

# SMART CONSTRUCTION

## PLASTBAU® CATALOGUE



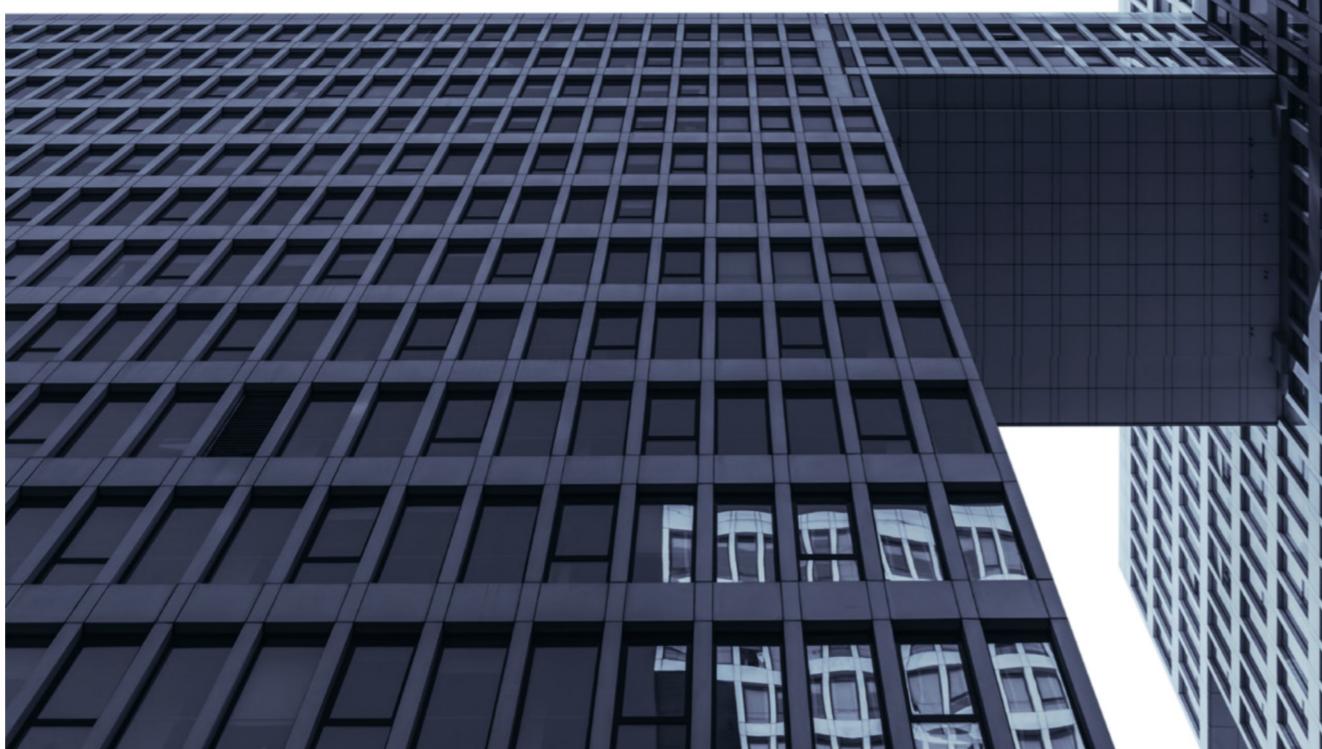
BOLVGROUP  
LIMITLESS

[www.bolvgroup.al](http://www.bolvgroup.al)

### SMART CONSTRUCTION

# The next construction generation

January 2024



## Construction Technology That Improves Scheduling, Budgeting, And Safety

It's time to start working smarter, not harder, by **embracing the future of construction management**. Transform your job site into a highly collaborative, sustainable, and safer environment where your data communicates.

### INTRODUCTION

#### WHAT IS SMART CONSTRUCTION TECHNOLOGY?

Smart construction is building design, construction, and operation that, through collaborative partnerships, makes full use of technologies and industrialized manufacturing techniques to improve productivity, minimize whole-life costs, improve sustainability, and maximize user benefits. This way of working can not only transform the housing industry but also maximize the benefits of a home for the occupants and provide them with a better quality of life.

#### WHY DO WE NEED SMART CONSTRUCTION?

We need to build more homes more quickly. The market demand is growing very fast and aspires for new technologies. Meeting this growing demand will stretch the housebuilding sector beyond its current capacity. This can be met by improving the productivity of the sector and making more efficient use of the people and resources available through the use of smart construction. Productivity in the construction industry poses a huge challenge. While productivity in manufacturing has steadily grown over the last two decades, it's remained the same in construction, with a gap compared to other product sectors.

#### AND IT'S NOT JUST PRODUCTIVITY WE NEED TO BE CONCERNED ABOUT.

The construction industry has a major impact on the environment, both in terms of the resources it consumes and the waste it produces. We also need to think about what is arguably the most important part of our challenge: how do we help people? How do we help them by making housing affordable and cost-effective to run? And how do we go further by helping them improve their lives, wellbeing, and future opportunities? The cost of running a home accounts for almost 30–40% of the household's income, with the average annual cost of household bills and mortgages for homes with three bedrooms. But it doesn't need to be this way.

There is a solution.

**Smart Construction Technology is it!**

### WHOLE LIFE PERFORMANCE

Advances in materials and building physics allow engineers to design high-performing homes that are comfortable to live in and low on energy use. Applied at scale, smart construction reduces running costs while improving the quality, performance, and durability of the home. This helps to reduce the overall whole-life cost of the building, which is a considerable benefit to both investors and occupants. By using advanced materials and techniques, we can improve the performance of a building. By improving the energy efficiency of a home, we can reduce running costs. By improving the durability of a home, we can reduce maintenance costs. By improving indoor air quality, visual, thermal, and acoustic comfort, along with boosting energy performance, we can enhance the overall wellbeing of the occupants.

### BENEFITS

#### RAISE QUALITY

Smart construction techniques involve building under controlled conditions, increasing precision, quality, and process control while minimizing waste. Pre-delivery inspections, factory-controlled installation conditions, traceability of components for maintenance or later modification, and properly planned interfaces reduce defects in the final building.

#### WHOLE LIFE BUILDING COST

This helps to reduce the overall whole-life cost of the building, which is a considerable benefit to both investors and occupants. Smart construction helps to reduce on-site costs and minimize waste while achieving 'right first time' delivery. By simplifying processes, reducing the risk of error, and streamlining the decision-making process, we also see productivity and efficiency benefits in the procurement and construction phases. Smart construction places greater emphasis on work carried out away from the site. This allows stakeholders and partners across the design, manufacturing, and construction stages to plan, organize, and work together to improve efficiency. We can generate greater predictability of performance and outcomes, significantly increase the speed of build on site, and provide greater certainty of project performance, costs, and completion deadlines.

#### DESIGN FOR WELLBEING

Smart construction helps us to design better homes that meet higher standards of indoor air quality, visual, acoustic, and thermal comfort, along with low energy use. We spend up to 90% of our time indoors, with as much as 65% of our time at home, so it needs to be a place where we feel comfortable, safe, and that benefits our health and wellbeing. Smart construction helps us make sure the design, specification, manufacturing, and construction of homes can achieve a higher level of control and comfort.

Homes that are high-quality and built with the occupant in mind are less likely to suffer from issues around underperformance. This not only enhances the quality of life and living conditions for the owner or tenant, but it also has wider social, economic, and environmental benefits. High-performing homes can help create happier, healthier communities with lower energy costs and a minimal impact on the environment.

### BOOST FLEXIBILITY

Using smart construction allows those involved with design and planning to fully explore ideas, concepts, processes, and materials while maintaining a degree of flexibility. From the early refinement of the design parameters to the materials used and the final construction details, digital technologies can make the whole design, planning, and implementation process more accurate and efficient. Smart construction isn't limited to a certain style of property or trend. Although one of the benefits of using smart construction is the ability to repeat and repurpose designs, that doesn't mean all homes have to look the same. A variety of finishes and configurations are usually available, and with specialist suppliers offering solutions to different parts of the market, all types of residential buildings can take advantage of smart construction, whether high-rise, mid-rise, or low-rise homes for private sale, rental, or social markets.

### ENVIRONMENTAL PERFORMANCE

Smart construction integrates the design and fabrication processes more than traditional construction methods, meaning minimal recycling and the elimination of waste. On top of this, techniques such as modular construction mean structures can be disassembled, reassembled, and reconfigured, opening up more opportunities for homes and buildings to be used again in a different location and/or for a different purpose. By addressing the use of materials in construction as well as the transport used for the project, the industry is already achieving a significant reduction in operational and embodied carbon.

### HEALTH AND SAFETY

In the design phase, smart construction technology allows organizations to review the design and make sure operations in the factory and on site are planned and optimized in a way to guarantee the best health, welfare, and safety outcomes. We can minimize, if not completely remove, any risks or negative impact on operations at all stages and from all perspectives. For example, during the construction phase, smart construction methods reduce the overall impact of noise and dust pollution, as well as the number of operatives on site and vehicle movements, which limits the impact on local neighbors as well as the risk of accidents.

### DESCRIPTIONS

Smart construction USE THE LAST GENERATION PRODUCTS OF PLASTBAU SYSTEMS.

#### Smart Construction Systems for Floors & and Roofs, Slabs, Walls and Partition Walls

The aim of SCT® is to offer the market an innovative and top-quality product for the construction industry. The focus of the SCT® system is to build with high-quality standards but with lower costs, a shorter time, and more ease compared to other construction systems. It consists of:

1. A technology for the industrial production of thermally and acoustically insulating, reinforced, stay-in-place formwork for the construction industry using "Flame Retardant" grade Expanded Polystyrene (EPS).
2. By means of the above-described insulating formworks, a constructive system that represents the

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most powerful, complete, and versatile method available for constructing reinforced concrete monolithic buildings with incorporated thermal and acoustic insulation in any size and form, from cottages to villas, from townhouses to large apartment buildings, from hotels to shopping malls and factories, and also for the renovation and consolidation of old buildings, can be easily integrated with other construction systems.

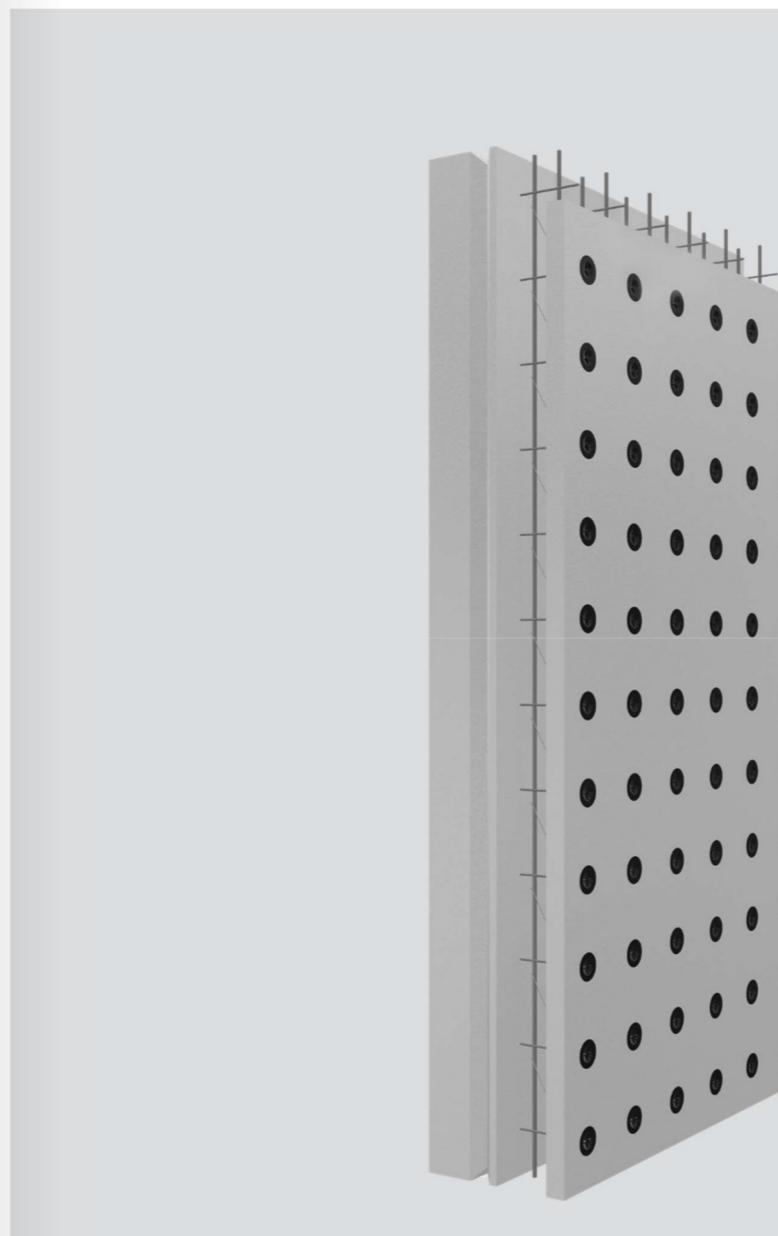
3. Increased living comfort due to improved sound and thermal insulation characteristics. Greater energy savings, both in heating and cooling. Increased structural safety resistant to earthquakes: monolithic reinforced concrete construction. Greater use of interior spaces with the same external dimensions of the project (on average, 5%-6% more). Lower cost of the building with the same performance and thermal insulation. The Smart Construction® System is made up of the combination of the two ICF (Insulated Concrete Form) formwork panels for the wall and floor slab with the partition wall plateau® unit; it offers the ideal solution for the safe industrialization of the building site. The ICF® (Insulated Concrete Form) integrated construction system with Wall Plastbau® 5 and Floors Slab Plastbau® Metal, thanks to its lightness, safety, flexibility of use, workability, and ease of installation, allows the construction of buildings, even in seismic areas, with the use of few construction site equipment. Smart Construction ICF is ideal for industrializing the site and meeting the needs of the designer. Wall Plastbau® 5 consists of ICF (Insulated Concrete Form) formwork panels, standard 120 cm wide; high-density EPS self-supporting slabs joined and spaced by metal frames that also contribute to the reinforcement of the cement to be cast on site inside them. An important aspect of this technology is its flexibility and adaptability to the needs of the designer. Smart Construction's integrated ICF solution provides for faster construction times on site, reduced labor costs, and the use of less equipment. Living comfort and high quality are achieved with significantly reduced costs in the design, construction, and management of the building.

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Green Building » **build with zero energy**

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Fast » **time reduced by up to 40%**

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Affordable » **costs reduced by up to 30%**

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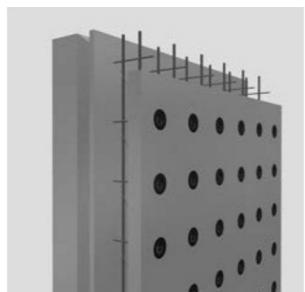
Easy » **intuitive, fast and adjustable  
to all market solutions**

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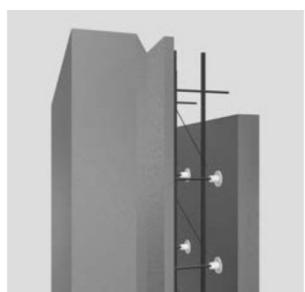
The PLASTBAU® 5 Wall (PB5) wall is manufactured from our HPB5 line. It consists of two EPS panels spaced apart by integrated crosspieces. It is our most advanced technological solution for **insulating formwork, without thermal bridges**, for external and internal load-bearing walls. It allows for fast, safe, and **passive anti-seismic construction as well as energy-saving buildings**. The internal reinforcement is composed of vertical reinforcing bars with a variable diameter ranging from 8 to 12 mm. The width of the formwork is standard, 120 cm, while the height of the internal and external slabs can vary according to the project requirements.

**The weight of the formworks is such that they can be easily moved, just by hand:** a formwork H 300 x 120 cm weighs 39 kg, so two people are more than enough to transfer it without the space dedicated to any lifting machinery. The formworks are laid in such a way that it's possible to create a solid structure ready to receive the concrete.



## EPS formwork properties

Standard width formwork	cm	120
External panel height	cm	40 ÷ 460
Internal panel height	cm	40 ÷ 460
External panel thickness	cm	8 ÷ 30
Internal panel thickness	cm	5
Thickness of concrete	cm	12 ÷ 30



## Ladders reinforcement properties

Vertical iron armature diameter	mm	8 ÷ 12
Horizontal crossbar diameter	mm	5.2
Diagonal iron bar diameter	mm	3.0

## Table of iron weight formwork PLASTBAU® 5

Ø Fe* (mm)	Thickness of concrete			
	15cm	20cm	25cm	30cm
Ø 8	4,53 kg	4,72 kg	4,91 kg	5,10 kg
Ø 10	6,75 kg	6,94 kg	7,13 kg	7,32 kg
Ø 12	8,97 kg	9,16 kg	9,33 kg	9,51 kg

\*Ø Fe - Vertical iron diam.

The two EPS panels are connected to each other and fixed by metal ladders with vertical irons of varying diameters. The metal reinforcement weight ranges from 4.5 to 9.5 kg. The weight of a Plastbau® 5 panel can vary from 8 to 18.5 kg/m<sup>2</sup>.

## Thermal transmittance properties U [W/m<sup>2</sup>K] and heat resistance R [m<sup>2</sup>K/W]

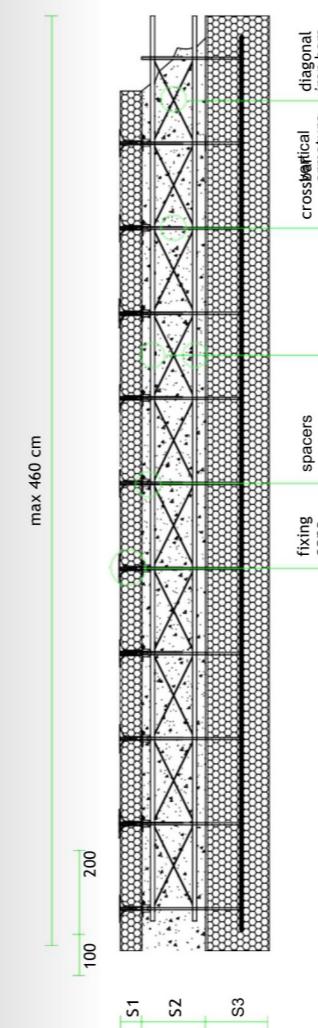
S1 (cm)	S3 (cm)	Ø Fe*(mm)	Thickness of concrete							
			S2 (15cm)		S2 (20cm)		S2 (25cm)		S2 (30cm)	
U	R	U	R	U	R	U	R	U	R	
0.207	4.839	0.206	4.854	0.205	4.878	0.203	4.926			
0.175	5.714	0.174	5.714	0.173	5.780	0.172	5.813			
0.149	6.711	0.149	6.711	0.148	6.756	0.148	6.756			
0.120	8.333	0.120	8.333	0.120	8.333	0.119	8.403			
0.101	9.99	0.101	9.9	0.1	10	0.1	10			
0.087	11.494	0.087	11.494	0.086	11.627	0.086	11.627			

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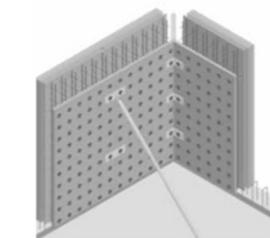
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## PLASTBAU® 5 installation instructions

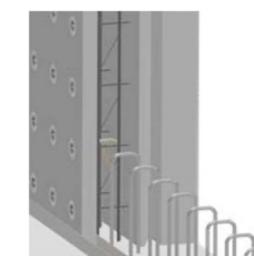
The PLASTBAU® 5-wall formwork is quick and intuitive to install. It allows you to position the perimeter of walls quickly and effortlessly. The PB5 formwork can be positioned by hand and connected to the reinforcing rods. Each panel is linked to the next using special PLASTBAU® plates or with other materials such as wire, wood, or sheet metal. The most complex points, such as doors and windows, can be handled easily thanks to customized elements.



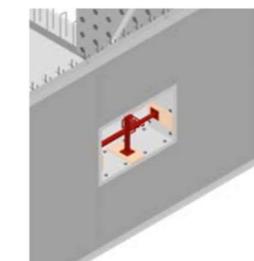
1 - The Plastbau® 5 formwork is positioned manually, starting at the corner, making sure that the internal EPS panel fits into the guides.



3 - Place the next formwork near the previous one, binding them with polyurethane glue and fixing steel ladders on each panel with metal wire or PVC clamps. On the external sides of the panels, use the special metal wall plates.



2 - It is then fixed to the reinforcement rods with wire or PVC ties. This gives stability to the formwork during installation in case of bad weather.



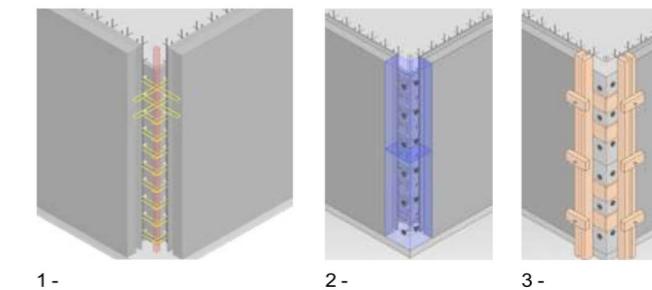
4 - Window compartments are fixed with simple wood planks and props. EPS panels are used to delete thermal bridges. Such a structure is sufficient to resist the concrete casting.

## Corner formation

1 - For the corners, use the steel vertical bars and set the horizontal steel bars as prescribed by the structural requirements.

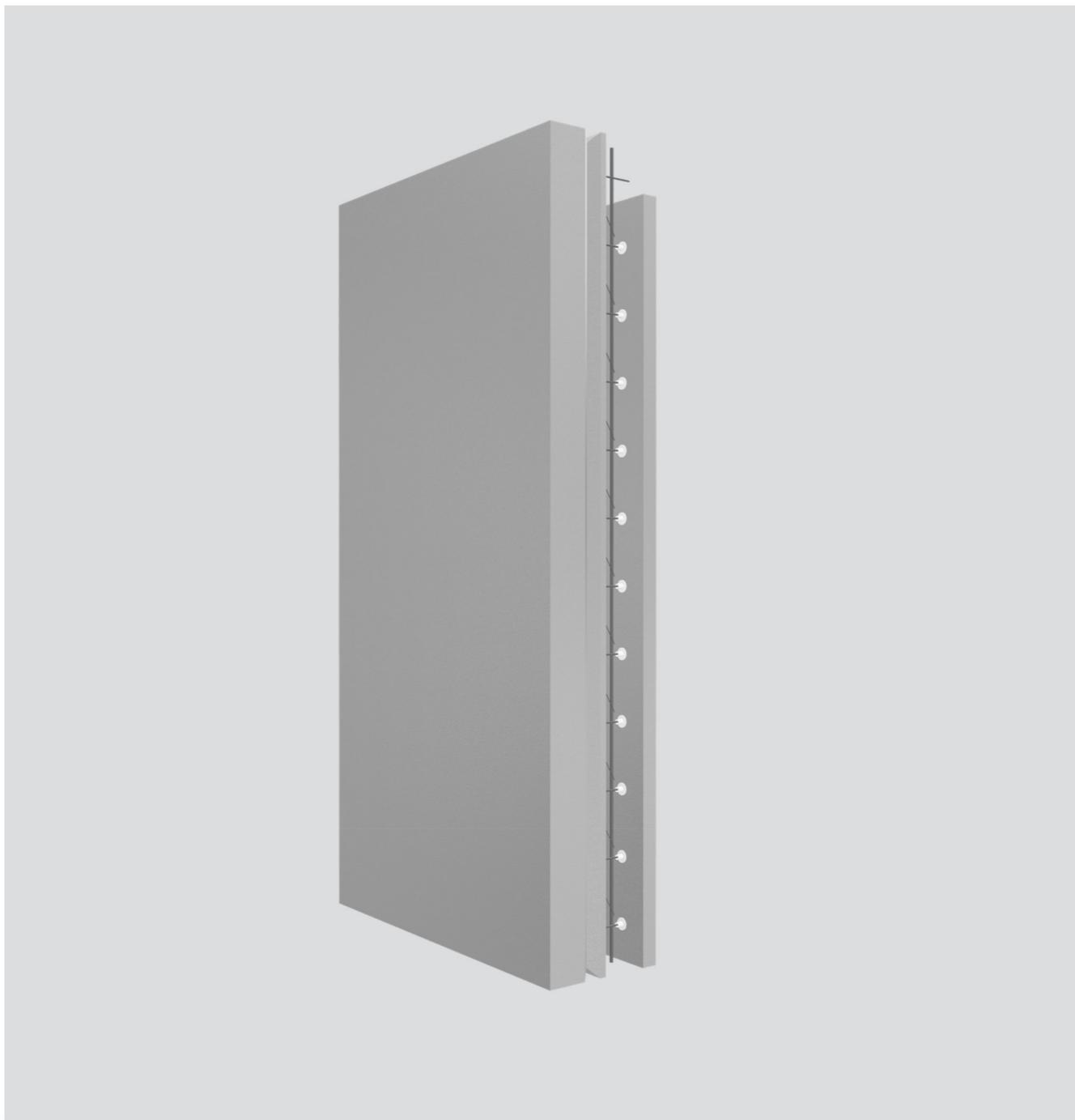
The PLASTBAU® 5 formwork offers a quick and easy way to reinforce and close corners. You can start the reinforcement with an open corner, then close it with EPS panels and formwork to resist pouring concrete. Other solutions are possible, depending on the project requirements.

- Position the special PLASTBAU® corner elements, fixing them with the polyurethane glue.
- Use the specific PLASTBAU® plastic screws in order to fix the corner element to the adjacent panels.



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**Self-Supported »** with supports every 2 - 2.5 m

**Lightweight »** Easily carried by hand

**Ventilated »** simplifies ventilated constructions

**Isolated »** insulation incorporated into the floor structure

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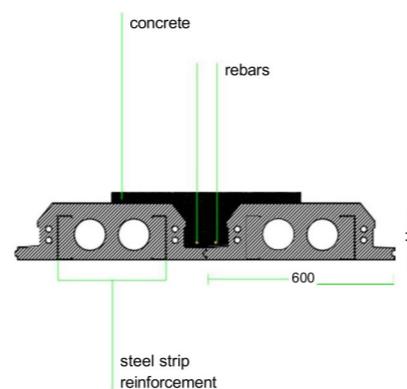
**PLASTBAU®**

The **PLASTBAU® METAL FLOOR** is a self-supporting, high-quality EPS shuttering panel for realizing unidirectional beam floors. It's less than half the weight of a comparable hollow core precast floor system, yet it will provide the same load capacity, thus reducing the load on the walls and foundation. Using PLASTBAU® Metal for basement and first-level floors results in better living conditions and energy savings. When used in roof construction, a ventilated roof is achieved by connecting the longitudinal cavities. One of the most important and unique features is the continuity of insulation that is assured by the tongue and groove connection between the panels. The insulation is incorporated into the concrete structure and, therefore, obtained automatically. The insulation R-value can vary according to the job requirements in a range from R-10 to R-25.

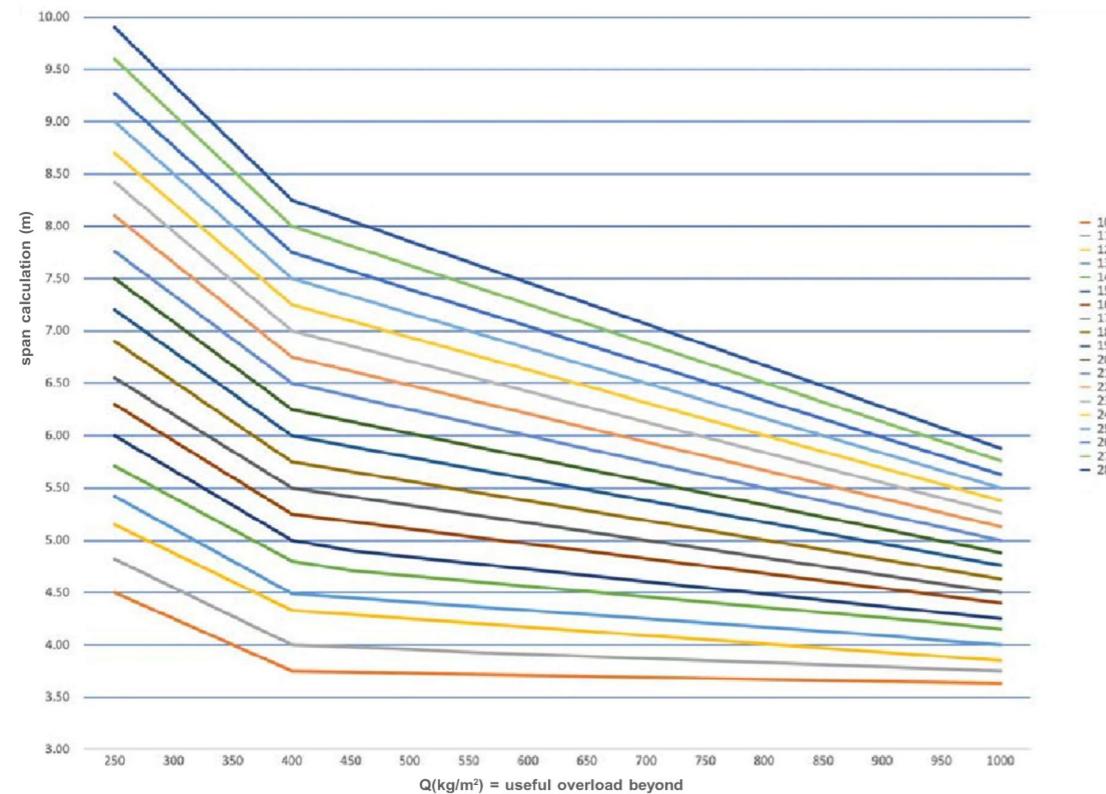
The PLASTBAU® metal manufacturing system can provide tailor-made products to solve your floor and roofing needs. The new, highly sophisticated, and fully automated production line can produce PLASTBAU® metal elements that are tapered and can include such features as openings for skylights, etc.

## Technical properties

<b>Dimensions</b>	
<b>Width</b>	600 mm (batten excluded)
<b>Wing Thickness</b>	variable from 30 to 80 mm
<b>Total Width</b>	variable from 180 to 580 mm
<b>Length</b>	variable from 300 to 13600 mm
<b>Degrees of cutting inclination</b>	variable from 0° to 53° (0°) Straight cut perpendicular to the panel – (53°) = maximum possible inclination



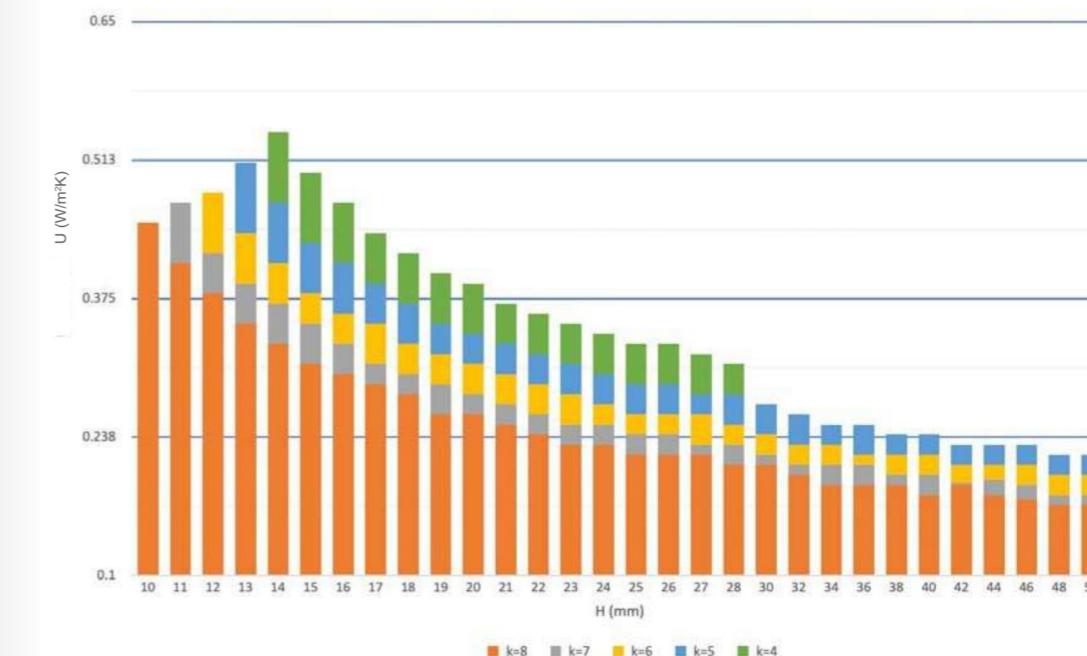
## Diagram for the best beam height choice - H



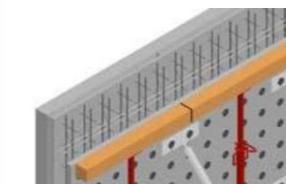
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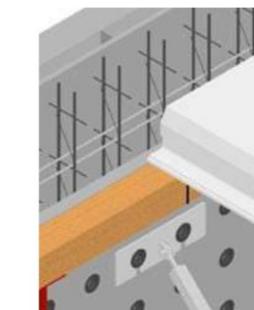
## Choosing the thickness - k



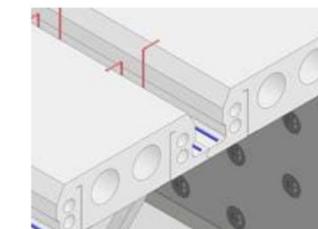
## PLASTBAU® METAL FLOOR - Installation instructions



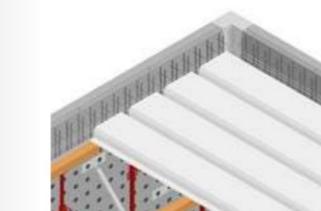
1- Positioning of the props and related wooden strips, which are fixed, attached with appropriate clamps, to the corresponding wall element in order to plumb the floor.



1.1 - The floor element Plastbau® metal is laid only in conjunction with the wooden strip (center distance 120 cm).



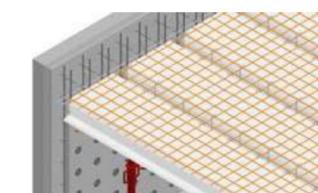
2 - Preparation of the reinforcement rods and iron cages placed all around the perimeter.



1 - Installation of Plastbau® metal elements. The metal floor can be laid in two ways:



1.2 - The floor element Plastbau® Metal is laid both on the wooden strip and on the internal EPS side (center distance between props 180 cm).



3 - Laying of wire mesh for concrete casting.

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**SIP**



**Green Building »** build with zero energy

**Fast »** time reduced by up to 40%

**Affordable »** reduced costs by up to 30%

**Flexible »** versatil system for every kind  
of construction

# SMART CONSTRUCTION

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The **PLASTBAU® SIP**, made of “Flame Retardant Type” Expanded Polystyrene (EPS) with embedded C-shaped zinc-coated steel reinforcing profiles, takes advantage of the structural integration of two materials: EPS and steel. This alliance allows for the use of very light insulated panels as structural building elements, able to support heavy loads in the building yards. Air barriers or vapor barriers are not required in **PLASTBAU® SIP** buildings because properly sealed SIPs create a code-compliant air barrier with a permeability rating of less than 1.0 perm.

A **PLASTBAU® SIP** building envelope provides high levels of insulation and is extremely airtight, meaning the amount of energy used to heat and cool a home can be cut by up to 50 percent.

## Technical properties

Dimension	Min (mm)	
Width	600	
Lengh	600	
Thickness	60	
Max (mm)		
Width	1200	
Lengh	any, according to the project	
Thickness	200	

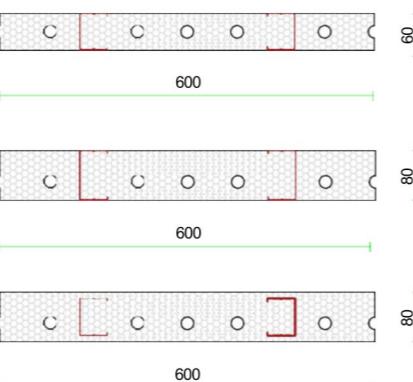
The **PLASTBAU® Structural Insulating Panel** is our most versatile product. Its adaptability to every kind of construction extends its field of application to reinforced concrete- and dry-buildings. The main applications are:

- Structural walls
- External Curtain Walls
- Internal Partition Walls
- False Ceilings
- 2D/3D structures
- Roofs
- Prefabricated buildings

## Thermal transmittance properties U [W/m<sup>2</sup>\*K]

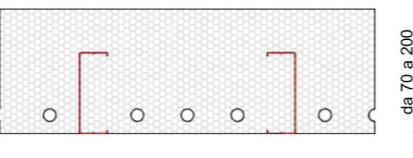
### “C” Profile Not at Sight

Thickness (mm)	“C” Profile (mm)	U [W/(m <sup>2</sup> *K)]	Weight (kg/m <sup>2</sup> )
30	60	0.38	4.83
100	80	0.31	5.70
120	100	0.26	6.58
140	120	0.22	7.46
160	120	0.19	7.96
180	120	0.17	8.46
200	120	0.15	8.96



### “C” Profile at Sight

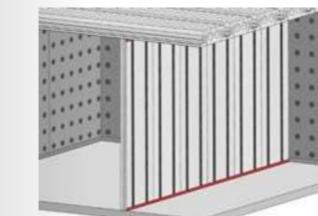
Thickness (mm)	“C” Profile (mm)	U [W/(m <sup>2</sup> *K)]	Weight (kg/m <sup>2</sup> )
60	60	0.42	4.33
80	80	0.39	5.20
100	100	0.32	6.08
120	120	0.27	6.96
140	140	0.23	7.46
160	160	0.2	7.96
180	180	0.18	8.46
200	200	0.16	8.96



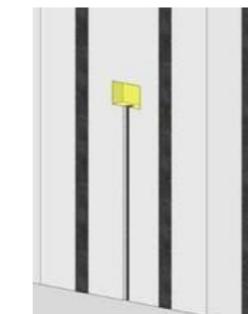
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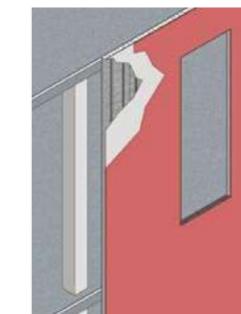
## PLASTBAU® SIP - Internal partition walls and external curtains/structural walls



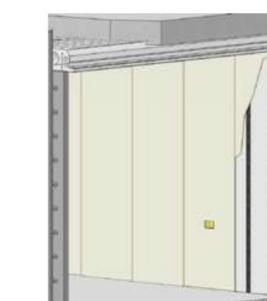
- 1 - Fix the L-shaped profile to the ceiling and the floor by means of screws, where the SIP panel element will be positioned.



- 3- Use the EPS cutter to make grooves to house the electrical and hydraulic pipe systems.



- 4.1- In the case of the external curtain wall, finish the SIP panel with fiberglass mesh and smoothing.

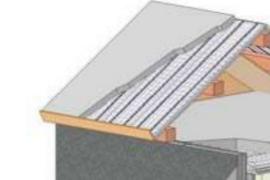


- 4.2- If used as an internal partition wall, finish with plasterboard sheets screwed directly to the C-shaped zinc-coated steel reinforcing profiles.

## PLASTBAU® SIP - Roof



- 1 - Identify the installation starting point according to the project and start positioning the SIP panels on the supporting beams. Screw the SIP panels' C-shaped reinforcing profiles to the beams.



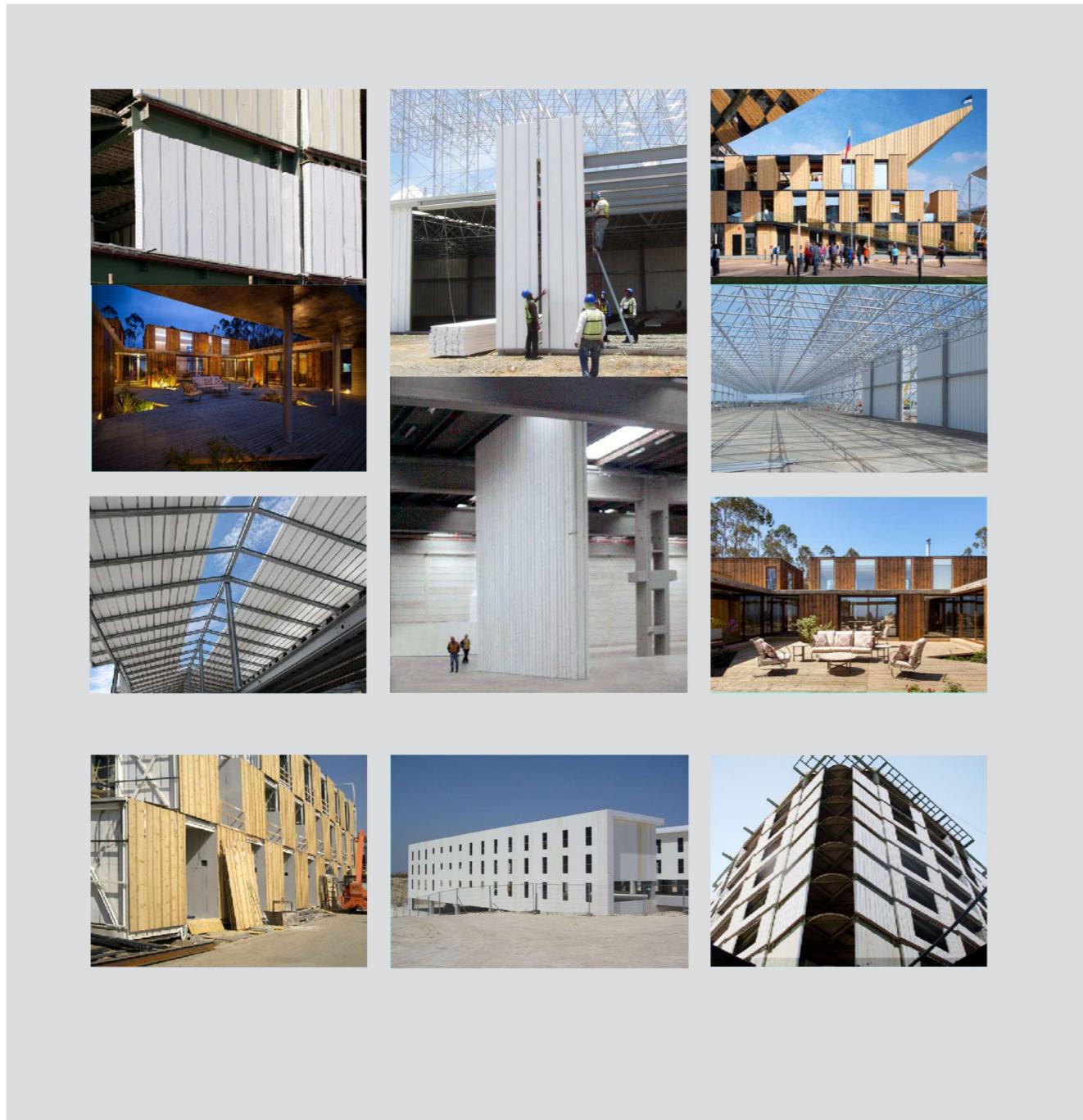
- 2.1 - Laying of wire mesh on the SIP panel, followed by the concrete casting.



- 2.2 - Laying of shaped roof metal sheets on the SIP panel fixing them by screw with sealing ring protection.

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## Key Points of Smart Construction Technology



### Green Building

The PLASTBAU® 5 System takes advantage of the EPS insulating coefficient, allowing you to build zero-energy buildings that can perfectly adapt to all climates.



### Affordable

Elimination of overuse of steel and concrete. Elimination of beam and pillar wood formworks. By saving on construction time, tools, and product costs, you can decrease construction costs by up to 30%.



### Fast

Due to the strong reduction in propping, the self-supporting capability, and the lightness of the elements-it's simple laying of formwork panels and concrete casting-the PLASTBAU® 5 Wall system allows you to reduce construction time by up to 40%.



### Anti-Seismic

Anti-seismic, anti-cyclonic, and fire-resistant up to 180 are just some of the structural properties of the PLASTBAU® System. The built-in reinforced iron bars in the PLASTBAU® 5 Wall can guarantee maximum seismic resistance, with certification to the Level 1 seismic zone.



### Eco-friendly

Excellent high thermal insulation, with great U-values, allows for a 50% reduction in energetic consumption, saving money and ensuring eco-sustainability. Both with extreme heat and cold, the PLASTBAU® 5 Wall guarantees maximum insulation, allowing a total savings on energy costs.



### Smart Building

The finishing of both internal and external facades is easy and can be done with any commonly available material or finisher on the market. Easy to integrate with plumbing and electrical works.