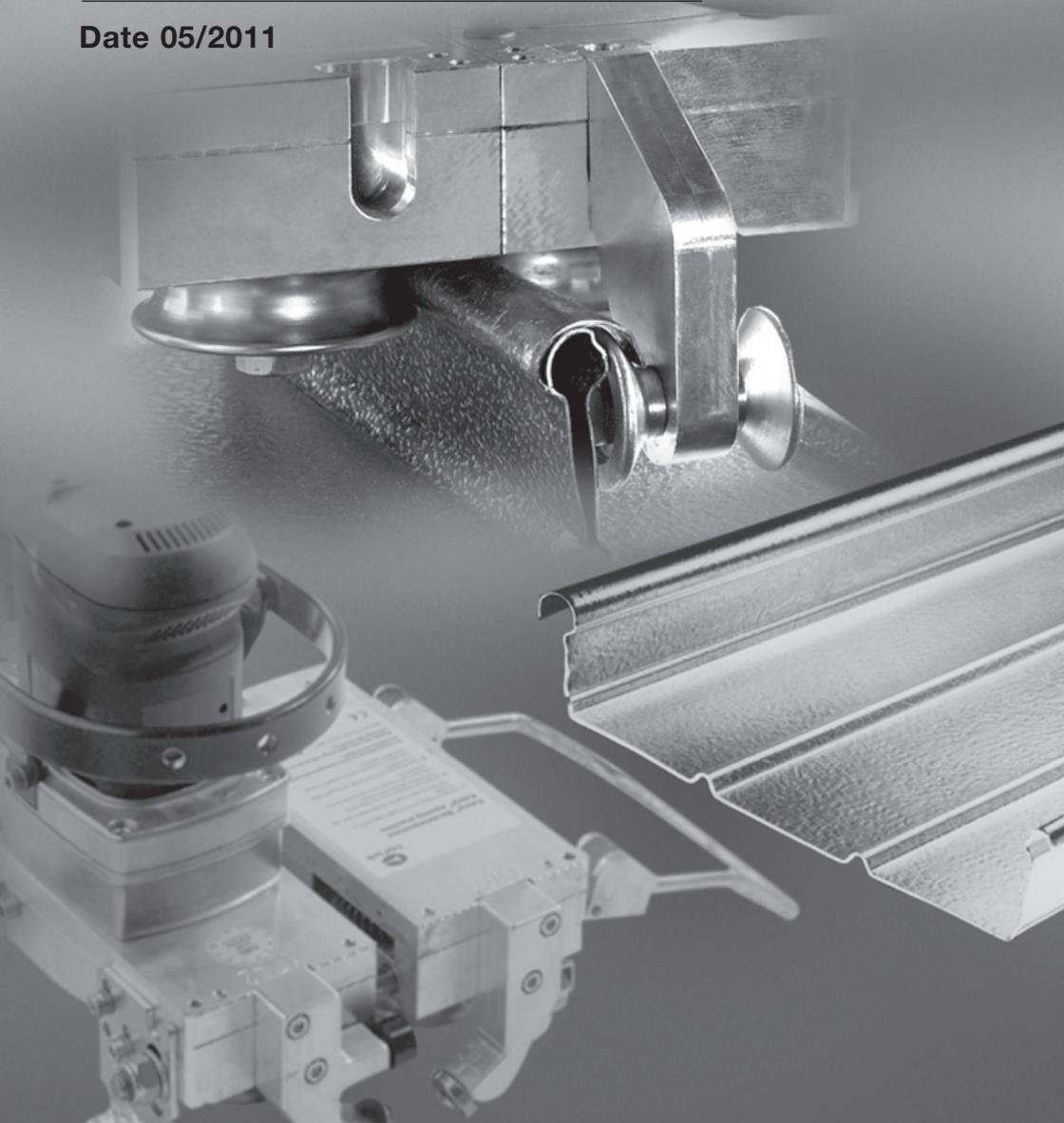




Kalzip® Installation Guideline

Date 05/2011



Introduction

This Kalzip Installation Guideline provides the company with the "Installation Instructions" required by the building regulations for installing the profiled sheets. It provides information, general notes and explanations, as well as detailed instructions for installing Kalzip aluminium roof and wall systems.

The present Guideline provides a basis for the correct, professional installation of Kalzip profiled sheets. It deals with the usual cases of processing and use. Supplementary guidelines are available for special applications, such as the installation of Kalzip solar power systems or the inclusion of roof lights (see **www.Kalzip.com/Installation.de**).

The Kalzip Installation Guideline constitutes part of a quality concept comprising the technical rules for installation in lightweight metal construction (Fachregeln des Metalleichtbaus – Montage) published by the IFBS (Industrieverband für Bausysteme im Metalleichtbau, a German industrial association for the lightweight metal construction sector) and the ALZ (Aluminium-Zentrale e.V.) leaflet A 7 ("Richtlinie für die Verlegung von Aluminium-Profiltafeln"), which provides a guideline for the installation of aluminium profiled sheets.

The applicable building authorities regulations, standards, accident prevention regulations, rules for health and safety and other similar guidelines have been taken into account.

The images and processing descriptions included here represent the present state of the technology. They do not take into account any specific application. We reserve the right to make technically appropriate modifications to the designs or installation procedures for the sake of our high quality standards and of progress. Due to the dynamism of product developments and improvements, the Kalzip printed documents do not always correspond to the actual products. The currently valid version of the Installation Guideline can be downloaded from the Internet at www.kalzip.com.

In the event of disagreement between those responsible for the construction, this Guideline shall be the standard for the correct and professional method for installing Kalzip.

The fact that this Guideline has been released does not obviate the personal responsibility of those concerned for their actions. Moreover, Kalzip GmbH cannot accept liability for any errors that this Guideline may contain. In the light of present knowledge it does nevertheless ensure correct technical performance. Compensation claims cannot be based on its application.

March 2011

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1.0 Introduction

Area of application

This Installation Guideline specifies the correct method for installing Kalzip profiled sheets, the fasteners and accessories.

Installing the profiled sheets

The profiled sheets may only be installed by skilled workers employed by the manufacturer or by companies who have been properly instructed and authorized by the manufacturer. The manufacturer, or whoever is responsible for laying the profiled sheets, must prepare installation instructions describing how the elements are to be laid, and must give them to the installation companies.

Approval

In accordance with building regulations Kalzip can only be installed by companies approved and trained by the manufacturer.

The general building inspectorate approval must be present at the construction site. This can be obtained from the manufacturer's works. It contains important notes on the qualifications required for the installing workers, on accident prevention, on walkability and on the fastening elements. It is essential that these instructions are followed. Other regulations from the building authorities, professional and trade association etc. are not considered here. Familiarity with them is assumed.

Preparatory work

In accordance with building regulations, certification of the stability and suitability of use is to be provided for each individual case. An installation plan must be derived from these certificates, and must also be available on-site. The contents of the installation plans is regulated by DIN 18807.

Before work starts, the geometry and the dimensions of the preceding works, as handed over, must be compared with the inspected plans. Contact the factory immediately if there are any deviations. Deviations must be reported to the client in writing in accordance with DIN 1961, VOB Part B, §4, Paragraph 3.

General Instructions

The instructions, recommendations and requirements correspond to the present level of knowledge. They are based on the experience of the manufacturing works as well as the practical experience of the building companies and are provided to the best of our knowledge. Therefore, no enforceable claims for defects, errors or incompleteness can be derived.

Special tools

Before commencing fixing work, check the zipping machine, hand closing tool, ridge folding tool and unzipping device. The zipping machine must close fully and the roller sets must be correctly fitted.

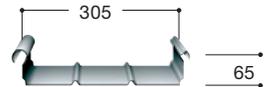
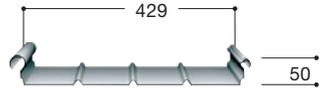
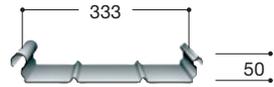
2.0 The System

Kalzip is a system of aluminium sheets designed for low pitched roofs to a minimum of 1.5 degrees when running from ridge to eaves as well as for steeper pitches.

Kalzip profiled sheets are available in a variety of construction widths and can be manufactured in different shapes such as straight, convex, concave, convex and concave curved, as well as XT free-form shapes to suit the roof geometry.

The aluminium sheets are fixed with clips which are locked into the seam and concealed by the adjacent sheet. This means that the fixings are positioned beneath the roof covering.

As a result of this, the fixings are located underneath the roof cladding. It is not penetrated. The clips permit the sliding movements of the Kalzip profiled sheets that occur due to changes of temperature. The sliding movements must not be impaired by connection to other structural elements (chimneys etc.).



2.1 Kalzip range of applications

The application determines the design

Kalzip aluminium profiled sheets are suitable both for non-ventilated and ventilated roofs of any shape or pitch from 1.5° and with any type of substructure or framework.

The construction design depends on the individual application. It must take into account the likely effects of snow, wind, heat, humidity and weathering.

High thermal insulation requirements can be easily fulfilled. The roof design can be adapted to suit the precise requirements of each individual building by selecting the appropriate thickness of thermal insulation. In addition to this, the system offers advanced detailed solutions for effective interior and exterior drainage which guarantee a high level of reliability throughout the lengthy service life of the building.

Insulated roof systems are the norm

The main applications for Kalzip roof systems are insulated roof structures supported by trapezoidal profiles, purlins, timber linings or concrete elements.

- Chemically neutral, fibre insulating materials e.g. Rockwool insulating felt in compliance with the German DIN 18165, are recommended as suitable thermal insulation. The insulation is laid into position and compressed to its required final thickness when the Kalzip profiled sheets are installed on top. There should be no cavity between the Kalzip sheets and the insulation.
- A convection barrier is required. When correctly installed, a vapour and convection barrier also provides the required air-tightness.
- The sound reduction values of the standard roof are outlined subsequently. Further improvements can be achieved through the use of additional layers.

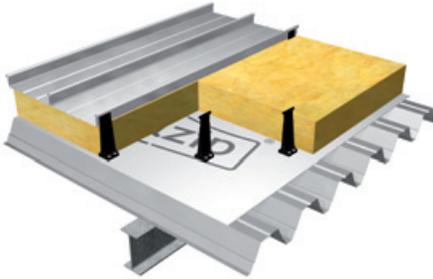


Attention

Special notes on the installation of XT free-form profiles

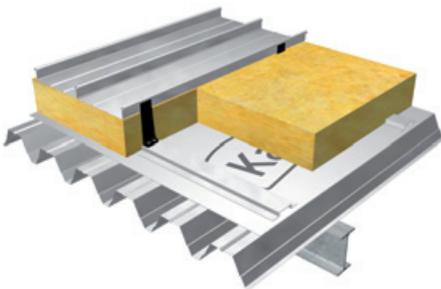
A high level of planning and installation work is required for XT profiled sheets. It is essential that the work is planned in advance, and should be agreed with our Application Engineering Department in Koblenz. The existing support construction must be examined carefully to see that it agrees with specifications, or whether it may have to be adapted. Any faults in the supporting construction will involve considerable additional expense if they have to be corrected later.

2.1.1 Kalzip non-ventilated roof on trapezoidal steel deck



$R'w \approx 35 \text{ dB (A)}^*$

2.1.2 Kalzip non-ventilated roof on purlin with trapezoidal sheets inner skin



$R'w \approx 35 \text{ dB (A)}^*$

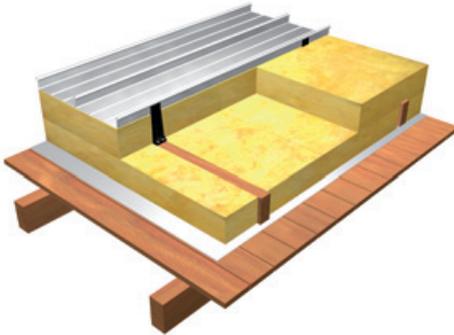
This very economical roof system is used both for industrial and residential buildings. In order to make sure that there are no air cavities under the Kalzip roof skin, compressible thermal insulation is used. Incorporated within the roof system the insulation material is compressed by approx. 20 mm.

The loading on the top skin is not transferred to the inner skin as an evenly distributed load but rather at set points via the secret fixing clips. The design roof load must be increased by 15 % when dimensioning the trapezoidal steel sheets. The clips must be staggered on the inner sheet to make sure that the load is evenly distributed across all corrugations of the inner sheet.

If the roof is supported on purlins, the inner sheet has to be oriented parallel to the top layer. If the module of the inner sheet does not correspond with the Kalzip elements a top hat section must be installed to support the clips. If the Kalzip sheets can span the existing spacing of the purlins, the top hat sections will be positioned on top of the purlins. In that case, the inner skin will only serve to hold the vapour and convection barrier and the thermal insulation.

For larger purlin spans additional top hat sections are required. In this instance, part of the load needs to be transferred by the inner sheet.

2.1.3 Kalzip non-ventilated roof on timber rafters with visible timber lining



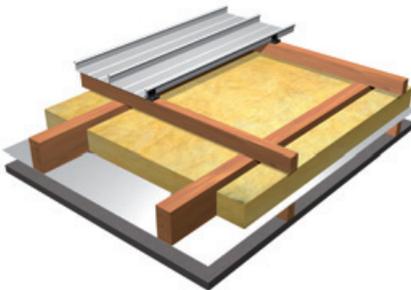
R'w ≈ 38 dB (A)*

In residential buildings the roof system is frequently built-up using wooden rafters with visible timber lining. This is advantageous, because:

1. there is a clear separation between the trades of carpenters, roofers etc.
2. a continuous flat vapour and convection barrier can be installed.

The clips can only be fixed directly in the timber lining if this has a minimum thickness of 23 mm. A minimum thickness of 19 mm applies for flat press boards, and 18 mm for OSBs. In both cases the fastener is visible from below. If the timber lining is too thin, then a timber purlin must be installed over the lining and attached to the rafters.

2.1.4 Kalzip roof with common rafter insulation



R'w ≈ 35 dB (A)*

With roofs featuring a structure as shown on the left it is quite often impossible to design the roof as a non-ventilated version because the distances are too great between the vapour and convection barrier and the roof skin. Consequently perfect functioning of the vapour and convection barrier is a prerequisite condition. Sufficient ventilation is essential for efficient dispersal of any condensation that might occur.

If there are any risks of wind driven snow it may be necessary to install a film barrier to prevent snow from coming into contact with the insulating material.

* varies depending on thickness and material qualities

2.2 Kalzip DuoPlus 100 and Kalzip Duo 100

2.2.1 Kalzip DuoPlus 100



$R'w \approx 43 \text{ dB (A)}^*$

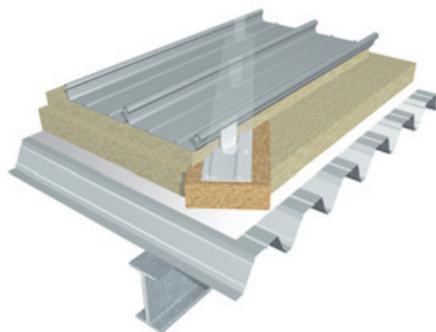
The precise spacings along with the position of the rail and the number of connection elements are given in the installation plan.

The Kalzip DuoPlus 100 system combines the advantages of rigid insulation with the constructional possibilities offered by the conventional Kalzip roofing system.

The special design is almost cold-bridge free and has excellent sound absorption properties. An aluminium rail is placed on the 100 mm thick rigid thermal insulation and is fixed onto the substructure through the insulation. Special clips are inserted in the rail and are adjusted to suit the respective conditions. Connection of the individual clips to the rail is not necessary.

The patented and type-tested system consists of rigid thermal insulation, DuoPlus rail, DuoPlus clip and connecting elements to secure the DuoPlus rail, the compressible heat insulation and the Kalzip profiles sheets.

2.2.2 Kalzip Duo 100



$R'w \approx 41 \text{ dB (A)}^*$

In the case of the Kalzip Duo 100 system, economic considerations are of central importance. For reasons of cost, a full layer of rigid thermal insulation is not necessary. If there are no specific sound insulation requirements then the Kalzip Duo 100 system can be used, whereby a full layer of rigid thermal insulation is not necessary. The base for the Kalzip DuoPlus 100 is simply provided by rigid insulation strips with a width of 24 cm and a thickness of 10 cm. The resulting spaces are filled with soft heat insulation or low-priced rigid insulating material.

In the case of Kalzip DuoPlus 100, rigid thermal insulation only needs to be used in those areas specified by the statistical requirements. The rigid thermal insulation is replaced by a layer of soft insulation in all areas where no reduction in snow loads is required. This type of roof design, which does not influence heat transfer or load bearing safety, is recommended if there are no specific sound insulation requirements.

When the rigid spacer strips are laid underneath the DuoPlus rails, it is not necessary to carry out the time-consuming task of marking-up, as the contours of the steel trapezoidal profiles are visible through the vapour and convection barrier.

2.2.3 Kalzip DuoPlus 100 or Kalzip Duo 100 on steel trapezoidal profile

- **Liner sheet:**

- **Fischer trapezoidal liner sheets**

Sheet thicknesses: $t = 0.88$ mm
 1.00 mm
 1.25 mm
 1.50 mm

Cross sections: FI 90/305
 FI 100/275
 FI 135/310
 FI 144/287
 FI 150/280
 FI 165/250

- **Alternative Fischer acoustic sheets, perforated:**

AK 100/275
 AK 135/310
 AK 150/280
 AK 165/250

- **Kalzip vapour and convection barrier, self adhesive**

- **High-density thermal insulation with a highly compressed surface in accordance with DIN EN 13162**

Euro Class A1 in accordance with DIN EN 13501 – non-combustible
 Application type: WD in accordance with DIN 18165
 Thermal conductivity group (WLG) 040
 Compressive strength: $\sigma_{10} \geq 70$ kN/m²

Thickness: 100 mm

Kalzip Duo 100

– installed in 24 cm wide strips

Kalzip DuoPlus 100

– installed as a full layer

- **DuoPlus rails**

Hole diameter 6.8 mm

- **DuoPlus clips**

Clip type complies with the requirements of the energy-saving directives

- **Connecting elements for DuoPlus rails**

SFS intec SD2-S16-6.0 x L

(In the case of a Kalzip Duo 100 roof, the spaces between the 24 cm wide strips should be filled with insulating felt.)

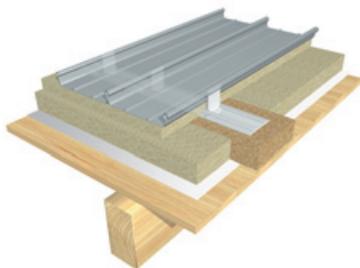
- **Rockwool insulation in accordance with DIN EN 13162**

Euro Class A1 in accordance with DIN EN 13501 – non-combustible
 Application type: WD in accordance with 18165

Thermal conductivity group (WLG) 040
 Thickness complies with the requirements of the energy-saving directives

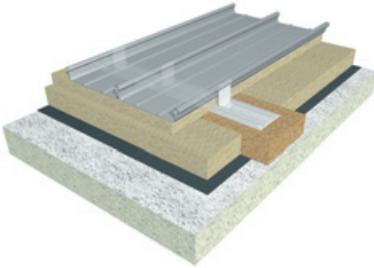
- **Kalzip aluminium profiled sheets**

2.2.4 Kalzip DuoPlus 100 or Kalzip Duo 100 on timber



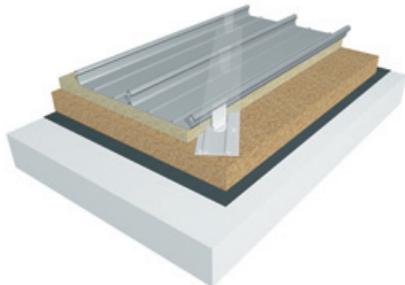
- **Liner sheet:**
Soft wood minimum sorting class S 10
- **Kalzip vapour and convection barrier H**
- **High density thermal insulation with highly compressed surface in accordance with DIN EN 13162**
Euro Class A1 – non-combustible
Application type: WD in accordance with DIN 18165
Thermal conductivity group (WLG) 040
Compressive strength: $\sigma_{10} \geq 70 \text{ kN/m}^2$
Thickness: 100 mm
Kalzip Duo 100
– installed in 24 cm wide strips
Kalzip DuoPlus 100
– installed as a full layer
- **DuoPlus rail**
Hole diameter 6.8 mm
- **DuoPlus clip**
Clip type complies with the requirements of the energy-saving directives (no composite clip possible)
- **Fasteners for the DuoPlus rail:**
SFS SD2-S-S16-6.0 x 165 screw or wood screws in accordance with DIN 1052 or thread forming screws suitable for wood in accordance with DIN 18807 or local building standards.
Sealing washer diameter min. 16 mm
Screw depth min. 26 mm
- **Installation:**
The max. screw spacing is 50 cm. The screws should be arranged in a staggered manner in the rail holes. The rails should be orientated at a right angle or at least at an angle of 45° to the Kalzip ribs. The rail spacings correspond to the load carrying capacity of the Kalzip profiled sheets. Two screws should be used per fixing point in the edge and corner areas of the roof. If the rail is to act as a single-span support (e.g. fitting piece at the end of a row), then it must be no longer than 40 cm. (In the case of Kalzip Duo 100 roofs, the spaces between the 24 cm wide strips should be filled with insulating felt.)
- **Rockwool insulating felt in accordance with DIN EN 13162**
Euro Class A1 – non-combustible
Application type: WL in accordance with DIN 18165
Thermal conductivity group 040
Thickness complies with the requirements of the energy-saving directives
- **Kalzip aluminium profiled sheets**

2.2.5 Kalzip DuoPlus 100 or Kalzip Duo 100 on concrete



- **Installed on 10 cm rigid thermal insulation or directly onto concrete \geq B 15 liner**
- **Kalzip vapour and convection barrier**
- **High-density thermal insulation with a highly compressed surface in accordance with DIN EN 13162**
Euro Class A1 – non-combustible
Application type: WD in accordance with DIN 18165
Thermal conductivity group (WLG) 040
Compressive strength: $\sigma_{10} \geq 70 \text{ kN/m}^2$
Thickness: 100 mm
Kalzip Duo 100
– installed in 24 cm wide strips
Kalzip DuoPlus 100
– installed as a full layer
Avoid contact corrosion when fixing directly onto concrete. Due to the rough concrete surface, the use of a 20mm thick separating layer made from rigid thermal insulation is recommended.
- **DuoPlus rail**
Hole diameter 10.5 mm
- **DuoPlus clip**
Clip type complies with the requirements of the energy-saving directives
- **Fasteners for the DuoPlus rail:**
SFS MBRK-X-S4-H18-10x80 and SFS MBR-X-S4-HX-10x160
Predrill diameter 10 mm
The shorter length of plug is designed for thermal insulation with a thickness of 20 mm (or equivalent plug with admissible FT $\geq 1.2 \text{ kN}$, approved by the building authorities, stainless steel fastener).
- **Installation:**
Maximum plug spacing 50 cm. The screws should be arranged in a staggered manner in the rail holes. The rails should be orientated at a right angle to the Kalzip ribs. The rail spacings are determined according to static calculations. Individual verification is required for other specifications. If the rail is to act as a single-span support, then it must be no longer than 40 cm. (In the case of Kalzip Duo 100 roofs, the spaces between the 24 cm wide strips should be filled with insulating felt.)
- **Rockwool insulating felt in accordance with DIN EN 13162**
Euro Class A1 – non-combustible
Application type: WL in accordance with DIN 18165
Thermal conductivity group 040
Thickness complies with the requirements of the energy-saving directives
- **Kalzip aluminium profiled sheets**

2.2.6 Kalzip DuoPlus 100 or Kalzip Duo 100 on aerated concrete

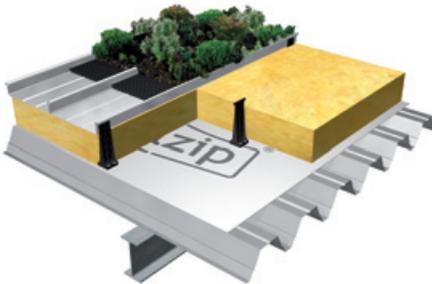


- **Installed on 10 cm rigid thermal insulation or directly onto the liner sheet of aerated concrete (PP2, P 3.3, PP4, P 4.4)**
Minimum component thickness: 150 mm
- **Kalzip vapour and convection barrier**
- **High-density thermal insulation with a highly compressed surface in accordance with DIN EN 13162**
Euro Class A1 – non-combustible
Application type: WD in accordance with DIN 18165
Thermal conductivity group (WLG) 040
Compressive strength: $\sigma_{10} \geq 70 \text{ kN/m}^2$
Thickness: 100 mm
Kalzip Duo 100
– installed in 24 cm wide strips
Kalzip DuoPlus 100
– installed as a full layer
Avoid contact corrosion when fixing directly onto aerated concrete.
- **DuoPlus rail**
Hole diameter 10.5 mm
- **DuoPlus clip**
Clip type complies with the requirements of the energy-saving directives
- **Fasteners for the DuoPlus rail:**
SFS MB-S4-HX-10x120 and
SFS MB-S4-HX-10x200
Predrill diameter 9 mm
The shorter length of plug is designed for thermal insulation with a thickness of 20 mm (or equivalent plug with admissible $F = 0.3 \text{ kN PP2, P 3.3}$ zul $F = 0.6 \text{ kN PP4, P 4.4}$, approved by the building authorities, stainless steel fastener).
- **Installation:**
Maximum plug spacing 50 cm. The screws should be arranged in the rail holes in a staggered manner. The rails should be orientated at a right angle or at least an angle of 45° to both the Kalzip ribs and the aerated concrete slabs. The rail spacings correspond to the load carrying capacity of the Kalzip profiled sheets. The number of plugs used should be doubled in the edge and corner areas of the roof. If the rail is to act as a single-span support (e.g. fitting piece at the end of a row), then it must be no longer than 40 cm.
- **Special features:**
The plug is fitted by driving it through together with the screw. The driving catch in the plug prevents premature spreading during insertion. The twist protection stops it from turning in the hole as the screw is turned in.

(In the case of Kalzip Duo 100 roofs, the areas between the 24 cm wide strips should be filled with insulating felt.)

- **Rockwool insulating felt in accordance with DIN EN 13162**
Euro Class A1 – non-combustible
Application type: WL in accordance with DIN 18165
Thermal conductivity group 040
Thickness complies with the requirements of the energy-saving directives
- **Kalzip aluminium profiled sheets**

2.3 Kalzip NatureRoof



All roof designs described above can be transformed into a Kalzip NatureRoof providing that the design requirements are taken into consideration and Kalzip 65/333 is being used.

Kalzip NatureRoof comprises an efficient draining mat to control the integral water management and a special substrate supporting a vegetation layer for extensive landscaping with sedum plants.

2.4 Kalzip FOAMGLAS®¹⁾ System as a standard and combined solution

This roof design and the system components used are particularly suitable for building projects which place high demands on ensuring that the roof system is free from condensation and where there is therefore a permanent risk of condensation formation.

The Kalzip FOAMGLAS® System offers a high level of energy efficiency as the thermal insulation is airtight and impervious to water vapour. What's more, there is no mechanical attachment between the Kalzip profiled sheets and the supporting structure. This means there is no coldbridging. As Foamglas is impervious to moisture penetration the insulation can also act as a watertight substructure.

Kalzip FOAMGLAS® System as a standard solution



The FOAMGLAS® slabs are bonded to different substructures using either a cold-bonding agent or hot bitumen. In order to attach the compound clips, the galvanized steel claw plates are inserted under heat in a fixed installation plan taking into account the respective roof geometry. The compound clips are installed on the claw plates using the recommended fastening elements.

The Kalzip profiled sheets are installed in the usual manner and are friction-fitted together. In order to ensure economic efficiency, the thickness of the compressible thermal insulation can be varied. Foamglas has a minimum thickness of 80 mm.

Kalzip FOAMGLAS® System as a combination solution



¹⁾ FOAMGLAS® is a registered trademark of the German company FOAMGLAS® GmbH.

2.5 Kalzip AF

Kalzip AF profiled aluminium sheets are especially designed for installation above rigid support layers. Under the trade mark “ProDach insulating system” Rockwool offers an accessible, compression-proof, water repellent mineral wool insulating board featuring a special fixing system. Kalzip AF profiled aluminium sheets are not only used in combination with the ProDach-insulation system but may also be used with FOAMGLAS® insulation and timber lining.

The twin layer ProDach insulating board: the ideal base for Kalzip AF

- non combustible
- very efficient thermal insulation and acoustic properties
- dimensionally stable
- vibration dampening
- open for diffusion
- high accessibility during installation and maintenance
- safe absorption of pressure and suction loads

Assembly

The corrosion-proof and weather resistant Kalzip AF aluminium external skin is fixed with clips in the usual way. However, and this is the distinctive feature of the ProDach insulation system, rather than

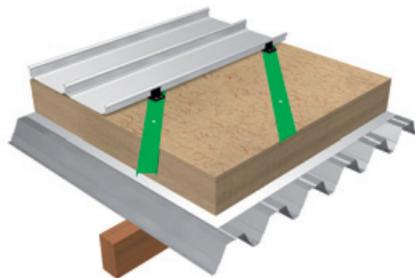
being fixed directly to the substructure the skin is fixed instead to special U-rails embedded in the insulation material.

The stainless steel system fasteners connecting the U-rails to the substructure of the roof penetrate the insulation material only locally. This almost entirely eliminates the effect of cold/heat and sound bridging.

2.5.1 Kalzip AF with ProDach-insulation on trapezoidal steel deck

In order to meet increased demands for sound reduction and to reduce cold/heat bridges it is advisable to install the ProDach Insulation System.

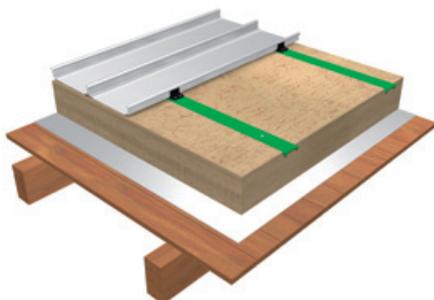
Fixing rails are embedded in the top-side of the insulation material and fixed to the trapezoidal steel deck.



$R'w \approx 42 \text{ dB (A)}^*$

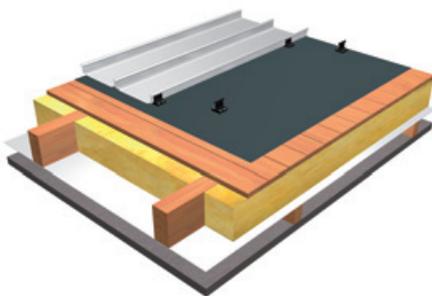
* varies depending on thickness and material qualities

2.5.2 Kalzip AF with ProDach-insulation on timber rafters with formwork



$R'w \approx 45 \text{ dB (A)}^*$

2.5.3 Kalzip AF with common rafter insulation



2.5.4 Kalzip AF on FOAMGLAS® insulation



With this type of roof, a timber lining which remains visible serves as a supporting element. This structure has proved to be ideal for residential buildings and other buildings of similar use. The potential extends from public buildings to multi-purpose halls and sports-arenas.

The rails are invisibly fixed to the rafters. There are no visible joints or fasteners.

This structure is comparable to traditional standing seam systems. It is frequently used in order to minimise the overall height of the roof structure. If there is an air gap under the timber lining adequate ventilation is essential. With this in mind, we recommend filling the total height of the rafters with insulating material for efficient performance. A vapour and convection barrier beneath the thermal insulation is also of critical importance.

Kalzip AF can also be installed on the proven FOAMGLAS® insulation (see p. 20). There are different ways of building up the roof structure. The method shown here with the L-shaped claw plate does not use any mechanical connection between the Kalzip profiles and the support structure and is free from cold-bridging. The plastic clips used allow optimum lubricating of the profiles in the case of thermal elongation.

* varies depending on thickness and material qualities

3.0 Transport · Storage · Inspection

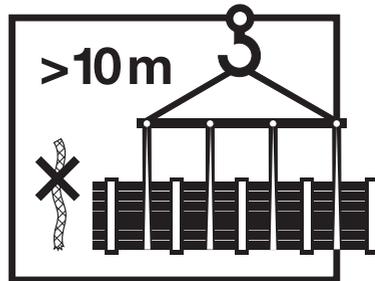
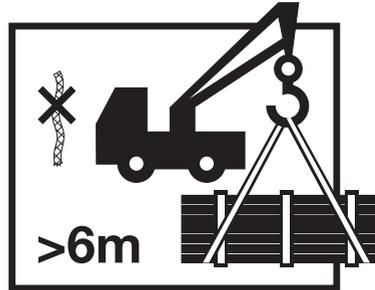
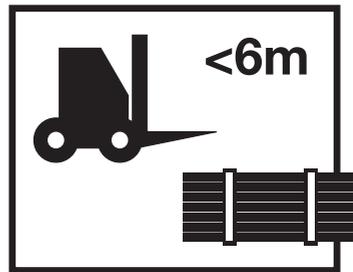
3.1 Transporting to the building site or unloading at a designated area

In general, Kalzip sheets are transported by road.

3.2 Unloading on the building site

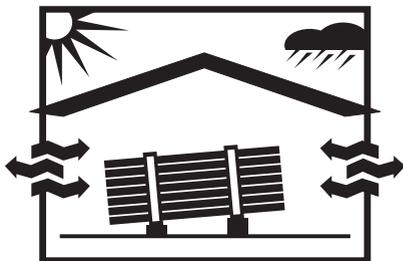
- General rule: access to the unloading point must be guaranteed.
- Before delivery, the person who has placed the order must check the site and it may also be necessary for the transport agent to check the route.
- Delivery dates must be agreed with the supplier.
- Packages can weigh up to 3.5 t, plus the weight of the cross beam. (Check crane capacity!)
- Make prior arrangements for lifting gear such as cranes, fork lift trucks, spreader beams, sling belts, etc. Protect edges of pallets if sling belts are used. Sources of supply for sling belts can be supplied on request.
- Maximum load per suspension point must not exceed 0.8 t!
- Projecting ends exceeding 4.50 m must be avoided!
- Precurved Kalzip: take special care when unloading/taking pre-curved Kalzip onto the roof. You must allow for the fact that extra sling belts need to be used. In many cases, the pallets cannot be placed directly on the sub-structure. The profiled sheets have to be lifted onto the roof individually or in small bundles.

Owing to the different sheet upstands, pallets must be stored in accordance with the direction of laying to avoid having to turn the sheets in the roof. Installation has to be made in the direction of the sheets' small upstands.

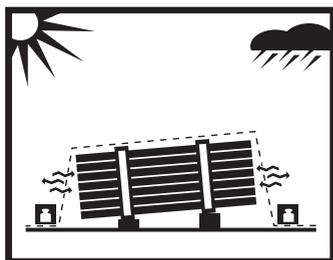


3.3 Storage on the building site

Packages are to be stored in an inclined position and protected against the weather. Building site stores, including those on the roof, must be roofed over and well-ventilated. Condensation must be avoided. Opened packages must be covered over again during interruptions to the assembly.



- When storing on the roof, ensure that the load bearing capacity of the sub-structure is sufficient.
- Exercise caution when opening packages stored at an angle: there is danger of sheets sliding sideways and/or in the direction of slope.
- Always cover translucent sheets to protect them from dirt and direct sunlight. Magnifying glass effect may cause distortion and discoloration.



3.4 Checking incoming materials

Obtain confirmation of any material and packaging deficiencies from the forwarder and notify the supplier immediately.

Check that the number of packages and their contents agree with the delivery documents. Inform the supplier immediately of any discrepancies in dimensions or quantities, etc. Period of time in which transport damages have to be claimed:

Maximum 1 week after arrival on the building site although an earlier claim is advantageous to all parties.

- Permissible length tolerances for Kalzip sheets:
 - for sheets of up to 3 m in length: + 10 mm / - 5 mm
 - for sheets of over 3 m in length: + 20 mm / - 5 mm
 Tolerances are based on production temperature of 20 °C.

3.5 Special instructions: transport, storage and installation of Kalzip profiled sheets made from AluPlusZinc

- Always ensure that AluPlusZinc is transported and stored in a dry and ventilated condition. Open transportation in unsettled weather conditions should be avoided.

- During storage, ensure that condensation does not form inside the coils or stacks. Storage in damp or warm locations, or locations where the temperature is subject to frequent change, should be avoided.
- Building site stores must be covered and ventilated – also on the roof. During production on-site the unprotected surface must not be exposed to rain. Roll formed profiled sheets should be laid immediately.



- The protective film on the profiled sheets not only protects them during transport, but also while they are being zipped. It is important to make sure that this film is removed from the small seam prior to zipping.



- The film is to be removed at the latest 2 weeks after delivery, or immediately after the zipping process. After this the profiled sheet should not be walked on.
- The profiled sheets must not be allowed to come into direct or indirect contact with other materials which have a corrosive effect on aluminium and/or zinc.
- Do not allow the surface of AluPlusZinc to come into direct contact with wet coverings. No objects (e.g. including damp thermal insulation) should be placed or stored on AluPlusZinc.
- Never attempt to remove dirt using abrasive or corrosive materials.
- Weld seams can be carefully painted over with a fine paint brush (RAL 7030 – weathered “new”; RAL 7023 – weathered “old”; zinc dust paint – changing grey tone depending on angle of vision).

3.6 Noise adsorbing and anti-condensation coatings

- Do not allow the coatings to come into direct contact with dirty or wet surfaces.
- The coated surfaces must not be exposed to direct rain.
- Ensure adequate ventilation during storage.

4.0 Clip installation

4.1 Attachments

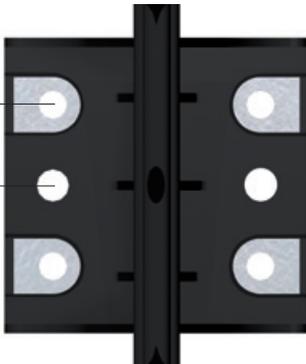
Kalzip clips are attached to the sub-structure using stainless steel screws or aluminium bulbtite blind rivets. Only the approved fasteners must be used. As a general rule, a screw or rivet is arranged on each side of the web. Kalzip fasteners and bulbtite blind rivets should be arranged in a diagonal manner. The number of attachments can also be increased in the edge areas of the roof. These details are outlined in the installation plan.

Please note:

The number and the positioning of the fastener elements are to be found in the installation plan or in the static calculations!

Holes for self-tapping screws or self drilling screws with diameter > 6 mm and sealing washer

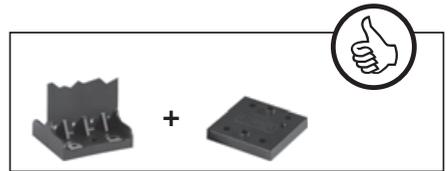
Holes for Kalzip drilling screws
Type SDK or bulbtite rivets



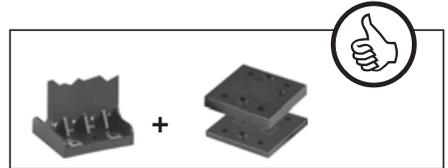
- Fixing elements:
1. self-tapping screws
 2. drilling screws
 3. bulbtite rivet

Use of spacer caps in combination with the Kalzip composite clip

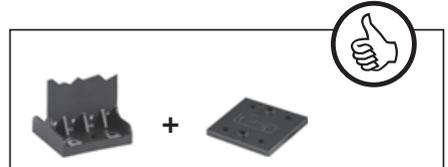
The Kalzip composite clips can be combined with spacer caps (DK) in order to compensate for height tolerances. A combination is thereby permissible only in following variants.



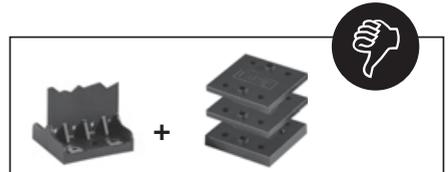
Composite clip + DK 10
Combination for the desired clip height



Composite clip + DK 10 + DK 5
Max. combination for the desired clip height and to compensate for height tolerances



Composite clip + DK 5
to compensate for height tolerances



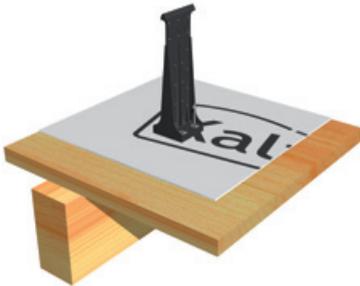
Composite clip with several DKs
– not permissible

Timber purlins or spacers

As a general rule, the timber must be predrilled when using screws. This is not necessary when self-drilling screws are used.

Self-drilling screw:

e.g. SFS-SDK2 -S-377-6.0 x 45

Timber lining minimum thickness 23 mm**without spacer cap**

self-drilling screw:

e.g. SFS-SXW-S16-6.5 x 50

or

e.g. SFS-SDK2-S-377-6.0 x 35

with spacer cap DK 5

Kalzip self-drilling screw:

e.g. SFS-SDK2-S-377-6.0 x 45

with spacer cap DK 10 or spacer cap DK 10 + DK 5

self-drilling screw:

e.g. SFS-SXW-S16-6.5 x 50

or

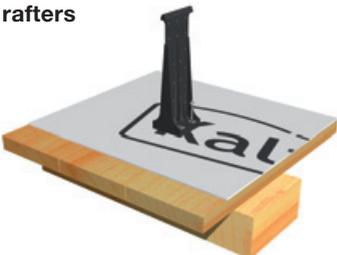
self-tapping fastener:

e.g. SFS-TDA-S-S16-6.5 x 64

predrilled with \varnothing 4.8 mm

or

e.g. SFS-SDK2-S-377-6.0 x 60

Through the lining into purlins or rafters**without spacer cap or with spacer cap DK 5 or spacer cap DK 10 or spacer cap DK 10 + DK 5**

self-tapping fastener:

e.g. SFS-TDA-S-S16-6.5 x 76

predrilled with \varnothing 4.8 mm

**On steel purlin with seam
thickness < 6 mm**



without spacer cap

self-drilling screw:

e.g. SFS-SX14/12-S16-5.5 x 38

with spacer cap DK 5

self-drilling screw:

e.g. SFS-SX14/12-S16-5.5 x 38

**with spacer cap DK 10 or
spacer cap DK 10 + DK 5**

self-drilling screw:

e.g. SFS-SX14/38-S16-5.5 x 61,

SFS-SX14/4-38-S16-5.5 x 61

or self-tapping fastener:

e.g. SFS-TDB-S-S16-6.3 x 38

pre-drill appropriately for the
thickness of the seam



Attention:

In order to guarantee that the clip is properly fastened it is necessary to ensure that no drilling swarf gets between the clip and the supporting construction. (This can be achieved by, for instance, fitting the clip with the aid of a grip wrench.)

**On steel purlin with seam
thickness > 6 mm**

self-tapping fastener:

e.g. SFS-TDB-S-S16-6.3 x L

pre-drill appropriately for the
thickness of the seam)



Attention:

Be sure to remove drilling swarf. Self-drilling screws no longer recommended.

**On steel trapezoidal profile
(thickness max. 1.25 mm)**



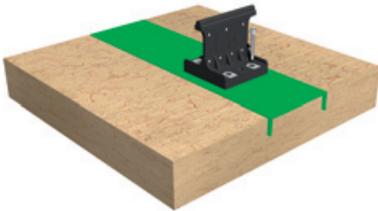
**without spacer cap or
with spacer cap DK 5**

Kalzip self-drilling screw:
e.g. SFS-SDK2-S-377-6.0 x 35
or bulbtite blind rivet:
e.g. SFS-RV-6604-6-12W

**with spacer cap DK 10 or
Spacer cap DK 10 + DK 5**

Kalzip self-drilling screw:
e.g. SFS-SDK2-S-377-6.0 x 45

**On ProDach rail
(thickness 1.15 mm)**



**without spacer cap
with spacer cap DK 5**

Kalzip self-drilling screw:
e.g. SFS-SDK2-S-377-6.0 x 35
or bulbtite blind rivet:
e.g. SFS-RV-6604-6-12W

**with spacer cap DK 10 or
Spacer cap DK 10 + DK 5**

Kalzip self-drilling screw:
e.g. SFS-SDK2-S-377-6.0 x 45

Kalzip clips must not be attached using hot fired pins!

On a steel top hat profile (thickness 1.50 mm)



Kalzip self-drilling screw:
e.g. SFS-SDK3-S-377-6.0 x 30
or self-drilling screw:
e.g. SFS-SX3/10-S16-5.5 x 28
or bulbrite blind rivet:
e.g. SFS-RV-6604-6-12W

with spacer cap DK 5

self-drilling screw:
e.g. SFS-SDK3-S-377-6.0 x 30
or self-drilling screw:
e.g. SFS-SX3/15-S16-5.5 x 38
or bulbrite blind rivet:
e.g. SFS-RV-6604-6-12W

with spacer cap DK 10 or spacer cap DK 10 + DK 5

self-drilling screw:
e.g. SFS-SX3/20-S16-5.5 x 52

Kalzip DuoPlus 100/Rotatable clip and Kalzip DuoPlus 100/Rotatable clip- rail, perforated



With the development of the DuoPlus rail and Kalzip the DuoPlus clip, a total solution has been created for the secure and convenient installation of the mounting elements for the Kalzip profiled sheets.

After the rigid insulation has been installed, the rails are aligned according to the calculations and are mounted in the steel trapezoidal profile substructure using the SD2-S-S16-6.0 x 4 fixing element from SFS intec. The approved dowel must be used for applications on concrete or aerated concrete. The DuoPlus clips are then manually screwed in.

4.2 Clip positioning

General

The distance between one clip and the next must never be less than the width of the Kalzip profiled sheet.

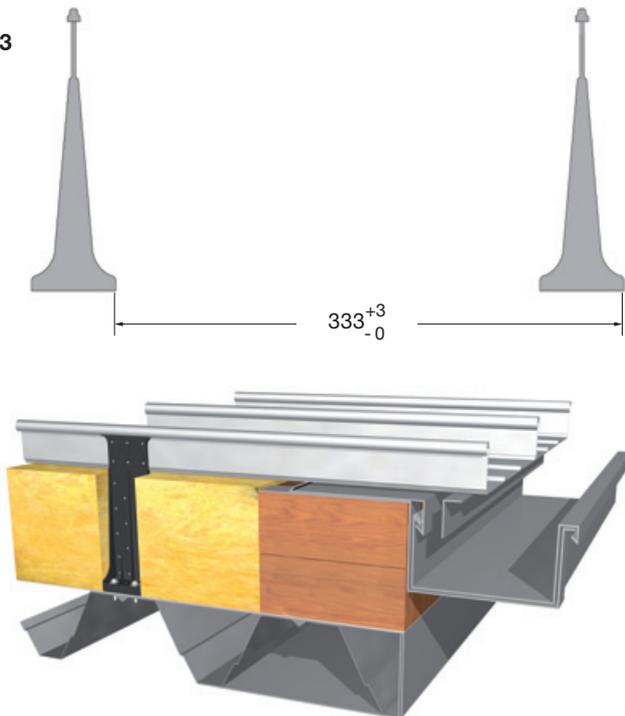
The maximum positive tolerance is about 3.0 mm. The clips must be positioned as far apart as possible on rounded Kalzip profiled sheets. That is therefore 336 mm in the example below. Otherwise it is not possible to rule out the possibility of buckling. For those of Kalzip profiled sheets with a thickness of $t = 1.2$ mm,

the positioning dimension is to be increased by 2 mm above the nominal dimension, in this case 335 mm.

With Kalzip AS and AF profiled sheets, an increase in construction width of up to 20 mm must be taken into account following curving (see also the Kalzip Technical Manual.)

The clips must be accurately aligned. This happens automatically if the positions of the clips are laid out with a marking line.

Example: Kalzip 65/333



Rafter roof

The clip arrangement on a rafter roof begins with a continuous row of clips in each case on the eaves and on the ridge. However, the row of clips on the eaves must not be positioned on the gutter board but, as is the case on the entire roof, on the supporting deck directly behind the gutter board. This ensures that, particularly in the case of low roof pitches, an inverse pitch is not created in the eaves area of the roof as a result of an incorrect gutter board height. Proceeding outwards from the eaves, no clip is positioned on the second upper seam of the supporting deck, so that the next clip to be positioned will be on the third upper seam.

Each further clip will now be staggered by one upper seam. When the maximum number of clips is reached then a new row should begin.

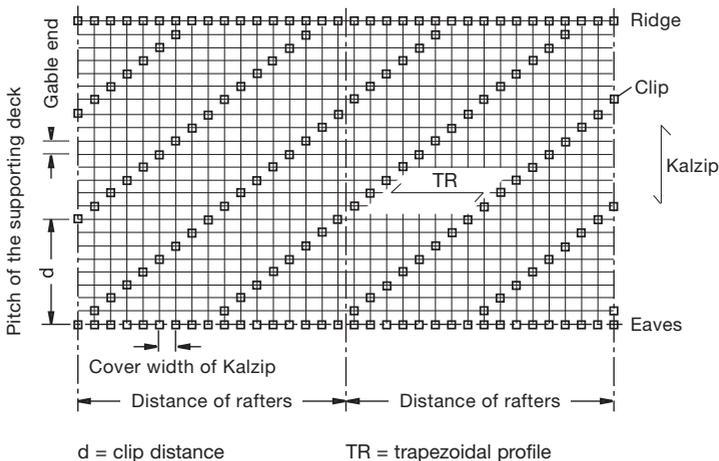
When the clips have been correctly positioned the arrangement should look like the positioning scheme outlined below. Under normal circumstances, the clip spacing in the edge and eaves areas of the roof is reduced to take into account the increased suction forces in these areas. For convenience, an additional clip row is positioned in this area in each case. The installation plan provides more detailed information on this.



Please note:

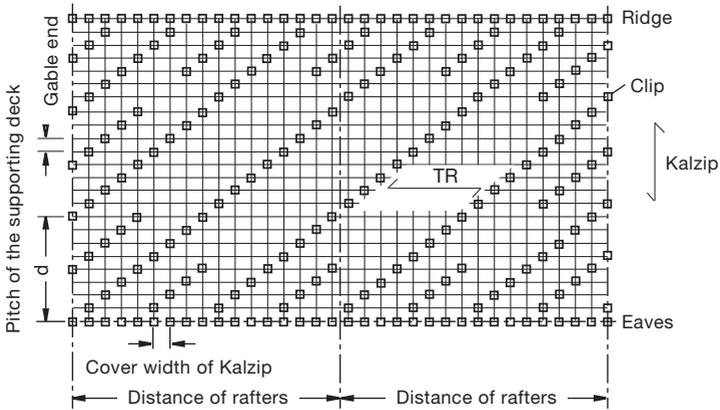
At least 2 clips must be positioned in each truss span on the upper strap of each trapezoidal profile.

Positioning scheme 1 Kalzip clips



Positioning scheme 2

Kalzip clips



d = clip distance

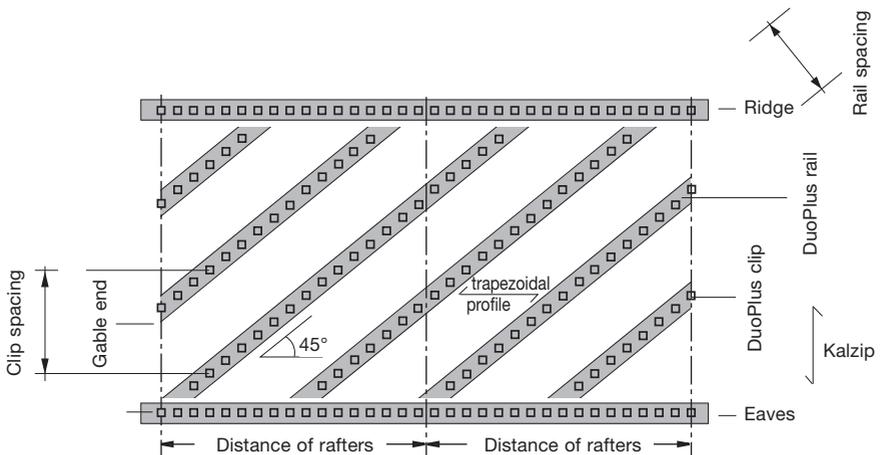
TR = trapezoidal profile

Distances not to scale

Positioning scheme DuoPlus 100 roof design

The system requires that the DuoPlus rails are positioned at an angle of 45°.

The position of the rails is given in the installation plan.



Purlin roof

On purlin roofs, a row of clips is arranged on each purlin. If Kalzip AF is fixed to ProDach rails, it is considered to be a purlin roof. Higher suction loads are to be accounted for in the edge areas of purlin roofs also. Occasionally it may be necessary to provide additional rails or purlins in this area. With small spacings between the purlins of approx. 1.5m, it is

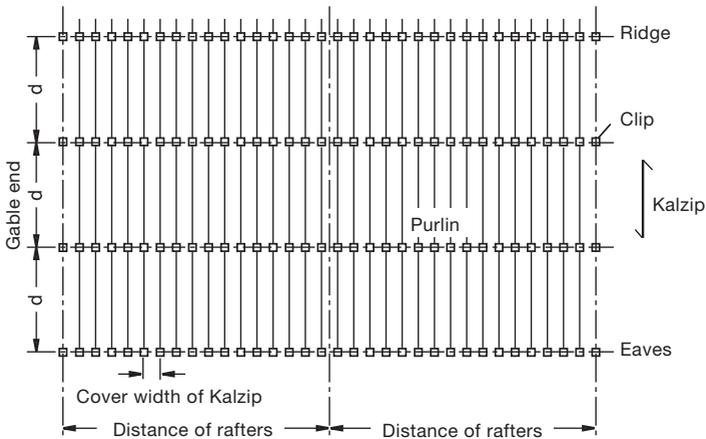
generally sufficient to only place clips on every second purlin. In order to evenly distribute the loads onto all purlins, the clips are fixed onto the purlins in a staggered arrangement. A stress calculation is required (see positioning scheme 2).

Further details can be found in the installation plans.

4.0

Positioning scheme 1

Kalzip composite clips

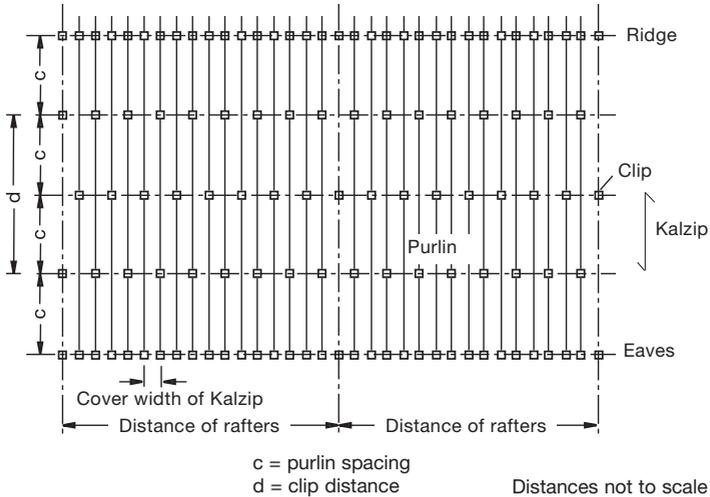


$d = \text{clip distance} = \text{purlin spacing}$

Positioning scheme 2

Kalzip composite clips

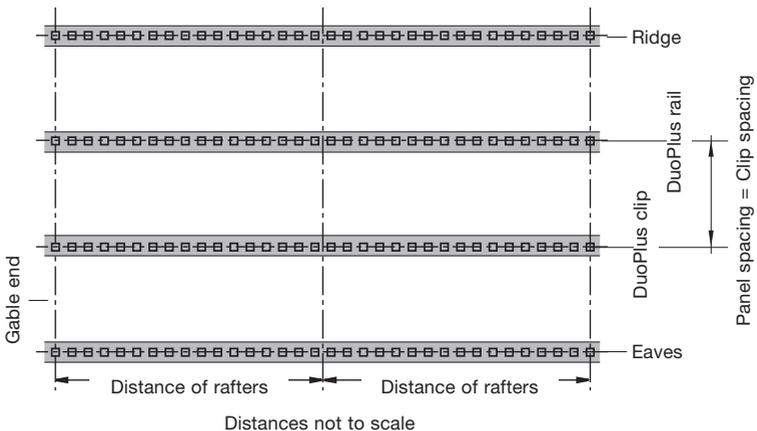
Clip positions with closer spaced purlins (e.g. re-roofing)



Positioning scheme DuoPLUS 100 roof design

The system requires that the DuoPlus rails are positioned parallel to the purlins.

The position of the rails is given in the installation plan.



5.0 Installing Kalzip · renovating with Kalzip

Principal rule:

Zip each sheet immediately after laying! This is the only way to ensure the load bearing capacity of the system and to provide the necessary protection against wind forces.

5.1 Wind, Weather

Kalzip sheets are light and have a large wind uplift area. Therefore exercise caution when storing open packages and lifting Kalzip sheets onto the roof.

- Lash down open packages and discontinue installation work in strong winds, immediately fasten individual sheets and zip together.
- In particular, secure the last sheet from blowing away, e.g. by provisionally fastening with the gable end clip.

While installing it is possible to walk as far as the subsequent span on profiled sheets without doing anything to spread the load, if they have been zipped on at least one side in the installation area:

Load bearing capacity¹:

Sheet thickness	Kalzip							
	65/305	65/333	65/400	50/333	50/429	65/333 ²	65/434 ²	65/434 ²
t mm	l _{gr} m							
0.8	2.90	2.90	3.00	2.50	2.50	2.90	3.50	3.50
0.9	3.35	3.35	3.40	2.65	2.60	3.20	3.55	3.55
1.0	3.80	3.80	3.80	2.80	2.70	3.50	3.60	3.60
1.2	3.80	3.80	3.80	3.00	2.90	3.50	3.60	3.60

Use load distributing planks on wider spans or larger cover widths. See also Kalzip Licensing Notice and Certificate.

- 1 Applies only to stucco-embossed and colour-coated Kalzip profile sheets. Other material combinations are available on request.
- 2 On grounds of final visual appearance, this information is only applicable when rigid thermal insulation is used.

5.2 Positioning

- Follow the installation plans!
Measure and string out roof and wall areas. Arrange sheet widths so that they meet transitional points such as roof lights, smoke vents etc. in accordance with the plans.
- The construction width (or installation dimension) of curved roofs must be increased by 3 mm.
The dimension must not be less than the construction width.



5.3 Corrosion protection

When fitting aluminium to other materials, contact corrosion must be avoided.

5.4 Installation

- Insert the first Kalzip profiled sheet into the clips with the large seam towards the gable.
- Zip up the large seam using the zipping machine so that the gable end channel can be attached and riveted. Here the zipping machine must be guided by hand.

x = Minimum distance 100 mm from gable end clip

1 = Aluminium blind rivet with stainless steel mandrel 5 x 8 mm

2 = Gable end channel

3 = Gable end clip

4 = 2 self-drilling screws stainless steel SFS-SX6/6-S16-5.5 x 26 mm or
2 threaded screws stainless steel SFS-TDA-S-S16-6.5 x 16 mm (predrilled with \varnothing 4.5 mm)

Transitional area

If a Kalzip profiled sheet is roll-curved with several radii, a transitional area is created in which no clip may be placed (except a fixed point clip).

- a) This transitional area can be safely estimated to be
- ± 300 mm (600 mm in total) if the two adjacent radii both have the same sign has, or
 - ± 600 mm (1200 mm in total) if the two adjacent radii have different signs, i.e. from concave to convex or vice versa.
- b) It is necessary to consult the Application Technology Dept. in Koblenz for a more exact determination of this transitional area.

The edge of the roof must be reinforced immediately and secured with gable end clips. A description of the area of the roof edge can be seen under the description of the connections on page 45.

The fixed point must be established before the next profiled sheet is laid. This can be done in the area of the ridge, but it can also be done somewhere else on the Kalzip profiled sheet if thermal expansion makes this necessary.

5.5 Design of fixed points

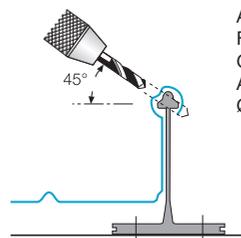
Kalzip aluminium clip/

Kalzip composite clip

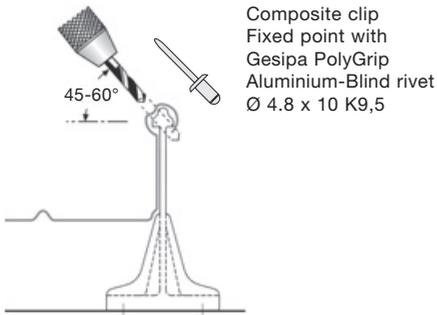
The fixed point prevents slippage of the profiled sheets and is the point of each Kalzip profiled sheet that is not subject to a change of length. Each Kalzip profiled sheet is to be secured at the fixed point against displacement.

If the fixed point is not located directly at the roof ridge, then the elongation of the Kalzip profiled sheets from the fixed point to the roof ridge must be taken into account when forming the covering of the roof ridge. Each Kalzip profiled sheet may have only one fixed point. Kinks in the Kalzip profiled sheet, fixed lighting elements etc. are likewise fixed points and must be taken into account. No second fixed point may be manufactured.

Fixed points are statically verified and are to be taken from the installation plan.



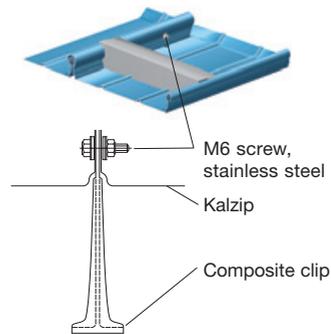
Aluminium clip
Fixed point with
Gesipa PolyGrip
Aluminium-Blind rivet
Ø 4.8 x 10 K9,5



A hole for the blind rivet is drilled through the small seam into the head of the clip at an angle of 45-60° degrees, the rivet is inserted and the swage head is covered by the large seam of the next profiled sheet.

Alternatively, the fixed point is manufactured by the insertion of bolts through the webs of the Kalzip and the fixed point clip. Sealing washers must be inserted on both sides (bolt head and

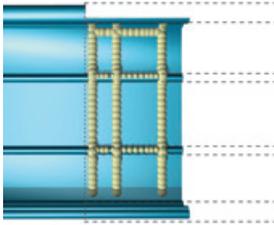
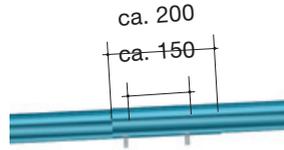
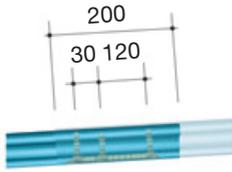
nut). If a composite clip is used for the fixed point, all drilling swarf must be removed from the profiles, since the composite clip is made of plastic-sheathed steel. Rust stains on the profiled sheets are thus avoided. For the further installation of the roof surface, the Kalzip profiled sheets are placed with the large seam on the small seam, aligned to the eaves and only then pressed into the next row of clips.



The sheets must be zipped immediately after laying

Zipping can be performed in any direction on sheets without transverse joints. In areas where the Kalzip profiled sheets have overlaps e.g. in the area of skylights, joints, etc. ensure that the zipping

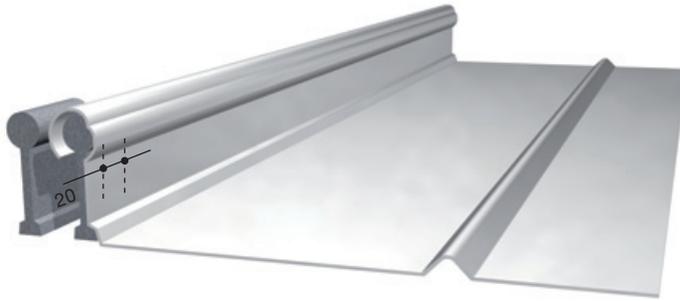
machine always runs in the direction of the slope over the overlaps. The diagrams below show the arrangement of the sealing and the connecting elements in the case of overlapping joints (excess silicon should be removed immediately).



Sealing scheme



Rivet arrangement



Seam filler

It is recommended that the seam filler is inserted 20 mm from the sheet end before the next Kalzip sheet is laid.

Sheet thickness mm	Final seam dimensions mm
0.7 - 1.0	approx 20
1.2	approx 22

5.6 Zipping procedure

A precondition for reliable load-carrying capacity, walkability, and even the function of a Kalzip roof and wall system is that the seams are mechanically zipped by a special tool, the zipping machine. This can be hired from Kalzip GmbH, and is also available for purchase. It is necessary to ensure that the small seam engages in the head of the clip, since otherwise the zipping can be faulty, and proper sliding in response to thermal expansion is also not guaranteed. For safety reasons, the Kalzip profiled sheets must be zipped immediately after laying to achieve the necessary composite effect to ensure correct load bearing capacity and accessibility.



Please note:

A special set of operating instructions is available on how to use the zipping machine.



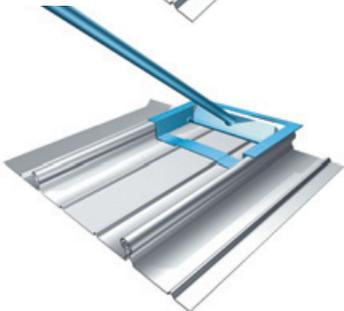
1. Zipping machine
2. Unzipping device (only in connection with the zipping machine)
3. Kalzip installation instructions
4. Operating instructions for the zipping machine
5. Portable steel box

6.0 Connections

6.1 Ridge

6.1.1 Upward fold

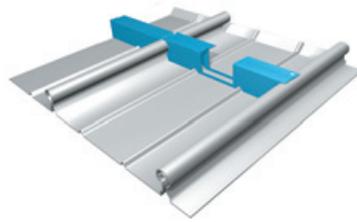
The end of the profiled sheet should be folded upwards at an angle of approx. 45° using the folding tool. When doing this, ensure that the correct tool is used for the corresponding Kalzip profile.



6.1.2 Ridge closure

When the sheet end has been folded upwards, the ridge closure should be inserted into the profiled sheet and secured on the seam webs by means of aluminium rivets using a Nirosta mandrel.

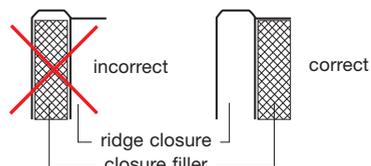
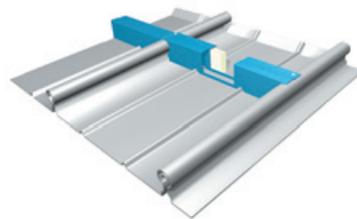
Ensure that the rear edge of the ridge closure has a distance of ≥ 100 mm to the upward fold.



6.1.3 Closure filler

The closure filler is inserted below the rear edge of the ridge closure, whereby the design of the ridge closure creates a contact pressure in order to ensure its function as a wind break.

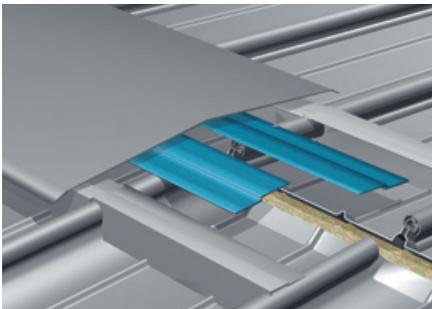
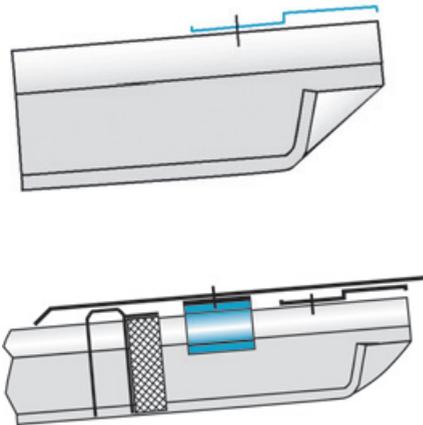
When the fixed point is positioned in the centre of the Kalzip profiled sheets, sliding elements should be used to accommodate longitudinal expansion and these also serve to secure the ridge cover.



6.1.4 Spacer section/sliding element

To support and stabilize the ridge plates the aluminium spacer section should be installed so that the upper supporting side is aligned flush with the end of the profiled sheets and the lower side is secured on the seam webs using aluminium rivets.

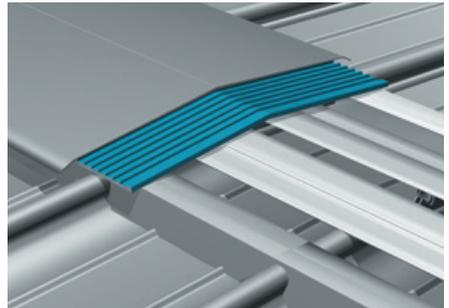
If the fixed point is not positioned in the ridge area, a flexible ridge design is achieved using the sliding elements.



6.1.5 Ridge cover plate

The ridge cover plates should only be attached in the centre or in the third sections of the ridge closures. Attachment in the area of the seam webs should always be avoided.

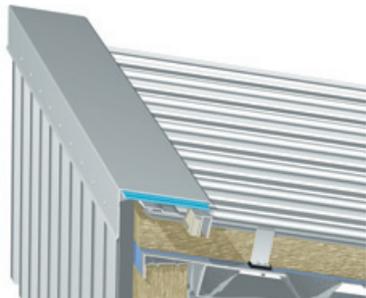
The ridge cover plates must not be connected to each other in the area of the joints. A butt jointed design with cover plates is recommended to allow for longitudinal expansion.



Alternative: Butt jointed sheet with foldover.



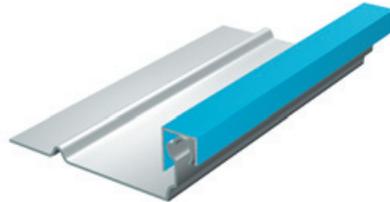
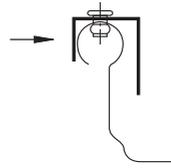
Ridge on shed roof



6.2 Gable end

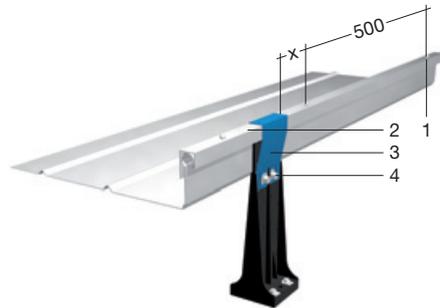
6.2.1 Gable end channel

The large seam web must be closed with the zipping machine. The gable end channel is placed in position, pressed against the outer seam edge, then fixed in a horizontal manner and attached in the centre of the seam rib by means of aluminium rivets at a distance of approx. 500 mm. The long side faces towards the roof side.



6.2.2 Gable end clip

The gable end clip is placed on the clamping profile in the area of the clips and attached onto the side of the clip shaft. In the case of connections to rising wall surfaces, the holes in the clip seam must be predrilled, whereby the gable end clip with holes predrilled in the factory can be used as a template.



x = Minimum distance 100 mm
from gable end clip

1 = Aluminium blind rivet with
stainless steel mandrel 5 x 8mm

2 = Gable end channel

3 = Gable end clip

4 = 2 self-drilling screws stainless steel
SFS-SX6/6-S16-5.5 x 26 mm
or 2 threaded screws stainless steel
SFS-TDA-S-S16-6.5 x 16 mm
(predrilled with \varnothing 4.5 mm)

6.2.3 Gable end support rail

The gable end support is hooked into the side of the gable end channel which faces the roof surface and pressed over the edge of the gable end clip until it locks in place.



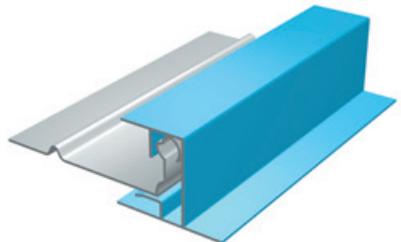
6.0

6.2.4 Gable end profile 50/65 (option) only for flat roofs

The gable end profile is premounted on the substructure like the clips. Here the edge of the bearing which is aligned outwards is the measurement for the centre of the seam (see diagram).

The large seam of the first Kalzip profiled sheet must be zipped using the zipping machine. To begin installation, this large seam is rotated into the gable end profile and the small seam attached on the first clip.

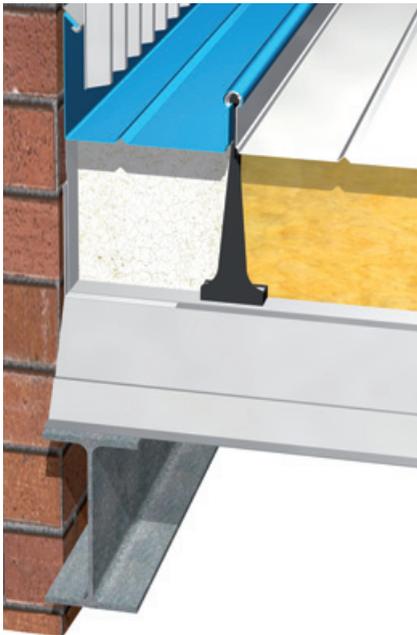
In the case of the last profiled sheet, the small seam is firstly rotated into the gable end profile and then the large seam pressed over the last small seam of the last but one profiled sheet.



6.2.5 Cover plate

The gable end cover plates should be attached on the gable end support and if necessary on the gable end profile. They must not be connected to each other in the area of the joints. A butt jointed design with splice plates is recommended. Alternatively, gable ends are also

equipped with Kalzip transition sheets appropriate to the particular type of Kalzip used. As the transition sheets are bended, they can have a maximum length of 6.00 m. Joints are welded in the case of low roof pitches. With roof pitches which are $> 5^\circ$ the joints can also be sealed.



Matching tracks

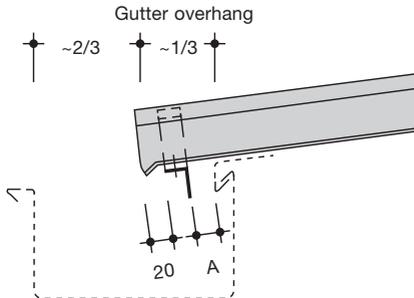
Matching tracks are only available with a large seam. If necessary, a "small seam" can be created by forcing down the large seam.

6.3 Eaves closure and static edge reinforcement

6.3.1 Gutter overhang

The following gutter overhang should be observed for Kalzip profiled sheets:

Kalzip sheet length	gutter overhang
up to 20.00 m	60 mm
up to 30.00 m	70 mm
up to 40.00 m	80 mm
up to 50.00 m	100 mm



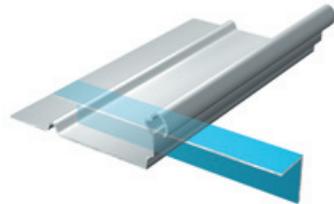
A = possible movement
1.0 mm/m Kalzip sheet



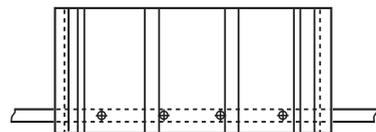
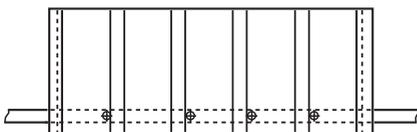
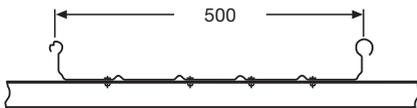
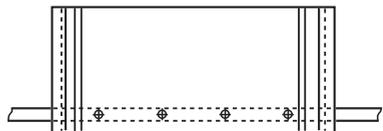
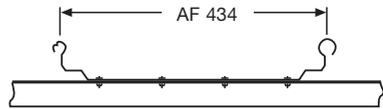
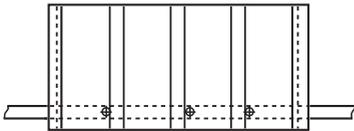
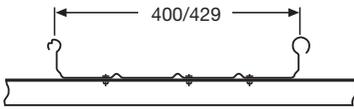
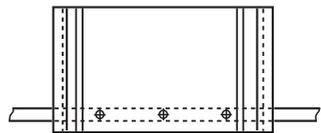
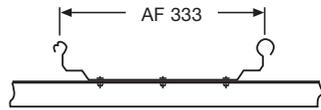
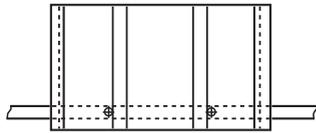
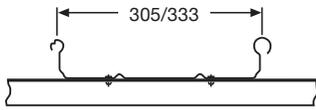
6.3.2 Drip angle

For static reasons, the drip angle is essential.

It should be fixed in the area of the gutter overhang of the Kalzip profiled sheets by means of screw clamps or locking pliers. Attachment then takes place from above by means of aluminium rivets using a Nirosta mandrel.



Rivet arrangement for installation of the drip angle



When the Kalzip projects over the first clip on the roof edge by more than 250 mm, riveting must be carried out in each rib of the bottom sheet.

6.3.3 Folding

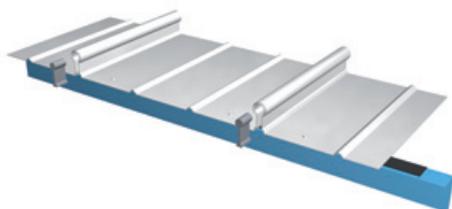
Follow installation of the drip angle, the ends of the Kalzip profiled sheets should be folded using the eaves folding tool. Always ensure that the correct tool is used for the corresponding Kalzip profile used.



6.3.4 Sealing the eaves

With roof pitches $< 5^\circ$ it is essential to seal the eaves using sealing tape and seam fillers.

Seam fillers are not necessary with roof pitches $> 5^\circ$.



With roof pitches $> 10^\circ$ the drip angle can be installed without the eaves seal.

7.0 Installations

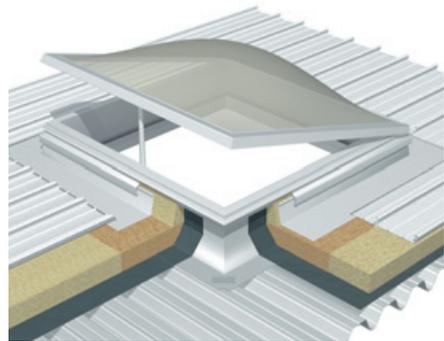
7.1 Skylights/smoke extractors

Kalzip GmbH supplies complete units with a variety of dimensions for the inclusion of skylight domes, SHEV systems etc.

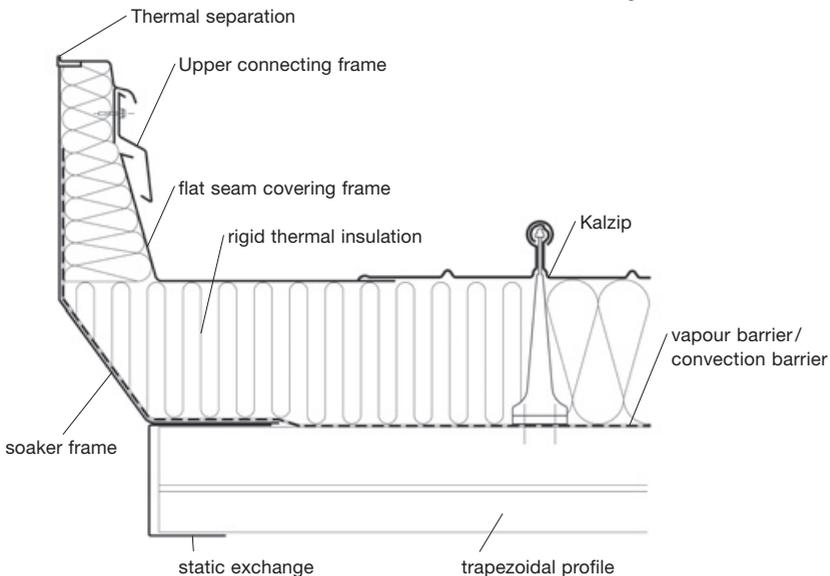
These consist of a steel soaker with skylight and a multipart, welded aluminium connecting frame. This can be welded into the roof surface. The diagram on page 52 shows a welded connecting frame.

For more detailed information on installation please refer to the assembly instructions which are supplied with the skylights.

Skylights and smoke extractors must not be walked on. As these must be regularly accessed for servicing and maintenance work, it is recommended that the area around the opening is reinforced with rigid thermal insulation.



Welded connecting frame

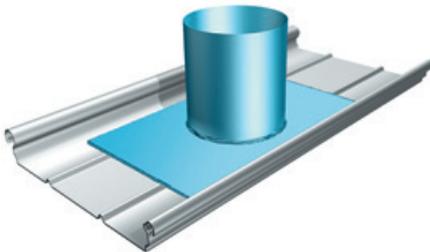


7.2 Vents

After laying the Kalzip sheets, cut out the bottom plate. Max. diameter (see below) if installed in the centre of a sheet. Minimum 75 mm wide gutters are left on each side.

Alternative:

Prefabricated aluminium vent welded to a short Kalzip sheet is sealed into the roofing area by using silicon sealant and blind rivets. (see diagram on page 40 "Sealing scheme" und "Rivet arrangement")



Weld aluminium vents into position

7.3 Kalzip roof anchor

Kalzip roof anchors must only be attached to Kalzip profiled sheets. Only original components may be used. For further instructions and regulations please refer to the instructions for use supplied with each roof anchor.



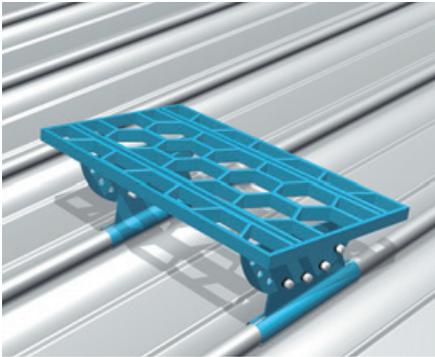
Roof anchor

7.4 Fall arrest systems

The general regulations stipulated by the building authorities, professional trade associations, etc. must always be observed. An installation plan is required in which all dimensions, details and materials to be used are stated. The manufacturer's instructions must always be observed and followed.

7.5 Walkways / steps

Special systems consisting of steps, access grids and corresponding brackets are used which are attached to the seams. Always ensure that the movement possibilities of the Kalzip are not hindered. Walkways must be accordingly fitted with joints. You will find further information about this product in the correspondingly data sheet.



Trittstufe

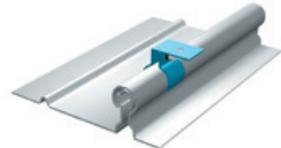
7.6 Solar systems

Solar systems are attached to the seams by means of clamps. The position and quantity of clamps are given in the statics or installation plan of the systems. The hexagonal nut of the clamps is tightened to a torque of 6 Nm, in order to prevent the nuts from being overwound and the seams from being damaged.

7.7 Seam clamps (stainless steel cable clips and seam clips)

Seam clamps or seam clips are used for fastening accessory components to Kalzip profiled sheets without making any perforation. The clips are placed, open, on the seam, after which the clamping screw is tightened to a torque of 6 Nm. It is important to note that once they have been tightened, the seam clamps can no longer be adjusted or moved, otherwise they will lose their clamping capacity. In practice this means that the clamping screws are not tightened with the torque of 6 Nm until the accessory components (e. g. frames for solar installations) have been fitted into the seam clamp. If, for some reason, it is necessary to change the position of the seam clamps, the clamping screws must be tightened up again.

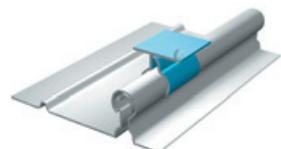
Cable clip
Stainless steel



Seam clip
Stainless steel



Seam clip
Aluminium



8.0 Welding · cutting · bending

8.1 TIG Welding

TIG welding is the most common method of welding aluminium. Welding can take place either at the construction site or in the factory. SG-ALSi5 is recommended as the filler material.

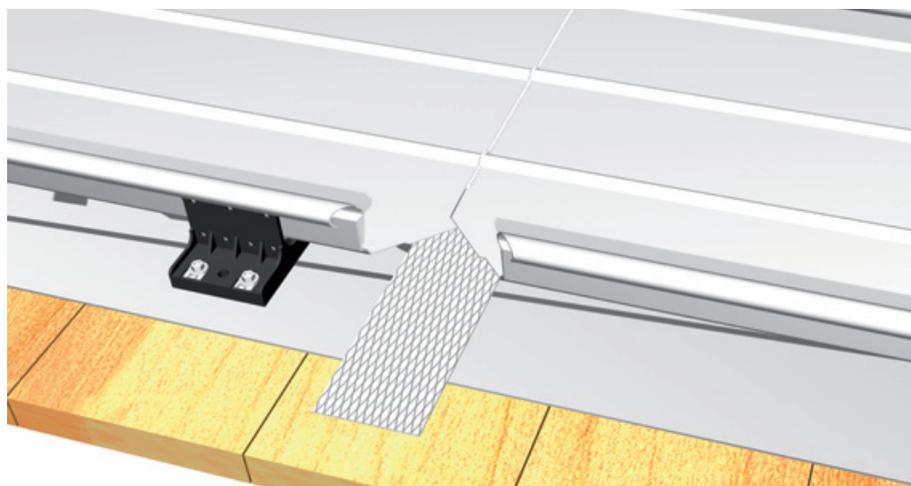
In order to ensure position stability during welding, the joints must be supported (e.g. rigid thermal insulation). The site fire department should be informed before welding takes place

8.1.2 Welding preparation

The sheets which are to be welded must be clean, dry and free from grease. In conditions of strong wind and rain, weather protection should be used if required. Before welding takes place, coated sheets should have the coating removed in small area of 20 to 30 mm. Butt joints should be avoided if possible. It is better to allow the sheets to overlap slightly (10 to 20 mm). If this is not possible, a made from non-coated aluminium can be placed underneath.

8.2 Welding backing strip

In the case of substructures which are temperature-sensitive or could set on fire, the substructures must be protected to prevent fire and damage. Here, a strip of Kalzip welding backing strip is placed under the weld joint and fixed to prevent movement. You will find further information about this product in the correspondingly data sheet.



Welding backing strip

8.3 Cutting

In the case of all procedures, suitability for the respective purpose should be checked by carrying out a test cut. The burrs should be removed following cutting. Caution: risk of injury.

8.3.1 Cutting and sawing

A hand-held circular saw with a hard metal blade with a coarse tooth pitch (9-20 mm) or a nibbler are best suited. For cutting straight roof edges, etc. guide the hand saw along a straight edge. A large bow saw with a hard metal blade is suitable for cutting individual sheets.

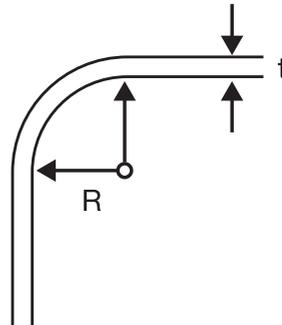
8.3.2 Cut-off discs

Special cut-off discs suitable for aluminium sheets are used for cutting out openings and for cutting individual profiled sheets (e.g. FT24A TOP from Rhodius).

8.4 Folding

Minimum radii must be observed in accordance with material quality and finish.

Kalzip sheets and flat sheets of coated coiled material are generally manufactured from 3/4 hard material. Special flat sheets are generally 1/2 hard.



Minimum internal radius

Surface	1/4 hard	1/2 hard	3/4 hard
Stucco-embossed mill finish	2 x t	3 x t	4 x up to 6 x t
Coil coating	generally 5 x t		

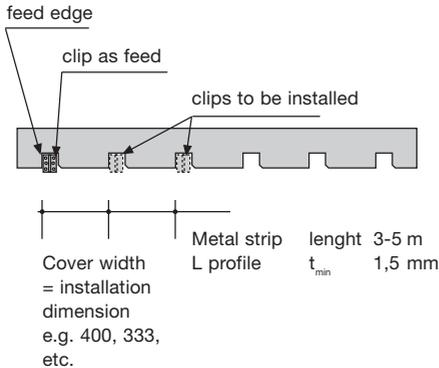
- Mark with a soft pen, do not use marking tools.
- When working with colour coated material, mask the bending tool or work with protective film.

9.0 Useful hints and advice

9.1 Installation template for installing clips

An installation template can be used to simplify clip installation. It consists, for example, of a metal strip with a length of 3 - 5 m. Notches are punched in the strip in accordance with the planned clip spacing. The first clip rows are measured and attached. The template is then placed on the existing clips and aligned. The new clips are positioned and directly attached without marking out.

The template can be used for purlin roofs, rafter roofs, flat roofs and curved roofs.



Installation template

Example: purlin roof

The roof is measured and the first two rows of clips are positioned on the gable end according to the measurement. The installation template is then used to continue installation in accordance with the plan.

Example: rafter roof

The roof is measured and the first rows of clips are positioned on the gable end according to the measurement. Depending on the plan, the clips are installed on a trapezoidal profile seam in each 4th, 5th, etc. Kalzip profiled sheet. Accordingly a specified clip rows must be installed in correspondance with the given measurement on the gable end. The template can then be used to continue installation. The corresponding gaps are marked out on the template.

9.2 Preassembly of the clips on top hat profiles

If the clips are attached to spacer profiles preassembly can be carried out in the factory.

9.3 Storing long sheets

It is difficult to store long sheets at a sloping angle. To prevent the accumulation of water, boards should be placed under the centre of the sheets to create a slightly sloping angle.

9.4 Installation with several installation groups

Only with flat roofs, not with curved sheets.

In order to be able to work with two or more assembly groups at the same time, installation can begin at several positions. The roof is firstly measured and the clips installed. It is important that the measurements are carried out extremely carefully. The direction of installation is the same at all positions.

The first group then begins on the gable end and a second group at any point on the roof. This second group begins so that a large seam is laid loosely on the clip. This seam is not zipped but is instead secured with gable end clips to prevent it lifting off.

Group 1
Installation direction →

Group 2
Installation direction →



Installation with several assembly groups

Installation can then take place as normal. When the first group comes to the interface, the first sheet of group 2 is raised so that the clip is once again free, the small seam of the last sheet of group 1 is placed on the clip, the large seam of the raised sheet is placed on top and zipped. Installation can begin at as many positions as required using this method.

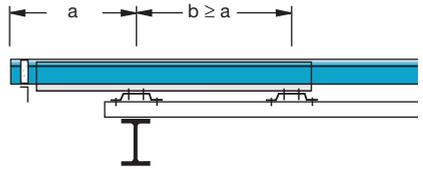
9.5 Protection when drilling through U disc

When drilling sheets, the drill can very easily slip through and damage the surface of the sheet. The risk of this occurring can be greatly reduced by placing a distance washer on the drill. In this way, the drill chuck cannot reach the sheet.

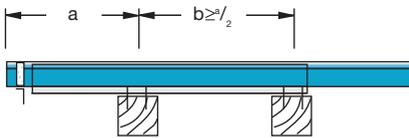
9.6 Roof projections with clip bars

The clip bars should be installed exactly as specified in the plan. The clip bars must be precisely aligned so that they do not tilt into the seams.

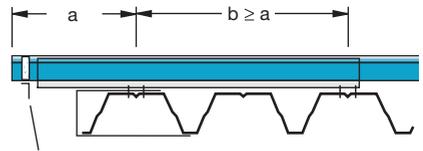
Maximum roof projection with clip bars
1.5 m.



hole pattern 2

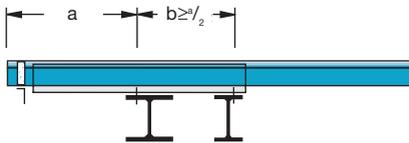


hole pattern 2

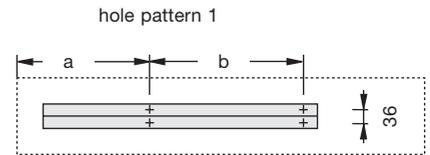


Drip angle as lateral stiffener

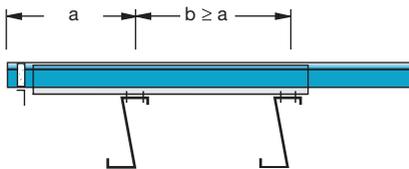
hole pattern 2



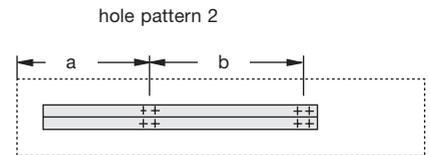
hole pattern 1



hole pattern 1



hole pattern 2



hole pattern 2

b = fixing distance depends on substructure

9.7 Roof projections without clip bars

Follow the specifications outlined in the plan precisely. The max. roof projection without clip bars is 1.00 m. However, this is on the condition that the Kalzip sheet length is at least 5.00 m. Please refer to Table 9.8 on Page 60 for precise values.

9.7.1 Requirements for installation

In this kind of design a short clip piece can be installed within the seams to secure the gutter support. The clip is attached by using either 2 rivets in the clip head or 2 screws. As there is no connection to the substructure, the Kalzip profile sheets are able to expand freely. With a sheet length of greater than 12 m the downpipe must be designed to accommodate the elongation of the tracks, e.g. by means of moveable pipe laps. **The sheets must be connected with the eaves angle in each case.**



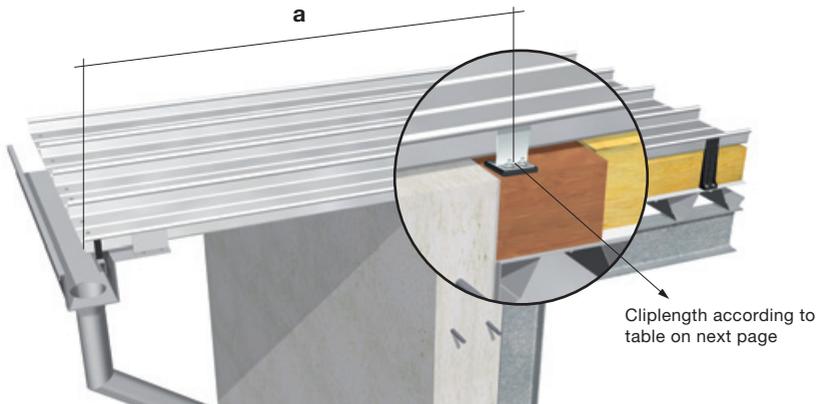
Please note:

The roof projections are not accessible during installation or before the seams are zipped.

Please observe and follow all instructions relating to safety measures and fall arrest equipment. Roof projections should be fitted with clip bars in the case of values above 1.0 and up to 1.5 m.

The roof projection (a) is calculated from the spacing between the first clip at the roof edge and the outer edge of the Kalzip.

When the Kalzip profile sheets are visible from below, it is advisable to always use load spreading equipment when gaining access.



9.8 Roof projections constructed from Kalzip profile sheets

Line	Kalzip type	Wind suction kN/m ²		
		1.50	2.00	2.50
		Roof projection (a) in metres		
1	50/333 x 0.9	0.90	0.80	0.60
	Clip length	s	s	d
2	50/333 x 1.0	1.00	1.00	0.80
	Clip length	s	s	d
3	50/429 x 0.9	0.80	0.60	0.50
	Clip length	s	d	d
4	50/429 x 1.0	1.00	0.80	0.60
	Clip length	s	d	d
5	65/305 x 0.9	1.00	1.00	0.90
	Clip length	s	s	d
6	65/305 x 1.0	1.00	1.00	1.00
	Clip length	s	s	d
7	65/333 x 0.9	1.00	1.00	0.80
	Clip length	s	s	d
8	65/333 x 1.0	1.00	1.00	1.00
	Clip length	s	s	d
9	65/400 x 0.9	1.00	1.00	0.60
	Clip length	s	d	d
10	65/400 x 1.0	1.00	1.00	0.90
	Clip length	s	d	d

s: first clip at the roof edge in standard length and in aluminium

d: first clip at the roof edge in double length

9.9 Removing dirt

Washing with warm water will usually be adequate. Detergent or special cleaning agents can be helpful, and should be used according to the instructions of the relevant manufacturer. Sponges or soft brushes – such as those used for washing cars – make suitable tools. The use of high-pressure cleaners creates a risk that water will penetrate into the roof space and into the supporting construction. Such devices should therefore only be used with great care. Rinsing off with warm, clean water is essential. The cleaning process must always work from the top to the bottom.

Natural-finish surface:

Use an abrasive agent with a pH-value of between 5 and 8 abrasive cleaning e.g. fibre fleece. Abrasion traces will be visible with abrasive cleaning. The surface will be brighter as the oxide coat darkens and the new coat will be bright metallic at first.

When using special cleaning agents, make sure that they are ecologically compatible. Always rinse off with water.

Steam-jet cleaning must be performed by a specialised company.

Coated surface:

Use special non-abrasive, biodegradable cleaner compatible with the coating system and rinse thoroughly after cleaning.

Always work with extreme care since major colour differences may occur.

It is often worthwhile delaying the cleaning process because weathering and dirt accumulation will reduce colour differences.

Good results are achieved with a chemically neutral ($5 \leq \text{pH} \leq 8$) 5 % soap solution, using a high-pressure cleaner.

Organic solvents, acid or alkalis, cleaning agents that contain chlorine or that are not neutral, abrasive agents such as coarse scouring agents, dry or hard brushes should not be used.

10.0 Special tools

The special tools listed below should be used for installing Kalzip roof and wall systems.



Please note:

A special set of operating instructions is available on how to use the zipping machine.

10.1 Tools and accessories

Tools	Use
Zipping machine 110/230 volts, 50/60 Hertz 1 roller set for Kalzip 0.7 - 1.0 mm, packed in portable steel box	for mechanically closing the Kalzip profiled sheets
Unzipping device	Unzipping Kalzip sheets (can only be used together with zipping machine)
Additional roller set	Type L for closure rail and translucent sheets Type 1.2 for material thickness 1.2 mm
Hand closing tool	Closing sheet upstands by hand
Folding tool (available for all standard profiles)	Folding Kalzip sheets at the ridge
Eaves folding tool (available for all standard profiles)	Folding down Kalzip profiled sheets in the eaves area
Roofing pliers cranked or straight	Folding down small sheets
Spreader beam (on rental basis)	Unloading long sheets Spreader beam length up to 24 m Spreader beam length up to 36 m

11.0 System components and accessories

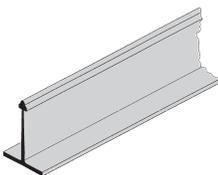
Kalzip composite clip type E



The new Kalzip Generation connecting clip for fastening Kalzip aluminium profiled sheets minimises thermal bridges, permitting a roof structure whose heat transfer rate is determined by the thermal insulation. The Kalzip Type E composite clip consists of a strong steel core enclosed in glass-fibre reinforced plastic.

Clip type	in combination with spacer cap (DK)	height in mm	Kalzip 50/... w3	Kalzip 65/... w3	Kalzip AF 65/... w3
E 5		66	20	not applicable	5
E 20		81	35	20	20
	E 20 + DK 10	91	45	30	30
E 40		101	55	40	40
	E 40 + DK 10	111	65	50	50
E 60		121	75	60	60
	E 60 + DK 10	131	85	70	70
E 80		141	95	80	80
	E 80 + DK 10	151	105	90	90
E 100		161	115	100	100
	E 100 + DK 10	171	125	110	110
E 120		181	135	120	120
	E 120 + DK 10	191	145	130	130
E 140		201	155	140	140
	E 140 + DK 10	211	165	150	150
E 160		221	175	160	160
	E 160 + DK 10	231	185	170	170
E 180		241	195	180	180
	DK 10 mm				
	DK 5 mm				

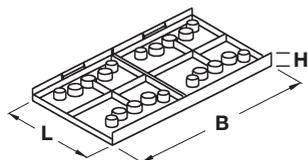
w3 = distance from Kalzip base to lower edge of clip foot base E

	Type	Size in mm
Clip bar 		Supply lengths of 6,000 mm
	L 10	
	L 25	
	L 100	
	L 140	

Clip bar curved		Supply lengths of 6,000 mm
	L 10	
	L 25	

Fixed point clip bar including fastening holes aluminium		Supply length 119 mm	
			58 mm
	L 10		
	L 25		
	L 140		

	L	B	H	
Thermal barrier polyamide suitable for fixed point clip bar	DTK 5	121	63	5
	DTK15	121	63	15



Rotatable clip



Type	clip height	Kalzip 50/... w4	Kalzip 65/... w4
D 10	66	25	not applicable
D 25	81	40	25
D 100	156	115	100
D 140	196	155	140

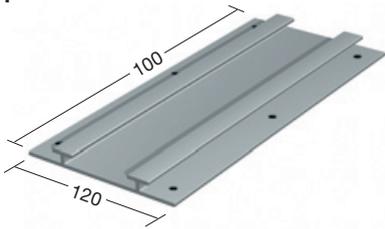
w4 = distance between Kalzip lower surface and the bottom edge of DuoPlus rail.

Only available together with the DuoPlus rail.

Size in mm

Rotatable clip rail perforated

120 x 6,000 long



Gable end channel aluminium press plain

35 x 27 x 20 x 1.5
6,000 long

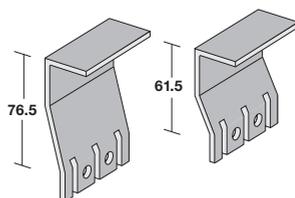


Size in mm

Gable end clip for Kalzip 50/... and AF/AS

l = 58
2 holes, Ø 7

Gable end clip for Kalzip 65/...
aluminium press plain
can be used for Al clip
and composite clip

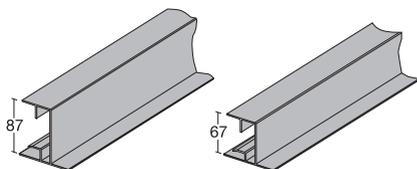


Gable end profile 50 for Kalzip 50/... and AF/AS

6,000 long

Gable end profile 65 for Kalzip 65/...
aluminium

6,000 long

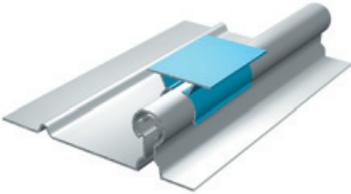


Gable end support rail
aluminium press plain

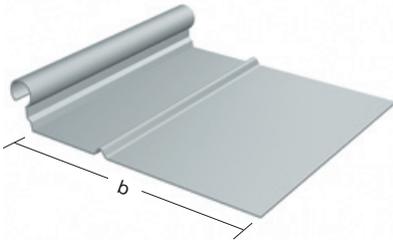
60 wide
6,000 long



	Type	Size in mm
Sliding element aluminium press plain		60 wide 60 long



Kalzip flashing sheet with large sheet upstand
aluminium
6,000 mm long



stucco		
Kalzip 50/..		599 wide
Kalzip 65/..		586 wide
Kalzip AF		385 wide

coloured		
Kalzip 50/..		on request
Kalzip 65/..		on request
Kalzip AF		385 wide

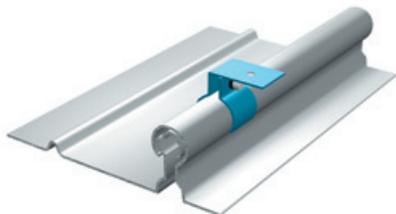
AluPlusPatina		
Kalzip 50/..		on request
Kalzip 65/..		on request
Kalzip AF		385 wide

AluPlusZinc		
Kalzip 50/..		496 wide
Kalzip 65/..		481 wide
Kalzip AF		385 wide

Size in mm

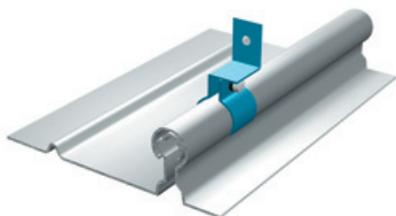
Cable clip
stainless steel

38 long
60 wide
Hole diameter 8.5 for screw diameter 8



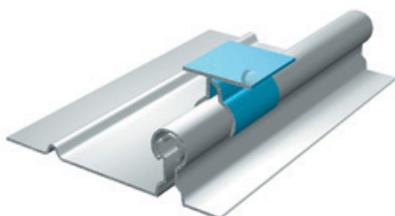
Seam clip
stainless steel

35 long
20 wide
Hole diameter 7 for screw diameter 6.5



Seam clip
aluminium

60 long
80 wide



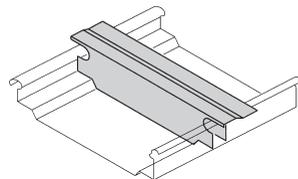
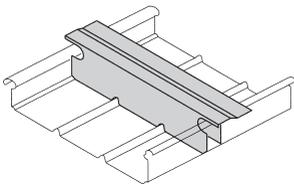
	Type	Size in mm
Spacer profile aluminium press plain		45 x 6 x 45 x 1.5 6,000 long



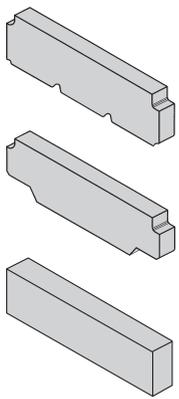
Flat bar aluminium press plain		22 x 6 6,000 long
--	--	----------------------

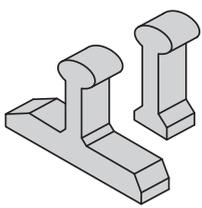


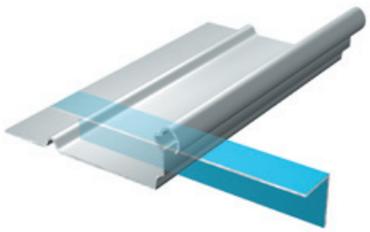
Ridge closure
aluminium



50/333	Cut to size of Kalzip profile
50/429	
65/305	
65/333	
65/400	
65/500	
AF 65/333	
AF 65/434	
AF 65/537	
AS 65/422	
Special ridge closure	As required
Arris ridge closure	As required

	Type	Size in mm
Closure filler cellulose polyethylene 	50/333	Cut to size of Kalzip profile
	50/429	
	65/305	
	65/333	
	65/400	
	65/500	
	AF 65/333	
	AF 65/434	
	AF 65/537	
	AS 65/422	
	Special size	1,000 long

Seam filler cellular polyethylene 	Typ 50	Cut to size of Kalzip profile
	Typ 65	
	Typ AF/AS	

Drip angle aluminium press plain 	40 x 20 x 2.0 6,000 long
	70 x 30 x 2.0 6,000 long

Size in mm

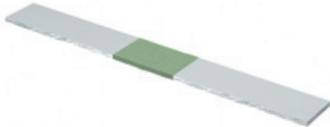
Compressed adhesive tape
precompressed
adhesive on one side

2/10 x 15
Roll length 12,500



Expansion compensating ribbon
aluminium vulcanized

1.2 x 390
6,000 long

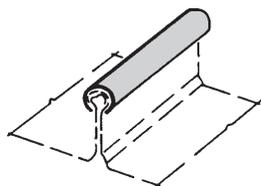


Size in mm

Repair cover strip

stucco embossed
(not suitable for translucent sheets)
aluminium, thickness 1 mm

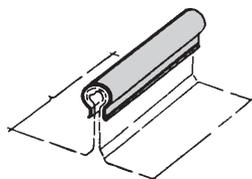
6,000 long



Omega profile

extruded aluminium
thickness 1.5 mm

6,000 long



Comb-profiled jointing sheet

aluminium press plain

3.0 x 80 x 6,000 long



Size in mm

Kalzip welding backing strip

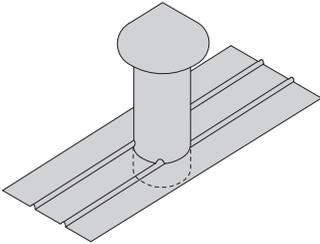
2.0 x 100
25,000 long



Sanitarian vent

with rain cap and compensation
for roof pitch

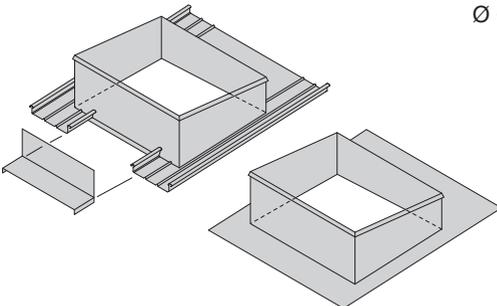
Ø 100
Ø 125
Ø 150
Ø 200



Soaker frame

single layer implementation
with roof pitch compensation
height at ridge side: 300 mm

500 x 500
800 x 800
Ø 300
Ø 400
Ø 500
Ø 600

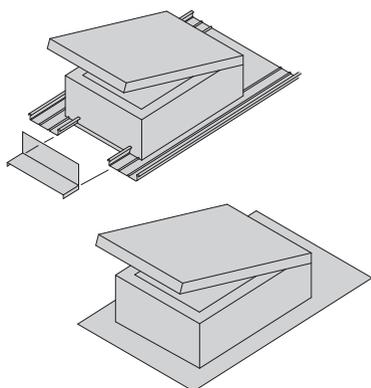


Size in mm

Roof exit

800 x 800

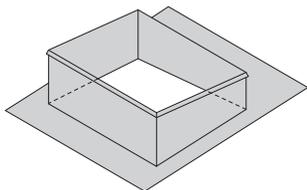
aluminium roof exit
double layer construction
incl. thermally insulated construction
Height: 300 mm



Vent socket

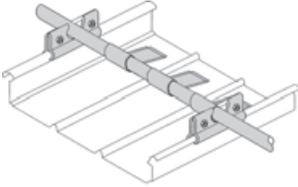
on request

(e.g. as surround for fan plinth)



Size in mm

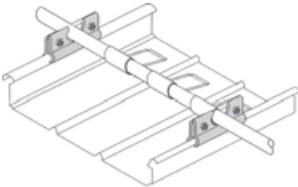
Kalzip snow guard system



Snow guard bracket

aluminium, with 2 stainless steel screws
M8 x 35 and nuts

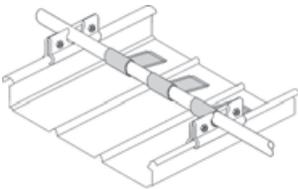
110 long



Snow stopper

aluminium with stainless steel screw

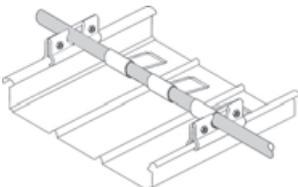
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Aluminium snow guard pipe

32/2 mm

6,000 long

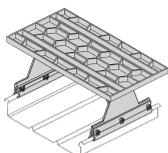


Size in mm

Roof step – short grid

460 x 250

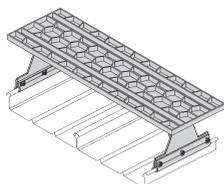
cleanly cast and machined,
including mounting bracket



Roof step – standing grid

800 x 250

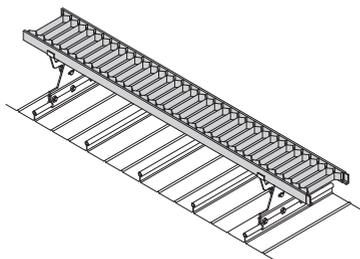
cleanly cast and machined,
including mounting bracket



Aluminium continuous access grid

1,500 x 250

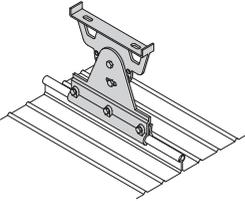
with plug-in connections



Size in mm

Bracket for aluminium access grid
for grids with width of 25 cm

–



**Kalzip vapour barrier /
Convection barrier**

1,000 x 25,000

elastomeric bitumen vapour barrier strip
for steel trapezoidal profile roofs, cold-bond,
self-adhesive, ensure there is an 8 cm seam
and joint overlap



**Kalzip vapour barrier H /
Convection barrier H**

1,000 x 25,000

elastomeric bitumen vapour barrier strip
for timber lining, cold self-adhesive seams,
ensure there is an 8 cm seam and joint
overlap



Size in mm

Kalzip roof anchor



can be used for Kalzip construction widths of between 305 mm and 434 mm, not for use with tapered sheets.

For further information please refer to the instructions for use supplied with every roof anchor.

Kalzip roof anchor, tapered



can be used for conical profiled sheets.

For further information please refer to the instructions for use supplied with every roof anchor.

Size in mm

Material

Fixing elements**Composite clip for wood***

without spacer cap (DK)

Kalzip self-drilling screw

SDK 2-S-377



6.0 x 35

stainless
steel

Kalzip self-drilling screw

SDK 2-S-377



6.0 x 45

stainless
steel

Kalzip self-drilling screw

SDK 2-S-377

6.0 x 60

stainless
steel

Self-drilling screw with

Washer and

seal 14 mm

SW 2-S-A14



4.8 x 35

stainless
steel

Wood screw with

washer and

seal 16 mm

TDA-S-S 16



6.5 x 51

stainless
steel**Composite clip for
steel trapezoidal sheet***

without spacer cap (DK)

Kalzip self-drilling screw

SDK 2-S-377



6.0 x 35

stainless
steel

Kalzip self-drilling screw

SDK 2-S-377



6.0 x 45

stainless
steel

Kalzip self-drilling screw

SDK 2-S-377

6.0 x 60

stainless
steel

Bulb-tite blind rivet

Bulb-tite RV 6604-6

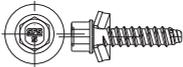


12 W

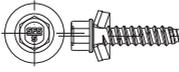
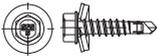
aluminium

*Screw length for fixing without spacer cap (DK).

Use the appropriate screw length if spacer caps are used.

		Size in mm	Material
Composite clip for folded steel section*			
without spacer cap (DK) Kalzip self-drilling screw SDK 3-S-377		6.0 x 30	stainless steel
Kalzip self-drilling screw SDK 3-S-377		6.0 x 45	stainless steel
Composite clip for steel			
Thread forming screw with washer and seal 16 mm TDB-S-S16		6.3 x 25	stainless steel
Kalzip corrugated and trapezoidal profiles on wooden supporting constructions			
Drilling screw with washer and seal 14 mm SW 2-S-A14		4.8 x 35	stainless steel
Kalzip corrugated and trapezoidal profiles on metal supporting constructions			
Drilling screw with lower head grip Irius drive, washer and seal 12 mm, SX3/4-L/2-A12		5.5 x 22	stainless steel
Drilling screw with hexagonal head Washer and seal 16 mm SX3/4-S16		5.5 x 22	stainless steel

*Screw length for fixing without spacer cap (DK).
Use the appropriate screw length if spacer caps are used.

	Size in mm	Material
Kalzip corrugated and trapezoidal profiles on lightweight steel supporting constructions		
Thread forming screw with washer and seal 16 mm TDB-S-S16	 6.3 x 25	stainless steel
Drilling screw with hexagonal head Washer and seal 16 mm SX3/4-S16	 5.5 x 22	stainless steel
Drilling screw with hexagonal head Washer and seal 16 mm SX3/10-S16	 5.5 x 28	stainless steel
Blind rivets		
Seal blind rivet ASC-D 48095	4.8 x 9.8	Alu/Niro
Blind rivet K9 ASO-D 50080	5.0 x 8.0	Alu/Niro
Blind rivet K9 ASO-D 50100	5.0 x 10.0	Alu/Niro
Fixed point rivet K9.5 Gesipa Poly Grip	4.8 x 10.0	Alu/Niro
Kalzip DuoPlus 100		
DuoPlus 100 screw SD 2 - S 6.0 x 127	6.0 x 127	stainless steel
DuoPlus 100 screw SD 2 - S 6.0 x 165	6.0 x 165	stainless steel



www.kalzip.com

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