RHEINZINK®

TILE SYSTEMS

Profile Technique for Roofing and Facades

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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14th edition

Foreword

This document describes the use of RHEINZINK-Tile Systems 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 type of cladding 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.

Please also note our information on the material and its processing on our websites.

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**

Datteln, May 2020

CONTENTS

RHEINZINK®

bright rolled

blue-grey

graphite-grey

RHEINZINK-CLASSIC

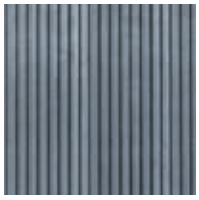
ORIGINAL.
EXPRESSIVE.
PATINATES OVER TIME.

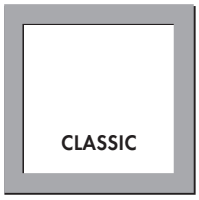
RHEINZINK-prePATINA

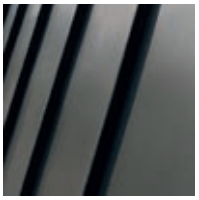
PRE-WEATHERED.
SELF-HEALING.
NATURAL.

ONE BRAND – 5 PRODUCT LINES

THE PERFECT SOLUTION FOR EVERY REQUIREMENT







TITANIUM ZINC BRIGHT ROLLED: PATINATES OVER THE YEARS. NATURAL, VARIABLE SURFACE CHARACTER.

THE ONLY NATURALLY PRE-WEATHERED SURFACE IN THE WORLD. ZINC TYPICAL PATINA EX WORKS. 100% NATURAL, 100% RECYCLABLE.

- skygrey
- basalte

RHEINZINK-GRANUM

NOBLE.
MATTE FINISH.
MULTIFACETED.

SKYGREY AND BASALTE. PURE, GREY ELEGANCE. URBAN DESIGN. PHOSPHATED SURFACE WITH COUNTLESS DESIGN OPPORTUNITIES.

- gold
- brown
- blue
- red
- green
- black

RHEINZINK-PRISMO

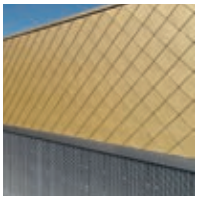
GLAZED.
DYNAMIC.
ADAPTABLE.

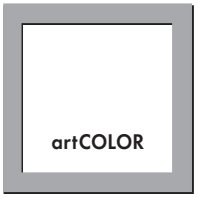
AESTHETIC, HARMONIOUS MATCH WITH ITS SURROUNDINGS. SUBTLE COLOUR VARIETY FOR A UNIQUE LOOK. SEMI-TRANSPARENT.

- pure-white
- pearl-gold
- moss-green
- nut-brown
- blue
- tile-red
- black-grey

RHEINZINK-artCOLOR

COLOURFUL.
LIVELY.
CREATIVE.





CREATIVE DESIGN POSSIBILITIES. INDIVIDUAL, EXPRESSIVE COLOUR COMPOSITIONS. COATED COLOUR VARIETY.

1. Function of rear-ventilated Facades

- **Windproof Building Envelope**
- **Weather Protection**
- **Moisture**
- **Thermal Economy**
- **Fire Protection**
- **Rear-Ventilation**
- **Air Intake and Exhaust Openings**
- **Soundproofing**
- **Other applicable Standards and Guidelines**

The rear-ventilated facade is a multi-layered system, which, when designed properly, guarantees permanent functional capability. By functional capability, we mean that all requirements pertaining to structural physics are met. This is described in detail below.

By separating the rain screen facade from the thermal insulation and supporting structure, the building is protected from the weather.

The supporting outer walls and the insulation remain dry and thus fully functional. Even when driving rain penetrates open joints, it is quickly dried out as a result of the air circulation in the ventilation space. The bracket-mounted rear-ventilated facade protects the components from severe temperature influence. Heat loss in the winter and too much heat gain in the summer are prevented.

Thermal bridges can be reduced considerably.

In the case of rounded parapets and dormer girders, the substructure and thermal insulation should be protected from penetrating moisture with a suitable layer.

1.1 Windproof Building Envelope

This does not apply to the rear-ventilated facade, as this component itself cannot be windproof.
The building must be windproof before the rear-ventilated facade is installed. A solid brick or concrete wall will ensure that the building is windproof. Penetrations (e.g. windows, ventilation pipes, etc.) must be sealed from the building component to the supporting structure. In the case of a skeleton construction, the wall surface must also be sealed.
If the building envelope is improperly sealed (wind suction, wind pressure), there is a high degree of ventilation/energy loss, which, along with drafts, creates unpleasant room temperature. Dew or condensation can be expected on the leeward side of the building.
Air circulation in the room should be provided through air conditioning or by opening the windows.

1.2 Weather Protection

Rear-ventilated facade cladding protects the supporting structure, the waterproofed thermal facade insulation, and the substructure, from the weather.
Bracket-mounted rear-ventilated facades provide a high degree of protection from driving rain.
Because of the physical structure, it is impossible for the rain or capillary water transfer to reach the insulating layers. Furthermore, moisture can always be drawn out through the ventilation space. This allows the insulating layers to dry out quickly, without impeding thermal insulation.

1.3 Moisture

Rear-ventilated facade cladding provides protection from driving rain and moisture. Moisture penetration as a result of diffusion does not occur in the rear-ventilated facade.
When the supporting structure is windproof, the diffusion current density is too small to cause the dew point temperature to drop.

1.4 Thermal Economy

In order to understand the thermal economy of the rear-ventilated facade, we must first consider the various heat flow rates, as well as the air exchange between the rear-ventilation space and the outside air, separately, in terms of structural physics..

1.4.1 Thermal Insulation

In the winter, heat flow from the inside to the outside is referred to as a heat transfer co-efficient (U-value).
The smaller the value, the smaller the quantity of heat escaping to the outside. The U-value is determined by the heat conductivity of the thermal insulation and insulation thickness.
The high-grade thermal insulation is a contribution to environmental protection and pays for itself in a relatively short period of time through low heating costs

1.4.2 Summer thermal Insulation

Summer thermal insulation should provide comfort: The amount of heat flowing from the outside to the inside sh ould remain as small as possible. Proper thermal insulation, as well as a certain mass in the construction itself, will help to achieve this objective.
The advantage of a bracket-mounted, rear-ventilated facade, is that a large portion of the heat which streams onto the cladding is diverted through convective air exchange.

1.4.3 Thermal Bridges

Thermal bridges are elements of the building envelope, that have high thermal conductivity (have high U-values) and are continuous from the warm side to the cold side of the thermal insulation. Apart from general design-dependent thermal bridges of a building, e.g. protruding balconies, the installation of the substructure must be taken into account in the case of a rear-ventilated facade. Thermal bridges can be reduced significantly by installing an insulating strip between the supporting structure and the substructure (thermal break).
Proper installation of the insulation reduces the formation of thermal bridges.

1.5 Fire Protection

Metal facades with a metal substructure and appropriate fasteners meet the highest requirements for non-combustibility (Building Material Class A1, DIN 4102). In the case of bracket-mounted, rear-ventilated facades, it may be necessary to install firestops.

1.6 Rear-ventilation

The free ventilation cavity between the facade cladding and the layer behind it must be at least 20 mm. Building tolerances and the slant of a building must be taken into account. In some places, this rear-ventilation space may be reduced locally up to 5 mm – e.g. by means of the substructure or the unevenness of the walls.

1.6.1 Air intake and exhaust Openings

The rear-ventilation space requires air intake and exhaust openings. These openings must be designed so that their functionality is guaranteed for the lifetime of the building. Their functionality may not be hindered through dirt or other external influences. The openings are located at the lowest and highest point of the facade cladding, as well as in windowsill and window lintel areas, and penetrations. In the case of higher, multi-storey buildings, additional air intake and exhaust openings should be provided (e.g. at each floor).

1.7 Soundproofing

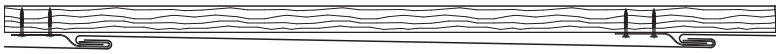
To prove that a facade design is soundproof, the entire wall structure, as well as each building component (windows, etc.) must be defined. The use of proper static fasteners will prevent any potential noise development as a result of the cladding.

1.8 Other applicable Standards and Guidelines

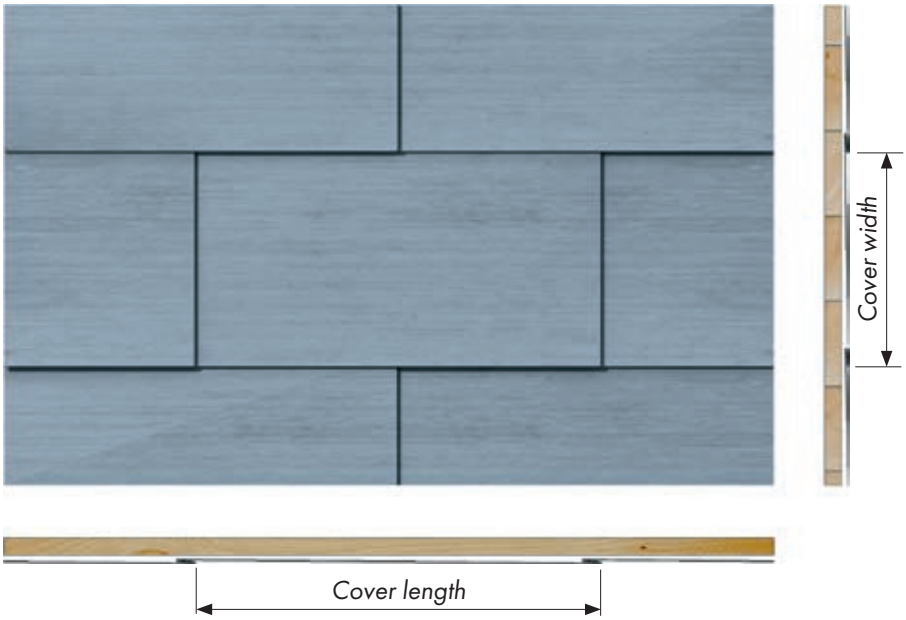
All trades must adhere to applicable DIN EN-/DIN-standards.
Guidelines for the design of metal roofs/ outer wall cladding and sheet metal work.
Government regulations, building codes in the currently valid version.

2.1 RHEINZINK-Flat-Lock Tile

Using the RHEINZINK-Flat-Lock Tile, the designer has almost endless options in structuring the design of his building. The flat-lock tile can be installed vertically, horizontally and diagonally. Even complex building shapes with convex and concave designs can be realized.



Systemschnitt



View with system profile

2.1.1 Profile Geometry

Metal thickness
s = 0.70 mm/0.80 mm/1.00 mm
Face width = cover width

Cover width ≤ 600 mm
Cover length ≤ 3000 mm
(optimal ≤ 2000 mm)
We recommend max. 2000 mm cover length for better handling.

Standard sizes in mm	Weight 1.00 mm
333 x 600 mm	~ 9.90 kg/m²
400 x 800 mm	~ 8.54 kg/m²
500 x 1000 mm	~ 8.90 kg/m²
600 x 1200 mm	~ 8.62 kg/m²

We are happy to advise you on other dimensions/intermediate sizes.

View of flat-lock tile
Roof application

View of flat-lock tile
Facade application

Application for outside Areas

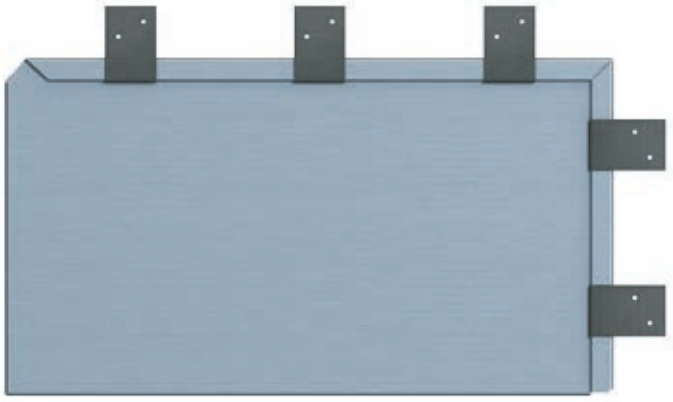
- Facades
- Roofs
- Soffits
- Dormers
- Parapets
- Cladding of roof edges

Application for inside Areas

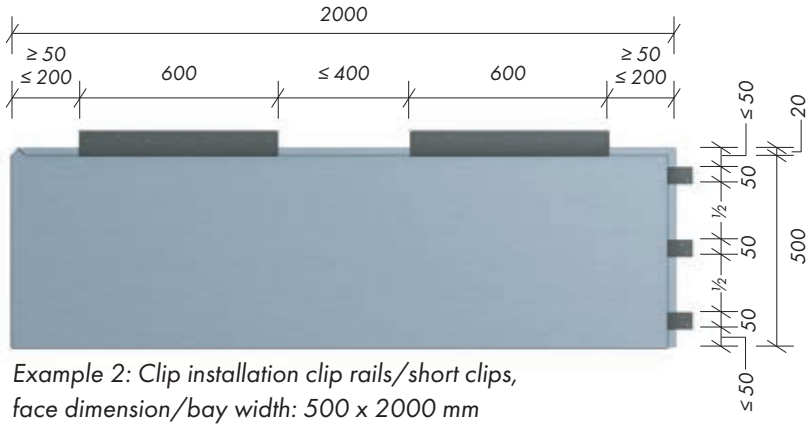
- Walls
- Ceilings

2.1.2 Installation Direction/ Installation Instructions

- Installation direction from bottom to top
  – from right to left
  – from left to right
- Installation with cross-joint or offset possible
- With the roof tile, the fold-forward or fold-back must be slightly bent up and processed to allow for the plug-in due to the closed upper corner.
- Fixing with tested RHEINZINK-clips or clip rails, see item 2.1.3.
- The film over the visible surface is to be removed immediately after installation.
- The film is removed from the folds ex works for an easier installation.



Example 1: Clip installation with short clips, face dimension/bay width: 333 x 600 mm



Example 2: Clip installation clip rails/short clips, face dimension/bay width: 500 x 2000 mm

2.1.3 Statics and Fixing

The stability of RHEINZINK-Flat Lock Tiles has been proven using wind suction tests according to the test criteria of ETAG 006. As a result from the tests, RHEINZINK has developed special clips and clip rails. These fixing elements consist of a special alloy and are factory pre-punched (hole diameter = 5 mm) in order to ensure the correct positioning of the fixing means. Roughened, hot-dip galvanised roofing nails 2.8 x 25 mm were used for the wind suction tests.

The maximum possible cover width of the flat-lock tiles and the required metal thickness are determined by the wind load on the building. The selection/ arrangement of the short clips (50 mm wide) and/or clip rails (600 mm wide) takes place adapted to the tile size and the wind load.

Short clip 50 x 75 mm

Clip rail 600 x 75 mm

Cover width x cover length	333 x 600						400 x 800						500 x 1000					
Area, m²	0.20						0.32						0.50					
Metal thickness, mm	0.70		0.80		1.00		0.70		0.80		1.00		0.70		0.80		1.00	
Fixing clip	SC	-	SC	-	SC	-	SC	CR	SC	CR	SC	CR	SC	CR	SC	CR	SC	CR
Number of clips/ spacing in mm	3/ 225	-	3/ 225	-	3/ 225	-	4/ 216.7	1	4/ 216.7	1	5/ 163	1	6/ 170	1	6/ 170	1	6/ 170	1
perm. w_d in kN/m²	-4.18	-	-4.50	-	-4.50	-	-2.01	-4.59	-3.00	-4.59	-4.69	-4.59	-0.82	-2.94	-1.23	-2.94	-2.40	-2.94

Cover width x cover length	500 x 3000						600 x 1500				600 x 2000			
Area, m²	1.50						0.90				1.20			
Metal thickness, mm	0.70		0.80		1.00		0.80		1.00		0.80		1.00	
Fixing clip	SC	CR	SC	CR	SC	CR	SC	CR	SC	CR	SC	CR	SC	CR
Number of clips/ spacing in mm	17/ 178.1	4	17/ 178.1	4	17/ 178.1	4	10/ 150	2	10/ 150	2	14/ 264.3	3	14/ 264.3	3
perm. w_d in kN/m²	-0.82	-3.92	-1.23	-3.92	-1.23	-3.92	-0.59	-3.27	-1.16	-3.27	-0.59	-3.68	-1.16	-3.68

SC: Short clip
CR: Clip rail

The tables show the number of clips required for the long side of the tile.
A factor of safety of 1.5 has been allowed for. The short side of each tile requires 2 or 3 additional clips.
From a cover width of 500 mm 3 clips are required. Installation according to example 2.

2.1.4 Shapes and Seam Offset

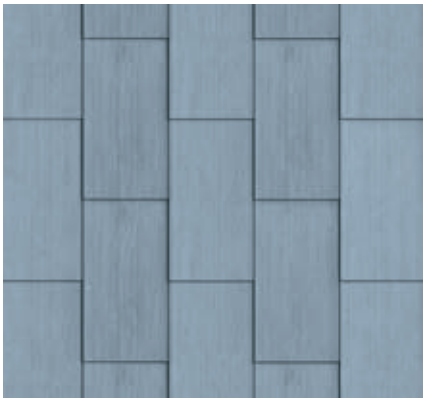
The design possibilities are virtually endless. It is up to the designer whether to use 1/2 staggered, a "random structure" or a 1/3 or 1/4 staggered.

Another variation is the formation of a cross-joint. The cross-joint is a visually calmer design.

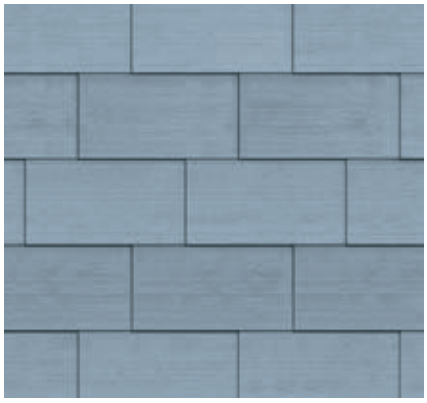
The random structure is borrowed from nature. It is an extremely vibrant design visually, which integrates the adaptor tiles discreetly into the overall design. Because of the flexibility of the diverse baywidths, it is ideally suited for the grid system in renovations.

A diagonally staggered installation has a dynamic, vibrant and exciting energy.

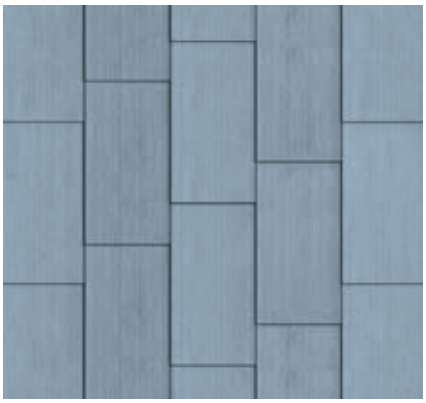
In addition to rectangular and square formats, tiles in parallelogram form are also possible in the facade, which is another design possibility of this versatile installation system.



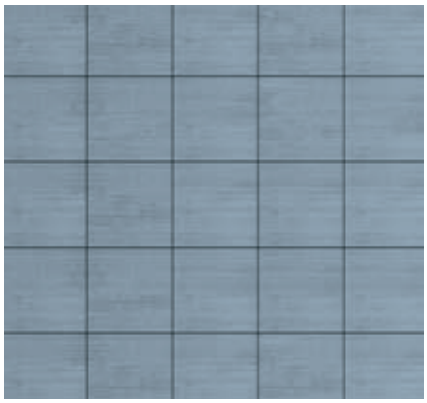
1/2 staggered



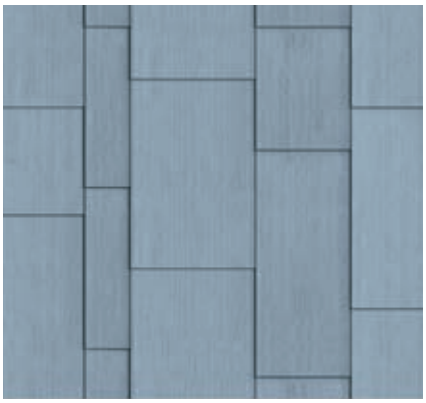
1/3 staggered



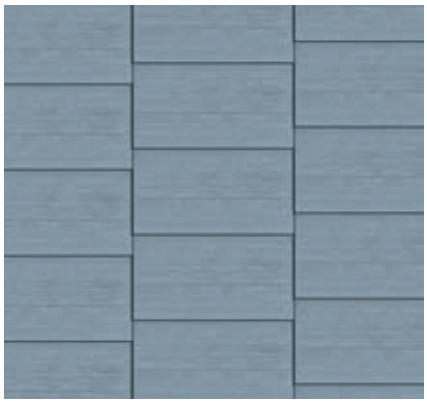
1/4 staggered



Cross-joint



Random structure



Diagonal staggered

Cross-joint

1/4 staggered

Private residence, Strasswalchen, Austria

Rosevia Resort, Jastrzębia Góra, Poland

2.1.5 Thermal Expansion

As a rule flat-lock tiles are indirectly fixed into the substructure using tested RHEINZINK clips or clip rails. The general waviness typical of thin metal sheeting depends on the thickness of the metal and the source material selected.

RHEINZINK material 1.00 mm thick is less wavy than 0.7 mm or 0.8 mm thick titanium zinc. Sheeting is used as standard for the production of RHEINZINK-Flat-Lock Tiles. This in turn reduces the effect of the tendency towards waviness. Indirect fixing allows the tiles to expand freely.

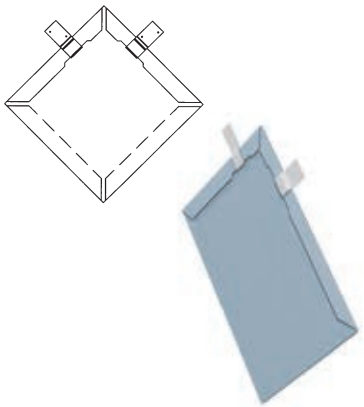
2.2 RHEINZINK-Small Tiles

The RHEINZINK small tile range includes the MULTI-FORM tiles, square and diamond tiles. Apart from the traditional areas of application on listed buildings, these various formatted tiles have also established themselves in the field of contemporary architecture. Due to their small size, not only can they be used for roofs and façades, but also on curved/rounded surfaces requiring small radiuses. The small tile also serves as a popular option for the maintenance-free cladding of architectural details such as dormers, chimney tops or fascias on eaves, verges or ridges.

2.2.1 Profile Geometry RHEINZINK-Square Tiles

Metal thickness: s = 0.70 mm
Face width = Cover width
Cover width: 325 x 325 mm
Demand: 10 pc. per m²
Weight: 8.06 kg per m²

We are happy to advise you on other dimensions.



Application for outside Areas

- Facades
- Roofs
- Soffits
- Dormers
- Parapets
- Cladding of roof edges

Application for inside Areas

- Walls
- Ceilings

Product Lines:
RHEINZINK-CLASSIC bright rolled*
RHEINZINK-prePATINA blue-grey/ graphite-grey*

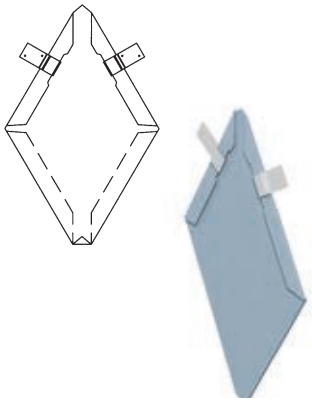
2.2.1.1 Installation Direction/ Installation Instructions

- Installation direction from bottom to top
- Installation with cross-joint possible
- Fixing with tested RHEINZINK-clips
- The film over the visible surface is to be removed immediately after installation.

2.2.2 Profile Geometry RHEINZINK-Diamond Tiles

Metal thickness: s = 0.70 mm
Face width = Cover width
Cover width: 330 x 228 mm
Demand : 28 pc. per m²
Weight: 9.88 kg per m²

We are happy to advise you on other dimensions.



Application for outside Areas

- Facades
- Roofs
- Soffits
- Dormers
- Parapets
- Cladding of roof edges

Application for inside Areas

- Walls
- Ceilings

Product Lines:
RHEINZINK-CLASSIC bright rolled*
RHEINZINK-prePATINA blaugrau/ schiefergrau*

2.2.2.1 Installation Direction/ Installation Instructions

- Installation direction from bottom to top
- Installation with cross-joint possible
- Fixing with tested RHEINZINK-clips
- The film over the visible surface is to be removed immediately after installation.

2.2.3 Profile Geometry
RHEINZINK-MULTI-FORM

Metal thickness: s = 0.70 mm, on request 0.80 mm

Profile geometry and dimensions:

Diamond Tile

Min. face dimension	302 x 210 mm;	26.74 pc. per m²
Max. face dimension	685 x 428 mm;	6.26 pc. per m²

Square Tile

Min. face dimension	200 x 200 mm;	25.00 pc. per m²
Max. face dimension	530 x 530 mm;	3.56 pc. per m²

Rectangular Tile

Face width and height min/max:	200/530 mm

Parallelogram

Face width min/max:	200/430 mm
Face height min/max:	180/370 mm

Application for outside Areas
- Facades
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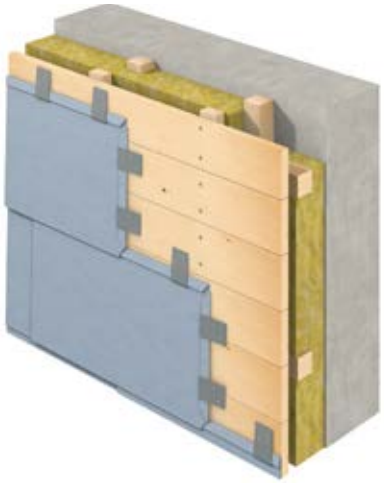
Application for inside Areas
- Walls
- Ceilings

Product Lines:
RHEINZINK-CLASSIC bright rolled*
RHEINZINK-prePATINA blaugrau/ schiefergrau*
RHEINZINK-artCOLOR

2.2.3.1 Installation Direction/ Installation Instructions
- Installation direction from bottom to top
- Cross joints are possible with horizontally installed square tiles and rectangular tiles
- Diamond tile generally attached with one clip
- Square tile generally attached diagonally
  < 400 mm construction width with one clip
  > 400 mm with two clips
- Starter tiles deliverable upon request
- Clips are pre-clamped onto folds

* on request with protective plastic film, other surface qualities on request

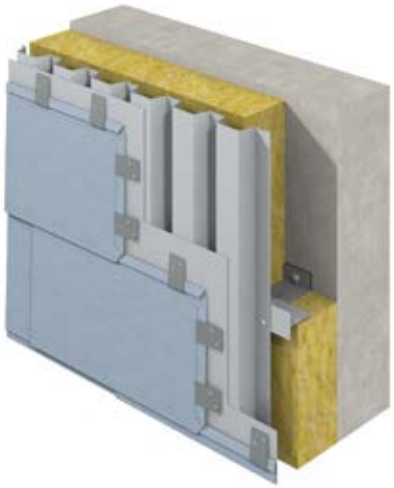
2.3 Substructures



Sketch Timber Substructure
(Example with tile size 333/600 mm)

Advantages:
- Tiles can be fastened at all points of the substructure
- Full-surface support provides protection from impact

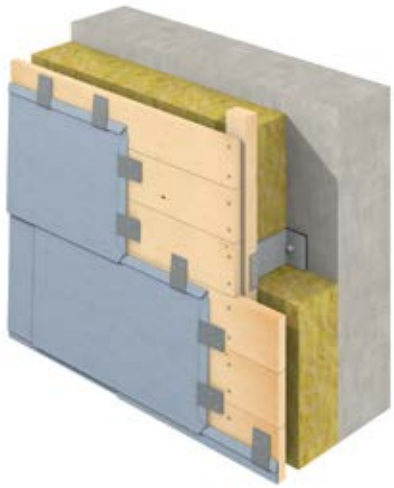
Disadvantages:
- The cost of installing thick insulation material is very high
- The cost and timing involved to adjust positive and negative tolerances on the supporting structure is high
- Only B2-designs are possible (Fireproof Classification B2, DIN 4102)



Sketch Metal Substructure
(Example with tile size 333/600 mm)

Advantages:
- Fireproof design of A1-facades is possible (Fireproof Classification A1, DIN 4102)
- The cost of installing thick insulation material is reasonable
- Tolerances in the supporting structure can be adjusted easily

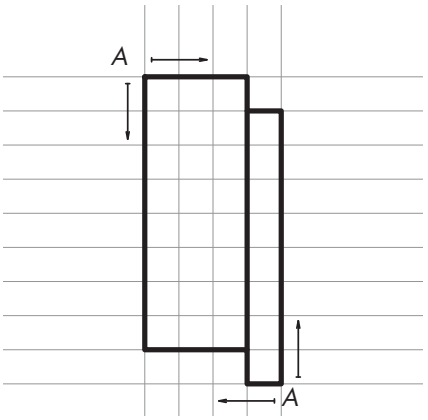
Disadvantages:
- Increased cost of installation



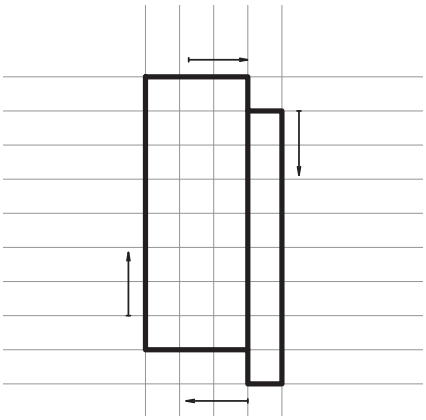
Sketch Combined Substructure of Timber/Metal
(Example with tile size 333/600 mm)

Advantages:
- The cost of installing thick insulation materials (> 120 mm) is reasonable
- Full-surface support provides protection from impact
- Tiles can be fastened at all points of the substructure

Disadvantages:
- Fireload because of the timber content the facade construction

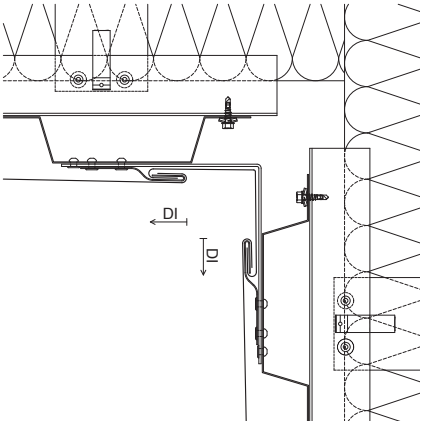


Installation from various starting points

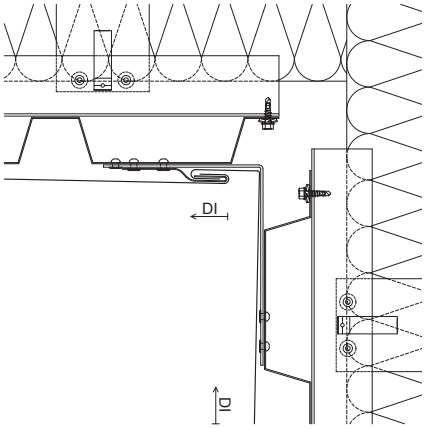


Continuous installation

2.4 Installation Sequences
Direction of Installation (DI)
Start at the left and at the right
Flat-lock tiles are installed from the bottom to the top. The direction of installation – from right to left or from left to left to right - is determined by the appearance desired. Building tolerances can only be balanced slightly using individual flat-lock tiles. Tolerance equalization by using adaptor tiles should not exceed 15 mm of the overall height, in order not to impede the aesthetics. The overall length should be proportional to the overall height.



Inside corner
The inside corner profile allows installation to be done to the left and to the right using two different installation teams.



Inside corner using adaptor tiles
When this type of installation is used, a continuous horizontal visual orientation is accentuated.

2.5 Detail Design

The design and quality of details determines the appearance of the facade. Details such as building corners, window reveals, roof edges, bases, as well as connections and terminations can be transformed with special tiles or building profiles. It is an indication of a good overall design, if the components are well-coordinated.
Three fundamental design variations are indicative of this.

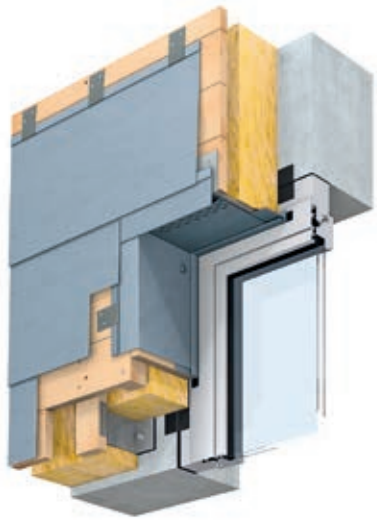
Width of building Profile or Section

The spectrum ranges from sharp-edged profiles to profiles that are several centimeters wide. Exact planning makes it possible to design all of the connection and structural profiles the same, or, to vary these proportionately, as desired.

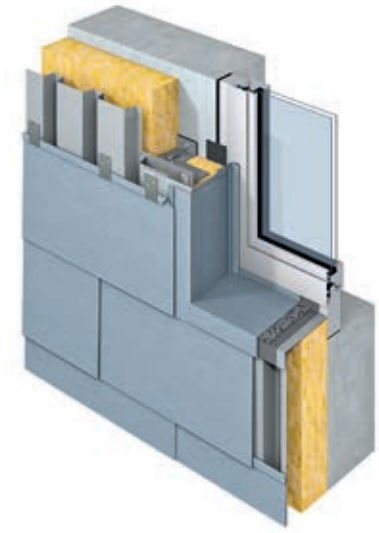
Projection of Profiles

Depending on the detail design, profiles either protrude from the facade surface or are flush with it. The overview clarifies the principle of flush connections:

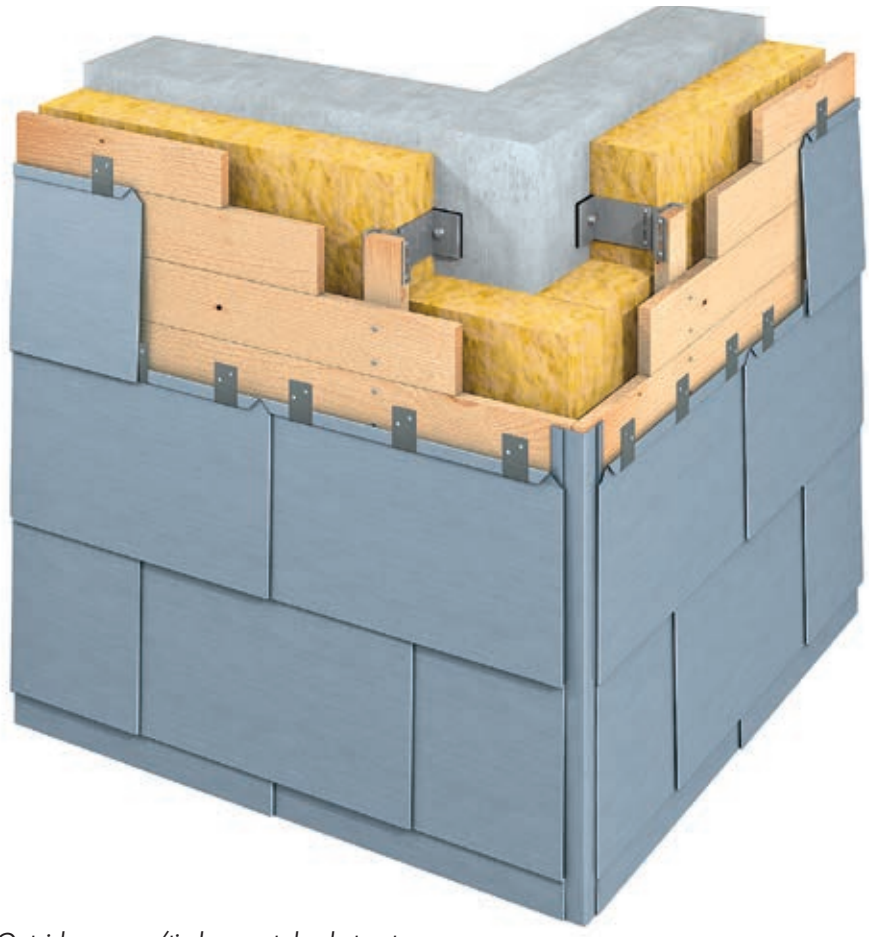
- Window lintel
  Installation of RHEINZINK-Flat-Lock Tile on full-surface timber boarding. Lintel and reveal profiles form a frame with a face of ca. 60 mm. The lintel profile is partially perforated and comes with a drip edge.
- Windowsill
  The frame width of the lintel and reveal panels is determined by the face of the windowsill. In this case, the substructure is designed as Fireproof Classification A1 (DIN 4102).
- Outside corner
  The outside corner profile corresponds directly with the window connection profiles. Due to the flush design, the visual affect is very conservative.



Window lintel/
Timber-metal-substructure



Window reveal/
Metal-substructure



Outside corner/timber-metal-substructure
(Example with tile size 333/600 mm)

2.6 Details

2.6.1 General Instructions

Third party Trades
Contracting third party trades for the facade cladding connections is necessary and unavoidable in most cases, to ensure impermeability. Because of the warranty obligations on the part of the craftsman, sub-contracting connections and fasteners to third party trades (e.g. windows), must always be approved by the project manager of the trade in question.

Wall Construction
Layered construction is commensurate with a rear-ventilated metal facade. A solid brick or concrete wall serves as the supporting structure. Of course, it can also be substituted with a column or steel support structure.

Substructure
see Chapter 2.3

Load Effect
The surface loads (wind suction/wind pressure), which affect the facade and the distance of the fasteners associated therewith, should be taken from the current Sheet Metal and Roofing Code.
We would be happy to advise you on the system loads of RHEINZINK tiles for individual cases.

Installation Instructions
Detailed discussion pertaining to installation sequences has been left out deliberately, because in practical terms, these are heavily influenced by the supporting trades such as window and steel construction, etc.
Installation sequences should be determined separately for each project, taking into account the interfaces and installation sequence for each project. Noteworthy deviations are pointed out for different details.

Drip Edges
The requirements as set out by standards and regulations must be taken into account for detail design, for example, drip edges over stucco facades (soiling as a result of atmospheric deposits).

Diagonal Installation
RHEINZINK-Flat-Lock Tiles can also be used in a diagonal facade segmentation. In most instances, the technical design of the structure, in this case, corresponds to that of horizontal installation.

2.6.2 Pictogram

Horizontal sections (see chapter 2.9)
H1: Outside corner
H2: Inside corner
H3: Window reveal
H4: Joint/lengthwise expansion separation

Vertical section (see chapter 2.9)
V1: Base
V2: Windowsill
V3: Window lintel
V4: Roof edge

Variations
In some cases, variations are shown for the same detail (e.g. window lintel with/without sun shade). These are marked and explained with additional texts or drawings.

Applicability
The details and designs outlined here are suggestions, which were carried out on various projects. The detail suggestions must always be coordinated responsibly, taking into account the applicable standards and stipulations, as well as the designer's intentions for the project.

Building height	Drip edge distance mm	Dripe edge dictance to rendering mm	Cover required*
h < 8	≥ 20	≥ 40	≥ 50
8 ≤ h ≤ 20	≥ 20	≥ 40	≥ 80
h > 20	≥ 20	≥ 40	≥ 100

Drip edge distances and overhang dimensions for copings and flashings.

* The overhang dimensions also apply on the roof side. If the roofing foil is routed to the front edge of the facade without interruption, 50 mm overhang generally apply independent from the building height.

2.7 Planning Grid

The Grid principle in Facade Construction

A metal facade consists of components, which have been industrially manufactured with high degree of production precision.
These components determine the aesthetics through precise horizontal and vertical segmentation.
Penetrations and terminations, which are not coordinated with the axial segmentation are obtrusive.
The following instructions serve to provide for proper planning of facade segmentation:

Principles

Generally speaking, a distinction must be made between new buildings and renovations when discussing grid difficulties.

In the case of new buildings, the facade grid can be matched to the design; penetrations such as windows, chimney pipes, etc. are always ancillary to the grid.

However, when it comes to renovations, the penetrations (e.g. windows) are immovable, so that the grid must be coordinated with the penetrations. Aesthetically speaking, a random structure is best suited for this.
The following principles apply to grid deviations:

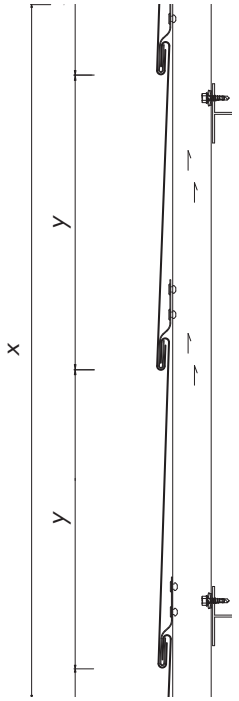
- One should start or end with a whole module (x or y) at the transitions
- Dimensional discrepancies of maximum 15 mm (deviations from module x or y on two-dimensional profiles) are not noticeable.
- Dimensional tolerances (dimensional change of x or y) which cannot be corrected, must be compensated in the windowsill or roof edge area.
- Adaptations or displacements of grid heights (height coordinates) can only be carried out in the roof edge and/or base area.

Module Y

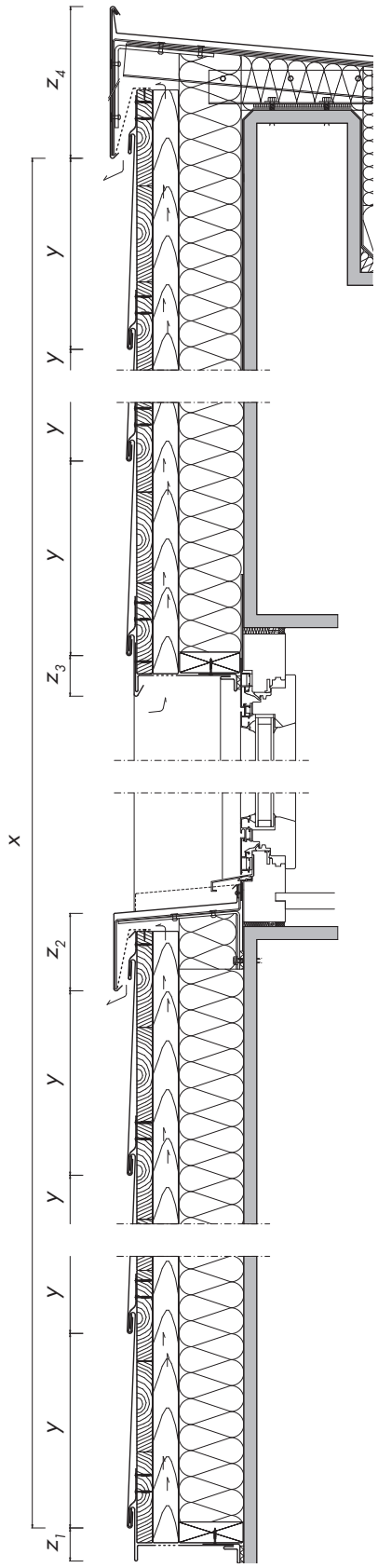
Y corresponds to the smallest unit of the facade segmentation, which repeats itself, e.g. the baywidth. Grid module Y determines the precise location of penetrations and transitions. In the case of flat-lock tiles, dimension y can be produced with cover widths of 333 mm to 800 mm, depending on the project. Dimensions > 600 mm must be discussed and agreed upon with RHEINZINK's Department of Application Technology.
The cover width (y) is determined by the face or surface view of the tile from drip edge to drip edge.

Dimension X

All of the segments marked with an x are a whole multiple of the selected module y and, as a rule, correspond to the cover width of a tile.



Random structure, horizontal installation



Position Z4: Roof Edge
Grid for new Buildings, respectively Renovations

If the height coordinates of the roof edge do not fit into the grid selected, the following corrective measures may be selected:

- Change the roof edge profile/slope
- Lower or raise the parapet or the roof edge board.

As a rule, both of these possibilities only exist if the flat roof is being renovated at the same time.

- Changing module X or Y

Position Z3: Window lintel
Position Z2: Windowsill
Grid Planning for new Buildings

- Determine openings of building shell
- Establish window frame profiles
- Establish location of window
- Establish profile geometry of window connections
- Develop design details within the grid

Grid planning for renovation projects

- Establish window frame profile, new/old
- Establish location of window, new/old
- Establish the profile geometry of window connections
- Establish design details within the grid

If the location of the window or detail does not fit into the grid, the following corrective measures may be selected:

- Change the profile geometry of the window lintel profile or the windowsill
- Adapt to the height of the window
- Change the slope of the windowsill
- Change the X or Y module

Position Z1: Base
Grid Planning for new Buildings, respectively Renovations

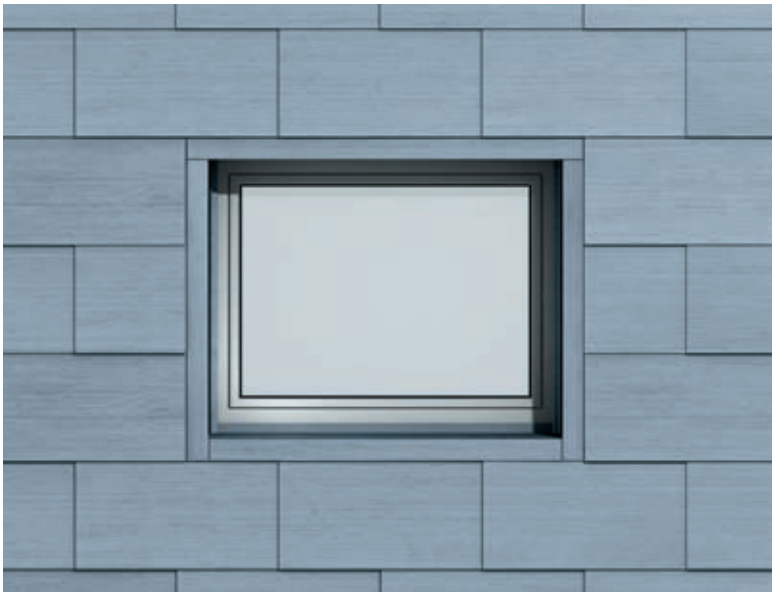
- Define potential deviations toward the top or the bottom
- Establish the profile geometry of the base detail

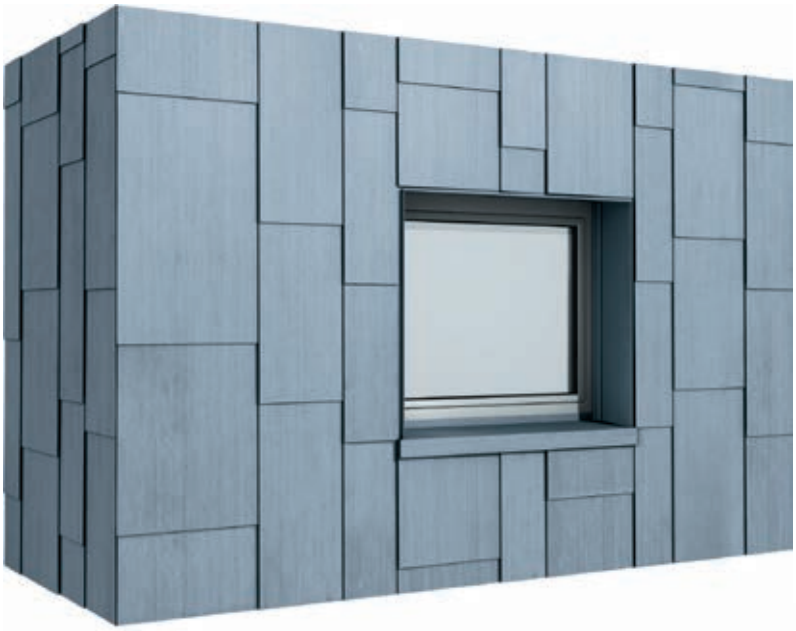
If the location of the base does not fit into the grid, the following corrective measures may be selected:

- Move the facade connection toward the top or the bottom
- Change the profile geometry of the base profile
- Lower or raise the plinth masonry, if it has been planned for or if it already exists

2.8 Examples of Applications
RHEINZINK - Square Tiles
Diagonal installation with pre-rounded window profiles

RHEINZINK - Flat-Lock Tile
Horizontal installation, 1/2 staggered, flush window profile, profile width > 60 mm; baywidth and bay length of flat-lock tile coordinated with overall design.



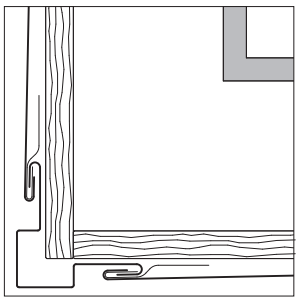


RHEINZINK - Flat-Lock Tile
Vertical installation, random structure, window surround and outside corner – very conservative visually.

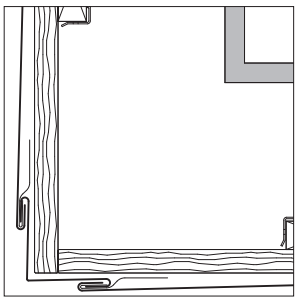
RHEINZINK - Flat-Lock Tile
Horizontal installation, window profiles and outside corner – matched to fit the face width.

2.9 Tile Systems Design, Facade, horizontal Sections

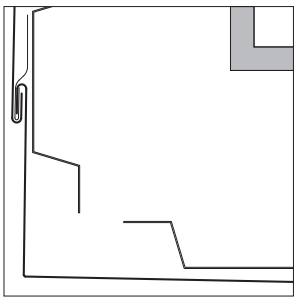
Detail H1: Outside corner



H1.1

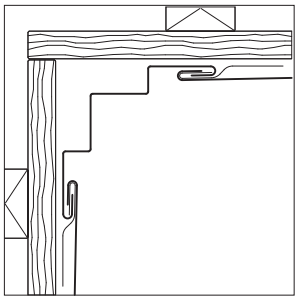


H1.2

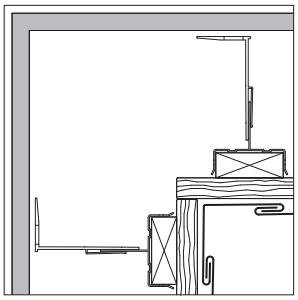


H1.3

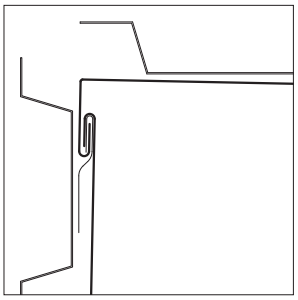
Detail H2: Inside corner



H2.1

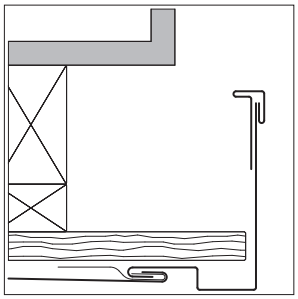


H2.2

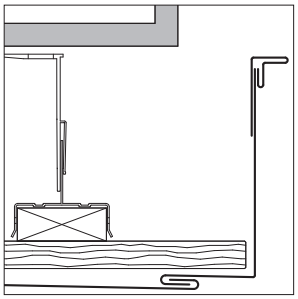


H2.3

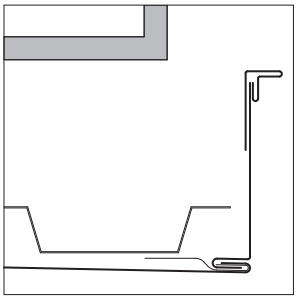
Detail H3: Windows reveal



H3.1

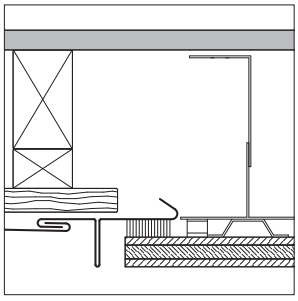


H3.2

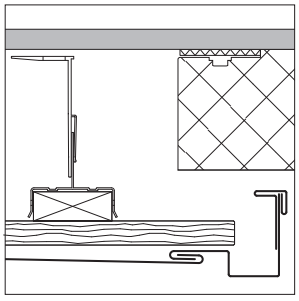


H3.3

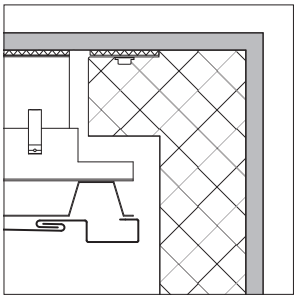
Detail H4: Connections/Terminations



H4.1



H4.2



H4.3

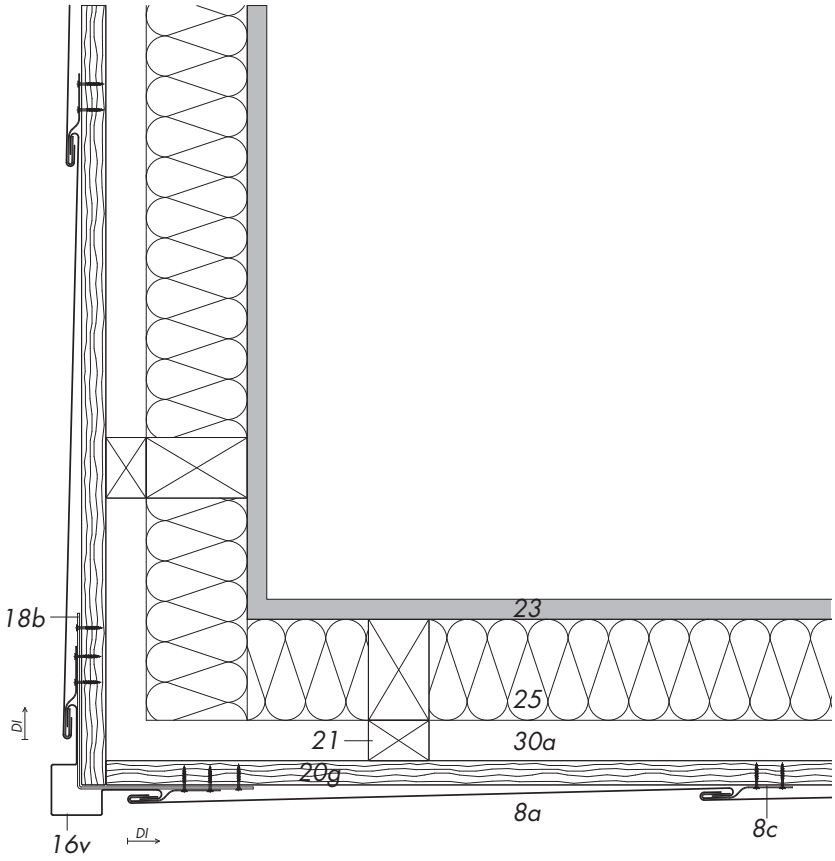
Timber substructure

Timber-metal-substructure

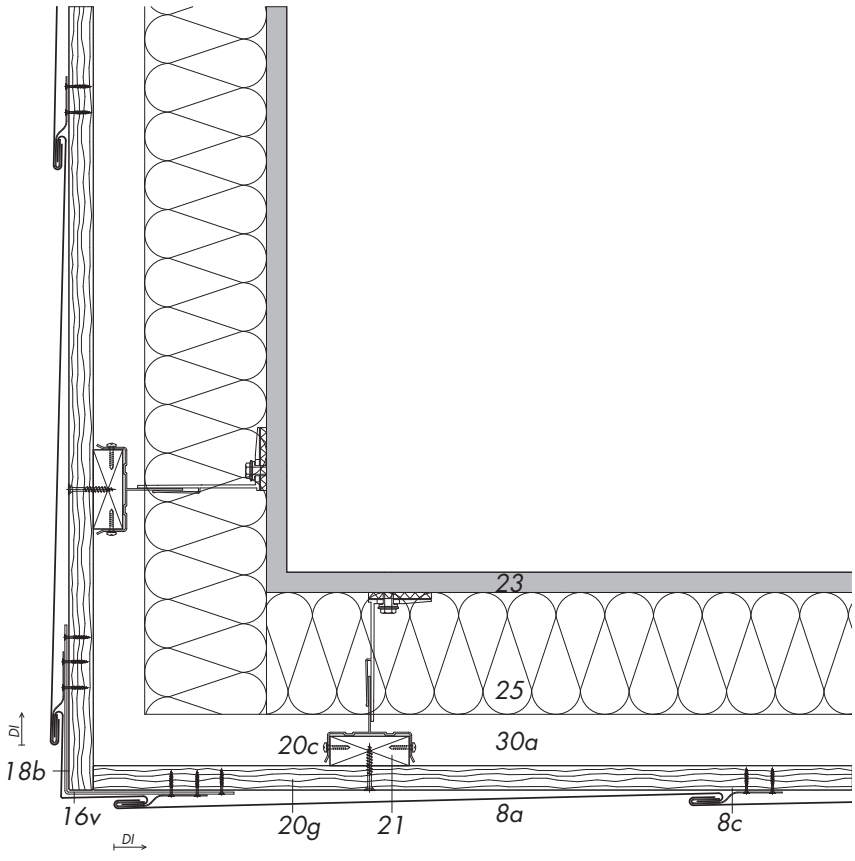
Metal substructure

DESIGN
DETAIL H1, OUTSIDE CORNER

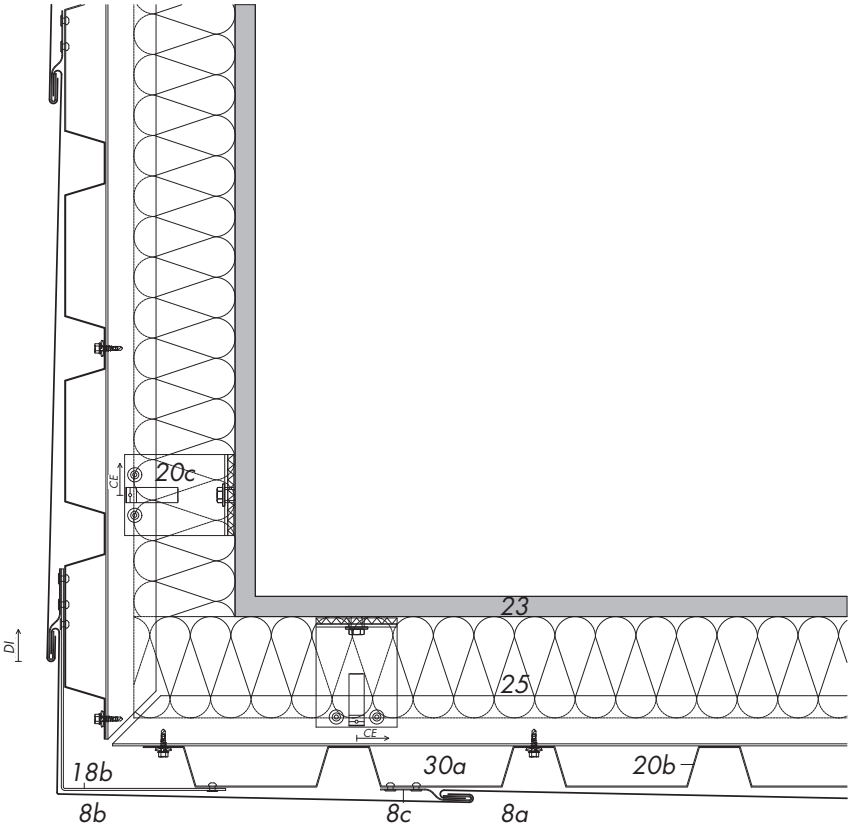
H1.1



H1.2



H1.3



Detail H1: Outside Corner

8 RHEINZINK-Tile
- a Standard tile
- b Fitting tile
- c Short clip/clip rail

16 RHEINZINK-Building Profile
- v Corner profile

18 Support Profile
- b Aluminium

20 Substructure
- b Metal, trapezoidal steel deck with coating*
- c Bracket system, with thermal break*
- g Softwood boarding, thickness min. 24 mm, width max. 100-160 mm**

21 Batten/Squared Timber

23 Supporting Structure

25 Thermal Insulation

30 Ventilated Air Space
- a Depth of air space ≥ 20 mm

DI Direction of installation

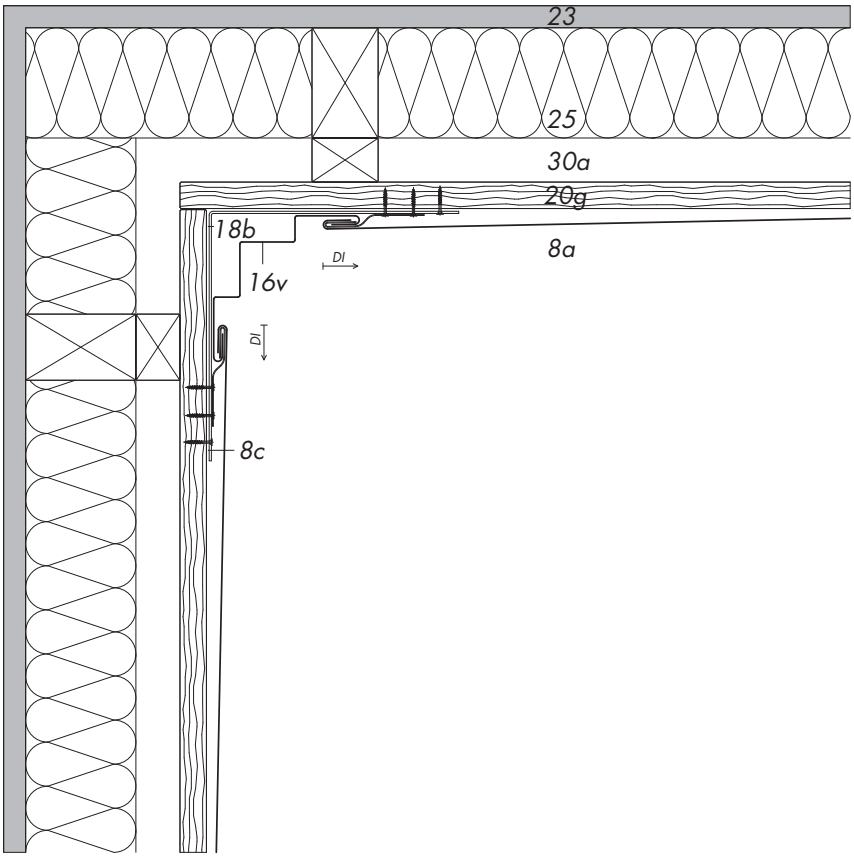
CE Controlled expansion of substructure

* Manufacturers' guidelines must be observed

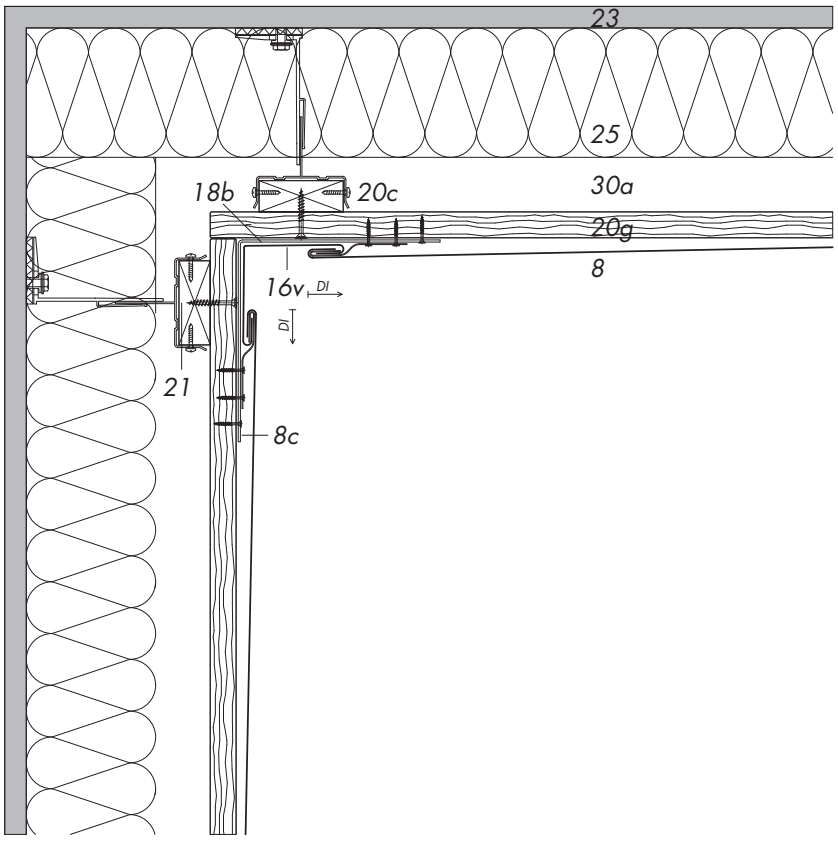
** With increased performance requirements the width of the boards should be max.100 mm.

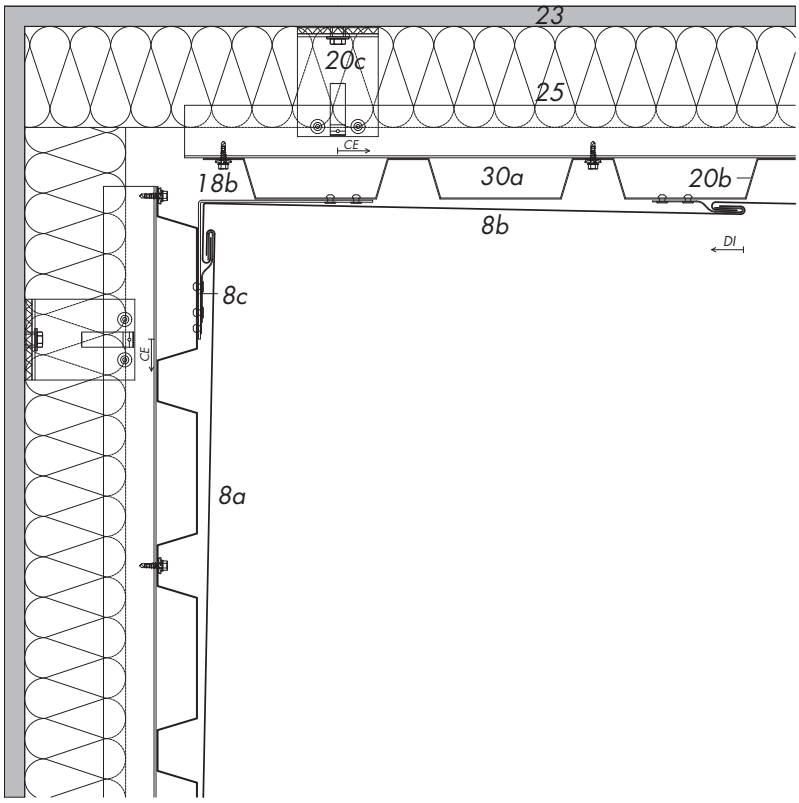
DESIGN
DETAIL H2, INSIDE CORNER

H2.1



H2.2





H2.3

Detail H2: Inside Corner

8 RHEINZINK-Tile
- a Standard tile
- b Fitting tile
- c Short clip/clip rail

16 RHEINZINK-Building Profile
- v Corner profile

18 Support Profile
- b Aluminium

20 Substructure
- b Metal, trapezoidal steel deck with coating*
- c Bracket system, with thermal break*
- g Softwood boarding, thickness min. 24 mm, width max. 100-160 mm**

21 Batten/Squared Timber

23 Supporting Structure

25 Thermal Insulation

30 Ventilated Air Space
- a Depth of air space ≥ 20 mm

DI Direction of installation

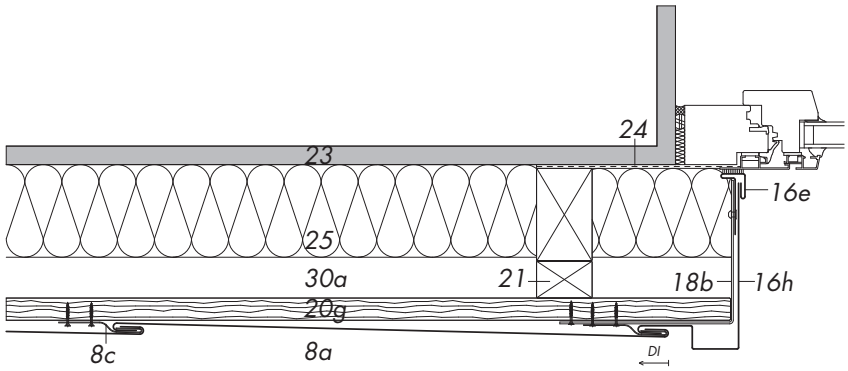
CE Controlled expansion of Substructure

* Manufacturers' guidelines must be observed

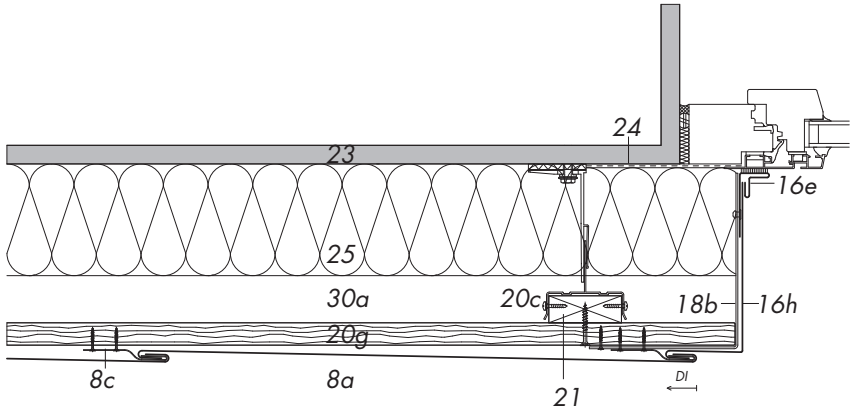
** With increased performance requirements the width of the boards should be max.100 mm.

DESIGN
DETAIL H3, WINDOW REAVEAL

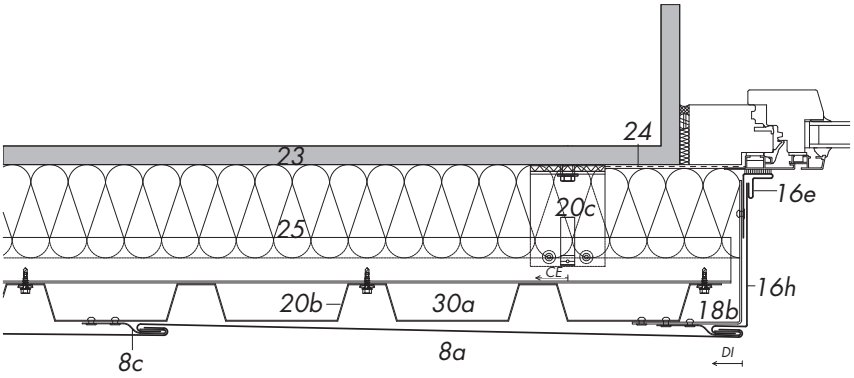
H3.1



H3.2



H3.3



Detail H3: Window Reveal

8 RHEINZINK-Tile
- a Standard tile
- c Short clip/clip rail

16 RHEINZINK-Building Profile
- h Jamb profile
- e Receiver strip, with sealant tape

18 Support Profile
- b Aluminium

20 Substructure
- b Metal, trapezoidal steel deck with coating*
- c Bracket system, with thermal break*
- g Softwood boarding, thickness min. 24 mm, width max. 100-160 mm**

21 Batten/Squared Timber

23 Supporting Structure

24 Window Foil

25 Thermal Insulation

30 Ventilated Air Space
- a Depth of air space ≥ 20 mm

DI Direction of installation

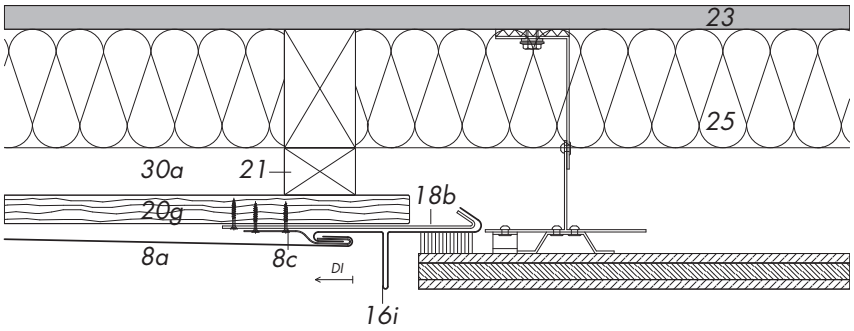
CE Controlled expansion of substructure

* Manufacturers' guidelines must be observed

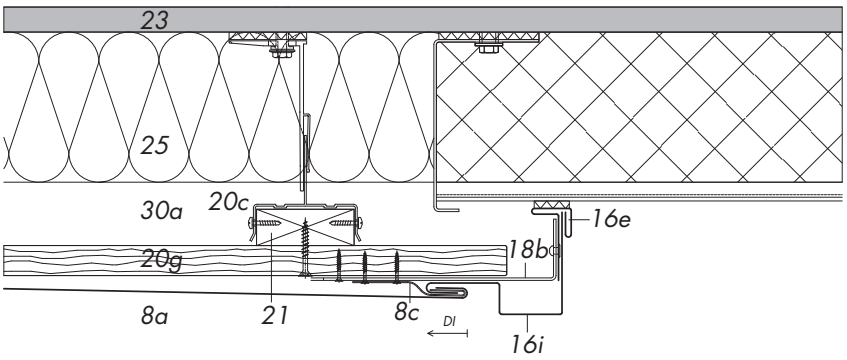
** With increased performance requirements the width of the boards should be max.100 mm.

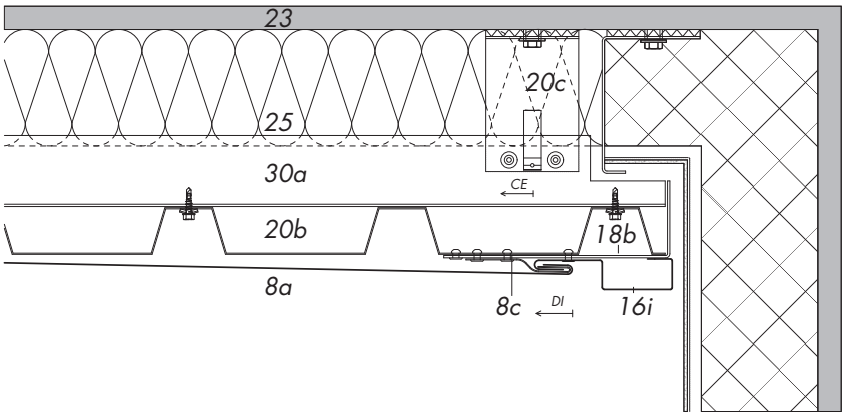
DESIGN
DETAIL H4, CONNECTIONS/TERMINATIONS

H4.1



H4.2





H4.3

Detail H4: Connections/Terminations

8 RHEINZINK-Tile
- a Standard tile
- c Short clip/clip rail

16 RHEINZINK-Building Profile
- e Receiver strip, with sealant tape
- i Connection/termination profile

18 Support Profile
- b Aluminium

20 Substructure
- b Metal, trapezoidal steel deck with coating*
- c Bracket system, with thermal break*
- g Softwood boarding, thickness min. 24 mm, width max. 100-160 mm**

23 Supporting Structure

25 Thermal Insulation

30 Ventilated Air Space
- a Depth of air space ≥ 20 mm

DI Direction of installation

CE Controlled expansion of Substructure

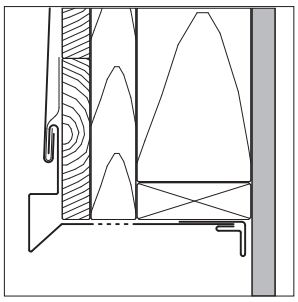
* Manufacturers' guidelines must be observed

** With increased performance requirements the width of the boards should be max.100 mm.

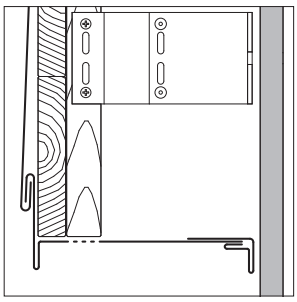

DIE FLASCHNEREI

2.9 Tile Systems Design, Facade, vertical Sections

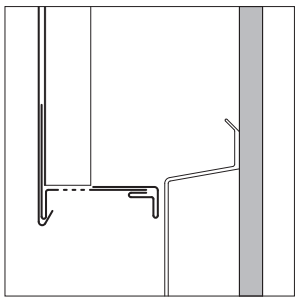
Detail V1: Base



V1.1

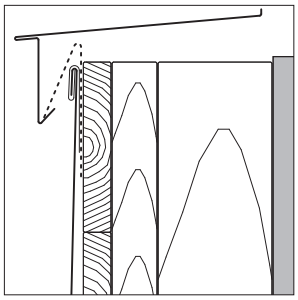


V1.2

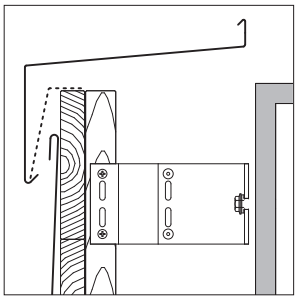


V1.3

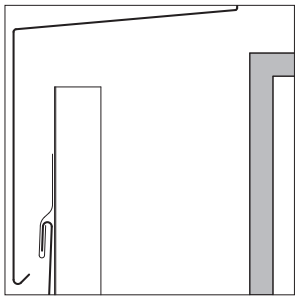
Detail V2: Window sill



V2.1

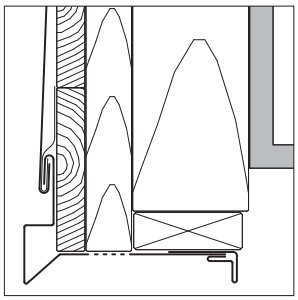


V2.2

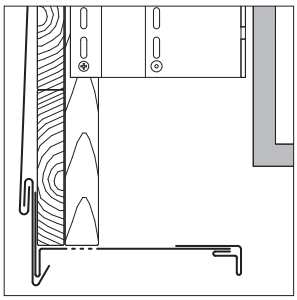


V2.3

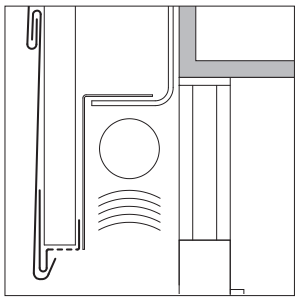
Detail V3: Window lintel



V3.1

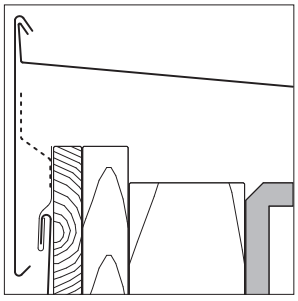


V3.2

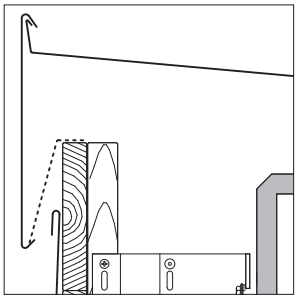


V3.3

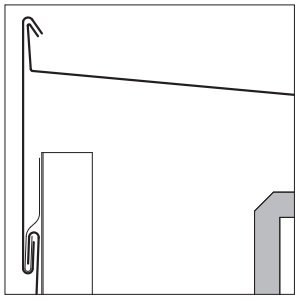
Detail V4: Roof edge



V4.1



V4.2



V4.3

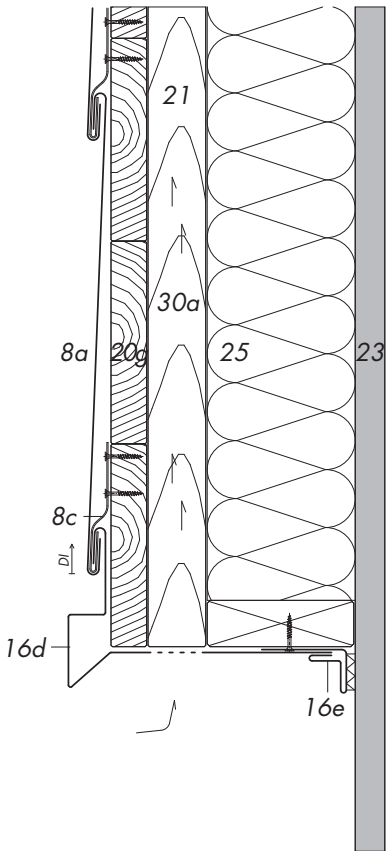
Timber substructure

Timber-metal-substructure

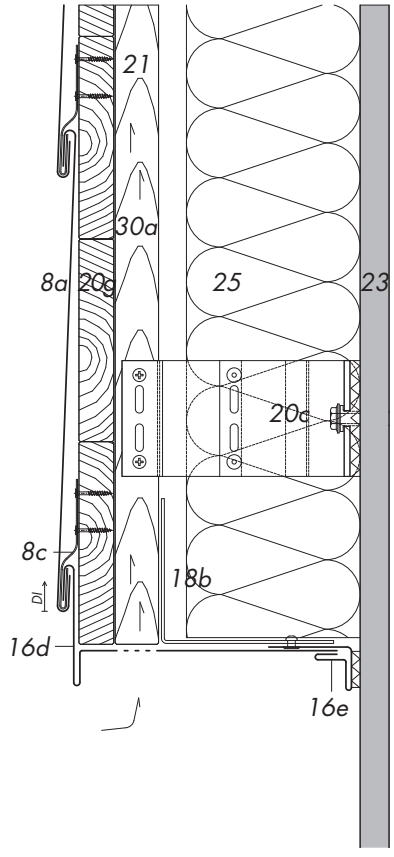
Metal substructure

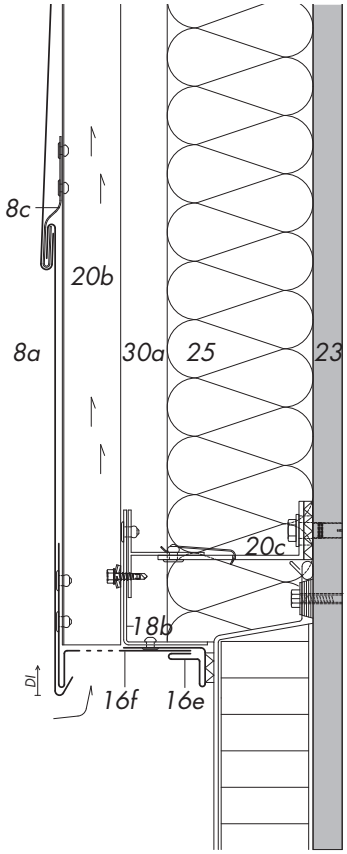
DESIGN
DETAIL V1, BASE

V1.1



V1.2





V1.3

Detail V1: Base

8 RHEINZINK-Tile
- a Standard tile
- c Short clip/clip rail

16 RHEINZINK-Building Profile
- d Base profile, partially perforated
- e Receiver strip, with sealant tape
- f Base trim, partially perforated

18 Support Profile
- b Aluminium

20 Substructure
- b Metal, trapezoidal steel deck with coating*
- c Bracket system, with thermal break*
- g Softwood boarding, thickness min. 24 mm, width max. 100-160 mm**

21 Batten/Squared Timber

23 Supporting Structure

25 Thermal Insulation

30 Ventilated Air Space
- a Depth of air space ≥ 20 mm

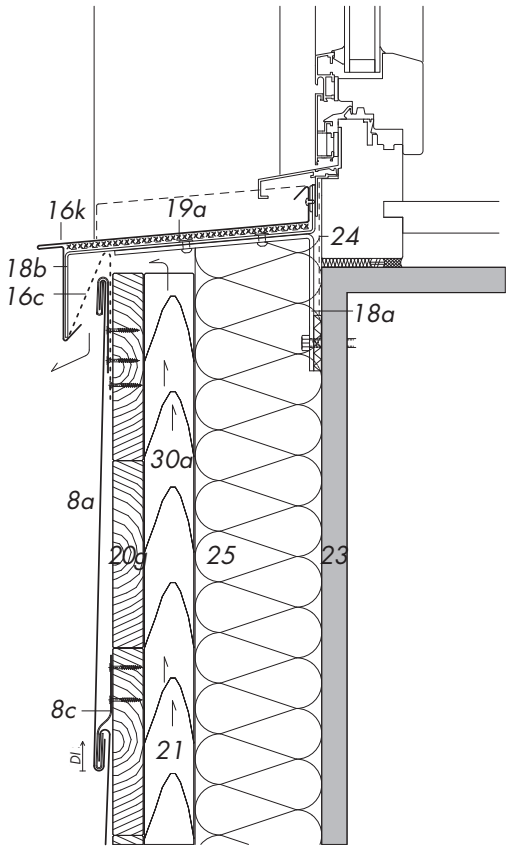
DI Direction of installation

* Manufacturers' guidelines must be observed

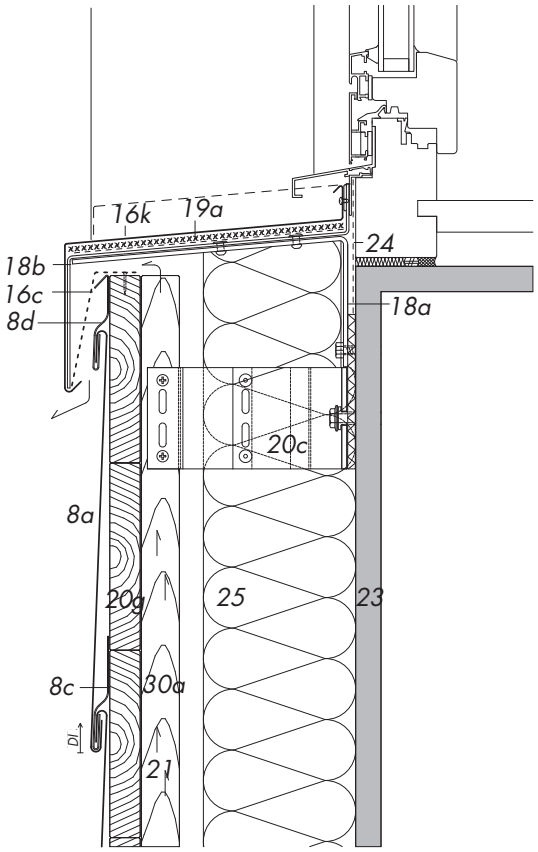
** With increased performance requirements the width of the boards should be max.100 mm.

DESIGN
DETAIL V2, WINDOW SILL

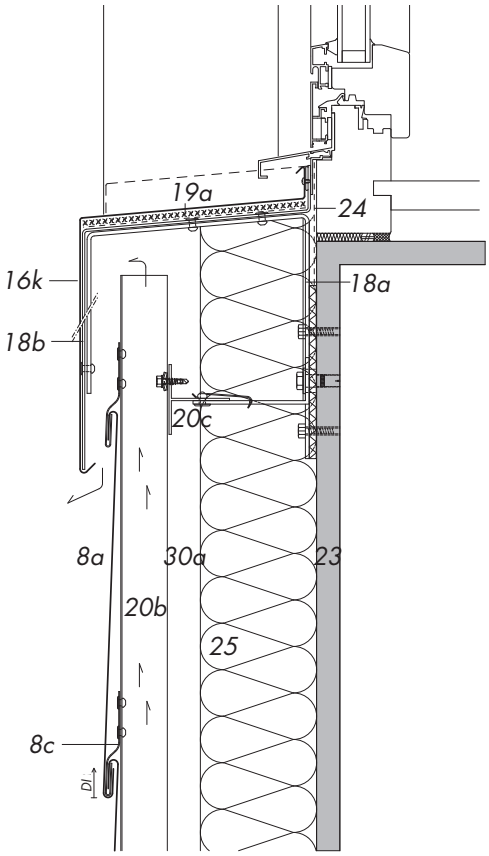
V2.1



V2.2



V2.3



Detail V2: Window Sill

8 RHEINZINK-Tile
- a Standard tile
- c Short clip/clip rail
- d Long clip, continuous with water drip

16 RHEINZINK-Building Profile
- c Perforated strip
- k Window sill coping, ≥ 3° slope

18 Support Profile
- a Galvanised steel, support angle with thermal break
- b Aluminium

19 Separating Layer
- a Structured underlay VAPOZINC
- ■ Alternative: glued to support profile over entire surface

20 Substructure
- b Metal, trapezoidal steel deck with coating*
- c Bracket system, with thermal break*
- g Softwood boarding, thickness min. 24 mm, width max. 100-160 mm**

21 Batten/Squared Timber

23 Supporting Structure

24 Window Foil

25 Thermal Insulation

30 Ventilated Air Space
- a Depth of air space ≥ 20 mm

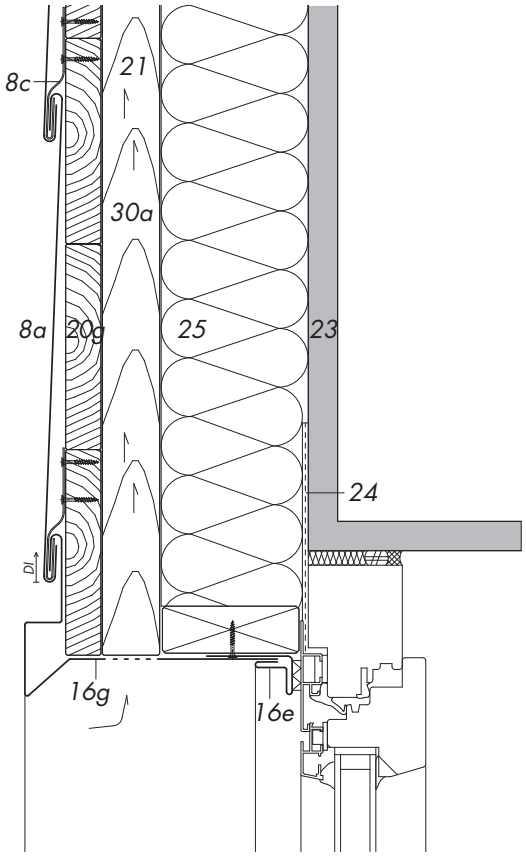
DI Direction of installation

* Manufacturers' guidelines must be observed

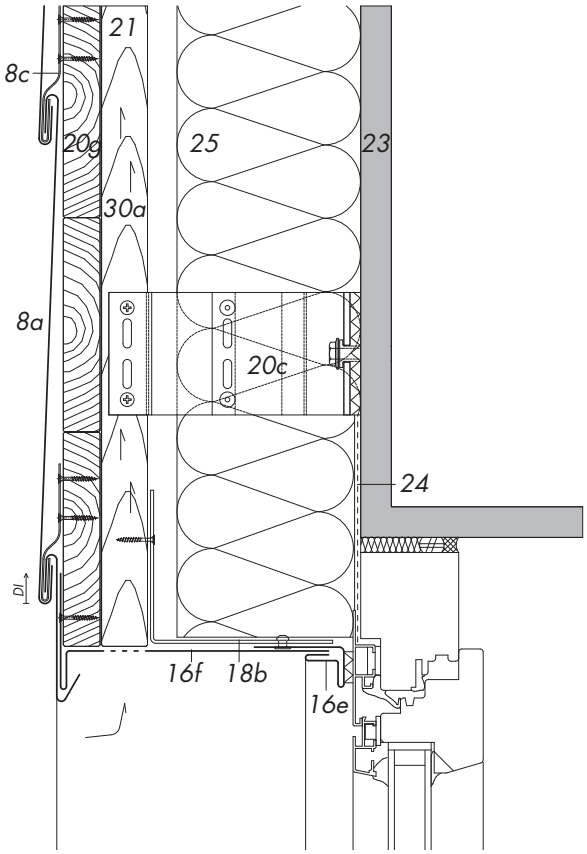
** With increased performance requirements the width of the boards should be max.100 mm.

DESIGN
DETAIL V3, WINDOW LINTEL

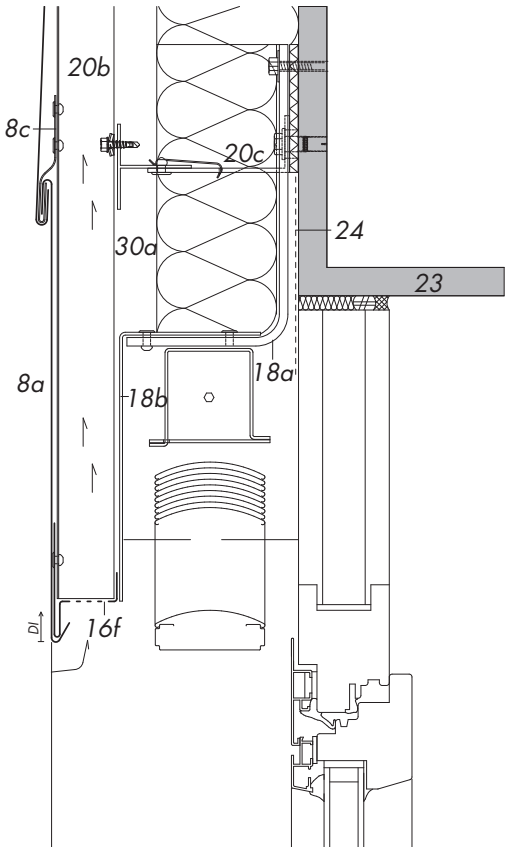
V3.1



V3.2



V3.3



Detail V3: Window Lintel

8 RHEINZINK-Tile
- a Standard tile
- c Short clip/clip rail

16 RHEINZINK-Building Profile
- e Receiver strip, with sealant tape
- f Base trim, partly perforated
- g Lintel profile, partly perforated

18 Support Profile
- a Galvanised steel
- b Aluminium

20 Substructure
- b Metal, trapezoidal steel deck with coating*
- c Bracket system, with thermal break*
- g Softwood boarding, thickness min. 24 mm, width max. 100-160 mm**

21 Batten/Squared Timber
23 Supporting Structure
24 Window Foil
25 Thermal Insulation
30 Ventilated Air Space
- a Depth of air space ≥ 20 mm

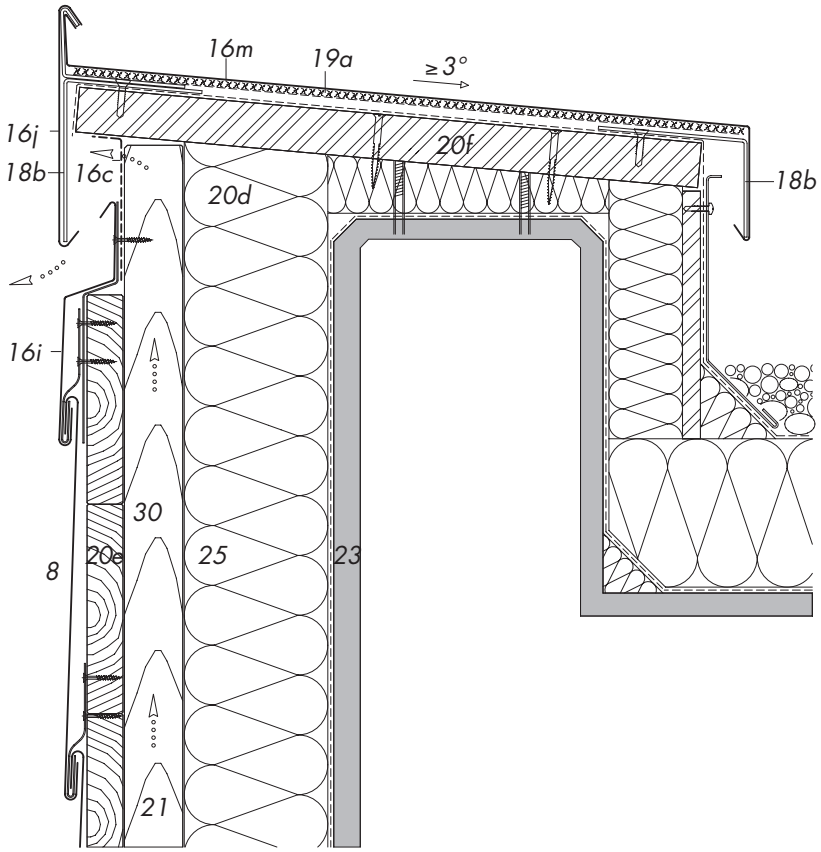
DI Direction of installation

* Manufacturers' guidelines must be observed

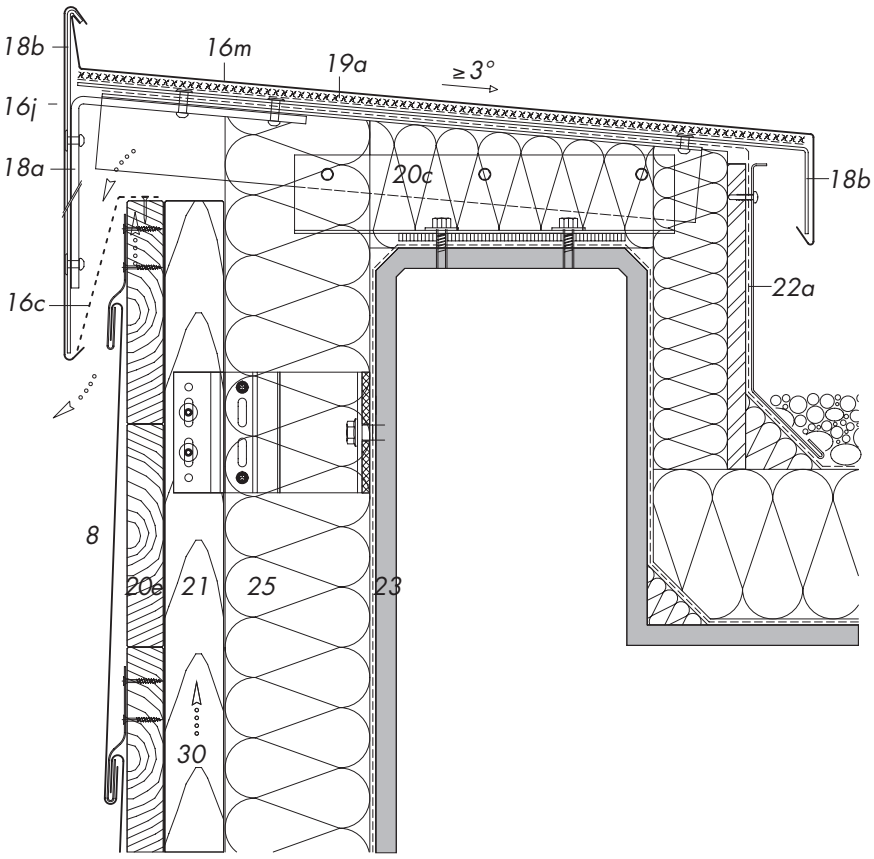
** With increased performance requirements the width of the boards should be max.100 mm.

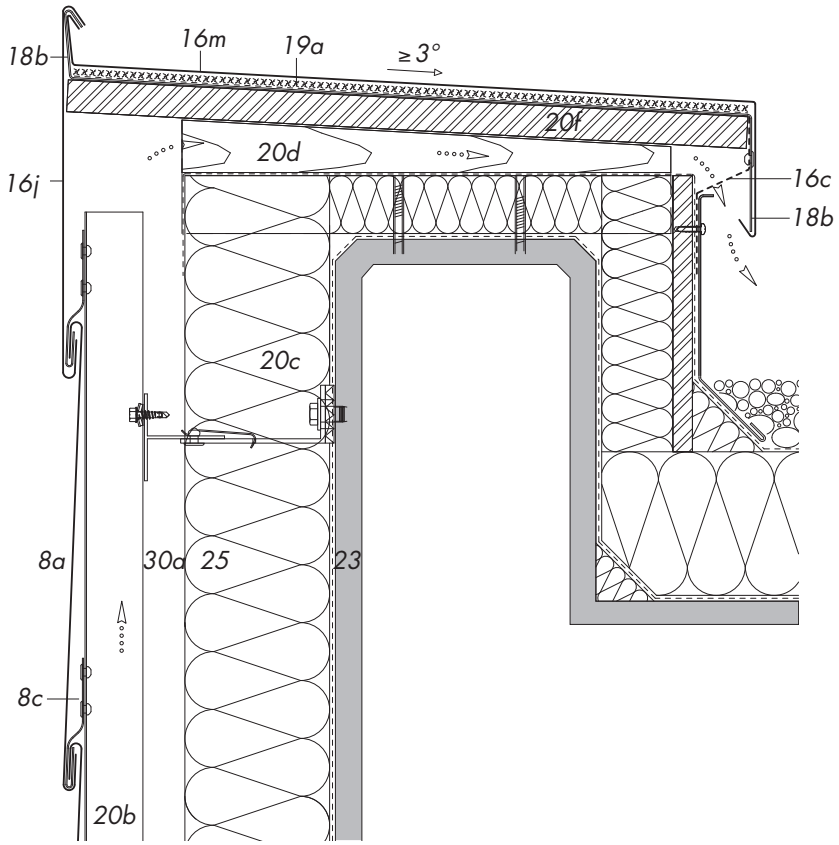
DESIGN
DETAIL V4, ROOF EDGE

V4.1



V4.2





V4.3

Detail V4: Roof Edge

8 RHEINZINK-Tile
- a Standard tile
- c Short clip/clip rail

16 RHEINZINK-Building Profile
- c Perforated strip
- i Termination profile
- j Fascia profile
- m Wall coping

18 Support Profile
- a Galvanised steel
- b Aluminium

19 Separating Layer
- a Structured underlay VAPOZINC, for copings with more than 50 cm width

20 Substructure
- b Metal, trapezoidal steel deck with coating*
- c Bracket system, with thermal break*
- d Wood, wooden wedge
- f OSB/veneer plywood sheathing, thickness min. 22 mm
- g Softwood boarding, thickness min. 24 mm, width max. 100-160 mm**

21 Batten/Squared Timber

23 Supporting Structure

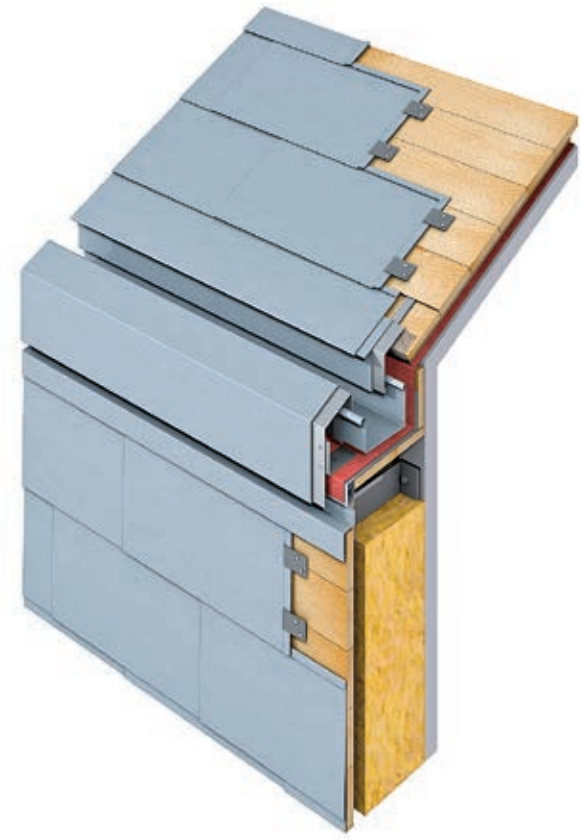
25 Thermal Insulation

30 Ventilated Air Space
- a Depth of air space ≥ 20 mm

DI Direction of installation

* Manufacturers' guidelines must be observed

** With increased performance requirements the width of the boards should be max.100 mm.



Integrated gutter

2.10 Application with Roofing

The use of tiles for roofing has a long tradition behind it. Numerous examples from the 19th and 20th century involving prestigious buildings and dwellings testify to this skilled craft that dates back so many years.

The design of modern roofs using a large-format tile flush with the wall is a popular design feature among architects and developers. It is even possible to create convex or concave roof surfaces, so offering the planner great scope for design.

When it comes to building roofs with pitches ≥ 35°, RHEINZINK can provide solutions that are not only satisfactory in technical terms but also fulfil high demands in relation to design.

- Installation options/Orientation
- Format lying parallel to eaves
- Format standing parallel to eaves
- Rectangular/square format positioned diagonal to eaves

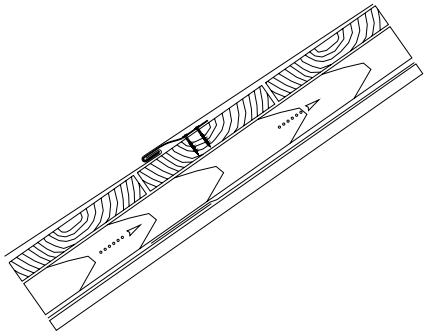
Please also note the RHEINZINK-Design Recommendations for Roof Coverings.

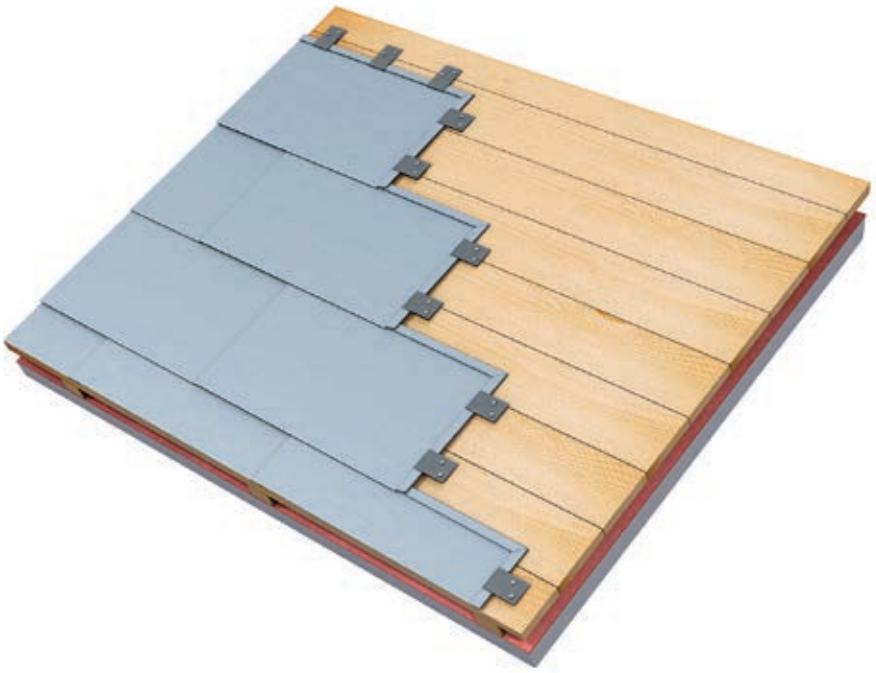
Fig. left: Petter Dass Museum, Sandnessjøen, Norway

2.11 Roof Structure for Tile Systems

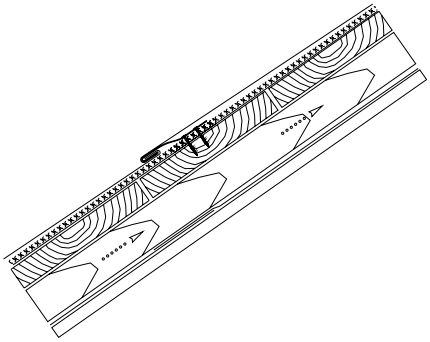
2.11.1 Dachaufbauten Großrauten

- Roof pitch ≥ 35° *
- RHEINZINK-Flat-Lock Tile
- Softwood boarding
  d ≥ 24 mm, b ≤ 160 mm
- Rear ventilation, height of ventilation space: min. 40 mm
- Underlay covering, including wind and rainproof sealed overlaps





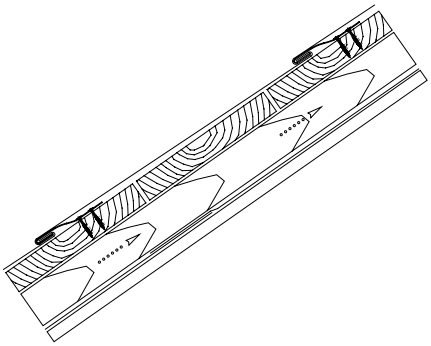
- Roof pitch ≥ 35° *
- RHEINZINK-Flat-Lock Tile
- Underlay + AIR-Z
- Softwood boarding
  d ≥ 24 mm, b ≤ 160 mm
- Rear ventilation,
  height of ventilation space:
  min. 40 mm
- Underlay covering, including wind and rainproof sealed overlaps

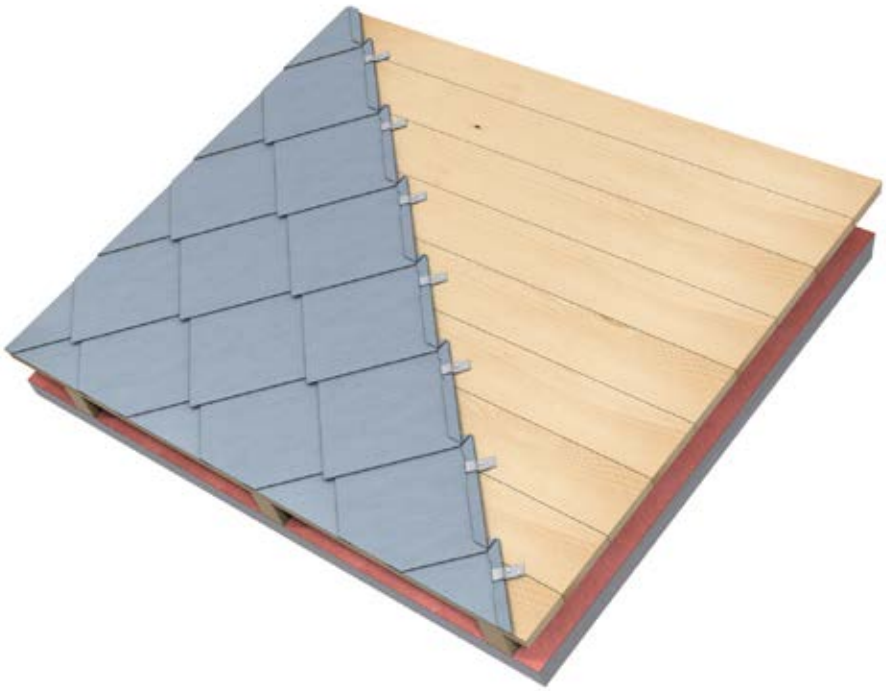


* Roof pitches below 35° have to be agreed with your local RHEINZINK consultant.

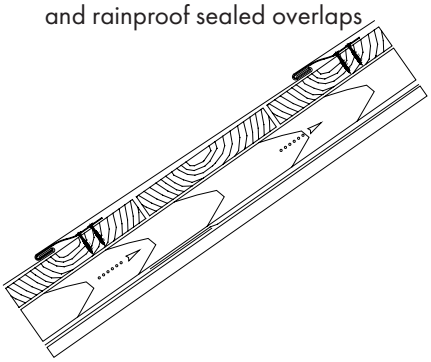
2.11.2 Roof Structure Small Tiles: Square Tiles, Diamond Tiles, MULTI-FORM

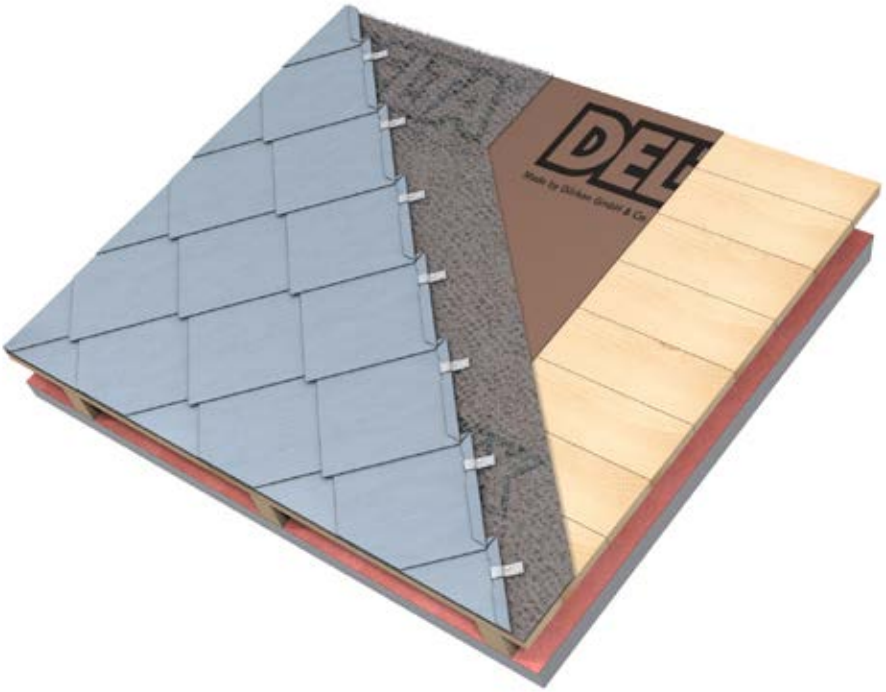
- Roof pitch ≥ 35° *
- RHEINZINK-Square Tile
- Softwood boarding
  d ≥ 24 mm, b ≤ 160 mm
- Rear ventilation, height of ventilation space: min. 40 mm
- Underlay covering, including wind and rainproof sealed overlaps





- Roof pitch ≥ 35° *
- RHEINZINK-Square Tile
- Underlay + AIR-Z
- Softwood boarding
  d ≥ 24 mm, b ≤ 160 mm
- Rear ventilation,
  height of ventilation space:
  min. 40 mm
- Underlay covering, including wind and rainproof sealed overlaps





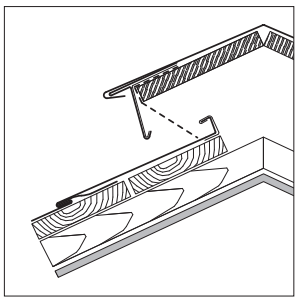
* Roof pitches below 35° have to be agreed with your local RHEINZINK consultant.

2.12 RHEINZINK-Flat-Lock Tile, Roofing Application

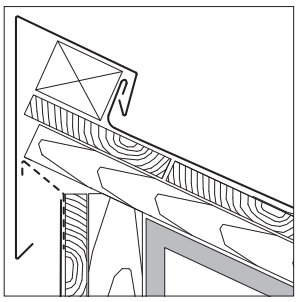
Private residence, Rangsdorf, Germany

TRUMPF Sachsen GmbH, Neukirch, Germany

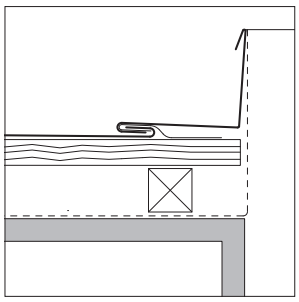
2.13 Roofing Design with Tile Systems



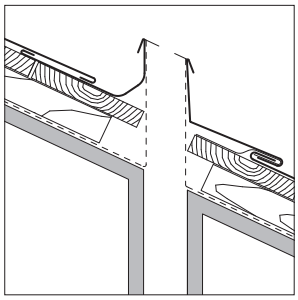
Ridge detail: Gable roof



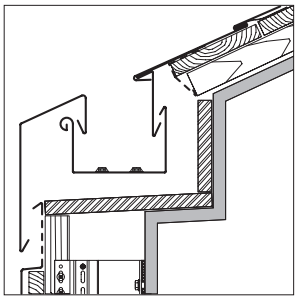
Ridge detail: Monopitch roof



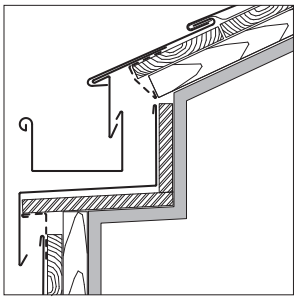
Penetration detail:
Lateral connection



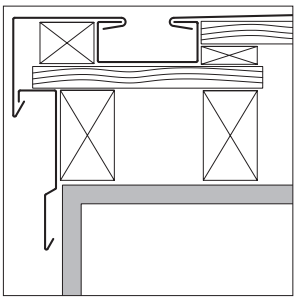
Penetration detail:
Front flashing/back gutter



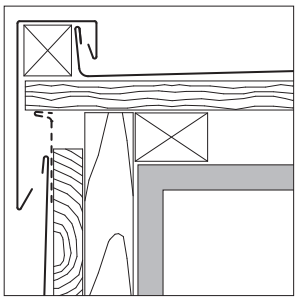
Eaves detail:
Roof-integrated gutter



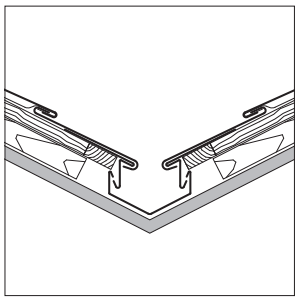
Eaves detail:
Bracket-mounted gutter



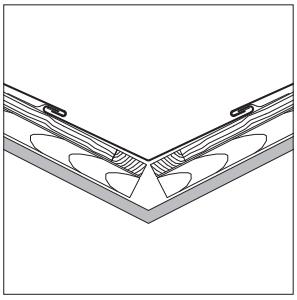
Verge detail: with verge gutter



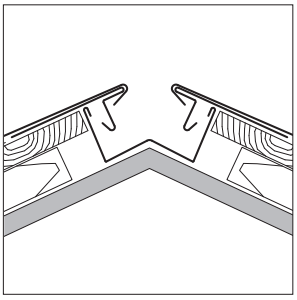
Verge detail: with flashing



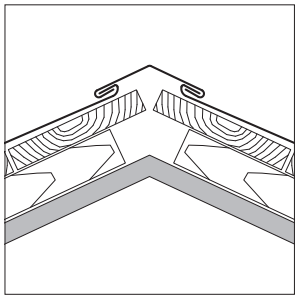
Valley detail: recessed



Valley detail: flush

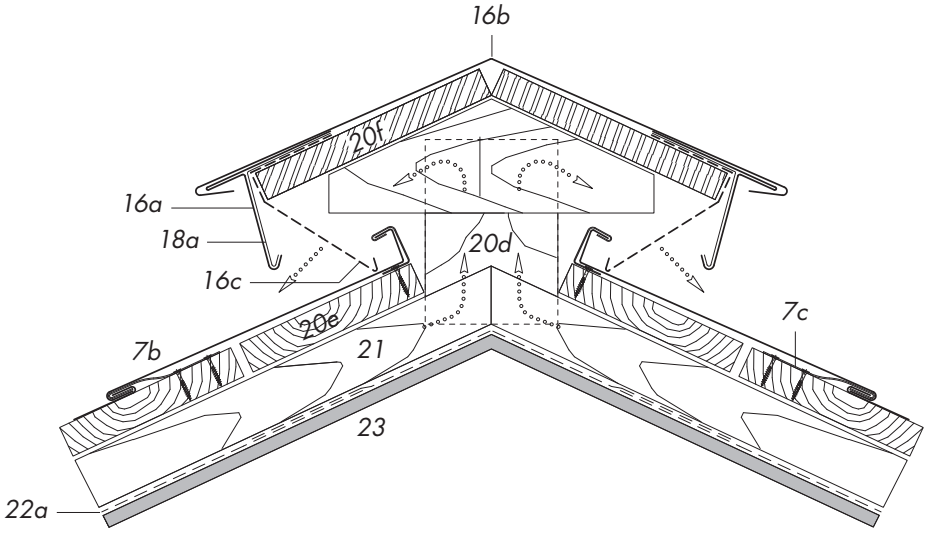


Hip detail: flush



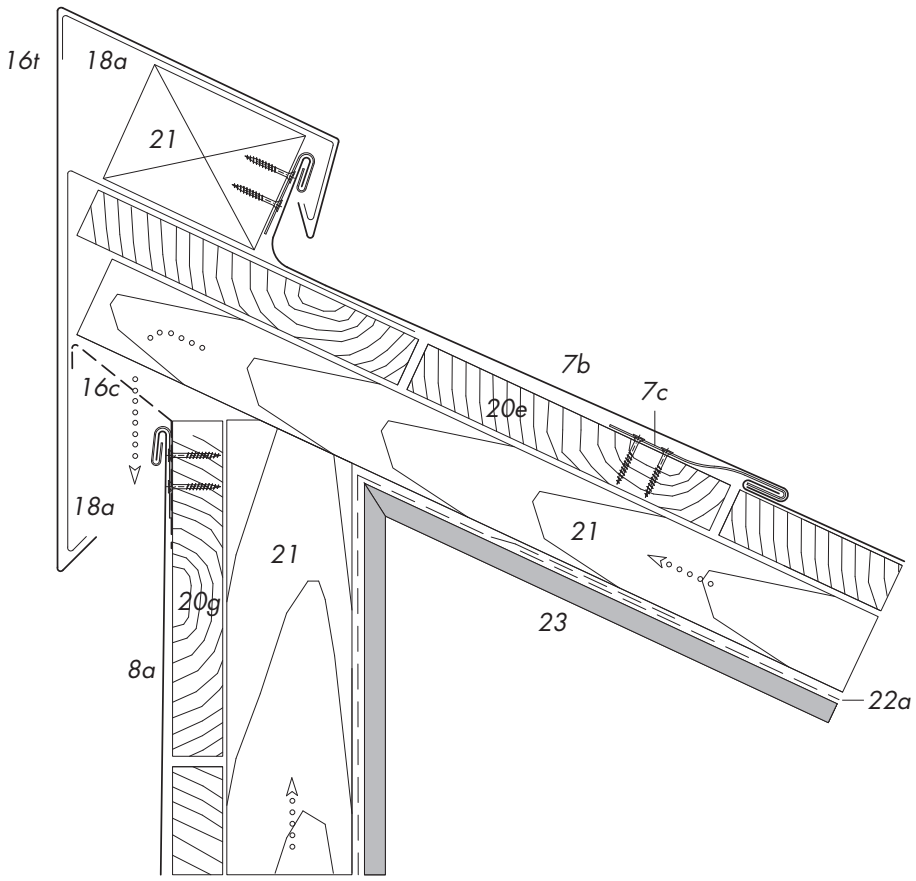
Hip detail: with cap

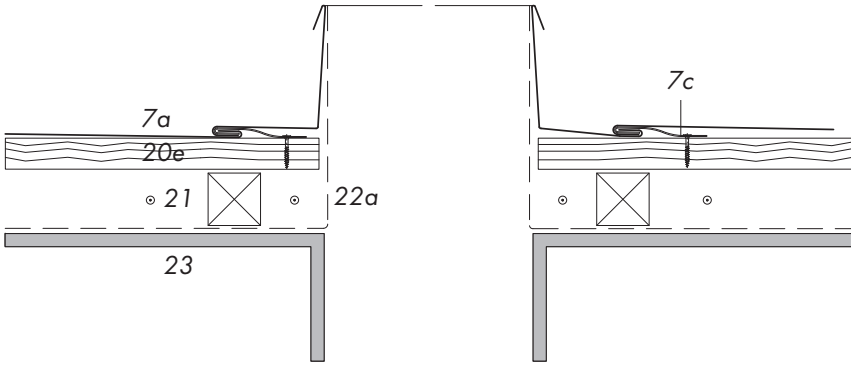
ROOFING APPLICATION DESIGN
RIDGE DETAIL

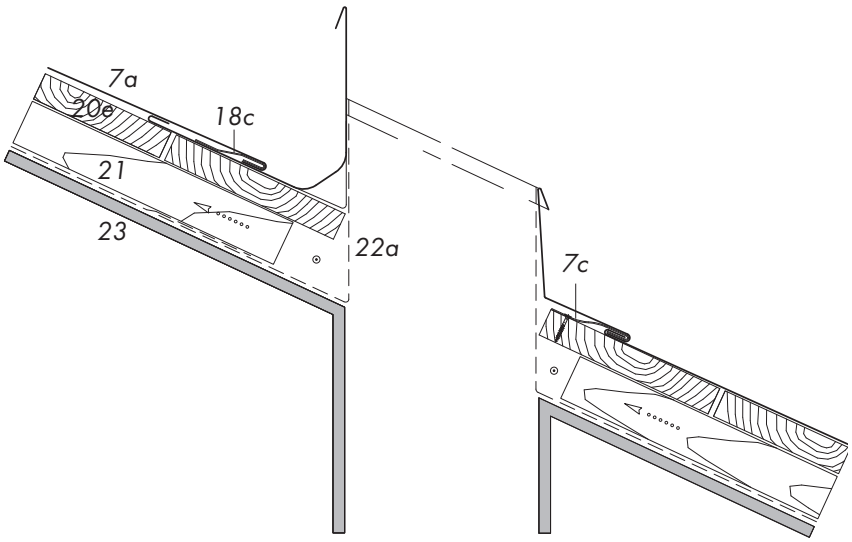


Detail: Ridge

- 7 RHEINZINK-Tile, roof
  - b Fitting tile
  - c Short clip/clip rail
- 8 RHEINZINK-Tile, facade
  - a Standard tile
- 16 RHEINZINK-Building Profile
  - a Eaves flashing
  - b Ridge flashing, double pitch roof/hipped roof
  - c Perforated strip
  - t Ridge flashing, mono pitch roof
- 18 Support Profile
  - a Galvanised steel
- 20 Substructure
  - d Wood, stud with cleat
  - e Softwood boarding, thickness min. 24 mm, width max. 160 mm
  - f OSB/veneer plywood sheathing, thickness min. 25 mm
  - g Softwood boarding, thickness min. 24 mm, width max. 100-160 mm
- 21 Batten/Squared Timber
- 22 Functional Layer
  - a Underlay covering
- 23 Supporting Structure







Detail: Penetration

7 RHEINZINK-Tile
- a Standard tile
- c Short clip/clip rail

18 Support Profile
- c Soldered continuous cleat

20 Substructure
- e Softwood boarding, thickness min. 24 mm, width max. 160 mm

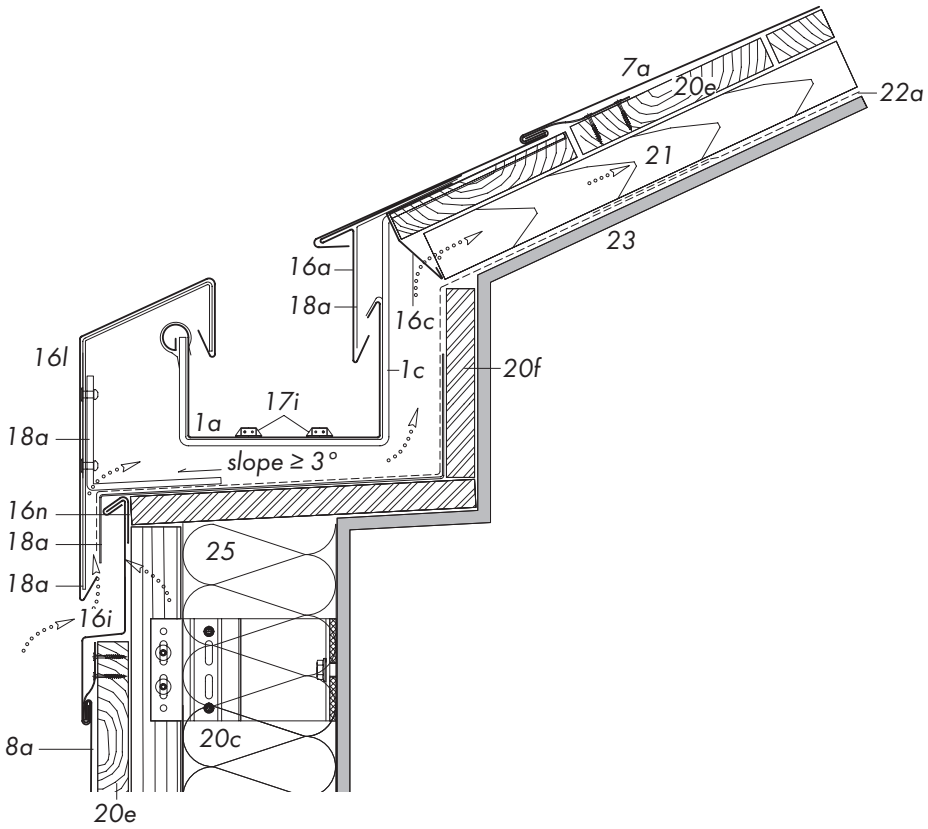
21 Batten/Squared Timber

22 Functional Layer
- a Underlay covering

23 Supporting Structure

⊙ Air flow in main flow direction respectively cross ventilation

ROOFING APPLICATION DESIGN
EAVES DETAIL



Detail: Eaves

1 RHEINZINK-Roof Drainage
- a Gutter
- c Gutter bracket, cladded

7 RHEINZINK-Tile, roof
- a Standard tile
- c Short clip/clip rail

8 RHEINZINK-Tile, facade
- a Standard tile
- c Short clip/clip rail

16 RHEINZINK-Building Profile
- a Eaves flashing
- c Perforated strip
- i Termination profile, partially perforated
- l Cornice coping
- n Continuous clip

17 RHEINZINK-Accessories
- i Gutter heating

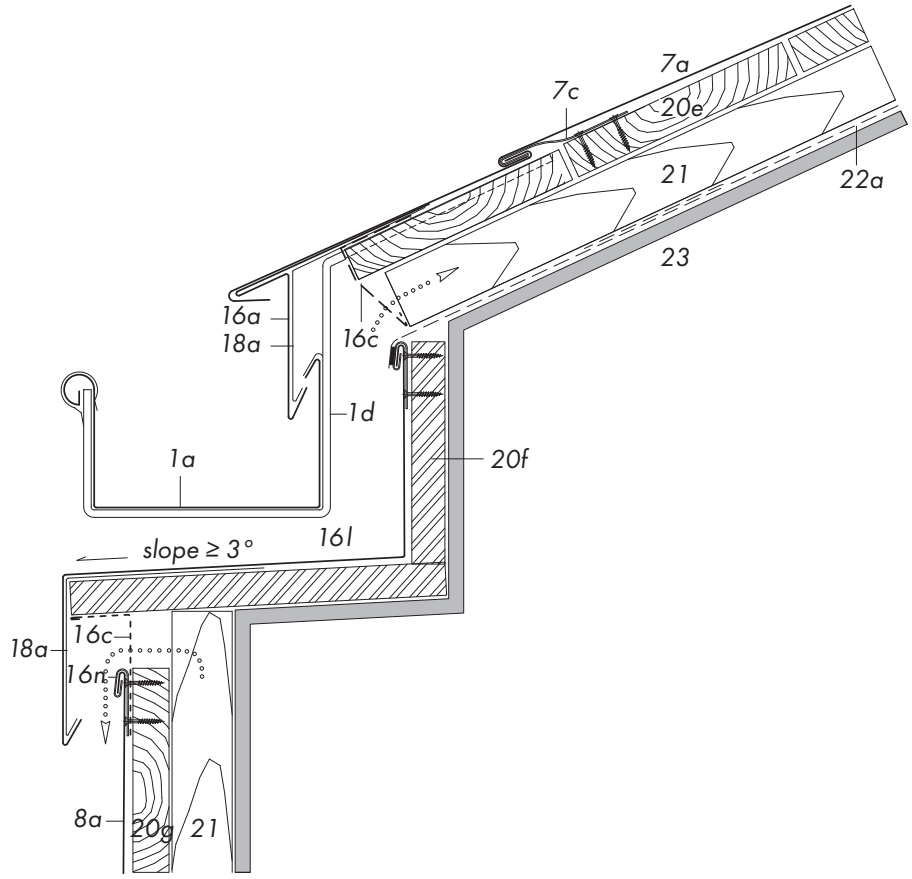
18 Support Profile
- a Galvanised steel

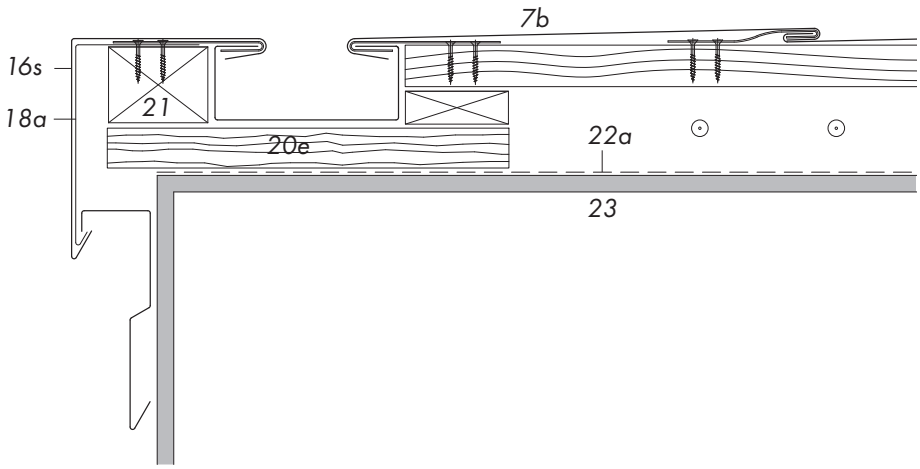
20 Substructure
- e Softwood boarding, thickness min. 24 mm, width max. 160 mm
- f OSB/veneer plywood sheathing, thickness min. 25 mm
- g Softwood boarding, thickness min. 24 mm, width max. 100-160 mm

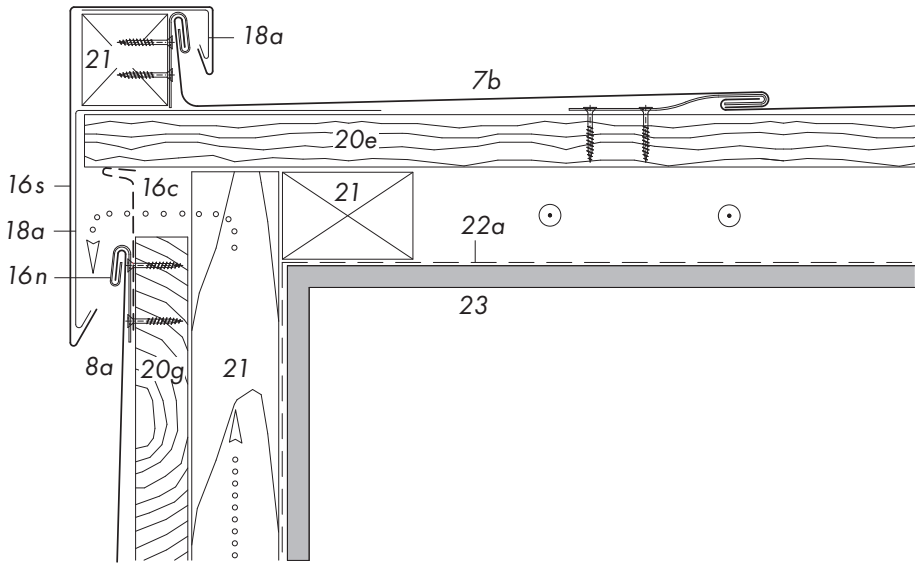
21 Batten/Squared Timber

22 Functional Layer
- a Underlay covering

23 Supporting Structure





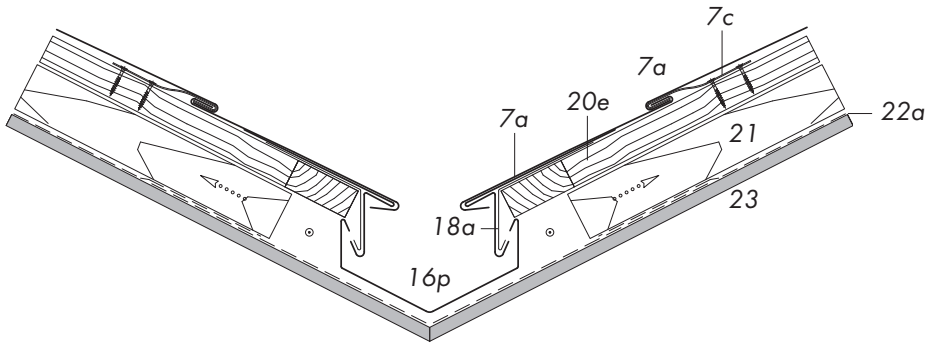


Detail: Verge

- 7 RHEINZINK-Tile, roof
  - b Fitting tile
  - c Short clip/clip rail
- 8 RHEINZINK-Tile, facade
- 16 RHEINZINK-Building Profile
  - c Perforated strip
  - n Continuous clip
  - s Verge flashing, two-part with gutter profile
- 18 Support Profile
  - a Galvanised steel
- 20 Substructure
  - e Softwood boarding, thickness min. 24 mm, width max. 160 mm
  - g Softwood boarding, thickness min. 24 mm, width max. 100-160 mm
- 21 Batten/Squared Timber
- 22 Functional Layer
  - a Underlay covering
- 23 Supporting Structure

⊙ Air flow

ROOFING APPLICATION DESIGN
VALLEY DETAIL



Detail: Valley

7 RHEINZINK-Tile, roof
- a Standard tile
- c Short clip/clip rail

16 RHEINZINK-Building Profile
- p Valley profile

18 Support Profile
- a Galvanised steel

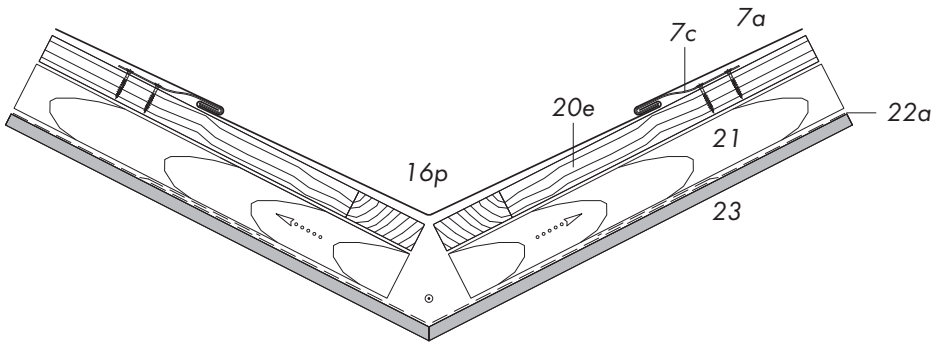
20 Substructure
- e Softwood boarding, thickness min. 24 mm, width max. 100-160 mm

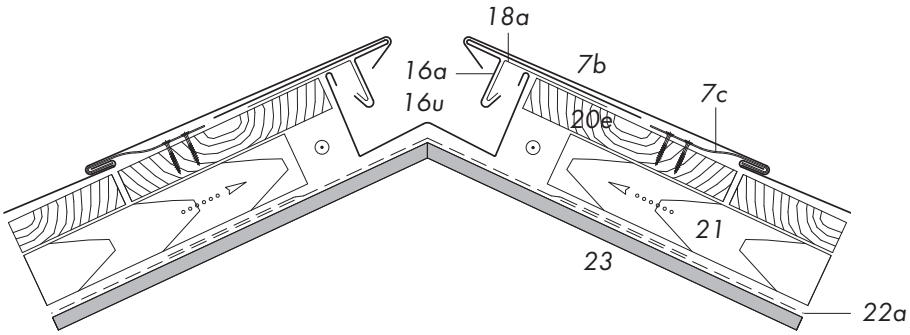
21 Batten/Squared Timber

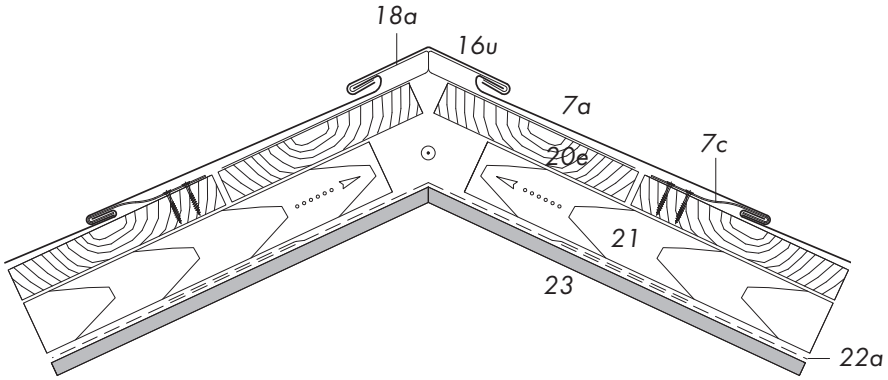
22 Functional Layer
- a Underlay covering

23 Supporting Structure

⊙ Direction of air flow as cross ventilation





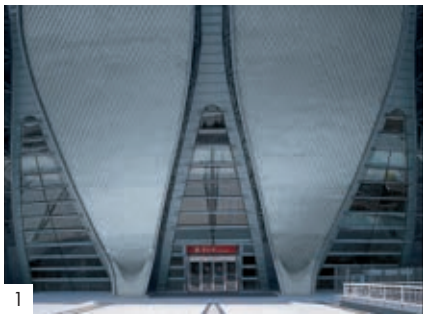


Detail: Hip

- 7 RHEINZINK-Tile, roof
  - a Standard tile
  - b Fitting tile
  - c Short clip/clip rail
- 16 RHEINZINK-Building Profile
  - a Eaves flashing
  - u Hip flashing
- 18 Support Profile
  - a Galvanised steel
- 20 Substructure
  - e Softwood boarding, thickness min. 24 mm, width max. 100-160 mm
- 21 Batten/Squared Timber
- 22 Functional Layer
  - a Underlay covering
- 23 Supporting Structure

⊙ Direction of air flow as cross ventilation

REFERENCE PROJECTS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Additional project references can be found on the Internet at **www.rheinzink.com**

TILE SYSTEMS, DESIGN AND APPLICATION

ILLUSTRATIONS

Title: TRUMPF Sachsen GmbH, Neukirch, Germany
Architect: Barkow + Leibinger Architecten, Berlin, Germany
RHEINZINK-work done by:
Dachdeckerei Bauklempnerei A. Gabriel, Grübschütz, Germany

1. Olympic Sports Centre, Jinan, China
Architects: China Construction (Shenzhen) Design International, Shenzhen, China
RHEINZINK-work done by:
Shenyang Yuanda Aluminium Industry Engineering Co., Ltd.,
Northeast Branch, Shenyang, China

2. Split-Level, Stuttgart, Germany
Architect: Klaus Schlosser Architecten BDA, Berlin, Germany
RHEINZINK-work done by:
Peter NESS Bauklempnerei GmbH, Berlin, Germany

3./5./6. Karl-Heinz Klein Sports Hall, Heiligenhaus, Germany
Architect: Ute Piroeth Architectur, Köln, Germany
RHEINZINK-work done by:
T. Sobireg, Wuppertal, Germany

4. Central Building of the Leuphana University, Luneburg, Germany
Design Architect: Studio Libeskind, New York, USA
Supervising Architect: rw+ Architecten GmbH, Berlin, Germany
RHEINZINK-work done by:
Blechtechnik Marco Pistorius GmbH, Lichtentanne, Germany

7. Private Residence, Rangsdorf, Germany
Architect: Steiner Weißenberger Architecten GmbH, Berlin, Germany
RHEINZINK-work done by:
Hoeltke & Langpeter Dachdeckerei GmbH, Berlin, Germany

8./9. Yarm School, Yarm, United Kingdom
Architect: Associated Architects, Birmingham, United Kingdom
RHEINZINK-work done by:
NJM Roofing Ltd., Gateshead, United Kingdom

10. Royal Beach, St. Petersburg, Russia
Design Architect: Astragal-Design, St. Petersburg, Russia
Supervising Architect: Astragal-Design, St. Petersburg, Russia
RHEINZINK-work done by:
Ochta Form, St. Petersburg, Russia

11. Gezi Hotel Bosphorus, Istanbul, Turkey
Architect: Metex Design Group, Istanbul, Turkey
RHEINZINK-work done by:
Naz Çati İnşaat San. ve Tic. Ltd. Şti., Istanbul, Turkey

12. Edmonton International Airport, Alberta, Canada
Architect: DIALOG, Edmonton, Alberta, Canada
RHEINZINK-work done by:
THERMAL SYSTEMS, Calgary, Alberta, Canada

13./14. Rosevia Resort, Jastrzębia Góra, Poland
Architect: SAS - Studio Architectoniczne Sietnicki, Szczecin, Poland
RHEINZINK-work done by:
F.H.U. Budownictwa „Krest" Paweł Kubacka,
Marek Kubacka, Niepołomice, SADKO DACHY
Miedziana Góra, Poland

15. Church Dome San Pietro, Gattinara, Italy
Design Architect: Arch. Fulvio Caligaris, Gattinara, Italy
Supervising Architect: Arch. Fulvio Caligaris, Gattinara, Italy
RHEINZINK-work done by:
Gebhard Trenkwalder, Ovada AL, Italy

16. Kirsch Pharma Bissendorf, Wedemark, Germany
Design Architect: Krüger Consult GmbH, Burgwedel
with SKAI GmbH, Wedemark, Germany
Supervising Architect: Stefan Antoni Saota, Cape Town, South Africa
RHEINZINK-work done by:
Dachbau Stassfurt GmbH, Staßfurt, Deutschland

17. Mühlenwiesenzentrum, Bietigheim-Bissingen, Germany
Architect: ATP Architecten ingenieure für Integrale Planung, Munich
General Contructor:
Industriebau Imetaal GmbH & Co. KG, Emmerich am Rhein, Germany
RHEINZINK-work done by:
Altvater GmbH, Nufringen, Germany

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