▶ **IKO GUIDE**

EVERYTHING ABOUT INSTALLING PIR INSULATION ON A FLAT ROOF

A roof structure is a system whereby a correctly-fitted insulation layer plays a crucial role in achieving the required thermal and mechanical performance. Before choosing a fixing method, you should ask the right questions. Is the insulation board suitable for the anticipated fixing method? Are the layers compatible? How can you check the right fitting method?

FIXING THE INSULATION DEMANDS THE NECESSARY ATTENTION, AS THIS IS ALSO ESSENTIAL FOR:

- resistance to wind loads
- avoiding thermal bridges
- continuity in the insulation layer (dimensional stability of the roof structure)

1 - Design

1.1 - Compatibility

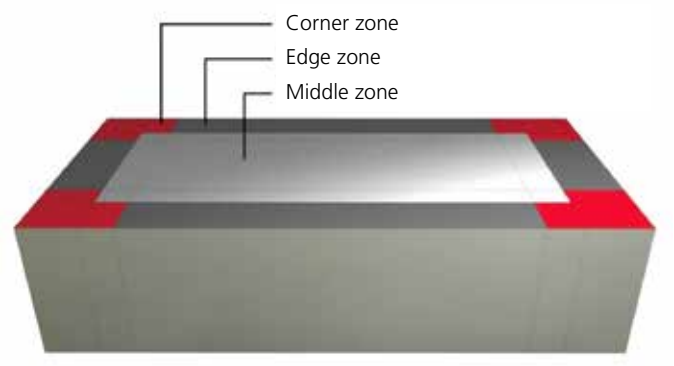
Ensure that the various layers in the roof structure are compatible.
Take care with the combination of an ALU-backed insulation board and gluing the waterproofing.

1.2 - ATG

Make sure that your fixing system is always ATG-approved, especially with glued systems.
This is a requirement in all insurance policies.

1.3 - Wind load calculation

For resistance to wind loads in flat roofs, a distinction is made between corner, edge and middle zones.
The dimensions and wind loads of these zones are determined by means of a wind load calculation. IKO provides this calculation as a free support service via the IKO website.



A wind load calculation will determine the fixing method and the installation pattern of the roof structure in the different zones, with a view to ensuring sufficient resistance to the wind loads present. Corner and edge zones are often exposed to higher wind loads. In these zones, an additional mechanical fixing method or ballast layer may be necessary. Ask your IKO consultant for advice on this.

Points for consideration

- The compatibility in terms of wind resistance of the various layers in a particular roof structure is determined by wind resistance tests. Based on this testing method, IKO can propose calculation values confirming that certain roofing materials are compatible in the context of resistance to wind loads.
- IKO will produce a complete flat roof structure, whereby the compatibility of the various layers (primers / vapour barriers / adhesives / insulation / waterproofing) can be demonstrated with official testing reports.
- When applying different adhesives, the applicable manufacturer should demonstrate that these are compatible with the layers above and below.
- For indoor climate class IV, a mechanical fixture through the vapour barrier is not permitted.

1.4 - Technical approval of fixture

The choice of base and the type of IKO enertherm insulation will determine which fixing method can be used. It is important to always check the technical (ATG) approval to determine the appropriate fixing method.

1.4.1 - Insulation types

Insulation type	Description of backing
IKO enertherm **ALU**	Gas-tight, multi-layer complex based on kraft aluminium laminate on both sides
IKO enertherm **MG**	Mineral-coated (and micro-perforated) glass fleece of around 300 g/m² on both sides
IKO enertherm **BM**	Bituminised glass fleece of around 400 g/m² on one side (with polypropylene fleece) and a mineral-coated (and micro-perforated) glass fleece of around 300 g/m² on the other side
IKO enertherm **BGF**	Bituminised glass fleece of around 400 g/m² on both sides (with polypropylene fleece)

1.4.2 - Fixing methods

There are various fixing options for all types of IKO enertherm insulation. The choice of the type of insulation also determines the fixing method for the roof membrane above.

Insulation fixing	
L	loose, with ballast on the roof membrane
Cs	cold-glued with synthetic cold adhesive
V	mechanically attached

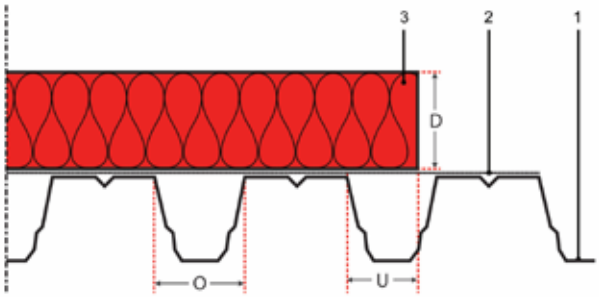
Roof membrane fixing	
L	loose, with ballast
PC	partially glued with PUR roof glue
TC	full surface glued with contact adhesive or bitumen adhesive
AC	self-adhesive roof membrane
PS	partially-welded bituminous roof membrane
V	mechanically-attached roof membrane

1.4.3 - Fixing method in line with the type of roof floor / insulation

	Type of roof floor				
	Concrete, cellular concrete, foam concrete or baked clay tiles	Wood or wood-like boards		Profiled steel sheets (≥ 0.75 mm)	
Board dimensions (mm)	1200 x 600 1200 x 1000 1200 x 1200	1200 x 600 1200 x 1000 1200 x 1200	1200 x 2400 1200 x 2500	1200 x 600 1200 x 1000 1200 x 1200	1200 x 2400 1200 x 2500
IKO enertherm ALU	L / V / Cs	L / V / Cs	V	V / Cs	V
Roof membrane	L / V / PC / AC / TC	L / V / PC / AC / TC	L / V / PC / AC / TC	V / PC / AC / TC	V / PC / AC / TC
IKO enertherm MG	L / V / Cs	L / V / Cs	V	V / Cs	V
Roof membrane	L / V / PC / AC / TC	L / V / PC / AC / TC	L / V / PC / AC / TC	V / PC / AC / TC	V / PC / AC / TC
IKO enertherm BGF/ BM	L / V / Cs	L / V / Cs	-	V / Cs	-
Roof membrane	L / PC / TC / PS	L / V / PC / TC / PS	-	V / PC / TC / PS	-

1.5 - Span and cantilever

When installing IKO enertherm insulation on a non-continuous base, the maximum span and cantilever must be taken into account.



1 - Non-continuous base (steel deck)
2 - Vapour barrier
3 - Insulation

Insulation thickness (D)	Permitted span (O)	Permitted cantilever (U)
30 mm	n.a.	n.a.
40 mm	≤ 120 mm	≤ 80 mm
50 mm	≤ 150 mm	≤ 100 mm
60 mm - ∞	≤ 165 mm	≤ 110 mm

2 - Implementation

Before proceeding to implementation, you should check that the various materials in the roof structure are compatible, that the system is ATG-approved and that the fixing method for the roof structure has sufficient wind resistance.

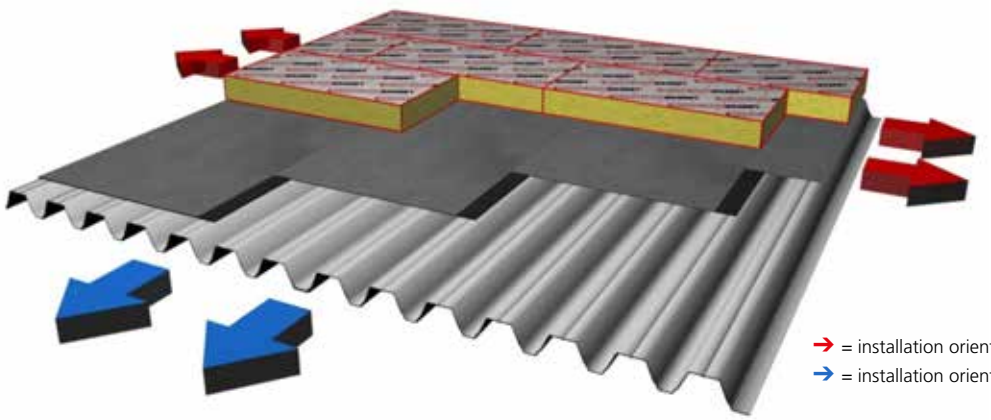
2.1 - General guidelines

2.1.1 - Transport and storage

For optimum performance, the boards must be protected against weather conditions. The IKO enertherm insulation boards are packed carefully with plastic film. Even so, in case of long-term storage they should additionally be protected against sunlight and precipitation.

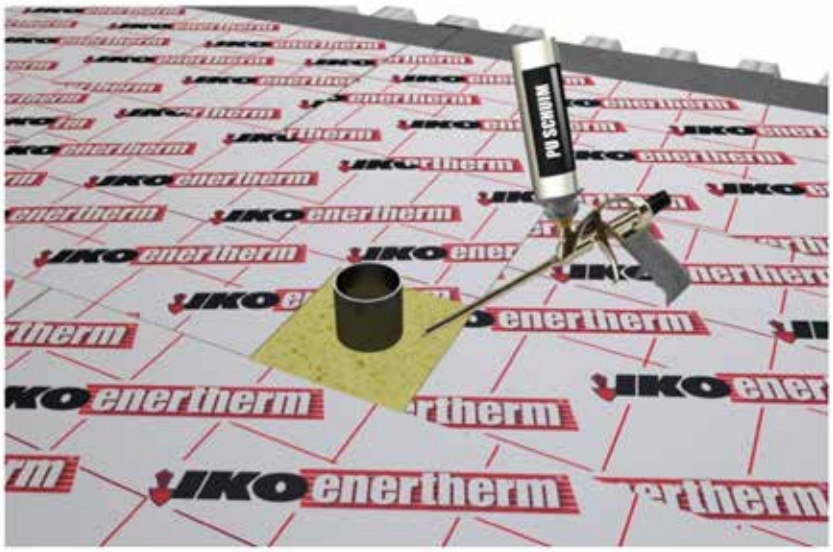
2.1.2 - Installation

- The base should be dry and dirt-free.
- On a profiled steel roof, longitudinal joints must be placed perpendicular to the grooves. Consequently, the header joints will be parallel to the grooves.



→ = installation orientation of insulation boards
→ = installation orientation of vapour barrier and grooves

- The header joints between adjacent insulation boards must always be staggered at least 20 cm.
- When installing several insulation layers, the joints of the insulation layers must be staggered.
- Always install the insulation boards in a continuous manner. Any openings for connections must be sealed with PU foam after installation.



Cut the insulation to fit around channels or other openings in the roof.
In order to ensure the continuity of the insulation around these details, any openings should be sprayed closed with a suitable PU foam.

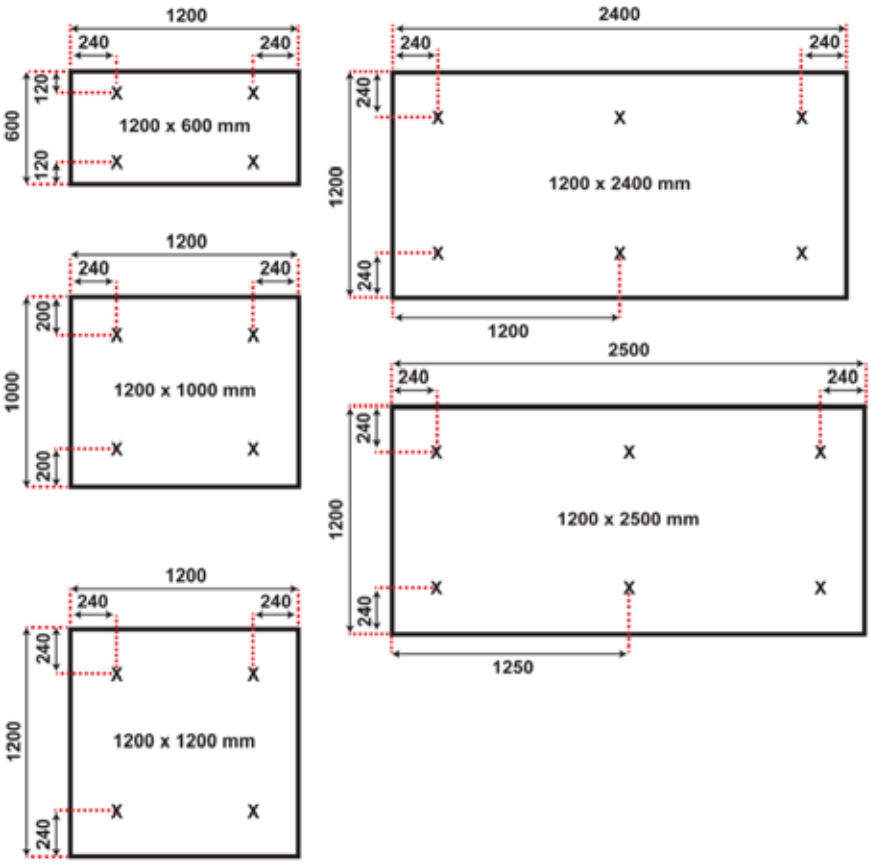
2.2 - Mechanical attachment

When screwing on the insulation and waterproofing, suitable fasteners and washer plates must be used. When choosing the type and dimensions, one must take into account the surface, the insulation thickness and the type of roofing (single-layer or double-layer).

The installation pattern of the membrane is independent from the installation pattern of the insulation. PIR insulation boards should always be installed in accordance with the installation pattern below. After that, the roof membrane must be installed using the appropriate number of fasteners depending on the wind load.

For the mechanical attachment of the insulation, a sufficient number of screws per insulation board must be used, in accordance with the correct installation pattern:

IKO enertherm dimensions	Number of fasteners (minimum)
1200 x 600 mm	4
1200 x 1000 mm	4
1200 x 1200 mm	4
1200 x 2400 mm	6
1200 x 2500 mm	6



Points for consideration

- The use of tulle attachments will ensure reduced heat loss, with a better EPB score as a result.
- In case of profiled steel sheets, the screws should screwed at least 15 mm into the steel sheet. For a wooden supporting structure, the screw should be screwed at least 30 mm into the base.
- For indoor climate class IV, the vapour barrier may not be perforated, making a mechanical attachment impossible in this case.

2.3 - Fixing with PU glue

	PU glue consumption	
Zone	Continuous base: wood, concrete	Non-continuous base: steel deck
Edge zone	middle zone x 1,5	middle zonee x 2
Corner zone	middle zone x 2	middle zone x 2

Points for consideration

- The presence of bituminous adhesive varnish has a negative effect on the adhesive strength of PU glues. No primer should be applied.
- Always consult the installation instructions for the PU glues. Respect the hardening time and the installation temperature.
- In corner zones, the glue can be equally distributed using a glue spreader, which increases the glue's adhesive surface area.

The effective glue consumption is always in line with the desired resistance to wind loads and can be checked using the number of packages used. We draw a distinction here between corner and edge zones and middle zones:

PU glue consumption for middle zone

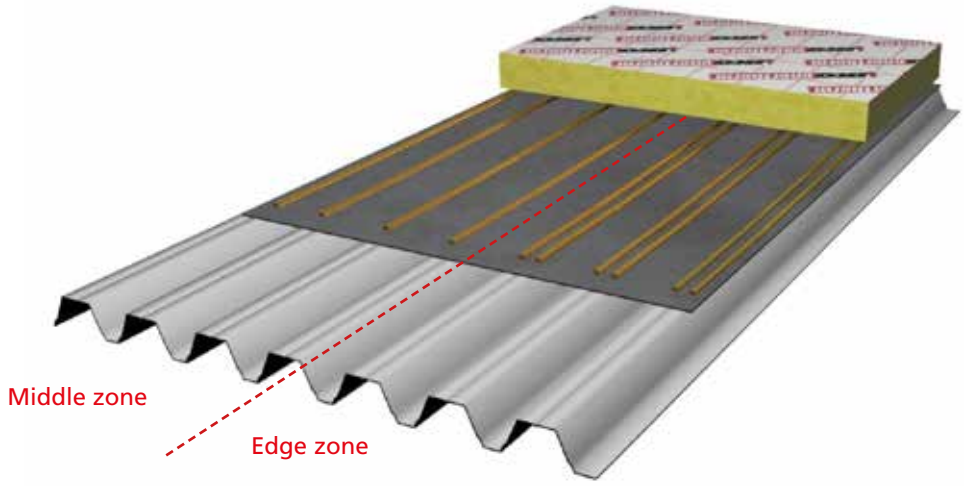
PU glue	Resistance to wind loads	Number of m² per l/kg	Number of l/kg per m²	Number of packages per 100 m²
IKO pro Fix gun 750 ml	2,67 kPa	13,33	0,075 l	10 spray cans
IKO pro PU glue 6,5 kg	4,67 kPa	5	0,2 kg	3 cans + 8% of a can
IKO pro Sprayfast 14,9 kg	1,67 kPa 2,33 kPa	18,18 15,38	0,055 kg 0,065 kg	0.5 of a pressure vessel 0.6 of a pressure vessel

PU glue consumption for corner and edge zones

PU glue	Resistance to wind loads	Number of m² per l/kg	Number of l/kg per m²	Number of packages per 100 m²
IKO pro Fix gun 750 ml	-	6,67	0,15 l	20 spray cans
IKO pro PU glue 6,5 kg	-	2,5	0,4 g	6 cans + 15% of a can
IKO pro Sprayfast 14,9 kg	- -	9,09 7,69	0,11 kg 0,13 kg	1 pressure vessel 1 pressure vessel + 11% of a pressure vessel

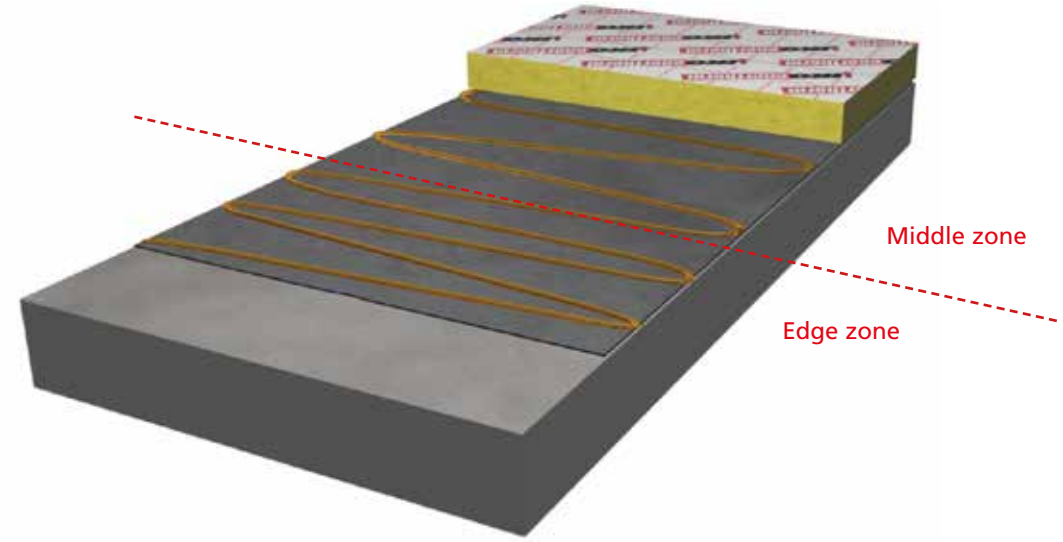
Application pattern for PU glue

Non-continuous base (steel deck)



On non-continuous bases (metal folded plates), apply 1 trail of glue in the centre area at the level of each rib, left or right from the middle. At the edge and corner areas, apply 2 trails of glue on each rib, left and right from the middle.

Continuous base (wood, concrete, etc.)



On continuous bases, the trails of glue are applied in a meandering form: maximum distance of the trails 25 cm centre-to-centre in the centre area. In the edge and corner areas, the maximum centre-to-centre distance is halved.

2.4 - Loose installation

A loose roof structure with ballast requires proper planning of the works. Immediately after installation of the insulation, the membrane and the ballast layer must be placed. The dimensions and weight of the ballast layer must be adapted to appropriate wind resistance.

3 - Choice of product

The IKO pro range contains various single-component PU glue solutions for gluing insulation boards to profiled steel sheets, bitumen, concrete or wood. The installation of bituminous waterproofing on the insulation can take place as soon as the insulation boards have been sufficiently secured.

			
	IKO pro Fix Gun	**IKO pro PU glue**	**IKO pro Sprayfast**
Packaging	750 ml aerosol can (net)	Can of 6,5 kg	Pressure vessel of 14,9 kg (netto 11,7 kg)
Adhesive beads	± 3 cm wide	± 3 cm wide Apply each 200-250 mm centre-to-centre in a meandering form in accordance with the wind load calculation. Apply to full bases and at the rib for metal folded plates	± 3 cm wide Apply each 200-300 mm centre-to-centre in a meandering form in accordance with the wind load calculation. Apply to full bases and at the rib for metal folded plates
Installing insulation boards	Fit insulation board within 5 minutes using a pressure roller to prevent skin formation	Apply insulation board within 20 minutes by pressing before skin formation occurs	Fit insulation board immediately using a pressure roller to prevent skin formation
Installation temperature	5°C - 30°C	5°C - 30°C	5°C - 30°C
Hardening time	± 2u hours at 20°C	± 3u hours at 20°C	15 minuten hours at 20°C
Minimum consumption in middle zone	65 g/m² 10 m²/package for resistance to wind loads of 2	200 g/m² for resistance to wind loads of 4.67kPa	55 g/m² 200 m²/package for resistance to wind loads of 1,67kPa 65 g/m² 165 m²/package for resistance to wind loads of 2.33kPaa

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With these documents IKO aims to highlight the various technical aspects of flat roofs that are important to Architects and Roofers.

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IKO nv - d'Herbouvillekaai 80 - 2020 Antwerp - Belgium - +32 3 248 30 00 - https://be.iko.com

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