



Kalzip FOAMGLAS® System

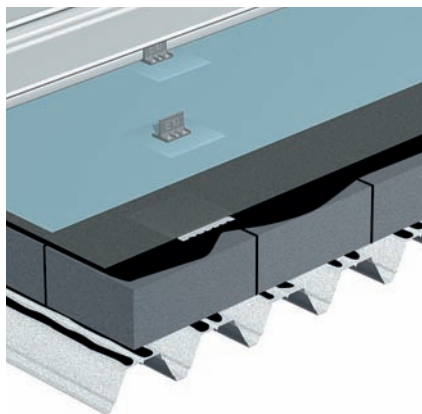
Kalzip Aluminium profiled sheets
and FOAMGLAS® insulation system



Kalzip + FOAMGLAS®
Provides the
perfect roofing
solution



The perfect roofing system for the toughest demands



Aluminium is the perfect building material for creating contemporary architecture with stunning aesthetics. Architects and planners are inspired by the virtually unlimited scope for design offered by Kalzip® aluminium profiled sheets. Builders value the functionality of this sophisticated roofing and façade system. Our aim is to continuously improve and perfect the Kalzip® system. Our many years of research, ongoing quality assurance and orientation towards the needs of architects and engineers, ensure that we are able to achieve this. Kalzip® offers innovations and leading-edge technology which shape the architectural landscape of the future.

The Kalzip FOAMGLAS® System represents the development of a roof design with extremely versatile insulation and therefore exceptional performance characteristics. The end result is a building envelope which is completely safe, durable and maintenance free.

Particularly suitable for buildings which need to withstand the toughest demands:

- swimming pools, ice stadiums,
- production halls for high quality goods, as well as industrial buildings with strict hygiene requirements.
- This roofing concept is ideal for high-quality administrative buildings and schools as it provides the perfect roofing solution which is safe and durable.

Because Kalzip FOAMGLAS® is:

- completely waterproof and impervious to water vapour (suitable as emergency insulation)
- has zero capillarity
- non-combustible (Euro class A1)
- cold bridge-free
- windproof and air-tight
- resistant to vermin
- imputrescible
- dimensionally stable
- does not expand, shrink or warp
- suitable as secondary waterproofing
- extremely temperature-resistant and
- offers optimal sound insulating properties.

Areas of use



The Kalzip FOAMGLAS® System is ideal for projects where the moisture and temperature conditions place particularly challenging demands regarding vapour-control and permanent risks of condensation to form. The system is also ideal for sensitive production areas, e.g. clean rooms for producing or storing electronic components, where a perfectly sealed building envelope is essential.

The combination of Kalzip and FOAMGLAS® means double the security, as the insulation itself creates a waterproof layer. The high compressive strength of the insulation ensures that the roof edges and connections are durable and free from cold bridges.

Virtually every shape of roof can be designed with FOAMGLAS® as the cellular glass slabs are easy to install and adapt.

Product benefits

- high level of energy efficiency as the thermal insulation is airtight and impervious to water vapour, coldbridging is also eliminated
- additional security provided by waterproof sub-construction (the system is secure against moisture transport)
- only a few functional layers
- no additional vapour-control layer
- no mechanical perforating fixing into the structural deck
- additional bearing capacity provided by the insulating layer
- suitable to improve the rigidity of the steel deck
- cost-effective roof system which allows for a great variety of claddings
- suitable for Kalzip folding aluminium roof coverings/standing seam
- ideal for renovating roofs, also for roofs with a low pitch
- prevents ponding water, e.g. from melting ice.

Cover page and left page:

Airport Terminal
Hamburg-Fuhlsbüttel (D)
Architects: von Gerkan, Marg & Partner

Kalzip FOAMGLAS® System description



Left:

Perforated steel deck roof on a sports hall with soundproofing fillers in the troughs. The FOAMGLAS® slabs are laid staggered and bonded to the crowns of the deck using a cold bitumen adhesive. The edges of the slabs are dipped into a hot bitumen dipping tray to achieve optimal sealing of the joints and finally a hot bitumen mop-coat is applied to the surface of the insulation.

Right:

The FOAMGLAS® slabs are cold-bonded to the deck using a bitumen gun.

FOAMGLAS® is made from 100% pure glass and is therefore totally inorganic. It is manufactured from recycled glass products and the natural materials sand, dolomite and chalk in the thermal foaming process. It contains no CFCs, flame retardants or binders, does not release any emissions or other chemical additives.

Fire protection

FOAMGLAS® is non-combustible and, when used in combination with the fixing system and the Kalzip aluminium profiled sheets, contributes towards fire protection.

Fire cannot spread across the cellular glass insulation layer. FOAMGLAS® insulating materials, the L-size fixing plate (claw plate) and the Kalzip profiled sheets are non-combustible and as so-called "hard roofing" are resistant to flying sparks and radiating heat ("fire from the outside"). A roof featuring a design made from FOAMGLAS® and Kalzip, as recommended by the manufacturer, is able to meet DIN 18234-1 requirements and can therefore be used in accordance with the construction standards for industrial buildings.

Sound insulation

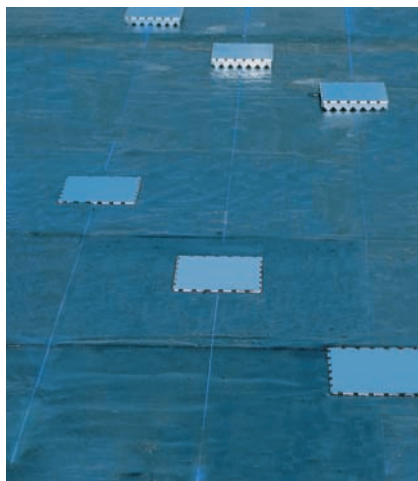
The weighted apparent sound reduction index $R'w$ for the roof design outlined below is approx. 36 dB.

- Steel deck, trapezoidal profile 106/250-1.0, unperforated
- Adhesive
- FOAMGLAS®, 100 mm thick, with L-size fixing plate applied to the surface
- Hot bitumen mop-coat, 3 mm
- Torch-on bitumen roofing, 5 mm
- Gap, 20 mm
- E-clips
- Kalzip > 0.9 mm.

Depending on the structural design, the roof system can achieve a sound reduction value $R'w$ of up to 56 dBa.

Curved roofs

All roof shapes are possible. In the case of large radii, the insulating slabs are connected in a polygonal manner or, in the case of smaller radii and freely shaped designs they are delivered already in the respective shapes or cut to size at the construction site. The suppliers have a team of technical advisors who will be delighted to advise you on these roof shapes. We recommend that you seek their advice at the earliest possible stage.



The reference values for the radii (r) are:

- $r \geq 12$ m: slabs installed in a polygonal manner (grind edges if necessary)
- $r \geq 6$ m: half slabs installed in a polygonal manner
- $r < 6$ m: special roof shape with formed elements from factory.

Safe and speedy installation

Kalzip FOAMGLAS® slabs are available in different formats and are suitable for all types of structural decks:

- steel deck (trapezoidal profiles)
- timber deck
- concrete deck.

The slabs are bonded to the structural deck using either a cold adhesive or hot bitumen and the bonding process can be carried out at an outside ambient temperature above +5°C. In case of lower temperatures the structural deck should be preheated.

With steel deck, bonding is carried out on the crowns of the deck. With continuous substrates as timber and concrete deck, FOAMGLAS® slabs are fully bonded with

hot bitumen onto the deck with joints filled. The slabs are laid staggered with the butt edges dipped in hot bitumen. A hot bitumen mop-coat is applied to seal the surface cells and create a bonding course for the subsequent layers.

Coldbridge-free fixing on L-size fixing plates

In order to fix the Kalzip compound clips, the newly developed, galvanized steel claw plates, L-size, are flame-bonded and hammered into place on top of the insulation, following a fixed grid which takes into account the specific roof geometry and wind/suction load.

A pull-out resistant, coldbridge-free connection is created with the insulation layer (covered by building approval Z-14.4-475, issued by the Institute for Building Technology).

In addition to this, a layer of polyester reinforced bitumen roofing sheet should be applied to cover the insulation and the claw plates.

The Kalzip compound clips are secured to the claw plates using the recommended fasteners. A durable PE film used as a slip and separating layer, ensures that the

Kalzip AF profiled sheets maintain their freedom of movement. The Kalzip profiled sheets are installed in the usual manner.

When installing standing seam sheets as Kalzip folding aluminium using stainless steel fixing cleats, please observe the specific instructions and rules.

Welding Kalzip on top of a bitumen roofing sheet/PE film

With Kalzip AF sheets, the Kalzip backing strip should be used during welding.

Left:

Application of a hot bitumen mop-coat.

Centre:

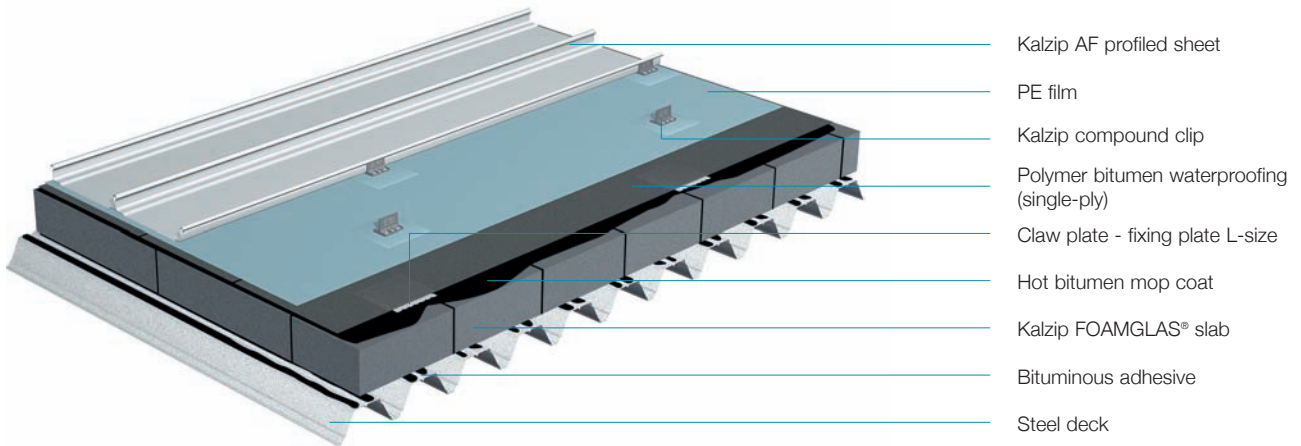
Installing the L-size fixing plates (claw plates).

Right:

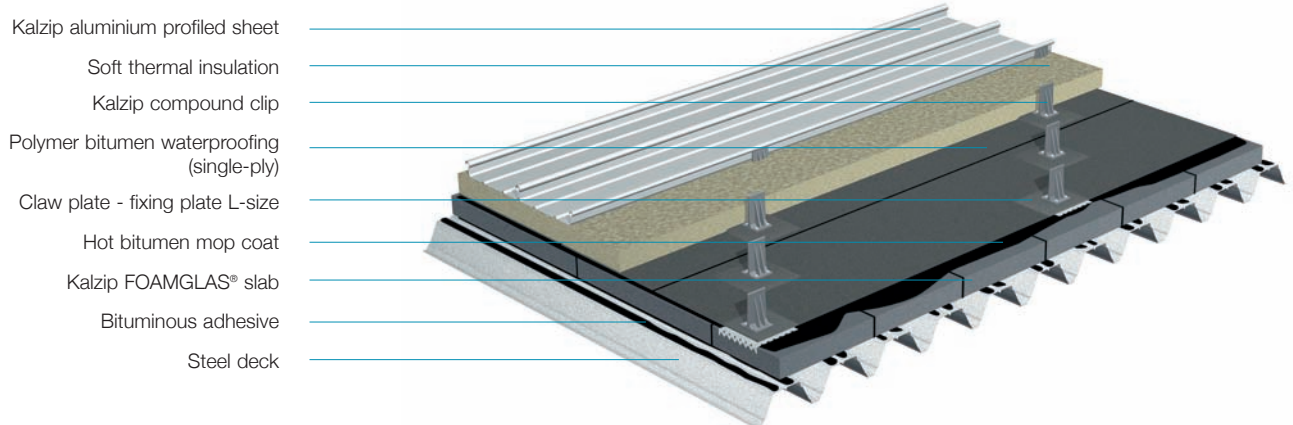
Kalzip compound clips fixed to the L-size claw plates, covered by the roofing membrane, which forms a secondary waterproofing along with the waterproof FOAMGLAS® insulation.

Roof structures featuring the Kalzip FOAMGLAS® System

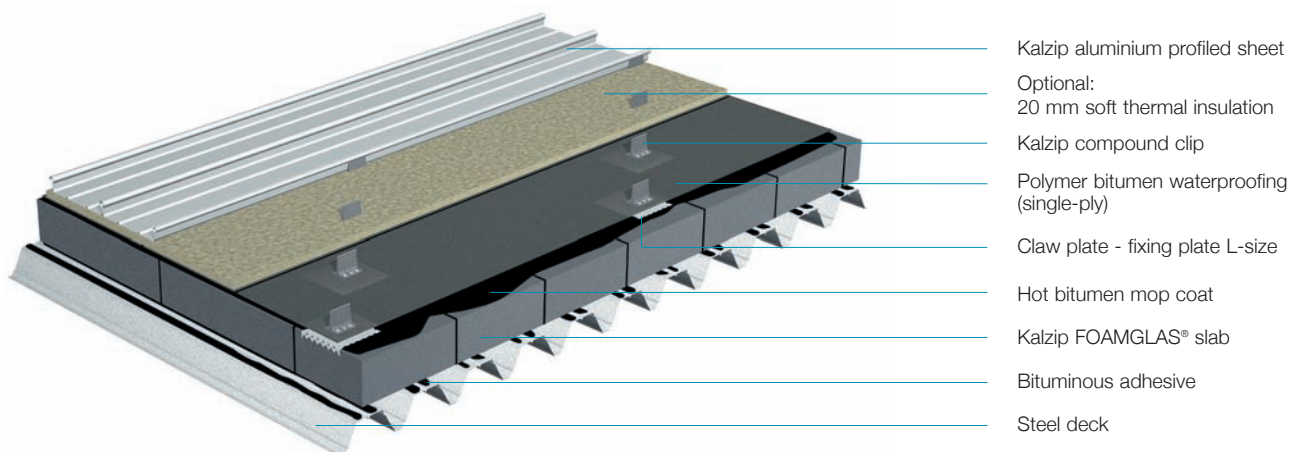
Kalzip FOAMGLAS® System with Kalzip® AF profile



Kalzip FOAMGLAS® System as a combined solution (DUO-roof)



Kalzip FOAMGLAS® System as a standard roof design



Relevant characteristics when FOAMGLAS® is used as thermal insulation in a Kalzip roof:

Technical data FOAMGLAS® T4+ insulation slabs

Density	$\rho = 115 \text{ kg/m}^3$
Thermal conductivity	$\lambda = 0.041 \text{ W/(m} \cdot \text{K)}$
Fire reaction	non-combustible, Euro Class A1
Compressive strength	allowable $\sigma = 0.25 \text{ N/mm}^2$
Coefficient of thermal expansion	$\alpha_{\text{th}} = 9 \cdot 10^{-6} \text{ 1/K}$
Resistance to water vapour transport	$\mu = \infty$ (impervious to water vapour)
Waterproof	Permanently impervious to water
Installation/processing temperature	above +5°C
Temperature limits	from -260°C to +430°C

Dimensions and delivery forms

Formats:	600 x 450 mm 300 x 450 mm	Slab thickness:	80 – 180 mm
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General approval issued by the German Institute of Building Technology Z-23.34-1311

Fixing plate/claw plate, size L

Bonded into the upper side of the FOAMGLAS® insulating layer.
Permissible tensile load 1.8 kN per fixing point.

Materials and dimensions

S235 steel, consistent with EN 10025-2, galvanized
Thickness: $t = 1.5 \text{ mm}$
Size: $l \times w = 200 \times 200 \text{ mm}$

General approval issued by the German Institute of Building Technology Z-14.4.-475

Bonding of the L-size claw plates into the FOAMGLAS® cell structure

- Use of unfilled oxide bitumen for bonding, consistent with EN 18195-2 (hot bitumen type 100/25).
- Roofing membrane should consist of talcum powdered or polymer bitumen torch-on sheet with slate chippings, at least 5 mm thick, made from elastomer bitumen or modified polymer bitumen with polyester reinforcement mat 200 g/m², consistent with DIN 52133 or EN 13707.
- When Kalzip AF sheets are directly installed a polyethylene separating layer should at least be laid over the bituminous membrane. The underlay film should be weatherproof and temperature-resistant. The joints do not need to be connected.
- The galvanized claw plate is additionally covered by the bitumen torch-on roofing membrane, which forms a secondary waterproofing along with the waterproof FOAMGLAS® insulation.

Services/Solutions for constructional details

FOAMGLAS® offers a comprehensive consulting service for the Kalzip FOAMGLAS® System right from the earliest planning phase of a new build or renovation project, e.g. helping customers to select the ideal, most cost-effective roof design which fulfils the structural requirements and is compatible with the respective structural decking (steel, timber or concrete). Our other services include:

- Calculations on λ -values and thermal performance
- Detailed specifications and costings tailored specifically to your construction project
- Determination of quantities
- Computer-aided preparation of construction plans
- Use

- Test certificates
- Necessary static certification.

For personal consultancy and further information on the services offered by FOAMGLAS® and the Kalzip FOAMGLAS® System contact your regional FOAMGLAS® offices or national distributors.

FOAMGLAS® and KALZIP® worldwide contact details

If you are looking for a specific FOAMGLAS® office, please contact us at one of our worldwide locations via internet by using the country selectors:

www.foamglas.com and www.kalzip.com

www.foamglas.com

FOAMGLAS®
Building

Headquarters

Pittsburgh Corning Europe SA
Albertkade 1
B – 3980 TESSENDERLO

**Pittsburgh Corning
International Territories**

Lasne Business Park – Building B
Chaussée de Louvain, 431
B – 1380 LASNE
Phone +32(2)352 31 70
Fax +32(2)352 31 71
info-intl@foamglas.com
www.foamglas.com

Approved systems. FOAMGLAS® and Kalzip Systems are approved by - BBA in Great Britain, - Avis Technique in France, - DIBt in Germany, - ASTM/Factory Mutual in America, - GOS Standard for Russia and the Commonwealth of Independent States and in other international markets. - CE mark.

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