



COPINGS AND CONNECTIONS

Optimum Protection for Walls, Roof Edges, Cornices and Window Sills

DESIGN AND APPLICATION



For up-to-date information, technical reports, advanced technical information, parts lists, standard details or specifications please visit our website.

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5th edition

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Foreword

This document describes the use of copings and connections made of RHEINZINK titanium zinc. Although it forms the basis for proper planning and classical application solutions, it is no more than a guide for users. The detailed drawings included here describe solutions which are feasible at a practical level.

We should like to explicitly point out that in actual practice it may not be possible to create the types of copings and connections illustrated in this document – or not to their full extent. In this context every situation should be examined in detail by the planner in charge. It is necessary here to take account of the system-specific effects on the property and local/climatic conditions as well as the requirements in terms of building physics. Compliance with the application techniques and specifications described here does not release users from any responsibility in this regard.

This document is based on our practical experience and represents the latest findings from research and development, recognised standards and state-of-the-art technology. We reserve the right to make changes at any time in the course of further development.

If you have any queries or suggestions, please contact your customer advisor or get in touch with your local RHEINZINK sales office. All contact data can be found on our homepage

www.rheinzink.com/contact.

For an overview of our sales offices see page 42 of this document.

Datteln, November 2017

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ONE BRAND – 3 PRODUCT LINES

**A perfect solution
for every requirement**

To give you even more design freedom, we offer our material in three different product lines and in numerous finishes. You get the perfect solution for every requirement with the trusted RHEINZINK quality. All products exceed the high standards of EN 988 and the TÜV QUALITY ZINC criteria. The high level of manufacture is guaranteed by constant inspections and extensive laboratory tests. On this double page, we have summarised the characteristic features of our three product lines. On request, we will gladly send you samples of material.

RHEINZINK-CLASSIC

**The natural material
in its most original form**

RHEINZINK-CLASSIC is the most original of all material options. The bright rolled version has proven itself for over 50 years of application. Depending on the weather conditions, over time a typical blue-grey patina is formed on the naturally shiny metallic surface. The patina gradually becomes more and more distinctive and develops a unique surface character.

Surface quality:

RHEINZINK-CLASSIC® bright rolled

RHEINZINK-artCOLOR

**Unlimited design in a variety of
colours**

RHEINZINK-artCOLOR is the coloured version for roofing and facade cladding. A durable coating allows a wide range of colours and opens up a variety of design options for architects, planners, builders and trade customers. Classically elegant, contemporary avant-garde, contrasting or tone-on-tone. If you have a special colour requirement, we will be happy to produce RHEINZINK-artCOLOR in the shade of your choice.

Surface qualities:

RHEINZINK-artCOLOR® anthracite
RHEINZINK-artCOLOR® pure-white
RHEINZINK-artCOLOR® pearl-gold
RHEINZINK-artCOLOR® moss-green
RHEINZINK-artCOLOR® nut-brown
RHEINZINK-artCOLOR® blue
RHEINZINK-artCOLOR® tile-red



prePATINA



prePATINA

THE WORLD'S ONLY NATURALLY PRE-WEATHERED SURFACES

Only RHEINZINK has a special process in which the blue-grey or graphite-grey colour of the natural patina is achieved naturally in production. As the inventors, we called this unique pickling process "pre-weathering". Virtually imperceptible to the human eye, atmospheric influences over time create a natural protective patina that reliably protects the product. In production, any use of artificial coatings, varnishes or phosphating is avoided completely. The prePATINA line products are the only ready-made natural surfaces in the entire global zinc construction market.

Natural weathering compensates for any installation-related scratches. Only the RHEINZINK-prePATINA and the RHEINZINK-CLASSIC lines offer this self-healing effect. They are environmentally friendly and absolutely maintenance-free.

100% SELF-HEALING
100% MAINTENANCE-FREE
Only available from RHEINZINK

Surface qualities:

RHEINZINK-prePATINA® blue-grey
 RHEINZINK-prePATINA® graphite-grey

MATERIAL

1. Material RHEINZINK Titanium Zinc

1.1 Alloy and Quality

RHEINZINK is titanium zinc according to DIN EN 988. The RHEINZINK alloy consists of electrolytically refined zinc according to DIN EN 1179 with a purity grade of 99.995% and precisely determined proportions of copper and titanium.

All RHEINZINK products are certified according to DIN EN ISO 9001:2008 and are subject to a voluntary inspection by TÜV Rheinland according to the strict QUALITY ZINC criteria catalogue (please request free of charge).

Ecological Relevance

RHEINZINK is a natural, 100% recyclable material that has always complied fully with today's strict ecological requirements. The latest production facilities, sophisticated logistics and favourable processing properties are available. Environmentally-conscious action is documented through the introduction of the environmental management system ISO 14001:2004. It is checked and certified according to TÜV Rheinland.

We also document responsible action in regard to the environment through the introduction of an energy management system according to ISO 50001:2011. It is our intention to save as much energy as possible, to save resources and to keep the environmental impact of our products as low as possible.

Aspects of ecological Assessment

According to the holistic assessment from the Institute for Construction and Environment e.V., RHEINZINK is declared an environmentally friendly construction product according to ISO 14025, type

III (EPD) and EN 18504 „Sustainability of construction works. Environmental product declarations“. The examination of the environmental and health compatibility criteria also includes the entire life cycle of RHEINZINK products, from the raw material extraction to processing and use to recycling and disposal. It is based on a life cycle assessment according to ISO 14040 (LCA) (please request the certificate free of charge).

Electromagnetic Radiation is safely shielded

There is much public controversial debate about electromagnetic radiation. The International Society for Electrosmog Research (IGEF e.V.) has provided information here on RHEINZINK's shielding properties. The result: Over 99% of electromagnetic smog present is shielded. Biological measurements on people confirm the technical measurements and show a harmonising effect on heart, circulation and the nervous system. Body relaxation increases.

Remaining values

With a service life that spans several generations, RHEINZINK is a material that sets new standards. The 30-year guarantee highlights the durability of the 100% recyclable material. This offers additional protection.

1.2 Marking

RHEINZINK sheets and coils:

Recognisable by the consecutive coloured stamping on the metal underside.

RHEINZINK-

Roof Drainage Products:

Recognisable by the brand embossing.

RHEINZINK-

Roof Drainage Accessories:

Recognisable by the brand embossing.

RHEINZINK-Palette Identification:

Recognisable by the packaging label with detailed product data.

1.3 Material Properties

- Density (spec. weight)
7.2 g/cm³
- Melting point approx. 420 °C
- Expansion coefficient:
in a longitudinal rolling direction:
2.2 mm/m x 100 K
in a transverse rolling direction:
1.7 mm/m x 100 K
- Typical joining techniques:
seaming, soft soldering, bonding,
screwing, riveting
- Non-magnetic
- Non-combustable
- Electromagnetic radiation shielding
- Recyclability 100 %
- High recycling rate
- Assured material cycle
- Environmentally compatible (EPD)
- Natural material
- Low energy use
- Long service life
- Vital trace element
- Extensive resources

Metal thickness (mm)	Weight (kg/m ²)
0.70	5.04
0.80	5.76
1.00	7.20

RHEINZINK weight according to Metal thickness in kg/m² (Numbers are rounded)



A



B



C



D

1.4 Patina Formation

On the natural RHEINZINK-prePATINA surface forms a bonded natural patina in the atmosphere. In so doing all the environmental influences from the air and rain water are integrated into the surface development. The material surface is maintenance free and as a natural product does not require care or cleaning.

When using the natural RHEINZINK-prePATINA line surfaces in areas subject to a marine climate, white deposits may develop on the surface due to the salt in the atmosphere. These natural deposits integrate into the natural patina and because of the colour contrast, are more visible on the darker, RHEINZINK-prePATINA graphite-grey surface. This will not affect the function or expected service life of the material when used on facades, roofs or other cladded building components. The natural patina will appear lighter when used in locations where the air contains chlorides. When used in environments where sulphur levels are higher, (e.g. industrial pollution), the patina may appear somewhat darker than usual.

1.4.1 RHEINZINK-CLASSIC bright rolled

Application for all sheet metal work in seaming and soldering techniques. Natural patina forms at different times depending on the application or roof pitch. In areas protected from rain water e.g. beneath eaves or on roof edges sometimes only after a few years.

1.4.2 RHEINZINK-prePATINA blue-grey and graphite-grey

The pre-weathering process was developed by RHEINZINK 25 years ago especially for use in areas where a "finished" picture of the RHEINZINK surface is desired even at the hand-over of keys. This process allows the production of colour of a natural patina although the natural patina itself only forms after installation.

RHEINZINK is the only manufacturer world wide who uses this unique pre-weathering process. The use of a pickling process compared to a coating or phosphating process has two distinct advantages: Pickling gives the surface the appearance of a genuine patina, something that only occurs otherwise after a long time through natural influences. Pickling produces an even colour tone but is not comparable however with a RAL shade. A protective coating applied to the surface achieves temporary protection for storage, transport and processing. This protective film makes oil-free forming possible for processing in the profile roll forming machines.

The RHEINZINK quality prePATINA graphite-grey is the dark alternative and may, after a few years during the formation of patina and depending on the regional climate, develop a slight dark green sheen as with slate.

During the pickling process other natural surface properties are preserved - the surface remains solderable. The visible "Ageing with dignity" is not prevented by pre-weathering and has proved its worth in practice over many decades. The material largely reduces the typical reflections of the surface of thin sheets (oil canning).

1.4.3 Information about Processing

In order to avoid surface reactions from excessive sweating from the skin and other impurities caused by the building site, oil-free clean textile gloves should be worn.

Suitable products can be found at www.rheinzink.de/werbemittelshop



1.4.4 Surface Uniformity

We make every effort to supply profiles with surface uniformity. Production-related slight differences can occur, which are purely of appearance in nature and which, in the prePATINA line, usually even out during the formation of patina. In order to exclude specific product-related visual imperfections, particular requirements should be requested with respect to surface uniformity.



* environmental label for building products recognized by the German Federal Environmental Agency

MATERIAL

1.4.5 Protection during Transportation and Installation

To protect the surface during the transport, storage and installation our façade profiles and also our surface quality art-COLOR line are delivered with a protective plastic film. It also protects against negative influences during the construction phase.

The foliation is a self-adhesive protective plastic film that is applied at the factory and is exposed during installation to UV radiation and temperature variations. If this exposure continues for a long time, the properties of the film may change and cause adhesive residues on the metal surface. To avoid these changes, we recommend removing the film immediately after the installation process.

1.4.6 Information on Wave Formation Strip Material

A characteristic surface phenomenon with strip material is the typical slight wavy structure of thin sheet metal.

These waves form because of the reaction of a natural material to the winding and unwinding process in the factory and the corresponding reworking (profiling etc.) during workshop preparation and installation.

The surface finish CLASSIC bright rolled emphasises the changing appearance because of light reflection. With increasing patination this perception reduces. If from the start e.g. for facades and roof surfaces, a high grade appearance is desired, we recommend, the surface finishes prePATINA blue-grey or prePATINA graphite-grey.

Panels

An improved evenness is obtained by using panels, which RHEINZINK can manufacture and supply at lengths up to 6 m. The measurement of corrugations is subject to strict controls and must not exceed the value defined under DIN EN 988 (max. 2 mm per metre). The RHEINZINKworks standard prescribes for each metre of sheet length e.g. max. 1 wave 1 mm in height.

1.5 Response to external Influences**1.5.1 Influence of other Metals placed on Top**

Unproblematic:

- Aluminium, shiny or coated
- Lead
- Stainless steel
- Galvanised steel (rust streaking possible, e. g. caused by unprotected cut edges)

Problematic:

- Copper

1.5.2 Influence of other Building Materials placed on Top

Problematic:

- Unprotected bitumen roof sheeting without grit layer/gravel fill (acid oxidation)
- PVC roof sheeting (hydrochloric acid emissions)

1.5.3 Influence of other substances incl. Mortar

- Mineral-based materials such as chalk, cement or plaster plus moisture have a corrosive effect on metals.
- A suitable separating layer must be fitted between RHEINZINK building profiles and these building materials.
- Installation sequence: Plasterwork prior to RHEINZINK (if possible use material with plastic film)

1.5.4 Effect of Oil Heating

Discolouration on RHEINZINK surfaces can occur in the case of oil-driven heating systems because of the ingredients of the heating oil and additives. Such discolouration is more or less visible on all covering materials and has no influence on the durability of the roofing.

Note:

The builder must be informed about this situation. With gas-operated plants, discolouration is not expected.

1.6 General Processing Principles

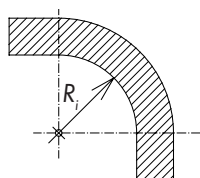
1.6.1 Marking

Mark using soft pens and not sharp pointed objects (scribing tool, pocket knife).

1.6.2 Forming/Radii of Curvature

Zinc and its alloys are anisotropic, which means they have different properties parallel and crosswise to the rolling direction.

The mechanical effect of this anisotropy is reduced to such a degree with RHEINZINK through the alloy and rolling process, that RHEINZINK independent of the rolling direction can be folded at 180° without incipient cracking.



Material thickness	Radius of curvature R_i minimum
1.00 mm	1.75 mm
1.20 mm	2.10 mm
1.50 mm	2.63 mm

Recommended radii of curvature (inner radius) for RHEINZINK

1.6.3 Metal Temperature

Processing without additional measures $\geq 10^\circ\text{C}$:

If the temperature of the material is under 10°C , and folding, bending or profiling has to take place, then the processing area must be heated.

Heating must occur constantly in parallel to the shaping process. Increased costs, if not covered in the contract specification, must be clarified with the building management before commencement.

Soft soldering is an option independent of the metal temperature.

1.6.4 Joining Techniques

1.6.4.1 Soft Soldering

- Substance-to-substance-bonded and water-tight connection of the seams of water-conducting profiles in only a single work process (gutters, valleys, copings); install expansion elements

Aids and tools:

- Soldering bit (hammer bit), weight $> 350\text{ g}$, better 500 g
- Flux, the company Felder ZD-pro, for surface prePATINA graphite-grey: also use stainless steel wool for abrasive treatment
- RHEINZINK-Solder for titanium-zinc according to ISO 9453-SnZn 801 – lead-free, environmental friendly, sustainable

Note:

Please pay attention to the RHEINZINK Processing Guide „Joining Technique“.

1.6.4.2 Seams

Double standing seam system, angled standing seam system, click roll cap system

1.6.4.3 Overlap

- Application for instance for valleys in the case of scaled roofs such as tiles, slate etc
- Overlap widths
Valley slope $\geq 15^\circ$, at least 150 mm
Valley slope $\geq 22^\circ$, at least 100 mm
- Design of profile butts with cranked edges

1.6.4.4 Bonding

- Bonding of coverings has been standard for decades.
- Bonding of metal facades (e.g. large flat-locked tiles) has been successfully used for some years. In particular in the case of extremely unfavourable conditions such as
 - Position of the structure
 - large metal widths
 there is a considerable reduction in fluttering noise through bonding (e.g. on metal brackets).

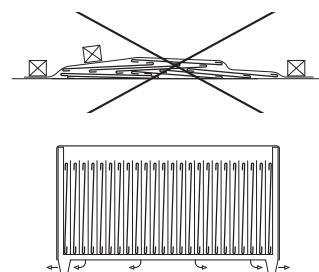
- The manufacturer's guidelines must be observed with respect to suitable polyurethane adhesives for the above given areas of application.
- The RHEINZINK gutter adhesive can be used as an alternative to soldering techniques for bonding RHEINZINK gutters.

1.6.5 Length Change caused by Temperature

With coverings, roofs, and facade cladding (panel length), sheet metal work and roof drainage (profile length), changes in length caused by temperature (expansion and contraction) must be taken into account in the design. In particular for penetrations, corners, joints and other transitions, the right design measures must be implemented; e.g. panels or profiles must be installed stress-free from the expansion technology perspective.

1.7 Storage and Transportation

RHEINZINK products must always be stored and transported in dry and ventilated conditions.



Storage and Transportation (Schema)

Note:

Container storage is the best method for optimum storage at the building site. If necessary request a dry and well-ventilated room from the building management. Do not place covers directly over the material as this can cause moisture or rain water to penetrate between the profiles and in the absence of ventilation lead to deterioration in appearance because of the formation of zinc hydroxide.

WALL COPINGS

2. Wall Copings

2.1 Copings with the Example of Fascia and Wall Copings

General

RHEINZINK copings offer optimum, long-term protection for various types of walls, roof edges, cornices and window sills. Any ingress of moisture into these components from precipitation is reliably prevented, so avoiding consequential damage such as the penetration of damp or flaking. The prerequisite for successful realisation is planning that has been carefully coordinated to each situation. RHEINZINK copings are installed on a continuous substructure and fixed in place indirectly.

The example of RHEINZINK copings for walls and roof edges has been taken here to illustrate the planning principles which should generally be followed when installing all types of RHEINZINK copings, and to describe the options available for their use.

The term "coping width" stands for the longest occurring edge of a building profile. This applies to profiles that are installed either horizontally or vertically (see Fig. 1).

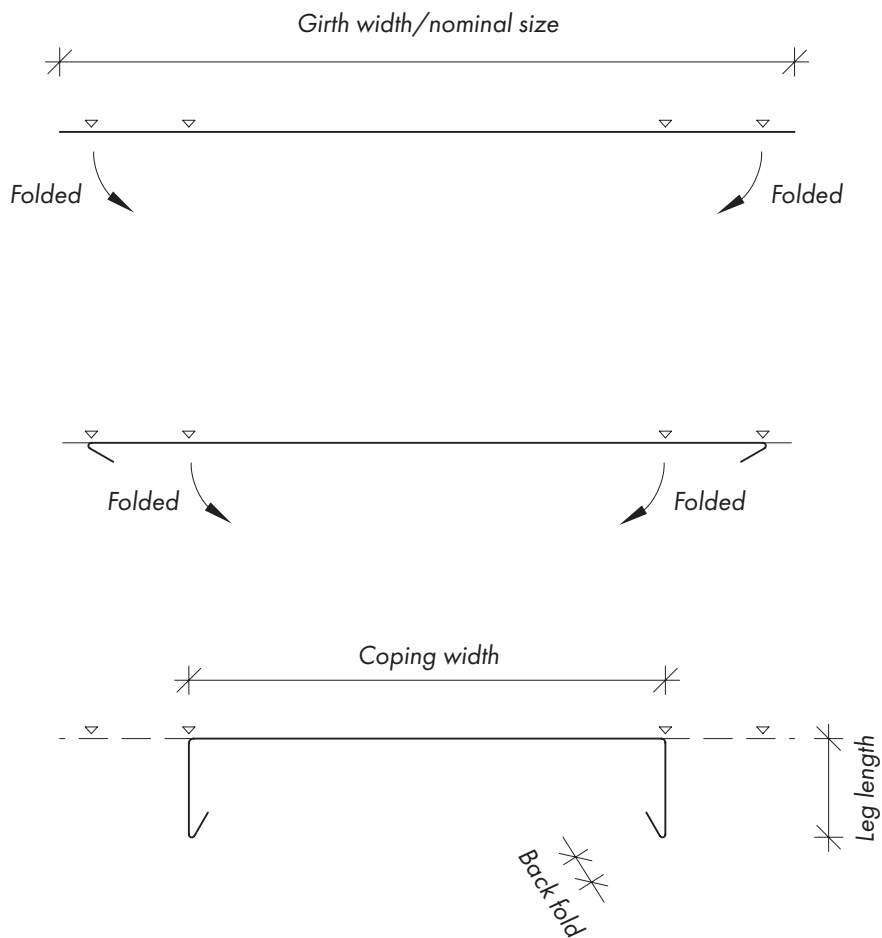


Fig. 1: Explanation of terms

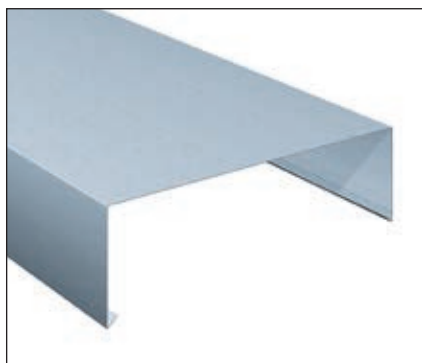


Fig. 2: Wall coping profile

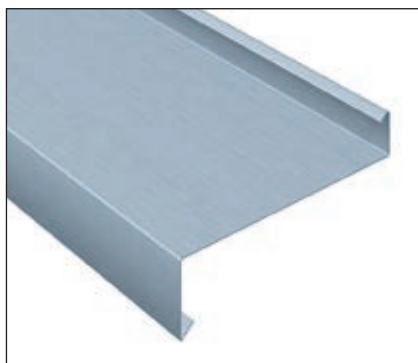


Fig. 3: Window sill flashing profile

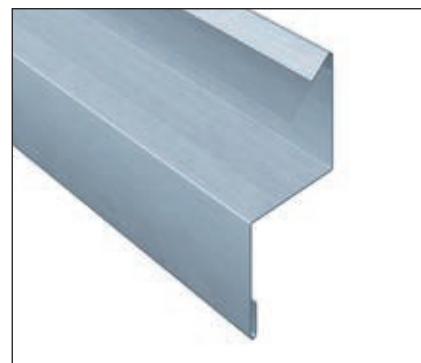


Fig. 4: Cornice coping profile



Fig. 5: Wall coping bonded over entire surface

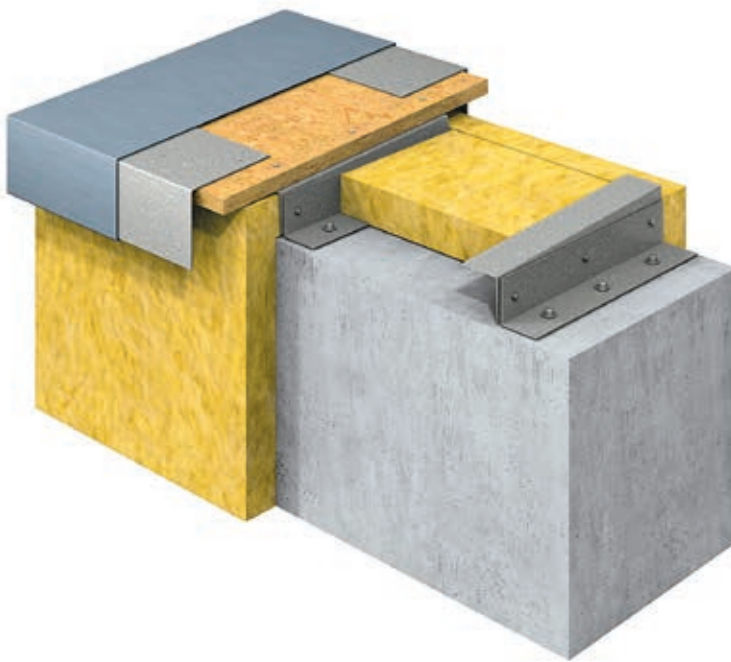


Fig. 6: Benefits for tolerance compensation are offered by this wall coping with a multisection metal substructure

Coping width a mm	Minimum thickness	
	when fixed with continuous cleats mm	when bonded without continuous cleats mm
$a < 300$	0.70	0.80
$a < 500$	0.80	1.00
$a \geq 500$	1.00	1.00

Table 1: Coping widths and material thicknesses

2.2 Profile Geometry

RHEINZINK offers a wide range of options in terms of profile geometry. We would be pleased to supply you with customised profiles (provided that manufacture is possible for the folding techniques required). Segmentation or prefabrication allows rounded forms to be produced. Please use our order list (see page 45 onwards).

2.3 Dimensional Specifications

2.3.1 Coping Widths and Metal Thicknesses

For aesthetic reasons wall copings are normally manufactured in lengths of at least 3 m, i.e. to avoid too many cross joints, and fixed in place indirectly. The metal thickness depends on a number of factors:

- width of coping/edge length
- requirements on flatness of finished surface.

Table 1 makes recommendations about the coping width and metal thickness with regard to aesthetic design to ensure a flat surface.

With coping widths from 600 mm it is generally advisable to opt for the standing seam system. The terminations should be created as for the eaves and ridge detailing on a monopitch roof with the standing seam technique.

We recommend installing a structured underlay with coping widths from 500 mm.

Wall copings may consist of one, two or more elements. Assembly from more than one element may offer advantages, particularly in terms of design and also expansion to a certain extent. Design benefits first and foremost include a much higher edge stiffness, so improving the linearity of the entire system. Segmentation helps to minimise stress levels in the material, e.g. with variations in exposure to sunshine.

WALL COPINGS

2.3.2 Overhangs, leg Lengths

The wall coping overhang should ensure that the drip edge is positioned at least 20 mm from the wall. The length of the overhang is measured from the edge of the building requiring protection (see Fig. 7).

The vertical leg length is at least 50 mm. When bonded in place, the leg length must not exceed 50 mm to ensure the tensile strength and shearing resistance of the adhesive bond (wind suction). If greater leg lengths are required in such cases, the use of continuous cleats will be necessary. The installation instructions of the adhesive manufacturer should be consulted here.

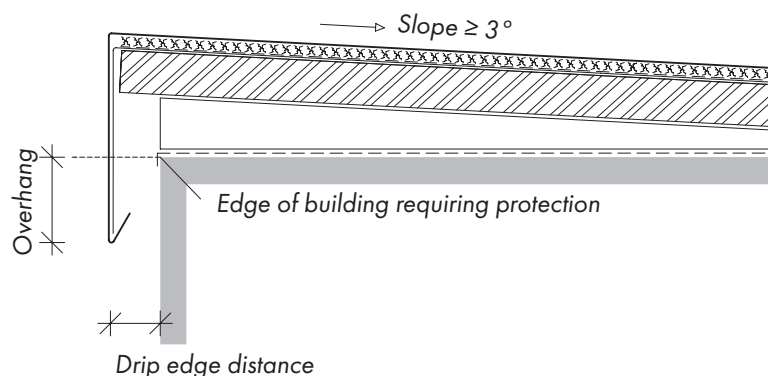


Fig. 7: Explanation of terms – Overhang and drip edge distance

Height of building h mm	Drip edge distance mm	Overhang mm
$h < 8$	≥ 20	≥ 50
$8 \leq h \leq 20$	≥ 20	≥ 80
$h > 20$	≥ 20	≥ 100

Table 2: Distance and overhang measurements for copings

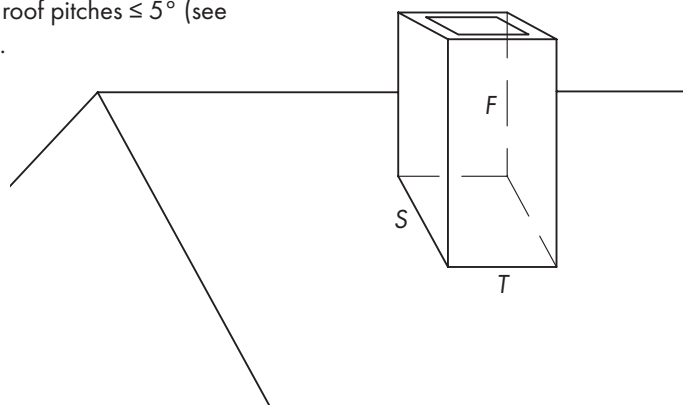
2.3.3 Connection Heights

When it is a question of connecting copings, there is wide variation in the possible situations that need to be evaluated. The requirements with cornice copings may differ from those for window sill flashings or standard wall copings.

In general the information given in the technical regulations of the trade association ZVSHK (Central Sanitary, Heating and Air Conditioning Association) should serve as the basis here (see Table 3 and Fig. 8). As this however primarily applies to roof connections and no specific data is given for wall, cornice and window sill flashings, in practice it is recommended consulting the relevant planner, installer and client about the exact situation and execution.

Besides the connections on the eaves and ridge side and the lateral connections, the transitions at verges are also of importance here. In the case of metal roofs a connection height of at least 25 mm above the water-bearing level is recommended. For flat roof seals with terminations in metal the seal should be

positioned min. 50 mm above the water-bearing level with roof pitches $> 5^\circ$ and min. 100 mm with roof pitches $\leq 5^\circ$ (see Table 6, page 30).



T = eaves side
S = laterally
F = ridge side

Fig. 8: Explanation of terms – Connection heights to vertical components

Slope	S mm	T mm	F mm
$< 5^\circ$	150	150	150
$< 22^\circ$	100	100	150
$\geq 22^\circ$	80	80	150

Table 3: Connection heights to vertical components



Fig. 9: Single-section wall coping

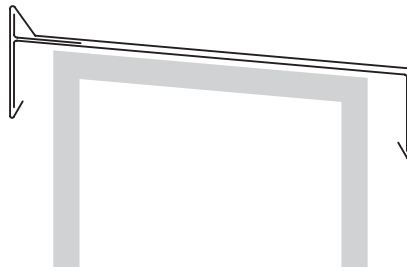


Fig. 10: Single-section wall coping with upfold

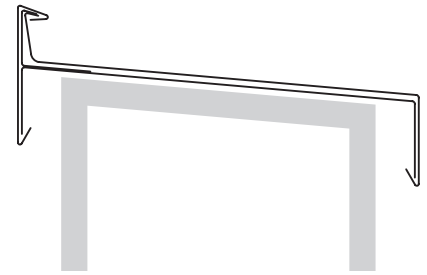


Fig. 11: Two-section wall coping

2.4 Slope

Copings should generally have a slope of min. 3° to the roof side. Installation without any slope may contribute to puddling due to the unavoidable slight unevenness and so encourage the formation of zinc hydroxide. Although the white discolouration occurring here may

spoil the final look, it does not shorten the life of the material in any way or constitute a defect. In addition, installing copings without any slope may allow atmospheric dust to collect. When it rains, this will run off both sides of the wall coping, so causing soiling.

In special cases not only an inward-facing slope should be provided but also an upfold on the outside or installation with two sections. This will be effective at preventing any undesirable runoff of water as well as any streaking on this side including with wind.

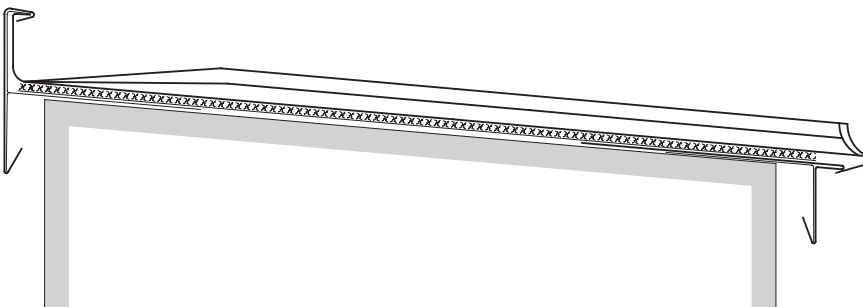


Fig. 12: Wall coping in standing seam technique

2.5 Substructure

Solid wood, derived timber board or metal are generally used as the substructure. In the case of solid wood sheathing the board thickness should be 24 mm, and the material thickness should be min. 22 mm with derived timber board.

In particular Oriented Structural Board of the type OSB/3 or OSB/4 has proved its worth in practice. The types of derived timber board permitted here are described in the sheet metalworking regulations issued by ZVSHK or ZVDH (German umbrella association of roofers).

These boards are attached to the substructure according to the manufacturer's instructions taking into account the appropriate wind loads as per DIN 1055-4/ DIN EN 1991. The fixings used here must be corrosion-resistant. Particleboard to DIN 68763 is not suitable for this purpose.

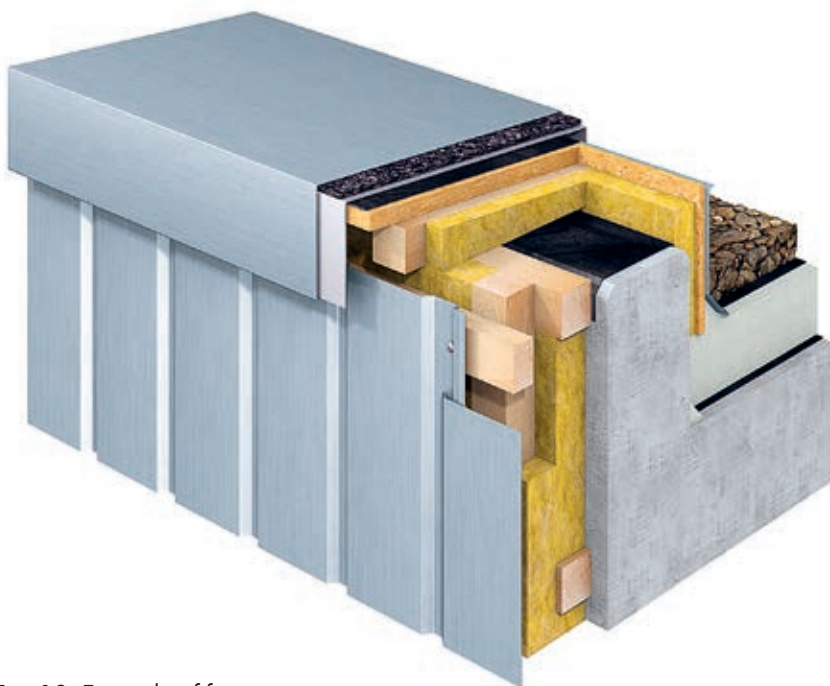


Fig. 13: Example of fascia coping

FIXING

2.6 Fixing

Wall copings are attached to the substructure either indirectly using continuous cleats made of galvanised steel or bonded in place over the entire surface. When it comes to bonding, the use of cold-applied bitumen adhesive has proved its worth here.

2.6.1 Fixing with galvanised continuous Cleats

The cleats are generally mounted on a substructure made of solid wood, derived timber board or metal, which has itself already been affixed to the substructure. Clout nails are often used to fix the cleats in place. They are normally fixed offset with a spacing of approx. 15-20 cm. According to the trade regulations the distance between the individual fixings depends on the construction, the local conditions and wind suction forces. Experience has shown that in most cases, a continuous cleat with a material thickness of 1.0 mm will satisfy all fundamental technical requirements. If leg heights exceeding 10 cm for the wall coping are required for design reasons, the continuous cleat should be provided with a turn under to ensure greater stability and a straighter edge.

2.6.2 Fixing with cold-applied Bitumen Adhesive

It is also possible to fix wall copings in place with cold-applied bitumen adhesive (e.g. ENKOLIT®, the company Enke). This method of fixing has proved successful over many years, but the metal thickness needs to be increased (see Table 1) as the stabilising effect of the cleat is absent here. The metal thickness does not need to be increased if 20 cm wide cleats are installed with a spacing of 1 m. This is in fact urgently recommend if the planning provides for leg heights ≥ 50 mm. The essential prerequisite for use of the bonding method is a flat, dry base for adhesion as well as bonding over the entire surface.

The manufacturer's instructions for use of the adhesive must be followed.

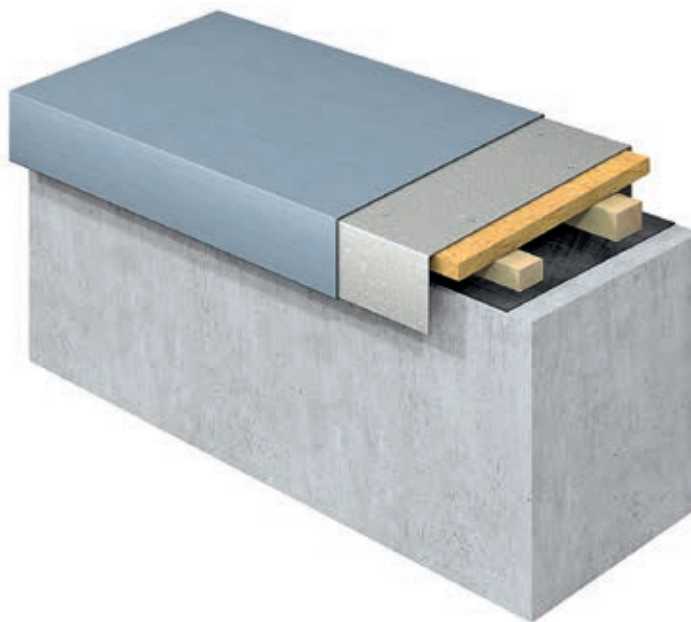


Fig. 14: Wall coping – Fixing with continuous cleats made of galvanised steel

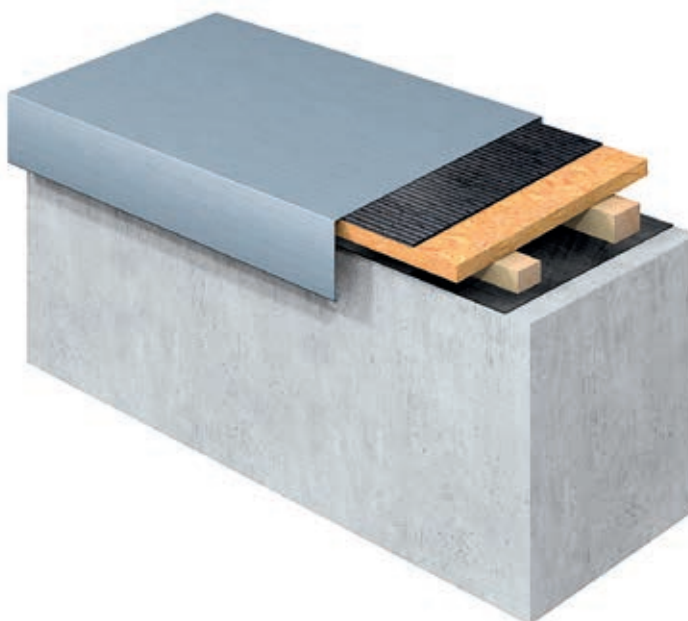


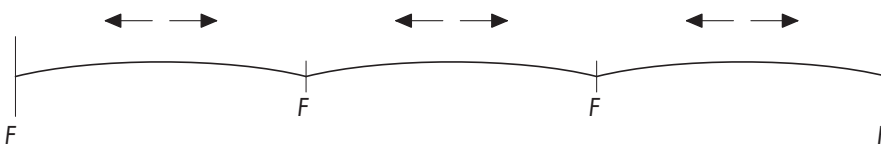
Fig. 15: Wall coping – Fixing with cold-applied bitumen adhesive

Length Change without Possibility of Expansion

State on installation



Effect



Length Change with Possibility of Expansion

State on installation



Effect

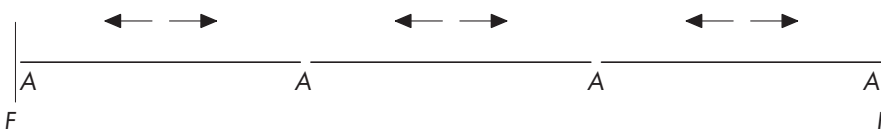


Fig. 15: Length change

F = Fixed point

A = Possibility of expansion

Example:

Length change (theoretical values)

Installation temperature RHEINZINK

15 °C

Length of coping: 6.0 m

Expansion:

$$6 \text{ m} \cdot \frac{2.2 \text{ mm}}{10 \text{ m} \cdot 10 \text{ K}} \cdot 65 \text{ K} = 8.6 \text{ mm}$$

Contraction:

$$6 \text{ m} \cdot \frac{2.2 \text{ mm}}{10 \text{ m} \cdot 10 \text{ K}} \cdot 35 \text{ K} = 4.6 \text{ mm}$$

2.7 Accommodation of Movement

Like all other materials, RHEINZINK is also subject to temperature-specific changes in length (linear expansion). The coefficient of expansion is 0.022 mm/mK in the direction of rolling. A temperature difference of 100 K (-20 °C to 80 °C) is assumed for standard applications. Length changes must not be constrained, and this means that such movement needs to be accommodated. The transition between the individual profiles must be designed so that they can expand, contract or move without restriction. This must not however impair sealing.

The maximum spacing between expansion elements for bonded or indirectly fixed building profiles is 8 m (when using cold-applied bitumen adhesive follow the manufacturer's instructions). These lengths are halved for spacing at corners or fixed points. It is permitted to slightly exceed the guidance values specified.

Calculation formula:

$$\Delta l = l_0 \cdot \Delta \vartheta \cdot \alpha$$

Symbols:

Δl : Length change (mm)

l_0 : Design length (m)

$\Delta \vartheta$: Temperature differential from installation temperature T_{inst} (K)*

α : Coefficient of expansion:
2.2 mm/(10 m · 10 K)

* Expansion: $T_{\text{max}} - <$
Contraction: $T_{\text{inst}} - T_{\text{min}}$
 $T_{\text{min}} = -20^\circ, 253 \text{ K}$
 $T_{\text{max}} = +80^\circ, 353 \text{ K}$

CONNECTION METHODS

2.8 Connection Methods and Creation of Profile Joints

When fixing wall copings in place with continuous cleats, soft soldering is generally used to join the individual coping lengths together. Although adhesive bonding is also possible, it is rarely used in practice.

The profile joints can take a variety of forms. The key factors here are the existing slope, coping width and the required result in terms of design.

Some examples of different cross joints are illustrated. Besides the illustrated examples this detail can also take the form of a standing seam. In this case it must be ensured that linear expansion is possible. We recommend using lengths of max. 2 m, which are fixed in place at the centre. A gap of 3 – 5 mm should be left between the seams.

2.8.1 RHEINZINK-UDS-Connector

The underlapping (UDS) butt connector offers multipurpose usage. Lap strip joint connectors (UDS-Connectors) made of RHEINZINK ensure rainproof seam connections for different copings without any need for additional sealing. A special profile geometry prevents capillary penetration of rainwater. The individual lengths of the wall coping are butt-jointed together on the RHEINZINK-UDS-Connector (butt joint approx. 10 mm with 3 m profile lengths). The open joint allows the coping profiles to move freely, so dispensing with the need for expansion elements.

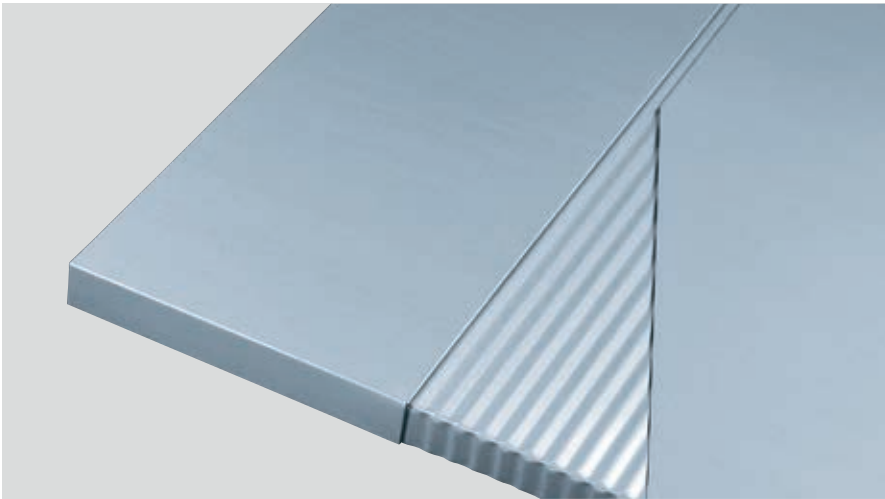


Fig. 17: The UDS-Connector is available in RHEINZINK’s three finishes.

Applications

RHEINZINK’s corrugated UDS-Connector can be used on transverse slopes $\geq 3^\circ$ with:

- Wall copings
- Roof edge copings
- Cornice copings
- Window sill flashings

Product Dimensions

Metal thickness: 0.80 mm and 1.00 mm
Profile width: 250 mm and 333 mm
Standard length: 3.0 m (other lengths on request)

The UDS-Connector is available in RHEINZINK’s three surface qualities.

Where the coping profiles join, the continuous cleat is interrupted by the folded RHEINZINK-UDS-Connector, which ensures that the connection is rainproof. The ends of the profile are installed with an open butt joint approx. 10 mm wide.

If an even greater degree of tightness to rain is required, the connection can be additionally sealed with ENKOLIT® cold-applied bitumen adhesive at the overlaps.

Coping width, mm	≤ 400		> 400 to ≤ 600	
Width of butt strap, mm	250		333	
Design of abutting edges	Cranked edge		Single turnover	
	Single turnover			

Table 4: Butt joints with different coping widths

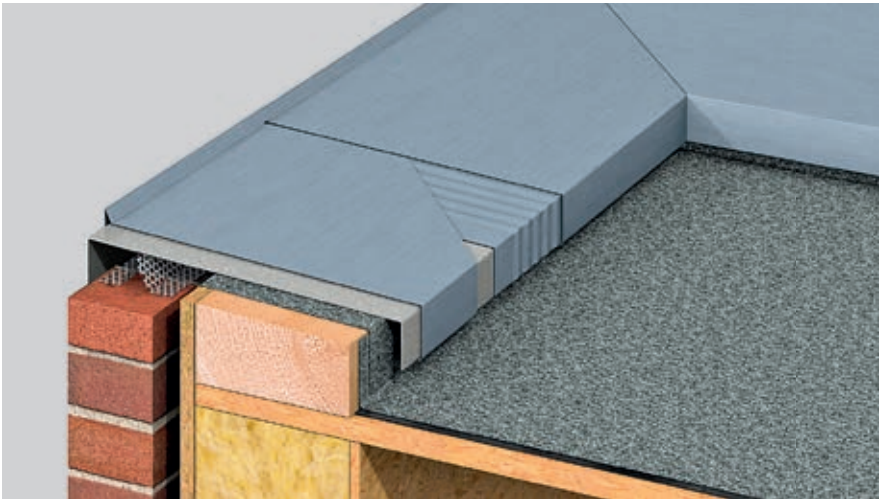


Fig. 18: UDS-Connector for a wall coping with inside corner

Processing

Profiled RHEINZINK strips can be cut, folded and curved using standard metal working machines and tools. Bending brakes and presses should be set to a

metal thickness of 3 mm. A single turnover is recommended for an aesthetically pleasing result.

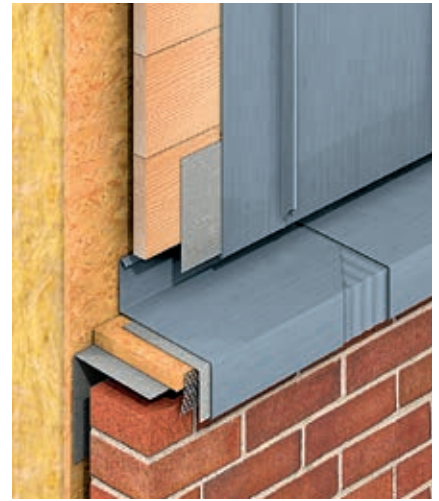


Fig. 19: UDS-Connector for a cornice coping

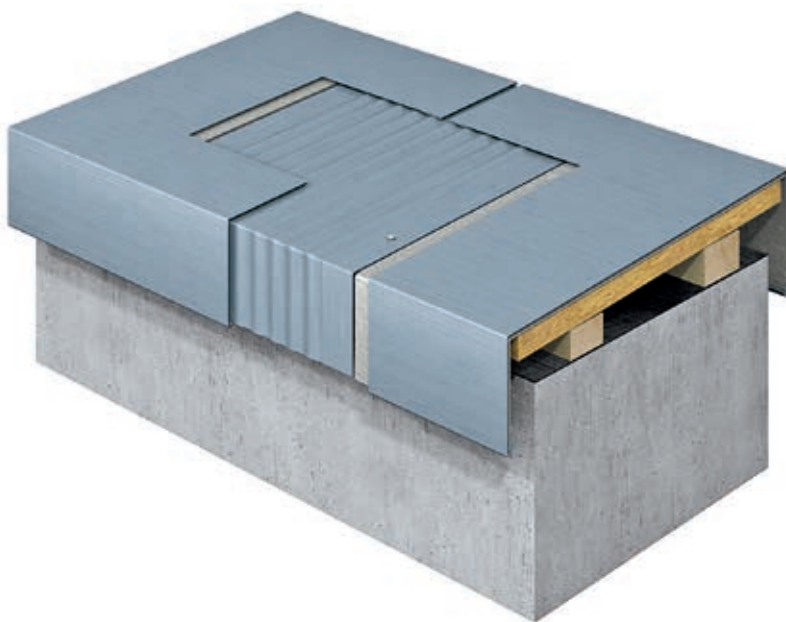
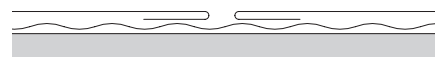


Fig. 20: RHEINZINK-UDS-Connector

Benefits of UDS-Connector

- Rainproof connection for all copings
- No soldering required
- No streaking
- No additional sealing required
- Expansion accommodated
- Fast installation
- Made of RHEINZINK QUALITY ZINC



2.8.2 Expansion Joint with Cap

- Transverse slopes min. 3°
- Rainproof

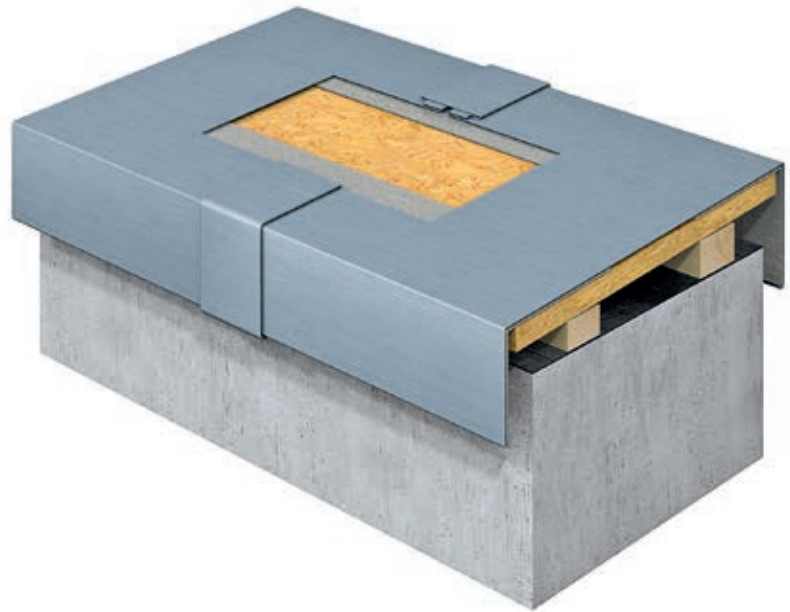


Fig. 21: Expansion joint with cap

2.8.3 Expansion Joint with coiled Expansion Element

- Transverse slopes min. 3°
- Waterproof
- Cap fixed on one side by soldering

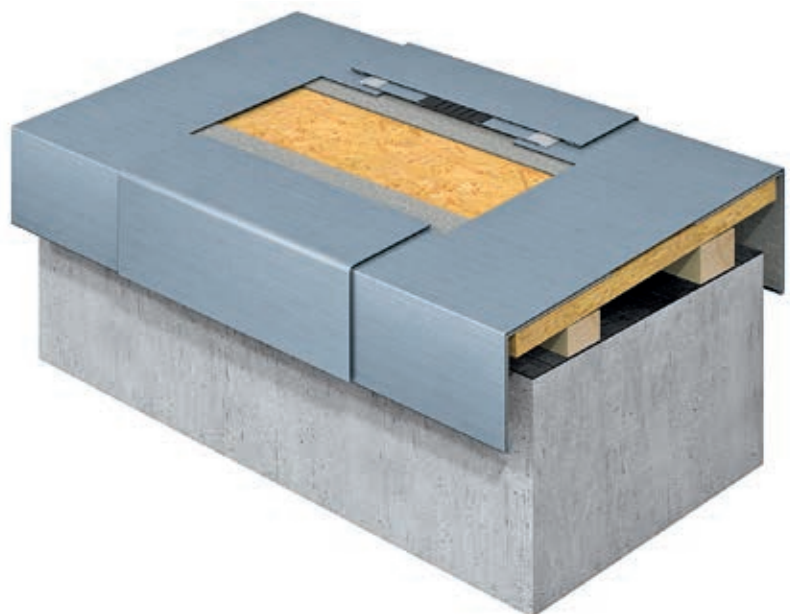


Fig. 22: Expansion joint with coiled expansion element

2.8.4 Expansion Joint with single Cross Seam

- Transverse slopes min. 3°
- Rainproof

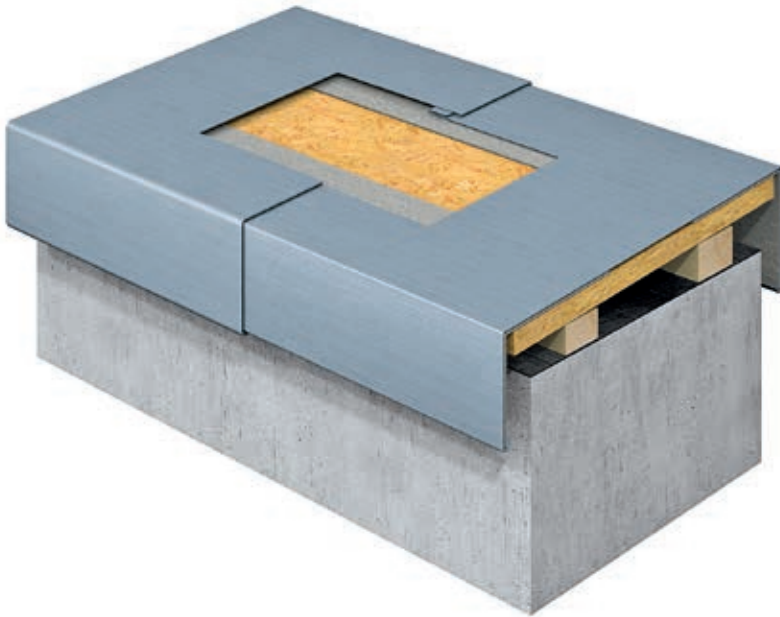


Fig. 23: Expansion joint with single cross seam



2.8.5 Expansion Joint with Butt Strap, bonded with cold-applied Bitumen Adhesive

- Transverse slopes min. 3°
- Waterproof butt joint

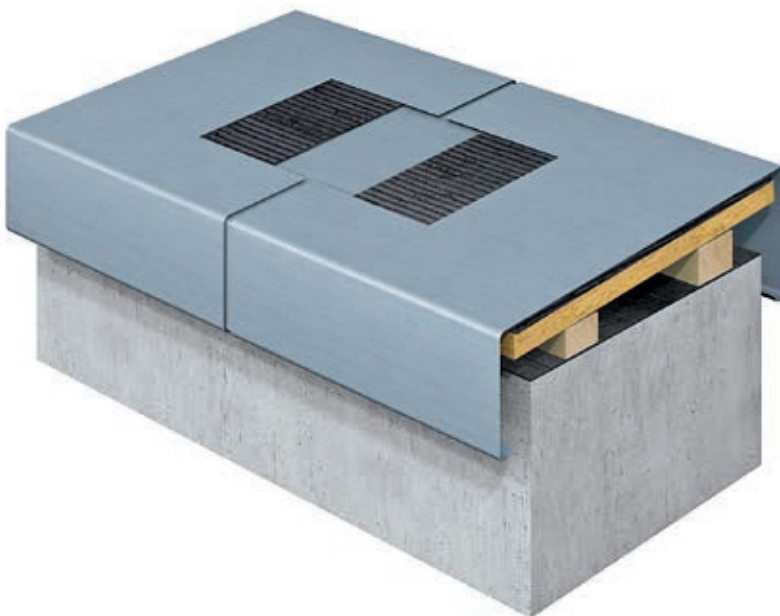


Fig. 24: Expansion joint with butt strap, bonded with cold-applied bitumen adhesive



CONNECTIONS

2.9 Connection of Metal Copings to vertical Components

Connections to the vertical components of a structure generally consist of a leg set on a component and a separate covering building profile, which is attached to the vertical component and needs to be protected from water seeping in behind. Connection is determined by the installation situation, with the connection height depending on the roof pitch and associated detailing (see section 2.3.3). We distinguish here between eaves/ridge side and lateral connections. It must be possible to accommodate the different movements of materials and components which occur without impairing the level of functionality.

In practice connections to vertical components made of lime sand brick, clinker brickwork, rendered masonry or concrete are created with cover flashings of many different types. The cover flashing is surface or flush-mounted on the wall. Joint sealant or precompressed sealing tape is normally used with this connection. In the case of surface-mounted cover flashings, fixing is at least every 250 mm, while with wall fastening rails corrosion-resistant fixings are spaced at least every 200 mm. With sealing joints it should be ensured that the sealant only adheres to two faces so that different movements can be absorbed on a long-term basis without damage.



Fig. 25: Render flashing with cover flashing



Fig. 26: Cover flashing flush-mounted in wall joint

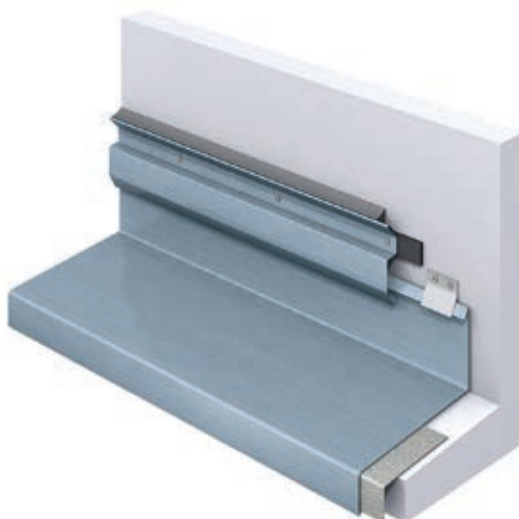


Fig. 27: Surface-mounted cover flashing with sealing tape and joint sealant

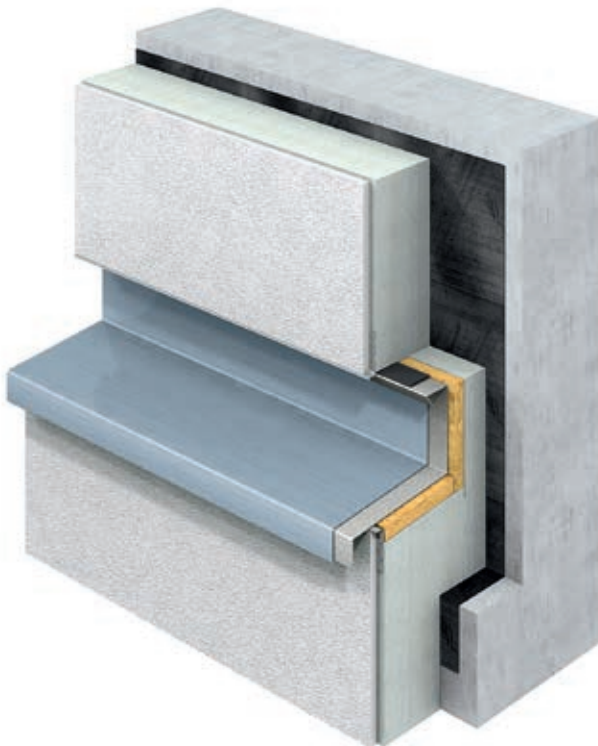


Fig. 28: Cornice construction with an exterior insulation and finishing system

2.10 Connection to Exterior Insulation and Finishing Systems

A wide range of connections to rendered surfaces and exterior insulation and finishing systems are possible and should be specified by the planner before installation. They should be designed to accommodate the different length changes occurring in the metal and render materials without any problems. The necessary overhangs must in particular be provided for, with the work sequences of the various trades involved being decided beforehand.

Render should be applied before installing titanium zinc sheeting to avoid marking being caused due to a chemical reaction with unset render.

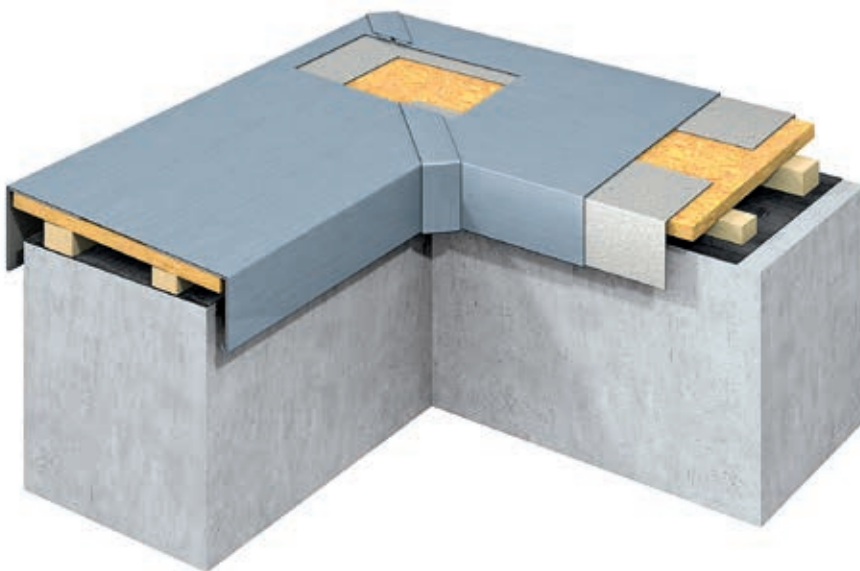


Fig. 29: Outside corner with expansion joint with cap

2.11 Creation of an outside Corner

In addition to the use of soft soldering for connection, it is also possible to construct masonry corners for example as an expansion joint with cap. Once again it is important to ensure a minimum slope of 3° to the inside of the roof edge and permit linear expansion of the material without restriction.

CORNICE COPINGS

3. Cornice Copings

When it comes to the planning and realisation of cornice copings, the rules applicable to fascia and wall copings generally also hold good. Any divergence will be given special mention in this section.

3.1 Applications

Cornices are building components which extend horizontally from the wall and are used to visually structure facade areas, particularly in the early days of architectural design. As well as their decorative function, cornices are also meant to protect the wall below from weathering. The cornices themselves are protected by cornice copings. The individual lengths of the profiles should not exceed 3 m. These copings are generally fixed in place indirectly using continuous cleats. However, cold-applied bitumen adhesive must be used if the base layer cannot be drilled so that fixing with continuous cleats is thus not possible. This fixing method has generally proved to be highly efficient, with the facing edges not normally being very wide. Various details are available for fixing to the wall connection, although they may vary depending on the extent of weathering expected to occur and the traditional architecture of the locality. Beside the details for cover flashings described in the previous section "Connection of metal copings to vertical components", other detailing that does not always comply with the trade regulations may be used for historical buildings. One traditional solution is to use metal sheeting with a 10 mm upfold in conjunction with wall hooks and then apply render on top, making a groove with a trowel. With this solution the upfold cannot be any greater due to the lack of adhesion



Villa Neunteufel, Linz, Austria



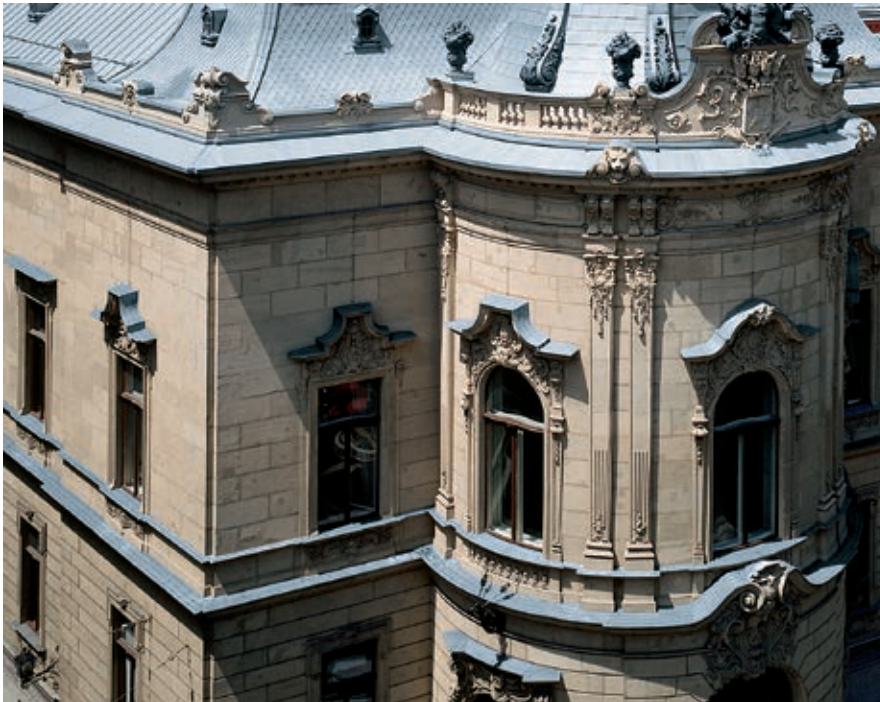
Palais Lumière, cultural/conference centre, Evian, France



Landestheater Salzburg, Salzburg, Austria

in relation to the render. This detail should therefore not be used in regions with heavy rainfall. With rendered cornices the movement distance should be 3 m (half this for corners and ends). With all other cornices the same distances apply as for wall copings. If the upper cornice faces are renovated with a new coat of render, the use of a suitable underlay is strongly recommended due to the additives generally contained in render (e.g.

for frost protection, etc.). This should not absorb or store water and is only unnecessary when using cold-applied bitumen adhesive, which itself acts as a separation layer.



Szabó Ervin Library, Budapest, Hungary



The Royal Danish Theatre, Copenhagen, Denmark

3.2 Protection of historical Monuments

When it is a question of protecting historical monuments, there is often a need for solutions which do not represent the state of the art but preserve the original appearance of the detail. In such cases the solution should be examined beforehand as regards its feasibility and practicability and an agreement reached between the planner, installer, client and the architectural conservation authority. Particularly with renovation projects it is not always possible to comply with the guidance values given for coping overhangs due to the dimensional tolerances that frequently occur – here all specified measurements should be considered as mean values.

WINDOW SILL FLASHINGS

4. Window Sill Flashings

When it comes to the planning and realisation of window sill flashings, the rules applicable to fascia and wall copings generally also apply. As the relevant standards of the metalworking sector do not in some cases contain specific information about this question, it is necessary here to fall back on other regulations and/or values from practical experience.

4.1 Applications

Window sill flashings made of RHEINZINK are used for both new builds and renovation projects and can be combined with a wide range of building materials. On request a variety of different geometries is available from RHEINZINK. We recommend using preweathered material with a material thickness of 0.8 mm. The result will be a stylish appearance with few reflections. Material with a protective film is also available and will help prevent unintentional soiling during processing. The film should then be removed immediately after installation.

Substructure

As regards suitable substructures, there are many different options available here. They range from products made of wood or derived timber to holders in aluminium or galvanised steel sheeting. With window sill flashings it is important to ensure that the substructure covers the entire surface. The substructure should be fitted in advance, e.g. when installing an exterior insulation and finishing system. RHEINZINK copings are not recommended for structures which will be regularly walked on.

Slope

Window sills should have a slope of min. 3°.

Fixing

To prevent drumming noises, the window sill flashings should be attached to the substructure over the entire surface with cold-applied bitumen adhesive (e.g. ENKOLIT).

Another option is indirect fixing using a structured underlay (RHEINZINK-VAPOZINC) between the substructure

and the window sill flashing. This permits movement of the window sill in relation to adjacent parts of the building on all four sides while ensuring the connection is impervious to driving rain. To ensure that the front edge of the window sill flashing remains permanently straight, a continuous cleat made of galvanised steel with a metal thickness ≥ 1.0 mm is generally fixed to the substructure and the vertical leg of the coping inserted in it. To act as a drip edge, it should project at least 20 mm from the facade, although 30 mm is recommended here. With short window lengths, the window sill can be secured from slipping by direct attachment to the mounting frame with stainless steel screws or clamping profiles. The fixing method chosen depends on the circumstances and wind loads prevailing at the locality.

Connections

Various standards and technical regulations apply to the connection of metal window sills. Handy guidelines in this regard can be found in the publication

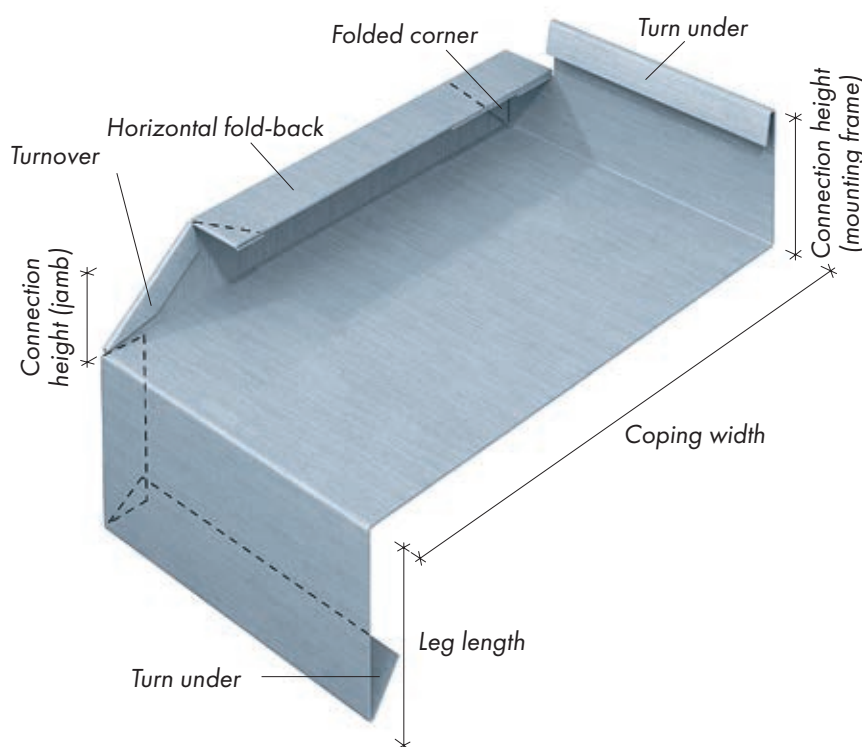


Fig. 30: Example of part of a window sill
Note: Avoid leaving any sharp edges exposed

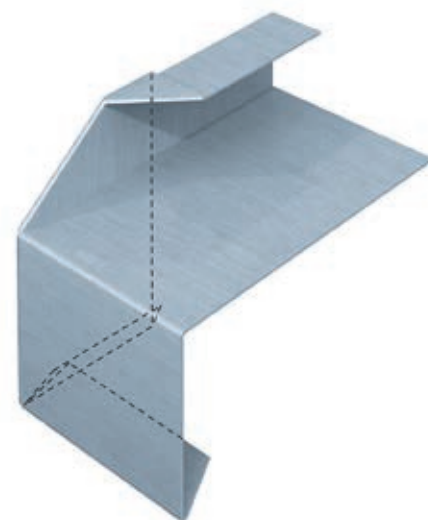


Fig. 30a: Detail improvement

“Leitfaden zur Planung und Montage von Fenstern und Haustüren” drawn up by the German window and door quality organisation RAL-Gütegemeinschaft Fenster und Haustüren e.V..

The main challenge when installing window sills is to create a watertight connection to adjacent parts of the building while ensuring movement of the joint to the components. This not only concerns the diffusion and convection of moisture and the accommodation of changes in temperature but in particular, the installation of a structure that is impervious to driving rain on the outside. To achieve this, the window sill should be made watertight using suitable sealants such as precompressed sealing tape at all connection points while fitting them to still permit movement. A watertight but mobile joint is created for connection to the mounting frame, jamb and underneath the window sill. A trough-shaped, rain-proof structure is required here to ensure that surface water is drained off in a controlled manner.

High-quality workmanship is ensured if a second sealing level which is impervious to driving rain is also created below the window sill. On installation the window sill flashing should not be inserted beneath the actual window profile for constructional reasons and to avoid thermal bridges.

Connection to the window sill groove (mounting frame) and to the jamb present special challenges in terms of water tightness and the accommodation of movement in materials.

Connection to Mounting Frame

The window sill upfold should be covered by the mounting frame structure to prevent the ingress of driving rain. The depth of the seam in the window profile depends on the material and the make of window: a minimum of 10 mm is recommended here. If it is not possible to create a clean connection on renovation projects, other additional sealing options will have to be used. Plans to use sealing tape or preferably retrofit overhang plates should be drawn up in detail and agreed with the planner or window manufacturer to avoid invalidating the war-

ranty. A connection height of min. 20 mm is recommended here, with a turn under where possible. Drainage of the window profile must not be impaired.

Connection to Window Jamb

A connection height of min. 20 mm is recommended for connection of the window sill to the jamb. With connection to an exterior insulation and finishing system, the horizontal foldover – the horizontal fold-back – should measure at least 18 mm to allow a sealing strip or finishing profile to be installed. Where possible, it should be completely covered with render.

If a roller shutter guide rail is fitted, this often makes installation far more difficult. The rail must end before the side upfold and should not extend to the horizontal fold-back. There must be a gap of at least 8 mm from the surface.

There is the option of installing roller shutters so they can be displaced at any time to facilitate retrofitting window sills. This should be agreed between the installer, planner and window manufacturer before proceeding with this option.

Butt Joints and Expansion

On installation it must be ensured that thermal linear expansion can be accommodated. A UDS-Connector, which is fitted completely behind the overlap of the mounting frame, should be used here.

It is also possible for the installer to produce plates modelled on the UDS-Connector. They are waterproof and attached to the jamb with a mobile joint. This structure offers the advantage that zinc window sills can be retrofitted without soiling. This method avoids marking the zinc surface during rendering and so ensures clean workmanship.

The joints of window sill flashings should not be soldered above facade claddings due to the possibility of streaking. Careful detailing with the UDS-Connector is the preferred option here. To permit linear expansion window sill flashings should not be soldered to the jamb profile.

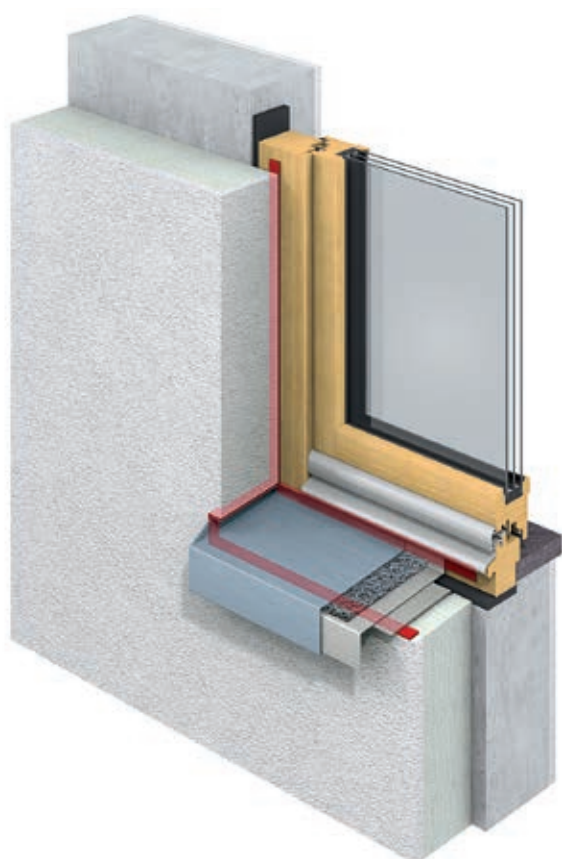


Fig. 31: Positioning of seal to prevent ingress of driving rain

4.2 Details

Connection of Window Sill to Exterior Insulation and Finishing System

This type of connection is used for both new builds and renovation projects. The holders for the window sill, with thermal breaks included, should be fitted before installation of the exterior insulation and finishing system: Pay attention to the sequence of trades: Installation of the window sill should follow rendering. When using material with a protective film, the film should be removed immediately after installation.

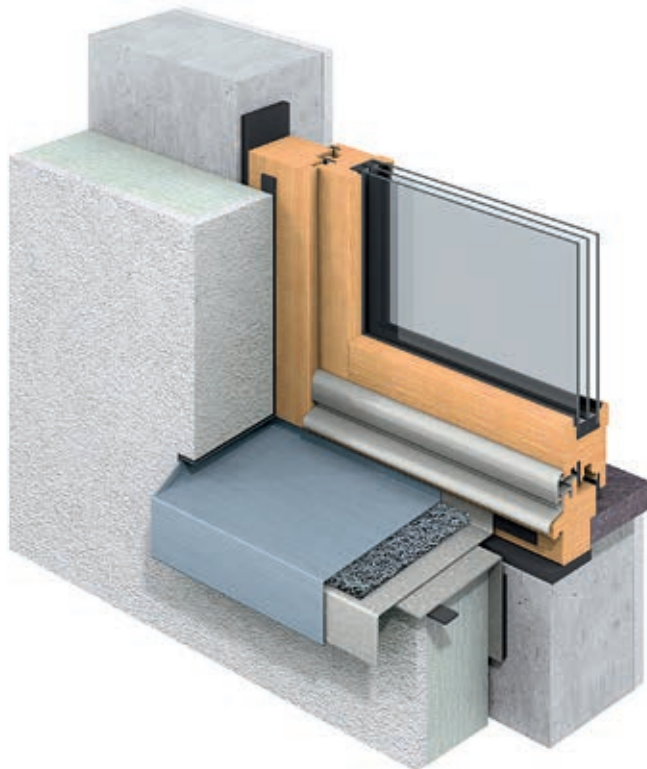


Fig. 32: Connection of window sill to exterior insulation and finishing system

Connection of Window Sill to Metal Facades (e.g. RHEINZINK-SP-Line)

The window sill, jamb and lintel should be installed before the facade. This application is suitable for either new builds or renovation work.

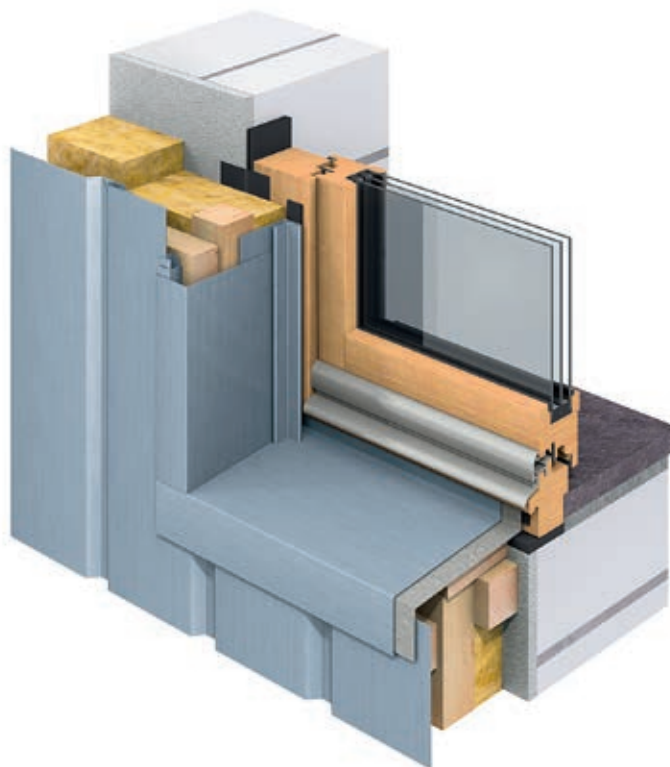


Fig. 33: Connection of window sill to RHEINZINK-SP-Line facade

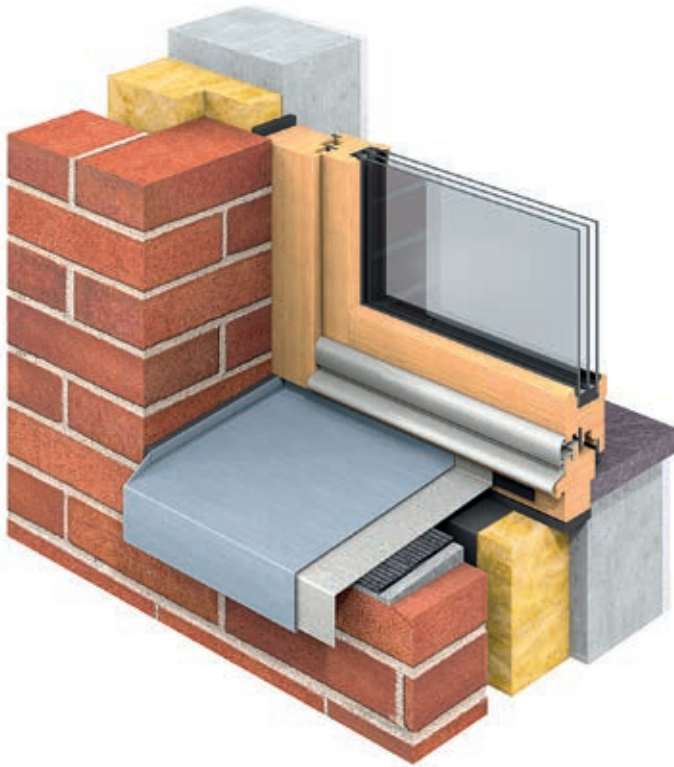


Fig. 34: Connection of window sill to brickwork

Connection of Window Sill to Brickwork

It must be ensured that the sealant in the joint only adheres to two faces so that different component movements do not cause cracking and subsequent leakage. A suitable sealing compound and back-up material should be used for separation here. These products should be pH-neutral.

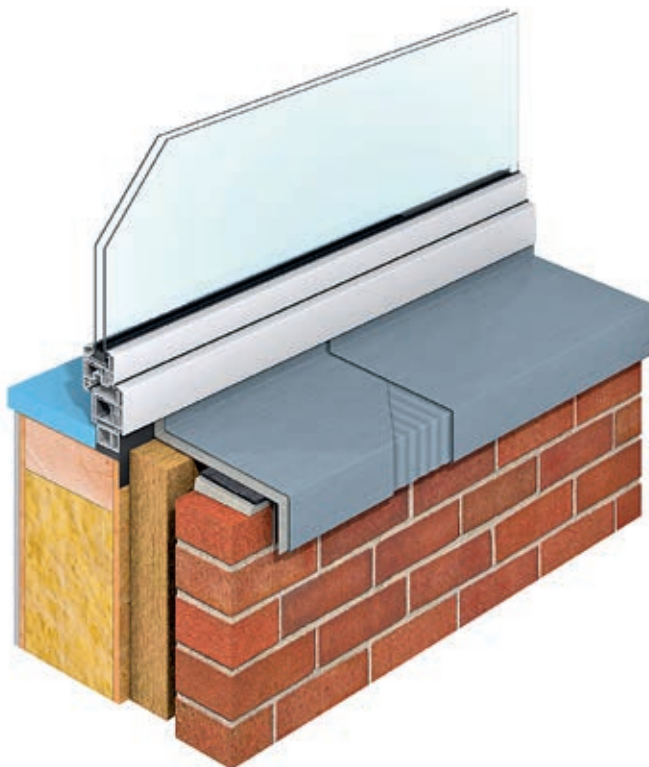


Fig. 35: Window sill butt joint with RHEINZINK-UDS-Connector

Window Sill Butt Joint with RHEINZINK-UDS-Connector

The RHEINZINK-UDS-Connector is also used to accommodate thermal linear expansion at the butt joints of window sill flashings and will look very attractive.

Note

A detailed study of the situation on site (tolerances, surrounding outer wall, etc.) is essential to ensure professional and economical execution with both existing structures and new builds. In the absence of an architect or other planner responsible for design, the contractor will be in charge of planning, so assuming responsibility for all legal consequences.

GABLE WALLS

5. Gable Walls

5.1 Copings with a longitudinal Slope – Gable Walls

Applications

Copings on gable walls may consist of one or more sections. A two-section design represents a balanced solution: It not only provides for covering of the gable wall but also connection to the main roof with an angle profile. Like fascia or wall copings, copings for gable walls are indirectly attached to the substructure with continuous cleats made of galvanised steel with a material thickness of min. 1.0 mm or using cold-applied bitumen adhesive.

5.2 Creation of Profile Joints

The relevant trade regulations do not contain any clear-cut specifications about this question. As the areas involved here are not subject to the same loads as other parts of a building, e.g. roof coverings, the following table has been drawn up on the basis of practical experience. It gives recommendations for the creation of profile joints for copings with a longitudinal slope. If any of the conditions for single overlapping with a cranked edge are not satisfied, it is recommended creating a single seam. This should always be capillary-breaking, i.e. the turn under of the upper coping is shorter (min. 10 mm) than the turn under of the lower coping. With coping widths exceeding 600 mm, similar principles as for standing seam coverings should be followed.



Standing seam covering with narrow gable coping and ventilated ridge



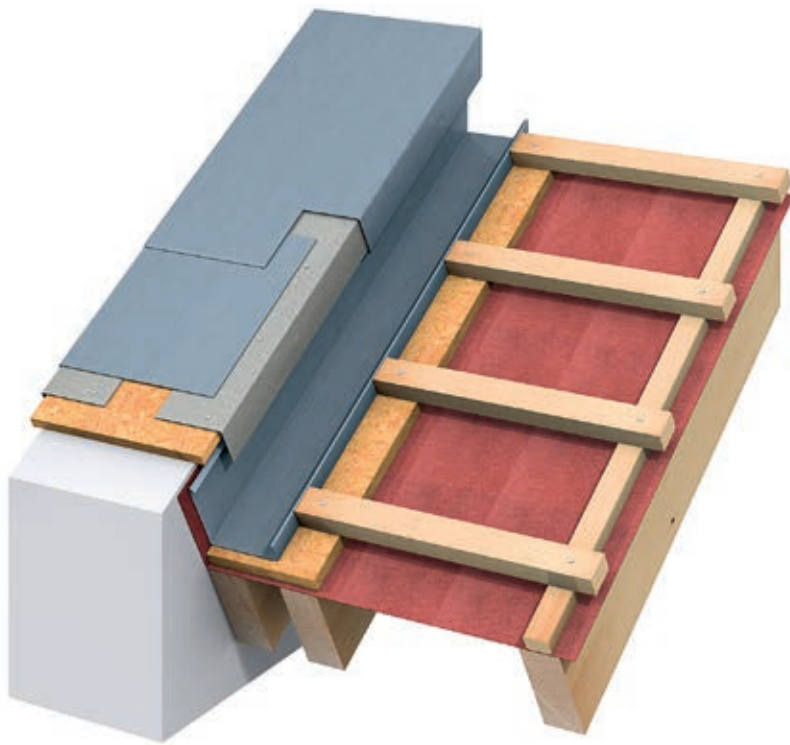
Gable cladding with coping



Standing seam covering with roof/facade and gable coping

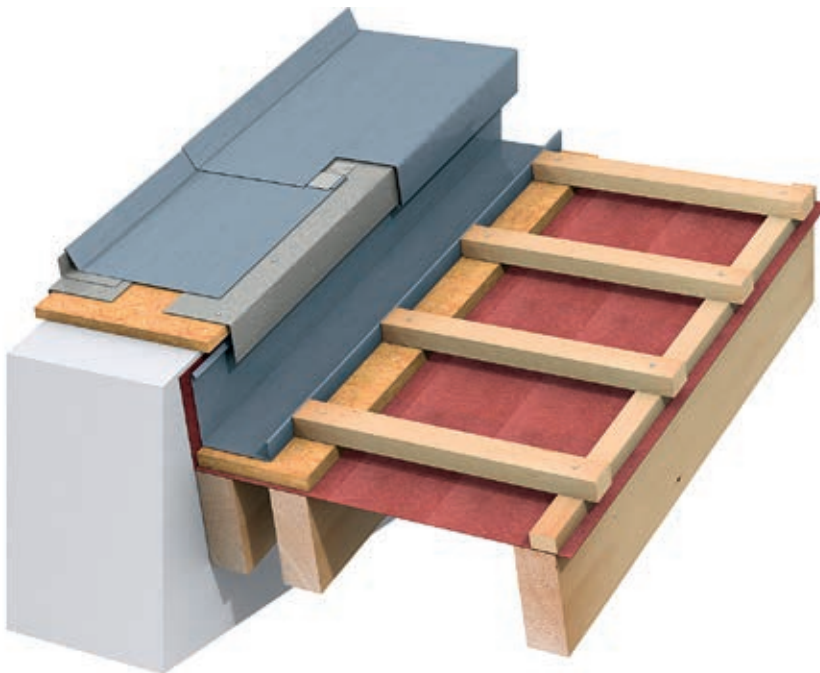
Roof pitch	Coping width	Connection method
$\geq 15^\circ$	≤ 400 mm	Single overlap with cranked edge
$\geq 3^\circ$	≤ 600 mm	Single seam
$\geq 3^\circ$	> 600 mm	Joint created as for standing seam

Table 5: Recommendations for the creation of profile joints for copings with a longitudinal slope (gable walls)

**Cross Joint as single Overlap with cranked Edge**

- Roof pitch $\geq 15^\circ$
- Coping width ≤ 400 mm
- Overlap ≥ 80 mm
- Cranked edge recommended
- Secured from slipping, e.g. riveted at side with continuous cleat

Fig. 36: Cross joint as single overlap with cranked edge

**Cross Joint as a single Seam**

- Roof pitch $\geq 3^\circ$
- Coping width ≤ 600 mm
- Cross joint with capillary-breaking effect:
 - Turn under of upper coping (≥ 30 mm) 10 mm shorter than turn up of lower coping (≥ 40 mm)
- Side upfold prevents streaking

Fig. 37: Cross joint as a single seam

ROOF SEALS

6. Roof Seals

6.1 Connection of RHEINZINK Profiles to Roof Seals

Applications

Titanium zinc profiles can be connected to roof seals in the form of eaves or angle flashings as well as other similarly shaped profiles. These profiles are fixed in place by bonding to the membrane roof. A distinction is made here between terminations for roof edges and connection to the vertical components of a building. Terminations for roof edges are categorised depending on whether they perform a supporting or sealing function. In the first case the zinc plate merely acts as a support and is bonded over the entire surface. In the second case the outer termination also functions as a design feature, with the seal stopping immediately before the edge of the roof. It must be ensured that the individual connections are permanently waterproof. In the case of roof edges with a sealing function, another distinction is made as to whether the structure has internal or external drainage.

Girth and Connection

The surface to be bonded must be dry, free of contamination, grease and dust and should be primed with a product that will act as a key. The sealant must be bonded over the entire surface and consist of two layers on the flange. A separating strip min. 100 mm in width should be loosely fitted at the transition between the edge of the adhesive and the roof seal to compensate for variations in movement between the metal parts and seal without stress. The seal should end 10 mm before the edge, and the adhesive flange fixed in place mechanically. Flashings joined to seals and their connections must all be watertight.

Connection Heights

The heights for the connection of bonded flashings to vertical components and for roof edge terminations can be found in Table 6, based on the trade regulations for seals, depending on the type of connection and roof pitch.

Fixing

See below for a description of the options available for fixing in relation to the individual structures.

Exposed areas of zinc that will come into contact with roof runoff should be provided with a porefree corrosion protection coating, e.g. Enke Multi Protect, depending on the roof seal, however especially in the case of bitumen roof sheeting. This also applies to roof drainage.

Roof pitch	Roof edge terminations	Connections to vertical components
$\leq 5^\circ$	$\geq 100 \text{ mm}$	$\geq 150 \text{ mm}$
$> 5^\circ$	$\geq 50 \text{ mm}$	$\geq 100 \text{ mm}$

Table 6: Connection heights for roof seals

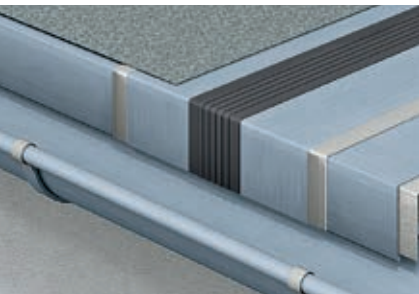


Fig. 38: Roof edge with a sealing function and external drainage



Fig. 39: Roof edge with a sealing function and internal drainage

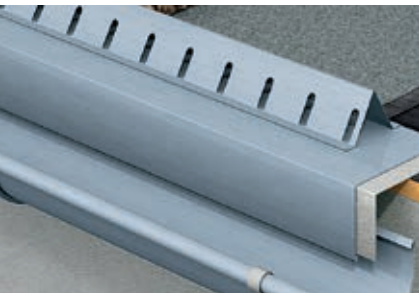


Fig. 40: Roof edge with a gravel strip

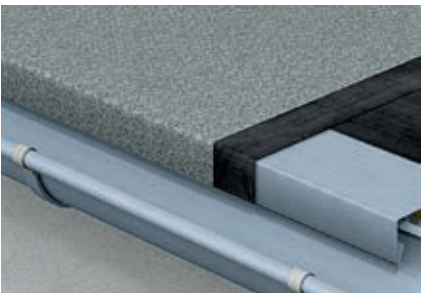


Fig. 41: Roof edge with a supporting function

6.2 Roof Edges with a sealing

Function and external Drainage

The standard length of the individual eaves flashings is 2 m or 3 m. The girth of the profile depends on the projection and the length of the vertical leg and takes into account the fact that the bonded surface on flashing connections must be at least 120 mm wide. In the case of roof edges with a gravel strip the flange must be min.

200 mm in width. The metal thickness directly depends on the girth but should be 0.8 mm with large projections.

Girth width mm	Material thick- ness min. mm
≤ 250	0,7
> 250	0,8

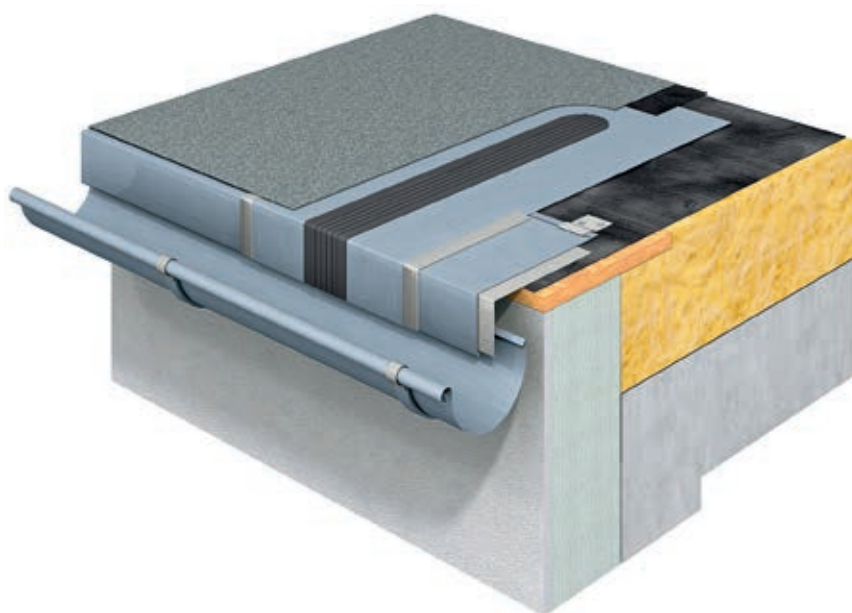


Fig. 42: Roof edge with a sealing function and external drainage

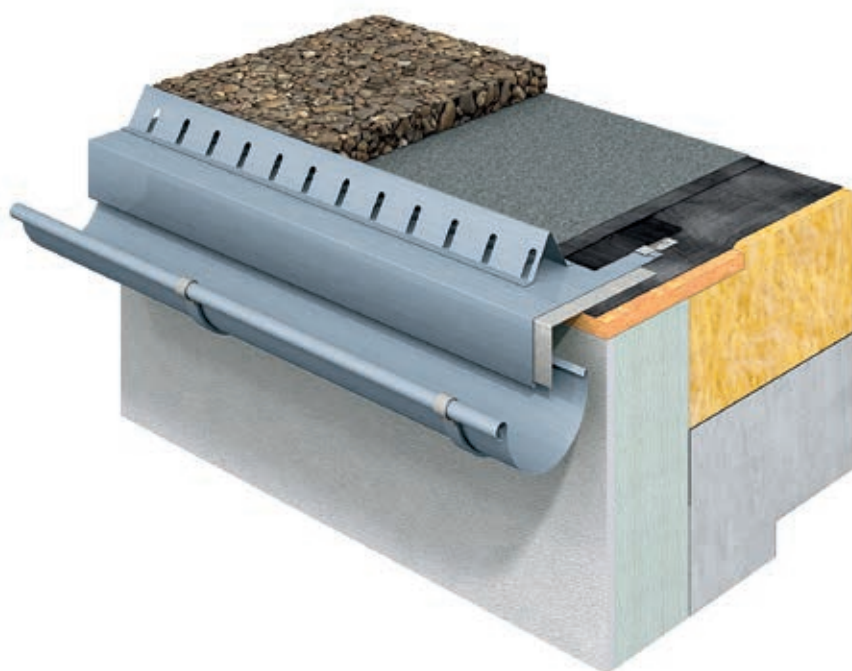


Fig. 43: Roof edge with a sealing function and external drainage – Variant with gravel strip

Fixing

Eaves flashings are fixed in place indirectly, i.e. using either horizontal clips which are hooked into the turn under of the eaves flashing, or toothed clips, with the smooth eaves flashing being clamped into these clips. The front edge of the eaves flashing is inserted in a continuous cleat or the springs of the gutter brackets. The support for the eaves flashing, the eaves board, should be recessed some 10 mm in relation to the heat insulation of the roof so as not to obstruct the runoff of water. The individual lengths of the eaves flashing are soft-soldered to join them together.

Movement

To permit linear expansion, flat roof edge expansion elements are soldered to the eaves flashings every 6 m (every 3 m from corners and ends). These elements permitting linear expansion must seat at least 60 cm on the roof area. The expansion element can be bent to fit virtually any profile specified. As in the case of the eaves flashing, thermal expansion should not be obstructed in any way, e.g. by being nailed in place. To accommodate the shear stress which is inevitable at the transition to the bonded profile flashing (here eaves flashing), a drag flashing min. 100 mm in width should be loosely fitted in this area to prevent direct adhesion between the edge of the profile and the roofing.

Slope

The eaves area must have a slight outward slope to prevent the pooling of water.

ROOF SEALS

6.3 Roof Edges with a sealing**Function and internal Drainage**

To minimise the number of cross joints, the profile lengths should not be shorter than 3 m. The girth depends on the final look required for the coping, but the metal thickness should be 0.8 mm. Like other bonded profiles, an adhesive flange of at least 120 mm is necessary here. To avoid facades being soiled by the uncontrolled runoff of rainwater, the height of the up-fold should comply with Table 6.

Fixing

Horizontal clips are used for indirect fixing at the upper edge. To ensure linearity, the front edge is inserted in a galvanised continuous cleat at least 1.0 mm thick. The individual lengths are soft-soldered together.

Movement

The information given for roof edges with a sealing function and external drainage apply accordingly here. To accommodate movement, a flat roof edge expansion element which seats at least 60 cm on the roof area should be fitted here. As regards the necessary spacing for these elements, the rule that half the distance should be used from corners and ends (i.e. incl. projecting or recessed faces) is of particular relevance in this case. The expansion elements are soldered to the roof edge profile and concealed with a cap folded along the profile in areas that are visible.

Wall Connections

In contrast to roof edge surrounds, wall connections are understood to mean the transition to a vertical wall, even where this may be rather low, e.g. as in the case of a fascia.

Note

Where roof seals include layers of gravel, it is recommended that the protective coating extends 20 mm above the surface of the gravel. A protective coating is also necessary with angle flashings under terrace coverings as in this case there is no free admission of air in the damp environment necessary to form a natural protective layer. Here too the protective coating should extend 20 mm from the water level above the terrace covering.

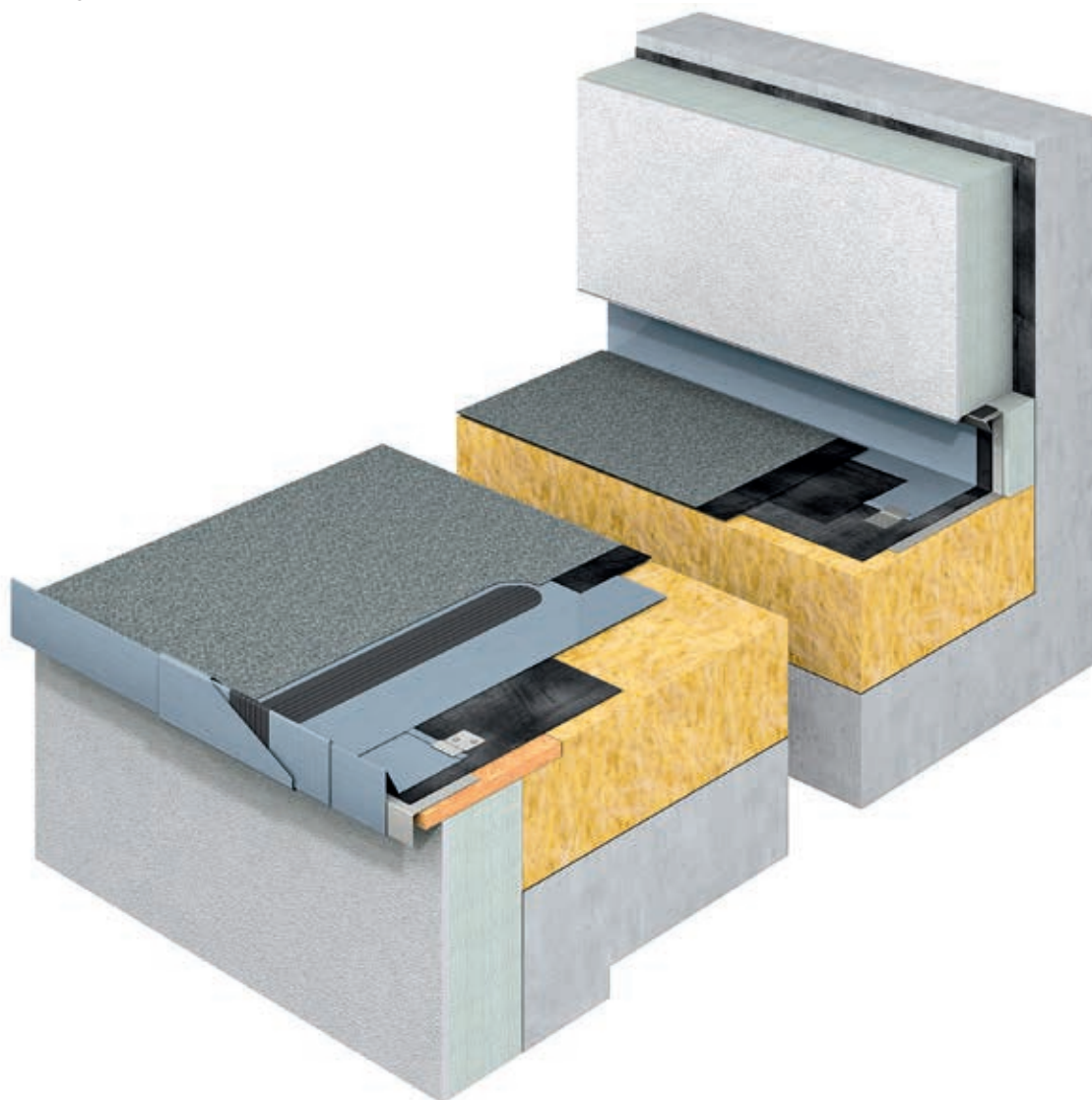


Fig. 44: Roof edge with a sealing function and internal drainage with connection to vertical wall

6.4 Roof Edges with a supporting Function for membrane Roofing

With this application eaves flashings made of RHEINZINK offer support at the transition between membrane roofing and external drainage, which tend to project slightly. This occurs on a localised basis and is particularly common with buildings of less complex design. The eaves flashings have a front termination but no water drip. They are completely covered by the roof sheeting, which thus also acts as a seal.

Individual lengths are limited to 3 m in length to permit thermal linear expansion, although in most cases this is generally reduced to 2 m. The girths and corresponding metal thicknesses depend on actual execution, but the adhesive flange positioned at roof level should however

be at least 150 mm in width. Where the eaves flashing markedly projects, the metal thickness should be a minimum of 0.8 mm irrespective of the girth.

Fixing

The individual lengths are mounted directly on the substructure using suitable fixings (generally roofing nails, 2.8 x 25 mm). This should be recessed some 10 mm in relation to the heat insulation of the roof so as not to obstruct the runoff of water. The individual lengths should overlap about 10 cm, so increasing the stability of the vertical leg. Nails are offset and spaced at approx. 50 mm. Piercing of the direct fixing does not affect water tightness as it will be entirely covered by the roof seal once glued in place.

Movement

With this simple detailing without any claim to water tightness no special provision need be made for movement if the individual lengths are limited to max. 3 m. The function of the roof seal will be improved if direct bonding does not take place at the overlap of the eaves flashings.

Slope

The eaves flashing must have a slight outward slope.

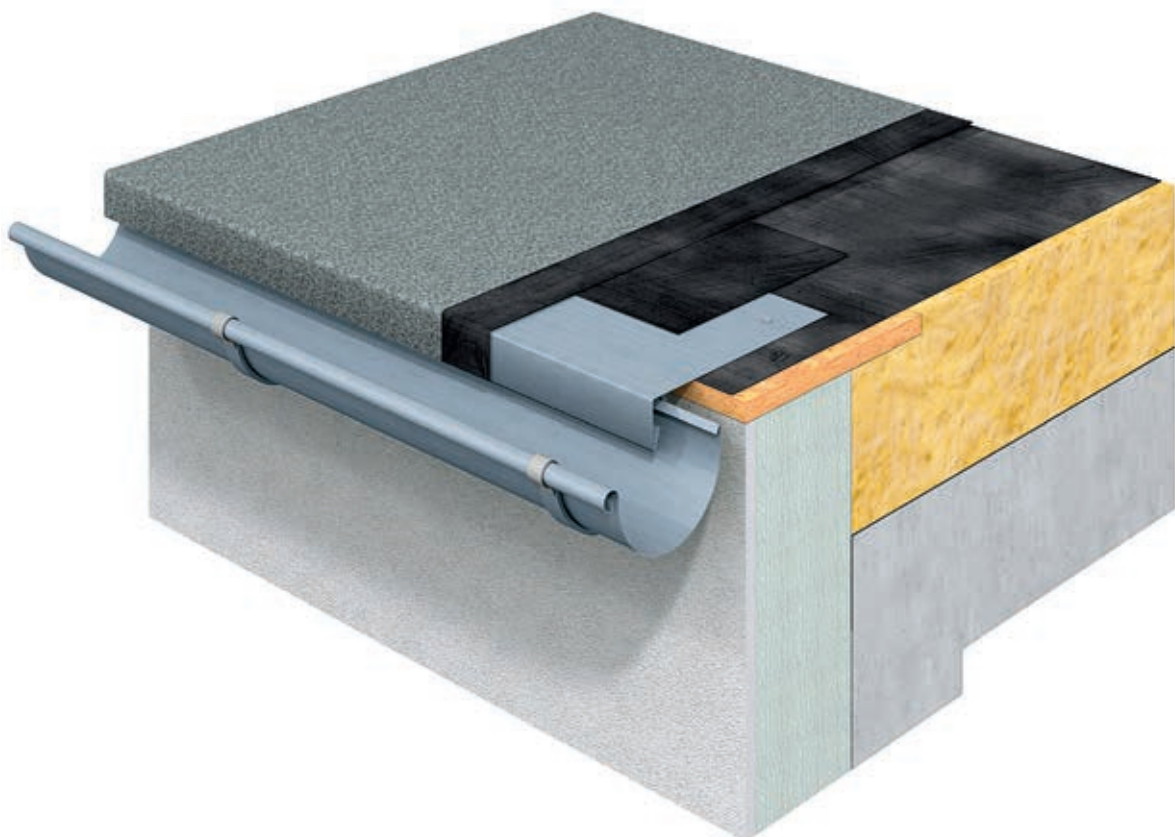


Fig. 45: Roof edge with a supporting function

7. Fire walls

7.1 Special Components – Fire Wall Copings

General

In the past the spread of fire via the roof often resulted in enormous damage, particularly in densely populated urban areas. As a key element of the fire protection concept, the fire wall is nowadays of major importance.

7.2 Legal Framework

Fire walls are used to separate or partition off fire compartments. They are designed to prevent the spread of fire to other buildings or parts of the same building. To satisfy these requirements, fire walls in Germany must be made of non-combustible building materials according to the relevant building regulations of the individual federal states and must resist fire for a minimum period of 90 minutes. It is important to note here that fire walls must not be bridged with combustible building materials or continuous air layers as they might result in the spread of flames, sparks or fumes.

The building regulations of Germany's federal states generally state that fire walls in class 1 – 3 buildings must continuously extend at least directly to the roof covering. In the case of other buildings they must continuously extend either 0.30 m above the roof or end level with the roof covering in a reinforced concrete slab built to fire resistance class F 90 that projects 0.50 m on both sides. In buildings with membrane roofing fire walls must extend 0.50 m above the roof. With metal roofs the most effective method of preventing the spread of fire is generally a fire wall that extends above the roof.

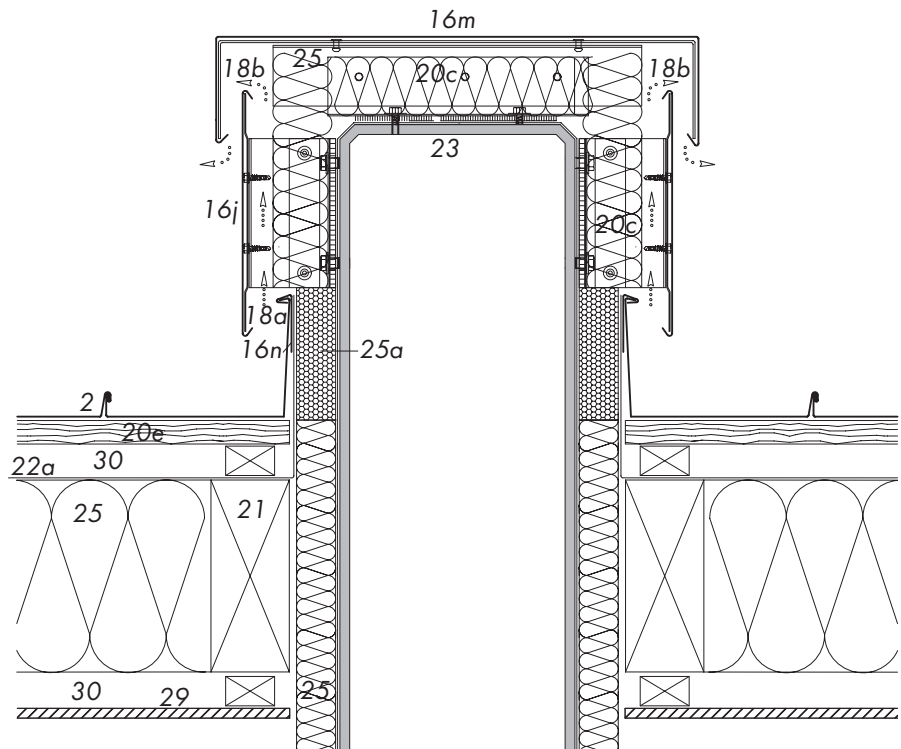


Fig. 46: Suggested design for a fire wall with RHEINZINK made of class A building materials

7.3 Applications

According to DIN EN13501-1 (DIN 4102-1) RHEINZINK is classified as a non-combustible building material belonging to Class A1. This is the best possible classification in terms of non-combustibility and means that this material is not combustible, and in the event of a fire, will not become detached and will not produce burning droplets or smoke. It is thus perfectly suitable as a coping for fire walls. Besides substructures made of metal (Fig. 46), cement-bonded particleboard as per DIN EN 633 can also be used here, although the titanium zinc and the particleboard need to be separated by a structured underlay. In this case information about the fire load to be expected should be given by the fire inspector responsible as such underlays do not exceed building material class B.

Key to Fig. 46

- 2 RHEINZINK-Double Standing Seam
- 16 RHEINZINK-Building Profile
 - j Fascia profile
 - m Wall coping
 - n Continuous clip
- 18 Support Profile
 - a Galvanised steel
 - b Aluminium
- 20 Substructure
 - c Bracket system, with thermal break*
 - e Softwood boarding, thickness min. 24 mm, width max. 160 mm
- 21 Batten/Squared Timber
- 22 Functional Layer
 - a Underlay covering
- 23 Supporting Structure
- 25 Thermal Insulation
 - a Heat insulation with high compressive strength, building material class A
- 29 Internal Lining
 - Plasterboard
- 30 Ventilation space

* Manufacturer's guidelines must be observed.

8. Solar Systems

8.1 Special Components – Incorporation of Solar Systems Applications

The incorporation of roof-integrated solar systems in titanium zinc roofing may offer an extremely stylish solution for roofs. The often considerable height of the superstructure tapering away from the middle of the roof to the edges is thus a sophisticated design detail that combines a low facing height with a clean termination in titanium zinc.

As there are many different manufacturers of solar collectors as well as numerous systems, it is not possible to offer a standard solution in terms of connection. The objective here is to ensure perfect detailing for sheet metalworking. It is necessary to check the information provided by solar collector manufacturers and where necessary, consult them regarding the water tightness of the connection points.

8.2 Details

Creation of the lateral connections or the connections on the eaves side does not

generally cause any problem in relation to water tightness when incorporating solar collectors. The ridge-side connection can either take the form of a recessed gutter or be lapped over the solar collector. Another possibility are systems where the width of the solar collectors is limited and the water drains off in guttering installed between the collectors. This system is comparable with the installation of skylights.

The example given below shows a fictitious solar collector, which is incorporated in a standing seam covering made of titanium zinc using clamping profiles.

Solar collector with
clamping profiles

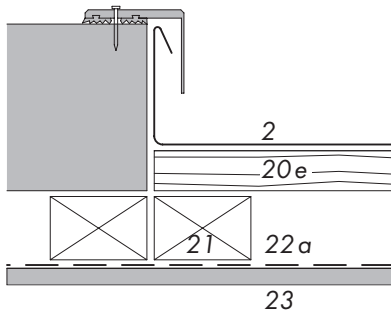
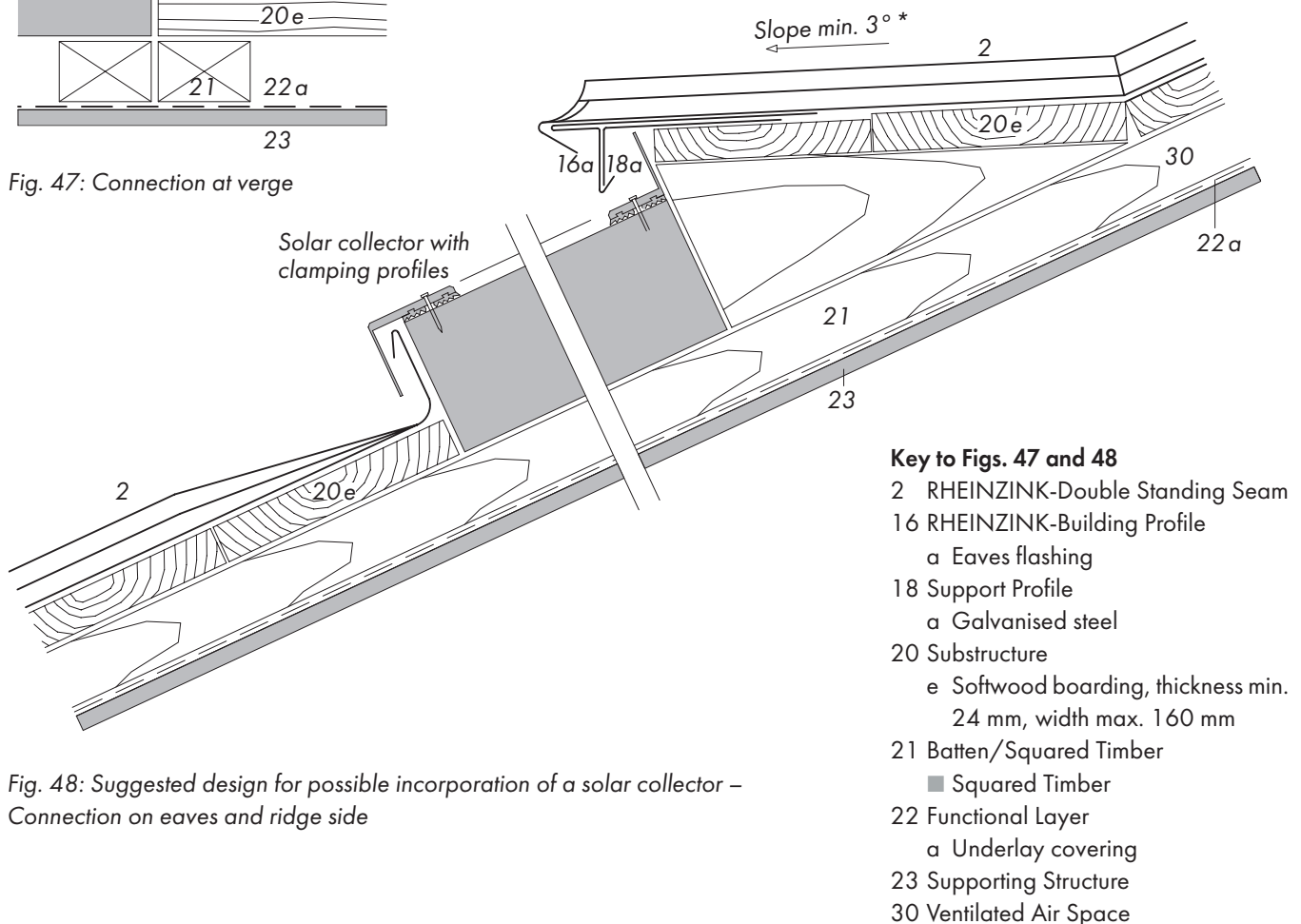


Fig. 47: Connection at verge



Key to Figs. 47 and 48

- 2 RHEINZINK-Double Standing Seam
- 16 RHEINZINK-Building Profile
 - a Eaves flashing
- 18 Support Profile
 - a Galvanised steel
- 20 Substructure
 - e Softwood boarding, thickness min. 24 mm, width max. 160 mm
- 21 Batten/Squared Timber
 - Squared Timber
- 22 Functional Layer
 - a Underlay covering
- 23 Supporting Structure
- 30 Ventilated Air Space

* Sealing strips included with roof pitches from 3° to 7°

9. Green Roofs

9.1 Special Components – Roof Edges with green Roofs Applications

As in the case of integrated solar collectors, the incorporation of green roof systems with titanium zinc will give a very elegant look to a building. The superstructure height tapers away from the middle of the roof to a slender face at the edges. The green roof should be built according to the manufacturer's instructions.

9.2 Details

Creation of the lateral connections and the connections on the eaves side is relatively simple in terms of sheet metalworking. The ridge-side connection is adapted to the individual situation and the final look required for the building.

See below for a suggested connection point at the eaves, ridge and verge. The green roof is drained via bracket-mounted guttering at the front to prevent the zinc panels being marked by streaking. The

dimensioning of such gutters depends on the volume of water to be drained and is not the responsibility of RHEINZINK. It is generally possible to drain off the rainwater from the green roof to the guttering via the zinc panels. This may soil the surface but will have no adverse effect on the longevity of the material. Controlled drainage is recommended.

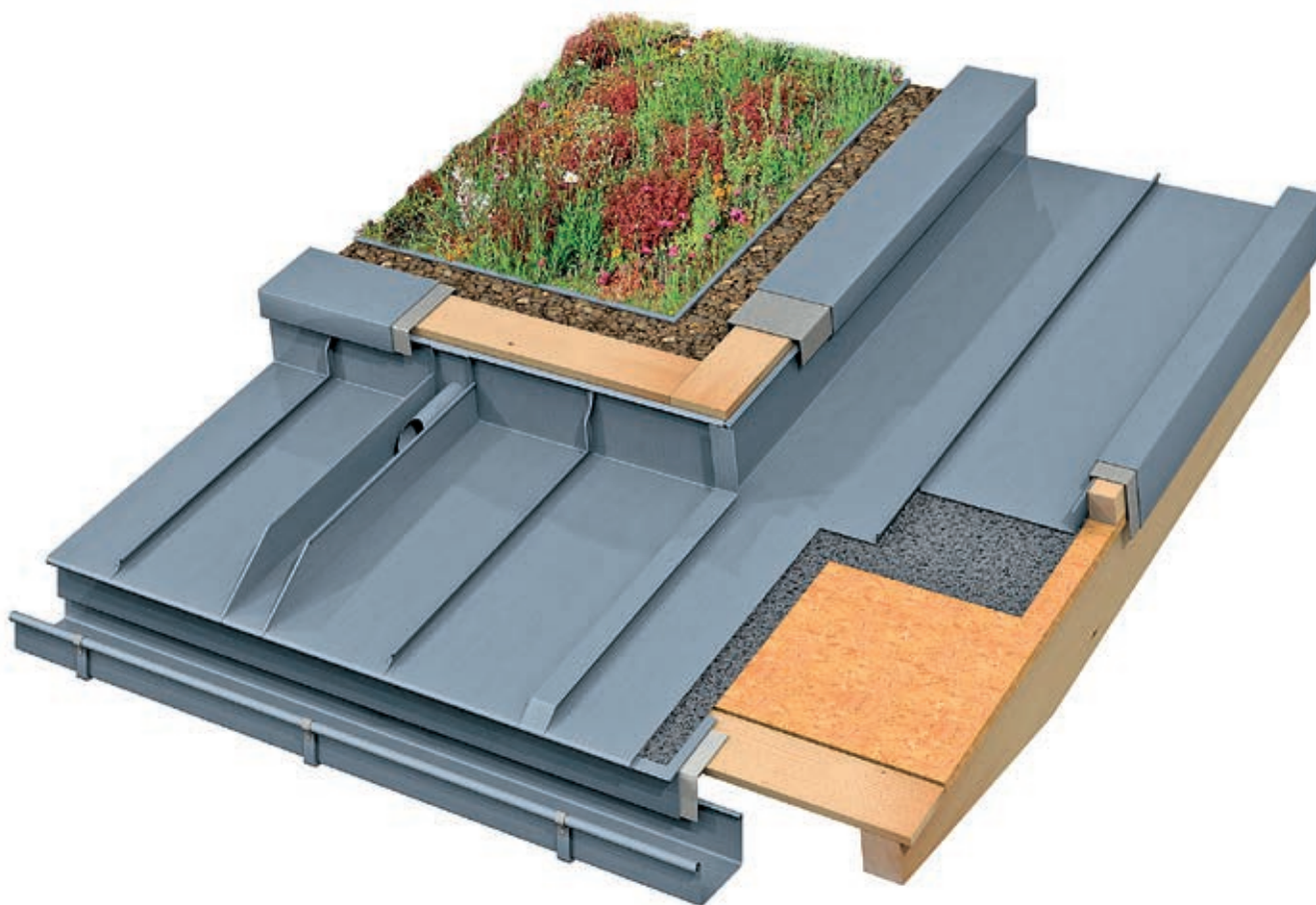


Fig. 49: Eaves side and lateral connection to green roof system – Suggestion with controlled rainwater drainage

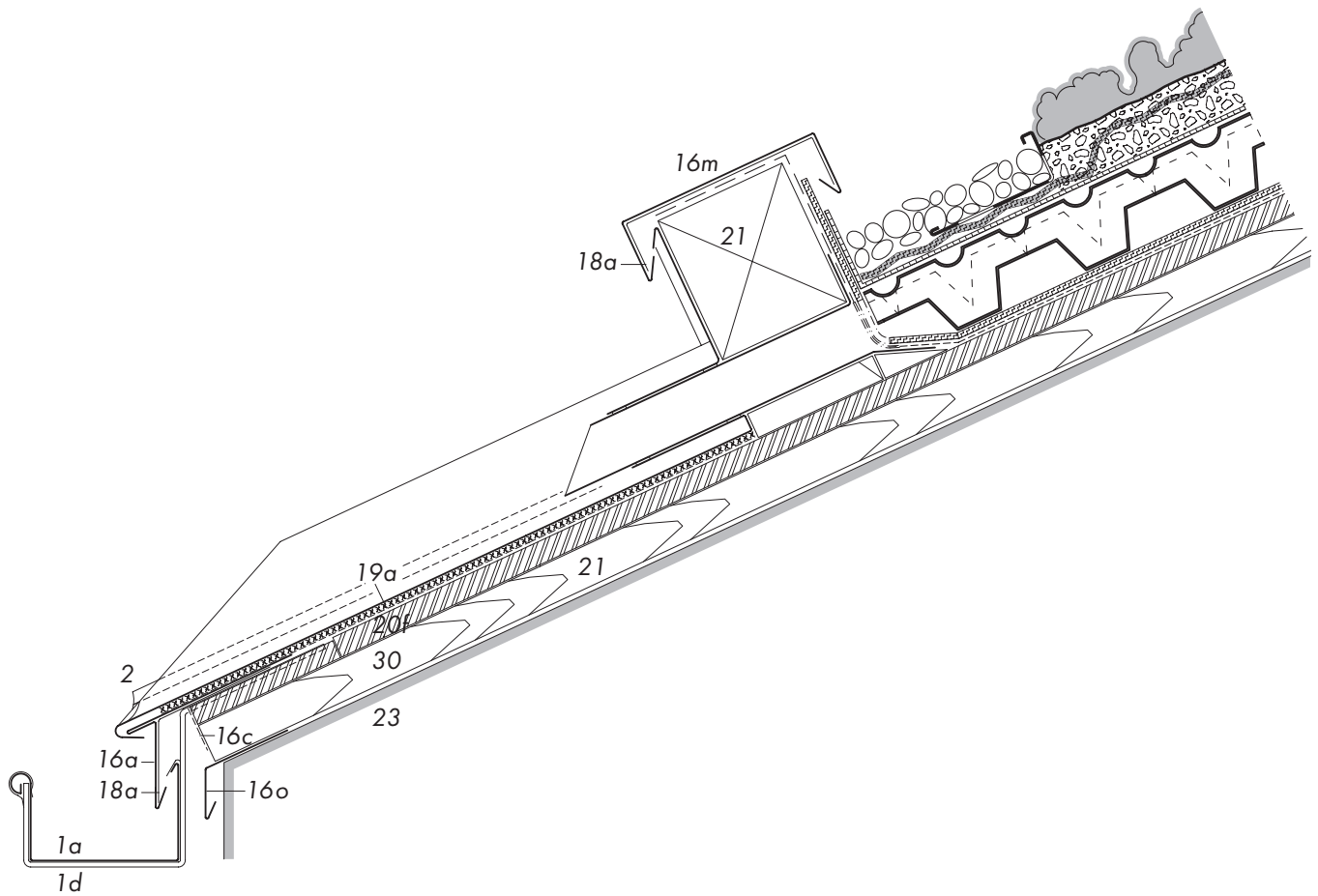


Fig. 50: Detail of eaves – Eaves side connection to a green roof

- | | |
|--|--|
| 1 RHEINZINK-Roof Drainage | 19 Separating Layer |
| a Gutter, box-shaped | a Structured underlay VAPOZINC |
| d Gutter bracket, cladded with RHEINZINK | 20 Substructure |
| 2 RHEINZINK-Double Standing Seam | f OSB/veneer plywood sheathing, thickness min. 22 mm |
| 16 RHEINZINK-Building Profile | 21 Batten/Squared Timber |
| a Eaves flashing | 23 Supporting Structure |
| c Perforated strip | 30 Ventilated Air Space |
| m Wall coping | |
| o Eaves profile | |
| 18 Support Profile | |
| a Galvanised steel | |

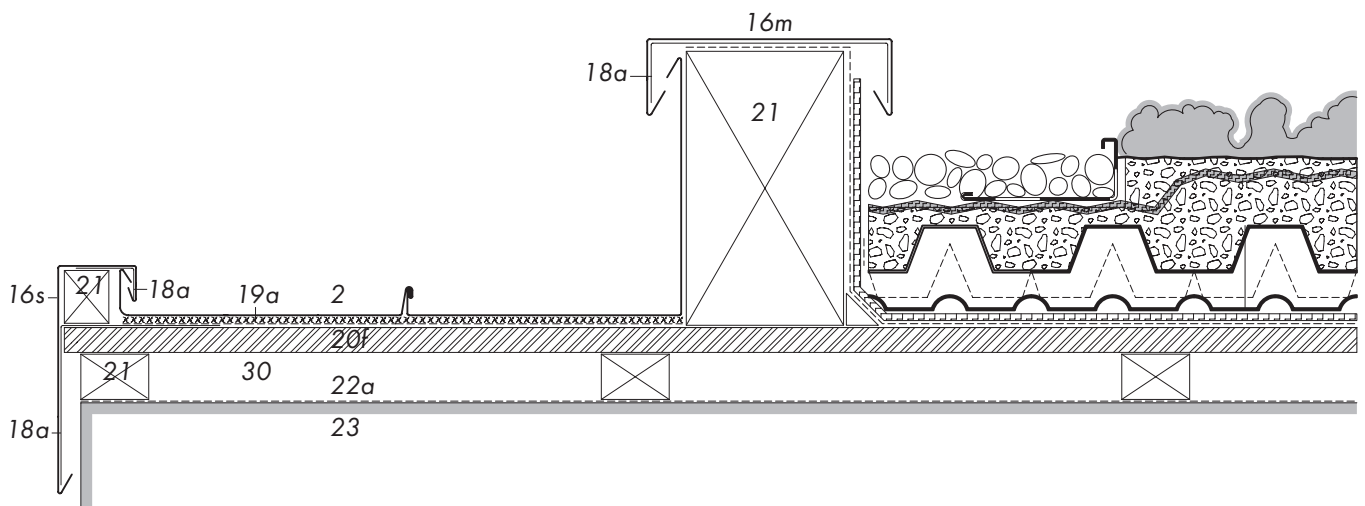


Fig. 49: Detail of verge – Lateral connection to a green roof

- | | |
|----------------------------------|---------------------------------|
| 2 RHEINZINK-Double Standing Seam | 20 Substructure |
| 16 RHEINZINK-Building Profile | f OSB/veneer plywood sheathing, |
| m Wall coping | thickness min. 22 mm |
| s Verge flashing | 21 Batten/Squared Timber |
| 18 Support Profile | 22 Functional Layer |
| a Galvanised steel | a Underlay covering |
| 19 Separating Layer | 23 Supporting Structure |
| a Structured underlay VAPOZINC | 30 Ventilated Air Space |

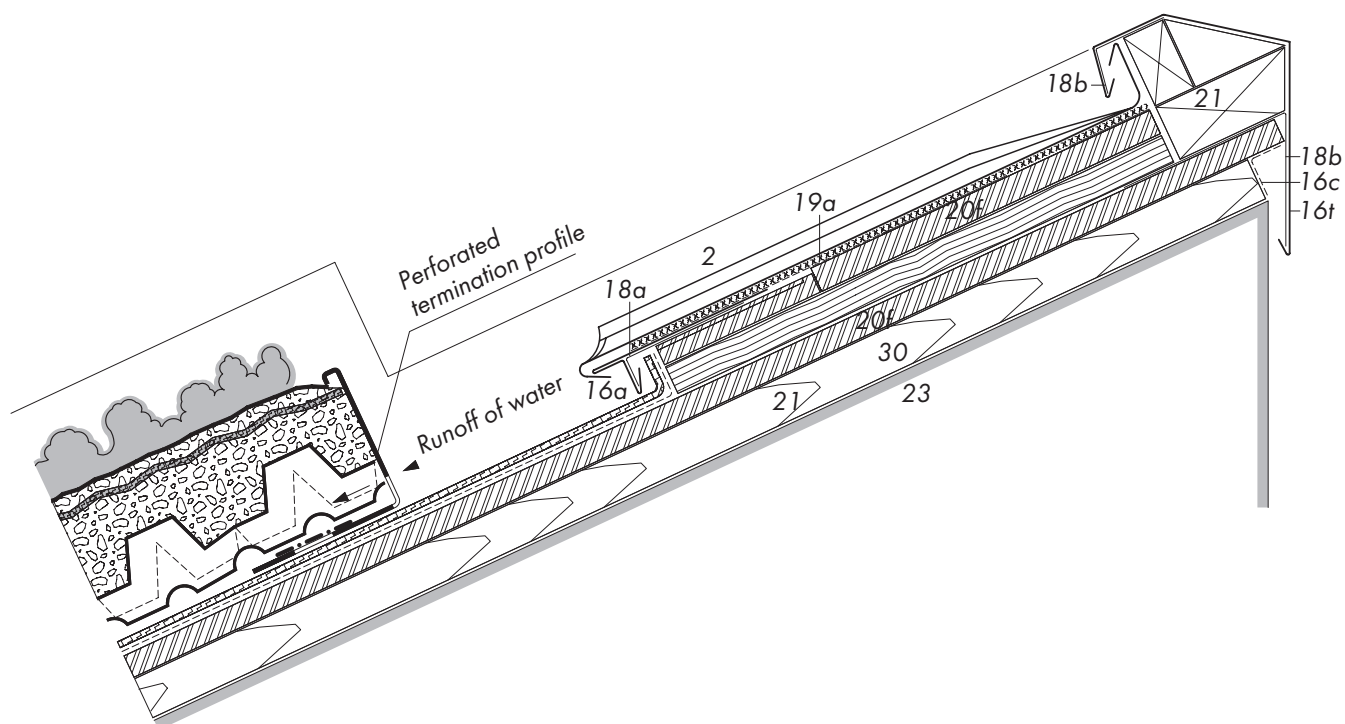


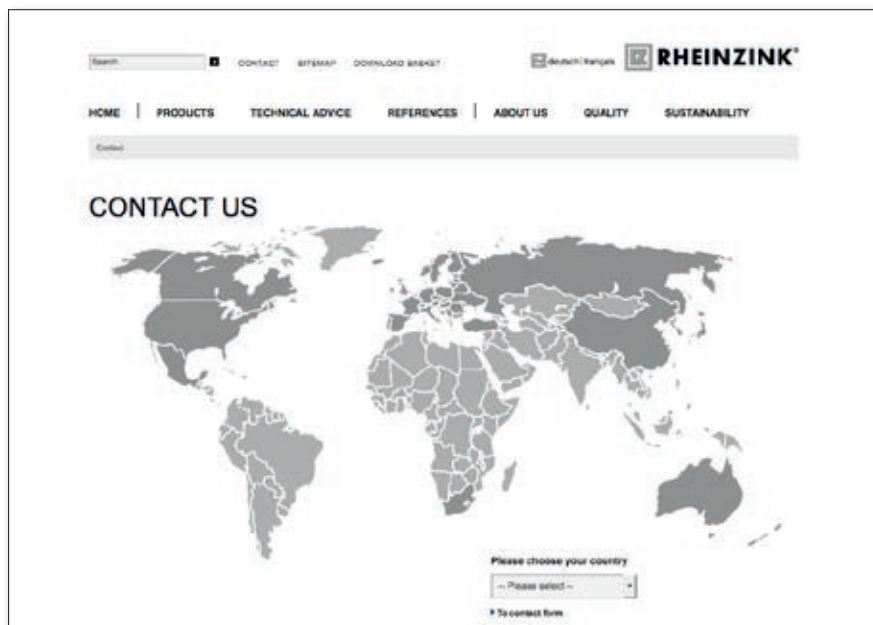
Fig. 51: Detail of ridge – Ridge side connection to a green roof

- | | |
|-----------------------------------|---------------------------------|
| 2 RHEINZINK-Double Standing Seam | 19 Separating Layer |
| 16 RHEINZINK-Building Profile | a Structured underlay VAPOZINC |
| a Eaves flashing | 20 Substructure |
| c Perforated strip | f OSB/veneer plywood sheathing, |
| t Ridge flashing, mono pitch roof | thickness min. 22 mm |
| 18 Support Profile | 21 Batten/Squared Timber |
| a Galvanised steel | 23 Supporting Structure |
| b Aluminium | 30 Ventilated Air Space |

CONTACT

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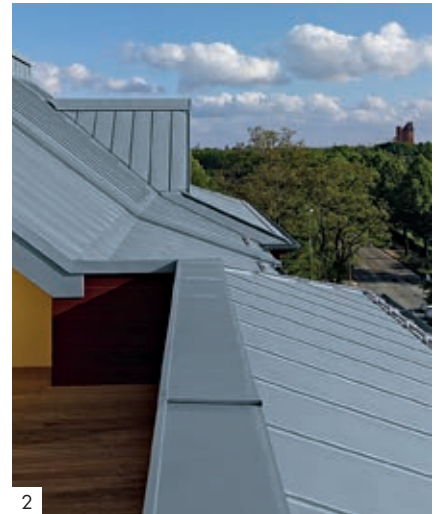
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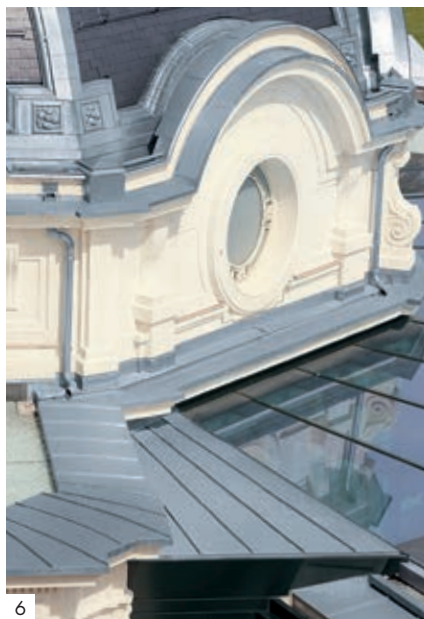
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COPINGS, DESIGN AND APPLICATION

REFERENCE PROJECTS



Cover (projekt left):

Two private Residences, Seeheim-Jugenheim, Germany

Architect: Planungsbüro Hapke GmbH, Herten, Germany

RHEINZINK-work done by: Schreck Klempnerei GmbH, Mespelbrunn, Germany

Cover (project top right):

Commercial/residential building, Bremen, Germany

Architect: Dipl. Ing. Arch. H. Kapels, Zetel, Germany

RHEINZINK-work done by: H. Egden, Friedeburg-Wiesede, Germany

Cover (project centre right):

Natural Living in De Weel, Zijdewind, The Netherlands

Architect: Breddels architecten bna, Heerhugowaard, The Netherlands

RHEINZINK-work done by: Ridder Metalen Dak- en Wandsystemen, Zwaag, The Netherlands

Cover (project bottom right):

Szabó Ervin Library, Budapest, Hungary

Architect: MATESZ, Budapest, Hungary

RHEINZINK-work done by: NARVA Kft., Budapest, Hungary

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Architect: Scheicher ZT GmbH Architekten, Adnet, Austria

RHEINZINK-work done by: Ing. Hans Öschlberger Bedachung, Seekirchen am Wallersee, Austria

2. Parkhotel Hagenbeck, Hamburg, Germany

Architect: Pbr Planungsbüro Rohling AG, Osnabrück, Germany

RHEINZINK-work done by: Athens GmbH & Co. KG, Hövelhof, Deutschland

3. Natural Living in De Weel, Zijdewind, The Netherlands

Architect: Breddels architecten bna, Heerhugowaard, The Netherlands

RHEINZINK-work done by: Ridder Metalen Dak- en Wandsystemen, Zwaag, The Netherlands

4. Private Residence, Dolenjska, Slovenia

Architect: Mars inženiring d.o.o., Ljubljana, Slovenia

RHEINZINK-work done by: M-STREHE d.o.o., Ljubljana, Slovenia

5. Kempinski Palace Portorož, Portorož, Slovenia

Architect: API d.o.o., KONSTAT BIRO d.o.o., ELEA IC d.o.o., BIRO ES d.o.o.,

LANDSCAPE d.o.o., BIROR d.o.o., Ljubljana, Slovenia

RHEINZINK-work done by: DIMNIKI d.o.o., Ljubljana-Bizovik, Slovenia

6. Hotel Beau Rivage Palace, Lausanne, Switzerland

Architect: Richter - Dahl Rocha & Associés architectes SA, Lausanne, Switzerland

RHEINZINK-work done by: ARGE RICHARD Pierre SA, Lausanne et Graf J.-Ch. et PH. SA, Montpreveyres, Switzerland
Jean-Michel Meyroux, Sugiez, Switzerland (Ornaments)

7. Two private Residences, Seeheim-Jugenheim, Germany

Architect: Planungsbüro Hapke GmbH, Herten, Deutschland

RHEINZINK-work done by: Schreck Klempnerei GmbH, Mespelbrunn, Deutschland

8. Hotel Corte Valier, Lazise, Italy

Architect: Stefano Feriotti, Verona, Italy

RHEINZINK-work done by: P-Dach, Egna, Italy

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