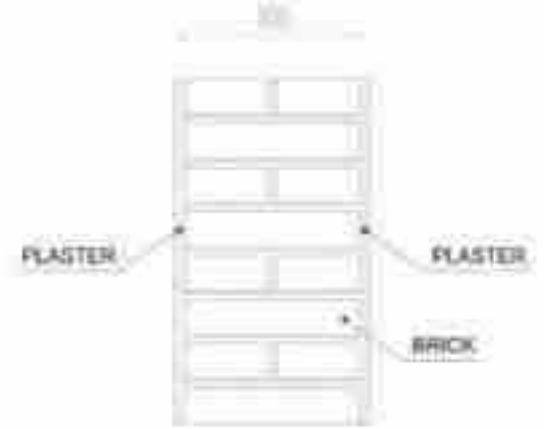
$$Q = UA(T_i - T_e)$$



Heat Flux

Comparison Analysis

MASONRY SYSTEM



U = 1,656 $\frac{W}{m^2\ K}$;

$\Delta T = 15\ K$

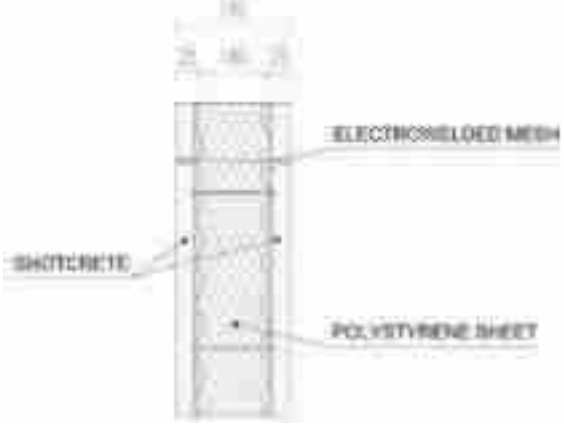
$A = 20\ m^2$

Q = U x A x ΔT = 1,656 $\frac{W}{m^2\ K}$ x 15 K x 20 m² = 496,8 W

Energy requirements = Q / heat efficiency

= 496,8 W / 1,5 = **331,2 W**

EMMEDUE SYSTEM



U = 0,339 $\frac{W}{m^2\ K}$;

$\Delta T = 15\ K$

$A = 20\ m^2$

Q = U x A x ΔT = 0,339 $\frac{W}{m^2\ K}$ x 15 K x 20 m² = 101,5 W

Energy requirements = Q / heat efficiency

= 101,5 W / 1,5 = **67,6 W**

M2 EMMEDUE Advanced Building System

Heat Flux

Energy Comparison Analysis

MASONRY SYSTEM	EMMEDUE SYSTEM
Energy requirements – 1 hour	Energy requirements – 1 hour
0,33 KWh	0,07 KWh
Energy requirements – 1 day (12 hours)	Energy requirements – 1 day (12 hours)
3,97 KWh	0,81 KWh
Energy requirements – 1 month (30 days)	Energy requirements – 1 month (30 days)
119,23 KWh	24,41 KWh
Energy requirements – 1 year (10 month)	**Energy requirements – 1 year (10 month)**
1192,32 KWh	**244,08 KWh**

Total difference = 948 KW

-80 %

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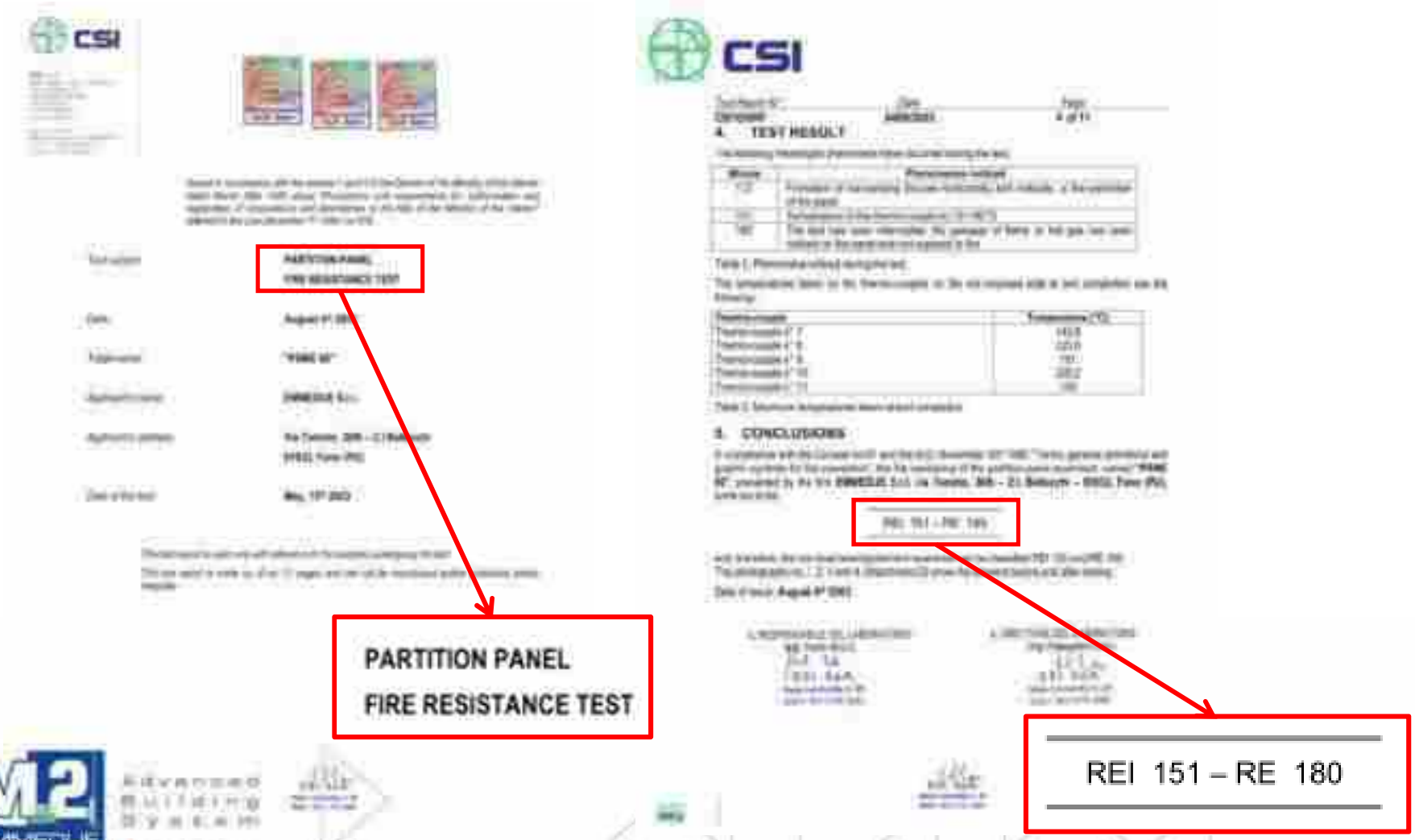
Fire resistance

Transmittance of Comparison

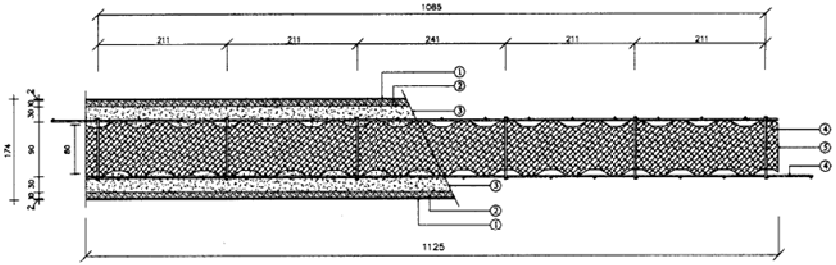


Acoustic resistance

TEST n.1

Single panel PST80

Rw = 41dB



Legend

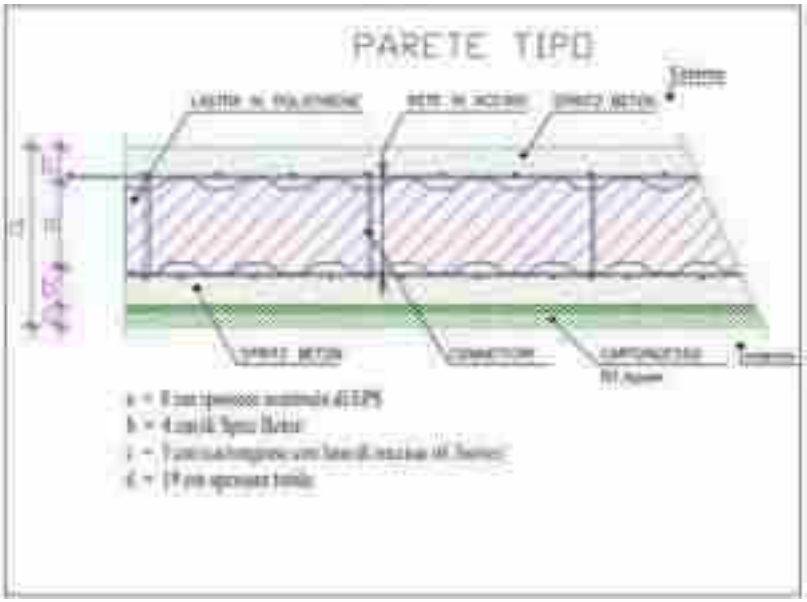
Symbol	Description
1	Finishing shaving with polymers and marble fines, 2 mm thick.
2	Coat of cement-based insulating plaster with hydrate air-hardening lime, lightened special aggregates and cellulose, 10 mm thick.
3	Cement-based undercoat of plaster, 30 mm thick.
4	Square mesh sheet with galvanized steel wires, diameter of wires 2,5 mm and length on mesh side 65 mm.
5	Self-extinguishing foamed polystyrene slab, density 15 kg/m^3, undulated on both faces, waviness height 10 mm.

TEST n.2

Single panel PST80

with rockwall and plasterboard

Rw = 51dB



M2 EMMEDUE Advanced Building System

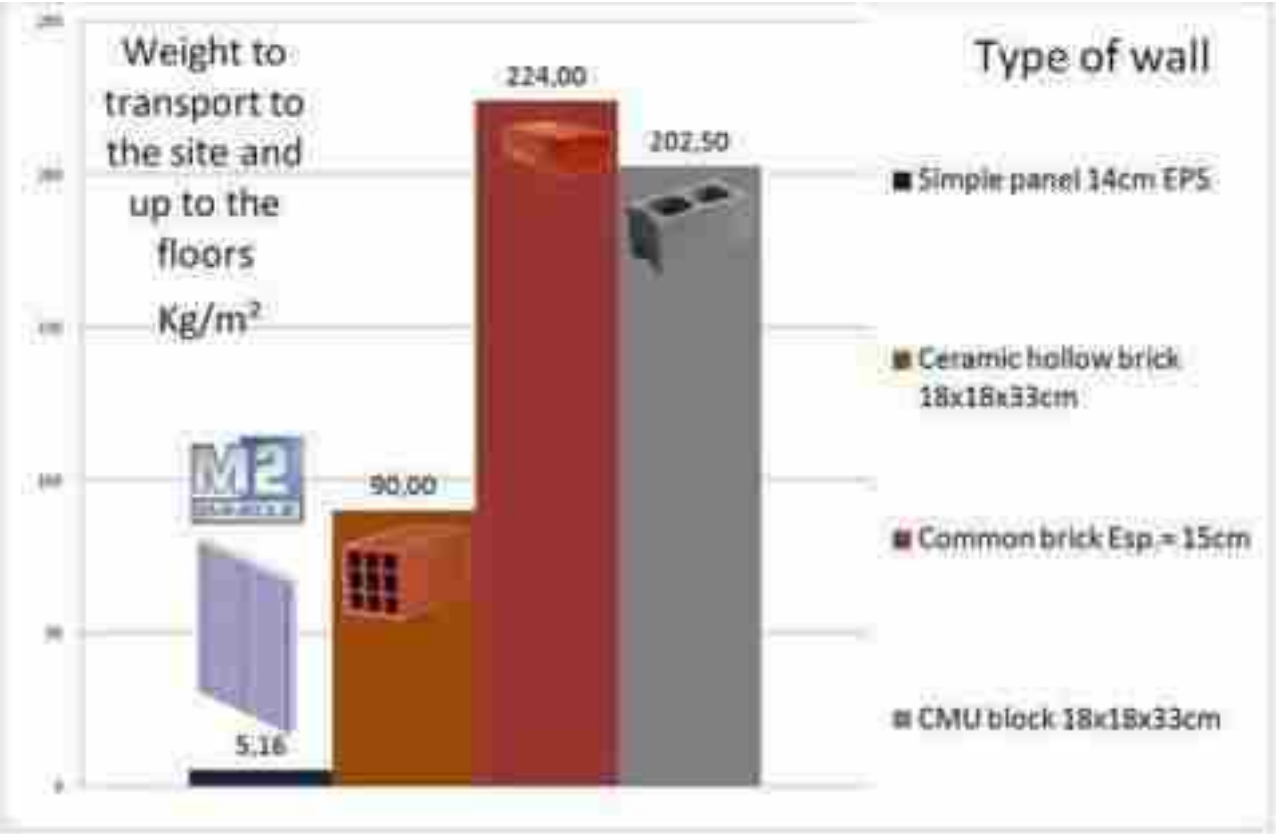
INTEGRATION WITH OTHER BUILDING SYSTEM

EMMEDUE® is a very versatile building system, compatible with all other existing systems; in fact EMMEDUE® products can be used to complete reinforced concrete or steel structures. In addition, they can be easily anchored to construction elements of all different kinds, such as steel, wood or reinforced concrete.

Panels integrated in STEEL STRUCTURE

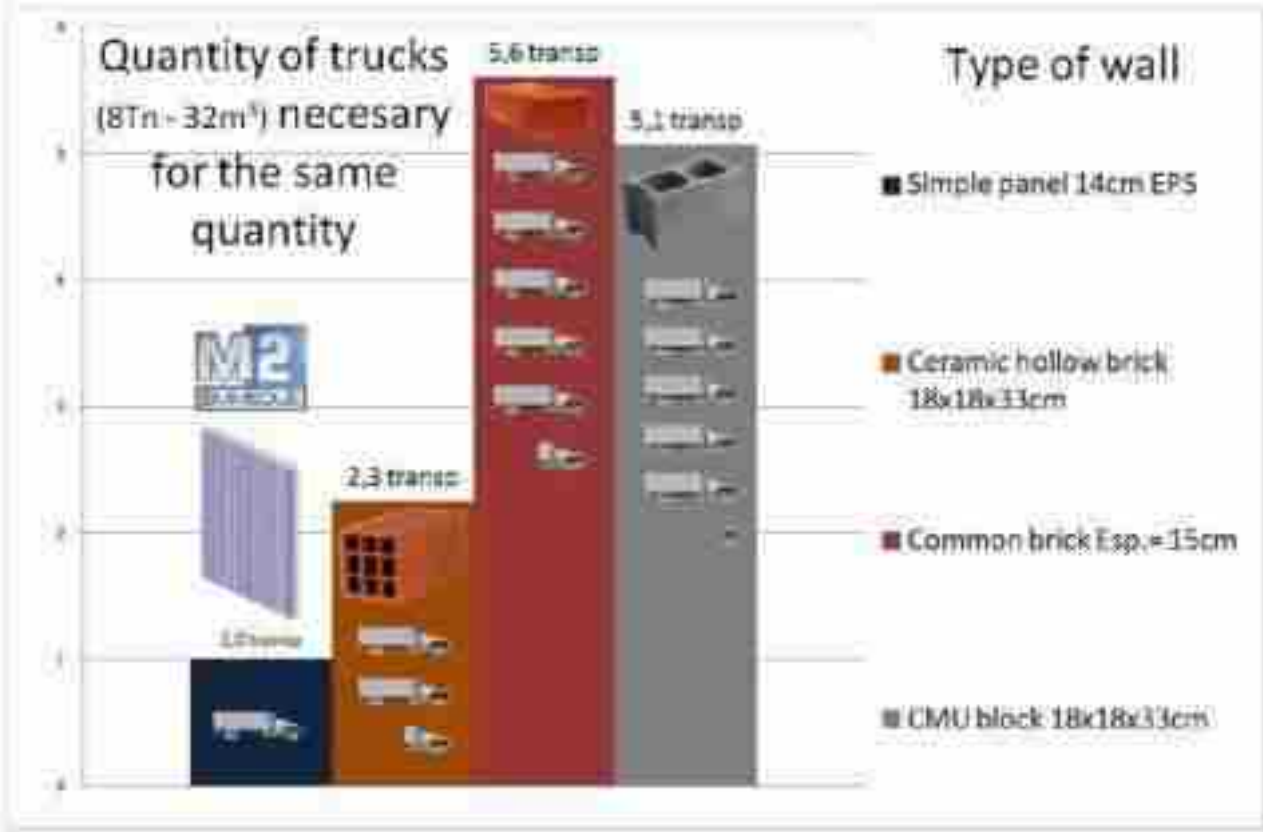
Panels integrated in CONCRETE STRUCTURE

Weight Comparison



The weight of the product in the management of the site. The Emmedue building system does not require a crane or other lifting equipment to move the panel in the site. It follows a lower cost of management of the product in the site compared to the traditional that requires mandatory rent of lifting equipment.

Weight Comparison



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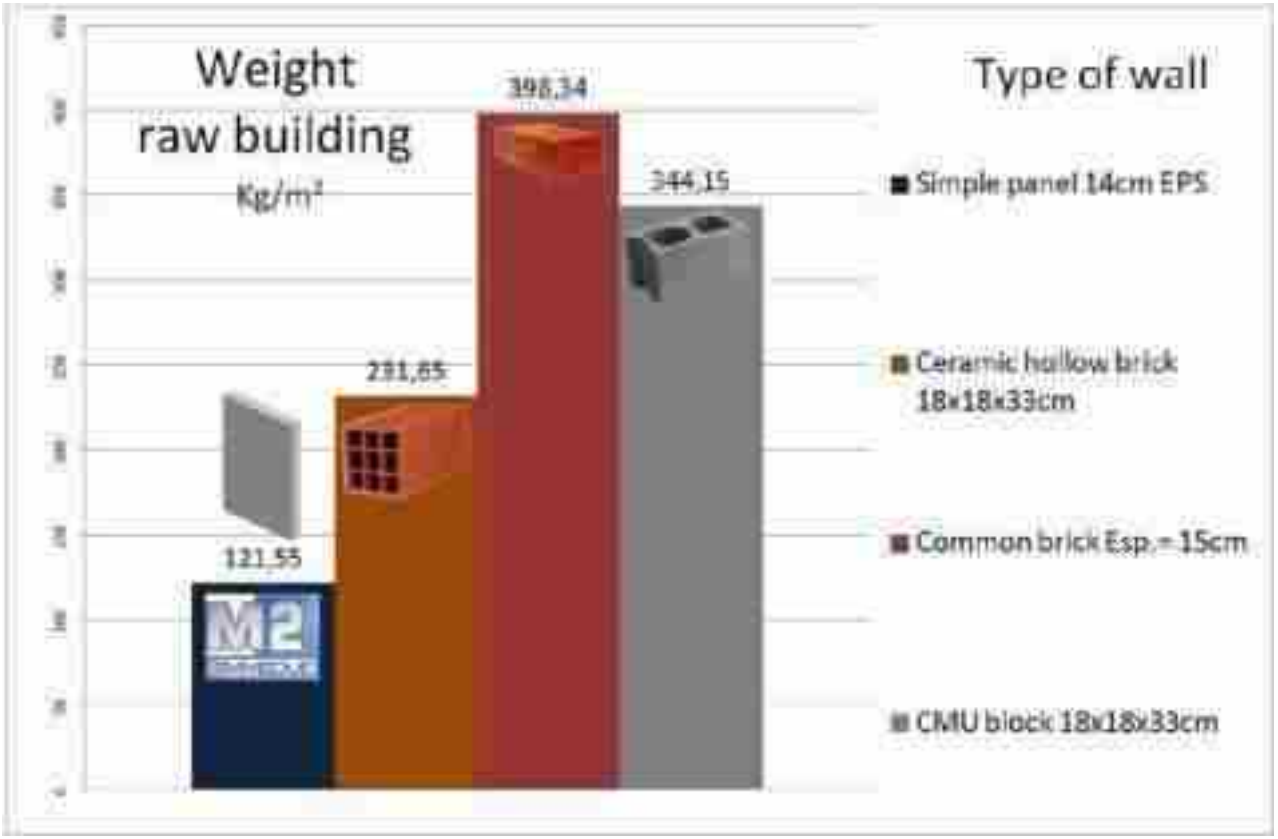
Weight Comparison



The weight of the structure on the foundation. The Emmedue building system is lighter than traditional, so the foundation can be calculated with less reinforcement and concrete. Therefore there will be benefits regarding the construction cost.

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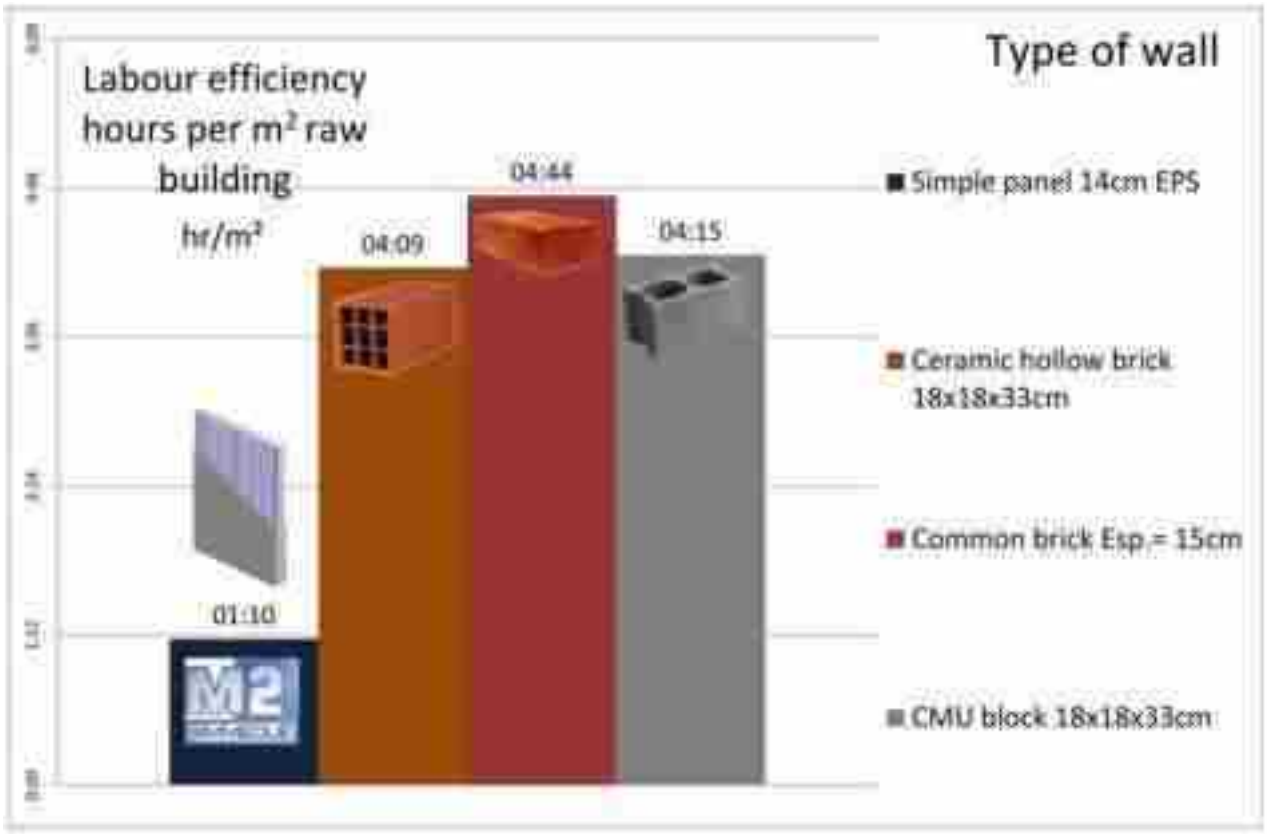
Speed Comparison



Speed of construction, Emmedue is an industrialized building system, in fact optimizes assembly processes, while minimizing labour force operation. For this reason the Emmedue construction times are less than the traditional system.

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EXAMPLES OF PROJECTS DEVELOPED BY OUR CUSTOMERS AROUND THE WORLD

M2 EMMEDUE Advanced Building System

M2 EMMEDUE Advanced Building System

KENYA

M2 EMMEDUE

Advanced Building System

ITALY

M2 EMMEDUE Advanced Building System

ITALY

M2 EMMEDUE Advanced Building System

ITALY

M2 EMMEDUE Advanced Building System

PANAMA

M2 EMMEDUE Advanced Building System

BOLIVIA

M2 EMMEDUE Advanced Building System

COLOMBIA

M2 EMMEDUE Advanced Building System

ECUADOR

M2 EMMEDUE Advanced Building System

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M2 EMMEDUE Advanced Building System

DOMINICAN REPUBLIC

ECUADOR

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