

# PIR INSULATION FOR FLAT ROOFS AN OBVIOUS CHOICE

PIR insulation has proven itself as the most effective insulation on the market. It insulates better than other types of insulation and, therefore, can be applied more thinly and lightly and be installed more quickly. This, without doubt, constitutes major benefits for application in construction today and even more so in the future.



For flat roofs it is best to apply PIR insulation that also meets the requirements of a roof. Indeed, a roof has to withstand more than the other parts of a building, namely the relentless effects of poor weather conditions: heat-cold cycles, rain, hail, snow and ice, not to mention the wind load.

In addition, today's roofs are increasingly used for energy generation, green and terrace areas and other applications. As a consequence, roofs are more frequently and more intensely walked on for maintenance and technical inspections. All this imposes even higher demands of resistance on all parts of a flat roof, and particularly the insulation.

It is therefore important to make sure that the applied insulation is designed specifically for flat roofs so that it meets those high demands. In this Guide we highlight the key points.

## INSULATION FOR FLAT ROOFS

### 1 - Function

Roof insulation requires proper attention because it:

- Is part of the building's thermal insulation
- Provides protection against condensation in the roof structure
- Is the base for fixing the water sealing
- Must offer adequate resistance to the load at the top of the roof structure
- Can be a way to provide additional slope

### 2 - Design

Opt for insulation that is designed specifically for flat roofs. Therefore, consider the following key points.

#### 2.1 - Points Requiring Attention

Besides the insulation value, the following factors are important:





- **Compression Strength:**  
A roofing system must be able to withstand the load which acts on it.  
Therefore, the insulation must be suitable for the load stemming from walking on it, technical installations, terraces, roof gardens, solar panels etc.
- **Insensitivity to Moisture:**  
Since the flat roof is fitted with a continuous and damp-repellent water sealing, it is essential that the insulation ensure appropriate resistance to moisture. This guarantees that the thermal performances (lambda value) are retained and also ensures that the insulation is fungicidal. Also in case of storage on the roof before or during execution, the board must be more resistant to the infiltration of rainwater.
- **Dimensional Stability:**  
The primary function of the insulation layer, obviously, is to limit heat loss.  
Good thermal performance and good dimensional stability of the insulation layer go hand in hand.  
This must remain uninterrupted so that no thermal bridges are created in the long term.
- **Weight:**  
Thanks to lighter insulation, installation is simpler and the roof construction can be designed in an economically optimal manner.
- **Handling:**  
The insulation boards must be fibre-free and easy to handle.
- **Volume:**  
A space- and weight saving insulation board is interesting for both new development and renovation applications. The ideal ratio between thermal performance and insulation thickness ensures a limited height of structure and edge of the roof.

- **Fire Safety:**  
 The insulation board must not contribute to the spread of fire. Therefore, it is important that melted insulation does not drip in the event of a fire so as to prevent the fire from spreading due to falling burning drops. In the interest of human and environmental safety, smoke development is also an important consideration. The insulation board preferably has limited smoke development. A high melting point is also recommended for the correct placement of welded (torched) waterproofing systems.
- **Sustainability:**  
 The life cycle of building products is receiving increasing attention in the building process. In this respect, limited environmental impact at the various stages of life is crucial. A colour label gives the necessary transparency to the ecological footprint of your building project.
- **Retention of Performance:**  
 The thermal requirements are becoming increasingly stringent. Therefore, it is essential that the thermal performances continue to be guaranteed throughout the building's life cycle. Not only the thermal performances, but also other technical properties of the insulation board must be retained during the building's use phase.
- **Manufacturer Support:**  
 Choose an insulation manufacturer who specialises in flat roofs. This way, the manufacturer can provide support in terms of wind load calculations, calculations relating to building physics, pressure load calculations and slope calculations. In addition, a prior examination of the roof by the manufacturer may also be necessary to determine the optimal roof structure.
- **Compatibility:**  
 An insulation board for a flat roof must be compatible with the applied roof system. Both the possible methods of fixing the insulation board and the roof sealing to be placed on top of it play a crucial role in this respect. The mutual chemical compatibility between the various roof layers is also a point that requires attention.
- **Warranty:**  
 An insurance-backed warranty can provide added value to all parties involved in the building process provided that the right aspects are covered. Therefore, choose an appropriate flat roof system with an all-in waterproof warranty without reduction clause that compensates for damage to the roof structure caused by a product or concept error as well as an execution error.

## 2.2 - IKO enertherm Roof Insulation Types

Within the IKO insulation product range we distinguish 4 types of boards according to their coating. Also, each type can have a different edge finish and size, depending on the application.

ALU coatings are gastight, causing them to have a better Lambda value than bitumen or mineral coatings. Therefore, for thermal considerations, the ALU-coated PIR insulation is preferred.

Name	Coating	Lambda	Edge Finish*
IKO enertherm ALU	Seven-layer aluminium complex	0,022	
IKO enertherm MG	Mineral glass fleece	0,025 – 0,027	
IKO enertherm BM	Bituminized glass fleece (side 1), Mineral glass fleece (side 2)	0,025 – 0,027	
IKO enertherm ALU TAP ( → slope )	Seven-layer aluminium complex	0,022	

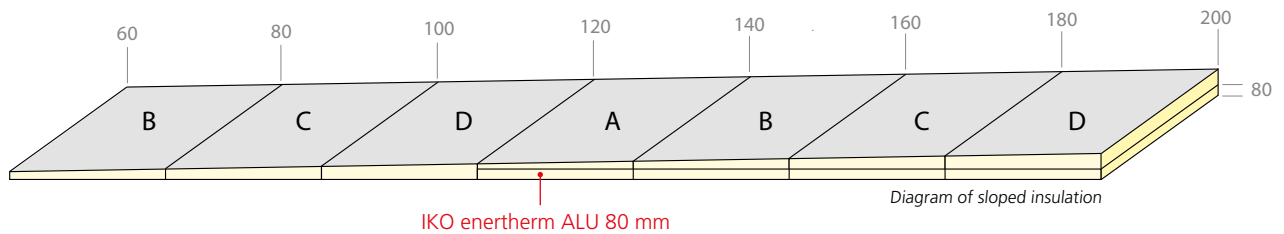
\* The straight edge finish is suitable for most flat roof applications.

### 2.3 - Permanent Load

IKO enertherm flat roof insulation meets load class P3 and, therefore, can be applied to roofs with extensive vegetation, technical installations or terraces requiring regular supervision and/or maintenance.

### 2.4 - Slope

The IKO enertherm insulation also comes in a sloped version: IKO enertherm ALU TAP. These boards are available with four different slope percentages: 0.83%, 1.25%, 1.67% and 2.08%.



ALU TAP (1200 x 1200 mm)	Thickness (mm)								
1/120 (0,83%)	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80	80 - 90	90 - 100	100 - 110	110 - 120
1/80 (1,25%)	30 - 45	45 - 60	60 - 75	75 - 90	90 - 105	105 - 120			
1/60 (1,67%)	40 - 60	60 - 80	80 - 100	100 - 120					
1/50 (2,08%)	20 - 45	45 - 70	70 - 95	95 - 120					







Working with IKO sloped insulation has several unique advantages:

- Economical
- Allows for adequate drainage with limited raising of the roof structure, particularly advantageous in case of limited upstand height
- Little impact on the roof construction due to limited weight

IKO offers, as a service, a detailed calculation of the slope with corresponding installation plan and complete list of materials (see website for application form).

### 3 - IKO enertherm, the Insulation Board for Flat Roofs

Relying on our many years of experience with flat roofs, the IKO enertherm insulation board has been specially designed taking into account the key points mentioned before. Additionally, the technical aspects below make the IKO enertherm boards unique.

	<p>High Compressive Strength: 175 kPa</p>	<p>IKO enertherm ALU has a pressure strength of 175 kPa. This allows for higher concentrated loads resulting from technical installations present (such as AC units, PV systems etc.) and makes it easier to walk on during and after execution. The insulation boards cannot be pushed in, ensuring that the water sealing, too, remains in top condition. There is less stress on the overlaps (both in one-layer and two-layer roof sealing) and there is no risk of the water sealing being perforated when applying mechanical fasteners.</p>
	<p>Insensitive to Moisture: WLT 1</p>	<p>IKO enertherm ALU is insensitive to moisture. The water absorption falls into LTW (Long-Term Water Absorption) class 1. This means that the IKO enertherm PIR insulation boards absorb a maximum of 1% of moisture in the long term. The actual test results show very low water absorption of a maximum of 0.6%. This ensures permanent thermal performances and avoids additional load through infiltration of moisture.</p>
	<p>Unique Dimensions: 30 – 200 mm</p>	<p>The IKO enertherm ALU board is available in various thicknesses up to 200 mm.</p>
	<p>Reaction to Fire: B-s2-d0 (end-use) / E</p>	<p>The IKO enertherm ALU board has the best reaction to fire class in the PIR insulation segment, tested both traditionally and in a roof structure. With a reaction to fire class (end-use) b-s2-d0 in combination with a regular reaction to fire class E, the IKO enertherm ALU board has a very low flammability even in a roof structure with steel deck. In the event of fire, there is no fire spread by drop formation and smoke development remains limited.</p>
	<p>Compatibility: Various Fixing Possibilities</p>	<p>The IKO enertherm ALU has been tested specifically for flat roofs and can be applied according to the current state of technology. This relates both to the method of fixing of the roof sealing and to the method of fixing of the insulation board itself. This IKO enertherm ALU is suitable, among other things, for fixing by means of PU adhesive and can be applied in combination with self-adhesive seals. In addition to bitumen roofing membranes, IKO enertherm can also be applied in combination with certain plastic seals.</p>
	<p>High Dimensional Stability</p>	<p>Thanks to the Micro Cell Technology of the IKO enertherm boards, the shape and dimensional stability are retained for a longer period of time than is the case with PIR boards consisting of rougher foam. The boards are shrink-proof and have a maximum dimensional stability. This benefits the continuity of the insulation shell as loss of heat is avoided.</p>

## 4 - IKO enertherm Insulation Technical Specifications Matrix

Insulation Type	IKO enertherm			
	ALU	BGF	MG	BM
Coating	Multi-layer gastight complex based on kraft-aluminium laminate on both sides	Bituminized glass fleece of approx. 400 g/m <sup>2</sup> on both sides (with polypropylene fleece)	Mineral-coated (and micro-perforated) glass fleece of approx. 300 g/m <sup>2</sup> on both sides	Mineral-coated (and micro-perforated) glass fleece of approx. 300 g/m <sup>2</sup> on side 1 and bituminized glass fleece of approx. 400 g/m <sup>2</sup> on side 2.
Thermal Conduction Coefficient (EN 12667/12939)	λ 0,022 W/(m.K)	λ 0,026 - 0,027 W/(m.K)	λ 0,026 - 0,027 W/(m.K)	λ 0,026 - 0,027 W/(m.K)
Compressive Strength at 10% Deformation (EN 826)	≥ 175 kPa   17,5 tonnes/m <sup>2</sup>	≥ 150 kPa   15 tonnes/m <sup>2</sup>	≥ 150 kPa   15 tonnes/m <sup>2</sup>	≥ 150 kPa   15 tonnes/m <sup>2</sup>
Tensile Strength – Perpendicular (EN 1607)	80 kPa	80 kPa	80 kPa	80 kPa
Dimensional Stability (EN 1604)	DS(70,90)3 DS(-20,-)1	DS(70,90)3 DS(-20,-)1	DS(70,90)3 DS(-20,-)1	DS(70,90)3 DS(-20,-)1
Can be walked on (≤ 5% deformation at 80°C and 40 kPa load)	Class C	Class C	Class C	Class C
	Roofs or parts of roofs which can be walked on by pedestrians and are suitable for frequent maintenance on the roof and on rooftop installations			
Reaction to Fire Class (EN 13501-1)	E B-s2-d0 (end-use)	F	E B-s2-d0 (end-use)	F
Long-term Water Absorption	0,6% LTW Class 1*	0,6% LTW Class 1*	0,6% LTW Class 1*	0,6% LTW Class 1*
Weight by Volume	± 32 kg/m <sup>3</sup>	± 32 kg/m <sup>3</sup>	± 32 kg/m <sup>3</sup>	± 32 kg/m <sup>3</sup>
Thickness**	30 – 200 mm	81 – 140 mm	30 – 140 mm	30 – 100 mm
Fixing of Water Sealing	Self-adhesive underlay Loose-laid and ballasted Mechanically fixed	Torched underlay Loose-laid and ballasted Mechanically fixed	Loose-laid and ballasted Mechanically fixed	Torched underlay (side 2) Loose-laid and ballasted Mechanically fixed
Certification	ATG ✓ CE ✓ FM ✓ DUBO ✓	ATG ✓ CE ✓	ATG ✓ CE ✓	CE ✓

\* LTW Class 1: long-term water absorption < 1%

\*\* Available thicknesses dependent on the dimensions and edge finish; see product sheets

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**This Guide is a document in the IKO Guides series.**

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

We draw on both our expertise and manufacturing experience in relation to bituminous waterproofing, insulation and liquid waterproofing to produce this series of guides, and we are pleased to have this opportunity to share our flat roof knowledge with you. Above all, they seek to defend a pragmatic quality philosophy with attention to detail which will benefit clients and roof professionals alike.

All of our **Guides** can be collected to form a complete volume that you can refer to for years to come, and they are also available to view online on the IKO website. Our Guides series will be regularly updated with new and useful materials.



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