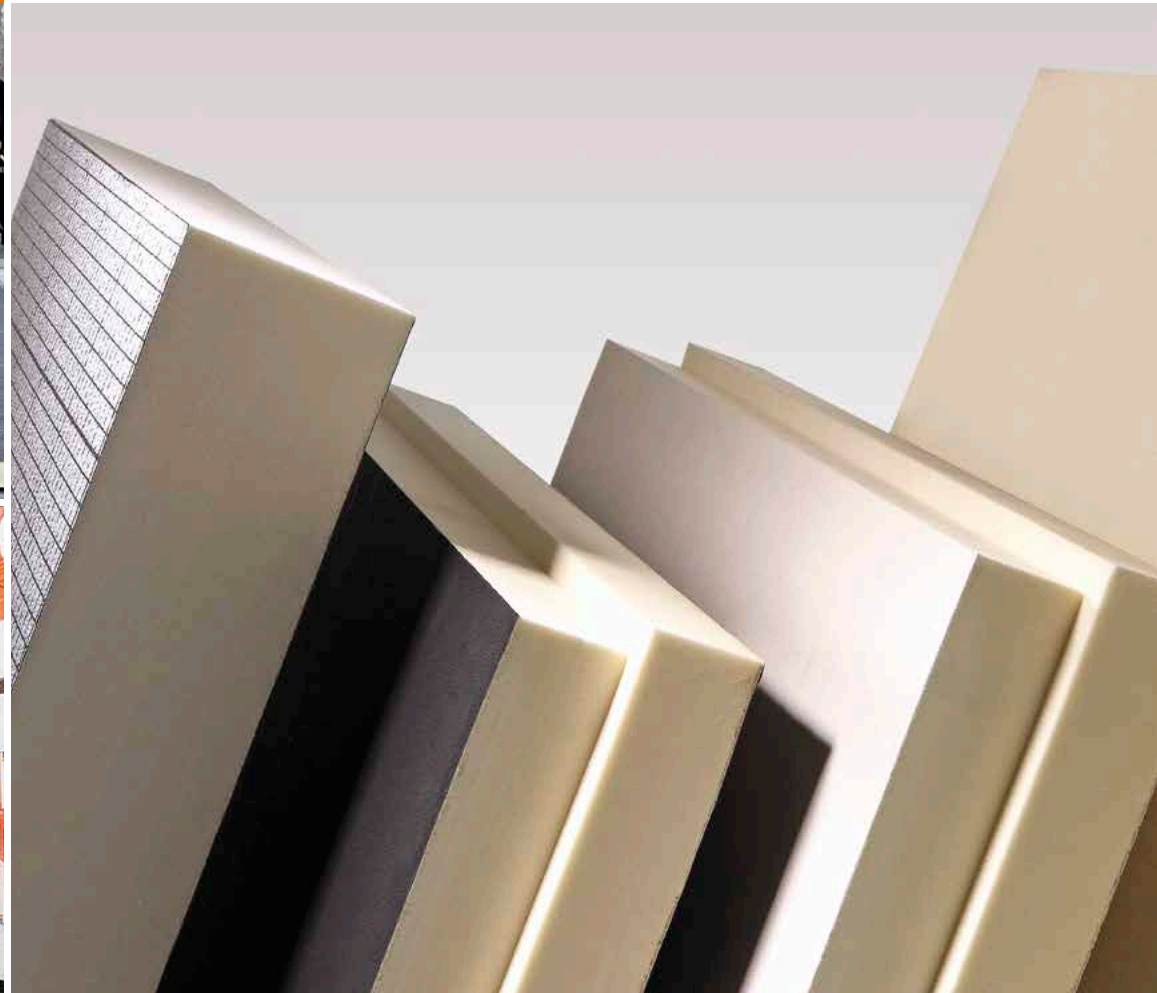


BauderPIR

Thermal insulation panels for flat roofs



Polyurethane

The better thermal insulation material

Polyurethane – a material that the world can no longer do without. Polyurethane is usually invisible yet present everywhere: in shoe soles, mattresses, steering wheels, medical technology and also above all in thermal insulation.

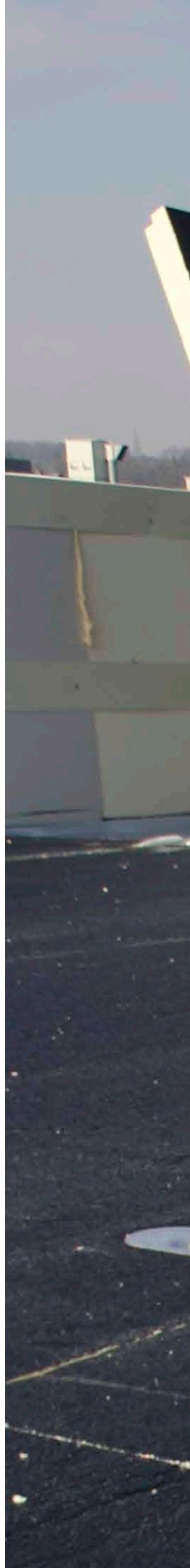
The spectrum of properties in the resulting polyurethane can be precisely adjusted depending on the composition and mixing ratio of the base products. The result is tailor-made and economical solutions for virtually any application.

Polyurethane offers all the benefits of energy-efficient building, particularly for the insulation of buildings. »Tailor-made insulation material« has extremely low thermal conductivity. The insulation performance is very high even with low material thicknesses. Good mechanical properties and an outstanding bonding effect with other materials enable a wide range of applications.

In addition to the very low thermal conductivity, the excellent resistance and durability are also among the key arguments for choosing polyurethane rigid foam insulation materials. They fulfil their function as long as the building is still standing. The life span of polyurethane rigid foam is 50 years and more.

Thermal insulation with polyurethane rigid foam protects resources and saves energy. Environmentally harmful emissions are significantly reduced.

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Thermal insulation with BauderPIR

Impressive properties

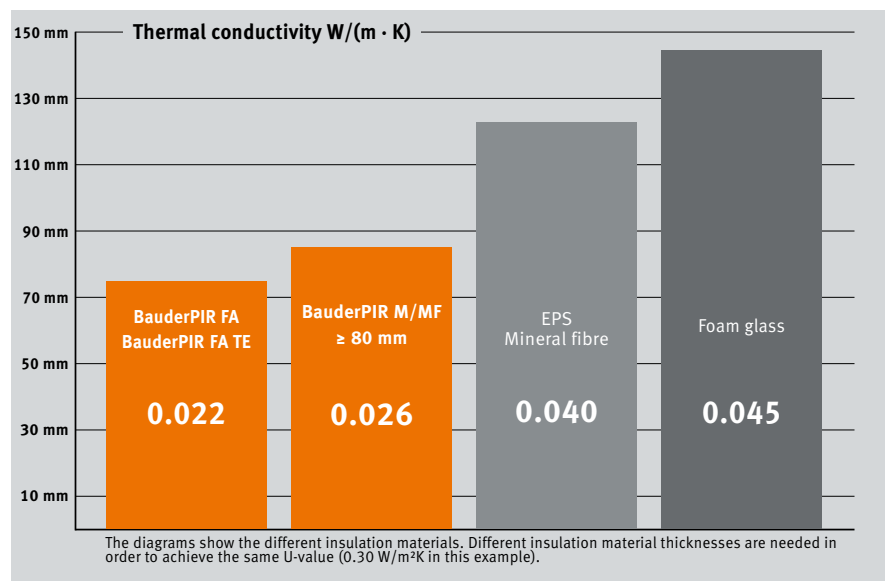
Bauder is one of the largest manufacturers of polyurethane rigid foam, an insulation material with outstanding quality features. In a time where higher requirements are placed on thermal insulation for environmental protection and energy saving reasons, this product, which Bauder produces under the brand name BauderPIR, has become an indispensable building material.

BauderPIR

BauderPIR is an advanced polyurethane rigid foam with a higher PIR index, which stands for improved characteristics.

A high insulating effect ensures high energy savings

BauderPIR is the insulation material with the lowest thermal conductivity and fulfils the requirements of the German Energy Saving Ordinance even with low insulation material thicknesses.



BauderPIR: low insulation thickness – high insulating effect

Stability and compressive strength

BauderPIR is a material suitable for all applications – from normal tread resistance to extreme loads.

Temperature resistant

Insulation materials made of BauderPIR are characterised by their high thermal resistance and excellent dimensional stability. The insulation materials made of BauderPIR typically used in construction can be used continuously in all temperature ranges usually found on building sites depending on the raw density and facing. Insulation materials made of BauderPIR can withstand brief temperature loads of up to $250^{\circ}C$ without incurring any damage. BauderPIR is resistant to hot bitumen and can be waterproofed with bitumen membranes in flat roof areas.

Chemical and biological resistance

Insulation panels made of BauderPIR are resistant to most of the chemical substances found in practical building applications. BauderPIR will not rot, is resistant to mildew and decay, is odourless, and is physiologically safe for the relevant technical building applications.



Only a small fraction of the volume of polyurethane rigid foam is composed of a solid substance. For a raw density of approx. 30 kg/m^3 typically used in construction, the solid synthetic material only makes up approx. 3% of the total volume. This solid synthetic material creates a grid framework of cell braces and cell walls in order to increase the material's mechanical resistance.

Fire behaviour of PIR rigid foam in lightweight steel roofs

When it comes to planning roofs from a fire-protection perspective, the roof construction must be examined as a system. The fire characteristics of the individual functional layers only permit limited conclusions to be drawn regarding the fire behaviour of the roof as a whole. In fire tests, PIR insulation materials exhibit exceptionally favourable fire behaviour. These days, many countries, e.g. the USA, predominantly use PIR insulation materials for large roofs. In Germany, these high-performance insulation materials are also becoming increasingly popular due to their high thermal resistance, infusibility, excellent thermal insulation properties, and efficient installation procedures.

In the event of a fire, PIR rigid foam retains its insulating effect for longer, does not drip and protects other component layers from the effects of fire. Roof areas above $2,500 \text{ m}^2$ must be formed so as to prevent the spread of fire over the roof in accordance with the German industrial building regulations. This is considered to be fulfilled for roofs in accordance with DIN 18 234. Special requirements are therefore placed on building products used on industrial roofs.

All of these requirements can be fulfilled easily and efficiently with roof constructions insulated with BauderPIR.

Future-oriented thermal insulation with polyurethane rigid foam is the right investment:

- Optimum and durable insulation without weak points, maintenance and repairs
- Increase in the building value and living comfort
- High energy savings and noticeably lower heating costs
- Economical and rational application of the PUR/PIR insulation panels
- BauderPIR does not melt under the waterproofing
- BauderPIR is also approved for large industrial roofs
- BauderPIR has a thermal conductivity rating of up to 022
- BauderPIR can be installed in a thin layer, fasteners can be shorter, connection heights are easier to observe
- BauderPIR weighs just around 30 kg/m^3 and is therefore easier to carry and apply
- BauderPIR has a compressive strength of 120 to 150 kPa

Thermal insulation with BauderPIR

A front runner in ecological terms

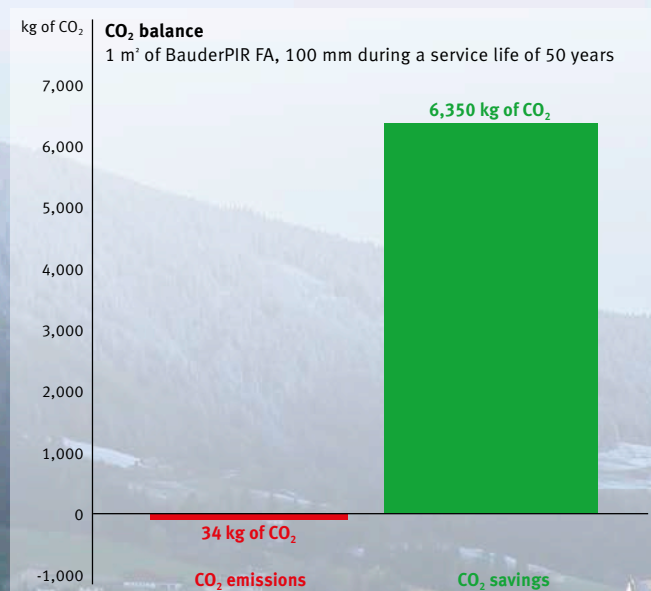
More than 40% of the total energy consumption in the EU is attributed to buildings. But there is not an infinite supply of energy resources. The objectives have to be an increase in energy efficiency, i.e. energy savings and the optimum use of energy as well as a consistent reduction in the emission of greenhouse gases. These objectives could be achieved through improved energy efficiency in buildings and not least through the insulation materials used.

Eco-energy balance of BauderPIR

In addition to good physical properties, ecological criteria play an increasing role in the selection of insulation materials. With respect to the eco-balance, it is important that comprehensive data on the use of energy and raw materials, the processing costs and the emissions in the air, water and soil (drains) is used for the assessment of the entire life cycle of thermal insulation material. The long service life and adequate life span of the materials play a decisive role in the assessment as they greatly improve the overall eco-balance.

The adjacent diagram shows the CO₂ balance of a surface insulated with 100 mm of BauderPIR FA compared to an uninsulated concrete ceiling. For one square metre of BauderPIR FA, approx. 35 kg of CO₂ is used from the extraction of the raw materials up to the use on a building site. The same square metre saves approximately 6.35 tones of CO₂ over 50 years (source: IVPU eco-balance and our own calculations).

BauderPIR saves in two respects: you can save up to 30% in heating costs for at least 50 years through the retrofitting of insulation with BauderPIR. Besides its insulating function, BauderPIR saves on a second score, namely on the use of new energy (oil or gas) in thermal waste treatment plants. This benefits the environment and ultimately benefits everyone: humans, plants and animals.



The vast majority of residential and commercial buildings fall under the category entitled “Buildings with normal indoor temperature”. The Energy Saving Ordinance prescribes the maximum heat loss values for the entire building in this respect. These maximum values provide a recommendation of $U \leq 0.16 \text{ W/m}^2\text{K}$ for the heat transition coefficient of roofs in new buildings. In addition, the maximum values are defined for the heat transition coefficient for the refurbishment of old buildings. The legislator has significantly tightened the requirements for flat roofs in this respect: $U \leq 0.20 \text{ W/m}^2\text{K}$.

The following tables show which insulation thicknesses can be used to achieve the recommended or prescribed U-value. The calculation takes into account the entire roof construction in each case (a sequence of layers from the inside outwards: 16 cm concrete ceiling, vapour barrier, thermal insulation, waterproofing)

Thermal insulation of flat roofs ($U \leq 0.16$)		
W/(m·K)	Insulation material	Thickness (mm)
0.022	BauderPIR FA	140
0.025	BauderPIR M	160
0.035	EPS / Mifa	220
0.040	EPS / Mifa	260
0.045	Foam glass / wood fibre	300

Thermal insulation of flat roofs ($U \leq 0.20$)		
W/(m·K)	Insulation material	Thickness (mm)
0.022	BauderPIR FA	120
0.025	BauderPIR M	140
0.035	EPS / Mifa	180
0.040	EPS / Mifa	200
0.045	Foam glass / wood fibre	220

The EnEV regulations always apply when flat roofs over heated rooms are replaced, installed for the first time or the waterproofing is replaced.

Special regulations apply for pitched roofs. Please contact your Bauder technical consultant or the Bauder Application Engineering Department for further details.

Maximum value for the heat transition coefficient of roofs in new and old buildings	
New buildings	Old buildings
Recommendation In accordance with section 3, paragraph 1 of the EnEV / Annex 1, table 1	Specification In accordance with Annex 3, table 1
$U \leq 0.16 \text{ W/m}^2\text{K}$	$U \leq 0.20 \text{ W/m}^2\text{K}$



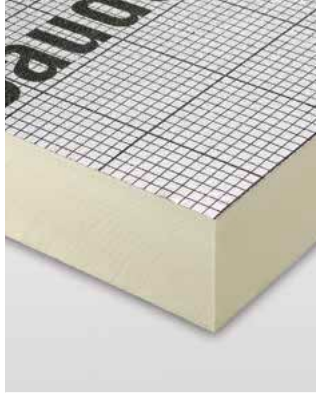
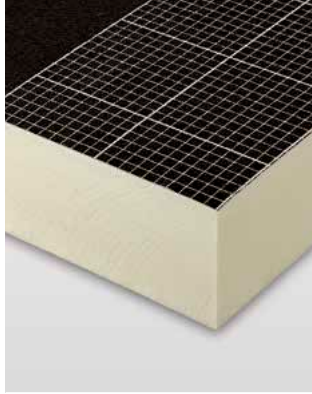


Thermal insulation with BauderPIR

All systems at a glance

Different insulation panels are required in order to ensure that the optimum solution is always achieved for the most diverse types of flat roof constructions. For example, an insulation panel that is large and as light as possible is particularly suitable for a lightweight industrial roof. On the other hand, roofs extending over smaller areas, which are to be water-proofed with welded membranes, require different panel dimensions and surface types.

	BauderPIR FA	BauderPIR M/MF
Areas of application	Large industrial flat roofs Quick application	Large and small surfaces Handy dimensions
Description	Flat roof insulation panels with a two-sided aluminium facing	Flat roof insulation panels with a two-sided facing made of mineral fleece
Design	Flat panels with a lap	Flat panels without a lap (M) Flat panels with a lap (MF)
Panel size	2400 x 1200 mm (Installation dimensions: 2,385 x 1,185 mm)	1,200 x 600 mm (Installation dimensions: 1,185 x 585 mm)
Standard thicknesses	60 to 240 mm	Without a lap (M): 20 to 100 mm; with a lap (MF): 40 to 240 mm
Fire behaviour	Class E in accordance with DIN EN 13501-1 B2 i.a.w. DIN 4102-1	Class E in accordance with DIN EN 13501-1 B2 i.a.w. DIN 4102-1
Compressive strength	≥ 120 kPa (≥ 0.12 N/mm ²)	≥ 120 kPa (≥ 0.12 N/mm ²)
Thermal conductivity λ Rated value (W/m·K) DIN 4108-4	0.023	0.028 (<80 mm) 0.027 (80 mm – <120 mm) 0.026 (≥ 120 mm)
Thermal conductivity λ_D (EU) Nominal value (W/m·K) DIN EN 13165	0.022	0.027 (<80 mm) 0.026 (80 mm – <120 mm) 0.025 (≥ 120 mm)
PIR index	> 250	> 250
Application type	DAA dh; DEO dh	DAA dh; DEO dh

BauderPIR T	BauderPIR KOMPAKT	BauderPIR FA TE	BauderPIR FA Slope
			
Slope insulation on flat roofs	Infiltration-proof insulation system with or without a slope	Patio insulation panel with handy dimensions	Slopes on flat roofs
Flat roof insulation panels without a facing	Flat roof insulation panels without a facing	Flat roof insulation panels with a two-sided aluminium facing	Flat roof insulation panels with a two-sided aluminium facing
Tapered panels (Flat panels also available)	Tapered panels (Flat panels also available)	Flat panels	Tapered panels
1200 x 800 mm Top with a slope	600 x 600 mm Top with a slope	1,200 x 600 mm	1200 x 1,200 mm
up to 400 mm (Other thicknesses and special slopes upon request)	up to 400 mm (Other thicknesses and special slopes upon request)	Without a lap (FA TE): 20 to 160 mm; with a lap (FA TE F): 60 to 160 mm	30 to 230 mm
Class E in accordance with DIN EN 13501-1 B2 i.a.w DIN 4102-1	Class E in accordance with DIN EN 13501-1 B2 i.a.w DIN 4102-1	Class E in accordance with DIN EN 13501-1 B2 i.a.w DIN 4102-1	Class E in accordance with DIN EN 13501-1
$\geq 120 \text{ kPa}$ ($\geq 0.12 \text{ N/mm}^2$)	$\geq 150 \text{ kPa}$ ($\geq 0.15 \text{ N/mm}^2$)	$\geq 120 \text{ kPa}$ ($\geq 0.12 \text{ N/mm}^2$)	$\geq 120 \text{ kPa}$ ($\geq 0.12 \text{ N/mm}^2$)
0.028 (<80 mm) 0.027 (80 mm – <120 mm) 0.026 ($\geq 120 \text{ mm}$)	0.028 (<80 mm) 0.027 (80 mm – <120 mm) 0.026 ($\geq 120 \text{ mm}$)	0.023	0.023
0.027 (<80 mm) 0.026 (80 mm – <120 mm) 0.025 ($\geq 120 \text{ mm}$)	0.027 (<80 mm) 0.026 (80 mm – <120 mm) 0.025 ($\geq 120 \text{ mm}$)	0.022	0.022
>250	>250	>250	>250
DAA dh; DEO dh	DAA ds DAA dh; DEO dh	DAA dh; DEO dh	DAA dh; DEO dh

BauderPIR FA

The “slim” thermal insulation panel



BauderPIR FA has been designed specifically for use on lightweight industrial roofs. The thickness of the insulation material can be reduced due to its excellent thermal insulation properties. This, in combination with the low raw density, enables the production of large, lightweight insulation panels.

One panel covers a surface of nearly 3 m² and the panel weighs only around 9 kg (100 mm thick). Nevertheless, Bauder PIR FA is very pressure-resistant. “Walkways” that you can get after waterproofing work on other insulation materials do not occur with BauderPIR FA. Damage to the waterproofing caused by rigid fasteners and soft substrates are excluded with BauderPIR FA.

- Thermal conductivity rating of λ 0.022
- Continuous stepped lap
- Low-reflection surface
- Easy and quick processing
- Low raw density
- High compressive strength, so no “walkways” like on soft insulation materials.

Thermal conductivity rating of λ 0.022

BauderPIR FA insulation panels have very low thermal conductivity. The heat transition coefficient (U-value) of a 12 cm thick panel is only 0.20 W/m²K. In order to achieve the same U-value as with conventional insulation with a thermal conductivity rating of WLG 040, the BauderPIR FA can be approx. 80 mm thinner.

This means that it is easier to realise all connection heights and also shorter fastening elements can be chosen. This saves time and money. It is not necessary to apply several layers of thermal insulation.

Large dimensions (2,400 x 1,200 mm), lower costs

Time is money and so it is important how many square metres of thermal insulation can be applied in a single process. Bauder has calculated the BauderPIR FA panels in such a way that the ratio between the panel size and weight is ideal to ensure the most economical handling.



A continuous stepped lap, a reliable connection

In order to ensure that the insulation panels are easy to connect, the Bauder PIRA FA panels have a continuous stepped lap for easy and safe working.

Low-reflection surface

A special coating ensures the absorption of up to 80% of the sunlight that would otherwise be reflected.

Easy and quick processing

As with all BauderPIR insulation materials, the same also applies for BauderPIR FA: the precise cutting of the panels with simple tools (knife or saw) and effort-less drilling, screwing, nailing and bonding. BauderPIR FA can be glued or mechanically fixed to the substrate with ballast. Five fastening elements per panel must be used to ensure a uniform planar fastening. Fastening is performed at the corner points and in the centre of the panel.

Particularly suitable for subsequent construction with the BauderTEC KSA DUO cold self-adhesive membrane

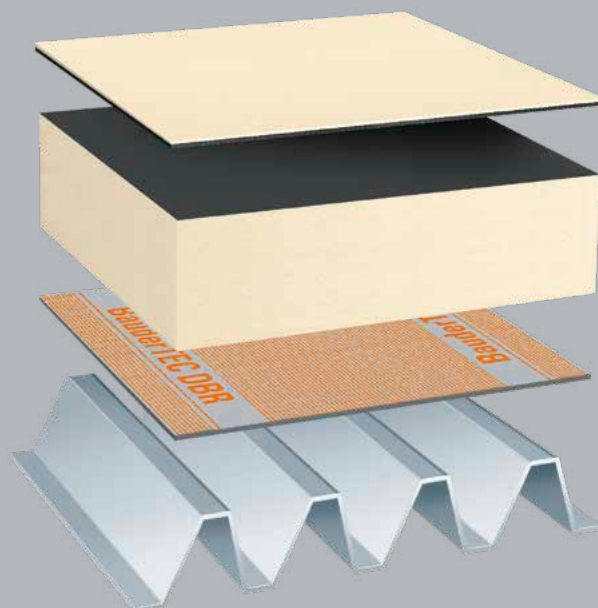
In order to prevent damage or possible loosening of the aluminium lamination caused by the open flame during the torch-on application, the BauderTEC KSA DUO cold self-adhesive membrane is glued on as the first layer. Nothing burns, the panels remain undamaged and the thermal insulation layer is uniform throughout. And it is clean work. We recommend welding on the BauderKARAT polymer bitumen membrane across the entire surface as a waterproofing capping sheet.

Economical solution for lightweight industrial roofs

Bauder THERMOPLAN-T is premium grade synthetic waterproofing based on flexible polyolefins (FPO). It can be used for the particularly fast and effective waterproofing of lightweight industrial roofs.

BauderPIR FA – technical data

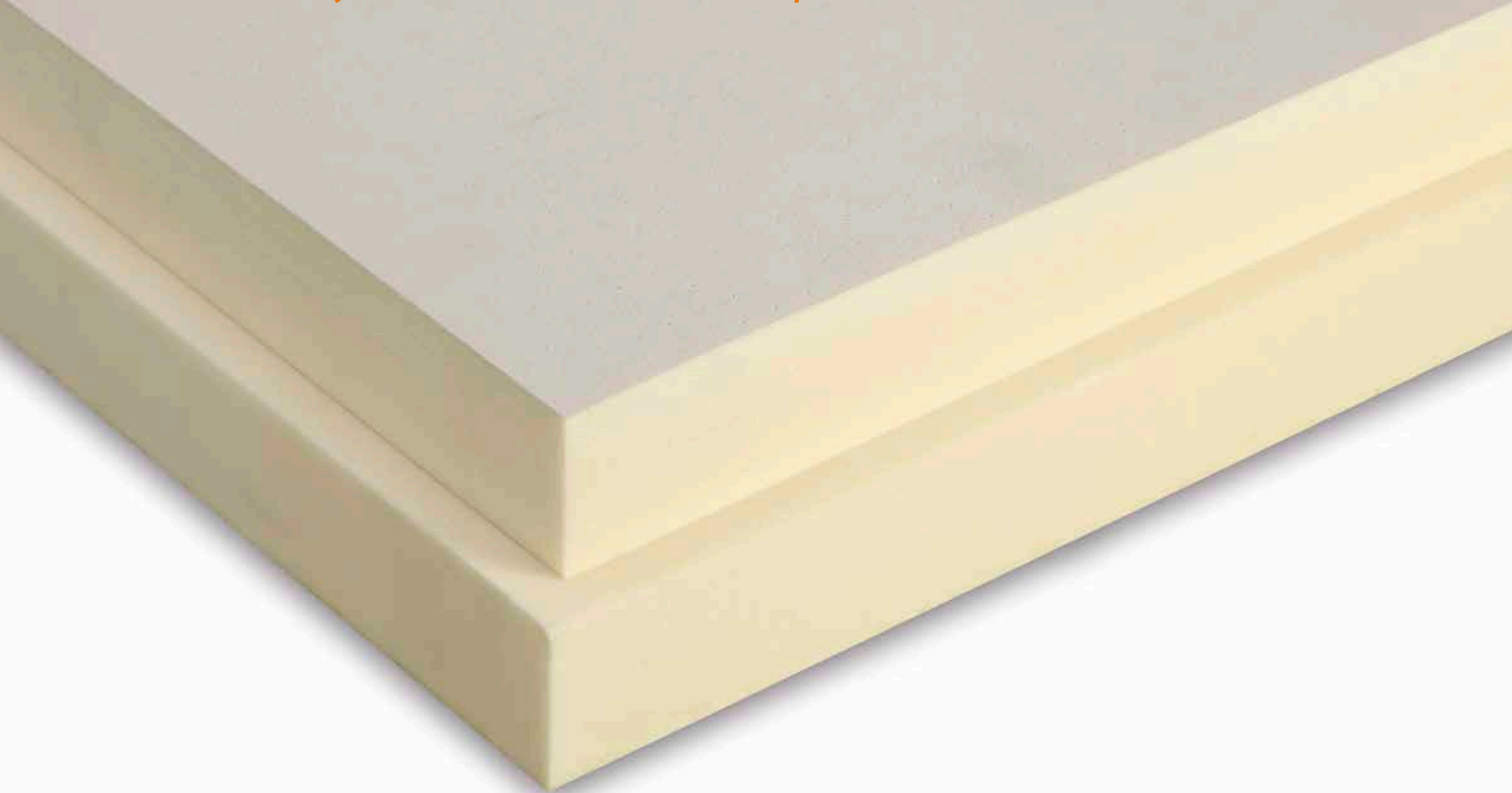
Description	Polyurethane rigid foam panels in accordance with DIN EN 13165	
Application	Thermal insulation under waterproofing	
Facing	Aluminium	
Length (mm)	DIN EN 822	2,400
Width (mm)	DIN EN 822	1,200
Thickness (mm)	DIN EN 823	60, 80, 100, 120, 140, 160, 180, 200, 220, 240
Compressive strength	DIN EN 826	≥120 kPa (≥0.12 N/mm²)
Fire behaviour	DIN EN 13501-1 DIN 4102-1	Class E B2
Thermal conductivity λ Rated value (W/mk)	DIN 4108-4	0.023
Thermal conductivity rating WLS (D)	–	023
Thermal conductivity λ _D (EU) Nominal value (W/m·k)	DIN EN 13165	0.022
Water absorption (%vol)	DIN EN 12087	max. 3
PIR index	–	> 250



Example of a system construction: BauderPIR FA with synthetic waterproofing

BauderPIR M/MF

The handy thermal insulation panel



The handy dimensions of the BauderPIR M/MF make it easy to apply, particularly on small roof areas.

- Thermal conductivity rating of λ 0.025 / 0.026 / 0.027
- Continuous stepped lap is possible
- Easy and quick processing
- Low raw density
- High compressive strength, so no “walkways” like on soft insulation materials.

Fast processing

BauderPIR M is particularly suitable for processing with quick-welding membranes. Due to the mineral fleece lamination, the surface of the insulation panels briefly withstands the open flame. BauderPIR M can, for example, be adhered to the substrate by fixing it in the bitumen stripes of the BauderTHERM DS1 DUO or BauderTHERM DS2 quick-welding membranes.



BauderPIR M/MF – technical data

Description	Polyurethane rigid foam panels in accordance with DIN EN 13165	
Application	Thermal insulation under waterproofing	
Facing	Mineral fleece	
Length (mm)	DIN EN 822	1,200
Width (mm)	DIN EN 822	600
Thickness (mm) Without a lap (M):	DIN EN 823	20, 30, 40, 50, 60, 80, 100
Thickness (mm) With a lap (MF)	DIN EN 823	40, 50, 60, 80, 100, 120, 140, 160, 180, 200, 220, 240
Compressive strength	DIN EN 826	≥120 kPa (≥0.12 N/mm²)
Fire behaviour	DIN EN 13501-1 DIN 4102-1	Class E B2
Thermal conductivity λ Rated value (W/mk)	DIN 4108-4	0.028 (<80 mm) 0.027 (80 - <120 mm) 0.026 (≥120 mm)
Thermal conductivity rating WLS (D)	–	028 (<80 mm) 027 (80 - <120 mm) 026 (≥120 mm)
Thermal conductivity λ _D (EU) Nominal value (W/m·K)	DIN EN 13165	0.027 (<80 mm) 0.026 (80 - <120 mm) 0.025 (≥120 mm)
Water absorption (%vol)	DIN EN 12087	max. 3
PIR index	–	> 250

Bauder PIR M / MF

Due to the mineral fleece lamination, the thermal conductivity rating of λ 0.027 applies for insulation panels up to a thickness of 80 mm. For thicker panels, the thermal conductivity rating is 0.026 W/(m·K), and for a thickness above 120 mm just 0.025 W/(m·K).

The insulation panels can be manufactured with a stepped lap for a thickness greater than 40 mm. The panels have a stepped lap as standard for panel thicknesses greater than 120 mm.



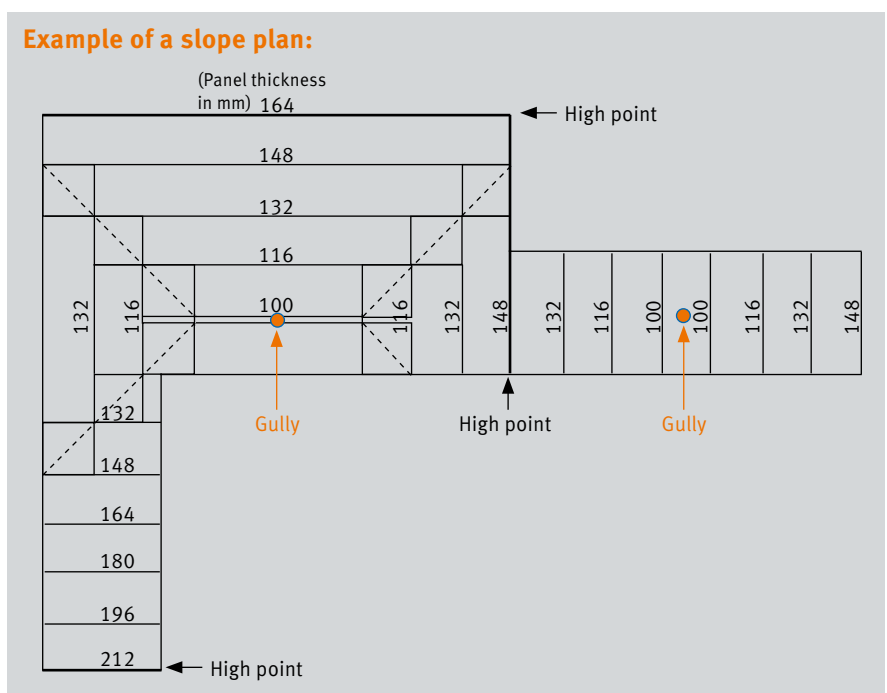
Example of a system construction: BauderPIR M with two-layer bitumen waterproofing and roof planting

Planning a roof slope with thermal insulation

Every roof surface, whether a solid reinforced concrete construction or a lightweight trapezoidal sheet metal roof, dips as a result of its own weight and the payload. Roof gullies are usually arranged in areas where there are supports and are therefore mostly at high points. The water gathers in the dipped areas and forms puddles. The waterproofing is impacted by the temperature limits along the puddles, on the one hand, and by dirt deposits that often occur at these low points, on the other hand.

The benefits of BauderPIR T tapered insulation panels

- Preplanned slope without heavy constructions.
- Slope and thermal insulation in a single process.
- Low installation height.
- High compressive strength.
- Outstanding manual workability.



Reliable water run-off with slope insulation

The application of BauderPIR T slope insulation creates a sloped plane to the low points. This is where a gully should be positioned.

The intelligent slope solution

BauderPIR T is a preplanned slope without the need for any high-cost heavy constructions. The slope and thermal insulation are applied in a single process.

This method allows the realisation of almost any slope design.

BauderPIR guarantees optimum thermal insulation at a low installation height and high compressive strength as well as outstanding manual workability.

Extremely high insulating effect ensures energy savings

The calculated value of the thermal conductivity of BauderPIR T is $\lambda_r = 0.025$ to $0.027 \text{ W/(m}\cdot\text{K)}$ in accordance with DIN 4108.

With this high insulation performance in accordance with DIN 4108, BauderPIR T Slope already meets the minimum thermal insulation resistance at the base point of a roof slope with a thickness of only 3 cm.

BauderPIR T Slope will stand up to all temperature loads

Polyurethane rigid foam has demonstrated its excellent resilience with constant loads for decades in refrigeration and heat technology applications.

On flat roofs in particular, where temperatures are constantly changing, the safety as well as the durable and economical function of a building is vitally important. BauderPIR T Slope is resistant to hot bitumen up to $+250^\circ \text{C}$ and therefore readily withstands all processing techniques on flat roofs.

High compressive strength for all applications

BauderPIR T Slope is a material suitable for all applications – from normal tread resistance to extreme loads. BauderPIR T Slope offers a compressive strength of 0.12 N/mm^2 (120 KPa) as standard and BauderPIR KOMPAKT Slope provides higher compressive strength.

BauderPIR T – technical data

Description	Polyurethane rigid foam panels in accordance with DIN EN 13165	
Application	Thermal insulation under waterproofing	
Facing	None	
Length (mm)	DIN EN 822	1200
Width (mm)	DIN EN 822	800
Thickness (mm) No slope	DIN EN 823	20 - 400 mm
Thickness (mm) With a slope*	DIN EN 823	20 - 400 mm
Compressive strength	DIN EN 826	$\geq 120 \text{ kPa}$ ($\geq 0.12 \text{ N/mm}^2$)
Fire behaviour	DIN EN 13501-1 DIN 4102-1	Class E B2
Thermal conductivity λ Rated value (W/mk)	DIN 4108-4	0.028 (<80 mm) 0.027 (80 - <120 mm) 0.026 ($\geq 120 \text{ mm}$)
Thermal conductivity rating WLS (D)	–	028 (<80 mm) 027 (80 - <120 mm) 026 ($\geq 120 \text{ mm}$)
Thermal conductivity λ_D (EU) Nominal value (W/m·k)	DIN EN 13165	0.027 (<80 mm) 0.026 (80 - <120 mm) 0.025 ($\geq 120 \text{ mm}$)
Water absorption (%vol)	DIN EN 12087	max. 3
PIR index	–	> 250

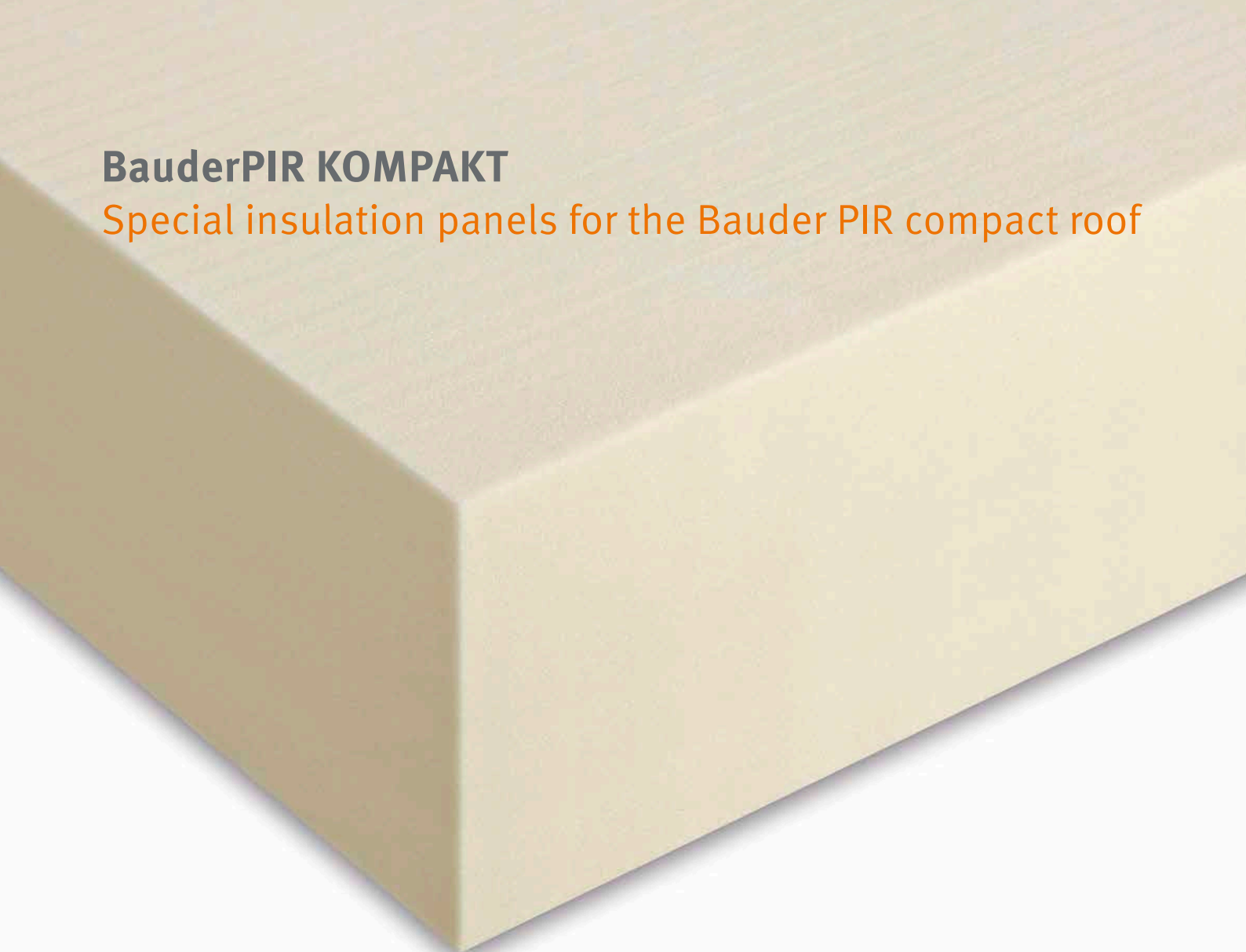
* Standard 2% pitch



Example of a system construction: BauderPIR T slope insulation with two-layer bitumen waterproofing

BauderPIR KOMPAKT

Special insulation panels for the Bauder PIR compact roof



Bauder PIR compact roof is a flat roof system where the waterproofing layers and the thermal insulation material are compactly bonded to one another and to the substrate.

The benefits of this system are obvious:

- Limited water infiltration under the waterproofing
- Localised damage limitation
- Well controlled
- All layers are compactly bonded
- No mechanical fastening
- Extremely high protection against ... leaks
- Extremely high protection against wind uplift
- Outstanding manual workability.

Limited water infiltration under the waterproofing

The problem for many conventional waterproofing systems is water infiltration under the waterproofing. Bauder PIR compact roof is completely encapsulated in hot bitumen and is therefore bonded to the roof substructure. For this reason, water infiltration under the waterproofing is impossible if there is any damage.

Maximum reliability

The consequences of mechanical damage are localised. The direct bonding of the waterproofing to the substructure prevents widespread damage if damage occurs. Damaged spots can be pinpointed exactly.

All layers are compactly bonded to one another

The vapour barrier, thermal insulation layer and first layer are each incorporated into hot bitumen and therefore form a compactly applied roof system.



Excellent insulation

The polyurethane insulation material impresses with its high thermal insulation properties at a low thickness.

Easy and quick to process

The handy insulation panels are easy to cut and therefore quick to process. In addition, they generate hardly any dust when processing them.

Slope-compliant

BauderPIR KOMPAKT insulation panels are also available as tapered insulation panels. Standard 2% pitch.

With protection against wind uplift

Tested with a building height up to 100 m (5,500 N/m²).

Fire protection

Tests at the Research Centre for Fire Protection in Karlsruhe conducted in accordance with ENV DIN V 1187, test procedure 3, have shown that the test roofs with BauderPIR M or foam glass T4 behave in a similarly uncritical way from above in the case of a fire, even with an increased fire load.

The “flammable” property of the BauderPIR insulation material has no negative effects.

Highly resilient

BauderPIR KOMPAKT is dimensionally stable and highly resilient due to its special composition. PIR index > 250, compressive strength ≥150 kPa.

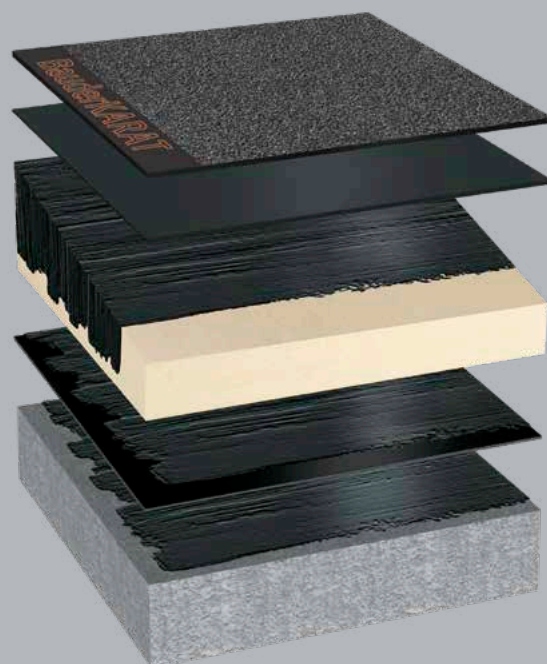
Low weight – handy size

BauderPIR KOMPAKT insulation panels are lightweight and particularly handy at a size of 600 x 600 mm. This is also noticeable in the calculation.

BauderPIR KOMPAKT – technical data

Description	Polyurethane rigid foam panels in accordance with DIN EN 13165	
Application	Thermal insulation under waterproofing for application in hot bitumen	
Facing	None	
Length (mm)	DIN EN 822	600
Width (mm)	DIN EN 822	600
Thickness (mm) No slope	DIN EN 823	20 - 400 mm
Thickness (mm) With a slope	DIN EN 823	20 - 400 mm
Compressive strength	DIN EN 826	≥150 kPa (≥0.15 N/mm ²)
Fire behaviour	DIN EN 13501-1 DIN 4102-1	Class E B2
Thermal conductivity λ Rated value (W/m·K)	DIN 4108-4	0.028 (<80 mm) 0.027 (80 - <120 mm) 0.026 (≥120 mm)
Thermal conductivity rating WLS (D)	–	028 (<80 mm) 027 (80 - <120 mm) 026 (≥120 mm)
Thermal conductivity λ_D (EU) Nominal value (W/m·K)	DIN EN 13165	0.027 (<80 mm) 0.026 (80 - <120 mm) 0.025 (≥120 mm)
Water absorption (%vol)	DIN EN 12087	max. 3
PIR index	–	> 250

* Standard 2% pitch



Example of a system construction: Bauder PIR compact roof with a slope

BauderPIR FA TE

Thermal insulation panels for terraces and balconies

If you want to protect living rooms beneath a terrace against energy losses, the optimum insulation is absolutely essential and also stipulated by law. BauderPIR achieves the best ever insulation ratings. Without any thermal bridges and shrinkage.

The statutory requirements for thermal insulation have become even more stringent with the Energy Saving Ordinance (EnEV). The choice of the right insulation material and careful manual application are even more important because subsequent repairs are time-consuming and expensive.

Insulation materials with a high insulating effect achieve the necessary insulation ratings even with a low thickness. This plays an important role if the terrace construction has height restrictions, especially in the case of refurbishments.

The moisture-resistant BauderPIR insulation panels have proven their worth in practice for decades.

Thermal conductivity rating of $\lambda 0.022$

BauderPIR insulation panels have the lowest thermal conductivity of all conventional insulation materials with an extremely low thickness at the same time. This significantly reduces the installation height.

High compressive strength at a low thickness

The compressive strength of BauderPIR is $\geq 0.12 \text{ N/mm}^2$. The panels are dimensionally stable and withstand the highest loads.

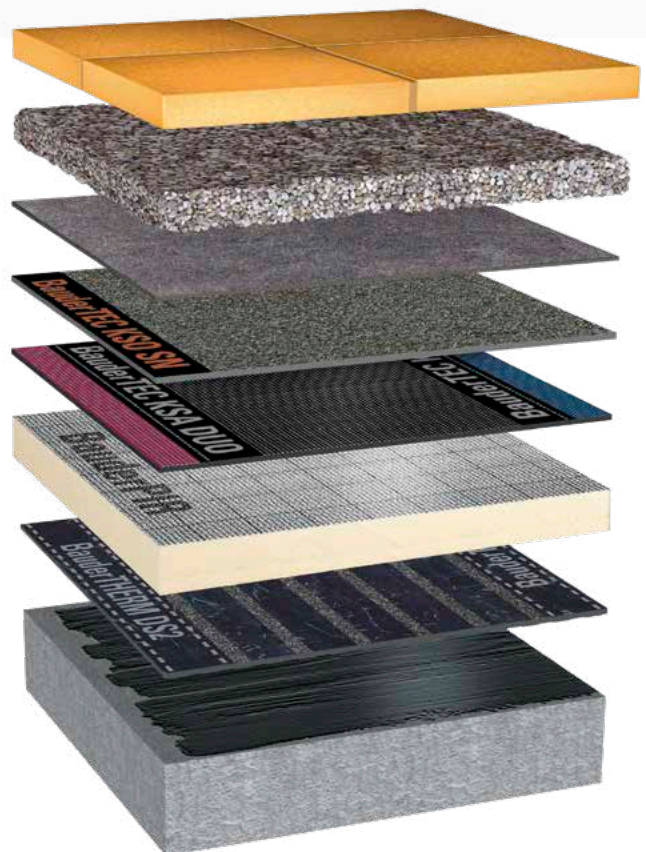
The optimum dimensions for terraces are 1,200 mm x 600 mm.

Extremely easy processing

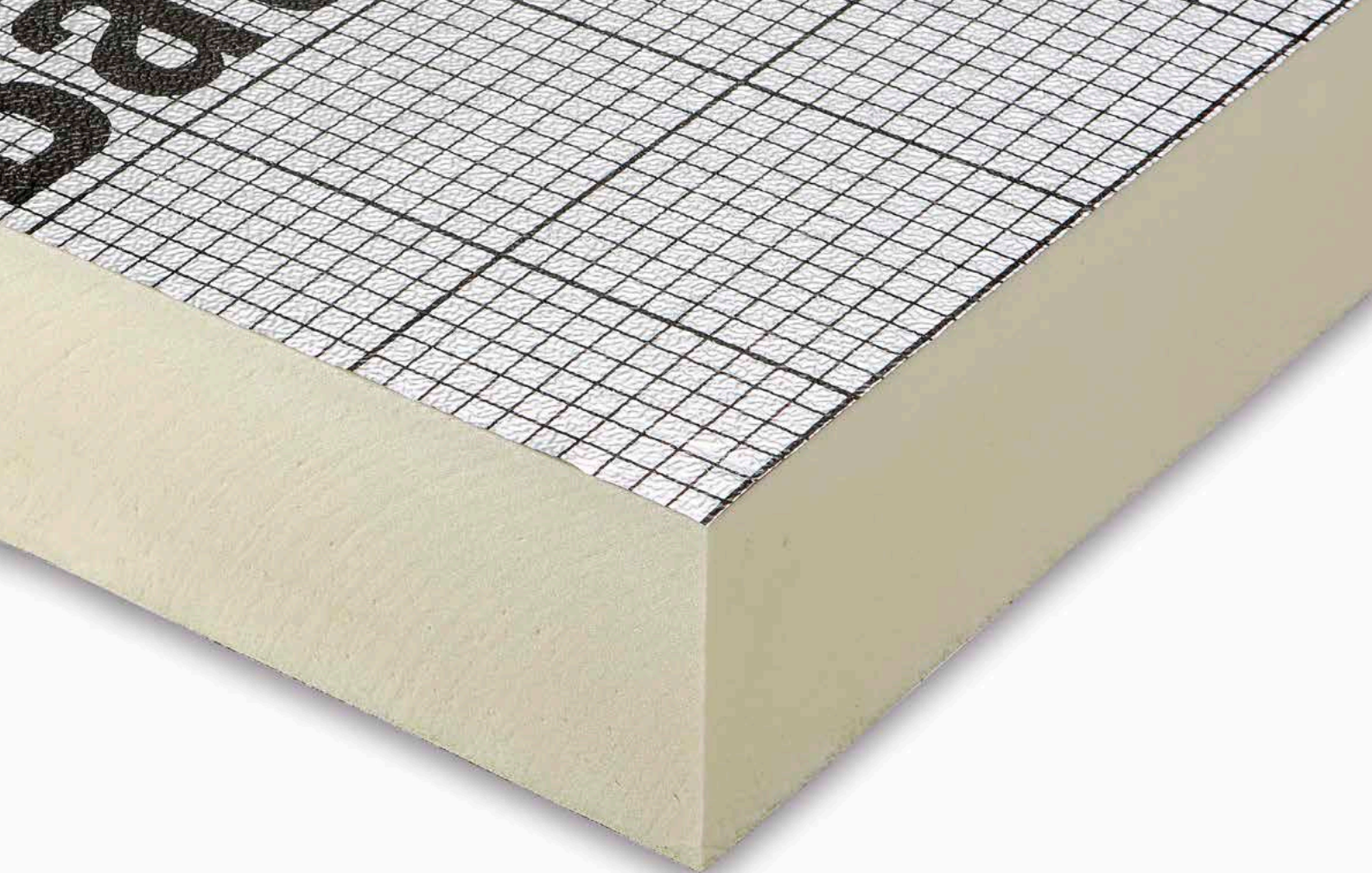
BauderPIR insulation panels can be trimmed easily and accurately on site with a knife or handsaw. The imprinted grid pattern serves as a cutting aid.

Impact sound reduction

Comfort at home is not only achieved with the correct thermal insulation – impact sound insulation is also an important aspect when it comes to planning a terrace. Bauder offers many systems tested in accordance with DIN EN ISO 140-8 that reliably protect living rooms under a patio against energy loss and noise caused by footfall.



Example of a system construction: BauderPIR FA TE

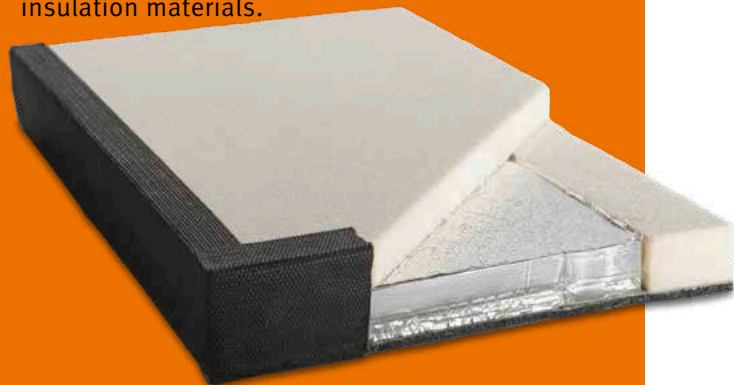


BauderPIR FA TE – technical data


Description	Polyurethane rigid foam panels in accordance with DIN EN 13165	
Application	Patio insulation	
Facing	Aluminium	
Length (mm)	DIN EN 822	1200
Width (mm)	DIN EN 822	600
Thickness (mm)	DIN EN 823	<u>No stepped lap:</u> 20, 30, 40, 50, 60, 70, 80, 100, 120, 140, 160 <u>With a stepped lap:</u> 60, 80, 100, 120, 140, 160
Compressive strength	DIN EN 826	≥120 kPa (≥0.12 N/mm²)
Fire behaviour	DIN EN 13501-1 DIN 4102-1	Class E B2
Thermal conductivity λ Rated value (W/m·K)	DIN 4108-4	0.023
Thermal conductivity rating WLS (D)	–	023
Thermal conductivity λ_D (EU) Nominal value (W/m·K)	DIN EN 13165	0.022
Water absorption (%vol)	DIN EN 12087	max. 3
PIR index	–	> 250

If the required installation height does not permit the use of BauderPIR FA TE, the extremely thin **BauderVIP TE** special insulation panels are an interesting alternative:

BauderVIP TE is the innovative solution for the thermal insulation of patios with a particularly low installation height. The highly insulating and very flat vacuum insulating core (WLS 007) makes it possible to comply with connection heights that would not otherwise be possible using normal insulation materials.



You can find further information in our brochure entitled “TERRACE SYSTEMS, complete solutions for terrace roofs and balconies” and on our website ...



BauderPIR FA Gefälle

Aluminium foil laminated PIR slope insulation

BauderPIR FA Slope is a high-quality standard slope, consisting of aluminium foil laminated tapered panels with a thermal conductivity rating of λ 0.022. The associated BauderPIR KFS valley filling pieces or BauderPIR GFS hip filling pieces simplify installations in valley and hip areas, on the one hand, and significantly reduce waste material, on the other hand.

Just eight different BauderPIR FA Gefälle insulation panels are needed to realise a single layer installation with a slope of 30 mm to 230 mm over a possible length of 9.60 m. In addition, this can be expanded if necessary over a length of 10.80 m (slope of 5 to 30 mm) through the use of a particularly flat special panel.

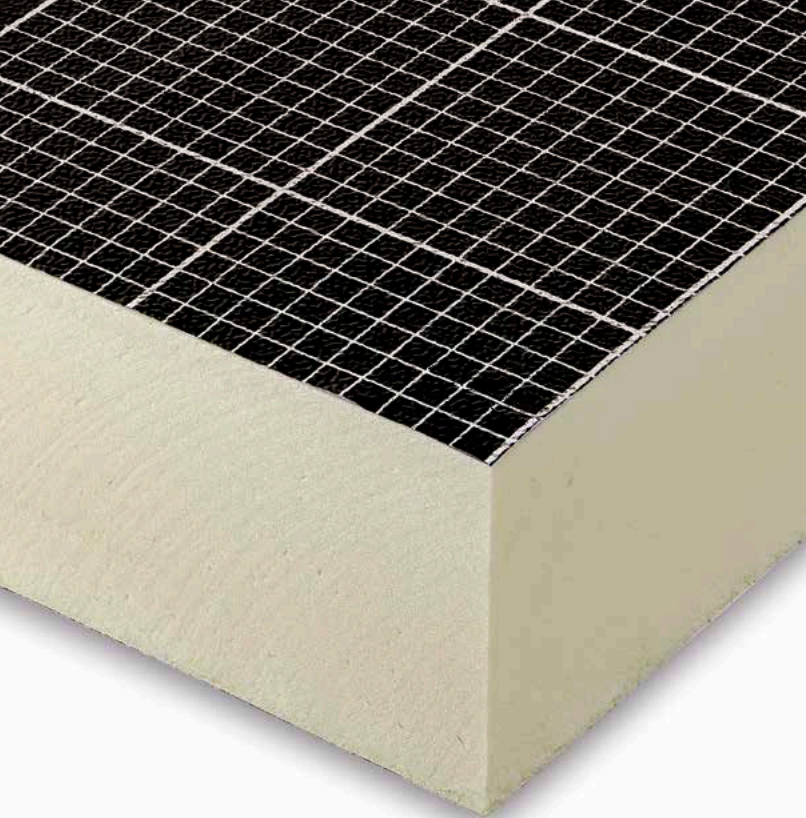
The BauderPIR FA Gefälle panels have standard dimensions that are produced for stock and are therefore readily available at all times.

BauderPIR FA Gefälle is suitable for roof constructions with bitumen membranes as well as for constructions with synthetic roof membranes.

The benefits of the new BauderPIR FA Gefälle insulation:

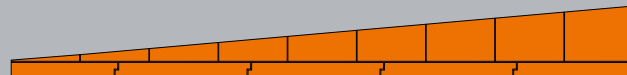
- Standardised tapered panels, therefore minimal or no delivery times as they are held in stock by retailers.
- Efficient valley and hip solution
- Thermal conductivity rating of λ 0.022
- Maximum insulation performance at a low installation height
- High compressive strength
- Optimised surface with low-reflection printing to help with the installation
- Proven, dimensionally stable high-performance insulation material

Additional information on the following pages.



Simply variable! Single- or multi-layer

Multi-layer application (recommendation)



We recommend applying multiple layers from an energy point of view. Potential thermal bridges are avoided by offsetting the layers. BauderPIR FA thermal insulation panels are used as the base insulation. BauderPIR FA TE terrace and floor insulation panels can also be used as an alternative. BauderPIR FA slope insulation is then applied on top. The slope can be extended as required by adjusting the thickness accordingly and applying additional layers of base insulation.

Single-layer application



A slope with a length of 10.80 m can be created with the BauderPIR FA tapered insulation panels 1 - 8 and the particularly flat special panel. This design in the lowest possible thickness may be required in individual cases if prescribed connection heights need to be observed. A project-specific energy analysis must be performed.

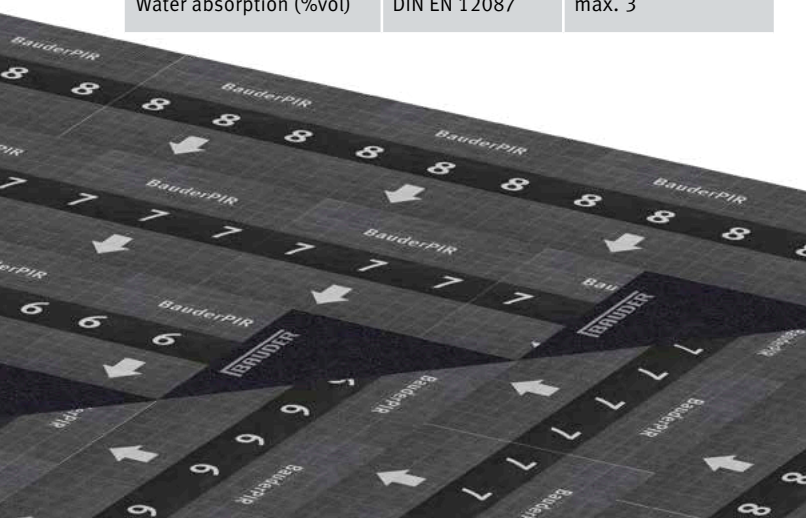
Combined application



A combination of the two preceding application methods is also possible. This combines the option of flat starting heights and large slope lengths. The number of different panels can therefore be minimised with a skilful design, thus optimising the stock holding: unlimited slope lengths can therefore be created with four tapered panels (no 1 - 4, starting/end height: 30 mm/130 mm) and 100 mm base insulation.

BauderPIR FA Gefälle – technical data

Description	Polyurethane rigid foam panels in accordance with DIN EN 13165	
Application	Slopes on flat roofs	
Facing	Aluminium (on both sides)	
Pitch	2.0 %	
Length (mm)	DIN EN 822	1200
Width (mm)	DIN EN 822	1200
Thickness (mm) No slope	DIN EN 823	30 mm
Thickness (mm) With a slope	DIN EN 823	230 mm
Compressive strength	DIN EN 826	≥ 120 kPa (≥ 0.12 N/mm ²)
Fire behaviour	DIN EN 13501-1	Class E
Thermal conductivity λ Rated value (W/m·K)	DIN 4108-4	0.023
Thermal conductivity λ_D (EU) Nominal value (W/m·K)	DIN EN 13165	0.022
Water absorption (%vol)	DIN EN 12087	max. 3



BauderPIR FA Gefälle

Valley/hip solution

The new BauderPIR FA Gefälle 2.0% tapered insulation panels can be used to easily realise slope insulation with a 2% pitch in a variety of lengths and shapes with a few standard elements. The installation starts on the respective roof substructure with the appropriate Bauder bitumen vapour barrier. BauderPIR FA base panels are applied depending on the requirement. The next step is to apply the new BauderPIR FA Gefälle insulation based on the slope layout. The low-reflection surface, a cutting grid as well as the panel labelling and imprint of the slope direction are useful during the installation.

Valley and hip filling pieces

The innovative valley and hip solution is the special feature of this system. It enables an innovative installation technique in the valley and hip areas with normal contours and pitches.

The tapered insulation panels are applied to the surface as normal, but now they are applied right into the valley and hip areas. The **BauderPIR KFS valley filling pieces** and **BauderPIR GFS hip filling pieces** are then used. They are designed in such a way that they fill in the resulting offset in the slope insulation and, at the same time, they fit into each valley or hip area. Only

one type of valley filling piece and one type of hip filling piece are now needed for the installation. This means simple stock holding, no sorting on the building site, no waste and no leftover pieces.

The new standardised BauderPIR FA Gefälle therefore not only ensures optimum insulation and precise drainage to the roof drains, but also an easy installation and problem-free, space-saving stock holding.

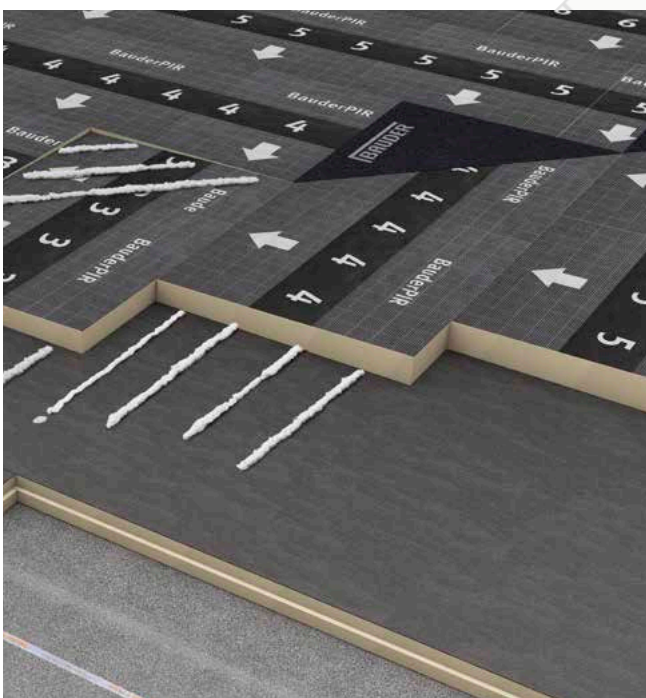


Fig. 6/1: Installation example with a **BauderPIR KFS** valley filling piece

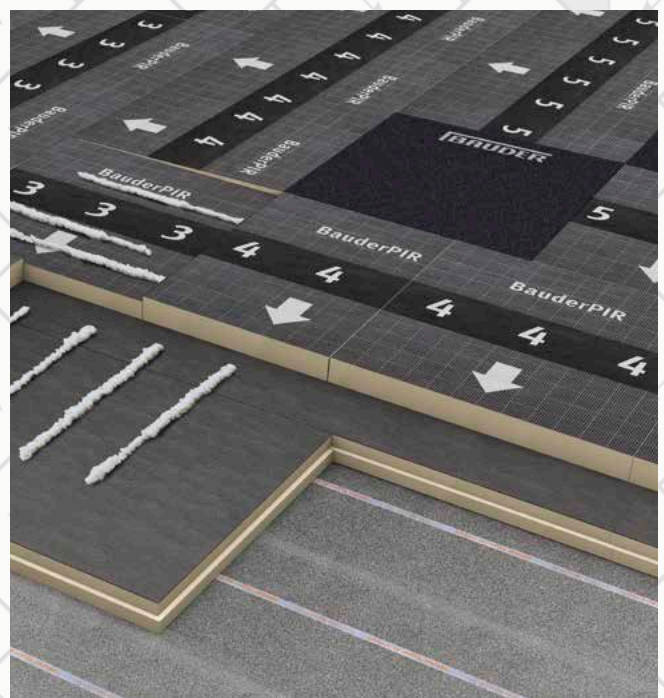
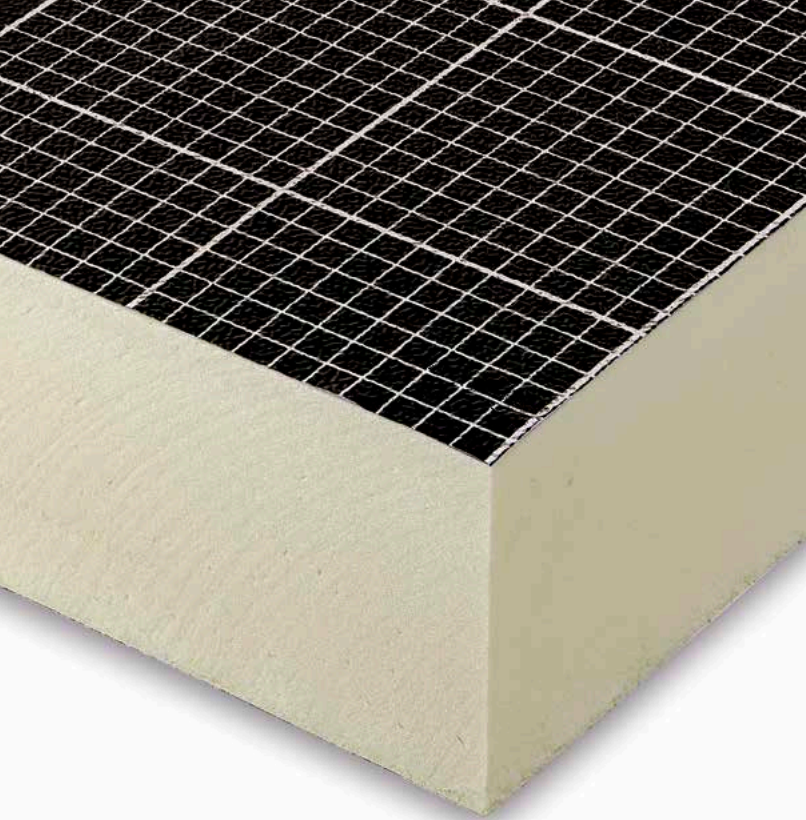


Fig. 6/2: Installation example with a **BauderPIR GFS** hip filling piece



The benefits of the Bauder valley and hip solution at a glance:

- Just one valley filling piece
- Just one hip filling piece
- Minimal storage space required
- Optimised workflow on the building site – no cutting, no searching, no waste
- Robust and flexible
- High compressive strength
- Low-reflection surface
- Suitable for waterproofing with bitumen and synthetic membranes
- certificated on external exposure to fire Broof(T1)

Simply excellent!

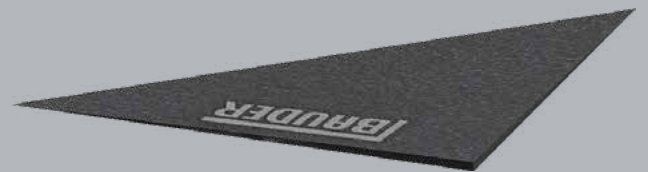
The BauderPIR FA Gefälle Valley and hip solution

Usually 16 valley panels and 16 hip panels are needed for 8 tapered panels, a left and right panel - in every tapered panel thickness. This means 32 additional panels and proportionally more for a version with lamination or a tapered pitch. For retailers, this means that they need lots of storage space and, for installers, they need to initially sort the different individual panels.

We have addressed this issue and developed a new solution. Two filling pieces solve the problem. Space-saving and efficient – really practical!

BauderPIR KFS valley filling piece

In a triangular shape – fits into the valley offsets. The slope insulation is placed right into the valley at the same height and then the valley filling piece is glued in with the same adhesive used for the rest of the insulation.



BauderPIR GFS hip filling piece

Square – fits into the hip offsets. The slope insulation here is also placed right into the hip. However, a lower height is chosen for the tapered panel directly in the hip, i.e. under the hip filling piece, than for the rest of the tapered panels in the row. Then the filling piece is also glued in here accordingly.



A special material was chosen due to the low thickness: flexible polypropylene. High compressive strength, highly flexible, suitable for gluing and certificated on external exposure to fire Broof(T1).

It is therefore ideal for using on building sites and also very economical in a system.

BauderPIR T LES

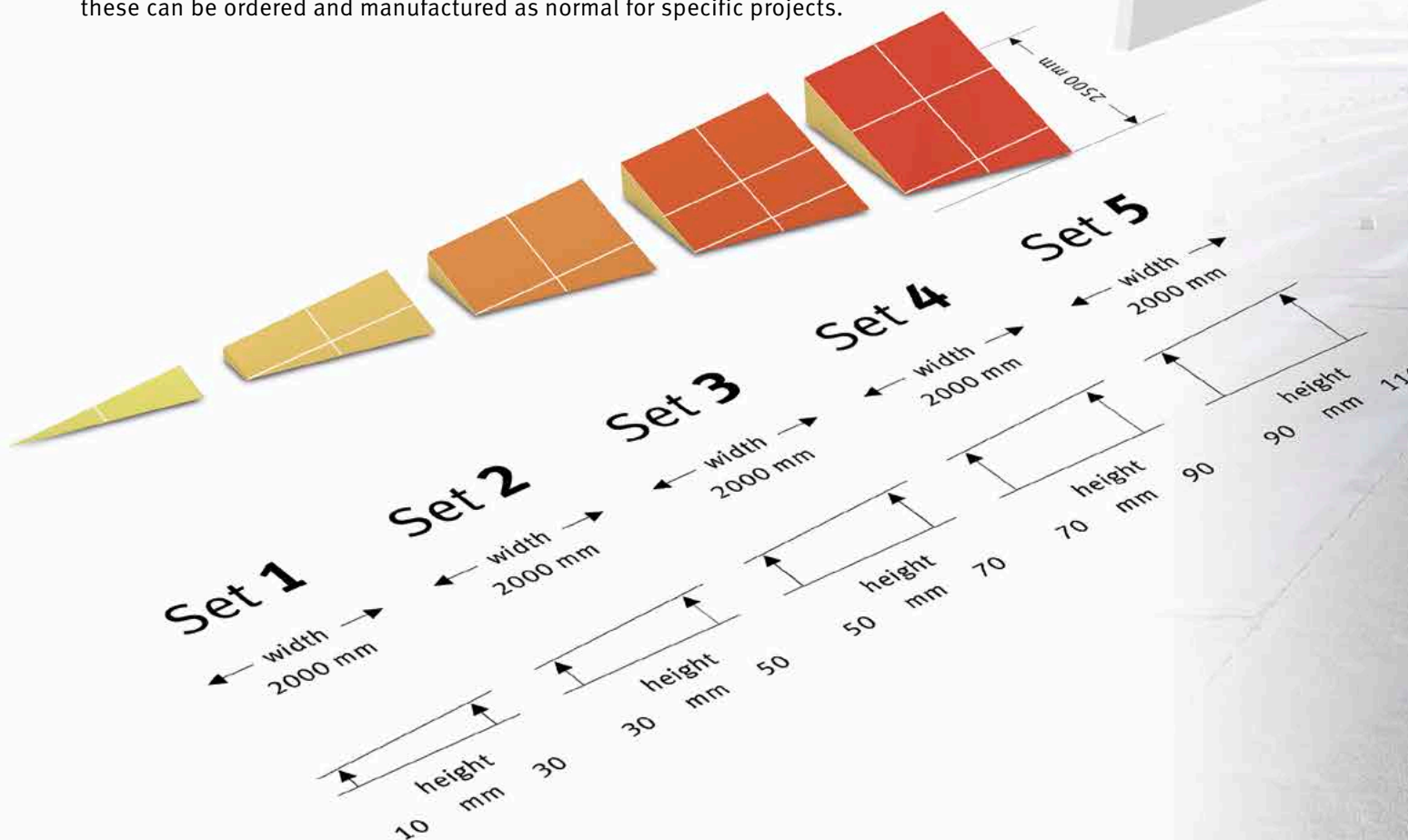
Linear drainage

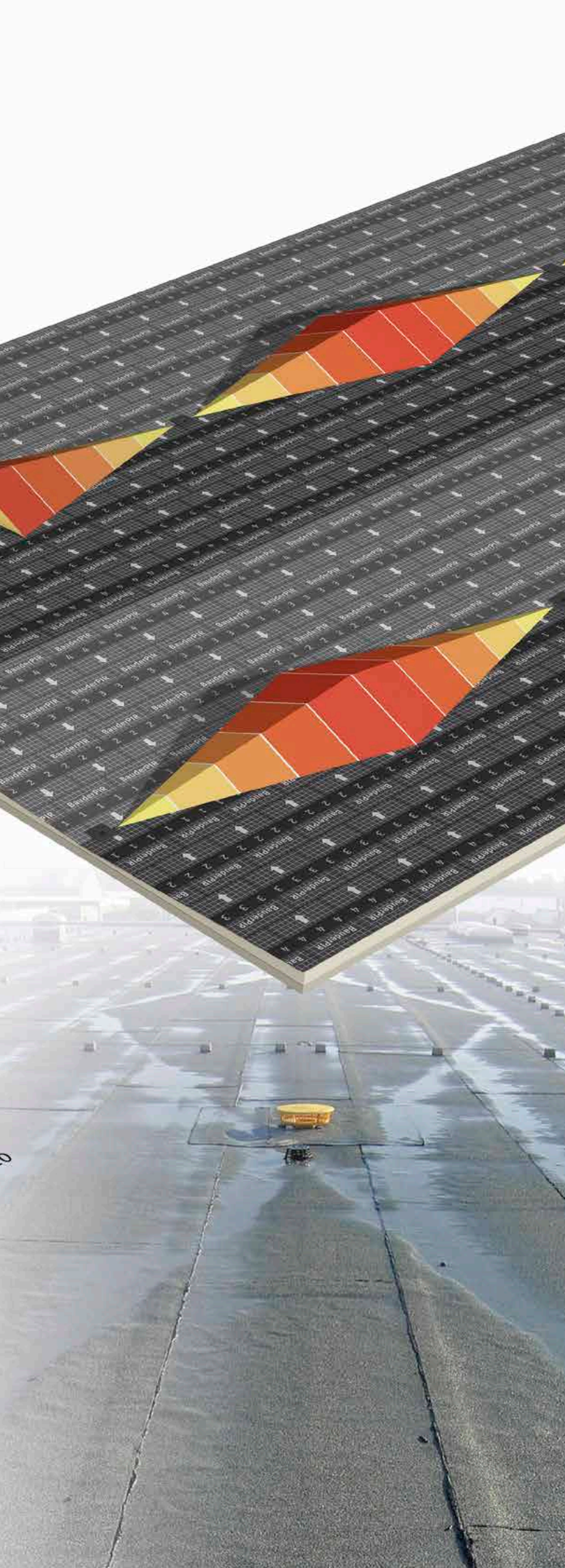
Linear drainage systems are used to economically create a cross slope between drains on the same level on an existing surface slope. Rainwater that would otherwise remain at the low point line is routed directly into the gullies.

The BauderPIR T LES linear drainage system has proven its worth over many years. Pressure-resistant polyurethane rigid foam, a very good thermal conductivity rating as well as high dimensional stability are just a few of the benefits of this system. However, the new BauderPIR T LES linear drainage system is no longer produced to order or for specific projects, but is held in stock by retailers and is therefore available at short notice as a “modular system” consisting of standard elements.

The high quality of the elements made of PU rigid foam with an increased density for improved compressive strength remains unchanged. The dimensions and pitches have also proven their worth and remain unchanged. Only the subdivision of the components and corresponding container sizes have been broken down into a standardised size. A total of 5 BauderPIR T LES sets are now available, which enable linear drainage systems of 1 to 10 m when combined.

If linear drainage systems are required with a length larger than 10 m, these can be ordered and manufactured as normal for specific projects.





BauderPIR T GGP

Counter-tapered panels

We have developed the new BauderPIR T GGP counter-tapered panels for roofs with a pitch on just one side and water drains at a certain distance to the eaves-side attic (mainly industrial buildings). These route the water arising in the eaves area directly into the drainage course in the gullies. Due to the polyurethane design, the materials and insulation are of the usual high quality and are resistant to dimensional changes and heat exposure.



Fig. 9/1: BauderPIR T GGP counter-tapered panels made of polyurethane rigid foam with the dimensions 1,200 x 600 mm

In the following installation example, the main application is shown on a trapezoidal sheet metal substrate that has already been applied to the prescribed slope. The remaining structure then comprises the primer (e.g. Bauder Burkolit V), bitumen vapour barrier (e.g. Bauder Super AL-E PLUS) and BauderPIR FA flat roof insulation as well as the BauderPIR T GGP counter-tapered panels in the fascia area for the direct routing of water into the drain level.

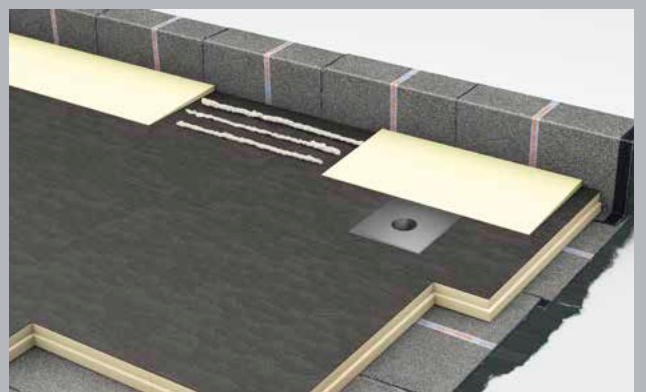


Fig. 9/2: Installation example for a BauderPIR T GGP counter-tapered panel

It is also possible to have a roof substructure made of concrete without a slope, followed by a structure with BauderPIR FA base insulation and the new BauderPIR FA Gefälle insulation, with a slope towards the attic as well as the BauderPIR T GGP counter-tapered panels in the fascia area for the direct routing of water into the drain level.

Installation instructions

BauderPIR FA / M / MF

1. Mechanical fastening

BauderPIR insulation panels can be mechanically fastened. In order to obtain wind uplift resistance, fastening elements must be used that are approved for the particular substrate. Irrespective of this, five elements must be used for the uniform planar fastening of large panels (2,400 x 1,200 mm). Fastening is performed at the corner points and in the centre of the panel. Two fasteners per panel will suffice for small panels.



2. Cold bonding

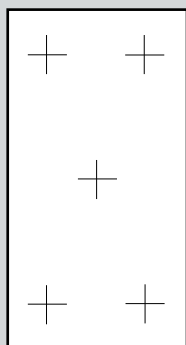
BauderPIR insulation panels can be bonded with Bauder foam adhesive.

For this type of application, a force-fit connection must be achieved between each BauderPIR roof insulation panel and the substrate through the uniform stripe-format application of Bauder foam adhesive in the installation condition. By way of example, this should consume 75 ml/m² for three adhesive strips per m².

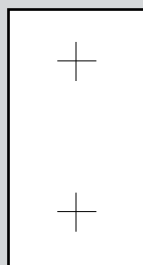
This could be more depending on wind uplift stress.



Panel fasteners:



Large panels
(1,200 x 2,400 mm)



Small panels
600 x 1,200 mm

The amount of adhesive required may increase based on project-specific peculiarities. Bauder foam adhesive must exclusively be used for the bonding. If the use of other adhesives is planned or there are project-specific peculiarities, please seek the advice of Bauder's Application Engineering Department [*Bauder Anwendungstechnik*].

Bauder foam adhesive hardens in contact with moisture, i.e. the reaction occurs much quicker with a small amount of moisture on the adhesive bead. In particular, if you want to walk on the insulation panels to be applied as quickly as possible, the adhesive beads should therefore be moistened with spray mist from a hand-operated sprayer as soon as they are applied (attention: only light mist, no drops of water etc.). The insulation panels must then be placed on the moistened adhesive beads and light pressure must then be applied. The insulation panels can be readjusted without adding moisture for around a further 10 minutes and for around a further 5 minutes when adding

moisture. **The panels must not be walked on before the Bauder foam adhesive has hardened.** This can take up to an hour or even longer in individual cases if no water is added depending on the weather conditions. The curing process can be reduced to under 20 minutes by adding moisture.

If nothing else is required in the wind uplift calculation, the spacing between the adhesive beads must be distributed evenly, with a gap from the edge of the panel of max. 5 cm. In profile sheet roofs, the BauderPIR insulation panels must be bonded to the appropriate vapour barrier on the upper flanges. An additional mechanical fastening in the edge and corner area may be necessary. The number of fastening elements is based on DIN EN 1991-1-4. A two-layer application is possible.

3. Bonding in BauderTHERM DS1 DUO or BauderTHERM DS2

If the BauderTHERM DS1 DUO or BauderTHERM DS2 vapour barrier has been properly applied, the bitumen stripes on the top side can be activated using a torch and BauderPIR pasted in. Aligning or shifting the insulation panels will subsequently no longer be possible. In order to ensure a bonding surface of at least 40%, this type of application is only recommended for sufficiently flat substrates. Excessively thick T-joint overlaps may have to be heated up and evened out under high pressure, or the insulation material may have to be cut out at these points. In the case of a roof pitch of $\geq 3^\circ$, the insulation material bonded in THERM stripes must also be secured against slipping.

4. Heat bonding (only BauderPIR M/MF)

BauderPIR insulation panels are resistant to hot bitumen (up to 250°C) and can therefore be bonded across the entire surface on the substrate with hot liquid bitumen compound. For partial-surface bonding with hot liquid bitumen compound, each BauderPIR insulation panel must be non-positively bonded up to at least 50% with the substrate in the installation condition with even distribution.

Bonding with "sinuous line distribution" when applying the adhesive has proven successful. By contrast,

point-by-point bonding is incorrect and can lead to damage.

The expenditure of hot bitumen adhesive compound depends on the substrate and should be at least 1.5 kg/m² for partial-surface bonding. The processing temperature is 180°C. BauderPIR insulation panels are applied in single layers and in combination with tight joints. If BauderPIR M/MF thinner than 80 mm is bonded in hot bitumen, the panels may deform due to the heat. A two-layer application is not possible due to the heat build-up to be expected. Panels with a stepped lap on all sides also reliably prevent thermal bridges.

5. Application on wood planking

A separating layer (bitumen membrane) must be fixed to the wood planking in accordance with DIN EN 1991-1-4 so that it is mechanically secured against wind uplift. The vapour barrier membrane is welded onto this with a finely spread surface.

The BauderPIR insulation panels can be bonded through the even stripe-format application of Bauder foam adhesive, as described in item 2.

General information

It is important to ensure that the surface of the applied thermal insulation is flat when using waterproofing made from high polymer membranes. BauderPIR is not resistant to all solvents. Any direct impact must therefore be avoided. Any indirect impact may also have a negative effect on the structure of the insulation material.

Store BauderPIR insulation panels in a dry condition, and protect them from humidity and direct sunlight during transport and application.

Please seek the advice of Bauder's Application Engineering Department in the case of project-specific peculiarities.

Installation instructions

BauderPIR T Gefälle

BauderPIR T Gefälle insulation panels (1,200 x 800 mm) can generally be installed in all non-ventilated roof system configurations. The layer construction is determined by the physical and technical planning specifications.

Recommended layer construction for a non-ventilated flat roof on concrete:

- 1 Undercoat: **Burkolit V**
- 2 Vapour barrier: **BauderFLEX DNA**
- 3 Thermal insulation layer: **BauderPIR T**
- 4 First layer of the waterproofing and vapour pressure compensating layer: **BauderTHERM UL 50**.
If the first layer of waterproofing is applied with cold self-adhesive as an alternative, e.g. with **BauderTEC KSA**, **BauderTEC KSA DUO** or **BauderTEC KSA DUO 35**, the waterproofing must be bonded only in combination with a torch-on membrane capping sheet to secure it against wind uplift.
- 5 Top waterproofing layer: **BauderKARAT**

Bonding the insulation panels

The BauderPIR T Gefälle insulation panels are bonded in strips with Bauder foam adhesive. At least four adhesive strips must be installed per m². This corresponds to a consumption of approx. 100 ml/m², even more depending on the wind load (observe DIN EN 1991-1-4). **Bauder foam adhesive hardens in contact with moisture, i.e. the reaction occurs much quicker with a small amount of moisture on the adhesive bead.** In particular, if you want to walk on the insulation panels to be applied as quickly as possible, the adhesive beads should therefore be moistened with spray mist from a hand-operated sprayer as soon as they are applied (attention: only light mist, no drops of water etc.).

The insulation panels must then be placed on the moistened adhesive beads and light pressure must then be applied. The insulation panels can be readjusted without adding moisture for around a further 10 minutes and for around a further 5 minutes when adding moisture. **The panels must not be walked on before the Bauder foam adhesive has hardened.** This can take up to an hour or even longer in individual cases if no water is added depending on the weather conditions. The curing process can be reduced to under 20 minutes by adding moisture. Alternatively, the panels can be bonded in stripes in hot bitumen. BauderPIR T

must be at least 100 mm thick in order to reliably prevent the deformation of the insulation panels due to the hot bitumen. The panels can also be mechanically fixed to the substrate using three suitable insulation fasteners.

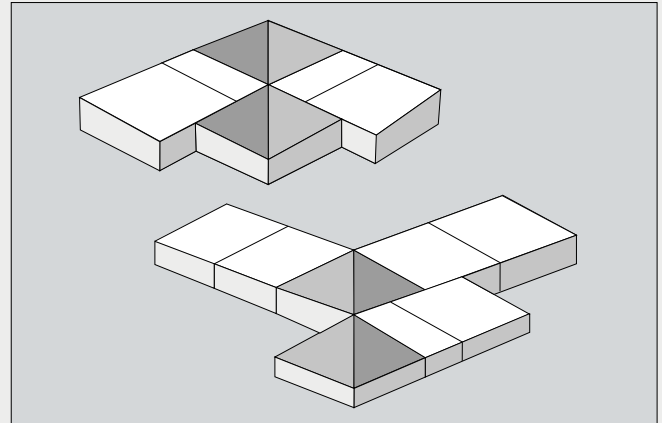
BauderPIR T is not suitable for loose application.

Applying multiple layers of insulation panels in hot bitumen is not possible because of the anticipated build-up of heat. Bauder foam adhesive must be used for this application.

Application with valley and hip panels

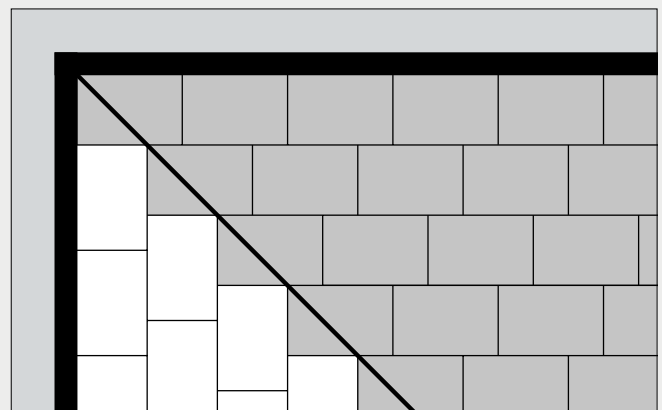
The dimensions of the panels are 800 x 800 mm. Either a valley or hip line is incorporated into the surface. Valleys and hips can be created without additional processing costs and waste when using these special panels.

Valley and hip panels are identified as such and an arrow points to the high point.



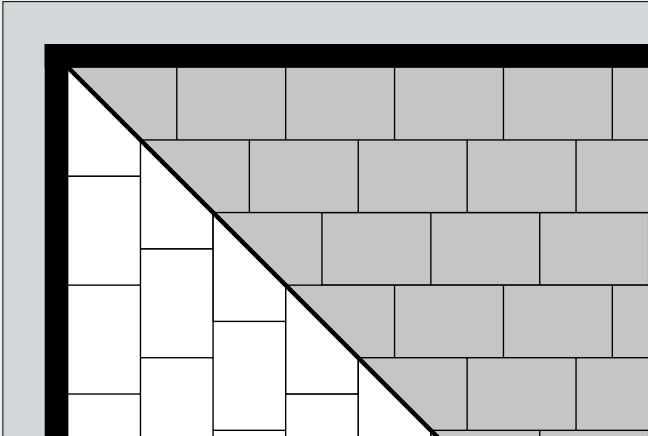
Mitring

Here, the insulation panels are cut to size on site and laid together in order to create uniform valley and hip lines. A certain amount of waste must be included with this solution.



Bonding

Hardly any waste – particularly cost-effective. With valleys, small cavities are created at the panel edges that are filled with hot bitumen. Small overhangs that can be cut off easily with a large handsaw form at the panel edges when creating hips.



Labelling

The thicknesses of the insulation material are indicated on the front of the tapered panels. An arrow indicates the top of the panel. If the roof area is divided into several sections, the different order numbers can be found on the label and on the installation plan.

Delivery

BauderPIR T Gefälle insulation panels are sorted and labelled by type and delivered in shrink-wrapped packs. The quantity calculations (number of panels) do not always amount to full packs. In these cases, the remaining panels are packed in mixed packs.

General information

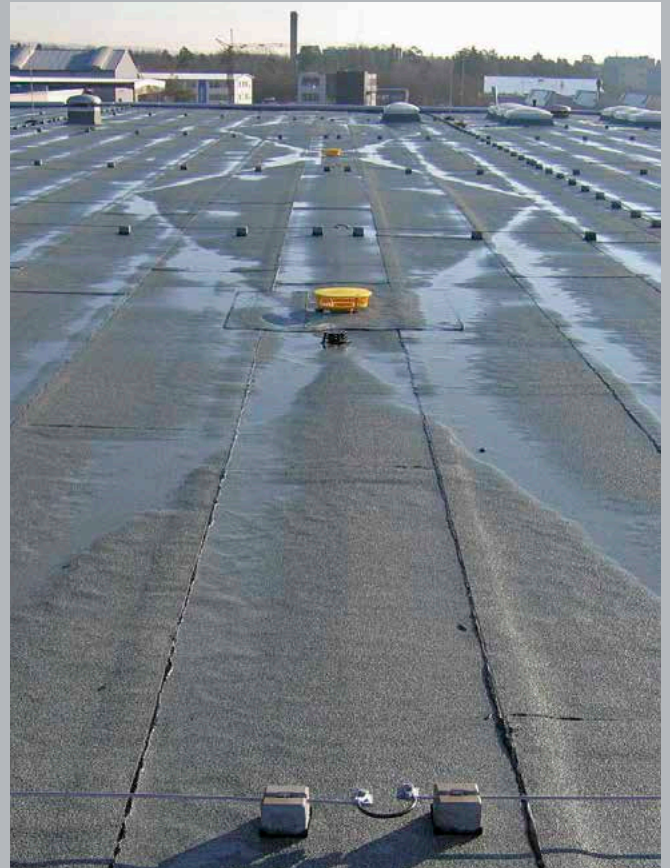
It is important to ensure that the surface of the applied thermal insulation is flat when using waterproofing made from high polymer membranes. BauderPIR is not resistant to all solvents. Any direct impact must therefore be avoided. Any indirect impact may also have a negative effect on the structure of the insulation material.

Store BauderPIR insulation panels in a dry condition, and protect them from humidity and direct sunlight during transport and application.

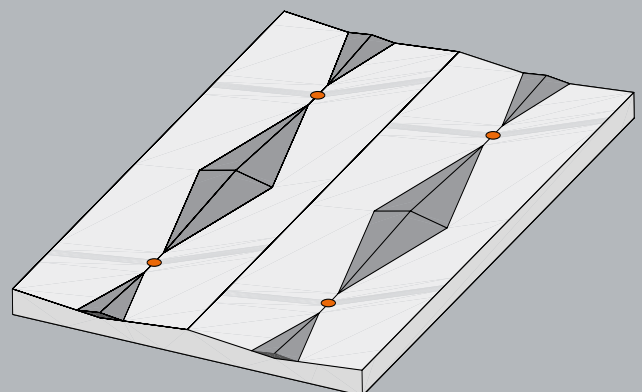
Please seek the advice of Bauder's Application Engineering Department in the case of project-specific peculiarities.

Bauder linear drainage system (LES)

A cross slope can be created very cost-effectively between the gullies with the Bauder linear drainage system without increasing the load.



Rainwater that would otherwise remain at the low point lines is routed directly into the gullies.



Installation instructions

BauderPIR KOMPAKT

The waterproofing layers and thermal insulation material are compactly bonded to each other and to the substrate with the Bauder PIR compact roof.

Substrate

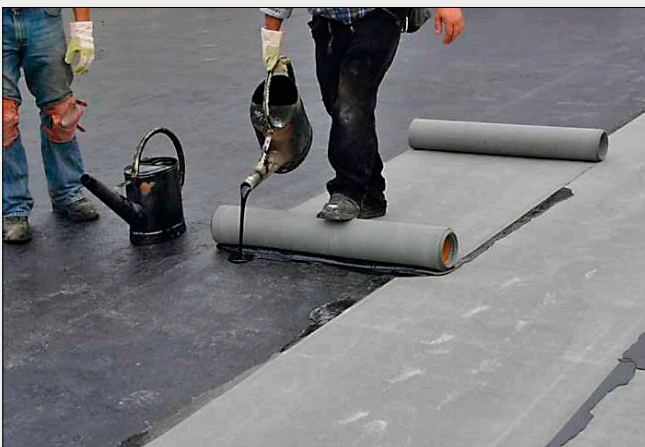
The evenness of the substrate must at least comply with the requirements of DIN 18202 (dimensional tolerances in building construction). Irregularities up to approx. 5 mm can be evened out with hot bitumen. Cavities occur if substrates are too uneven. The full-surface bonding of the vapour barrier on a concrete roof substructure in a pouring process reduces water infiltration under the vapour barrier if there is localised damage. Cracked substrates (or potentially sloping screeds) do not allow for infiltration-proof bonding. If the vapour barrier is to be applied to the concrete roof structure so that there is no water infiltration underneath, the concrete surface must be pretreated, for example, using a sander. These measures must be planned beforehand, see DIN 18532 or the directive for flat roofs. The 3° (approx. 5%) incline of the substrate should not be exceeded because of the hot liquid bitumen.

Preparatory work

The membrane temperature, outdoor temperature and substrate temperature must not exceed +5 °C. Clean the concrete surface by sweeping it with a stiff broom. Apply an undercoat of bitumen (Bauder Burkolit V) to the dry concrete surface, consumption approx. 0.3 kg/m².

Vapour barrier

Completely bond the BauderKOMPAKT DSK vapour barrier membrane in hot bitumen. Consumption approx. 2.5 kg/m² depending on the substrate.



Applying insulation panels

It must not rain and the substrate must remain dry during the entire application. Insulation panels that have become moist must not be installed. Moisture leads to the formation of bubbles in the waterproofing.

Pour hot bitumen with a temperature of 180°C onto the vapour barrier membrane that has been applied, consumption at least 4 kg/m², also significantly more depending on the substrate.



Dip both sides of the BauderPIR KOMPAKT insulation panels into the bitumen adhesive compound that has been poured out.

Apply the BauderPIR KOMPAKT insulation panels with press-fitted joints together, cross joints must be avoided. Push the panels diagonally so that the joints are completely filled with hot bitumen. Hot bitumen must be added from above to fill the joints with larger thicknesses of insulation material. The insulation panels must be secured to prevent them from slipping before the bitumen has cooled down sufficiently (e.g. with beds of nails).

Panels thinner than 60 mm may deform due to the hot bitumen. When panels are thicker than 160 mm, it is hardly feasible in practice to completely cover each individual insulation panel with hot bitumen.

Remove hot bitumen seeping out of the joints with the next BauderPIR KOMPAKT insulation panel and spread evenly. Finely spread the surplus adhesive compound. The application of multiple layers of BauderPIR

KOMPAKT insulation panels is not possible because of the anticipated build-up of heat. Rough, uneven areas on the surface of the PIR panels must be levelled out once they are applied, for example, by pouring hot bitumen into the dips or rubbing off the peaks on the insulation panels. The hardened or wall insulation should be processed after the roof insulation in the workflow.

Valley and hip area

The dimensions of the valley and hip panels are 600 x 600 mm. Either a valley or hip line is incorporated into the surface.

First layer

Apply BauderKOMPAKT ULK to the BauderPIR KOMPAKT insulation panels as the first layer of roof waterproofing with a lap and joint overlap of 8-10 cm and cover them completely with hot bitumen in a pouring process in accordance with the applicable guidelines, consumption at least 3 kg/m².

Use a heavy-duty winding core. Roll in the waterproofing membrane so slowly that a bead of bitumen emerges at the front of the roll. No air must be trapped under



Bitumen compound seeping out may need to be finely spread to avoid bonding.

The first layer must be applied step by step. The insulation material must not get wet. Moisture on the surface of the bitumen membrane must be dried during the application, for example, using a torch. Bauder Flex K5E finely spread, for example, can also be installed as a first layer in vertical connection areas (e.g. fascias) in a welding process as an alternative to BauderKOMPAKT ULK.

Waterproofing capping sheet

Completely weld BauderKARAT as a second layer to the first layer of roof waterproofing in a welding process with a lap and joint overlap in accordance with the applicable guidelines.

Other system construction options:

Planting with Bauder green roof systems (BauderSMARAGD as a root-resistant capping sheet) or a gravel bed (grain size 16/32, filling height at least 50 mm).

Important information:

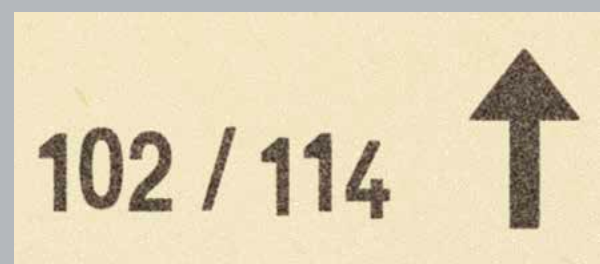
Store BauderPIR insulation panels in a dry condition and protect them from moisture during transport and application! Do not store in puddles and cover insulation panels that are not stored under a roof with additional foil. The ingress of moisture leads to the formation of bubbles in the waterproofing.

BauderPIR is not resistant to all solvents.

Any direct or indirect exposure must be avoided at all times.

Labelling of BauderPIR KOMPAKT tapered insulation panels

The thicknesses of the insulation material are indicated on the front of the tapered panels. The arrow indicates the top of the panel. If the roof area is divided into several sections, the different order numbers can be found on the label and on the installation plan. Valley and hip panels are identified as such and the arrow points to the high point.



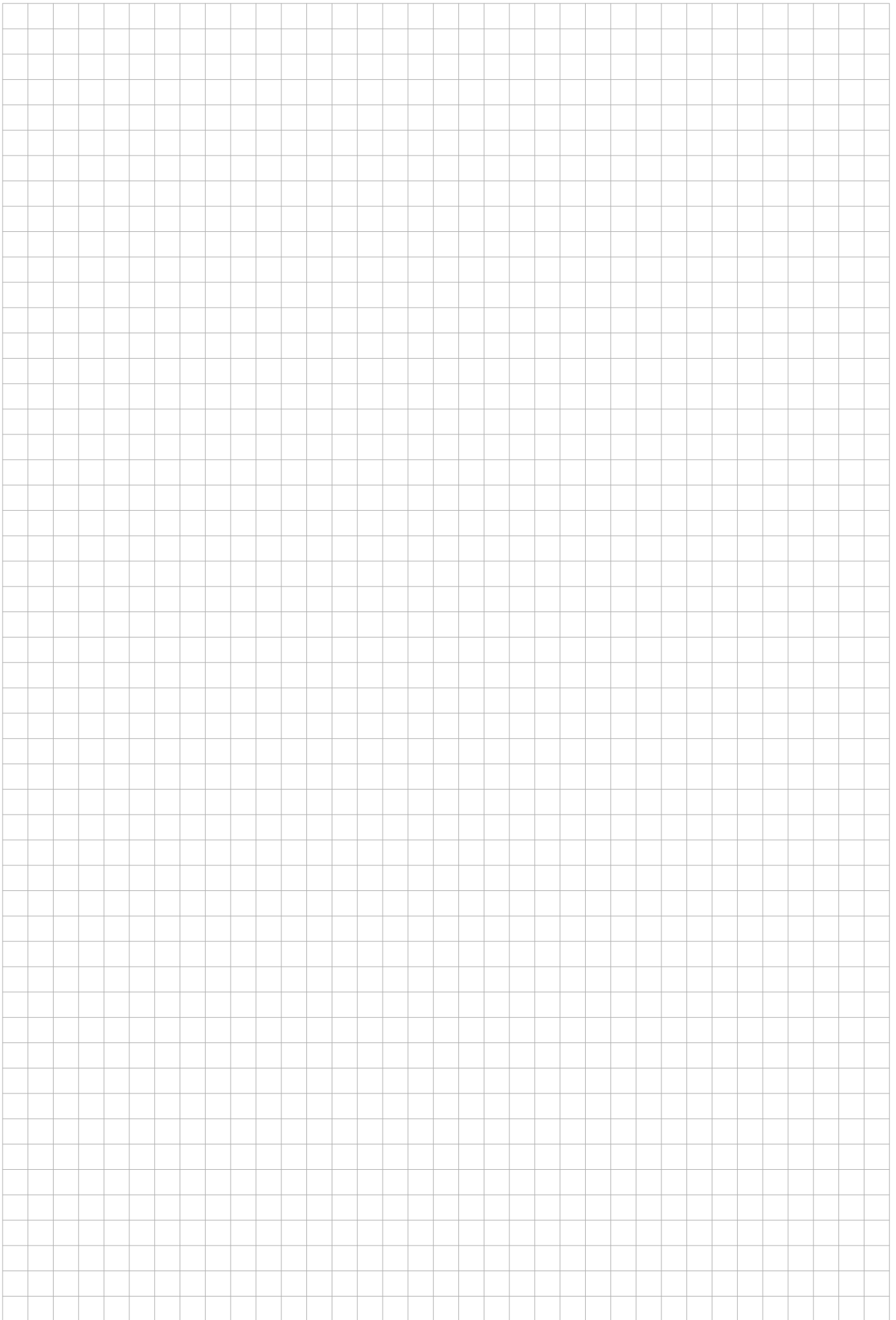
Insulation thicknesses and U-values in comparison

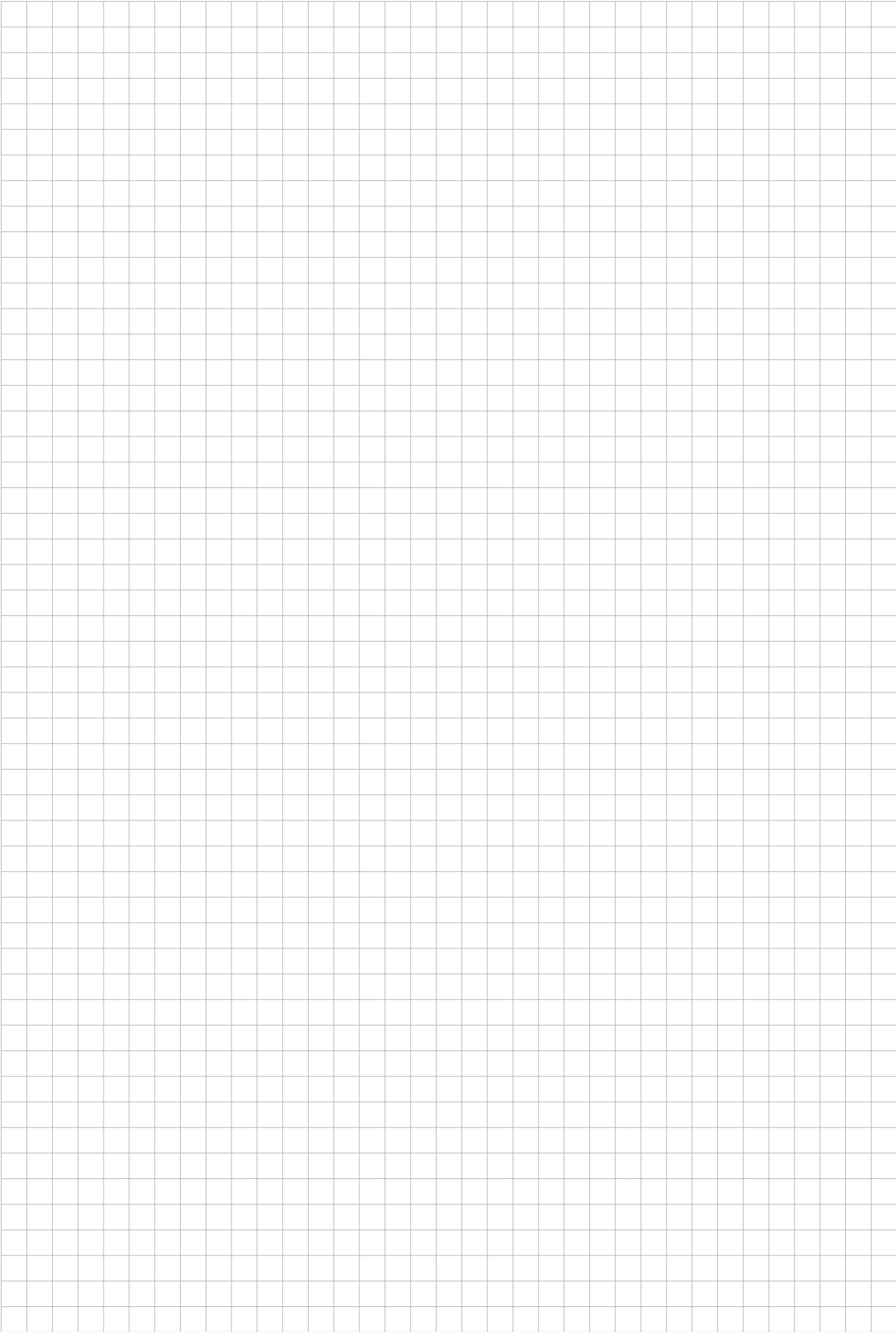
Thermal insulation without raw ceiling

Insulation material thickness (in mm)	λ 0.021 0.021 W/m·K	λ 0.022 0.022 W/m·K	FA/FA TE, FA Gefälle, SF, PLUS λ 0.022 0.023 W/m·K	BauderPIR			Mineral fibre, EPS, XPS			Foam glass, Wood fibre λ 0.045 0.045 W/m·K
				M/ME, T, KOMPAKT, SDS, AZS λ 0.025 ¹⁾ 0.026 W/m·K (thickness \geq 120 mm)	λ 0.026 ¹⁾ 0.027 W/m·K (thickness \geq 80 mm)	λ 0.027 ¹⁾ 0.028 W/m·K (thickness $<$ 80 mm)	λ 0.032 0.032 W/m·K	λ 0.035 0.035 W/m·K	λ 0.040 0.040 W/m·K	
20	0.915	0.953	0.991	1.100	1.135	1.171	1.307	1.406	1.563	1.711
30	0.638	0.665	0.692	0.773	0.799	0.825	0.928	1.003	1.124	1.240
40	0.489	0.511	0.532	0.596	0.617	0.638	0.719	0.780	0.877	0.972
50	0.397	0.414	0.432	0.485	0.502	0.519	0.587	0.638	0.719	0.799
60	0.334	0.349	0.364	0.409	0.423	0.438	0.496	0.539	0.610	0.679
70	0.288	0.301	0.314	0.353	0.366	0.379	0.430	0.467	0.529	0.590
80	0.253	0.265	0.276	0.311	0.322	0.334	0.379	0.412	0.467	0.521
90	0.226	0.236	0.247	0.278	0.288	0.298	0.339	0.369	0.418	0.467
100	0.204	0.213	0.223	0.251	0.260	0.269	0.306	0.334	0.379	0.423
110	0.186	0.195	0.203	0.229	0.237	0.246	0.280	0.305	0.346	0.387
120	0.171	0.179	0.187	0.210	0.218	0.226	0.257	0.280	0.318	0.356
130	0.158	0.165	0.173	0.195	0.202	0.209	0.238	0.259	0.295	0.330
140	0.147	0.154	0.161	0.181	0.188	0.195	0.221	0.242	0.275	0.308
150	0.137	0.144	0.150	0.169	0.176	0.182	0.207	0.226	0.257	0.288
160	0.129	0.135	0.141	0.159	0.165	0.171	0.195	0.212	0.242	0.271
170	0.121	0.127	0.133	0.150	0.155	0.161	0.183	0.200	0.228	0.255
180	0.115	0.120	0.126	0.142	0.147	0.152	0.173	0.189	0.216	0.242
190	0.109	0.114	0.119	0.134	0.139	0.144	0.165	0.180	0.204	0.229
200	0.103	0.108	0.113	0.128	0.132	0.137	0.156	0.171	0.195	0.218
210	0.099	0.103	0.108	0.122	0.126	0.131	0.149	0.163	0.186	0.208
220	0.094	0.099	0.103	0.116	0.121	0.125	0.143	0.156	0.177	0.199
230	0.090	0.094	0.099	0.111	0.115	0.120	0.136	0.149	0.170	0.190
240	0.086	0.091	0.095	0.107	0.111	0.115	0.131	0.143	0.163	0.183
250	0.083	0.087	0.091	0.103	0.106	0.110	0.126	0.137	0.156	0.176
260	0.080	0.084	0.087	0.099	0.102	0.106	0.121	0.132	0.151	0.169
270	0.077	0.081	0.084	0.095	0.099	0.102	0.117	0.127	0.145	0.163
280	0.074	0.078	0.081	0.092	0.095	0.099	0.112	0.123	0.140	0.157
290	0.072	0.075	0.078	0.089	0.092	0.095	0.109	0.119	0.135	0.152
300	0.069	0.073	0.076	0.086	0.089	0.092	0.105	0.115	0.131	0.147
310	0.067	0.070	0.073	0.083	0.086	0.089	0.102	0.111	0.127	0.142
320	0.065	0.068	0.071	0.080	0.083	0.086	0.099	0.108	0.123	0.138
330	0.063	0.066	0.069	0.078	0.081	0.084	0.096	0.105	0.119	0.134
340	0.061	0.064	0.067	0.076	0.079	0.081	0.093	0.101	0.116	0.130
350	0.060	0.062	0.065	0.074	0.076	0.079	0.090	0.099	0.112	0.126
360	0.058	0.061	0.063	0.071	0.074	0.077	0.088	0.096	0.109	0.123
370	0.056	0.059	0.062	0.070	0.072	0.075	0.085	0.093	0.106	0.120
380	0.055	0.057	0.060	0.068	0.070	0.073	0.083	0.091	0.104	0.116
390	0.053	0.056	0.058	0.066	0.069	0.071	0.081	0.089	0.101	0.114
400	0.052	0.055	0.057	0.064	0.067	0.069	0.079	0.086	0.099	0.111

Thermal transition resistance of 0.10 m²K/W + 0.04 m²K/W (i.e. heat flow upwards) has been taken into consideration.

1) The values only apply to a single-layer application of insulation panels or a multi-layer application of insulation panels with an identical thermal conductivity rating.







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