HORIZONTAL PANEL
System technology for façades

DESIGN AND APPLICATION
Disclaimer
RHEINZINK GmbH & Co. KG always considers state-of-the-art technology, along with current product development and research when issuing engineering opinions or comments. These type of statements or recommendations describe optional designs in standard cases based on a European climate, specifically Europe's interior climate. It is not possible to consider every scenario, in which more extensive or restrictive measures may be required. Thus, an opinion issued by RHEINZINK GmbH & Co. KG does not replace the planning advice of a responsible architect or planner for a specific building project or the advice given by the company carrying out the tasks, while considering practical local conditions. Using the documents provided by RHEINZINK GmbH & Co. KG is a service, which excludes liability for damages or claims of any kind. Contingent liability for malice or gross negligence, as well as liability in the event of injury to body, life or health of an individual is unaffected. Claims in accordance with the product liability law also remain unaffected.

3rd edition
© 2009 RHEINZINK GmbH & Co. KG
All rights reserved. No part of this book may be reproduced in any form without written permission of RHEINZINK GmbH & Co. KG.
Foreword

This document is based on practical experience and our current status of knowledge in research and development, as well as recognized regulations and state-of-the-art technology. This manual describes a general application of RHEINZINK-Façade Systems for façade cladding worldwide. It is the basis for proper planning and application technology in standard cases.

In consideration of the current status of structural engineering and definite development trends, this manual provides a guideline for the designer as well as for the company executing the work. However, there could be instances, in which this type of cladding can only be used in a restricted manner or not at all. The detail drawings in the manual describe the standard details of the systems. The planner must take into account the impact of the system application, the local and climatic conditions and the demands in terms of structural physics on the respective building.

Using these guidelines does not preclude independent thinking and responsibility.

We reserve the right to undertake changes, which result from further development of the systems. Should you have any questions with respect to these systems, please do not hesitate to contact our Department of Application Engineering. We welcome any suggestions you may have with respect to our products.

Datteln, January 2010
## TABLE OF CONTENTS

1. **MATERIAL**  
   1.1 Alloy and quality 7  
   1.2 Material properties 7  
   1.3 **RHEINZINK-**  
      “preweathered\textsuperscript{pro} blue-grey”,  
      “preweathered\textsuperscript{pro} graphite-grey” 8  
   1.4 Storage and transportation 8  
   1.5 Surfaces 8  
   1.6 Structural physics 8  
   1.7 Airtightness 9  
   1.8 Weather protection 9  
   1.9 Moisture 9  
   1.10 Thermal economy 9  
      1.10.1 Thermal insulation 9  
      1.10.2 Summer thermal insulation 9  
      1.10.3 Thermal bridges 9  
   1.11 Fire protection 10  
   1.12 Rear ventilation 10  
   1.13 Soundproofing 10  
   1.14 Processing 10  
   1.15 Other applicable standards and guidelines 10

2. **HORIZONTAL PANEL**  
   2.1 Profile geometry 12  
      2.1.1 Horizontal Panel, Installation 13  
   2.2 Joint formation 14  
      2.2.1 Panel installation 14  
      2.2.1.1 Vertical joint 14  
   2.3 Thermal expansion 15  
   2.4 Substructures 16  
   2.5 Fasteners 17  
   2.6 Detail design 18  
   2.7 Details 19  
      2.7.1 General instructions 19  
      2.7.2 Pictogram 19  
   2.8 Planning grid 20  
   2.9 Design variations 22  
      2.10 Installation and building tolerances 23  
      2.11 Design, Overview of horizontal sections 24  
      2.12 Design, Overview of vertical sections 25  
      Details of horizontal sections 26  
      Details of vertical sections 27  

Service Centres 42  
Reference Projects 44  
Illustrations 47
1. Material

1.1 Alloy and quality
RHEINZINK is titanium zinc, manufactured in accordance with DIN EN 988. RHEINZINK-alloy consists of electrolytic high-grade pure zinc with a purity of 99.995% conforming to DIN EN 1179, alloyed with exact percentages of copper and titanium. RHEINZINK-products are certified according to DIN EN ISO 9001:2008 and are subject to voluntary testing by TÜV Rheinland Group (the relevant local inspection and monitoring body) according to the stringent requirements of the Quality Zinc Criteria Catalogue (available upon request).

Ecological relevance
RHEINZINK is a natural material, which meets today’s strict ecological requirements in many areas. Environmental protection is evident in the production, transportation and installation of this material. State-of-the-art facilities, well thought-out logistics and favourable processing properties attest to this. Environmentally conscious handling is documented through the adoption of ISO 14001:2004, the Environmental Management System, tested and certified by the TÜV Rheinland Group.

Other significant aspects of the overall ecological assessment of zinc are:
- Natural material
- Low energy requirement
- Durability
- An established cycle for valuable material resources
- High percentage of recycling

Other significant properties of zinc are:
- Vital trace element
- Extensive resources

RHEINZINK has been declared as an environmentally sound building product according to ISO 14025 Type III by the German Institute Construction and Environment. The environmental product declaration includes the entire life cycle of RHEINZINK-products, from raw material extraction to production and use phase, right up to the end-of-life stage and recycling. An integral part of the environmental product declaration is a life cycle assessment (LCA) according to ISO 14040 (declaration available upon request).

1.2 Material properties
- Density (spec. weight) 7,2 g/cm³
- Density (specific gravity) 4,18 g/cm³
- Melting point 418 °C
- Recrystallisation temperature > 300 °C
- Coefficient of thermal expansion: in length as rolled: 2,2 mm/m x 100 K in transverse direction 1,7 mm/m x 100 K
- Modulus of elasticity ≥ 80000 N/mm²
- Non-magnetic
- Non-combustible

Mechanical properties
(measured lengthwise)

RHEINZINK-bright rolled, “preweathered™ blue-grey”:
- 0,2 % (yield strength) (R_p 0,2) 110 - 160 N/mm²
- Tensile strength (R_m) 150 - 190 N/mm²
- Total elongation (A_50) ≥ 35 %
- Vickers hardness (HV 3) ≥ 40

RHEINZINK-“preweathered™ graphite-grey”:
- 0,2 % (yield strength) (R_p 0,2) ≥ 140 N/mm²
- Tensile strength (R_m) ≥ 180 N/mm²
- Total elongation (A_50) ≥ 50 %
- Vickers hardness (HV 3) ≥ 40

<table>
<thead>
<tr>
<th>Material thickness (mm)</th>
<th>Weight (kg/m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,00</td>
<td>7,24</td>
</tr>
<tr>
<td>1,20</td>
<td>8,60</td>
</tr>
<tr>
<td>1,50</td>
<td>10,80</td>
</tr>
</tbody>
</table>

Table 1:
RHEINZINK-weight according to material thickness in kg/m² (numbers have been rounded)
In order to protect the surface during transportation, storage and installation and from negative influences during construction, the façade systems are provided with a thin strippable plastic film. This is a one-sided protective adhesive film, which should be removed at the end of each working day, immediately following installation.

1.4 Storage and transportation
Always store and transport RHEINZINK-products in a dry, well-ventilated area.

Fig. 1: Storage and transportation of profiles and panels, (diagram)

Note:
For optimum storage on the construction site, please ask construction management for a dry, well-ventilated space or use containers. Do not place cover sheets directly on the material.

1.5 Surfaces
RHEINZINK-“preweathered™” is used for RHEINZINK®-façade systems. This material has a permanent surface coating. When the building is finished, it will have the classical-modern blue-grey/graphite-grey look, typical of zinc. RHEINZINK-façades do not require cleaning or maintenance. As a result of natural weathering, the façade will get slightly darker with time.

1.6 Structural physics
- Weather protection
- Moisture regulation
- Thermal economy
- Rear ventilation
- Sound proofing/fire protection

The rear-ventilated façade 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 façade 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 façade 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.

1.7 Airtightness
This does not apply to the rear-ventilated façade, as this component itself cannot be airtight.

The building must be airtight before the rear-ventilated façade is installed. A solid brick or concrete wall will ensure that the building is airtight. 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.

1.8 Weather protection
Rear-ventilated façade cladding protects the supporting structure, the water-proofed thermal façade insulation, and the substructure, from the weather. Bracket-mounted rear-ventilated façades 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.

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

1.10 Thermal economy
In order to understand the thermal economy of the rear-ventilated façade, 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.

1.10.1 Thermal insulation
In the winter, heat flow from the inside to the outside is referred to as a heat transfer coefficient (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.

1.10.2 Summer thermal insulation
Summer thermal insulation should provide comfort: The amount of heat flowing from the outside to the inside should 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 façade, is that a large portion of the heat which streams onto the cladding is diverted through convective air exchange.

1.10.3 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 façade. 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.
1.11 Fire protection
Metal façades 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 façades, it may be necessary to install firestops.

1.12 Rear-ventilation
The free ventilation cavity between the façade cladding and the layer behind it must be at least 20 mm. Tolerances and plumbness of the 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.

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

1.13 Soundproofing
To prove that a façade 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.

1.14 Processing
Bending radii
Zinc and its alloys are anisotropic, which means they have different properties parallel and horizontally to the rolling direction.

The mechanical effects of this anisotropy is reduced to such a degree with RHEINZINK through the alloys and the rolling process, that RHEINZINK, independent of the direction of rolling, can be folded at 180° without cracking. When processing in order to manufacture a cold-rolled or pressed profile, compliance with the minimum radii is recommended (see Table 3).

1.15 Other applicable standards and guidelines
All trades must adhere to applicable DIN EN-/DIN-standards. Guidelines for the design of metal roofs/façade cladding and sheet metal work. Government regulations, building codes.

<table>
<thead>
<tr>
<th>Building height</th>
<th>Size of rear-ventilation</th>
<th>Free ventilation shaft</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 6 m</td>
<td>20 mm</td>
<td>200 cm²/m</td>
</tr>
<tr>
<td>&gt; 6 m ≤ 22 m</td>
<td>30 mm</td>
<td>300 cm²/m</td>
</tr>
<tr>
<td>&gt; 22 m</td>
<td>40 mm</td>
<td>400 cm²/m</td>
</tr>
</tbody>
</table>

Table 2: Specifications pertaining to rear-ventilation space Source: FVHF 20.09.94

<table>
<thead>
<tr>
<th>Material thickness</th>
<th>Bending radius R, Min.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.00 mm</td>
<td>1.75 mm</td>
</tr>
<tr>
<td>1.20 mm</td>
<td>2.10 mm</td>
</tr>
<tr>
<td>1.50 mm</td>
<td>2.63 mm</td>
</tr>
</tbody>
</table>

Table 3: Recommended bending radii (inner radius) for RHEINZINK
2. RHEINZINK-Horizontal Panel H 25

Using the horizontal panel, the designer has the option of realizing grid dimensions up to 6000 mm in length. The width of the shadow joint is fixed at 20 mm.

The horizontal panel is available in widths of 200-333 mm.

<table>
<thead>
<tr>
<th>Span width in m</th>
<th>0.80</th>
<th>0.90</th>
<th>1.00</th>
<th>1.10</th>
<th>1.20</th>
<th>1.30</th>
<th>1.40</th>
<th>1.50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permissible wind load in kN/m²</td>
<td>3.54</td>
<td>2.80</td>
<td>2.27</td>
<td>1.87</td>
<td>1.56</td>
<td>1.33</td>
<td>1.15</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>1.85</td>
<td>1.65</td>
<td>1.48</td>
<td>1.35</td>
<td>1.23</td>
<td>1.13</td>
<td>1.05</td>
<td>0.98</td>
</tr>
<tr>
<td></td>
<td>2.10</td>
<td>1.87</td>
<td>1.68</td>
<td>1.53</td>
<td>1.40</td>
<td>1.30</td>
<td>1.20</td>
<td>1.11</td>
</tr>
</tbody>
</table>

H 25 - 200, s = 1,00 mm

<table>
<thead>
<tr>
<th>Span width in m</th>
<th>0.80</th>
<th>0.90</th>
<th>1.00</th>
<th>1.10</th>
<th>1.20</th>
<th>1.30</th>
<th>1.40</th>
<th>1.50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permissible wind load in kN/m²</td>
<td>2.12</td>
<td>1.68</td>
<td>1.36</td>
<td>1.12</td>
<td>0.94</td>
<td>0.80</td>
<td>0.69</td>
<td>0.60</td>
</tr>
<tr>
<td></td>
<td>1.11</td>
<td>0.99</td>
<td>0.89</td>
<td>0.81</td>
<td>0.74</td>
<td>0.68</td>
<td>0.63</td>
<td>0.59</td>
</tr>
<tr>
<td></td>
<td>1.26</td>
<td>1.12</td>
<td>1.01</td>
<td>0.92</td>
<td>0.84</td>
<td>0.78</td>
<td>0.72</td>
<td>0.67</td>
</tr>
</tbody>
</table>

H 25 - 333, s = 1.00 mm

<table>
<thead>
<tr>
<th>Span width in m</th>
<th>0.80</th>
<th>0.90</th>
<th>1.00</th>
<th>1.10</th>
<th>1.20</th>
<th>1.30</th>
<th>1.40</th>
<th>1.50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permissible wind load in kN/m²</td>
<td>3.92</td>
<td>3.10</td>
<td>2.50</td>
<td>2.07</td>
<td>1.73</td>
<td>1.48</td>
<td>1.28</td>
<td>1.11</td>
</tr>
<tr>
<td></td>
<td>2.03</td>
<td>1.82</td>
<td>1.65</td>
<td>1.48</td>
<td>1.36</td>
<td>1.25</td>
<td>1.16</td>
<td>1.03</td>
</tr>
<tr>
<td></td>
<td>2.32</td>
<td>2.07</td>
<td>1.85</td>
<td>1.68</td>
<td>1.55</td>
<td>1.43</td>
<td>1.33</td>
<td>1.23</td>
</tr>
</tbody>
</table>

H 25 - 200, s = 1,20 mm

<table>
<thead>
<tr>
<th>Span width in m</th>
<th>0.80</th>
<th>0.90</th>
<th>1.00</th>
<th>1.10</th>
<th>1.20</th>
<th>1.30</th>
<th>1.40</th>
<th>1.50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permissible wind load in kN/m²</td>
<td>2.35</td>
<td>1.86</td>
<td>1.50</td>
<td>1.24</td>
<td>1.04</td>
<td>0.89</td>
<td>0.77</td>
<td>0.67</td>
</tr>
<tr>
<td></td>
<td>1.22</td>
<td>1.09</td>
<td>0.99</td>
<td>0.89</td>
<td>0.82</td>
<td>0.75</td>
<td>0.70</td>
<td>0.62</td>
</tr>
<tr>
<td></td>
<td>1.39</td>
<td>1.24</td>
<td>1.11</td>
<td>1.01</td>
<td>0.93</td>
<td>0.86</td>
<td>0.80</td>
<td>0.74</td>
</tr>
</tbody>
</table>

H 25 - 333, s = 1,20 mm

Table 4: Calculation table for horizontal panel (intermediate values between building widths can be interpolated)

Basis for calculation: uniformly distributed load including profile dead load

Safety factor: 1,50

Yield limit: 100 N/mm²

Width of support profile: ≥ 50 mm

DIN 18807/experimental testing at the University of Karlsruhe, Germany
2.1 Profile geometry

Material thickness
\( s = 1.00 \text{ mm}/1.20 \text{ mm} \)

<table>
<thead>
<tr>
<th>Cover widths ( H , 25 ) ( s = 1.00 \text{ mm} )</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 mm</td>
<td>11.20 kg/m²</td>
</tr>
<tr>
<td>225 mm</td>
<td>10.70 kg/m²</td>
</tr>
<tr>
<td>250 mm</td>
<td>10.40 kg/m²</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cover widths ( s = 1.20 \text{ mm} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>250 mm</td>
</tr>
<tr>
<td>300 mm</td>
</tr>
<tr>
<td>333 mm</td>
</tr>
</tbody>
</table>

Cover widths from 200-333 mm
All sizes between in mm increments can be produced.
For widths of over 250 mm, we recommend using a material thickness of 1.20 mm.

Application for outside areas
- Façades
- Soffits
- Rounded parapets

Fasteners
The panels are screwed/riveted to the substructure through the RHEINZINK-Cast Fixing Clip. 2 fasteners must be used per clip. The location is secured by fixing the centre of the panel with appropriate fasteners.

Dimensions
- Drawings: Dimensions in mm
- Panel markings: \( H \, 25 \, - \, 287 \) (Example)
- Standard length: \( \leq 6000 \text{ mm} \)
- \( C \): Cover width = bay width
- \( J \): Joint width
- \( F \): Face width

Tolerances
According to Works Standard WN 21

Installation Tips
- Boxed ends should be used at both ends of the panel for reinforcement.
- Panels (C) are manufactured with a minus tolerance of 1,00 mm smaller than ordered.
2.1.1 RHEINZINK-Horizontal Panel, Installation

Private Residence, Straden, Austria

RHEINZINK-Panel H 25 with shadow joint profile

Office building, Reykjavik, Iceland

RHEINZINK-Panel H 25 with 20 mm joint and slave profile
2.2 Joint Formation

2.2.1 Horizontal installation

2.2.1.1 Vertical joint
A: Slave profile with boxed ends
A slave profile corresponding to the panel geometry is installed behind the joint. Aesthetically speaking, this is a very conservative joint design, accentuating the horizontal orientation of the panels.

B: Joint with closed panel
The panels are terminated with a lateral fold (boxed end) in order to prevent one from seeing into the profile and to lend greater stability to the profile.*

C: Joint profile using random structure
The staggered vertical joints make the façades come to life. By using custom profiles, the joints take the formation of shadow joints.

D: Shadow joints
Vertical joints serve to separate the individual panel fields through expansion.

Note:
- Generally speaking, the joints should be dimensioned 5–10 mm bigger than the anticipated thermal expansion.

* If the cover width is 250 mm or greater, it is recommended that panel ends be terminated with boxed ends.
2.3 Accommodating thermal expansion of façade cladding

- Thermal expansion of façade profiles is accommodated by using expansion joints.
- Static continuous fields longer than 6000 mm are not permitted.
- In those joints, which will accommodate thermal expansion, the substructure must have an appropriate fastening system.
- The substructure must be designed/formed separately for each façade field in the area of the expansion joint. Exceptions must be discussed and coordinated with the Department of Application Engineering*.

Two examples of façade design illustrate the correlation:

**Example A**
Large cladding components each form a field, which is fastened separately from the next field, by means of an expansion joint.

**Example B**
This type of cladding is characterized by the installation of semi-staggered vertical joints. If the substructure is designed properly, a double substructure in the joint profile area is no longer required. This type of installation is only possible with indirect fastening H 25, but not with a reveal panel that has been fastened directly.

When installing support profiles (horizontal panel brackets), please note that the Y dimension should always be 5 mm bigger than the calculated dimension for contracted panels.

* see addresses and contacts, page 42
2.4 Substructures

RHEINZINK-Façade systems are typically installed on substructures comprising single, two or multi-part NE metal systems. Apart from structural and economical advantages, these systems guarantee control of fastening patterns, compliance with fire protection specifications and problem-free compensation of building tolerances when two or multiple systems are used.

The architectural appearance of the profiles determines the design of the substructure. Prior to designing the substructure, the overall design must be determined. Otherwise the design will determine the architecture – which could be avoided in this case.

Note:
Due to moisture retention and problems when adjusting tolerances, we do not recommend using wood as a substructure for large façade surfaces.

For small-surface applications such as dormers, fascias and gable cladding, a dry wood substructure is definitely suitable.

The location and alignment of sliding and fixed points for metal substructures is determined based on the type of cladding, as well as the surface and length of the panels.

For single systems, the disadvantages outweigh the advantages, among others:
- great effort when accommodating building tolerances
- large thermal bridges

Technical problems are solved when using two-piece/multiple systems:
- local thermal bridges only
- continuous rear-ventilation is guaranteed.

However, the high cost of design and the fact that two or more installation sequences must be carried out, should be taken into account.

Two-piece systems are the “happy medium”:

Advantages:
- cost-effective
- building tolerances are easily accommodated
- local thermal bridges only

Disadvantages:
- two installation sequences
- high cost of design, depending on the detail
2.5 Fasteners
Fasteners are parts that connect the cladding to the substructure mechanically. The edge distance of connections and fasteners in the substructure must be at least 10 mm. Only corrosion-resistant fasteners, which guarantee long-term function capability, may be used.

### 2.5.1 EJOT® Drilling screws

**Area of application**
- Drilling screws to join
  - RHEINZINK-Cast Fixing Clip onto
  - steel substructures
  - 1.5 - 4.0 mm
  - aluminum substructures
  - 1.5 - 4.0 mm

---

#### JT 3 - FR - 6 - 5.5 x 25 - E11

<table>
<thead>
<tr>
<th>Marking</th>
<th>Ø x</th>
<th>Length</th>
<th>Drill capacity t₁ + t₂</th>
<th>Clamping thickness mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>JT3 - FR - 6</td>
<td>5.5</td>
<td>25</td>
<td>min. 0.63 + 1.5, max. 2.0 + 4.0</td>
<td>7.0</td>
</tr>
</tbody>
</table>

**Note**
When using screws without sealing washers, clamping thickness increases by 3 mm.

---

### 2.5.2 EJOT® Blind rivet with large collar

**Blind rivet K14 - AI/E - 5.0 x 8.0**

- Aluminum (Al) rivet sleeve
- Rivet mandrel made of high-grade steel
- Secure connection

**Area of application**
- Use blind rivets to fasten
  - RHEINZINK-Cast Fixing Clip
  - steel or aluminum profile sheets onto
    - steel substructures
    - aluminum substructures

---

#### Blind rivet K14 - AI/E - 5.0 x 8,0

<table>
<thead>
<tr>
<th>Marking</th>
<th>Ø x</th>
<th>Length</th>
<th>Clamping thickn.</th>
<th>Drill hole Ø</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blind rivet K14 - AI/E - 5.0 x 8,0</td>
<td>5.0</td>
<td>8.0</td>
<td>2.5 - 4.5</td>
<td>5.1</td>
</tr>
<tr>
<td></td>
<td>5.0</td>
<td>10.0</td>
<td>4.5 - 6.0</td>
<td>5.1</td>
</tr>
<tr>
<td></td>
<td>5.0</td>
<td>12.0</td>
<td>6.0 - 8.0</td>
<td>5.1</td>
</tr>
<tr>
<td></td>
<td>5.0</td>
<td>18.0</td>
<td>12.0 - 14.0</td>
<td>5.1</td>
</tr>
</tbody>
</table>

### 2.5.3 EJOT® Blind rivet

**Blindniet AI/E - 4.8 x 10**

- Aluminum (Al) rivet sleeve
- Rivet mandrel made of high-grade steel
- Secure connection

**Area of application**
- Blind rivets are used to fasten secondary components, e.g. slave profiles.

---

#### Blindniet AI/E - 4.8 x 10

<table>
<thead>
<tr>
<th>Marking</th>
<th>Ø x</th>
<th>Length</th>
<th>Clamping thickn.</th>
<th>Drill hole Ø</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blindniet AI/E - 4.8 x 10</td>
<td>4.8</td>
<td>10.0</td>
<td>0.5 - 6.5</td>
<td>4.9</td>
</tr>
<tr>
<td></td>
<td>4.8</td>
<td>15.0</td>
<td>4.5 - 11.0</td>
<td>4.9</td>
</tr>
<tr>
<td></td>
<td>4.8</td>
<td>25.0</td>
<td>11.0 - 19.5</td>
<td>4.9</td>
</tr>
</tbody>
</table>
2.6 Detail concept
Detail design has a formative influence on the façade. Building profiles are required for most corners, flashings, connections and terminations. These must be coordinated when working out the detail concept. Two significant design variations will illustrate this.

Face width of building profile
The spectrum ranges from sharp-edged profiles to profiles that are several centimetres wide. Precise planning gives one the option of making the width of all termination and frame profiles the same, or to vary these proportionately as desired.

Projection of profiles
Depending on the detail concept, profiles can either be flush with or protrude from the façade.

The overview illustrates two possible flush principles:

Profile group 1
A relatively wide pilaster profile (face width ca. 60 mm) was selected for the building profile, which is terminated flush with the façade level. The edge profile, selected as the pilaster profile, is used as a flashing, in coordination with the window sill and window lintel.

Profile group 2
This version of a corner panel forms the window flashing, accentuating the horizontal line, without any disruption in the window area.
2.7 Details

2.7.1 General instructions

Third Party Trades

Connections of façade claddings to third party trades are 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. Please keep the location of the scaffold anchors in mind during planning/design.

Wall construction

Layered construction is commensurate with a rear-ventilated metal façade. 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 2.4

Load effect

If buildings are situated in exposed areas, boxed ends are required on all flat cladding profiles (all panel types) that are only fastened on one side, in order to provide additional reinforcement.

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 façades (soiling as a result of atmospheric deposits).

2.7.2 Pictogram

Horizontal sections (see Pages 24/25)

H1: Outside corner
H2: Inside corner
H3: Window jamb
H4: Joint/lengthwise expansion separation

Vertical sections (see Pages 25 and 43)

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 identified and explained with additional text 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 applicable standards and stipulations, as well as the designer’s intentions for the project.

Building height | Overlap | Distance to drip edge
--- | --- | ---
≤ 8 m | ≥ 50 mm | ≥ 20 mm
> 8 m ≤ 20 m | ≥ 80 mm | ≥ 20 mm
> 20 m | ≥ 100 mm | ≥ 20 mm

Table 6: Distance and overlap dimensions for flashings (e.g. windowsills, wall copings, verge profiles, etc.)

Source: German Sheet Metal Standards 2005
2.8 Planning grid

A metal façade 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 façade 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 façade 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.

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 on two-dimensional profiles wider than 250 mm, are not noticeable.
- Dimensional tolerances (dimensional change of 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.

The principles of façade segmentation will be illustrated and explained using a grid for horizontal cladding. This principle also applies to vertical façade cladding (e.g. reveal panel).

Module Y

Y corresponds to the smallest unit of the façade segmentation, which repeats itself, e.g. panel width. Grid module Y determines the precise location of penetrations and transitions. In the case of horizontal panels, dimension Y can be produced with cover widths of 200 mm to 333 mm, depending on the project. The bay width (Y) is determined by the face view of the panel and shaped in each case by a shadow joint.

The bay width = cover width is determined by the visible surface and joint width. Joint width is fixed at 20 mm.

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 profile.

Combination of panels and building profiles
Position Z₁: Base

Grid planning for new buildings, respectively, renovations
If the base location does not fit into the grid, the following corrective measures may be selected:
- Move the façade connection toward the top or the bottom.
- Change the profile geometry of the base profile.
- Lower or raise the base brickwork, if it has been planned for or if it already exists.

Position Z₂: Window lintel

Position Z₃: Window sill

Grid planning for new buildings
- Determine recess of unfinished structure.
- 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 incline of the windowsill
- Change the Y module.

Position Z₄: Roof edge

Grid planning for new buildings, respectively, renovations
If the height coordinates of the roof edge do not fit into the grid, the following corrective measures may be selected:
- Change the roof edge profile/incline
- Lower or raise the parapet or the roof edge frame.

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
2.9 Design variations

The following instructions serve to assist in proper planning of façade segmentation:

The façade images illustrated here represent a very small spectrum of design possibilities.

A combination of RHEINZINK-surfaces in “preweathered™ blue-grey” and “preweathered™ graphite-grey” material qualities segment and accentuate a façade very clearly. Above and beyond that, various materials, widths and lengths can be combined. The examples shown here illustrate ½ staggered cladding, combined widths and a random structure.
2.10 Installation and building tolerances

Adapter panels are used to accommodate building and installation tolerances. The position of these panels in the façade is controlled by the installation sequence: The building profiles, e.g. window and door frames, corner profiles, joint profiles, are installed first. The panels are manufactured in the RHEINZINK-System Center based on precise dimensions. Dimensional adaptations can be made on site by making minor changes to the joint width. This does not affect the clamping function of the panels, one to the other. The panels are installed starting at Installation Point A. Usually, the adapter panels are installed before the next building profile. Depending on the tolerance to be accommodated, one or two panels are fitted in.

Note:
Using adapter panels ≤ 15 mm wide to accommodate tolerances is hardly noticeable.
2.11 Horizontal Panel application, horizontal sections

Detail H1: Outside corner, page 26

H1.1

H1.2

H1.3

Detail H2: Inside corner, page 28

H2.1

H2.2

H2.3

Detail H3: Window jamb, page 30

H3.1

H3.2

H3.3

Detail H4: Expansion joint, page 32

H4.1

H4.2

H4.3
2.12 Horizontal Panel application, vertical sections

Detail V1: Base, page 34

Detail V2: Window sill, page 36

Detail V3: Window lintel, page 37

Detail V4: Two-part roof edge, page 40
HORIZONTAL PANEL, DESIGN AND APPLICATION

DESIGN
DETAIL H1, OUTSIDE CORNER

H1.1

H1.2
2.11.1 Detail H1: Outside corner

11 RHEINZINK-Horizontal Panel H 25
   a With long boxed end
   b Corner panel
16 RHEINZINK - Building profile
   a Outside corner profile
   b Slave profile
18 Support profile
   ■ Made of aluminum
20 Substructure*
   ■ T-Profile
   ■ Wall bracket with thermal break
23 Supporting structure
25 Thermal insulation

* Compliance with manufacturers’ guidelines
HORIZONTAL PANEL, DESIGN AND APPLICATION

DESIGN
DETAIL H2, INSIDE CORNER

H2.1

H2.2
2.11.2 Detail H2: Inside corner

11 RHEINZINK-Horizontal Panel H 25
   □ With long boxed end
16 RHEINZINK - Building profile
   □ Inside corner profile
18 Support profile
   □ Made of aluminum
20 Substructure*
   □ T-Profile
   □ Wall bracket with thermal break
23 Supporting structure
25 Thermal insulation

* Compliance with manufacturers’ guidelines.
HORIZONTAL PANEL, DESIGN AND APPLICATION

DESIGN
DETAIL H3, WINDOW JAMB

H3.1

H3.2
2.11.3 Detail H3: Window jamb

11 RHEINZINK-Horizontal Panel H 25
   a With long boxed end
   b Corner panel
16 RHEINZINK - Building profile
   a Jamb profile
   b Slave profile
   c Receiver strip
   d Termination profile
18 Support profile
   ■ Made of aluminum
20 Substructure*
   ■ T-Profile
   ■ Wall bracket with thermal break
23 Supporting structure
25 Thermal insulation
31 Airtight sealing

* Compliance with manufacturers’ guidelines.
2.11.4 Detail H4: Expansion joint

11 RHEINZINK-Horizontal Panel H 25
   a With long boxed end
16 RHEINZINK - Bauprofil
   a Pilaster profile
   b 2-part shadow joint profile
   c Slave profile
20 Substructure*
   T-Profile
   Wall bracket with thermal break
23 Supporting structure
25 Thermal insulation

* Compliance with manufacturers’ guidelines.
HORIZONTAL PANEL, DESIGN AND APPLICATION

DESIGN
DETAIL V1, BASE

V1.1

V1.2
2.12.1 Detail V1: Base

11 RHEINZINK-Horizontal Panel H 25
16 RHEINZINK - Building profile
   a Base profile, partially perforated
   b Receiver strip
   c Wall coping
   d Perforated strip
18 Support profile
   Made of aluminum
19 Separating layer
   Structured underlay
20 Substructure*
   T-Profile
   Wall bracket with thermal break
22 Function layer
   Watertight barrier
23 Supporting structure
25 Thermal insulation

* Compliance with manufacturers’ guidelines
HORIZONTAL PANEL, DESIGN AND APPLICATION

DESIGN
DETAIL V2, WINDOWSILL

V2.1

V2.2
2.12.2 Detail V2: Windowsill

11 RHEINZINK-Horizontal Panel
   H 25
16 RHEINZINK - Building profile
   a Windowsill profile
   b Perforated strip
   c Fixing profile
18 Supporting profile
   a Made of aluminum
   b Made of galvanized steel
      with thermal break
19 Separating layer
   ■ Structured underlay
20 Substructure*
   ■ T-Profile
   ■ Wall bracket with thermal break
23 Supporting structure
25 Thermal insulation
31 Airtight sealing
100 Rivet connection with slotted hole
   and rivet jig

* Compliance with manufacturers’ guidelines.
HORIZONTAL PANEL, DESIGN AND APPLICATION

DESIGN
DETAIL V3, WINDOW LINTEL

V3.1

V3.2
2.12.3 Detail V3: Window lintel

11 RHEINZINK-Horizontal Panel H 25
16 RHEINZINK - Building profile
  a Lintel profile
  b Lintel profile, partially perforated
  c Receiver strip
18 Supporting profile
  a Made of aluminum
  b Made of aluminum, partially perforated
  c Made of galvanized steel with thermal break
20 Substructure*
  □ T-Profile
  □ Wall bracket with thermal break
23 Supporting structure
25 Thermal insulation
31 Airtight sealing

* Compliance with manufacturers’ guidelines.
HORIZONTAL PANEL, DESIGN AND APPLICATION

DESIGN
DETAIL V4, TWO-PIECE ROOF EDGE
2.12.4 Detail V4: Roof edge

11 RHEINZINK-Horizontal Panel H 25
16 RHEINZINK - Building profile
   a Fixing profile
   b Perforated strip
   c Edge profile
   d Wall coping, slope > 3°
18 Supporting profile
   □ Made of aluminum
19 Separating layer
   □ Structured underlay
20 Substructure*
   a T-Profile, L-Profile
      Wall bracket with thermal break
   b Plywood or sterling boards
23 Supporting structure
25 Thermal insulation

* Compliance with manufacturers’ guidelines
HORIZONTAL PANEL, DESIGN AND APPLICATION

INTERNATIONAL SERVICE CENTRES
APPLICATION ENGINEERING CONSULTATION

Germany
RHEINZINK GmbH & Co. KG
Bahnhofstraße 90
45711 Datteln
Tel.: +49 2363 605-0
Fax: +49 2363 605-209
info@rheinzink.de

Belgium/Luxembourg
RHEINZINK BELUX S.A./N.V.
Chaussée de Namur 119 bte 3
BE-1400 Nivelles
Tel.: +32 67 55638
Fax: +32 67 335138
info@rheinzink.be

Netherlands
RHEINZINK Nederland Wentzel B.V.
Postbus 2726
NL-1000 CS Amsterdam
Tel.: +31 20 4352000
Fax: +31 20 4352015
verkoop@wentzel.nl

Austria
RHEINZINK AUSTRIA GMBH
Industriestraße 23
A-3130 Herzogenburg
Tel.: +43 2782 85247-0
Fax: +43 2782 85191
info@rheinzink.at

France
RHEINZINK FRANCE
La Plassotte, B.P. 5
F-42590 Neulise
Tel.: +33 4 77 66 42 90
Fax: +33 4 77 64 67 67
contact@rheinzink.fr

Poland
RHEINZINK Polska Sp. z o.o.
Majdan 105/Warszawy
RO-500387 Brasov
Tel.: +40 268 546550
Fax: +40 268 546551
info@rheinzink.ro

America
RHEINZINK America, Inc.
96F Commerce Way
USA-Woburn, MA 01801
Tel.: +1 781 729 0812
Fax: +1 781 729 0813
info@rheinzink.com

Czech Republic
RHEINZINK ČR s.r.o.
Na Valech 22
CZ-29001 Poděbrady
Tel.: +420 325 615465
Fax: +420 325 615721
info@rheinzink.cz

Romania
RHEINZINK RO
Str. Al. Vlahuţă 10, ITC, bioul A4
RO-500387 Brasov
Tel.: +40 268 546550
Fax: +40 268 546551
info@rheinzink.ro

Asia-Pacific
RHEINZINK Zinc Manufacturing
(Shanghai) Co., Ltd.
T3-4A, Jinqiao Export
Processing Zone (South)
5001 Hua Dong Road
PRC-Shanghai 201 201
Tel.: +86 21 5858-5881
Fax: +86 21 5858-5877
info@rheinzink.cn

Russia
OOO RHEINZINK
ul. Urshumskaja 4
RU-129343 Moscow
Tel.: +7 495 775-2235
Fax: +7 495 775-2236
info@rheinzink.ru

Norway
RHEINZINK Norge
Hamang Terrasse 55
N-1336 Sandvika
Tel.: +47 67 540440
Fax: +47 67 540441
info@rheinzink.no

Australia/New Zealand
RHEINZINK Service Australia
Craft Metals Pty. Ltd.
Unit 6, 39 King Road
AUS-Hornsby NSW 20 77
Tel.: +61 2 94824166
Fax: +61 2 94761366
info@craftmetals.com.au

Slovak Republic
RHEINZINK SK s.r.o.
Zadunajská cesta 6
SK-85101 Bratislava
Tel.: +421 2 53414565
Fax: +421 2 53632808
info@rheinzink.sk
HORIZONTAL PANEL, DESIGN AND APPLICATION

REFERENCE PROJECTS

Additional project references can be found on the Internet at www.rheinzink.com
Title: Private Residence, Sydney, Australia
Architect: Jahn Associates, Surry Hills, Australia
RHEINZINK-work done by:
Architectural Roofing & Wall Cladding, Hornsby, Australia

1. Breeding facility for domestic animals in the Friedrich-Loeffler-Institute,
Greifswald-Insel Riems, Germany
Architect: Maedebach, Redeleit & Partner, Berlin, Germany
RHEINZINK-work done by:
Bau- & Kupferklempnerei Martin Boecker, Hintersee, Germany

2. Spenglerei Pilatus
Architect: Peter Amrein, Sarnen, Switzerland
RHEINZINK-work done by:
Spenglerei Pilatus AG, Kriens, Switzerland

3. Private Residence, Cantù, Italy
Architect: Paolo Pirovano, Merone, Italy
Mauro Angelo Ceresa, Cantù, Italy
RHEINZINK-work done by:
Galavotti Mauro, Gaglianico, Italy

4./10. Private Residence, Colmanicchio, Italy
Architect: Mario and Giuditta Botta, Lugano, Italy
RHEINZINK-work done by:
Torsetta SA Massimo Frizzi, Muralto, Italy

5. FERI, Maribor, Slovenia
Architect: Styria d.o.o., arhitekturni atelje, Maribor, Slovenia
RHEINZINK-work done by:
KLEMAKS d.o.o., Maribor, Slovenia
PROFORMA TREND d.o.o., Zgornja Ložnica, Slovenia

6./11. FHS Osnabrück/new lecture hall, Osnabrück, Germany
Architect: Jockers Architekten BDA, Stuttgart, Germany
RHEINZINK-work done by:
Feldhaus Fenster + Fassaden GmbH & Co. KG, Emsdetten, Germany

7. Private Residence, Kaarst, Germany
Architect: petershaus GmbH & Co. KG, Kaarst, Germany
RHEINZINK-work done by:
petersdach GmbH, Kevelaer, Germany

8. Private Residence, Neustadt, Austria
Architect: Dimiter Karaivanov, Neustadt, Austria
RHEINZINK-work done by:
Resch Dach GmbH & Co KG, Mattersburg, Austria

9. Private Residence, Straden, Austria
Architect: Rauchsignale, Straden, Austria
RHEINZINK-work done by:
Spenglerei Klaus Zidek, Straden, Austria