termPIR®
insulation boards

Insulation boards from Gór-Stal

termPIR® INSULATION BOARDS

FLAT ROOF INSTALLATION INSTRUCTIONS

termPIR® insulation boards

1. INTRODUCTION

Gór-stal manufactures PIR insulation boards that are ideal for a variety of flat roof systems, including systems with bitumen roofing and synthetic membranes on concrete, trapezoidal sheet or wood substrates. Installing PIR insulation boards on flat roofs definitely increases the energy efficiency of the building if done correctly.

This installation manual describes technical solutions of Gór-Stal on flat roofs. Before installing insulation boards on flat roofs, read and carefully follow the installation instructions below.

termPIR® insulation boards

2. STORING AND HANDLING INSULATION BOARDS

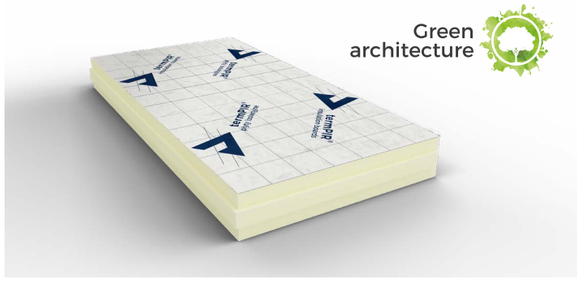
To ensure high performance of the insulation, the following recommendations must be observed:

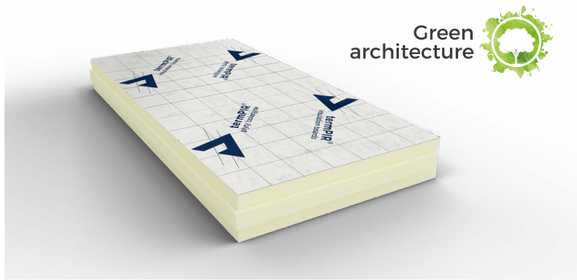
- The termPIR® insulation boards must always be dry. This applies to both the storage and installation of the boards. At the end of the working day, the installed boards shall be covered and protected from rain, snow and ice. Moist insulation cannot be used in roof systems and must be replaced. At all times during the installation of the flat roof, it must be protected against penetration of water into the system.
- Protect the boards, packages and stacks of PIR boards from direct sunlight during storage.
- The packaging of termPIR® insulation boards cannot be regarded as a shield against water and solar radiation.
- Boards should not be stored directly on the ground (use washers). A minimum distance of 12 cm between the substrate and the first board is recommended.
- Stacks of insulation boards should not be higher than 3m.
- Stacks of termPIR® boards should be protected from slipping or being dropped by gusts of wind.
- Storage of the boards on the roof should be done close to the place of installation to avoid unnecessary movement (and thus the possibility of mechanical damage) of the boards.
- When storing boards on the roof, consider guidelines for roof structure load capacity, fire safety and wind protection. Stored boards must never block safety paths. Boards must not be stored in the immediate vicinity of heat sources such as: membrane welding equipment or hot bitumen spreaders.
- Only packages from which boards will be mounted and covered on the same working day may be opened.
- The termPIR® boards should be stored on site only for the time necessary for the standard construction process, i.e. continuous work associated with the installation of all elements of the roof system
- Do not place any sharp objects on the insulation boards to avoid damaging the surface of the boards.
- Inspect boards for damage before installation. If you have any doubts as to the condition of the board, contact the Gór-Stal technical department.

Detailed information on the transport and storage of boards is available on the website www.termPIR.eu

termPIR® insulation boards

3. PRODUCTS

termPIR® AL	Product details:
Board description: termPIR® AL insulation boards consist of a thermal insulation core of rigid PIR foam. The boards are protected on both sides with a layered gas-tight lining consisting of aluminum (AL), paper and polyethylene.	
Declared heat transfer coefficient for lining:	λ_D = 0,022 W/m·K
Apparent core density:	ρ = 30 kg/m³
Standard boards dimensions [mm]:	600 x 1200 / 1200 x 2400 (minus the depth of the joint)
Available boards dimensions [mm]:	1000 x1200 / 1200 x 1200 / 1200 x 1800 / 1200 x 3000 (minus the depth of the joint)
Joint types:	FIT - flat milling, LAP - stepwise milling*, TAG - tongue and groove*
Board thickness [mm]:	50 - 250

termPIR® MAX 19 AL	Product details:
Board description: The termPIR® MAX19 AL insulation boards comprise a rigid polyisocyanurate foam thermal insulation core, featuring a thermal conductivity coefficient of 0,019 [W/m·K]. The core is protected on both sides by gas resistant multilayer aluminium (AL), paper and polyethylene facings.	
Declared heat transfer coefficient for lining:	λ_D = 0,019 W/m·K
Apparent core density:	ρ = 30 kg/m³
Standard boards dimensions [mm]:	600 x 1200 / 1200 x 2400 (minus the depth of the joint)
Available boards dimensions [mm]:	1000 x1200 / 1200 x 1200 / 1200 x 1800 / 1200 x 3000 (minus the depth of the joint)
Joint types:	FIT - flat milling, LAP - stepwise milling*, TAG - tongue and groove*
Board thickness [mm]:	80 - 160

* dimensions of boards with joint types are 2 to 4 % smaller

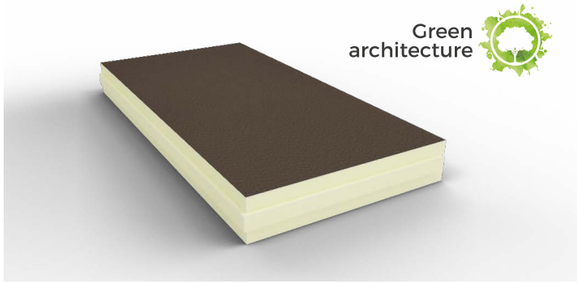
3. PRODUCTS

termPIR® PRIME	Product details:

Board description:

The termPIR® PRIME insulation boards comprise of a PIR rigid foam thermal insulation core. The boards are protected on both sides gas-tight aluminum foil lining with a thickness of 50 µm.
A board intended for insulating flat roofs in glued and mechanical systems.

Advantages of dark cladding:
- Reduction of light reflections (safer and more comfortable working conditions)
- Better masking of work dirt

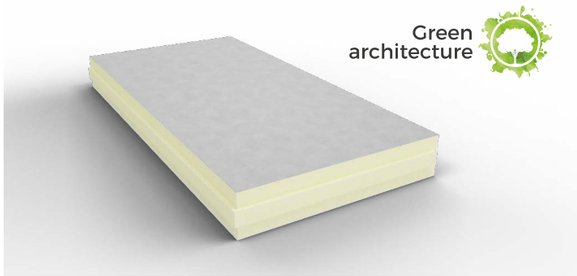


Declared heat transfer coefficient for lining:	λ_D = 0,022 W/m·K
Apparent core density:	ρ = 30 kg/m³
Standard boards dimensions [mm]:	600 x 1200 / 1200 x 2400 (minus the depth of the joint)
Available boards dimensions [mm]:	1000 x1200 / 1200 x 1200 / 1200 x 1800 / 1200 x 3000 (minus the depth of the joint)
Joint types:	FIT - flat milling, LAP - stepwise milling*, TAG - tongue and groove*
Board thickness [mm]:	50 - 200

termPIR® AGRO AL	Product details:

Board description:

The termPIR® AGRO AL insulation boards comprise of a PIR rigid foam thermal insulation core. The boards are protected on both sides with a washable gas tight aluminium foil lining thickness 50 µm (Agro AL).



Declared heat transfer coefficient for lining:	dla (80 ≤ d_N ≤ 220 mm): λ_D = 0,022 W/m·K
Apparent core density:	ρ = 30 kg/m³
Standard boards dimensions [mm]:	600 x 1200 / 1200 x 2400 (minus the depth of the joint)
Available boards dimensions [mm]:	1000 x1200 / 1200 x 1200 / 1200 x 1800 / 1200 x 3000 (minus the depth of the joint)
Joint types:	FIT - flat milling, LAP - stepwise milling*, TAG - tongue and groove*
Board thickness [mm]:	50 - 250

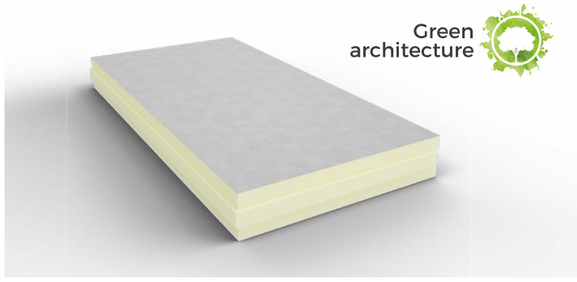
* dimensions of boards with joint types are 2 to 4 % smaller

3. PRODUCTS

termPIR® WS	Product details:

Board description:

The termPIR® WS insulation boards comprise of a PIR rigid foam thermal insulation core.
The boards are protected with gas- permeable lining from glass reticular fibre (WS).



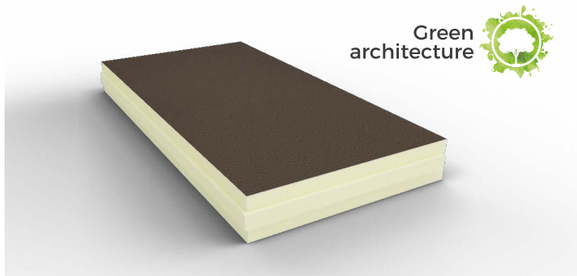
Declared heat transfer coefficient for lining:	λ_D = 0,025 - 0,027 W/m·K
Apparent core density:	ρ = 30 kg/m³
Standard boards dimensions [mm]:	600 x 1200 / 1200 x 2400 (minus the depth of the joint)
Available boards dimensions [mm]:	1000 x1200 / 1200 x 1200 / 1200 x 1800 / 1200 x 3000 (minus the depth of the joint)
Joint types:	FIT - flat milling, LAP - stepwise milling*, TAG - tongue and groove*
Board thickness [mm]:	50 - 250

IZOPROOF® ALu	Product details:

Board description:

The IZOPROOF® ALu insulation boards comprise of a PIR rigid foam thermal insulation core.
The boards are protected on both sides gas-tight aluminum foil lining with a thickness of 50 µm.
A board intended for insulating flat roofs in glued and mechanical systems.

Advantages of dark cladding:
- Reduction of light reflections (safer and more comfortable working conditions)
- Better masking of work dirt



Declared heat transfer coefficient for lining:	λ_D = 0,022 W/m·K
Apparent core density:	ρ = 30 kg/m³
Standard boards dimensions [mm]:	600 x 1200 / 1200 x 2400 (minus the depth of the joint)
Available boards dimensions [mm]:	1000 x1200 / 1200 x 1200 / 1200 x 1800 / 1200 x 3000 (minus the depth of the joint)
Joint types:	FIT - flat milling, LAP - stepwise milling*, TAG - tongue and groove*
Board thickness [mm]:	50 - 150

* dimensions of boards with joint types are 2 to 4 % smaller

4. FLAT ROOF DESIGN

4.1 Roof system design

PIR insulation boards made by Gór-Stal can be installed only in a roof of classic structure. This means that the insulation layer is located above the load-bearing substrate, but only under the waterproofing.

4.2 Vapour barrier

In order to avoid problems with condensation, it is necessary to install a suitable vapour barrier layer. A vapour barrier is characterized by its Sd value, which is an indicator of the product's resistance to water vapour permeability. The performance of this layer will depend on the type of building and its use, often determined by standards in individual countries. The correct installation of a vapour barrier is described by the manufacturer of that coating. Documentation should include information on how to attach the vapour barrier membrane, details, connections, seals, etc. The PIR insulation board can only be installed if the correct type of vapour barrier is used and installed correctly. The most common types of vapour barriers are PE foils, bitumen membranes on glass veils, bitumen membranes on polyester fleece backing, bitumen vapour barriers with aluminium liner and reinforced aluminium foils.

4.3 Pokrycia dachu płaskiego

Roof coverings that can be combined with Gór-Stal boards can be divided into two main groups:

- Bituminous coverings
- Synthetic coatings

4.3.1 Bituminous coverings

Waterproof bitumen coatings consist of one or two layers. Each layer consists of a modified bitumen membrane (e.g. SBS or APP) over a glass felt, polyester fleece backing, a combination of both, or a fiberglass/polyester composite mat. The top side can be finished with a coarse mineral sprinkle, while the bottom side is protected with a plastic film, a fine sprinkle or a removable film. The finish of the bottom side of the roofing felt depends on the installation method (e.g. hot-melt sheet in the case of welding, removable sheet in the case of self-adhesive roofing felt, etc.). The method of installation of bitumen felts depends on the type of membrane and the PIR insulation board. The membrane can be mechanically fixed, welded, loose laid and ballasted, glued (cold glue, hot bitumen, partial or full bond) or self-adhesive. Therefore, the variety of possible roof arrangements is large. Permitted roof systems in combination with Gór-Stal insulation boards are described in the following section.

4.3.2 Synthetic coatings

Synthetic coatings (e.g. EPDM, PVC, TPO/FPO/TPE, etc.) are typically single-layer. There is a wide range of possible membrane types (mechanically unreinforced, reinforced, weldable, with non-woven backing, etc.) and installation methods (e.g. mechanical fixing, cold bonding, single-sided (e.g. PU adhesive) or double-sided (e.g. contact adhesive), loose lay and ballasting, self-adhesive, etc.). Each system has its own specifications, guidelines and accessories. Follow the roofing manufacturer's instructions. Permitted roof systems in combination with Gór-Stal insulation boards are described in the following section.

5. ASSEMBLY INSTRUCTIONS

5.1 Choosing the method of fixing the insulation board

The roof system (i.e., vapour barrier + insulation board + waterproofing) must be adequately attached to the load-bearing substrate so that it can withstand the wind suction forces acting on the roof.

The insulation boards can be glued (partially or completely) or mechanically fixed to the substrate or laid loosely with ballast. The acceptable ways to attach the board will depend mainly on:

- the type of cladding on the board
- board sizestype of substrate

Considering the above (excluding the type of substrate), the permitted methods for installing insulation boards are shown in the table below.

Board	Dimension [mm]	MM	BA	Glue - Z	Glue - C
termPIR® AL	1200x2400	■			
	1200x1200	■			
	600x1200	■	■		
termPIR® MAX 19 AL	1200x2400	■			
	1200x1200	■			
	600x1200	■	■		
termPIR® PRIME	1200x2400	■			■
	1200x1200	■			■
	600x1200	■	■		■
termPIR® AGRO AL	1200x2400	■			
	1200x1200	■			
	600x1200	■	■		
termPIR® WS	1200x2400	■		■	■
	1200x1200	■		■	■
	600x1200	■	■	■	■
IZOPROOF® Alu	1200x2400	■		■	■
	1200x1200	■		■	■
	600x1200	■	■	■	■

Legend:

MM: mechanical assembly | **BA:** ballast load | **Glue-Z:** cold bonding with polyurethane adhesive
Glue-C: hot bonding with bitumen glue

The term „cold bonding" can refer to both bitumen adhesives (bitumen adhesive solutions) and synthetic cold adhesives. PU spray adhesive, PU foam adhesive, PU liquid adhesive, solvent based contact adhesives are examples of synthetic cold bonding.

The term „hot bonding" refers to hot-applied bitumen binders.

Although the above application methods are theoretically allowed, practical aspects will also determine the effectiveness of the method used. More details on the application methods are given later in the document.

5.2 Fixing of roof coverings to insulation boards

Roof coverings (single or double layer) can be mechanically fastened, loose laid and ballasted or glued (bitumen or synthetic cold bonding). In the case of the two-layer system, the underlayer and the top-cover layer can be fastened differently (e.g. self-adhesive or mechanically fastened underlayer + weldable top layer).

The acceptable types of roofing materials AND their fastening methods depend mainly on:

- type of insulation boards
- board sizes
- type of roofing (bitumen, synthetic).

5.2.1 Bitumen roofing

The permitted bitumen systems are summarized in the table below. The table is valid for a given bitumen membrane in case of single-layer roofing or for an underfelt in case of double-layer roofing. The method of fixing the top layer in two-layer systems is not only determined by the type of insulation boards, but depends on the entire roof system in which it will be used. Ensure that the two layers of coverage are compatible, as guaranteed by the felt manufacturer. In most cases, the top layer is fully welded to the underfelt.

Full bonding is only allowed with bitumen adhesives (cold bitumen adhesive). Note that full-surface bonding always involves a risk of blistering, as moisture and air can be trapped between the membrane and the insulation board. At high temperatures, enclosed air or vapour created from moisture can expand the membrane inside these inclusions, causing blistering. Usually this is just an aesthetic issue, but in the long run it can cause stagnant water or accelerated ageing of the membrane. Thorough workmanship is essential for full-surface bonded systems. Partially adhered systems are recommended and preferred because vapour and air can diffuse under the membrane in areas where it is not bonded to the insulation board.

Board	Dimension [mm]	MM	BA	Glue - Z	Felt - S	Combination*	
						First Felt-S	Second felt-Z
termPIR® AL	1200x2400	■					
	1200x1200	■					
	600x1200	■	■		■		
termPIR® MAX 19 AL	1200x2400	■					
	1200x1200	■					
	600x1200	■	■		■		
termPIR® BWS	1200x2400	■		■	■	■	■
	1200x1200	■		■	■	■	■
	600x1200	■	■	■	■	■	■
IZOPROOF® ALu	1200x2400	■					
	1200x1200	■					
	600x1200	■	■				
termPIR® AGRO AL	1200x2400	■		■			
	1200x1200	■		■			
	600x1200	■	■	■	■	■	■
termPIR® WS	1200x2400	■		■	■	■	■
	1200x1200	■		■	■	■	■
	600x1200	■	■	■	■	■	■

Legend:

MM: mechanical assembly | **BA:** ballast load | **Glue-Z:** weldable underfelt | **Felt-Z:** weldable underfelt | **Felt-S:** self-adhesive underfelt

* for layer combinations: 1st self-adhesive, 2nd and subsequent torch-on

5.2.3 Synthetic single-layer roofing

Synthetic roofing typically consists of a single layer. Appropriate installation instructions are specified for the respective system. Seal the joints according to the membrane manufacturer's guidelines (e.g., welded, glued with double-sided tape, adhesive and sealant, etc.). Please download the manufacturer's documentation for more details.

The note on full-surface bonded bitumen roofing given in paragraph 5.2.1 also applies to synthetic membranes. Furthermore: some synthetic waterproofing membranes are quite flexible and sensitive to thermal expansion (e.g. EPDM), which causes the membrane to wrinkle when the roof is exposed to intense sunlight. This is inherent to such a system and cannot be avoided. If this type of layout is used, the aesthetics of the coverage cannot be guaranteed. In this case, it is recommended to use either a partially bonded system or a type of membrane that is sufficiently dimensionally stable (e.g. reinforced fiberglass insert). An alternative to partially adhered systems may be a full surface adhered membrane with a fleece underneath, in which water vapour can move through the fleece.

5.3 General installation recommendations

During termPIR® installation of Gór-Stal insulating boards, the following rules must be observed:

- Insulation boards should be laid over the vapour barrier or existing roofing. In case of renovation, the condition of the existing waterproof membrane (vapor barrier) has to be checked.
- During the installation of a flat roof, it should be protected against ingress water to the system. It is unacceptable for the already installed boards to get wet, i. g. by rain, snow, or dew on the boards unprotected with waterproofing covering. The most sensitive to moisture are boards with AL-type cladding. It is absolutely forbidden to cover dank thermal insulation boards with roofing. Non-adjustment to the above condition may cause loose of dimensional stability of the thermal insulation board.
- The substrate must be even, dry (no water, ice, snow or frost) and free from dirt and dust before the boards are installed.
- For renovations, check the condition of the existing waterproofing membrane.
- The termPIR® insulation boards are laid in a continuous, tight-fitting manner (no gaps) to avoid thermal bridges and leaks, thus creating a continuous insulation layer.
- The boards should be laid with staggered joints (Photo below). Ideally, the board joints should be offset by half the length of the board side. If it is not possible to offset the joints of the boards by half, the boards should be offset by at least 250 mm.
- When insulation is laid in a single layer, it is recommended that only milled boards be used.
- **When using boards in large format (1200 x 2400 mm), or medium format (1200 x 1200 mm), use only milled boards with LAP type lock.**
- It is not recommended to use elements with sides smaller than 500 mm.
- Ducts for pipes and other building installation components cannot be drilled in the termPIR® insulation boards. A levelling layer should be provided over the potential ducts system.
- Boards cannot be cut to reduce thickness. If a thinner board is required, such as around roof drains, use a board of the required thickness.
- The roof membrane and the vapour barrier must form a completely closed layer around the insulation boards (e.g. by overlapping the vapour barrier with the waterproofing membrane in the roof eaves).
- A flat roof system is always a combination of several layers and materials, in which thermal insulation is only one part. To achieve a positive end result, follow the guidelines of the manufacturers of the materials used. This includes the application of the adhesive (curing time, amount of adhesive, temperature during the work, etc.), the laying of the waterproofing membrane (joint sealing, membrane relaxation, etc.), and the use of mechanical fasteners (type of fasteners, pull-out strength in a given substrate, etc.).

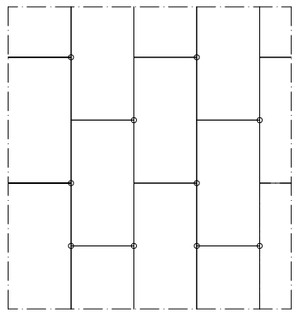


Photo 1. Placement of first layer boards

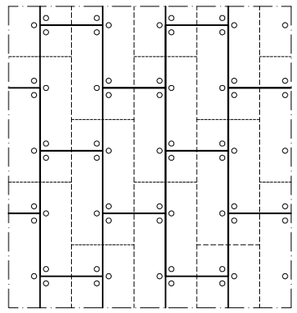


Photo 2. Laying the second layer

5.4 Mechanical installation of insulation boards

5.4.1 General remarks

The mechanical installation of termPIR® insulation boards in a flat roof system is carried out in three stages:

1st stage - installation of vapour barrier
2nd stage - mechanical installation of insulation boards to the substrate.
3rd stage - mechanical or glued roofing installation

Each insulation board must be properly secured to the substrate with mechanical fasteners to prevent detachment by suction wind forces. The selection of the fastener type should be made according to the recommendations of the fastener/pin/anchor supplier based on the characteristics of the particular roof and wind load calculations. The type of fasteners and the depth of their embedding depending on the ground are specified by the fastener manufacturer and must be strictly observed. Attach the waterproofing membrane separately from the insulation boards. The

number of fasteners is determined by the membrane manufacturer (based on wind load calculations and membrane properties). These fixings cannot be considered as fixings of the insulation boards to the substrate. It is recommended to use fasteners with improved insulation (telescopic fasteners) to reduce heat loss due to the thermal bridge effect occurring in the insulation layer on the metal part of the fastener. Use fasteners that have a rebate part in the form of a circle with a diameter of min. 50 mm so that the pressure is sufficiently distributed over the insulation board. Fasteners should not be pressed too tightly to prevent damage to the cladding and core of the boards. At the same time, the fixing must be strong enough to resist wind suction and ensure that the spacer adheres to the insulation board. The overlapping part of the fastener should be slightly recessed in the board to avoid damage to the waterproofing membrane above.

The number of mechanical fasteners securing the board to the substrate per m2 of insulation board should be determined on a case-by-case basis by the competent designer.

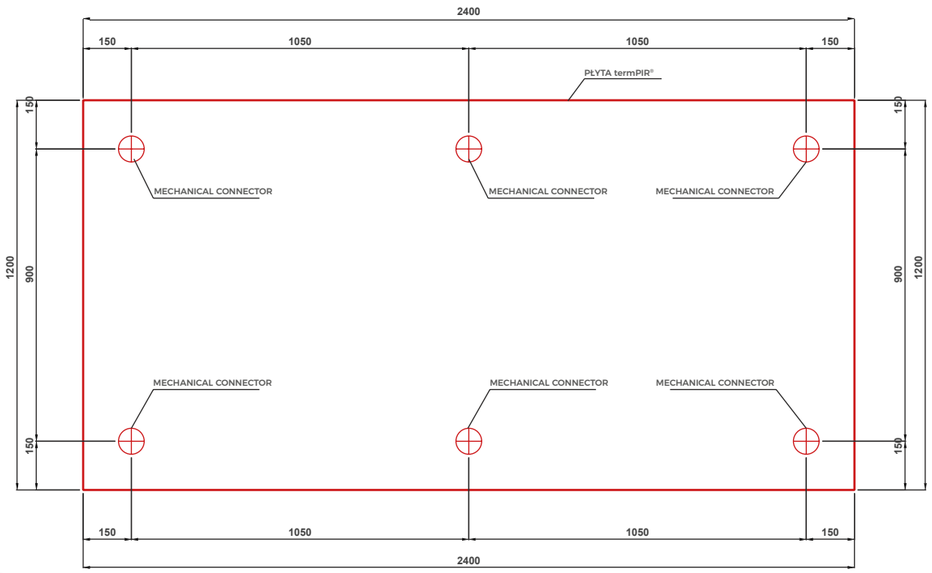


Photo 3.

5.4.2 Arrangement of fasteners for a large board (1200x2400 mm)

In order to ensure safe operation of the roof system, it is important not only to determine the minimum number of mechanical fasteners per m2 of insulation, but also the correct distribution of fasteners on the surface of the board. Each single Gór-Stal insulation board of 1200x2400 mm format, regardless of the number of fasteners per m2 specified by the designer as the absolute minimum, must always be fastened in accordance with the illustrations „Photo 3".

You should pay special attention when the roof waterproofing will be a material whose external surface has a high emissivity coefficient equal to or higher than 0.95 (dark colors – black or close to black, dark matt surfaces). Such a roof covering will put a high thermal load on the insulation boards on sunny days. Therefore, in such a situation each single 1200x2400 mm termPIR® board, regardless of the number of fasteners per sqm specified by the designer as an absolute minimum, must always be fixed in accordance with Photo 4.

In both of the above cases, any additional mechanical fasteners resulting from the designer's calculations should be placed evenly on the internal surface of the termPIR® board, not exceeding the limit of 150 mm from the external perimeter of the board.

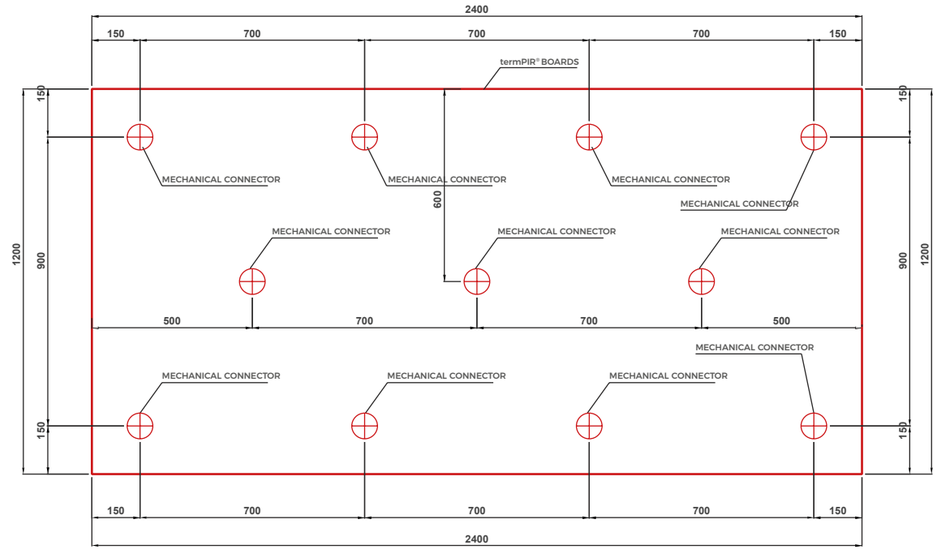
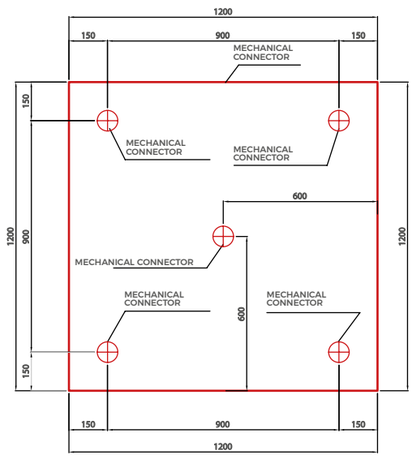


Photo 4.

5.4.3 Arrangement of fasteners for a medium board (1200x1200 mm)

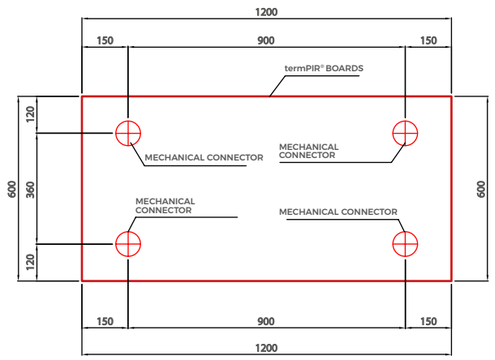
Each single Gór-Stal insulation board of 1200x1200 mm format, regardless of the number of fasteners per m2 specified by the designer as the absolute minimum, must always be fastened in accordance with the illustrations below:



Any additional mechanical fasteners resulting from the designer's calculations should be placed evenly on the inner surface of the insulation board, not exceeding the limit of 150 mm from the outer circumference of the board.

5.4.4 Arrangement of fasteners for a small board (1200x600 mm)

Each single Gór-Stal insulation board of 1200x600 mm format, regardless of the number of fasteners per m2 specified by the designer as the absolute minimum, must always be fastened in accordance with the illustrations below:



Any additional mechanical fasteners resulting from the designer's calculations should be evenly distributed on the inner surface of the insulation board, not exceeding the limit of 150 mm and 120 mm from the outer circumference of the board.

5.4.5 Concrete or reinforced concrete substrate

Mechanical fastening to concrete substrates usually requires pre-drilling and is therefore more time consuming and costly compared to fastening to trapezoidal sheets or wood substrates. Special fasteners are required. The fastener manufacturer must provide the necessary information on the method of installation, the depth of embedding of the dowels and screws and the tear strength of the fasteners. Mechanically fastened systems on concrete substrates are typically used for large format insulation boards.

If the reinforced concrete substrate (e.g. precast TT slabs or hollow-core slabs) is too thin, fastening is only permitted at the rib locations. The exact method of attachment is specified by the manufacturer of the reinforced concrete slabs. The insulation boards are laid with the longer side perpendicular to the length of the precast reinforced concrete slab.

5.4.6 Trapezoidal sheet substrate

Large format insulation boards are usually installed on trapezoidal sheet substrates. The termPIR® boards should be installed with the longer side perpendicular to the ribs (profile) of the sheet. The recommended fastener distances from the edge of the insulation board must be observed, but a slight adjustment may be needed given that the boards can only be fastened to the top fold of the sheet profile.

It is recommended to lay the insulation boards in such a way that all edges are supported on the trapezoidal folds. Where this is not possible, a restricted support is allowed. The maximum distance between the upper folds of the board (unsupported section of the board between the ribs of the board) must not exceed three times the thickness of the insulation board. Board support is only permitted when the thickness of the insulation board is at least 50 mm. A safe rule is to limit the board bracket to 100 mm. When thin boards are used, in some trapezoidal sheets the distances between the folds are too large to properly support the insulation boards. Then fill the trapezoidal cavities with insulation of adequate compressive strength (not less than 120 kPa).

5.4.7 Wood substrate

For wooden substrates, the same fastener fixing schemes apply as described above. Insulation boards on wooden substrates in a flat roof system should always be laid on a continuous sheathing (e.g. OSB or plywood). **Direct installation of boards on wooden beams is prohibited.**

5.5 Bonding of termPIR® insulation boards

5.5.1 General remarks

Acceptable adhesive types for a given type of insulation board are listed in Table 1. The compatibility of a particular adhesive with Gór-Stal boards must be additionally confirmed by the adhesive manufacturer. If in doubt, contact the Gór-Stal technical department. It should be noted that solvent-based adhesives cannot be used, which can damage the cladding or the PIR core in the insulation boards. In addition to the compatibility of the adhesive with the insulation boards, it is also necessary to ensure the compatibility of the adhesive with the substrate. In case of renovation, the condition of the existing roofing that will be covered with PIR boards should be checked beforehand. It must be a substrate that allows adhesive mounting. If necessary, prime the existing waterproofing membrane with a suitable primer. **Always follow the adhesive manufacturer's application instructions.** This includes the required amount of adhesive, adhesive distribution pattern, minimum application temperature, storage temperature, adhesive open time, curing time, etc.

Only the quantity of boards to be glued on a given day should be transported from the roof-protected warehouse to the installation site.

Bonding of insulation boards is not permitted in cold weather (<5 degrees), rainy or snowy weather, or wet substrates. It is unacceptable for the already installed boards to get wet, i. g. by rain, snow, or dew on the boards unprotected with waterproofing covering. The most sensitive to moisture are boards with AL-type cladding.
It is absolutely forbidden to cover dank thermal insulation boards with roofing. Non-adjustment to the above condition may cause loose of dimensional stability of the thermal insulation board.
In case of unevenness of the substrate, polyurethane foam adhesives are recommended to level these unevennesses. Do not walk on the boards immediately after they have been glued to the substrate or move them after they have been laid on the adhesive layer. To avoid having to move the insulation boards on the substrate to achieve a tight joint, it is recommended to use boards equipped with straight sides or LAP milling. Boards with tongue and groove milled sides should not be used in a bonded flat roof system.

AP cutters should always be laid so as to avoid having to slide them under previously laid boards.

Observe the guidelines of the national building code and follow the calculation results of an authorized designer.

The following are the basic rules for bonding using the two main types of adhesives most commonly used in the installation termPIR® insulation boards: foam polyurethane adhesives and hot applied bitumen adhesives.

5.5.2 Installation of insulation boards using polyurethane foam adhesives

It is recommended to use foam adhesive TYTAN TACK-R.

Please note that the adhesive must be applied according to the adhesive manufacturer's instructions. The amount of adhesive and the appropriate spread pattern are specified by the adhesive manufacturer. Additional mechanical or ballast fastenings may be required for excessive wind loads.

Unless otherwise recommended by the adhesive manufacturer, polyurethane foam adhesive should be applied in strips. Adhesive strips in diameter of ca. 2-3 cm (the thickness of the adhesive strip depends on the unevenness of the substrate) should be laid parallel to the longer side of the insulation board at a distance of about 100 mm from the edge of the board and at a maximum spacing of 200 mm between each adhesive strip. The thickness of the individual foam adhesive band should be adjusted to the the degree of unevenness of the substrate. Immediately after putting adhesive (preferably up to 4 minutes), the joined elements should be applied. The setting of the elements can be adjusted for up to 10 minutes. Board pressed to the substrate should be covered with adhesive at least >5% of its surface. Foam, polyurethane adhesives harden in contact with moisture. In case of very dry installation

conditions, it is permissible to slightly moisten the substrate, e.g. with water mist from a sprayer. Especially if you immediately need to walk on the glued boards, you can wet the substrate with a sprayer immediately after applying the glue beads (note: only a light mist, no water drops, etc.).

5.5.3 Installation of insulation boards using hot bitumen adhesive

An effective and inexpensive way to attach boards to concrete substrates is to glue them with bitumen adhesive using the „hot bonding" method. An adhesive based on oxidized bitumen as well as its more modern variant, modified bitumen adhesive, can be used for bonding. Both solutions ensure the same, safe fixing of insulation boards to the substrate, such as concrete, however, in the case of using modified bitumen, we can significantly reduce the consumption of adhesive per m2 of glued surface.

The process of bonding with hot adhesive consists basically of two stages:

- o substrate preparation
- o bonding the boards to the primed substrate

Surface preparation:

The substrate, e.g. concrete, should be primed with an bitumen primer, solvent primer or bitumen dispersion primer before bonding the termPIR® insulation boards to it.

Before priming, the surface must be properly prepared. The substrate should be even, load-bearing, continuous, clean, dry or slightly damp, cleaned of grease, stains and other substances that reduce adhesion. Thoroughly mixed compound is applied on the primed surfaces with a roofer's brush or with a brush. On slightly damp substrates the primer should be rubbed in vigorously. It is recommended to perform the work in positive temperatures. During cold weather, to make the work easier, it is advisable to put the container with the product in a warm room for 1 - 2 days before use. Do not work during precipitation or strong sunlight.

If the primer manufacturer does not recommend otherwise, the minimum primer consumption should be approx. 0,2 l/m2.

Bonding of termPIR® insulation boards:

After removing the bitumen compound from the package, it should be pre-crushed and put into the boiler. Heat the mixture to 140 - 150 oC. The bitumen mix should be stirred as it is heated to avoid local overheating and deposition of coked sealant on the boiler walls. Only melt the amount of mass that is anticipated for a full day's use, as product properties may change as a result of repeated melting. If it rains, stop work.

Bitumen adhesive should not be overheated to temperatures above 180 oC.

Do not work during precipitation or strong sunlight.

termPIR® insulation boards require no special preparation before installation. However, care should be taken that the surface of the boards is not moistened before the bonding process, e.g. by rain, condensation or fog.

Thoroughly mixed bitumen compound is applied to primed concrete surfaces with a roofer's brush or spread with a metal watering can. Spread the bitumen sealant on the surface corresponding to the size of the board being laid (in the case of full-surface gluing) and then press down the board.

If a modified bitumen adhesive is used, the hot mass should be applied in strips about 4 cm wide and 0.5 cm thick, with a maximum axial spacing of 15 cm between strips. 15cm.
When using bitumen, oxidized adhesive for bonding, the compound should be hot applied over the entire surface with a layer thickness of approximately 0.5 cm.

Boards can be installed using this technique in one or several layers using the staggered system, however it must be remembered that the glue between individual layers of boards will take a long time to set due to the lack of possibility of quick heat dissipation from the glue.

We do not recommend using bitumen adhesive on the sides of the boards during installation. Adhesive which will be deposited in the joints between adjacent boards will cause the formation of unfavourable thermal bridges.

The permissible temperature range of the substrate and surroundings during hot bonding of insulation boards with bitumen adhesive is: from +5 ˚C do +30 ˚C.

Do not work during precipitation or strong sunlight.

Approximate consumption of bitumen adhesive, oxidized:
4,5 – 6 kg/m2.

Approximate consumption of modified bitumen adhesive (laying in strips): 2,5 – 3 kg/m2.

Always follow the recommendations and application instructions provided by the adhesive manufacturer.

6. NOTES

These installation instructions should be read carefully before mounting the Gór-Stal insulating boards. Improper installation and/or the use of inappropriate tools can have undesirable effects on the properties of the boards and the overall system. If the insulation boards show visible visual defects or they get wet, stop the installation and contact Gór-Stal technical department.

Gór-Stal shall not be held liable if wet boards or boards with visible defects have been installed.

The client must ensure that the installation of the boards, and therefore the entire flat roof system, complies with all applicable laws, regulations, directives and national/international requirements. Installation must be done in accordance with good building practice.

Please note that technical specifications may vary from country to country. The contractor is obliged, at its own risk, to ensure that all specifications meet the technical and legal requirements of the project, for which it bears sole responsibility. Gór-Stal Sp. z o. o. shall not be liable for design errors, product selection or execution errors, or any consequences thereof. This document does not create, define, modify or supersede any new or prior contractual obligations agreed to in writing between Gór-Stal and the user. Gór-Stal Sp. z o. o. reserves the right to change this document, without prior notice.

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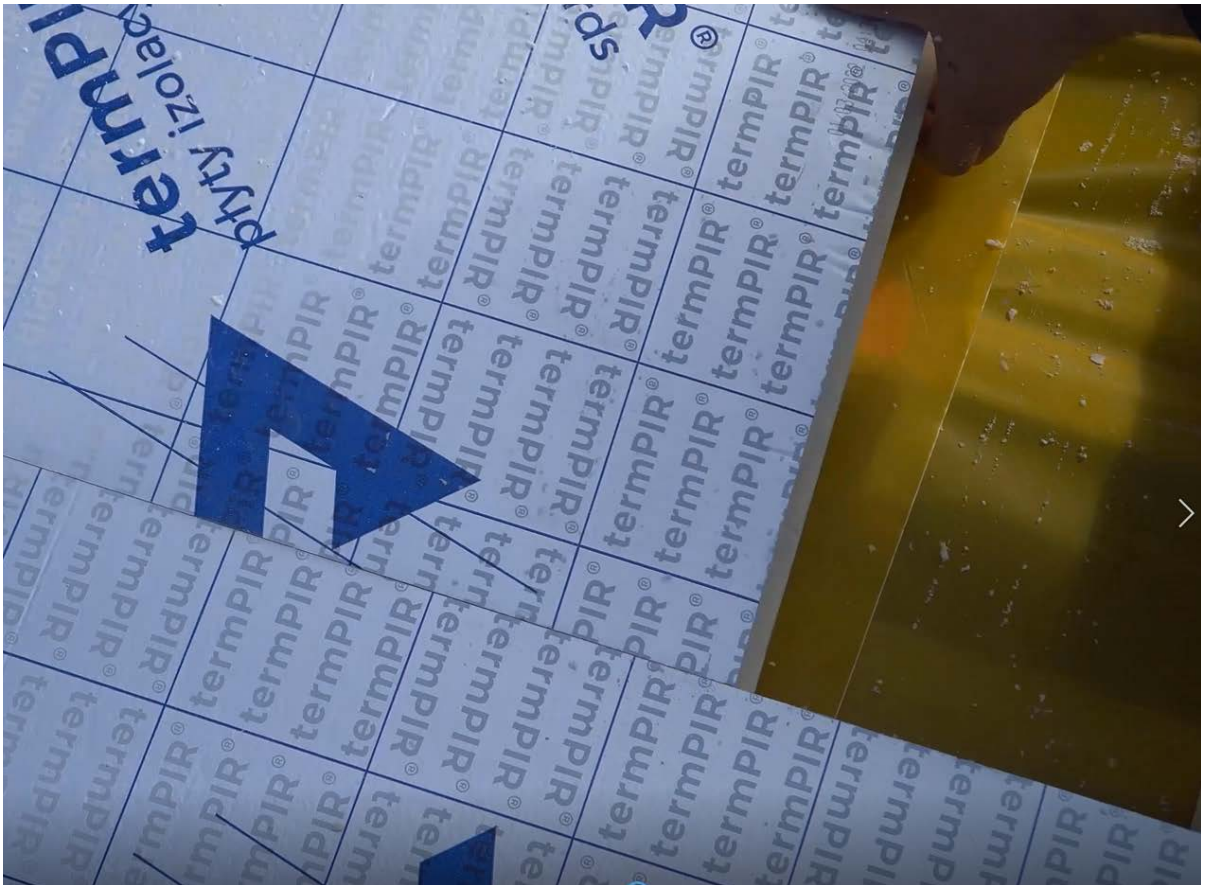
termPIR®
insulation boards

GÓR-STAL®
SANDWICH PANELS



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