



Under-rafter insulation system
Interior wall insulation

PAL GK

The slim interior insulation for perfect living comfort

The ideal insulation under the rafters

You save heating costs, gain additional living space, and protect the environment.

Excellent insulation value – TCL 022

Installation directly under the rafters

Minimum panel thickness for maximum living space

Interior facing ready for rendering and wallpapering

Full-surface, uninterrupted thermal insulation

With integrated vapour barrier

No additional battens required

Protects from electrosmog

Perfect design from a structural point of view

Environmentally compatible material properties: PUR/PIR rigid foam, free of formaldehyde and fibers

Positive ecobalance



Building without a construction site

Living comfort under the roof

Living space is limited and expensive. The attic offers additional space, and the conversion is worthwhile even with roof pitches down to 12° (and sufficient knee wall height). With a roof inclination of 50°, even two floor levels are possible in the attic.

If a new roof is to be built, insulation above the rafters is recommended. Where this is not possible, LINITHERM elements under the rafters provide additional airtight insulation simply, quickly, in a minimum of space, and without thermal bridges.

Benefits for builders and renovators:

- Time-saving and cost-reduction due to fewer work steps
- Easy handling and processing
- Interior surfaces ready of rendering and wall-papering
- Additional living space due to slim construction
- Aluminium coating protects from electro-smog
- Safe, perfect design from a structural point of view
- also as F30B construction
- new buildings: Lower material costs due to smaller rafter cross-sections
- old buildings: Rafters do not have to be doubled up and the "old" insulation between the rafters and old facings need not be removed and disposed of

LINITHERM PAL GK – insulation under the rafters with many extras.

Forget everything that you would have to take into account with conventional insulation, because LINITHERM insulating panels are all-inclusive:

- Outstanding insulation values with minimum panel thickness PUR/PIR rigid foam $\lambda_D = 0.023 \text{ W/(mK)}$.
- Prevent heat loss in winter and keep out the heat in summer.
- A vapour barrier, so that moisture doesn't have a chance.
- An ingenious edge system for absolute sealing tightness.
- LINITHERM insulation systems are processed and installed as easily as wood.
- With between-rafter insulation of material class A1 you get an F30B construction (see test certificate).
- Without additional battens. The panel's strength permits rafter spacings up to 87 cm.
- The interior facing of plasterboard (GK) can be rendered and wallpapered.



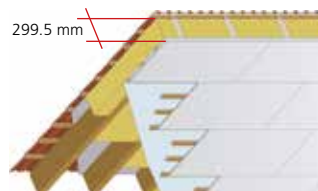
- And best of all, you have our 100% guarantee: We exclusively use PUR/PIR rigid foam from our own quality-inspected production – free of formaldehyde and fibers.
- PUR/PIR rigid foam does not rot, is pressure-resistant, insensitive, and odourless.



LINITHERM PAL 2L with integrated battens is also ideal under wooden facing.

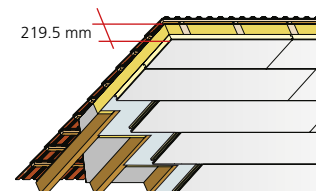
Overall construction with conventional thermal insulation

Rafter height: 260 mm
Insulation between rafters: 260 mm mineral fiber (TCL 035)
Additional vapour barrier, battens, and plasterboard:
U-value = 0.18 W/(m²K)



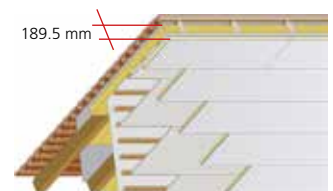
Overall construction in new buildings with LINITHERM PAL GK

Rafter height: 180 mm
Insulation between rafters: 180 mm mineral fiber (TCL 035)
LINITHERM L+D foil
LINITHERM PAL GK 39.5 mm with integral vapour barrier under the rafters:
U-value = 0.18 W/(m²K)



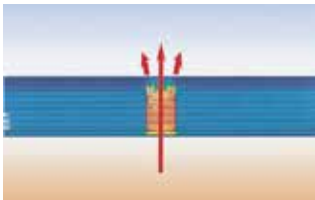
Overall construction in old buildings with LINITHERM PAL GK

Rafter height: 140 mm
Insulation between rafters: 100 mm mineral fiber (TCL 040), eventually existing vapour barrier, battens, and plasterboard
LINITHERM PAL GK 49.5 mm:
U-value = 0.22 W/(m²K)



NEW BUILDINGS

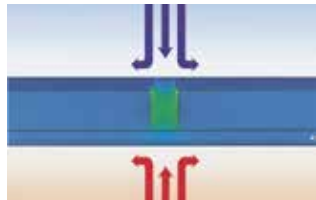
Combined thermal insulation between and under the rafters or collar beams



Heat loss through the rafters

With insulation only between the rafters, thermal bridges exist due to the higher thermal conductivity of wood.

For adequate insulation, larger rafter cross-sections are necessary. This leads to higher material costs and loss of space. Moreover, the additional battens and plasterboard facing reduce the living space even more.



Additional space, lower heating costs

With insulation between the rafters and LINITHERM PAL GK under the rafters, your attic is optimally protected from heat and cold:

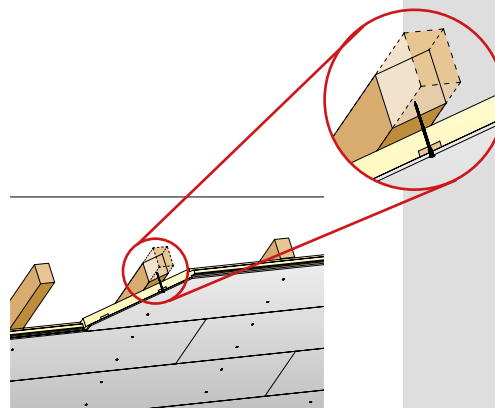
Due to the high-performance PUR/PIR insulating material, even minimum panel thicknesses lead to an enormous increase in thermal insulation. Result: the rafter cross-sections can be considerably smaller.

LINITHERM PAL GK is simply screwed into the rafters from below. Thanks to the tongue-and-groove pressfit joints, an insulation layer without thermal bridges is created. The plasterboard facing presents a clean interior surface.



LINITHERM PAL GK with integrated battens

LINITHERM PAL GK is also available with integrated battens. Adjustment screws permit irregular rafter heights to be compensated and spaced.



EXISTING BUILDING

Improved effectiveness of existing insulation between rafters with LINITHERM PAL GK under the rafters or collar beams, on the jamb wall or knee wall

The right insulation ensures real living comfort

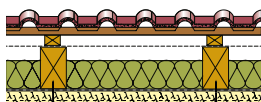
Frequently, "some kind" of insulation has already been fitted between the rafters. However, this insulation usually does not comply with current standards. Moreover, this insulation method creates thermal bridges, and does not protect from moisture damage. Fortunately, with LINITHERM you avoid all the work and expense involved to remove and dispose of

the old insulation, battens, and plasterboard or wooden tongue-and-groove facing.

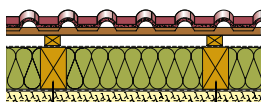
LINITHERM is the ideal answer – fast and easy:

The slim LINITHERM PAL GK elements are simply screwed onto the rafters from below. The interior facing of plasterboard provides a smooth surface that can be rendered and wallpapered.

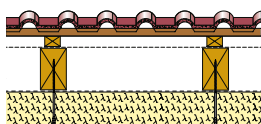




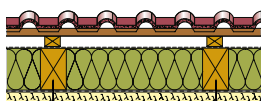
LINITHERM PAL GK
Under the rafters
Partial insulation between rafters



LINITHERM PAL GK
Under the rafters
Full insulation between rafters



LINITHERM PAL 2
Under the rafters



LINITHERM PAL 2
Under the rafters
Full insulation between rafters

LINITHERM PAL GK

Insulation core: PUR/PIR rigid foam acc. to DIN EN 13165, class E, coated with aluminum film on both sides = vapour barrier

Facing: Inside with plasterboard 9.5 mm thick (ready for rendering and wall-papering)

Edge joints: Thickness from 39.5 to 69.5 mm: Tongue-and-groove pressfit joints on all sides
Thickness from 89.5 mm: transverse joint with tongue-and-groove pressfit joints, longitudinal joint grooved for spring (included in delivery)

Overall dimension: 2500 x 600 mm (= calculation measurement)

Thickness mm total*	Thickness mm PUR/PIR	Thickness mm fiber-reinforced facing	Palette contents Qty.	m ²	TCL PUR/PIR	U-value* [W/(m ² K)]
39.5	30	9.5	45	69.8	022	0.65
49.5	40	9.5	36	55.8	022	0.50
69.5	60	9.5	26	40.3	022	0.34
89.5	80	9.5	20	30.0	022	0.26
109.5	100	9.5	17	25.5	022	0.21

LINITHERM PAL 2

Insulation core: PUR/PIR rigid foam acc. to DIN EN 13165, class E, coated with aluminum film on both sides = vapour barrier

Edge joints: Tongue-and-groove pressfit joints on all sides

Overall dimension: 2500 x 620 mm (= calculation measurement, covered area is 2 cm less)

Thickness mm total*	Thickness mm PUR/PIR	Palette contents Qty.	m ²	TCL PUR/PIR	U-value* [W/(m ² K)]
40	40	50	77.5	022	0.51
60	60	33	51.2	022	0.35
80	80	25	38,3	022	0.27
100	100	31	31,0	022	0.21

*Thermal conductivity coefficient U takes the thermal resistance (R_{si} = 0.1 m²K/W and R_{se} = 0.04 m²K/W). Object-specific features according to DIN EN ISO 6946 are not taken into account.

LINITHERM PAL GK, thickness 49.5 mm and 69.5 mm, and LINITHERM PAL 2 are also available with integrated battens. This permits irregular rafter heights to be compensated by means of adjusting screws and without additional battens.

Insulation values of the overall construction

LINITHERM PAL GK
under the rafters
mineral fibers between the rafters

Mean U-value calculation with 625 mm rafter spacing and 80 mm rafter width

Thickness mm PAL GK	Thickness mm mineral fibers WLS 040	Overall mean U-value	Thickness mm PAL GK	Thickness mm mineral fibers WLS 035	Overall mean U-value
39.5	140	0.23	39.5	120	0.23
39.5	160	0.21	39.5	140	0.21
39.5	180	0.19	39.5	160	0.19
39.5	200	0.18	39.5	180	0.18
39.5	200	0.18	39.5	200	0.17
49.5	120	0.22	49.5	100	0.23
49.5	140	0.20	49.5	120	0.21
49.5	160	0.19	49.5	140	0.19
49.5	180	0.18	49.5	160	0.18
49.5	200	0.16	49.5	180	0.16
49.5	200	0.16	49.5	200	0.15
69.5	100	0.20	69.5	100	0.19
69.5	120	0.18	69.5	120	0.18
69.5	140	0.17	69.5	140	0.16
69.5	160	0.16	69.5	160	0.15
69.5	180	0.15	69.5	180	0.14
69.5	200	0.14	69.5	200	0.13

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