PROFHOLOD

ENERGY SAFE TECHNOLOGIES

PIR PLITA® BOARDS

INSULATION BOARDS MADE FROM FIRE RESISTANT POLYISOCYANURATE PIR PREMIER

Technical Catalog

CONTENTS

1. GENERAL PROVISIONS

This document will provide you with contains information about the design of walls, panelling, flooring and partitions using polyisocyanurate foam insulated boards with various types of cladding.
PIR Plita® polyisocyanurate foam insulated boards can be used:

a) in the following natural and climatic conditions:
   - in regions with an estimated winter outdoor temperature below minus 40 °C;
   - in regions of varying humidity - dry, normal and humid
   - in a non-agressive or slightly agressive outdoor environment
   - indoors with relative humidity of up to 85%.

b) for buildings and structures up to 75 m high. The permissible height of a building or structure should be determined when designing a specific structure, taking into account the climate, the details of the construction site, purpose, space-planning and design solutions.

2. PURPOSE OF THERMAL INSULATION

To reduce energy consumption you can use heat-insulating materials to improve the heat-shielding qualities of enclosing structures.

Thermal insulation material performs several tasks:

- limiting heat losses in winter and incoming in summer, leveling temperature fluctuations;
- reduction of deformations, stresses and cracking caused by temperature effects;
- saving energy for heating;
- achieving a comfortable indoor climate.

The required thickness of the insulating layer is determined in heat engineering calculation.

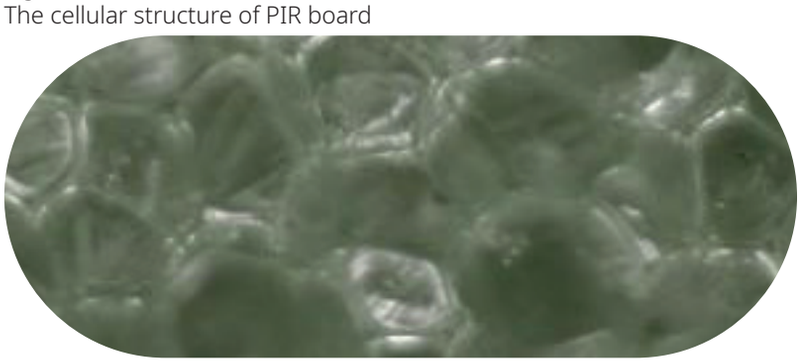
3. DESCRIPTION

Multi-purpose energy-efficient insulation material PIR Plita® board is the trade name of PIR insulation material made from polyisocyanurate foam and manufactured at the ProfHolod plant in Russia, 40 km from Moscow.

PIR Plita® is manufactured with the highest quality materials on a continuous automated production line (PuMa, imported from Italy) with a capacity of 2,500,000 square meters of product per year. The automated line completely eliminates human error in production, which ensures the high quality of our products.

PIR Plita® is a lightweight and durable heat-insulating board which consists of expanded polyisocyanurate foam with a cellular structure and soft covering. Polyisocyanurate foam is a type of polyurethane foam. Only 3% of its volume is made up of solid material, which forms a framework of veins and walls. The remaining 97% of the volume is occupied by closed cavities and pores filled with gases. The main difference between polyisocyanurate foam and simple polyurethane foam is the ratio of the main components - polyol and isocyanate.

Figure 1.
The cellular structure of PIR board



Polyisocyanurate PIR foam is very popular due to its high resistance to fire. Its defining feature in this regard is its ability to charr during combustion or when it is exposed to flame, due its “porous” carbon matrix. This matrix protects the inner layers and prevents them from burning. In addition, due to the structure of the matrix, significantly less heat is generated than with other foams which burn completely. The operating temperature of PIR Plita® is up to 120 °C.

The thermal conductivity value of PIR Plita® is 0.020 W/m·K or lower. The thermal conductivity of polyisocyanurate foam (PIR) is determined by the thermal conductivity of the foaming gases with which the cells are filled, the thermal

conductivity of the solid walls and their convection currents. With relatively small cell sizes, convective heat transfer is negligible, while the contribution of the solid components is about 20%. The main contribution to the thermal conductivity of polyisocyanurate foam belongs to the gaseous components. As a result of the foaming process, in addition to the foaming agent, a certain amount of carbon dioxide also enters the cells, however, the CO2 dissipates through the cell walls relatively quickly compared with the other gases, and after some time, the cells contain just a foaming agent with a very low thermal conductivity.

Due to its porous structure, PIR Plita® has high moisture resistant qualities. Closed cells also eliminate the formation of condensation inside the insulation. Thus, you can use PIR Plita® in all weather conditions.

PIR Plita® is a fairly lightweight heat-insulating material that is easy to install. Its density is 30-35 kg/m^3.

PIR Plita® is used as a heat-insulating layer in various types of buildings: warehouses, manufacturing plants, shopping centers, agro-industrial complexes, railway stations, administrative buildings, residential and communal services buildings, business centers and sports complexes etc. PIR Plita® is used in both new construction projects and renovations.

4. TYPES OF PIR PLITA®

ProfHolod produces PIR Plita® boards of different types according to the type of edge:

1. with flat ends around the perimeter;
2. with “L-shaped” joints for slabs 50-100 mm thick: in order to avoid “cold bridges”.

Figure 2.
PIR board with flat ends

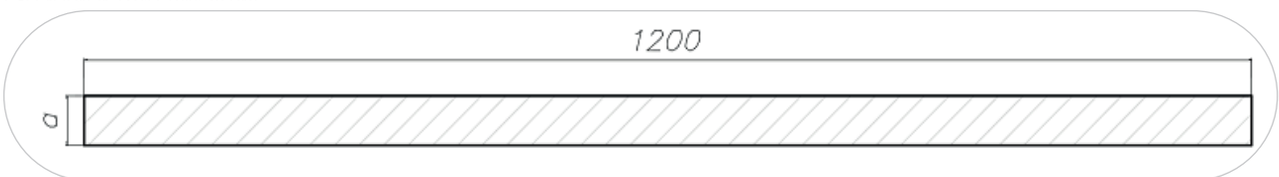
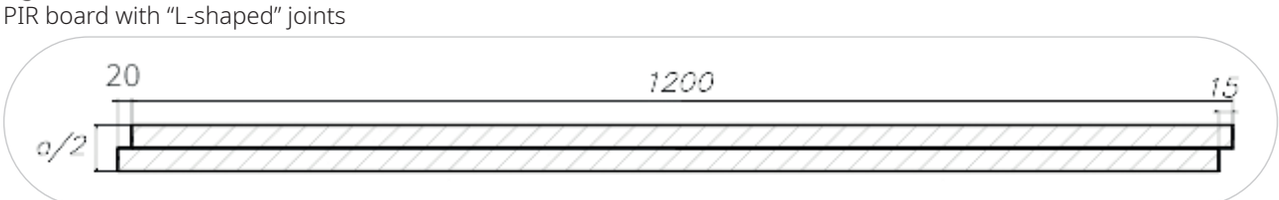


Figure 3.
PIR board with “L-shaped” joints

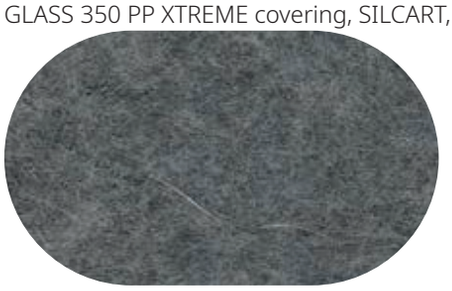


PIR Plita® is available with different coverings (outer layers).

Material	Thickness, μm	Density, g/m^2
Paper	—	120-140
Foil	50	260
Polyethylene film	50	—
Foil paper:		
• paper	—	120-140
• foil	9	—

ProfHolod will produce PIR Plita® with basic or special coverings:

GLASS 350 PP XTREME covering, SILCART, Italy



Bitumen coated fiberglass base with polypropylene. Mainly used on the construction of pitched roofs and flat roofs.
Density 330–370 g/m^2, thickness 0.72 mm (± 15%)

STONEGLASS B EVO covering, SILCART, Italy

Fiberglass base with additional graphite and flame retardant coating.
For use on the external cladding of walls and facades.
Density 630–700 g/m^2, thickness 1.10 mm (± 15%)

CARBOGLASS LIGHT covering, SILCART, Italy

Fibreglass base reinforced with fiberglass mesh and mineral coating.
For use on the external insulation of walls and facades using plaster.
Density 450–500 g/m^2, thickness 0.7 mm (±15%)

STONEGLASS 300 covering, SILCART, Italy

Mineral coated fiberglass base. A universal product used for wall and floor insulation. Density 280–340 g / m^2, thickness 0.5 mm (±15%).

LAMINGLASS CLASSIC B2 covering, SILCART, Italy

Fiberglass base with breathable waterproofing membrane.
For use on roofing of a wooden truss system.
Density 190 (± 5%) g/m^2, thickness 0.9 mm (±15%).

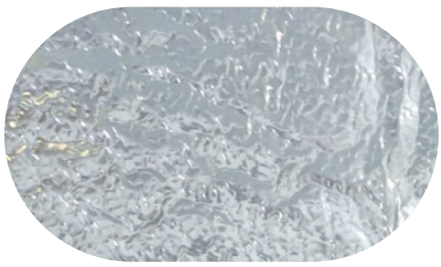
CART 90, Italy

Bitumen paper for hot melt roofing with high adhesion with bitumen.
Density 85 (±6%) g/m^2

Film

Perfect for use in places with high humidity – for roofs, basements, bathrooms.

Foil



Ideal for use in saunas and other places with high temperature, under heaters and heating devices.

Production size of the boards:

Size	Thickness											
	25	30	40	50	60	70	80	90	100	120	140	150
600x1200	✓	✓	✓	✓	✓	✓	✓	✓	✓	—	—	—
1200x3000	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

5. PHYSICAL CHARACTERISTICS OF PIR PLITA®

Dow Research Center conducted physical and mechanical testing of ProfHolod's PIR Plita® in Russia.
The thickness of the test sample — 50 mm.
Cover material – paper.
The tests were carried out on samples taken from 3 zones of the PIR board:
1 — left edge, 2 — central part, 3 — right edge.

Table 2.
PIR Plita® testing results

Measurement		Sample zone			Regulatory documentation (code of practice)
		1	2	3	
Total density, kg/m^3		32.9	32.8	32.8	Russian State Standard GOST 409-77
Apparent density in the product core, kg/m^3		30.4	30.5	32.8	GOST 409-77
Compression stress at 10% deformation, kPa	Heigthways	134.3	122.83	151.67	GOST 23206-78
	Lengthways	146.85	136.12	155.53	
	Widthways	146.38	196.12	110.78	
Water Absorption, 24 hours, %		2.00			GOST 20869-75

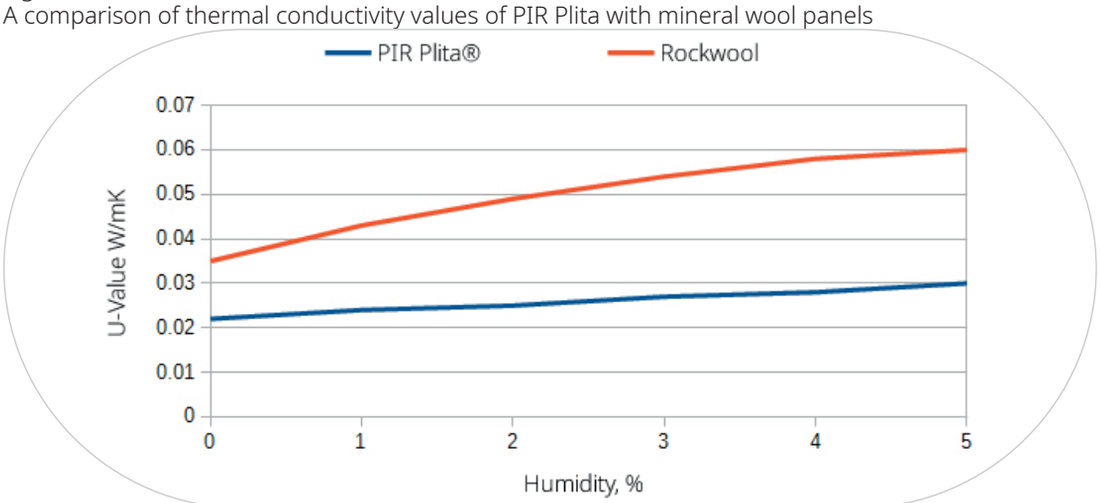
Stability of linear dimensions at T = + 80 °C, 24 hours,%	Δ L	< 1	GOST 20989-75
	Δ B	< 1	
	Δ H	< 1	
Change in mass, T=+80 ^{0}C, 24 hours, %		-2.07	GOST 20989-75
Thermal conductivity coefficient at T = 10/35 0C, W/m*K		0.022	GOST 7076-99

In the Russian Certification and Research Center, thermal insulation tests were carried out to measure the thermophysical characteristics of PIR Plita®. For comparison, mineral wool panels were also tested.

Table 3.
Thermal conductivity of PIR Plita®

Thermal conductivity coefficient, W/m.K	PIR Plita®	Mineral wool board
λ_0 , W/m k	0.022	0.035
λ_A , W/m k	0.026	0.052
λ_B , W/m k	0.031	0.060

Figure 4.
A comparison of thermal conductivity values of PIR Plita with mineral wool panels



6. DURABILITY OF PIR PLITA®

The estimated service life of polyisocyanurate foam boards is from 30 to 80 years, depending on the place of application and operating conditions.

The durability of a product is the ability of the product to maintain its properties for a given time under certain operating conditions.

The durability of thermal insulation materials can significantly affect the cost of operating a building, due to the fact that a significant part of the cost is spent on heating and air conditioning. If over time the thermal insulation layer loses its operational characteristics, and heat loss through the outer layers increases, this will lead to an increase in the overall cost of energy consumed. Repair or partial replacement of the thermal insulation layer before the end of its useful life will also lead to additional costs, since access to the insulation layer is often difficult or impossible.

The durability of PIR Plita® will be ensured and prolonged by maintaining the following factors:

- thermal conductivity
- compression strength
- water absorption
- size stability

PU EUROPE tested polyurethane boards which were part of the thermal insulation layer in two different roof structures in buildings with a service life of 28 and 33 years. The test results showed that the withdrawn samples

did not have significant damage and the values of the originally declared characteristics did not differ significantly from those measured after operation. The insulating boards tested were fully functional and still achieved all of their stated performance metrics.

7. ENERGY EFFICIENCY

Energy efficiency is a characteristic which compares the ratio of the beneficial effect of energy resources with the cost of energy resources.

One of the ways to reduce energy consumption in buildings and structures is to reduce heat loss through external layers, which is ensured through the use of effective thermal insulation materials.

From the point of view of thermophysical properties, the efficiency of heat-insulating materials can be indicated using thermal resistance to heat transfer R, ($m^{2\cdot 0}C$)/W:

$$R = \frac{\delta}{\lambda} \quad (1)$$

where: δ is the thickness, m;
λ is the thermal conductivity coefficient, W/($m\cdot{}^{0}C$);

In turn, the flow of heat during heat transfer, through the enclosing structure, is determined by the formula:

$$\frac{A \cdot \Delta T}{R} = \frac{(\lambda \cdot A \cdot \Delta T)}{\delta} = Q \quad (2)$$

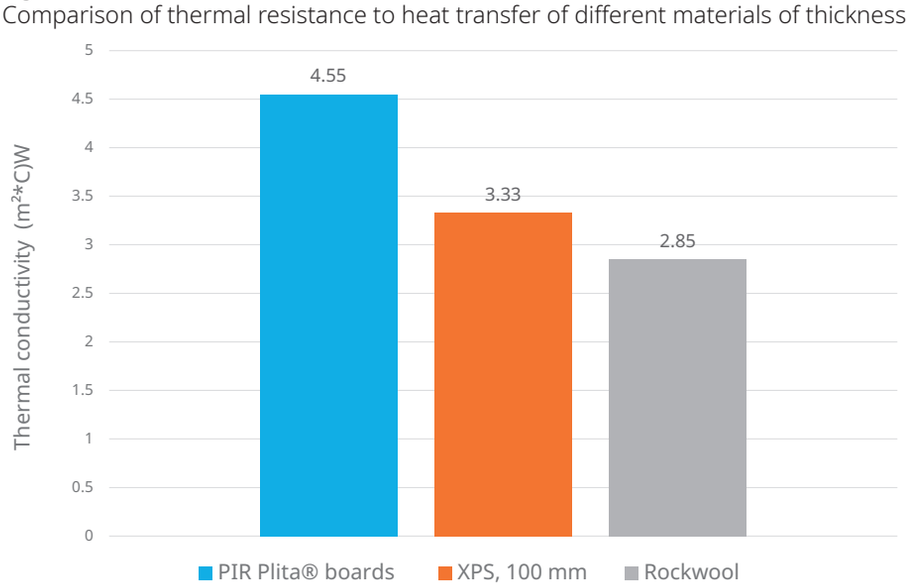
where: A is the area of the enclosing structure, m^2,
ΔT is the temperature difference of the two sides of the structure, ^0C;

Thus, from the above formula, it is clearly seen that heat loss through enclosing structures is proportional to the thermal resistance to heat transfer.

The thermal conductivity coefficient of PIR Plita® in a dry state is up to 0.020 W/m*K.
The value of thermal resistance to heat transfer allows you to visually compare the thermal insulation properties of various materials.

Insulation material	Thermal conductivity coefficient, λ W/($m\cdot{}^{0}C$)	Thickness δ, m	Thermal resistance to heat transfer R, ($m^2 \cdot °C$)/W
PIR Plita®	0.022	100	4.545
Extruded polystyrene, EPS or XPS	0.03	100	3.333
Mineral wool	0.035	100	2.85

Figure 5.
Comparison of thermal resistance to heat transfer of different materials of thickness 100 mm



8. FIRE SAFETY

When exposed to flame, PIR Plita® forms a carbon crust on the surface, which prevents further penetration of fire. Although the insulation boards are classified as a combustible material, the PIR boards do not smolder, melt or drip.

Table 4.
Fire hazard groups of PIR Plita®

Name of the national standard or code of practice	Verifiable requirements of the nationals standard or code of practice
Building materials. Flammability test methods.	Flammability group — G2
Building materials. Ignition test method.	Ignition group — B2
Occupational safety standards. Risk of fire and explosion of substances and materials. Nomenclature of indicators and methods for their determination.	Smoke production group — D3
Occupational safety standards. Fire and explosion hazard of substances and materials. Nomenclature of indicators and methods for their determination.	Combustion toxicity group — T2

Flammability groups are a classification of the ability of substances and materials to burn. Combustion is an exothermic reaction that occurs under conditions of its own progressive self-acceleration. The testing method for determining flammability is to create temperature conditions conducive to combustion and to assess and study the behavior of the substances and materials under these conditions.

PIR Plita® is certified to the Russian G2 flammability group (moderately flammable), which means that:

- smoke gases temperature T <235 °C;
- the degree of damage along the length SL <85%;
- the degree of damage by mass Sm <50%;
- the duration of self-sustained burning tsg. <30 s.

Ignition is the combustion of a substance initiated by an ignition source and continuing after it has been removed. The ignition temperature is the lowest temperature of a substance at which, under the conditions of the tests, the substance emits flammable vapors and gases at such a rate when they are exposed to an ignition source that ignition can be observed. To determine the flammability group, the critical surface density of the heat flow is used: the minimum value of the surface density of the heat flow at which a stable combustion occurs, the minimum value is from 20 to 35 kW/m^2.

The smoke production coefficient is an indicator that characterizes the optical density of smoke generated during the flame combustion or the smoldering of a certain amount of solid matter (material) under special test conditions. The smoke production coefficient value should be used to classify materials in terms of their smoke generating ability. The testing method for determining the smoke production coefficient is to determine the optical density of the smoke generated during combustion or smoldering of a known amount of the test substance or material in a given volume. PIR Plita® is certified to D3 group of smoke production (high smoke generating ability), which means that: the coefficient of smoke production is not less than 50, but not more than 500 square meters per kilogram.

The way of measuring combustion toxicity is conducted through measuring the ratio of the amount of material and the volume of an enclosed space in which the gaseous products formed during the combustion of the material. We then looked to see if this ratio caused the death of 50% of the test animals. The value of the toxicity index of combustion products should be used for a comparative assessment of polymer materials, and also included in the technical specifications and standards for heat-insulating materials. The testing method for determining the toxicity indicator is to observe the combustion of the material in the combustion chamber at a given heat flow density and the identification of the lethal effect of the gases of the material per unit of volume of the chamber itself. PIR Plita® has T2 combustion toxicity value - moderately hazardous.

9. HOW TO SELECT THICKNESS OF PIR PLITA®

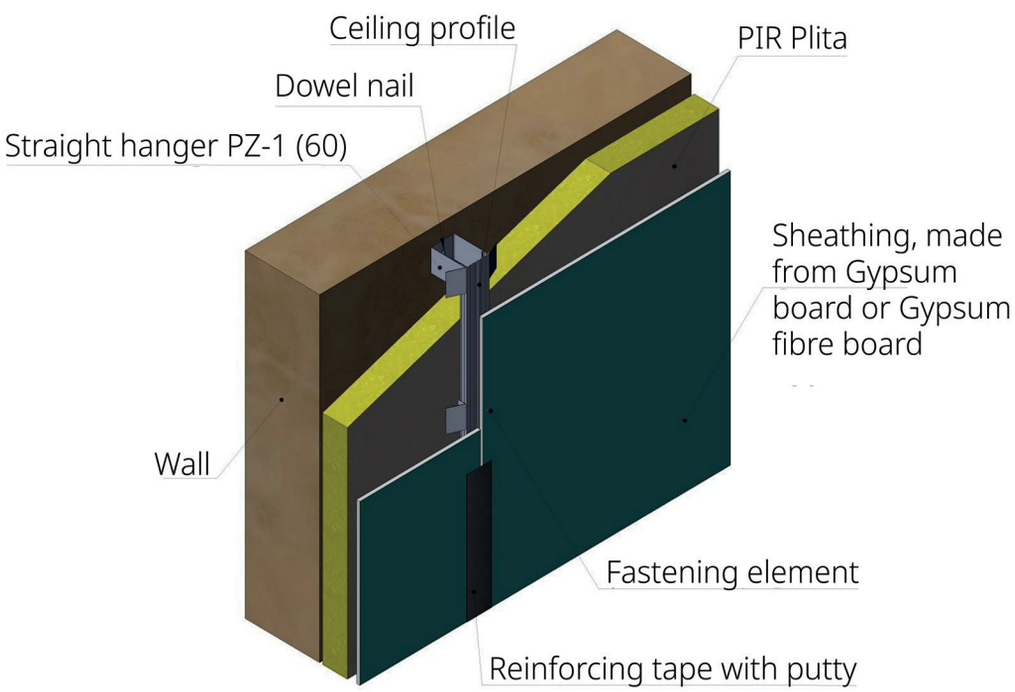
The thermal insulation layer in the building enclosing structure (walls/roofs) is fitted in order to ensure:

- the specified parameters of the microclimate necessary for people, operational equipment or household equipment;
- thermal protection;
- efficiency of heat energy consumption for heating and ventilation;
- the necessary reliability and durability of structures.

The heat transfer resistance of basement walls is taken as the same as for the outer walls, taking into account the temperature of air in the basement.

The procedure for calculating the required thickness of the thermal insulation layer is as follows:

1.Determination of operating conditions of the enclosing structures
Determining the operating conditions within enclosing structures is necessary for the selection of the appropriate materials. To do this, you need to know the humidity and temperature of the indoor air, as well as the humidity zone (outdoor conditions) of the area where this building is located.



10. WALL WITH PIR PLITA® PLACED ON THE INSIDE

DESCRIPTION

Before starting work, the surface of the insulated wall should be appropriately prepared. This means it should be freed from old plaster and paint and any protruding parts that are not part of the building structure should be removed.

The attaching of PIR Plita® to the insulated outer wall is carried out using disc dowels. If the surface is even, the gypsum plasterboard sheets are attached to PIR Plita® with glue. If the unevenness of the surface is 10 mm or more, the drywall sheets are fixed to the metal frame using self-tapping screws. Galvanized sections are used as a metal frame.

For this type of insulation it is recommended to use PIR Plita® with STONEGLASS 300 covering on both sides, a universal covering layer of a glass fiber base with a mineral coating.

APPLICATION AREA

PIR Plita® can be used for thermal insulation of premises on the inside, for example, balconies, apartments, public spaces, etc.

The insulation of walls from the inside is recommended in cases where working on the outside

of the facade is impossible.

CALCULATION OF THE NECESSARY THICKNESS OF PIR PLITA® WHEN INSULATING THE EXTERNAL WALL FROM THE INSIDE
Location of the building: Moscow, Copenhagen.
Building type - residential building.
Internal air temperature: 20 °C.
Average temperature of the outside air during the heating period: minus 3.6 °C.
The duration of the heating period is 213 days.

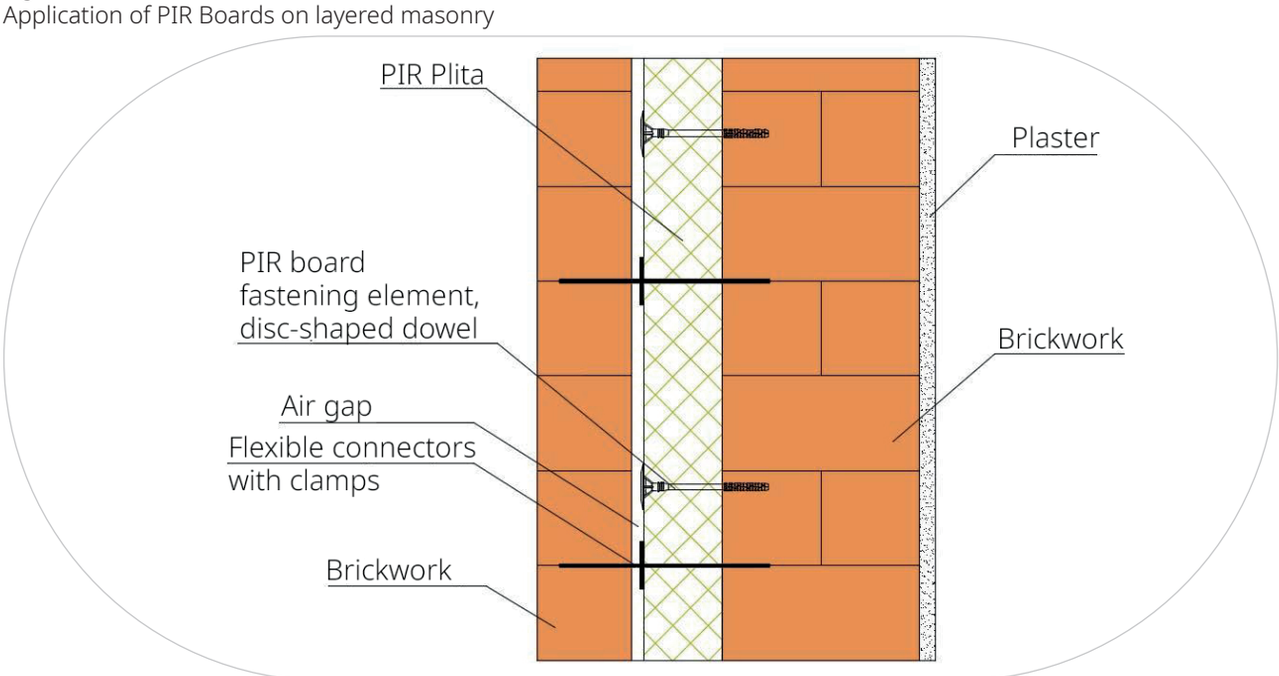
Layers of the enclosing structure and their characteristics:

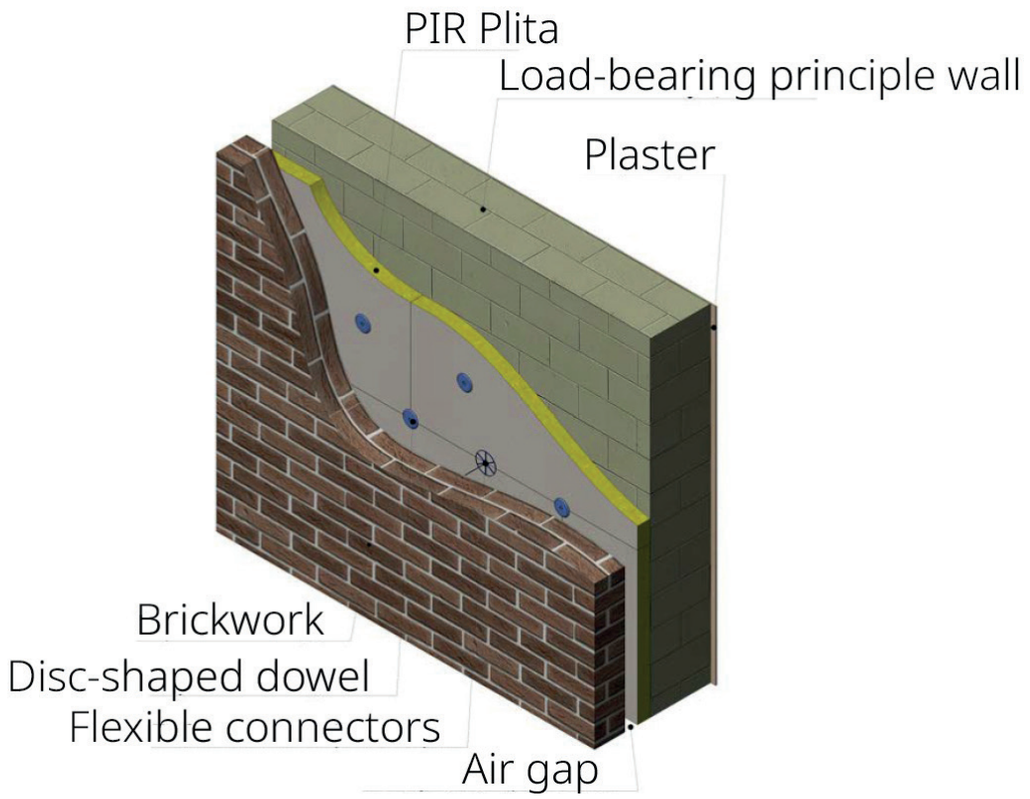
Type of layer of the enclosing structure	Thickness of the layer, mm	Thermal conductivity λ, W / (m² · ⁰C)
Thin-layer plaster	6	0.87
Brick wall	510	0.81
Lime cement	20	0.87
PIR Plita®	δ	0.031
Dry wall sheet	10	0.56

The thermal insulation layer of PIR boarding for a wall consisting of 510 mm thick ordinary clay bricks with 20 and 6 mm thick internal and external plaster, respectively, should have a thickness of 90 mm.

11. BRICK WALL WITH PIR PLITA®. WALL OF BRICK BEARING ADDITIONAL MASONRY

Figure 7.
Application of PIR Boards on layered masonry





DESCRIPTION

The PIR board should be installed between the inner and outer structural layers of the wall during its construction. The PIR plate should be attached using disc-shaped dowels. For a bundle of brickwork, flexible connections should be established with clamps. The flexible connection kit includes a retainer washer and a flexible metal tie.

For this type of insulation, it is recommended to use PIR boards with STONEGLASS 300 covering on both sides — a universal covering of a fiberglass-based layer with a mineral coating.

CALCULATION OF THE NECESSARY THICKNESS OF PIR Plita® WHEN INSULATING THE EXTERNAL WALL (LAYERED Masonry)

Location of the building: London.
Building type - administrative building.
Internal air temperature: 19 °C.
Average temperature of the outside air for the heating period - minus 2.4.
Duration of the heating period - 198 days.

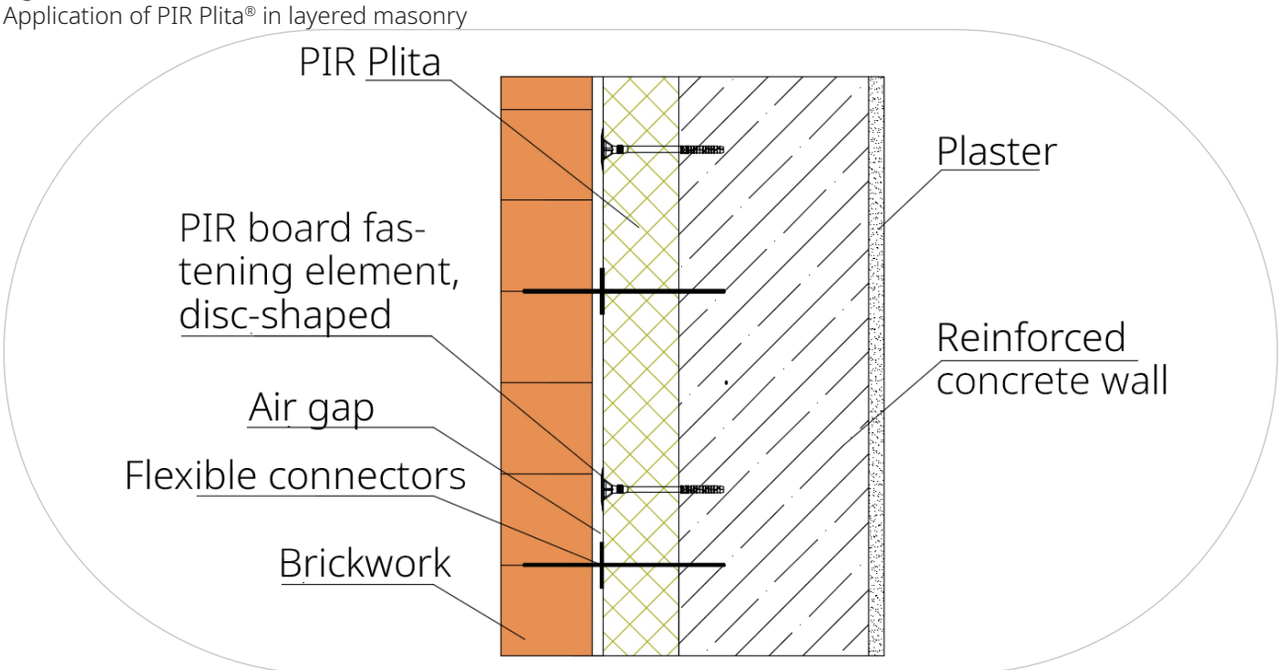
Layers of the enclosing structure and their characteristics:

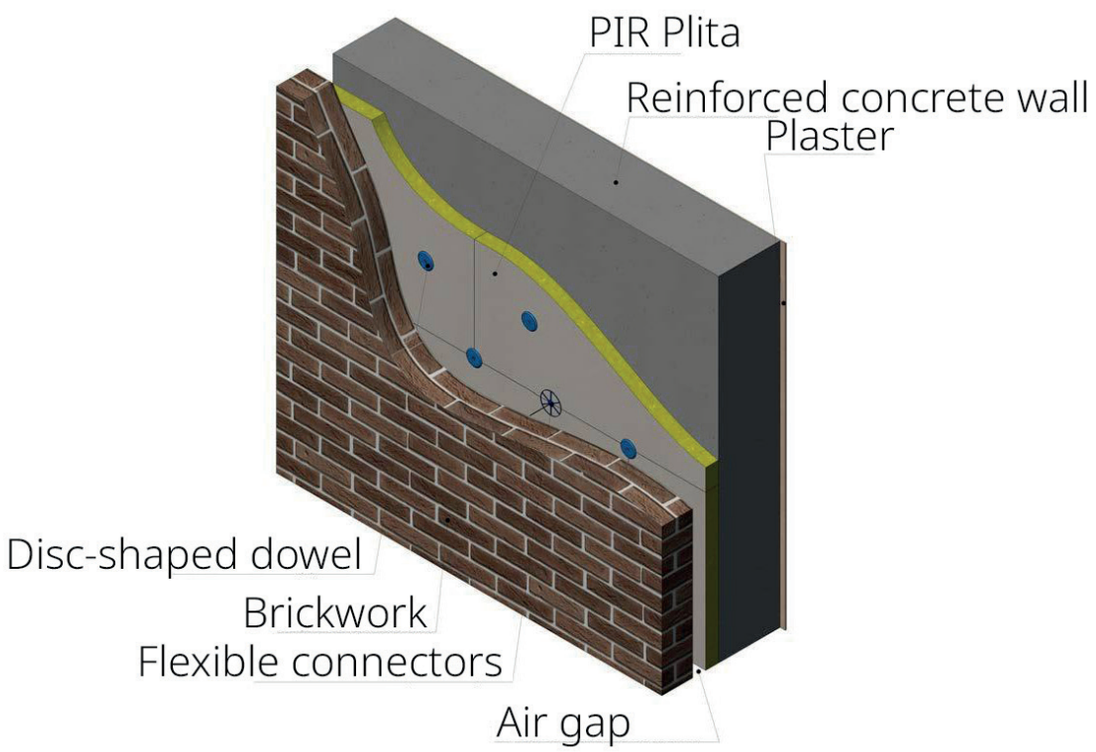
Type of layer of the enclosing structure	Thickness of the layer, mm	Thermal conductivity λ, W / ($m^2 \cdot {}^0C$)
Sand cement plaster	20	0.76
Brick wall, made from common clay bricks	250	0.7
PIR Plita	δ	0.026
Hollow clay brickwork	120	0.58

The thermal insulation layer of PIR boarding for a wall consisting of ordinary clay bricks of 250 mm, ceramic hollow bricks of 120 mm with internal plaster of 20 mm thick should be 60 mm thick.

12. BRICK WALL WITH PIR PLITA®. REINFORCED CONCRETE BEARING WALL

Figure 8.
Application of PIR Plita® in layered masonry





DESCRIPTION
The PIR board should be installed between the inner and outer structural layers of the wall during its construction. The PIR plate should be attached using disc-shaped dowels. For a bundle of brickwork, flexible connections should be established with clamps. The flexible connection kit includes a retainer washer and a flexible metal tie.

For this type of insulation, it is recommended to use PIR boards with STONEGLASS 300 covering on both sides — a universal covering of a fiberglass-based layer with a mineral coating.

CALCULATION OF THE NECESSARY THICKNESS OF PIR PLITA® WHEN INSULATING THE EXTERNAL WALL (LAYERED Masonry)
Location of the object — Moscow, Copenhagen.

Building type - residential building.
Internal air temperature: 20 °C.
The average temperature of the outside air during the heating period — minus 3.6 °C.
Duration of the heating period — 213 days.

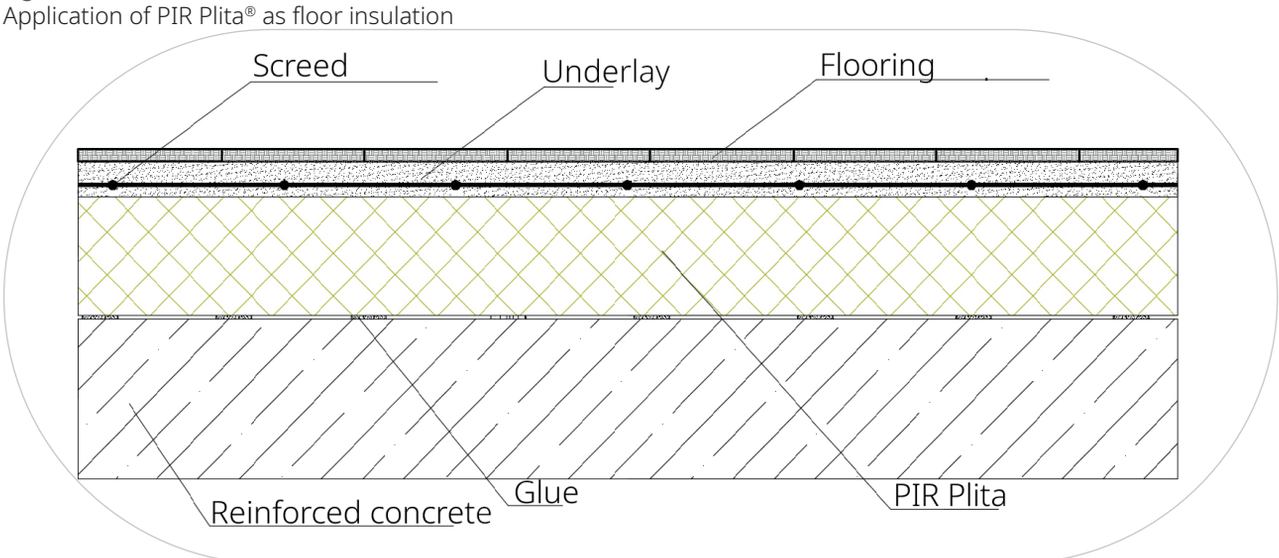
Layers of the enclosing structure and their characteristics:

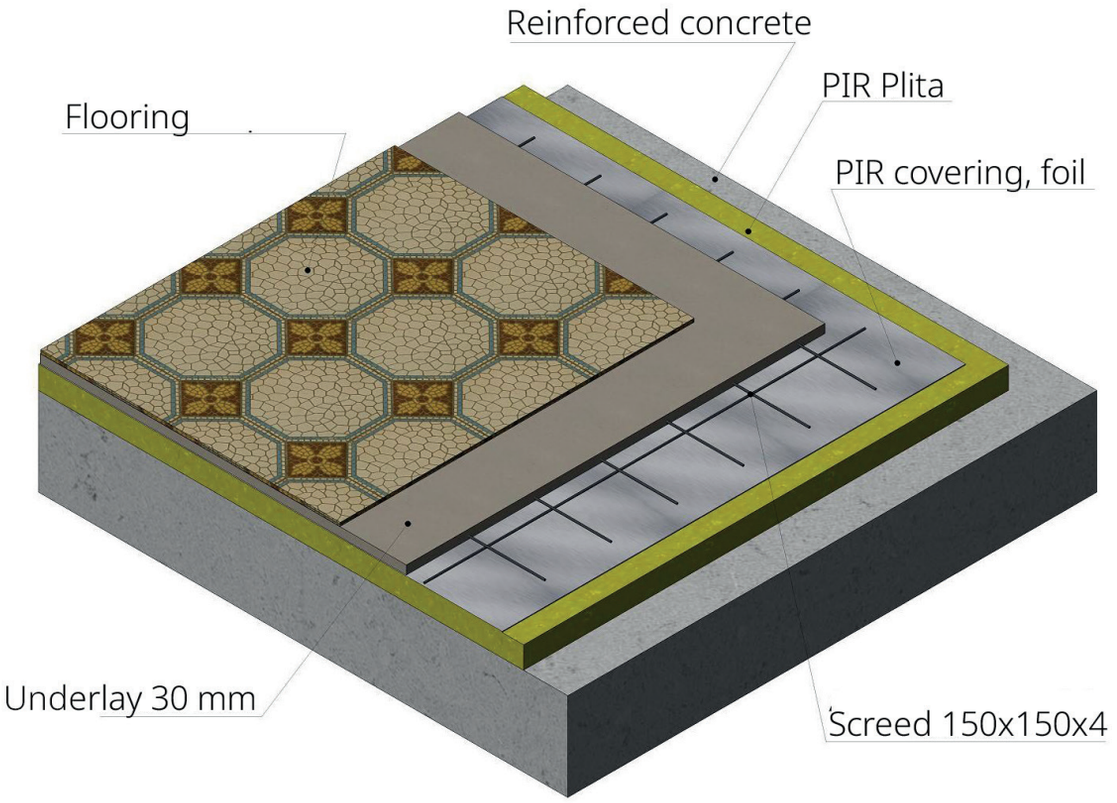
Type of layer of the enclosing structure	Thickness of the layer, mm	Thermal conductivity λ, W / ($m^2 \cdot {}^0C$)
Sand cement plaster	20	0.93
Reinforced concrete	210	2.04
PIR Plita	δ	0.031
Hollow clay brickwork	120	0.64

The thermal insulation layer of PIR Plita®, for a wall consisting of reinforced concrete 210 mm, hollow brickwork 120 mm with internal plaster of 20 mm, must be 100 mm thick.

13. FLOORING WITH PIR PLITA®

Figure 9.
Application of PIR Plita® as floor insulation





DESCRIPTION
The PIR Plita® thermal and sound insulating layer can be used for the following:
- to reduce the rate of heat absorption of the floor - laying it on a reinforced concrete base;
- to increase the sound insulation of the floor;
- for thermal insulation of ceilings located above arches, unheated rooms or basements;
- to reduce heat loss in heated floors.

PIR Plita® is attached with glue on a leveled heat-insulated floor surface. A cement screed is placed on top of the insulation. The desired floor covering is then laid.
For this type of insulation, it is recommended to use PIR Plita® with a foil covering.

POTENTIAL APPLICATION
PIR Plita® floor insulation is used in both new builds and renovations. It is well suited for floor insulation in residential areas.

CALCULATION OF THE NECESSARY THICKNESS of PIR Plita® FOR THE INSULATION OF FLOORS
Location of the building: London.

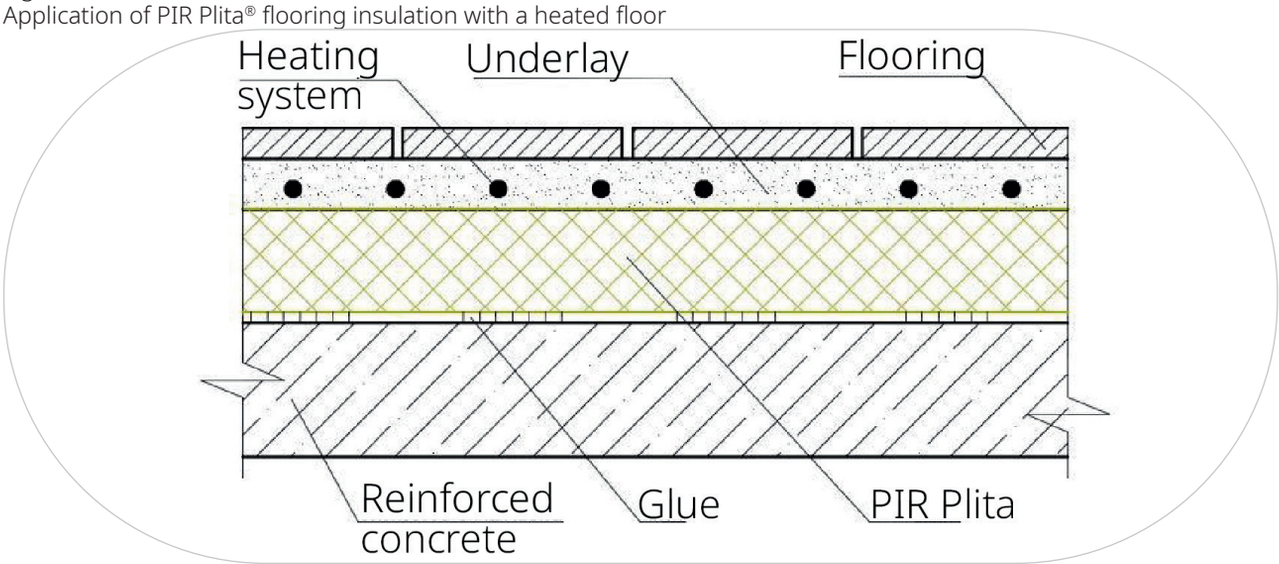
Building type — residential building.
Insulated floor structure — overlay in an unheated basement.
Internal air temperature: 20 °C.
Average temperature of outside air during the heating period — minus 3.1 °C.
The duration of the heating period - 196 days.

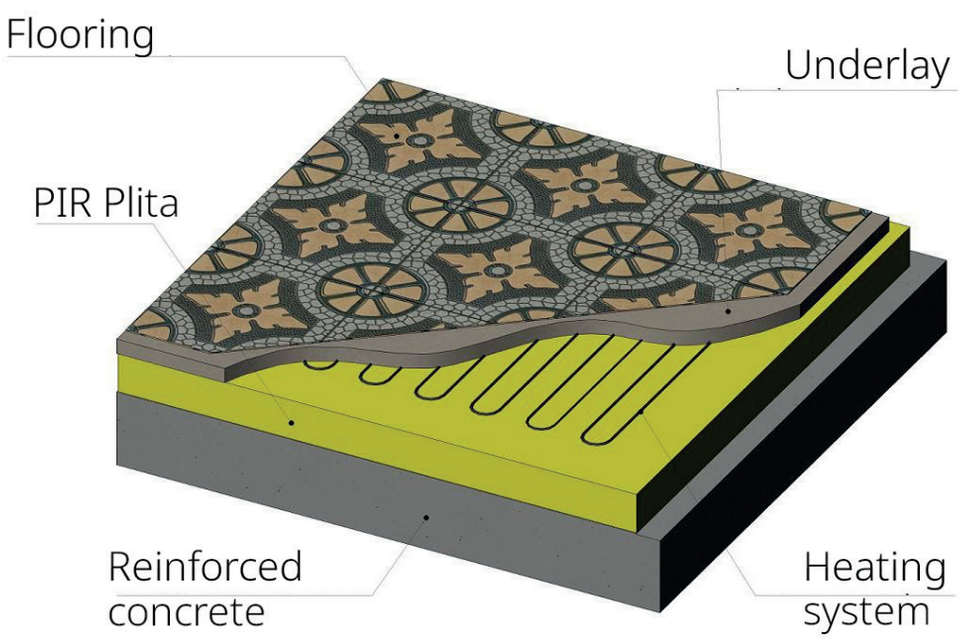
Layers of the enclosing structure and their characteristics:

Types of layers of the enclosing structure	Thickness of the layer, mm	Thermal conductivity λ, W / ($m^2 \cdot {}^0C$)
Reinforced concrete	210	1.69
PIR Plita	δ	0.026
Strengthening mesh	30	0.76
Flooring	8	0.76

14. FLOOR WITH A HEATING SYSTEM AND PIR PLITA®

Figure 10.
Application of PIR Plita® flooring insulation with a heated floor





DESCRIPTION
The PIR insulation is attached with glue to a pre-leveled insulated floor surface. Next, the heating system is laid and a screed is attached. It is important that the thickness of the screed in heated floors must be 50 mm greater than the diameter of the heating elements. The screed is reinforced with a masonry wire mesh. Finally the desired flooring is laid over the screed.

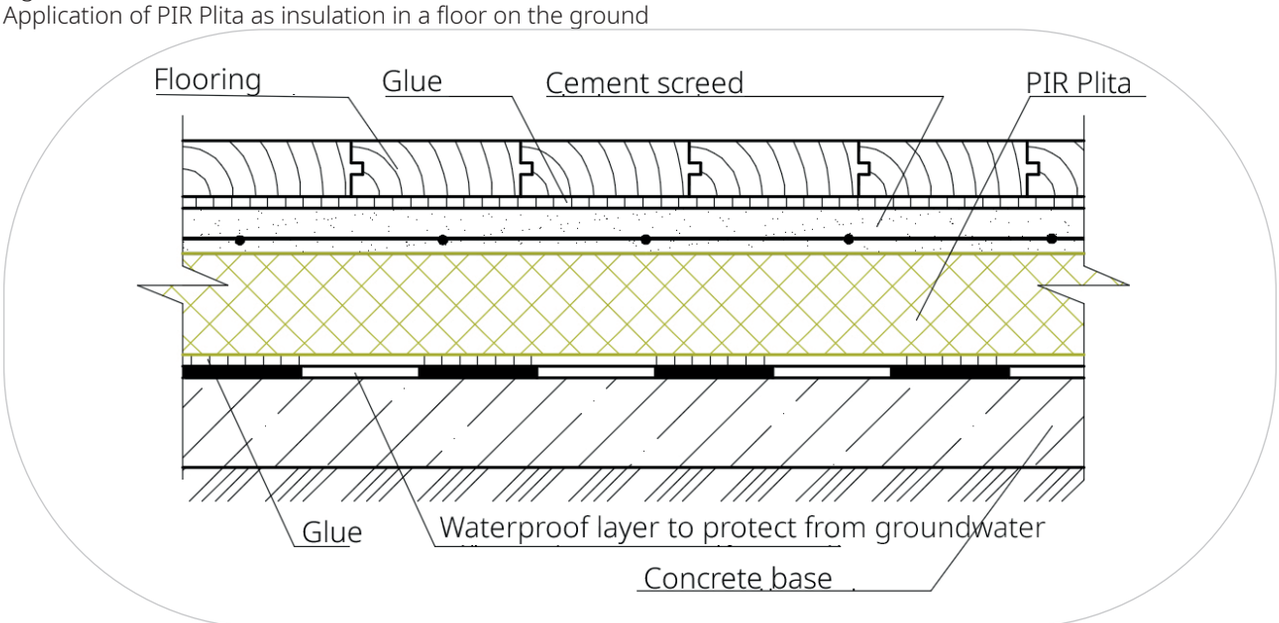
Electric and water heating elements can be used as a heating system.
For this type of insulation, it is recommended to use PIR Plita® with a foil covering.

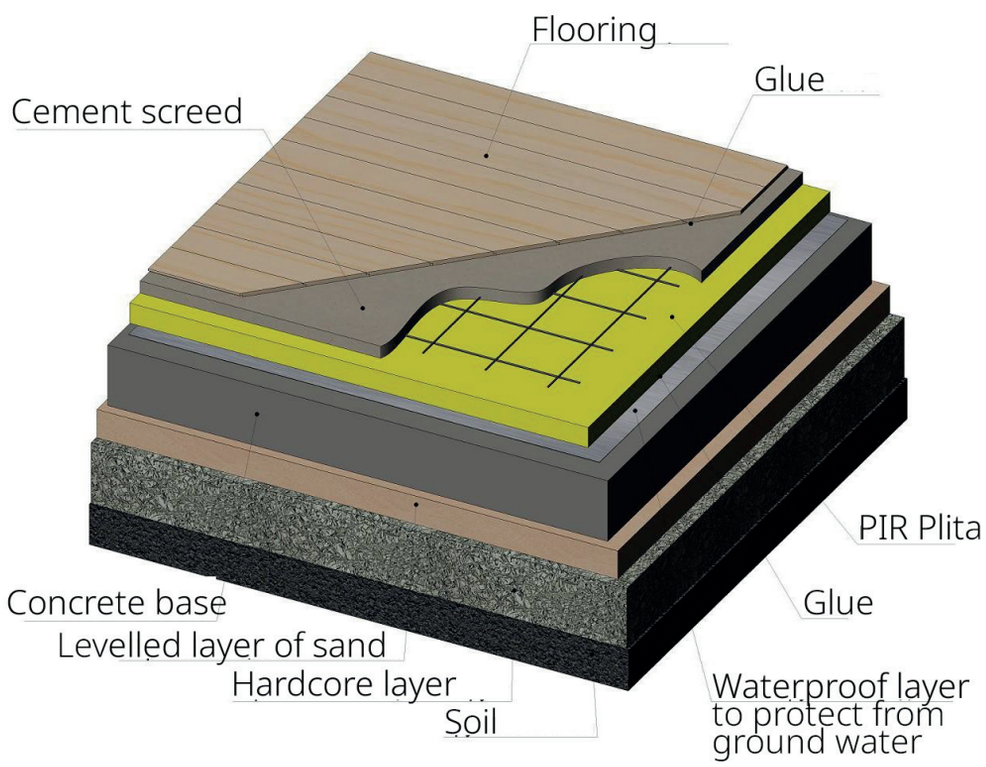
POTENTIAL APPLICATION
The installation of an additional underfloor heating system often occurs when the structure is limited in height. This system is used for partial or complete heating of premises.

PIR Plita® floor insulation is used in both new construction and renovation. It is well suited for floor insulation in residential areas.

15. FLOORING WITH PIR PLITA® (OPTION 1)

Figure 11.
Application of PIR Plita as insulation in a floor on the ground





DESCRIPTION
A concrete base layer should be fixed on the base soil. For floors on the ground, polyisocyanurate foam boards should be laid on a waterproofing layer to prevent the penetration of groundwater. PIR Plita® is then attached to the waterproofing layer with glue. A reinforced screed is placed on top of the insulation. The desired floor covering is then laid.

For this type of insulation, it is recommended to use PIR Plita® with a foil covering.

POTENTIAL APPLICATION
This type of flooring is a popular solution for both residential and commercial premises, and is used on the ground floor in buildings without basements. The simple design and the use of PIR Plita® as an insulating layer make such floors efficient and attractive in terms of cost.

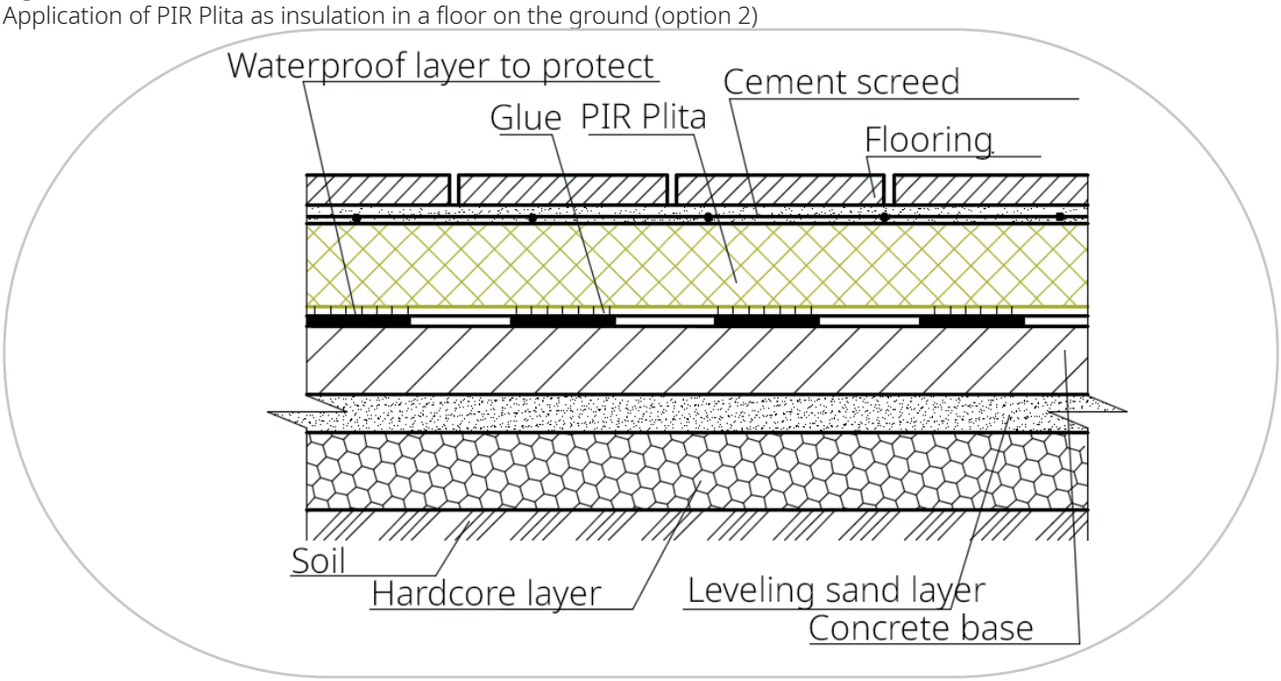
CALCULATION OF THE NECESSARY THICKNESS OF PIR PLITA® FOR THE INSULATION OF FLOORS
Initial data: public building, Moscow.
The initial data for the calculation is presented in the table below:

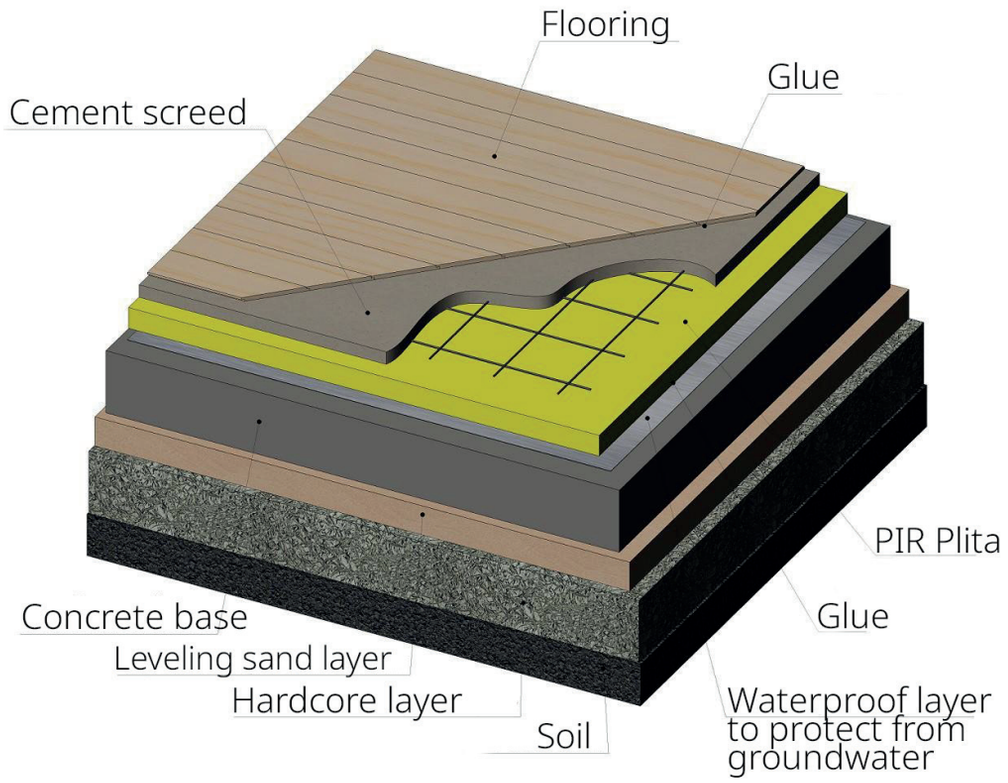
№	Flooring layer	Thickness of the layer, m	Material density when dry , ρ_0, kg/m^3	Thermal conductivity, λ, W / (m · ^{0}C)	Heat absorption, S, W / (m^2 · ^{0}C)	Thermal resistance of the layer, R, (m^2 · ^{0}C)/W
1	Top layer flooring (laminate)	0.01	600	0.23	6.75	0.043
2	Reinforced sand cement screed	0.03	1800	0.81	9.76	0.037
3	PIR Plita®	0.05	34	0.031	0.44	1.61
4	Waterproofing layer	0.002	1000	0.17	4.56	0.012
5	Concrete base layer	0.2	2500	2.04	18.95	0.098

The 50 mm thick PIR Plita® heat-insulating layer into the floor structure will reduce the heat absorption index of the floor surface from 15.06 to 13.7 W / (m^2 · °C).

16. FLOORING WITH PIR PLITA®. OPTION 2.

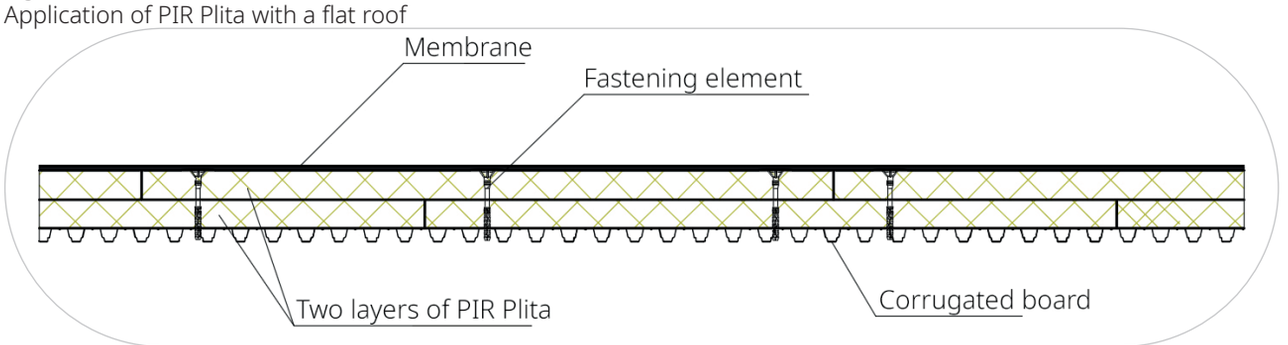
Figure 12.
Application of PIR Plita as insulation in a floor on the ground (option 2)

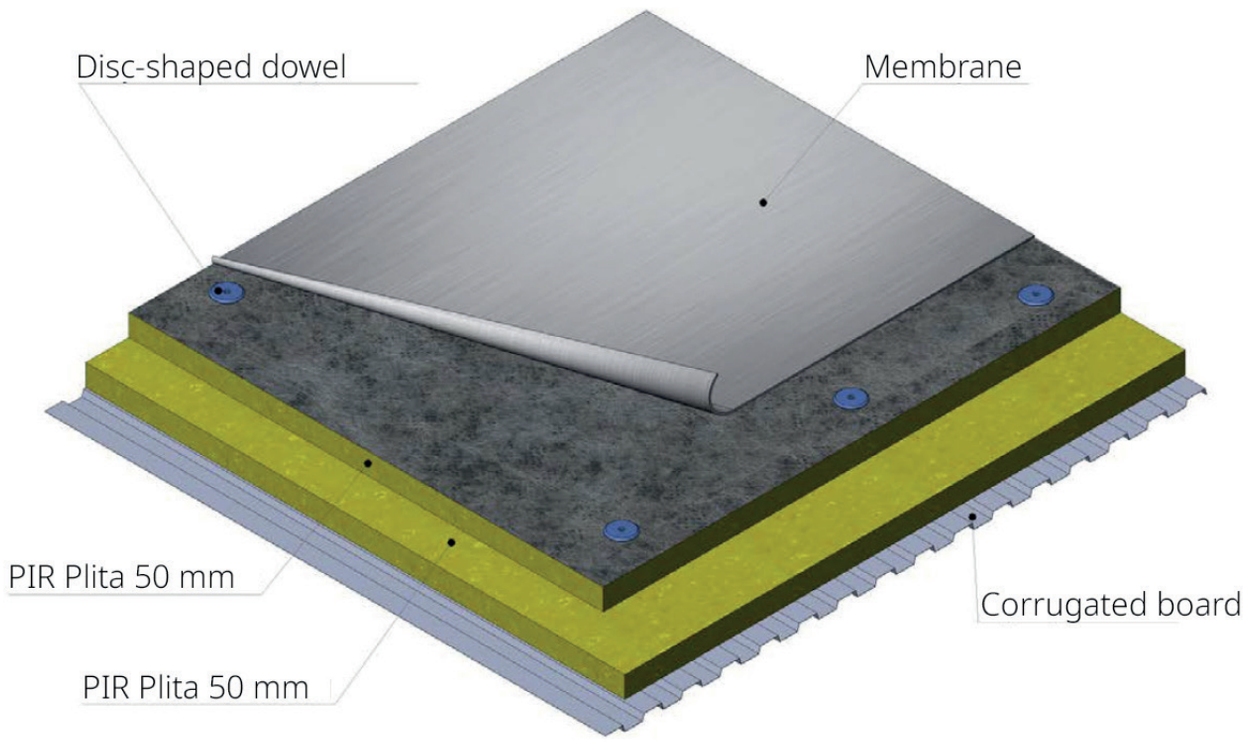




17. LOAD-BEARING FLAT ROOF WITH PIR PLITA®

Figure 13.
Application of PIR Plita with a flat roof





DESCRIPTION

You can use PIR Plita® on the supporting base of a roof made from corrugated boarding: the PIR boarding should be laid with their long side perpendicular to the direction of the corrugated board ribs. The insulation boards should be joined to the corrugated boards at the point where the rib touches the insulation board, ensuring there is now cavity. When mechanically fastened, PIR Plita® should point-glued to the shelves of the corrugated board, if using "telescopic" fasteners, they should be fixed to the base. The installation depth of fasteners in the corrugated board should be 15–25 mm.

The membrane is laid on top of the slab.

For this type of insulation it is recommended to use PIR Plita® with a GLASS 350PP XTREME covering — a fiberglass-based covering layer with a bitumen and polypropylene coating.

POTENTIAL APPLICATION

PIR Plita® in flat roofs is ideal for roofing in public and industrial buildings. It is the optimal solution for non-attic roofing of buildings, for unlimited maximum roof area and increased fire safety features.

CALCULATION OF THE NECESSARY THICKNESS OF PIR PLITA® WITH A FLAT ROOF

Location of the object – Moscow, Copenhagen.
Building type — shopping center
Enclosing construction — flat roof.
Internal air temperature: 19 °C.
Average temperature of the outside air during the heating period — minus 8.3.
Duration of the heating period — 231 days.

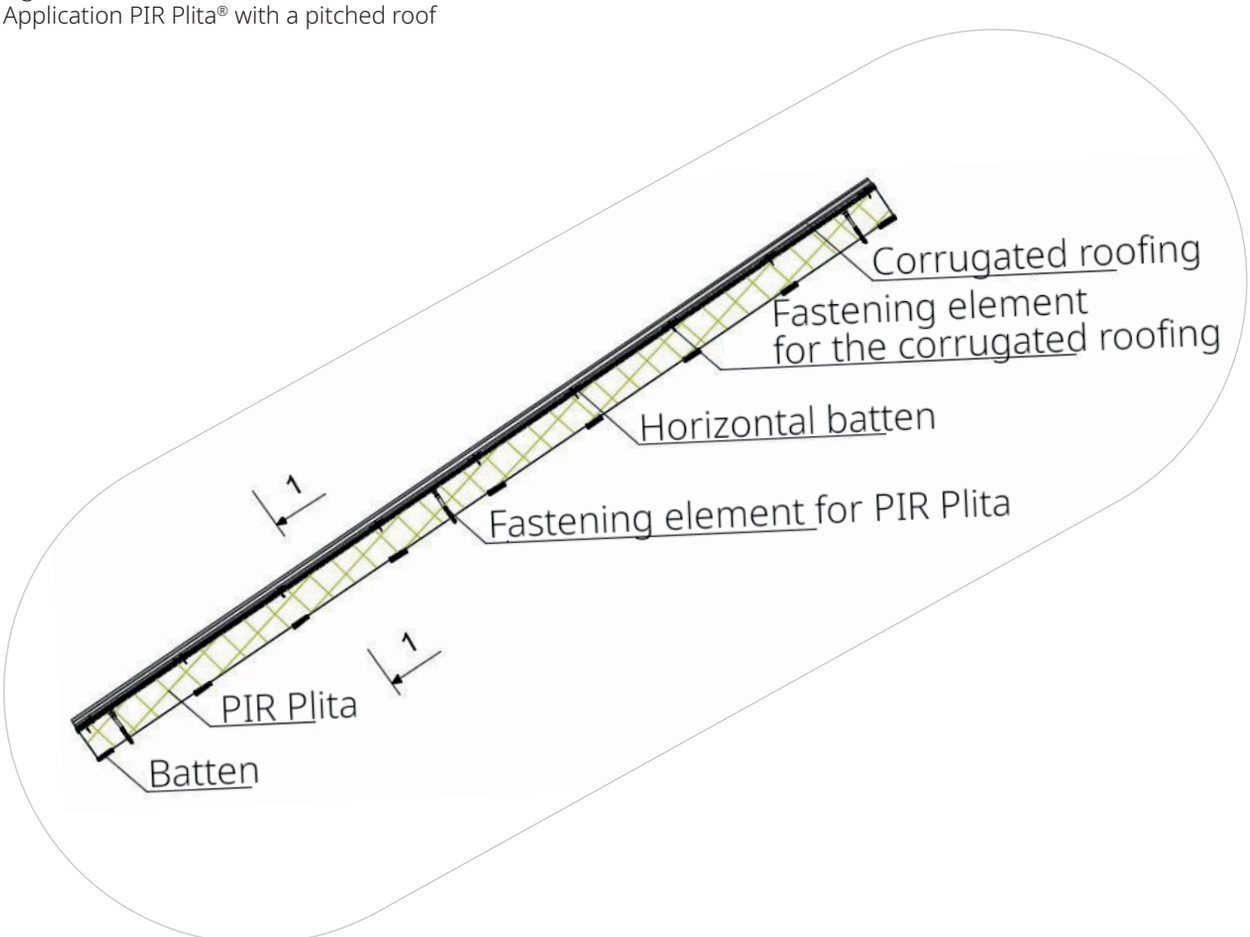
Layers of the enclosing structure and their characteristics:

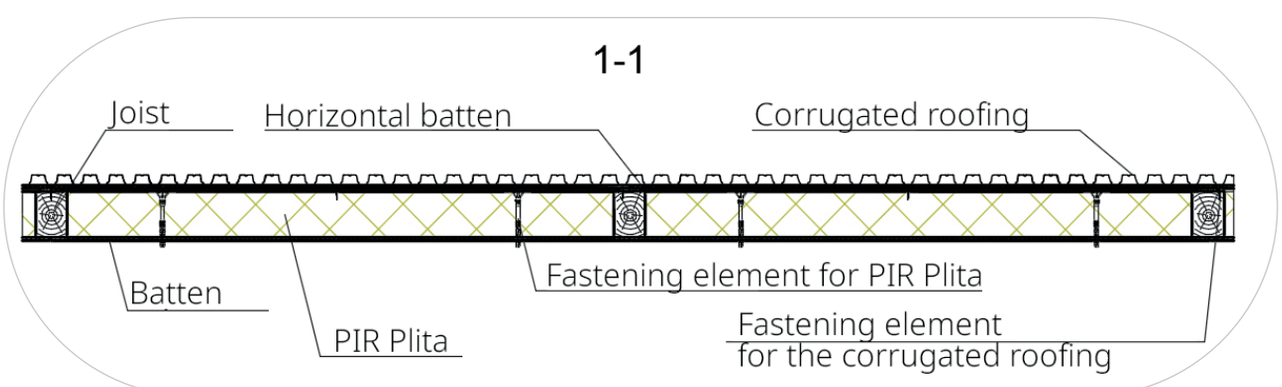
Type of layer of the enclosing structure	Thickness of the layer, mm	Thermal conductivity λ, W / ($m^2 \cdot {}^0C$)
Corrugated steel	0.7	58
PIR plita	δ	0.026
Membrane	1.5	0.17

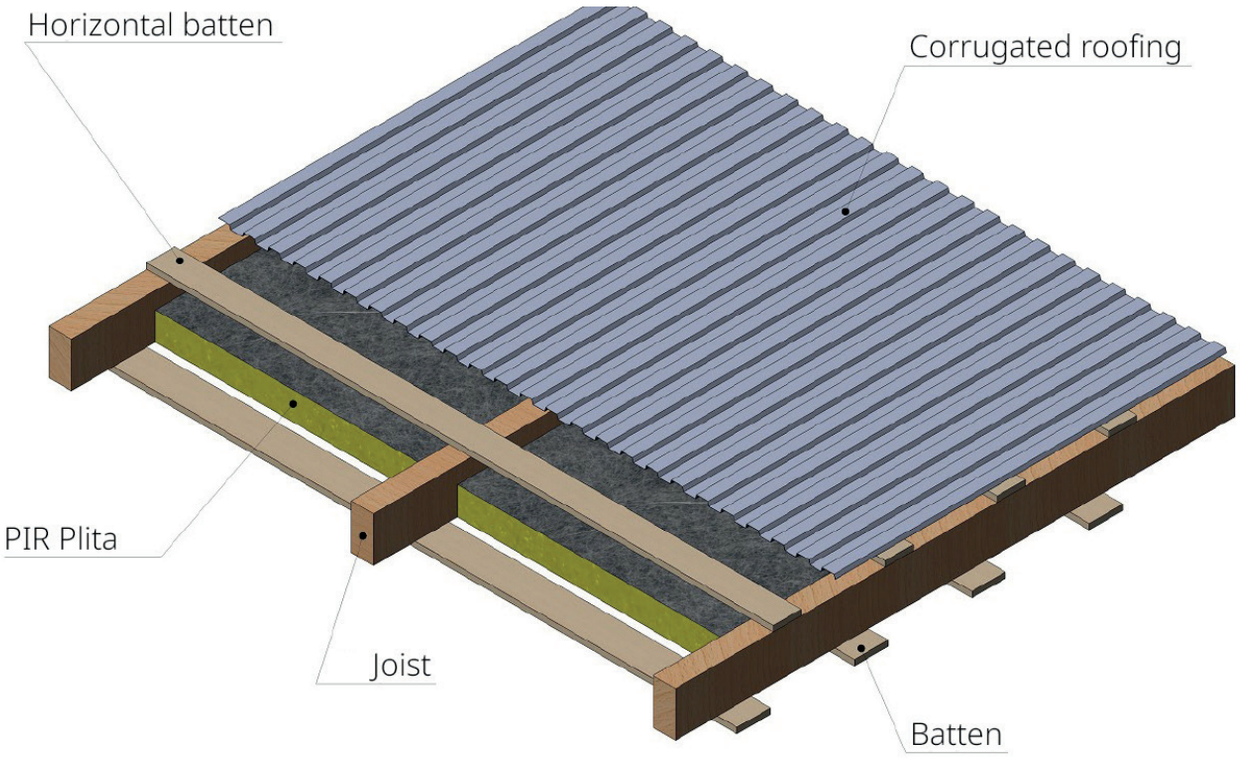
The PIR Plita® insulating layer for the installation of a flat roof, consisting of corrugated steel 0.7 mm, insulation and a membrane of 1.5 mm must have a thickness of 120 mm.

18. PITCHED ROOF WITH RIGID ROOFING MATERIAL AND PIR PLITA®

Figure 14.
Application PIR Plita® with a pitched roof







DESCRIPTION
On the lower batten, between the joists, PIR Plita® is laid and fixed with fasteners. Next, the upper battens are arranged, on which the sheets of the corrugated roofing are fixed.
For this type of insulation it is recommended to use PIR Plita® with a GLASS 350PP XTREME covering — a fiberglass-based covering layer with a bitumen and polypropylene coating.

POTENTIAL APPLICATION
The use of PIR boarding in pitched roofs is possible both for major repairs and for newly erected roofs in all types of buildings.

CALCULATION OF THE NECESSARY THICKNESS OF PIR PLITA® FOR ROOFING
Location of the building: Belfast.
Building type — residential building.
Enclosing structure — pitched roof.
Internal air temperature (warm attic): 12 °C.
Average temperature of the outside air during the heating period — minus 3.5.
Duration of the heating period — 208 days.

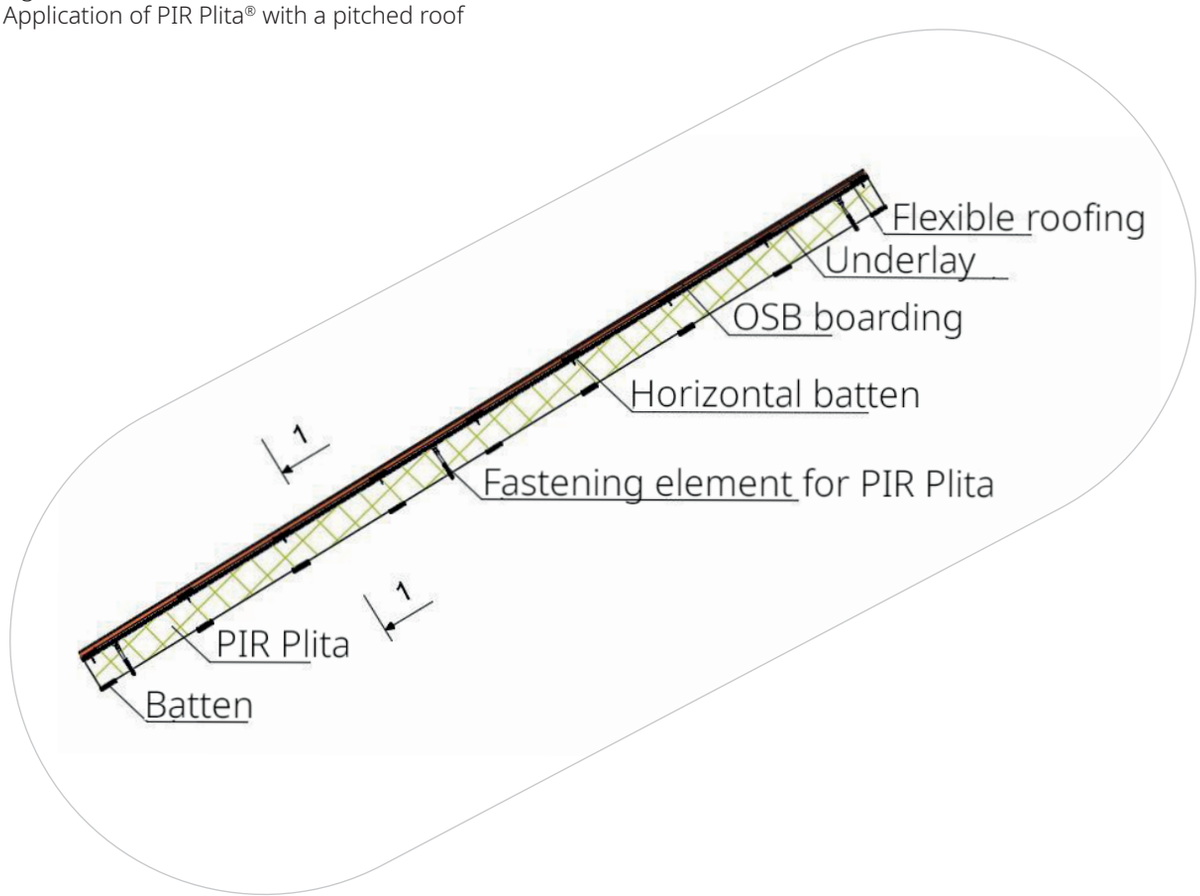
Layers of the enclosing structure and their characteristics:

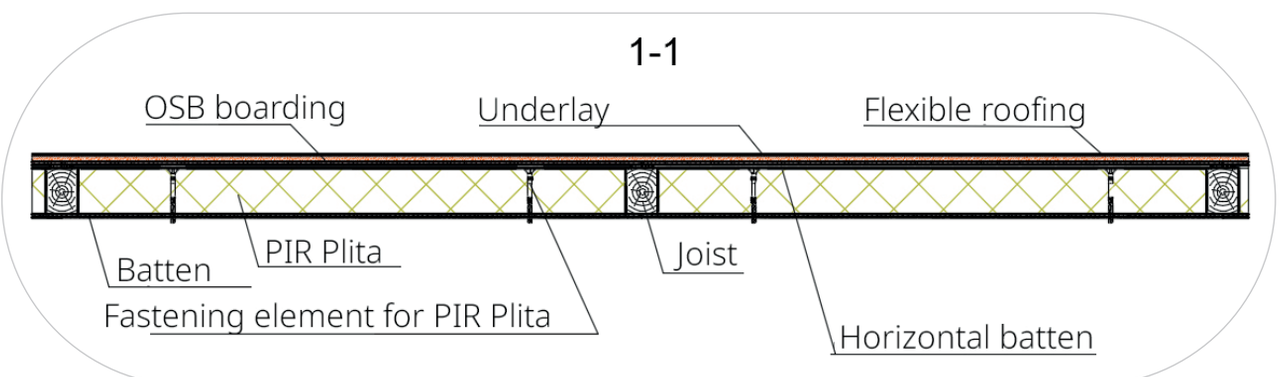
Type of enclosing layer	Thickness of the layer, mm	Thermal conductivity λ, W / (m^2 · ^{0}C)
PIR Plita®	δ	0.031
Corrugated steel	0.7	58

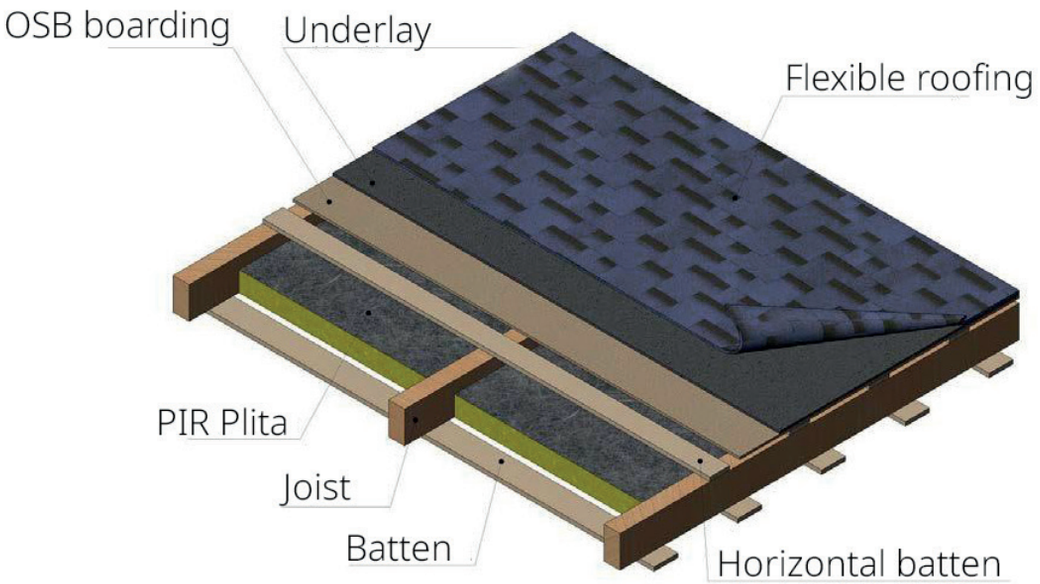
The thermal insulation layer of PIR Plita® for pitched roofs should be 130 mm thick.

19. PITCHED ROOF WITH FLEXIBLE ROOFING MATERIAL AND PIR PLITA®

Figure 15.
Application of PIR Plita® with a pitched roof







DESCRIPTION

PIR Plita should be laid on the lower battens, between the joists, using fasteners. Then, the upper battens should be laid on top, to which the OSB boarding is attached. The underlay is then laid on top of the OSB boarding, and finally the tiles are laid on top of that.

For this type of insulation it is recommended to use PIR Plita® with a GLASS 350PP XTREME covering — a fiberglass-based covering layer with a bitumen and polypropylene coating.

POTENTIAL APPLICATION

The use of PIR Plita® in pitched roofs is possible for reconstruction, major repairs as well as newly erected roofs in all buildings.

CALCULATION OF THE NECESSARY THICKNESS OF PIR PLITA FOR ROOFING

Location of the building: Zurich, Budapest.
Building type — residential building.
Enclosing structure — pitched roof.
Internal air temperature (warm attic): 12 °C
Average outside air temperature during the heating period — minus 0.4 °C
Duration of the heating period — 167 days.

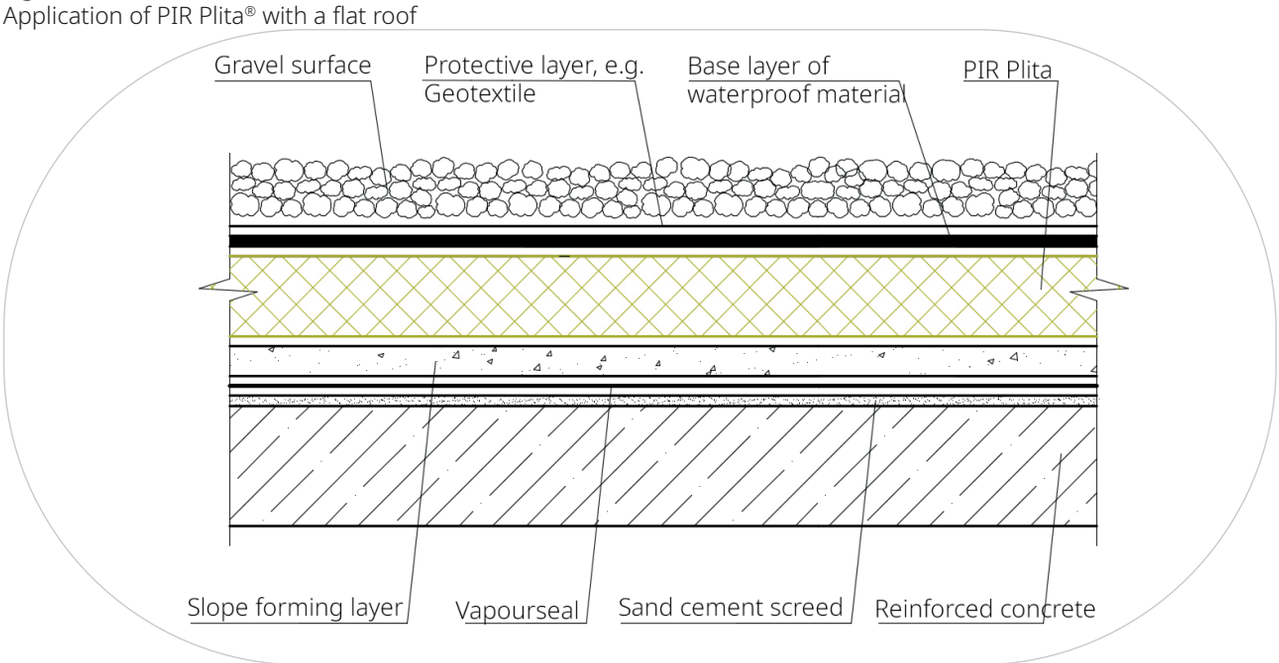
Layers of the enclosing structure and their characteristics:

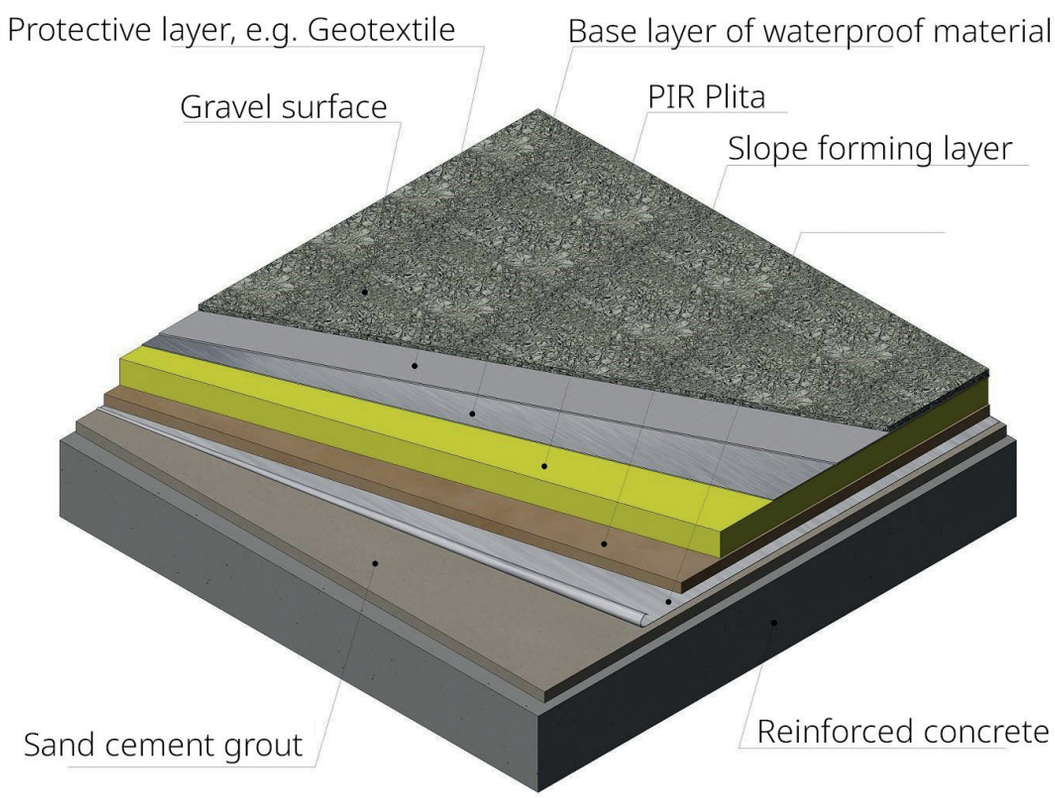
Type of enclosing structure	Thickness of layer, mm	Thermal conductivity λ, W / (м^2 · ^{0}C)
PIR Plita	δ	0.026
OSB boarding	10	0.07
Underlay	2	0.27
Flexible roofing	3	0.27

The PIR Plita® insulation layer for pitched roofs should be 90 mm thick.

20. FLAT ROOF ON A REINFORCED CONCRETE BASE WITH PIR PLITA® AND GRAVEL SURFACE. OPTION 1

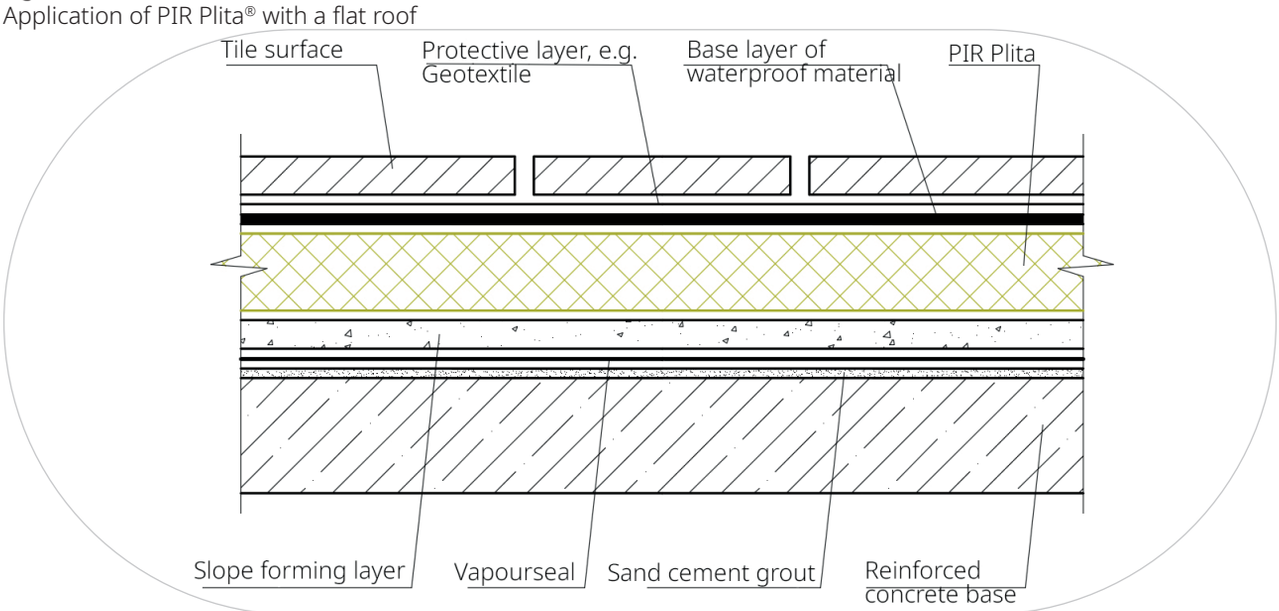
Figure 16.
Application of PIR Plita® with a flat roof

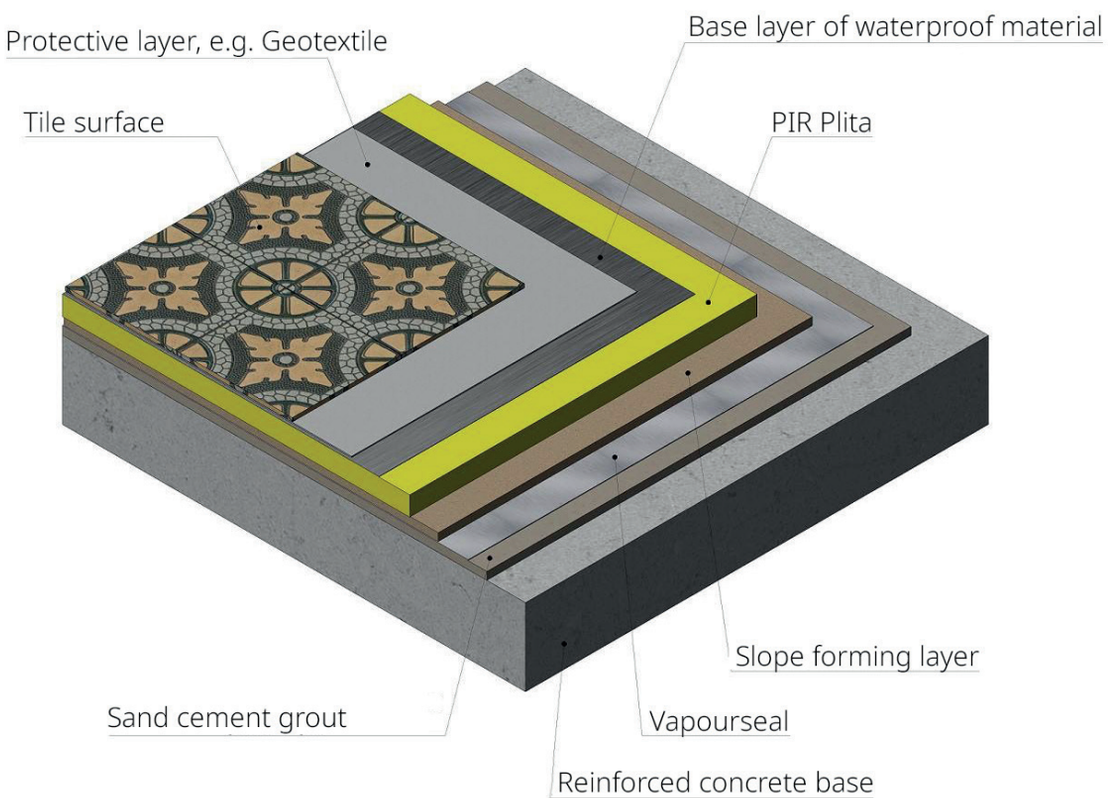




21. FLAT ROOF ON A REINFORCED CONCRETE BASE WITH PIR PLITA® AND A TILE SURFACE. OPTION 2.

Figure 17.
Application of PIR Plita® with a flat roof





DESCRIPTION
Roofs on a reinforced concrete base usually consist of the following layers:
- load-bearing slabs made of monolithic or precast concrete;
- leveling grout from cement-sand mortar;
- vapourseal
- slope forming layer;
- PIR Plita® boards;

- waterproof layer;
- protective layer;
- surface layer.

The base of this type of flat roof is reinforced concrete slabs, the surface of which is made level with sand-cement mortar.

A vaporseal is laid on top of the leveled slab (the need and type of vapor barrier is determined in accordance with the project). Bitumen or bitumen-polymer materials on a fibreglass or polyester layer are often used as a vapour seal If necessary, then a slope-forming layer is also laid after the vapourseal.

The heat-insulating layer of PIR Plita® should then be glued to the base or to the vapour seal layer or the slope forming layer. The point or strip gluing should be uniform and cover 25% to 35% of the surface. Thermal insulation boarding, when laid layers of two or more, should be arranged so that they fit snugly to each other. Gaps between insulation boards over 5 mm must be filled with some type of thermal insulation material. Insulation boarding is usually laid from the corner of the roof.

A waterproofing layer should then be placed on top of the PIR boards. A layer of geotextile should then be laid on to the surface of the waterproofing layer, which is necessary to protect the waterproofing layer from being punctured. On roofs with a slope of 5% or less, it is possible to lay tiles or gravel directly on to the waterproof layer (the weight of which should be determined by calculating the wind force). When fixing the waterproofing layer with fasteners, distance between them should be determined by calculating the wind load.

POTENTIAL APPLICATION
The use of PIR Plita® in reinforced concrete roofs is possible in residential and public buildings. Such a structure can be used not only for the construction of operational roofs, but also for the protection of the roof surface on roofs next to residential buildings. This design would allow the roof to withstand the fall of reasonably heavy objects without damaging the waterproofing layer.

CALCULATION OF THE NECESSARY THICKNESS OF THE PIR BOARDS FOR THE INSULATION OF A ROOF ON A REINFORCED CONCRETE BASE
Location of the building: Moscow, Copenhagen.
Building type — public building.
Enclosing construction — flat roof.
Internal air temperature (warm attic): 12 °C
Average outside air temperature for the heating period — minus 4 °C
Duration of the heating period — 214 days

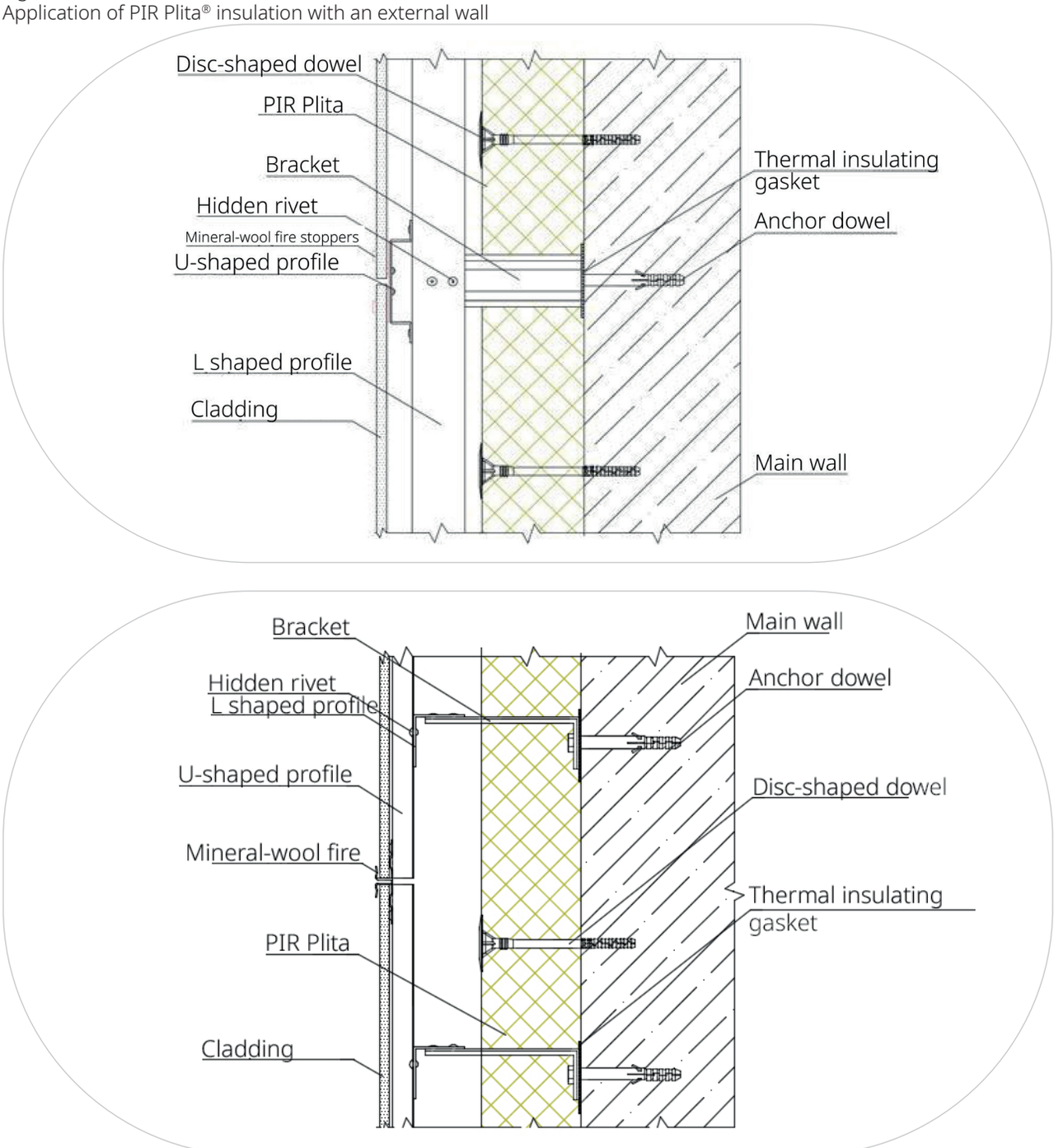
Layers of the enclosing structure and their characteristics:

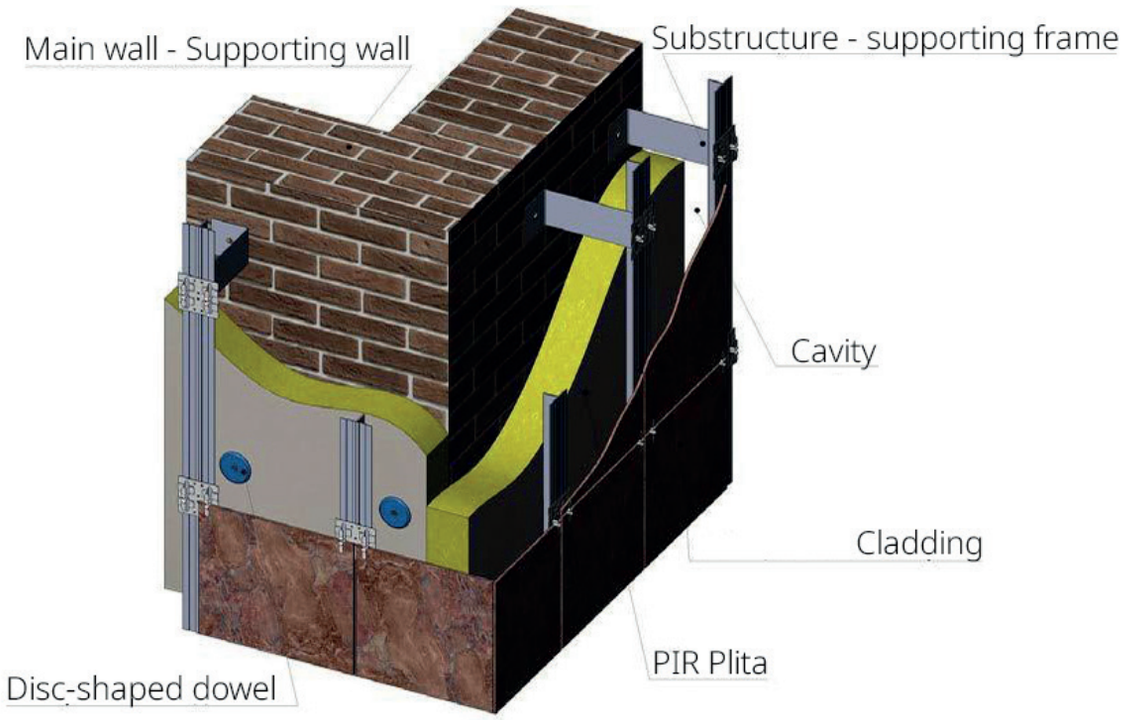
Type of layer of the enclosing structure	Thickness of the layer, mm	Thermal conductivity λ, W/(m^2 · ^{0}C)
Reinforced concrete base	220	2.04
Sand-cement leveling grout	10	0.93
Vapourseal	2	4.56
Slope forming layer	30	0.93
PIR Plita®	δ	0.031
Waterproof seal	2	0.17
Geotextile	3	0.08
Tiles	30	1.86

The heat-insulating layer of PIR Plita® for roofing must have a thickness of 90 mm.

22. EXTERNAL WALL WITH PIR PLITA® AND A VENTILATED FACADE

Figure 18.
Application of PIR Plita® insulation with an external wall





The attaching of PIR Plita® to the wall should be done using disc dowels. The insulation boarding is fixed to the brackets and then mounted. After that, the cladding is attached.

An important point to note when insulating a wall with PIR Plita® is that it is necessary to make sure the frames are fireproof and the fire stoppers are made from mineral wool.

For this type of insulation, we recommend using our specifically manufactured PIR Plita® with a STONEGLASS B EVO covering on the side facing the cavity, and a STONEGLASS 300 covering on the side facing the wall.
When using PIR Plita® as the main layer of thermal insulation, it is required to also provide fire stoppers made of non-combustible materials.

POTENTIAL APPLICATION
The technology of an external wall with a cavity combines the cladding of, and at the same time, the insulation of a building. It is therefore actively used in modern construction. The versatility of the wall system makes it possible to install the system on existing buildings, it is therefore widely used in the reconstruction and renovation of old buildings.

MAIN ADVANTAGES OF VENTILATED FACADES.
The main advantages of the ventilated facade systems are as follows:

1. Protection of external walls from heavy rain. Ventilated facades offer reliable protection of the enclosing walls from the effects of heavy rain. Due to special physical processes, there is no capillary ingress of water, much less direct leaking into the heat-insulating layer. Even if a few drops nevertheless fall on the thermal insulation layer due to a strong gust of wind, the damp thermal insulation layer dries quickly due to the cavity. This guarantees that the ventilated facade retains its insulation properties.

2. Protection against corrosion and damage to the reinforced concrete walls. Widely used reinforced concrete slabs are susceptible to corrosion and joint damage. When installing a ventilated facade, the corrosion process can be stopped. The system becomes resistant to aggressive external phenomena: the critical moisture content is reduced to a minimum and the concrete is reliably protected.

3. Noise protection/Sound insulation. The system is not only an architectural solution, providing protection from adverse climate influences, reliable thermal insulation, but it also provides extra sound insulation.

4. Effective protection of buildings from lightning strikes. If a building has been installed with a ventilated facade system, it will be effectively protected from the effects of lightning strikes. The electromagnetic field generated by a lightning strike can seriously damage equipment or cause it to malfunction. The ventilated facade system is able to counteract this as, when it is installed into a structure, it functions as a protective screen. The shielding method can be defined as the most expedient and economical way to protect against lightning strikes and reduce the effects of the resulting electromagnetic radiation.

5. Easy to repair and upgrade. The way that the ventilated facade system has been designed means that if the system requires repair work or even some of individual elements need repairing, the dismantling of the entire system is not necessary.
6. Year round installation.

CALCULATION OF THE NECESSARY THICKNESS OF PIR Plita® WHEN INSULATING A WALL WITH A VENTILATED FACADE
Location of the building: Warsaw, Berlin.
Building type — residential building.
The enclosing structure is a wall.
Internal air temperature: 20 °C
Average temperature of the outside air during the heating period — minus 3.4 °C
The duration of the heating period is 202 days.

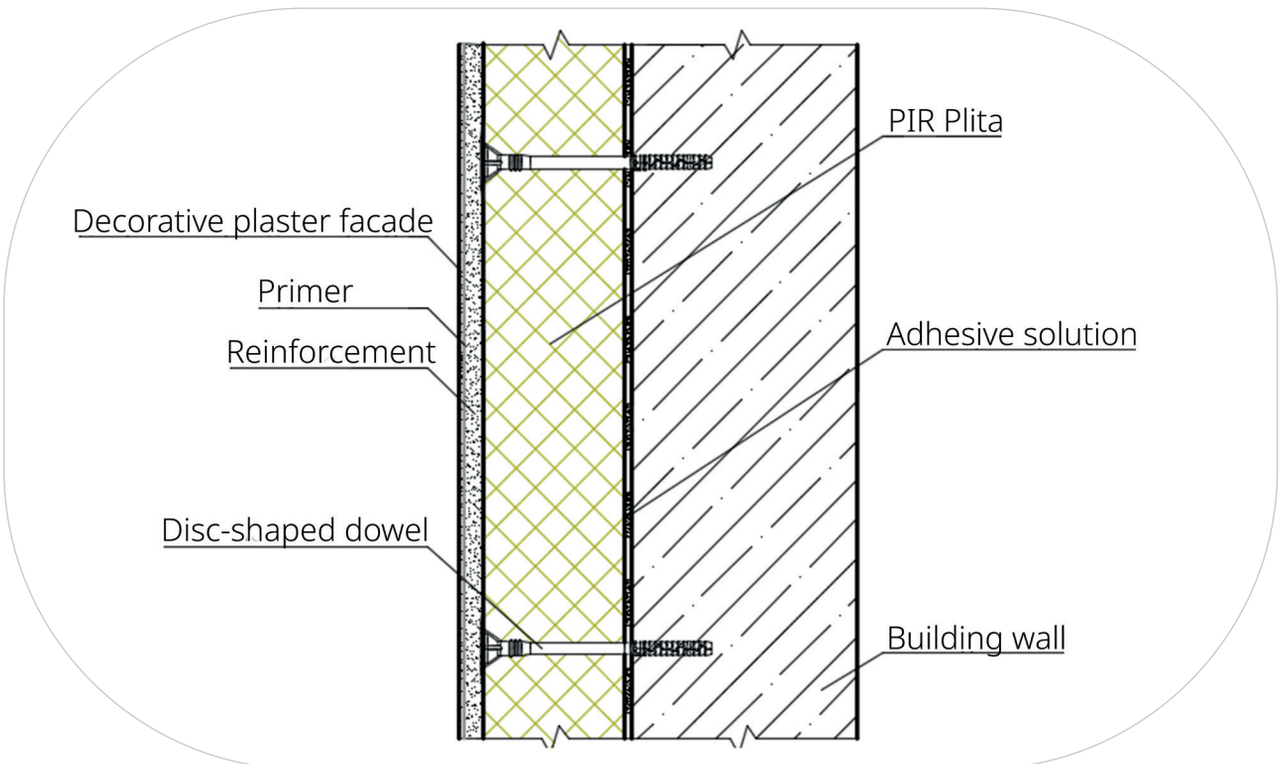
Layers of the enclosing structure and their characteristics:

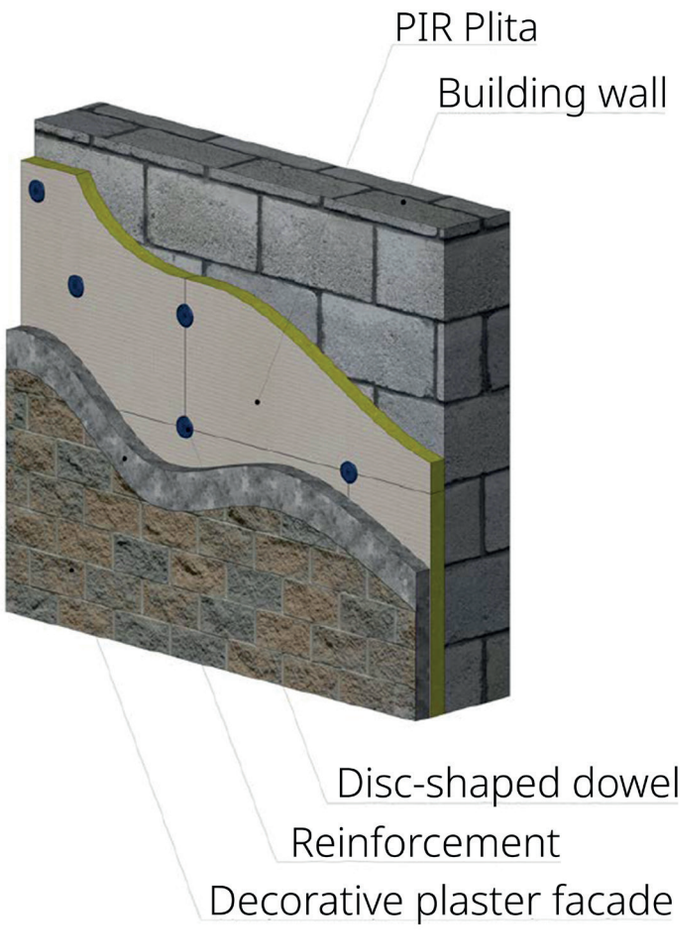
Type of layer of the enclosing structure	Thickness of the layer, mm	Thermal conductivity λ, W / ($m^2 \cdot {}^0C$)
Common clay brick	510	0.7
PIR Plita®	δ	0.026

The heat-insulating PIR Plita® layer for a wall, consisting of 510 mm of ordinary clay brick, should be 90 mm thick.

23. WALL WITH PIR PLITA® AND ADDITIONAL PLASTERING

Figure 19.
Application of PIR Plita® with a wall and additional plaster





DESCRIPTION

Before starting work, the surfaces which are to be insulated should be freed and cleaned from any splashes of concrete, masonry mortar, old fragile plaster, oil stains, as well as from any protruding parts that are not actually part of the building structure.

The thermal insulation layer should be installed after the external window and door blocks have been fitted, as well as after the completion of all internal work related to “wet” processes (masonry, concrete and plastering work).

The installation of thermal insulation boarding should be done in stages (if several layers are provided). You should install the thermal insulation boards from the bottom up, observing the rules for connecting the joints. The attaching of PIR Plita® boards to the wall should be done using special glue and disc-shaped dowels. Moreover, the area of the glue should cover should be at least 40% of the total area of the boarding.

After fixing the insulation boards, a reinforcing/strengthening material is applied to it, on top of which a finishing facade coating (plaster) is added.

For this type of insulation, PIR Plita® is manufactured with CARBOGLASS LIGHT covering on one side and STONEGLASS 300 covering on the other side.

When using PIR Plita® as the main layer of thermal insulation, it is necessary to provide fire stoppers made from non-combustible materials.

POTENTIAL APPLICATION

Plastering is widely used both in the construction of multi-storey housing and in the construction of private houses. The popularity of the plaster facade is due to the simplicity of the work and the wide range of various finishes.

CALCULATION OF THE NECESSARY THICKNESS OF PIR PLITA® WHEN INSULATING A WALL

Location of the object – Moscow, Copenhagen.
Building type — administrative building.
The enclosing structure is a wall.
Internal air temperature: 20 °C
Average temperature of the outside air during the heating period — minus 3.6 °C
Duration of the heating period — 213 days.

Layers of the enclosing structure and their characteristics:

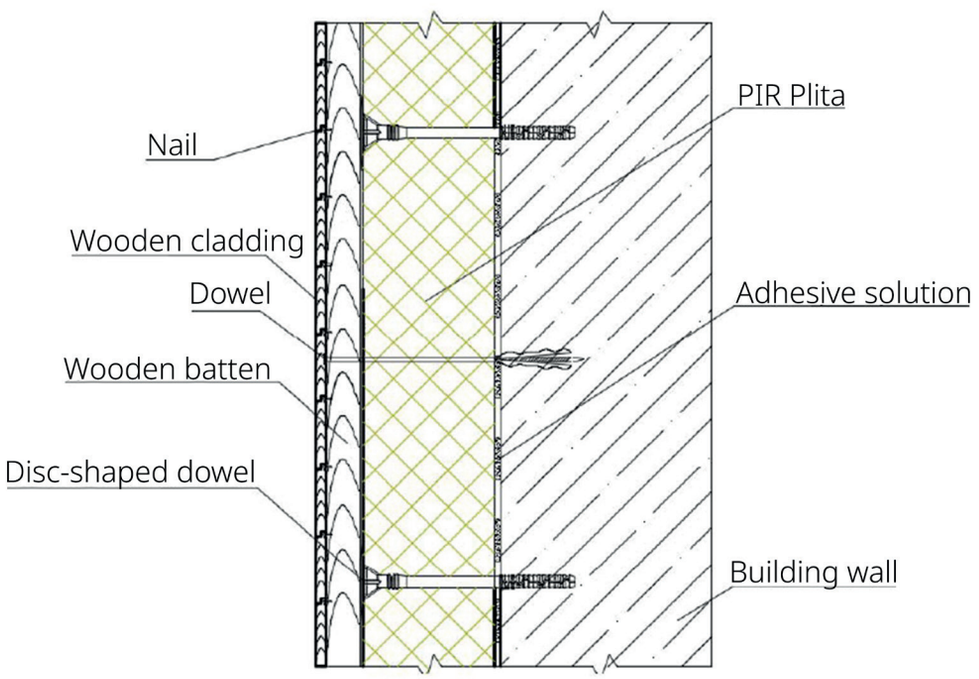
Type of layers of the enclosing structure	Thickness of the layers, mm	Thermal conductivity λ, W / ($m^2 \cdot {}^0C$)

Aerated concrete	380	0.26
PIR Plita®	δ	0.031
Plaster finishing layer	7	0.87

The heat-insulating layer of PIR Plita® for the wall must be 50 mm thick.

24. WALL WITH PIR PLITA® AND WOODEN CLADDING

Figure 20.
Application of PIR Plita® with a wall and wooden cladding



DESCRIPTION

The preparation of the surface of the wall which is to be insulated and subsequent attachment of the PIR boarding is done in the same way as the previous version of insulation with plastering.

On top of the heat-insulating layer, wooden battens are fixed to which the wooden cladding will be fastened.

After fixing the insulation, a reinforcing compound is applied to it, on top of which a finishing facade coating (plaster) is arranged.

For this type of insulation, PIR Plita® is manufactured with a STONEGLASS B EVO covering, which is a fiberglass covering with the addition of graphite and a fire retardant coating.

When using PIR Plita® as the main layer of thermal insulation, it is necessary to provide fire stoppers made from non-combustible materials.

POTENTIAL APPLICATION

The cladding of a wall with wood is most often used in private low-rise construction. One of the advantages of using wooden cladding is the simplicity and speed of its installation. A wall of PIR Plita PIR Plita® insulation boards and wooden cladding will be long lasting and will improve the indoor climate.

CALCULATION OF THE NECESSARY THICKNESS OF PIR PLITA® WHEN INSULATING A WALL
Location of the building: Zagreb/Milan/Bordeaux/Montreal.
Building type — residential building
Internal air temperature tv: 20 °C.
Average temperature of the outside air during the heating period tht — plus 2 °C.
Duration of the heating period zfrom — 149 days.

Layers of the enclosing structure and their characteristics:

Types of layers of the enclosing structure	Thickness of layer, mm	Thermal conductivity λ, W / ($m^2 \cdot {}^0C$)
Aerated concrete	300	0.22
PIR Plita®	δ	0.026
Wooden cladding	15	0.18

The thermal insulation layer of PIR boarding for a wall to be insulated must be 40 mm thick.
This calculation was made for an outer wall of a residential building in Krasnodar.

DECLARATION OF PERFORMANCE

CE

No: DoP – 005-2020

1	**Product Type:** Unique identification code of the product-type	**Thermal insulation products for building, factory made rigid polyurethane foam (PU)**
2	**Type**, batch or serial number or any other element allowing identification of the construction product as required under Article 11(4):	**PIR Plita® Board with rigid polyisocyanurate (PIR) with fiberglass/fiberglass covering**
3	**Intended use** or uses of the construction product, in accordance with the applicable harmonised technical specification, as foreseen by the manufacturer:	**Product is intended to use as thermal insulation for building**
4	**Name, registered trade name** or registered trade mark and contact address of the manufacturer as required under Article 11(5)::	**ProfHolod Ltd.** 141100, Moscow region, Schelkovo district, Schelkovo, Agrohim territory, building 58. Tel.: +7 (495) 745-01-37, E-mail: info@profholod.com
5	**Contact address**: Name and contact address of the official representative in EU	**Self-employed Akopyan A.** Contact address: Ernst-Lemmer Str. 14 35041 Marburg, DE 255 410046, Tel.: 0049 174 922 35 16, E-mail: arakel@arakel.de
6	**AVCP:** System of assessment and verification of constancy of performance (AVCP):	**System 3**
7	**Harmonized standard:**	**EN 13165:2012+A2:2017**
	Notified bodies: In case of the Declaration of Performance (DoP) concerning a construction product covered by a harmonised standard	**Building Research Institute – Certification Company, Ltd. (VUPS), NB 1516**, Prague, Prazska 16, Czech Republic. **Forest and Wood Products Research and Development Institute, Testing laboratory (MeKA), NB 2040**, Dobeles str. 41, Jelgava, Latvia **Institute for Testing and Certification (ITC ZLIN)**, **NB 1023**, trida Tomase Bati 299, Louky, 763 02 Zlin, Czech Republic
	Test reports VUPS:	**No. 1516-CPR-20-0023**, Issue date: 04.02.2020 **No. A 018/ 2020**, Issue date: 30.01.2020.
	Test reports MeKA:	**No. 5080-2/2020**, Issue date: 21.10.2020. Classification on reaction to fire **K51/2020**, Issue date: 21.10.2020
	Test report ITC ZLIN:	**No. 412109562-02,** Issue date: 20.02.2020.
8	**Notified body (ETA):** In case of the Declaration of Performance concerning a construction product for which a European Technical Assessment (ETA) has been issued:	**Not applicable** (refer to item 7)
9	Declared performance:	**Presented in Table 1**

Table 1

Essential characteristics	Performance			Harmonised technical specification
Density of PIR insulating core	**37,23 kg/m³**			**EN 13165:2012+ A2:2016**
Reaction to fire (EN 13501-1)	**Class E**			
Thermal resistance (EN 12667)	Nominal thickness of the product d_N [mm]	Statistic value of thermal resistance $R_{90/90}$ [mm² ·K/W]	Statistic of aged values of thermal resistance $R_{90/90,a}$ [mm² ·K/W]	
	25	1,08	0,87	
	30	1,30	1,05	
	40	1,72	1,40	
	50	2,15	1,75	
	60	2,58	2,10	
	70	3,02	2,54	
	80	3,45	2,90	
	90	3,88	3,26	
	100	4,35	3,65	
	120	5,22	4,38	
	140	6,09	5,11	
	150	6,52	5,47	
Thermal conductivity λ_D	Statistical value of thermal conductivity, for declared λ_D			
	Statistic value of thermal conductivity	$\lambda_{90/90}$	0,023 W/(m · K)	
	Statistical of aged values of thermal conductivity, for declared $\lambda_{D,a}$			
	Thermal conductivity of initial values: mean statistical	$\lambda_{mean,i}$ $\lambda_{90/90,i}$	0,02120 W(m·K) 0,02246 W/(m.K)	
	Aged values of thermal conductivity **λ90/90,** non or diffusion open facing, d_N < 80 mm d_N ≥ 80 mm	$\lambda_{90/90,a}$ $\lambda_{90/90,a}$	0,028 W/(m·K) 0,027 W/(m·K)	
Comprehensive strength			CS (10\Y)130	
Water absorption	Short term water absorption, W_p [kg ·m⁻²]		0,15	
Dimensional stability			DS (70,-)4 DS (23,90)2	
Tensile / Flexural strength	Tensile strength perpendicular to faces		TR40	
Acoustic absorption index	Sound absorption		NPD	
Release of dangerous substances	Pentachlorophenol, mg/kg Formaldehyde emission, mg/kg		< 1 < 0,012	

10 The performance of the product identified in points 1 and 2 is in conformity with the declared performance in point 7. This declaration of performance is issued under the sole responsibility of the manufacturer identified in point 4.

Signed for and on behalf of the manufacturer by :

General Director of ProfHolod Ltd. Sergey Tokmakov Schelkovo, Russia, 03/02/2021 ..... Issue place and date	..... Signature

Declaration of performance PIR board with fiberglass-fiberglass soft linings. Continued

CE
ProfHolod Ltd. **141100, Moscow region, Schelkovo district, Schelkovo, Agrohim territory, building 58.** **Tel.: +7 (495) 745-01-37, E-mail: info@profholod.com** **20**
EN 13165:2012+A2:2016 **PIR Plita® Board with rigid polyisocyanurate (PIR) with fiberglass/fiberglass covering** **Product is intended to use as thermal insulation for building**
Reaction to fire: E **Thermal resistance $R_{90/90,a}$ accounting for aging 25(0,87), 30(1,05), 40(1,40), 50(1,75), 60(2,10), 70(2,54), 80(2,90), 90(3,26), 100(3,65), 120(4,38), 140(5,11), 150(5,47) mm² ·K/W** **Thermal conductivity coefficient accounting for aging λ_D 0,023 W/(m·K)** **Thicknesses: 25, 30, 40, 50, 60, 70, 80, 90, 100, 120, 140, 150 mm**

PROFHOLOD

DECLARATION OF PERFORMANCE

CE

No: DoP – 007-2020

1	**Product Type:** Unique identification code of the product-type	**Thermal insulation products for building, factory made rigid polyurethane foam (PU)**
2	**Type**, batch or serial number or any other element allowing identification of the construction product as required under Article 11(4):	**PIR Plita® Board with rigid polyisocyanurate (PIR) with film/film covering**
3	**Intended use** or uses of the construction product, in accordance with the applicable harmonised technical specification, as foreseen by the manufacturer:	**Product is intended to use as thermal insulation for building**
4	**Name, registered trade name** or registered trade mark and contact address of the manufacturer as required under Article 11(5)::	**ProfHolod Ltd.** 141100, Moscow region, Schelkovo district, Schelkovo, Agrohim territory, building 58. Tel.: +7 (495) 745-01-37, E-mail: info@profholod.com
5	**Contact address**: Name and contact address of the official representative in EU	**Self-employed Akopyan A.** Contact address: Ernst-Lemmer Str. 14 35041 Marburg, DE 255 410046, Tel.: 0049 174 922 35 16, E-mail: arakel@arakel.de
6	**AVCP:** System of assessment and verification of constancy of performance (AVCP):	**System 3**
7	**Harmonized standard:** **Notified bodies:** In case of the Declaration of Performance (DoP) concerning a construction product covered by a harmonised standard Test reports VUPS: Test reports MeKA: Test report ITC ZLIN:	**EN 13165:2012+A2:2017** **Building Research Institute – Certification Company, Ltd. (VUPS), NB 1516**, Prague, Prazska 16, Czech Republic. **Forest and Wood Products Research and Development Institute, Testing laboratory (MeKA), NB 2040**, Dobeles str. 41, Jelgava, Latvia **Institute for Testing and Certification (ITC ZLIN)**, **NB 1023**, trida Tomase Bati 299, Louky, 763 02 Zlin, Czech Republic **No. 1516-CPR-20-0023**, Issue date: 04.02.2020 **No. A 018/ 2020**, Issue date: 30.01.2020. **No. 5080-3/2020**, Issue date: 21.10.2020. Classification on reaction to fire **K52/2020**, Issue date: 21.10.2020 **No. 412109562-02,** Issue date: 20.02.2020.
8	**Notified body (ETA):** In case of the Declaration of Performance concerning a construction product for which a European Technical Assessment (ETA) has been issued:	**Not applicable** (refer to item 7)
9	Declared performance:	**Presented in Table 1**

Declaration of performance PIR board with film-film soft linings. Continued

Table 1

Essential characteristics	Performance			Harmonised technical specification
Density of PIR insulating core	**37,23 kg/m³**			**EN 13165:2012+ A2:2016**
Reaction to fire (EN 13501-1)	**Class F**			
Thermal resistance (EN 12667)	Nominal thickness of the product d_N [mm]	Statistic value of thermal resistance $R_{90/90}$ [mm² ·K/W]	Statistic of aged values of thermal resistance $R_{90/90,a}$ [mm² ·K/W]	
	25	1,08	0,87	
	30	1,30	1,05	
	40	1,72	1,40	
	50	2,15	1,75	
	60	2,58	2,10	
	70	3,02	2,54	
	80	3,45	2,90	
	90	3,88	3,26	
	100	4,35	3,65	
	120	5,22	4,38	
	140	6,09	5,11	
	150	6,52	5,47	
Thermal conductivity λ_D	Statistical value of thermal conductivity, for declared λ_D			
	Statistic value of thermal conductivity	$\lambda_{90/90}$	0,023 W/(m · K)	
	Statistical of aged values of thermal conductivity, for declared $\lambda_{D,a}$			
	Thermal conductivity of initial values: mean statistical	$\lambda_{mean,i}$ $\lambda_{90/90,i}$	0,02120 W(m·K) 0,02246 W/(m.K)	
	Aged values of thermal conductivity **λ90/90,** non or diffusion open facing, d_N < 80 mm $d_N \geq 80$ mm	$\lambda_{90/90,a}$ $\lambda_{90/90,a}$	0,028 W/(m·K) 0,027 W/(m·K)	
Comprehensive strength			CS (10\Y)130	
Water absorption	Short term water absorption, W_p [kg ·m^{-2}]		0,15	
Dimensional stability			DS (70.-)4 DS (23,90)2	
Tensile / Flexural strength	Tensile strength perpendicular to faces		TR40	
Acoustic absorption index	Sound absorption		NPD	
Release of dangerous substances	Pentachlorophenol, mg/kg Formaldehyde emission, mg/kg		< 1 < 0,012	

10 The performance of the product identified in points 1 and 2 is in conformity with the declared performance in point 7. This declaration of performance is issued under the sole responsibility of the manufacturer identified in point 4.

Signed for and on behalf of the manufacturer by :

General Director of ProfHolod Ltd. Sergey Tokmakov Schelkovo, Russia, 03/02/2021 ..... Issue place and date	 ..... Signature

Declaration of performance PIR board with film-film soft linings. Continued

CE
ProfHolod Ltd. **141100, Moscow region, Schelkovo district, Schelkovo, Agrohim territory, building 58.** **Tel.: +7 (495) 745-01-37, E-mail: info@profholod.com** **20**
EN 13165:2012+A2:2016 **PIR Plita® Board with rigid polyisocyanurate (PIR) with film/film covering** **Product is intended to use as thermal insulation for building**
Reaction to fire: F **Thermal resistance $R_{90/90,a}$ accounting for aging 25(0,87), 30(1,05), 40(1,40), 50(1,75), 60(2,10), 70(2,54), 80(2,90), 90(3,26), 100(3,65), 120(4,38), 140(5,11), 150(5,47) mm² ·K/W** **Thermal conductivity coefficient accounting for aging λ_D 0,023 W/(m·K)** **Thicknesses: 25, 30, 40, 50, 60, 70, 80, 90, 100, 120, 140, 150 mm**

DECLARATION OF PERFORMANCE

CE

No: DoP – 006-2020

1	**Product Type:** Unique identification code of the product-type	**Thermal insulation products for building, factory made rigid polyurethane foam (PU)**
2	**Type**, batch or serial number or any other element allowing identification of the construction product as required under Article 11(4):	**PIR Plita® Board with rigid polyisocyanurate (PIR) with foil/foil covering**
3	**Intended use** or uses of the construction product, in accordance with the applicable harmonised technical specification, as foreseen by the manufacturer:	**Product is intended to use as thermal insulation for building**
4	**Name, registered trade name** or registered trade mark and contact address of the manufacturer as required under Article 11(5)::	**ProfHolod Ltd.** 141100, Moscow region, Schelkovo district, Schelkovo, Agrohim territory, building 58. Tel.: +7 (495) 745-01-37, E-mail: info@profholod.com
5	**Contact address**: Name and contact address of the official representative in EU	**Self-employed Akopyan A.** Contact address: Ernst-Lemmer Str. 14 35041 Marburg, DE 255 410046, Tel.: 0049 174 922 35 16, E-mail: arakel@arakel.de
6	**AVCP:** System of assessment and verification of constancy of performance (AVCP):	**System 3**
7	**Harmonized standard:**	**EN 13165:2012+A2:2017**
	Notified bodies: In case of the Declaration of Performance (DoP) concerning a construction product covered by a harmonised standard	**Building Research Institute – Certification Company, Ltd. (VUPS), NB 1516**, Prague, Prazska 16, Czech Republic. **Forest and Wood Products Research and Development Institute, Testing laboratory (MeKA), NB 2040**, Dobeles str. 41, Jelgava, Latvia **Institute for Testing and Certification (ITC ZLIN), NB 1023**, trida Tomase Bati 299, Louky, 763 02 Zlin, Czech Republic
	Test reports VUPS:	**No. 1516-CPR-20-0023**, Issue date: 04.02.2020 **No. A 018/ 2020**, Issue date: 30.01.2020.
	Test reports MeKA:	**No. 5080-1/2020**, Issue date: 21.10.2020. Classification on reaction to fire **K51/2020**, Issue date: 21.10.2020
	Test report ITC ZLIN:	**No. 412109562-02,** Issue date: 20.02.2020.
8	**Notified body (ETA):** In case of the Declaration of Performance concerning a construction product for which a European Technical Assessment (ETA) has been issued:	**Not applicable** (refer to item 7)
9	Declared performance:	**Presented in Table 1**

Declaration of performance PIR board with foil-foil soft linings. Continued

Table 1

Essential characteristics	Performance			Harmonised technical specification
Density of PIR insulating core	**37,23 kg/m³**			**EN 13165:2012+ A2:2016**
Reaction to fire (EN 13501-1)	**Class E**			
Thermal resistance (EN 12667)	Nominal thickness of the product d_N [mm]	Statistic value of thermal resistance $R_{90/90}$ [mm² ·K/W]	Statistic of aged values of thermal resistance $R_{90/90,a}$ [mm² ·K/W]	
	25	1,08	0,87	
	30	1,30	1,05	
	40	1,72	1,40	
	50	2,15	1,75	
	60	2,58	2,10	
	70	3,02	2,54	
	80	3,45	2,90	
	90	3,88	3,26	
	100	4,35	3,65	
	120	5,22	4,38	
	140	6,09	5,11	
	150	6,52	5,47	
Thermal conductivity λ_D	Statistical value of thermal conductivity, for declared λ_D			
	Statistic value of thermal conductivity	$\lambda_{90/90}$	0,023 W/(m · K)	
	Statistical of aged values of thermal conductivity, for declared $\lambda_{D,a}$			
	Thermal conductivity of initial values: mean statistical	$\lambda_{mean,i}$ $\lambda_{90/90,i}$	0,02120 W(m·K) 0,02246 W/(m.K)	
	Aged values of thermal conductivity **λ90/90**, non or diffusion open facing, d_N < 80 mm $d_N \geq 80$ mm	$\lambda_{90/90,a}$ $\lambda_{90/90,a}$	0,028 W/(m·K) 0,027 W/(m·K)	
Comprehensive strength			CS (10\Y)130	
Water absorption	Short term water absorption, W_P [kg ·m^{-2}]		0,15	
Dimensional stability			DS (70.-)4 DS (23,90)2	
Tensile / Flexural strength	Tensile strength perpendicular to faces		TR40	
Acoustic absorption index	Sound absorption		NPD	
Release of dangerous substances	Pentachlorophenol, mg/kg Formaldehyde emission, mg/kg		< 1 < 0,012	

10 The performance of the product identified in points 1 and 2 is in conformity with the declared performance in point 7. This declaration of performance is issued under the sole responsibility of the manufacturer identified in point 4.

Signed for and on behalf of the manufacturer by :

General Director of ProfHolod Ltd. Sergey Tokmakov Schelkovo, Russia, 03/02/2021 ..... Issue place and date	 ..... Signature

Declaration of performance PIR board with foil-foil soft linings. Continued

CE
ProfHolod Ltd. **141100, Moscow region, Schelkovo district, Schelkovo, Agrohim territory, building 58.** **Tel.: +7 (495) 745-01-37, E-mail: info@profholod.com** **20**
EN 13165:2012+A2:2016 **PIR Plita® Board with rigid polyisocyanurate (PIR) with foil/foil covering** **Product is intended to use as thermal insulation for building**
Reaction to fire: E **Thermal resistance $R_{90/90,a}$ accounting for aging 25(0,87), 30(1,05), 40(1,40), 50(1,75), 60(2,10), 70(2,54), 80(2,90), 90(3,26), 100(3,65), 120(4,38), 140(5,11), 150(5,47) mm² ·K/W** **Thermal conductivity coefficient accounting for aging λ_D 0,023 W/(m·K)** **Thicknesses: 25, 30, 40, 50, 60, 70, 80, 90, 100, 120, 140, 150 mm**

Declaration of performance PIR board with paper-paper soft linings

DECLARATION OF PERFORMANCE

No: DoP – 008-2020

1	**Product Type:** Unique identification code of the product-type	**Thermal insulation products for building, factory made rigid polyurethane foam (PU)**
2	**Type**, batch or serial number or any other element allowing identification of the construction product as required under Article 11(4):	**PIR Plita® Board with rigid polyisocyanurate (PIR) with paper/paper covering**
3	**Intended use** or uses of the construction product, in accordance with the applicable harmonised technical specification, as foreseen by the manufacturer:	**Product is intended to use as thermal insulation for building**
4	**Name, registered trade name** or registered trade mark and contact address of the manufacturer as required under Article 11(5)::	**ProfHolod Ltd.** 141100, Moscow region, Schelkovo district, Schelkovo, Agrohim territory, building 58. Tel.: +7 (495) 745-01-37, E-mail: info@profhold.com
5	**Contact address**: Name and contact address of the official representative in EU	**Self-employed Akopyan A.** Contact address: Ernst-Lemmer Str. 14 35041 Marburg, DE 255 410046, Tel.: 0049 174 922 35 16, E-mail: arakel@arakel.de
6	**AVCP:** System of assessment and verification of constancy of performance (AVCP):	**System 3**
7	**Harmonized standard:**	**EN 13165:2012+A2:2017**
	Notified bodies: In case of the Declaration of Performance (DoP) concerning a construction product covered by a harmonised standard	**Building Research Institute – Certification Company, Ltd. (VUPS), NB 1516**, Prague, Prazska 16, Czech Republic. **Forest and Wood Products Research and Development Institute, Testing laboratory (MeKA), NB 2040**, Dobeles str. 41, Jelgava, Latvia **Institute for Testing and Certification (ITC ZLIN)**, **NB 1023**, trida Tomase Bati 299, Louky, 763 02 Zlin, Czech Republic
	Test reports VUPS:	**No. 1516-CPR-20-0023**, Issue date: 04.02.2020 **No. A 018/ 2020**, Issue date: 30.01.2020.
	Test reports MeKA:	**No. 5080-4/2020**, Issue date: 21.10.2020. Classification on reaction to fire **K52/2020**, Issue date: 21.10.2020
	Test report ITC ZLIN:	**No. 412109562-02,** Issue date: 20.02.2020.
8	**Notified body (ETA):** In case of the Declaration of Performance concerning a construction product for which a European Technical Assessment (ETA) has been issued:	**Not applicable** (refer to item 7)
9	Declared performance:	**Presented in Table 1**

Table 1

Essential characteristics	Performance			Harmonised technical specification
Density of PIR insulating core	**37,23 kg/m³**			**EN 13165:2012+ A2:2016**
Reaction to fire (EN 13501-1)	**Class F**			
Thermal resistance (EN 12667)	Nominal thickness of the product d_N [mm]	Statistic value of thermal resistance $R_{90/90}$ [mm² ·K/W]	Statistic of aged values of thermal resistance $R_{90/90,a}$ [mm² ·K/W]	
	25	1,08	0,87	
	30	1,30	1,05	
	40	1,72	1,40	
	50	2,15	1,75	
	60	2,58	2,10	
	70	3,02	2,54	
	80	3,45	2,90	
	90	3,88	3,26	
	100	4,35	3,65	
	120	5,22	4,38	
	140	6,09	5,11	
	150	6,52	5,47	
Thermal conductivity λ_D	Statistical value of thermal conductivity, for declared λ_D			
	Statistic value of thermal conductivity	$\lambda_{90/90}$	0,023 W/(m · K)	
	Statistical of aged values of thermal conductivity, for declared $\lambda_{D,a}$			
	Thermal conductivity of initial values: mean statistical	$\lambda_{mean,i}$ $\lambda_{90/90,i}$	0,02120 W(m·K) 0,02246 W/(m.K)	
	Aged values of thermal conductivity **λ90/90**, non or diffusion open facing, d_N < 80 mm $d_N \geq 80$ mm	$\lambda_{90/90,a}$ $\lambda_{90/90,a}$	0,028 W/(m·K) 0,027 W/(m·K)	
Comprehensive strength			CS (10\Y)130	
Water absorption	Short term water absorption, W_P [kg ·m⁻²]		0,15	
Dimensional stability			DS (70.-)4 DS (23,90)2	
Tensile / Flexural strength	Tensile strength perpendicular to faces		TR40	
Acoustic absorption index	Sound absorption		NPD	
Release of dangerous substances	Pentachlorophenol, mg/kg Formaldehyde emission, mg/kg		< 1 < 0,012	

10 The performance of the product identified in points 1 and 2 is in conformity with the declared performance in point 7. This declaration of performance is issued under the sole responsibility of the manufacturer identified in point 4.

Signed for and on behalf of the manufacturer by :

General Director of ProfHolod Ltd. Sergey Tokmakov Schelkovo, Russia, 03/02/2021 ..... Issue place and date	 ..... Signature

Declaration of performance PIR board with paper-paper soft linings. Continued

CE
ProfHolod Ltd. **141100, Moscow region, Schelkovo district, Schelkovo, Agrohim territory, building 58.** **Tel.: +7 (495) 745-01-37, E-mail: info@profholod.com** **20**
EN 13165:2012+A2:2016 **PIR Plita® Board with rigid polyisocyanurate (PIR) with paper/paper covering** **Product is intended to use as thermal insulation for building**
Reaction to fire: F **Thermal resistance $R_{90/90,a}$ accounting for aging 25(0,87), 30(1,05), 40(1,40), 50(1,75), 60(2,10), 70(2,54), 80(2,90), 90(3,26), 100(3,65), 120(4,38), 140(5,11), 150(5,47) mm² ·K/W** **Thermal conductivity coefficient accounting for aging λ_D 0,023 W/(m·K)** **Thicknesses: 25, 30, 40, 50, 60, 70, 80, 90, 100, 120, 140, 150 mm**