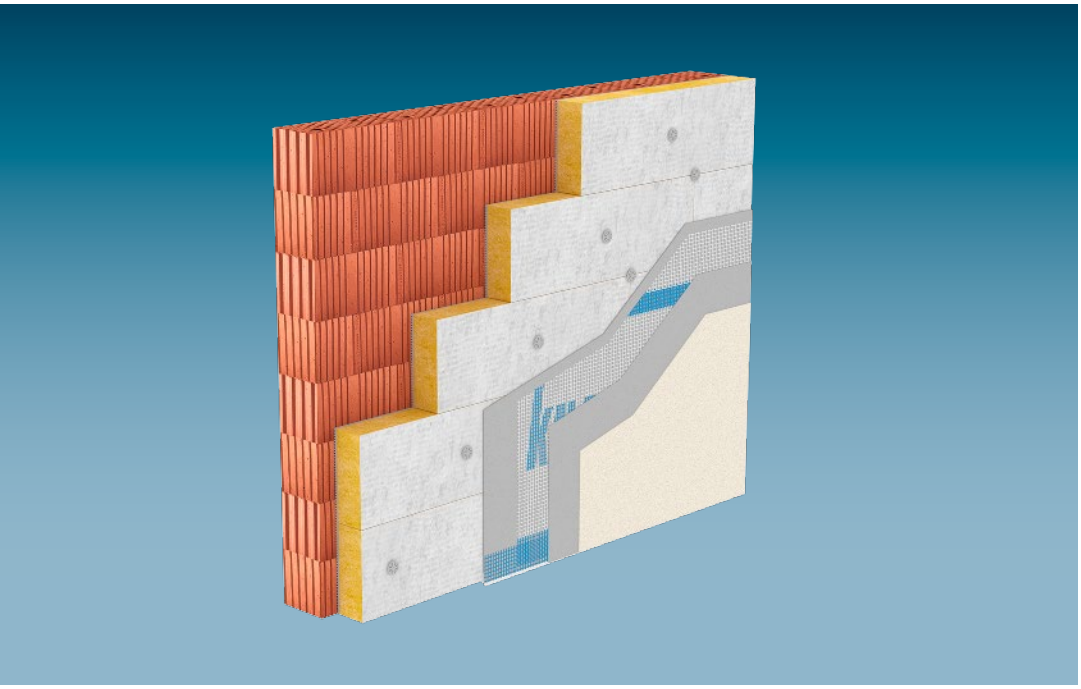


Plaster and Façade Systems

WE112.de

System Data Sheet 2021-07

Knauf WARM WALL Plus in Solid Construction ETICS with Mineral Wool Insulation Materials

WE112a.de – With mineral-based render system
WE112b.de – With mineral-based / organic-based render system
WE112c.de – With mineral-based scratch render system

Note on English translation / Hinweise zur englischen Fassung

This is a translation of the system data sheet valid in Germany.
All stated details and properties are in compliance with the regulations of the German standards and building regulations. They are only applicable for the specified products, system components, application rules, and construction details in connection with the specifications of the respective certificates and approvals.
Knauf Gips KG denies any liability for applications outside of Germany as this requires changes acc. to the respective national standards and building regulations.

Dies ist eine Übersetzung des in Deutschland gültigen Detailblattes. Alle angegebenen Werte und Eigenschaften entsprechen den in Deutschland gültigen Normen und bauaufsichtlichen Regelungen. Sie gelten nur bei Verwendung der angegebenen Produkte, Systemkomponenten, Anwendungsregeln und Konstruktionsdetails in Verbindung mit den Vorgaben der bauaufsichtlichen Nachweise.
Die Knauf Gips KG lehnt jegliche Haftung für Einsatz und Anwendung außerhalb Deutschlands ab, da in diesem Fall eine Anpassung an nationale Normen und bauaufsichtliche Regelungen notwendig ist.

Contents

Notes on the document

Knauf system data sheets are the basis for planning and application for planners and professional installers when applying Knauf systems. The contained information and specifications, constructions, details and stated products are based, unless otherwise stated, on the Certificates of Usability (e.g. general national technical approvals abZ and general type approvals aBG) valid at the date they are published as well as on the applicable standards. In addition, design and structural requirements and those regarding building physics (fire protection and sound insulation) are considered.
The details shown are solution suggestions intended for general orientation in the subject matter and must be adapted accordingly to suit the constructional features on site. Ancillary trades are only represented schematically.

References to other documents

System data sheets

- ETICS systems with mineral wool insulation materials on old ETICS or wood wool lightweight panels: Knauf WARM WALL Plus in solid construction P323-E01.de
- ETICS in Timber Construction with Insulation Materials made of Mineral Wool:
  Knauf WARM WALL Plus MW in Timber Construction P333.de
- ETICS with mineral wool and EPS insulation materials with ceramic lining
  Knauf WARM WALL Keramik in Solid Construction WE101e.de

Product data sheets

- Observe the product data sheets of the individual Knauf system components.

Intended use of Knauf systems

Please observe the following:

Caution	Knauf systems may only be used for the application cases specified in the Knauf documentation. In case third-party products or components are used, they must be recommended or approved by Knauf. Flawless application of products / systems assumes proper transport, storage, assembly, installation and maintenance.

General notes on the Knauf system

Building physics requirements must be examined and tested in detail.

Thermal bridges must be avoided, see DIN 4108 amendment 2.

The assessment of the thermal insulation is to be performed in accordance with DIN 4108-2 and if necessary the GEG (German Buildings Energy Act).

The structural stability of the existing wall or ceiling must be assured before installation of ETICS. The proof must include all load-bearing and associated positioned elements.

Special care must be taken, particularly with the application of the connections and ensuring that the construction is driving-rain proof.

When handing over the site to a different trade, we recommend the use of a hand-over protocol.

Term definitions

Splash water zone

The splash water zone starts with the edge of the ground line or top edge of the covering and has a height of at least 300 mm and up to maximum 600 mm. Water from precipitation must be diverted away from the façade by constructional measures (gravel bed or layer that interrupts capillary action). Paving stone or paving must be installed sloping away from the building and be constructionally separated from the building. Observe the DIN 18533.

Explanation of terms

In this system data sheet, the following terms that diverge from the system approvals are used:

- Finish coat with paint coat instead of a final coating

Abbreviations used in this document

- DIBt: Deutsches Institut für Bautechnik
- EPS: Expanded polystyrene
- GEG: German Buildings Energy Act
- MW: Mineral wool
- VDPM: Verband für Dämmsysteme, Putz und Mörtel e. V.
- ETICS: External thermal insulation composite system

Notes on sound insulation

The weighted sound reduction index $R_{w,ETICS}$ of the uninterrupted solid wall (without window / door openings) with WARM WALL Plus application acc. to abZ Z-33.43-82 can be determined with the aid of the Knauf Schallschutzprognose-Tools sound insulation forecasting tool (German only): knauf.de/schallschutzprognose.

Certificates of Usability

Knauf System	Proofs
WARM WALL Plus with dowelled and adhesively bonded mineral wool lamella MW Volamit 040 and mineral wool boards MW Wolle 035, MW Wolle 035 plus, MW Wolle 035 plus L and MW Wolle 035 plus M2.	Z-33/43-82
WARM WALL Plus with adhesively bonded mineral wool lamella MW Volamit 040	Z-33.44-83
WARM WALL doubling up on existing ETICS or wood wool lightweight panels	Z-33.49-981
General type approval of the VDPM (German association for insulation systems, plaster and mortar)	Z-33.49-1505

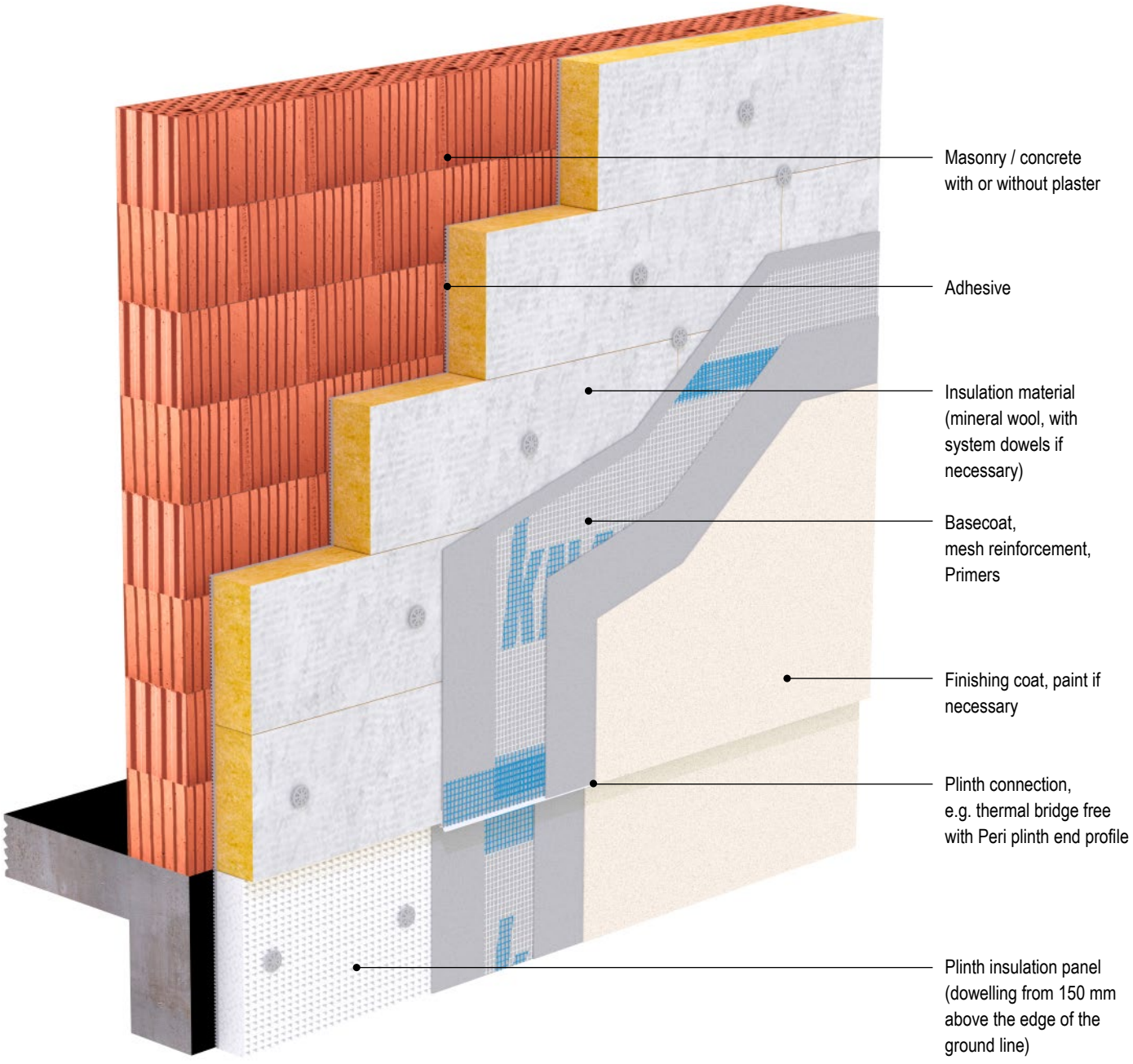
Knauf WARM WALL Plus in solid construction with mineral wool insulation materials

In the exterior walls area

Knauf WARM WALL plus in solid construction are building authority certified external thermal insulation composite systems (ETICS) with insulation materials made of mineral wool (MW). Optionally, mineral wool boards (WAP-zg) or mineral wool lamella (WAP-zh) can be used on masonry and concrete with or without plaster in the exterior wall area. The system WARM WALL Plus in solid construction can be used as a not easily flammable (B1) and non-combustible (A) system. The application as dependent on the building height is governed by the respective state building code.

Properties

- Reaction to fire of ETICS: depending on the version is non-combustible (building material class A2 and/or A2-s1, d0) and/or not easily flammable (building material class B1), see table on page 16
- Very good sound insulation characteristics (WAP-zg)
- Total insulation material thickness: permissible up to maximum 400 mm



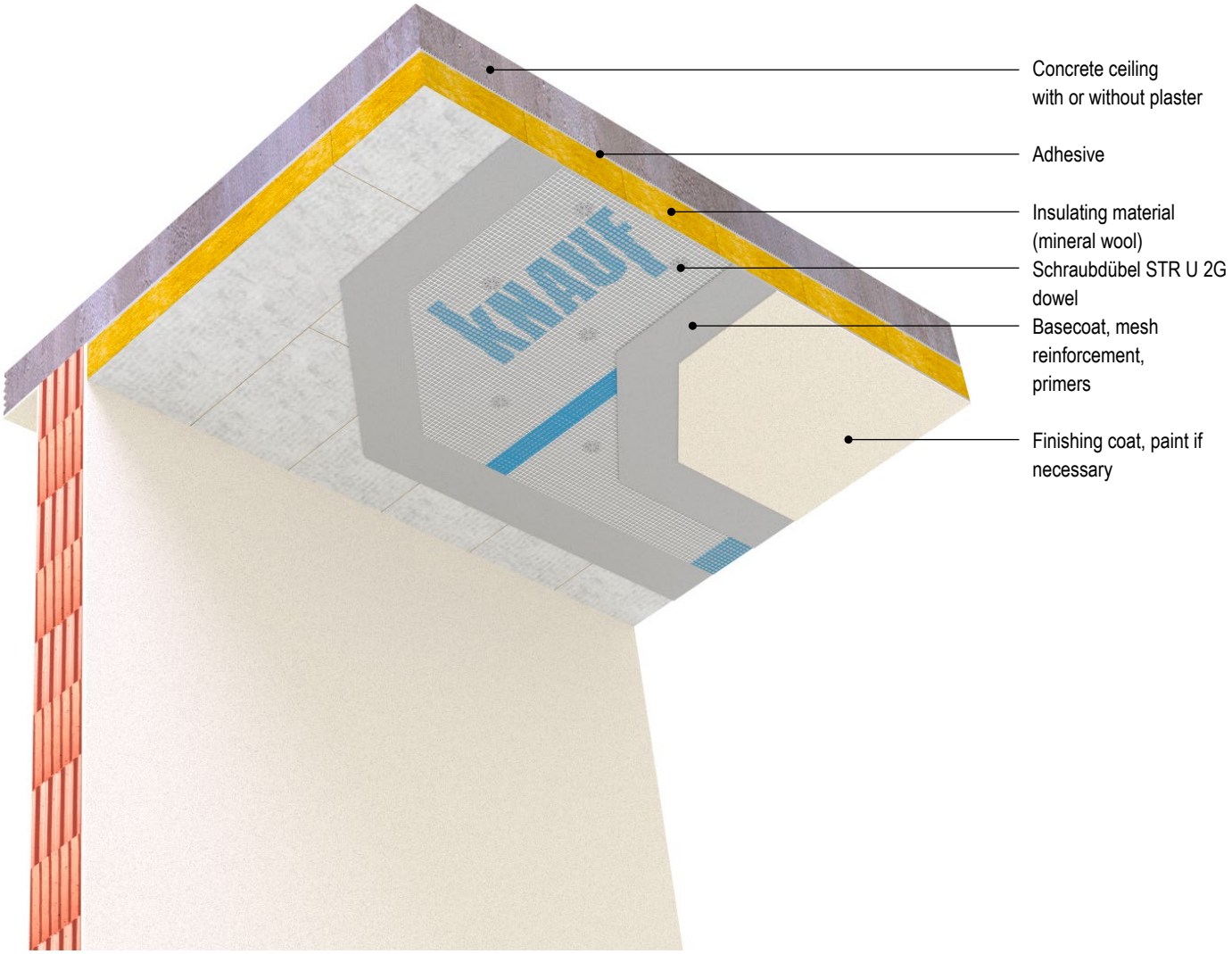
Knauf WARM WALL Plus in solid construction with mineral wool insulation materials (continued)

In the ceiling underside area

Knauf WARM WALL Plus in solid construction can be optionally applied with mineral wool boards (WAP-zg) or mineral wool lamella (WAP-zh) on concrete with or without plaster in the ceiling underside area. The system can be employed where building authority requirements exist for exterior wall cladding are flammable, not easily flammable (B1) or flammable (A). Application in dependence on the building height is governed by the respective state building codes.

Properties

- Reaction to fire ETICS: non-combustible
- Very good sound insulation characteristics (WAP-zg)
- Total insulation material thickness: permissible up to maximum 200 mm



System overview

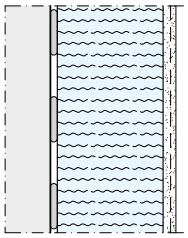
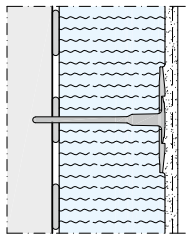
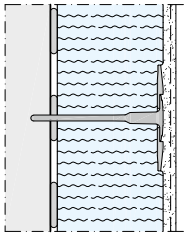
Knauf System	WE112a.de WARM WALL Plus Mineral-based	WE112b.de WARM WALL Plus Mineral / organic	WE112c.de WARM WALL Plus Scratch render
Description	Natural rendering mortar made of high-quality mineral-based raw materials optionally available with marble grains. Robust, durable, open to diffusion with variable render surface. Combined with a mineral reinforcement layer.	Organically bonded finishing plaster for a more intensive range of colour shades. Combined with a mineral reinforcement layer.	Classic, thick layer mineral-based scratch render system with an open surface structure. Natural self-cleaning effect, very robust system and highest level of sound insulation. Combined with a mineral reinforcement layer.
Reaction to fire/building material class ETICS	Non-combustible, A2	Non-combustible, A2-s1, d0 or not easily flammable, B1	Non-combustible, A2
Maximum total insulating material thickness t	Exterior wall: up to 400 mm[1] / ceiling underside: up to 200 mm		
Render system layer thickness (reinforcement layer and finish coat)	4.5[2] – 20 mm	4.5[2] – 18 mm	approx. 17 mm
Exterior wall / ceiling underside			
Adhesive – exterior wall	SM700 Pro, SM700, SM300, Lustro, Duo-Kleber, Sockel-SM		
Adhesive – ceiling underside	SM700 Pro, from 180 mm: Duo-Kleber adhesive only		
Mineral wool insulation MW	MW Volamit 040, MW Wolle 035, MW Wolle 035 plus, MW Wolle 035 plus L, MW Wolle 035 plus M2		
System dowels – Exterior wall (if required)	Schlagdübel CNplus 8 insulation anchor nails, Schraubdübel STR U 2G dowels; Schraubdübel HTR-P/HTR-M dowels, Schraubdübel Termoz SV II Ecotwist dowels		
System dowel – ceiling underside	Schraubdübel STR U 2G dowel		
Dowel plates / rondelles (if required)	DT 90, VT 2G, HDT 90, SBL 140 plus, DT 140, HDT 140		
Basecoat	SM700 Pro, SM700, SM300, Lustro, Sockel-SM		SM300
Reinforcing mesh	4x4 mm, 5x5 mm		
Priming	Isogrund (recommended)	Quarzgrund pro	–
Finish coat	SM700 Pro RP 240, SP 260 Pro Noblo, Noblo Filz, Carrara, MineralAktiv Scheibenputz floated render, MineralAktiv Scheibenputz Dry scratch render	Conni S Addi S Kati S	Mak3
Coats	Siliconharz-EG-Farbe paint Autol, Minerol Fassadol , Fassadol TSR MineralAktiv Fassadenfarbe paint	Fassadol, Fassadol TSR Autol Minerol (only on Kati S) MineralAktiv Fassadenfarbe paint	–
Plinth / splash water area			
Adhesive	Sockel-SM Pro or Sockel-SM, SM700 Pro, SM700, SM300, Duo-Kleber adhesive		
Insulation material	Sockeldämmplatte 032, Sockeldämmplatte 035		
Plinth connection (with recessed plinth)	Sockel-Abschlussprofil Peri plinth profile (free of thermal bridges), plinth profile and push on plinth profile		
Basecoat	Sockel-SM Pro or Sockel-SM, SM700 Pro, SM700, SM300		
Mesh reinforcement, primer, finish coat and decorative coat	Such as for façade (without Mak3), Butz, Sockel-SM Pro, Sockel-SM		
Moisture protection	Sockel-Dicht (with Sockel-SM Pro as a basecoat and render finish and for a total thickness ≥ 7 mm not required)		

1) *Maximum insulation thickness varies according to the insulation type, see pages 7 to 9.*

2) *Minimum plaster thickness only on mineral wool insulation boards in conjunction with adhesive and reinforcing mortar SM300, reinforcement mesh 4x4 mm and final coats Noblo, Noblo Filz, RP 240, SP 260 Pro, Conni S, Addi S, MineralAktiv Scheibenputz floated render or MineralAktiv Scheibenputz Dry floated render*

System variants

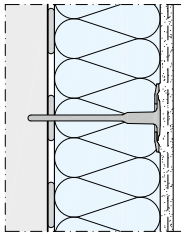
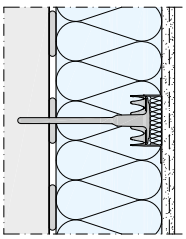
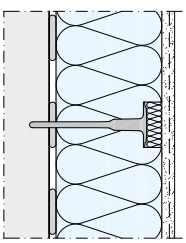
Mineral wool lamella – fastening to the exterior wall

Scheme drawing	Insulation material	Permissible insulation thickness mm	Bonding	Fastening
Adhesive bonding acc. to abZ Z-33.44-83 (minimum bond strength ≥ 0.08 N/mm²)				Adhesive bond only
	MW Volamit 040	40 – 200	■ Full surface ▪ Insulation ▪ Substrate ■ Partial surface ≥ 50 % ▪ Substrate	Maximum wind load w_{ek}: 1.59 kN/m²
		> 200 – 400	■ Full surface ▪ Substrate ■ Partial surface ≥ 50 % / ≥ 70 %[1)] ▪ Substrate Adhesive must be machine applied.	Maximum wind load w_{ek}: ■ 1.1 kN/m² in case of adhesive surface share ≥ 50 % ■ 1.6 kN/m² in case of adhesive surface share ≥ 70 % Insulation width/height of the partial surface to be insulated must be > 2x insulation thickness. ■ Exception: last upper uninterrupted insulation panel layer (upper building party wall) ■ Exception: lateral building perimeter area ≤ 2 m.
Dowel installation acc. to abZ Z-33.44-83 (minimum bond strength ≥ 0.08 N/mm²)				Glue and dowel
Surface flush under mesh (or through the mesh)	MW Volamit 040	40 – 200	■ Full surface ▪ Insulation ▪ Substrate ■ Partial surface ≥ 50 % ▪ Substrate	Wind load w_{ek}: 1.6 kN/m² to 2.2 kN/m² ■ Plaster system weight ≤ 10 kg/m²: ≥ 3 dowels/m² ■ Plaster system weight ≤ 10 kg/m²: ≥ 5 dowels/m² In case of dowel installation below the mesh use additional Ø 140 mm dowel rondelle.
		> 200 – 400	■ Full surface ▪ Substrate ■ Partial surface ≥ 50 % / ≥ 70 %[1)] ▪ Substrate Adhesive must be machine applied.	Maximum wind load w_{ek}: ■ 1.1 kN/m² in case of adhesive surface share ≥ 50 % ■ 1.6 kN/m² in case of adhesive surface share ≥ 70 % 3 dowels / board ▪ If insulation width/height of the partial surface to be insulated ≤ 2x insulation thickness and ▪ In the last upper uninterrupted insulation panel layer 5 dowels / 2 m vertical in lateral building perimeter area ≤ 2 m. In case of dowel installation below the mesh use additional Ø 140 mm dowel rondelle.
Dowel installation acc. to abZ Z-33.43-82 (minimum bond strength < 0.08 N/mm²)				Glue and dowel
Surface flush under mesh (or through the mesh)	MW Volamit 040	40 – 200	■ Full surface ▪ Insulation ▪ Substrate ■ Partial surface ≥ 50 % ▪ Substrate	See Z-33.43-82 for number of dowels. In case of dowel installation below the mesh use additional Ø 140 mm dowel rondelle.
				

1) Required minimum adhesive surface for wind load capacity of maximum 1.6 kN/m²

System variants (continued)

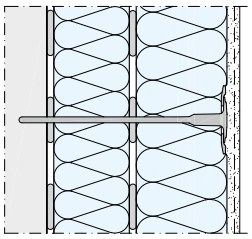
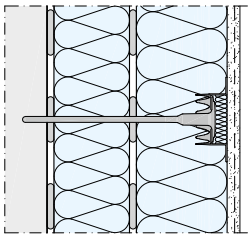
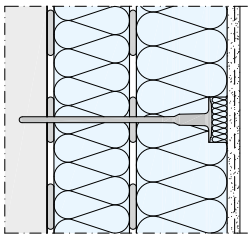
Mineral wool boards – fastening to the exterior wall

Scheme drawing	Insulation material	Permissible insulation thickness mm	Bonding	Fastening
Dowel installation acc. to abZ Z-33.43-82				Glue and dowel
Surface flush under mesh (or through the mesh) 	MW Wolle 035	60 – 300	■ Full surface ▪ Insulation ■ Partial surface ≥ 40 % ▪ Insulation	See Z-33.43-82 for number of dowels. For dowel installation below the mesh: ■ Up to 200 mm insulation material thickness: if necessary use additional dowel plates Ø 90 mm ■ In case of > 200 mm insulation material thickness: with additional dowel plates Ø 90 mm
	MW Wolle 035 plus	60 – 300	■ Full surface ▪ Insulation ▪ Substrate ■ Partial surface ≥ 40 % ▪ Insulation ■ Partial surface ≥ 50 % ▪ Substrate	
	MW Wolle 035 plus L	60 – 200		
	MW Wolle 035 plus M2	60 – 300		
Dowel installation acc. to abZ Z-33.43-82				Glue and dowel
Recessed deep under mesh 	MW Wolle 035	60 – 300	■ Full surface ▪ Insulation ■ Partial surface ≥ 40 % ▪ Insulation	Number of dowels see Z-33.43-82, Schraubdübel STR U 2G dowel with dowel plate VT 2G and STR Rondelle MW dowel plate.
	MW Wolle 035 plus	60 – 300	■ Full surface ▪ Insulation ▪ Substrate ■ Partial surface ≥ 40 % ▪ Insulation ■ Partial surface ≥ 50 % ▪ Substrate	
	MW Wolle 035 plus L	60 – 200		
	MW Wolle 035 plus M2	60 – 300		
Dowel installation acc. to abZ Z-33.43-82				Glue and dowel
Recessed under mesh 	MW Wolle 035	80 – 200	■ Full surface ▪ Insulation ■ Partial surface ≥ 40 % ▪ Insulation	Number of dowels see Z-33.43-82, Schraubdübel STR U 2G dowel with STR Rondelle MW dowel plate.
	MW Wolle 035 plus	80 – 200	■ Full surface: ▪ Insulation ▪ Substrate ■ Partial surface ≥ 40 % ▪ Insulation ■ Partial surface ≥ 50 % ▪ Substrate	
	MW Wolle 035 plus L	100 – 200		
	MW Wolle 035 plus M2[1)]	100 – 200		

1) Deeply recessed dowel installation with Termoz SV II Ecotwist is possible, see certification for more detailed information

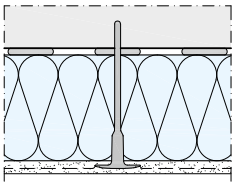
System variants (continued)

Mineral wool boards – fastening to exterior wall – double-layer application

Scheme drawing	Insulation material	Permissible total insulation material thickness mm	Adhesive bonding of the insulation material layer to solid substrate	Adhesive bonding of the second insulation material layer	Anchoring of the second insulation material layer
Dowel installation acc. to abZ Z-33.43-82					Glue and dowel
Surface flush under mesh (or through the mesh) 	MW Wolle 035	120 – 400	■ Full surface ▪ Insulation material ■ Partial surface ≥ 40 % ▪ Insulation material	■ Full surface ▪ Insulation material ■ Partial surface ≥ 40 % ▪ Insulation material	See Z-33.43-82 for number of dowels. In case of dowel installation below the mesh use additional Ø 90 mm dowel rondelle. The dowels have to be anchored in the solid substrate through both insulation material layers.
	MW Wolle 035 plus	120 – 400	■ Full surface ▪ Insulation material ▪ Substrate ■ Partial surface ≥ 40 % ▪ Insulation material		
	MW Wolle 035 plus M2	120 – 340	■ Full surface ▪ Insulation material ■ Partial surface ≥ 50 % ▪ Substrate	■ Full surface ▪ Insulation ■ Partial surface ≥ 50 % ▪ Insulation	
Dowel installation acc. to abZ Z-33.43-82					Glue and dowel
Recessed deep under mesh 	MW Wolle 035	120 – 400	■ Full surface ▪ Insulation material ■ Partial surface ≥ 40 % ▪ Insulation material	■ Full surface ▪ Insulation material ■ Partial surface ≥ 40 % ▪ Insulation material	Schraubdübel STR U 2G dowel with dowel plate VT 2G and STR Rondelle EPS dowel plate. The dowels have to be anchored in the solid substrate through both insulation material layers.
	MW Wolle 035 plus	120 – 400	■ Full surface ▪ Insulation material ▪ Substrate ■ Partial surface ≥ 40 % ▪ Insulation material		
	MW Wolle 035 plus M2	120 – 340	■ Full surface ▪ Insulation material ■ Partial surface ≥ 50 % ▪ Substrate	■ Full surface ▪ Insulationl ■ Partial surface ≥ 50 % ▪ Insulation	
Dowel installation acc. to abZ Z-33.43-82					Glue and dowel
Recessed under mesh 	MW Wolle 035	120 – 200	■ Full surface ▪ Insulation material ■ Partial surface ≥ 40 % ▪ Insulation material	■ Full surface ▪ Insulation ■ Partial surface ≥ 40 % ▪ Insulation material	Schraubdübel STR U 2G dowel with STR Rondelle MW dowel plate. The dowels have to be anchored in the solid substrate through both insulation material layers.
	MW Wolle 035 plus	120 – 200	■ Full surface ▪ Insulation material ▪ Substrate ■ Partial surface ≥ 40 % ▪ Insulation material		
	MW Wolle 035 plus M2	120 – 200	■ Full surface ▪ Insulation material ■ Partial surface ≥ 50 % ▪ Substrate	■ Full surface ▪ Insulation material ■ Partial surface ≥ 50 % ▪ Insulation	

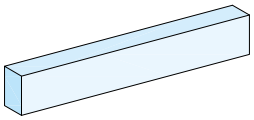
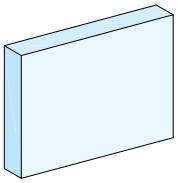
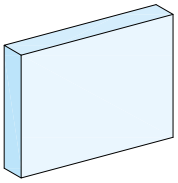
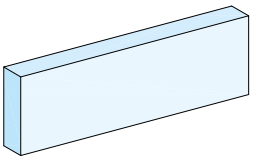
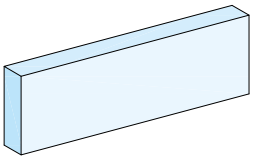
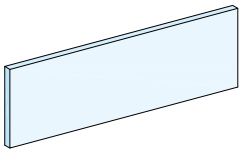
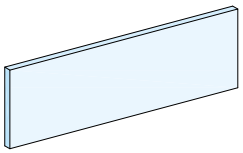
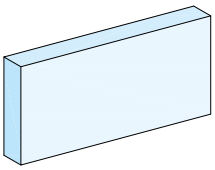
System variants (continued)

Mineral wool insulation material – Fixing to the ceiling underside made of concrete

Scheme drawing	Insulation material	Permissible insulation thickness mm	Bonding	Fastening
Dowel installation acc. to abZ Z-33.43-82				Glue and dowel
Surface flush through the mesh 	MW Wolle 035	80 – 200	■ Full surface ▪ Insulation	See Z-33.43-82 for number of dowels. Installation only with Schraubdübel STR U 2G dowels. In case of dowel installation through the mesh no additional dowel rondelle is necessary.
	MW Wolle 035 plus	80 – 200	■ Full surface ▪ Insulation material ■ Partial surface ≥ 50 % ▪ Substrate	
	MW Wolle 035 plus L	80 – 200		
	MW Wolle 035 plus M2	80 – 200		
	MW Volamit 040	80 – 200		

Note	Two-layer application of the insulation materials on the undersides of the ceiling is not permissible

Insulation material

Insulation material	Description	Rated value of thermal conductivity λ W/(m·K)	Dimensions w x l mm	Application type Acc. to DIN 4108-10	Available insulation material thickness mm
Exterior wall / ceiling underside					
	**MW Volamit 040**[1)] *Mineral wool lamella*	0.041	200 x 1200	WAP-zh	60 – 300
	**MW Wolle 035**[2)] *Mineral wool boards*	0.035	625 x 800	WAP-zg	60 – 300
	**MW Wolle 035 plus**[1)] *Mineral wool boards*	0.035	625 x 800	WAP-zg	60 – 300
	**MW Wolle 035 plus L**[1)] *Mineral wool boards*	0.035	400 x 1200	WAP-zg	60 – 200
	**MW Wolle 035 plus M2**[1)] *Mineral wool boards*	0.035	400 x 1200	WAP-zg	60 – 300
Reveal					
	**MW Wolle 035 Laibung**[3)] **reveal** *Mineral wool boards*	0.035	400 x 1200	WAP-zg	20 – 50
	**MW Wolle 035 Laibung plus**[1)] **reveal plus** *Mineral wool boards*	0.036	400 x 1200	WAP-zg	20 – 30
Plinth					
	**Sockeldämmplatte 035**[4)] **plinth board** *EPS, white*	0.035	500 x 1000	PW	30 – 400
	Sockeldämmplatte 032[4)] **plinth board** *EPS, grey*	0.032	500 x 1000	PW	40 – 200

1) Coated on both sides
2) Compacted on one side
3) Compacted upper layer
4) In case of use on non-combustible façades, prior consultation with those with fire protection responsibility and/or building authorities is required. Otherwise suitable non-combustible insulation materials have to be used.

Insulation material (continued)

Thermal resistance

Examples

Insulation material	Thermal resistance **R** in $(m^2 \cdot K)/W$ Total insulation thickness **t** in mm																	
	60	**80**	**100**	**120**	**140**	**160**	**180**	**200**	**220**	**240**	**260**	**280**	**300**	**320**	**340**	**360**	**380**	**400**
MW Volamit 040	1.46	1.95	2.44	2.93	3.41	3.90	4.39	4.88	5.37	5.85	6.34	6.83	7.32	7.80	8.29	8.78	9.27	9.76
MW Wolle 035 MW Wolle 035 plus	1.71	2.29	2.86	3.43	4.00	4.57	5.14	5.71	6.29	6.86	7.43	8.00	8.57	9.14	9.71	10.29	10.86	11.43
MW Wolle 035 plus L	1.71	2.29	2.86	3.43	4.00	4.57	5.14	5.71	–	–	–	–	–	–	–	–	–	–
MW Wolle 035 plus M2	1.71	2.29	2.86	3.43	4.00	4.57	5.14	5.71	6.29	6.86	7.43	8.00	8.57	9.14	9.71	–	–	–

In the table, you can read off the thermal conductivity as well as the total thickness of the insulation material of the thermal resistance R using the rated value. The sum of all thermal resistances (plaster, masonry, insulation material, etc.) is added to the sum of 0.17 $(m^2 \cdot K)/W$ of both internal and external thermal resistances and results in the thermal resistance. The inverse value of the thermal resistance is the U value.

Dowels

Schraubdübel STR U 2G dowel

Schraubdübel STR U 2G dowel is installed using an installation tool for surface flush or recessed installation and can be combined with the Dübelteller VT 2G dowel plate. The pre-installed screw dowel is made of galvanized steel. The dowel housing is made of a high-quality plastic with a predefined crumple zone for recessed dowel installation. The minimal anchoring depth of just 25 mm (aerated concrete 65 mm) ensures cost-effective dowel lengths. The dowel is secure with the highest characteristic load levels.

Schlagdübel CNplus 8 insulation anchor nail

Schlagdübel CNplus 8 insulation anchor nail is used for surface flush installation. The dowel can be applied by impact or screw-in installation. It is characterized by a very low impact energy. The pre-installed screw nail consists of a combination of fibre glass reinforced polyamide and electro-galvanized steel in the expansion area. The dowel housing is made of a high-quality plastic.

Schraubdübel HTR-P/HTR-M dowels

The Schraubdübel HTR dowel is used together with a setting tool for surface flush installation. The Schraubdübel HTR-P dowel is an anchor with a pre-installed purely plastic screw that functions as an expanding component. The Schraubdübel HTR-M dowel is an anchor with a pre-installed composite screw that functions as an expanding element and which consists of galvanized steel in the expanding area. Both dowels feature a low tightening torque facilitating optimum installation performance with a cordless screwdriver.

Basecoat

The adhesive is referred to as basecoat in the approvals and in ETICS is a component of the rendering/plastering system. Their purpose is to protect ETICS permanently from the effects of weather and to safely integrate the reinforcement mesh and form the basis for the subsequent final coats and finishes.

Reinforcing mesh

The reinforcement meshes 4x4 mm and 5x5 mm are high-strength, durable, alkaline-resistant reinforcement meshes made of glass fibres with a mesh size of 4 x 4 or 5 x 5 mm. They are non-slip and contain blue markings for mesh overlaps. In addition to the mesh sizes, both of the meshes also differ in terms of their tear resistance, weight per unit area and rigidity. They function as a reinforcement for the avoidance of cracks where moisture can ingress in the system. The mesh is worked into the fresh basecoat. The position in the adhesive depends on its thickness. The reinforcement mesh 4x4 mm may be used additionally as a reinforcement mesh for bridging joints on expansion joints in the exterior wall surfaces of prefabricated-slab buildings in conjunction with Lustro or SM700.

Finish coat

Carrara

Mineral finishing plaster as a modelling plaster. For the creation of diverse textured or brushed final coat textures.

Noblo Filz

Mineral-based, fine grain finishing plaster with 1.0 or 1.5 mm marble grains for fine sponged surface finishes.

Noblo, SP 260 Pro, RP 240

Mineral finishing renders as a floated render texture (Noblo and SP 260 Pro) and/or groove render texture (RP 240).

SM700 Pro

The mineral based, universal all-rounder for façades and plinths can be sponge finished or freely-structured as a natural white or coloured top coat. A broom finish or trowel finish application of SM700 Pro caters for special highlights on the façade.

MineralAktiv Scheibenputz and MineralAktiv Scheibenputz Dry floated renders

In a system with MineralAktiv Fassadenfarbe paint, the mineral floated render offers the highest level of protection against growth of algae and fungi and contributes to the permanent retention of impeccable façades. MineralAktiv Scheibenputz floated render also impresses with its elegant texture.

Conni S

Ready-to-use, paste-like, soiling-resistant silicone resin floated render, highly water-repellent and highly water permeable.

Addi S

Ready-to-use, paste-like, organically bonded and silicone resin reinforced floated render for intensive colour shades. Very extra-hard wearing, water-repellent and water-vapour-permeable.

Kati S

Ready-to-use, mineral silicate floated render with maximum 5 % organic share, highly water-repellent and highly water permeable.

Mak3

Classic mineral-based traditional scratch render with a mica additive provides excellent weather protection and a self-cleaning effect thanks to its surface

Final coat (continued)

properties.

Sockel-SM Pro, Sockel-SM

System approved and mineral based universal all rounder on a cementitious basis for the plinth area. Use as an adhesive and reinforcing mortar as well as a sponged final coat. When using Sockel-SM Pro as a basecoat and render finish with a total render thickness ≥ 7 mm, no additional protection for the render against ground moisture (moisture protection) is necessary.

Butz

Can only be used in the plinth zone. Coloured stone render with washed plaster effect for surface design in areas subject to wear and tear, e.g. plinth surfaces in the splash water zone.

Properties of finish coats for plinth / splash water zone and façade

Properties	Mineral-based finishing plasters							Organic finishing plasters			
	Noblo Filz, Noblo, SP 260 Pro, RP 240	SM700 Pro	Mak3	Carrara	MineralAktiv Scheibenputz and MineralAktiv Scheibenputz Dry floated renders	Sock-el-SM Pro	Sock-el-SM	Silicate render Kati S	Silicon resin renders Conni S	Silicon resin renders Butz	Resin plasters Addi S
Binder	Lime cement	Lime cement	Lime cement	Lime cement	Hybrid binder	Cement	Cement	Potas-sium silicate, disper-sion	Silicone resin emulsion, dispersion	Silicone resin emulsion, dispersion	Polymer dispersion, silicone resin
Hydrophobic (water-repellent)	●●	●●	●●	●●	●●	●●●●	●●●	●●	●●●●	●●●●	●●●
Diffusion properties	●●●●	●●●●	●●●●	●●●●	●●●●	●●	●●	●●●	●●●	●●	●
Colour shade range	●●	●●	●●	●●	●●	●	●	●●	●●●	●●	●●●●
Resistance to soiling	●●●●	●●●●	●●●●	●●●●	●●●●	●●●●	●●●●	●●●	●●●●	●●●●	●●●
Plinth/splash water area	●●	●●●●		●	●●	●●●●	●●●●	●	●●●	●●●●	●●

●●●● *Ideal*
●●● *Ideal to very well suited*
●● *Very suitable*
● *Suitable*

Use of finish coats for plinth / splash water zone and façade

Criteria	Mineral-based finishing plasters									Organic finishing plasters			
	Noblo Filz	Noblo, SP 260 Pro	RP 240	SM700 Pro	Mak3	Carrara	MineralAktiv Scheiben-putz floated render	MineralAktiv Scheiben-putz Dryr	Sockel-SM Pro, Sockel-SM	Silicate render Kati S	Silicon resin renders Conni S	Silicon resin renders Butz	Resin plasters Addi S
Surfaces													
Sponged texture	●			●					●				
Scratched texture					●								
Freely styled texture	●			●		●						●	
Textured floated render		●					●	●		●	●		●
Textured groove render			●										
Application													
By machine	●	●	●	●	●	●	●	●	●	●	●		●
By hand	●	●	●	●		●	●	●	●	●	●	●	●
Order information													
Bucket (paste-like)							●			●	●	●	●
Bagged material	●	●	●	●	●	●		●	●				

Coats

Siliconharz-EG-Farbe paint

Siliconharz-EG-Farbe paint is especially suitable for equalisation (single coat) of mineral finishing coats with the same colour shade as the render and the paint. Suitable for equalisation of drying-related, weather-related or application-related differences in the colour shade on the finishing coat.

Autol

Autol is a highly permeable, matt, premium silicon resin self-cleaning effect façade paint. It is ideally suited as two paint coats on mineral and organically bound renders, as well as a top coat in case of different shades of finishing coat and paint. A strong reduction in the adhesion of dirt particles facilitates wash-off of dirt and soiling by the action of precipitation.

Fassadol

Fassadol is a highly permeable, matt and highly colour shade fast silicone-reinforced façade paint. It is ideally suited as two paint coats for intensive colour shades on mineral and organically bound renders, as well as a top coat in case of different shades of finishing coat and paint.

Fassadol TSR

Fassadol TSR is a reflection-optimised, diffusion permeable, highly colour shade fast and high coverage silicone reinforced façade paint with a satin-matt appearance. It is suitable for applying two coats on white, mineral and organic bonded render systems on which a colour shade with a luminosity < 20 is required.

Minerol

Minerol is a highly permeable, matt, premium silicate façade paint with organic stabilisers. It is ideally suited as a structure-retaining, two coat paint on mineral renders. Minerol bonds by silification with the substrate and is an ideal coating on mineral renders, and on Kati S silicate floated render in case of different shades of finishing coat and paint.

MineralAktiv Fassadenfarbe paint

MineralAktiv Fassadenfarbe paint is a structure preserving, mineral façade paint on a hybrid binder basis without addition of softeners, solvents and preservatives. The optimised moisture management ensures that MineralAktiv Fassadenfarbe façade paint in a system with MineralAktiv finish coats is ideal in preventing growth of algae and mould. It has a high yield and an elegant mineral appearance.

Comparison of Knauf façade paints

Criteria	**Mineral based**		**Organic**		
	Silicate based dispersion	Hybrid façade paint	Silicone resin paints		Silicone-reinforced pure acrylic paint
	Minerol	**MineralAktiv Fassadenfarbe paint**	**Autol**	**Siliconharz-EG-Farbe paint**	**Fassadol, Fassadol TSR**
Binder	Potassium silicate, dispersion	Hybrid binder	Silicone resin emulsion, dispersion	Silicone resin emulsion, dispersion	Pure acrylic
Hydrophobic (water-repellent)	●●●	●●●	●●●●	●●●●	●●●●
Diffusion properties	●●●●	●●●●	●●●●	●●●	●●
Colour shade range	●●	●●	●●●	●●	●●●●
Resistance to ageing	●●●●	●●●●	●●●●	●●●●	●●●●
Hiding power	●●●	●●●●	●●●●	●●●	●●●●

●●●● *Ideal*
●●● *Ideal to very well suited*
●● *Very suitable*

Knauf Farbcenter (colour center)

The Knauf Farbcenter provides information on the feasibility and luminosity of colour shades for Knauf paints and plasters / renders: knauf.de/farbcenter.

Explanation of colour code

B P 2 5 7
- 7 — Luminosity range (here: 70 to 79)
- 5 — Brightening
- 2 — Greying
- P — Colour shade with English designation abbreviations (In this case: Blue Purplish)
- B

Thermal upgrading of common exiting walls

Overview of common existing walls and the required insulation material thicknesses

Existing walls Exterior walls	Density	Thick-ness	Rated value of thermal conductivity λ	U value without ETICS system[1]	Knauf WARM WALL Plus Minimum insulation material thickness t in mm			
					At U value[2] ≤ 0.20 W/(m²·K) after state support by the German federal government		At U value[2] ≤ 0.24 W/(m²·K) acc. to the GEG (German Buildings Energy Act)	
					Design thermal conductivity λ in W/(m·K)		Design thermal conductivity λ in W/(m·K)	
Construction type	kg/m³	mm	W/(m·K)	W/(m²·K)	**0.041**	**0.035**	**0.041**	**0.035**
Concrete	2400	200	2.10	3.40	200	180	160	140
		250		3.15	200	180	160	140
Solid brick	1800	240	0.81	2.02	200	160	160	140
	1800	300		1.76	200	160	160	140
	1800	365		1.54	180	160	160	140
Vertical coring bricks	1200	240	0.58	1.63	200	160	160	140
		300		1.40	180	160	160	140
	1000	240	0.45	1.37	180	160	160	140
		300		1.16	180	160	140	120
Light vertical coring brick	800	240	0.33	1.08	180	160	140	120
Lime sandstone KSV	1800	240	0.99	2.27	200	160	160	140
		300		1.99	200	160	160	140
Lime sandstone KSL	1400	240	0.70	1.85	200	160	160	140
		300		1.59	180	160	160	140
Light concrete cavity block	1200	240	0.60	1.67	200	160	160	140
		300		1.43	180	160	160	140
Light concrete solid brick	1000	240	0.46	1.39	180	160	160	140
		300		1.18	180	160	140	120
Normal-weight concrete cavity block	1800	240	0.92	2.18	200	160	160	140
		300		1.91	200	160	160	140
Aerated concrete precision block	800	240	0.27	0.92	180	140	140	120
		300		0.76	160	140	120	120
	500	240	0.17	0.62	140	120	120	100
		300		0.51	140	120	100	80

1) Calculated with all wall constructions including 10 mm plaster (gypsum), λ = 0.39 W/(m·K)

2) Reduction using dowels due to a thermal bridge effect not considered

Calculation of the required insulation material thickness

According to the GEG the required U value for the exterior wall with ETICS system of 0.24 W/(m²·K) may not be exceeded.
The required insulation material thickness can be calculated as follows:

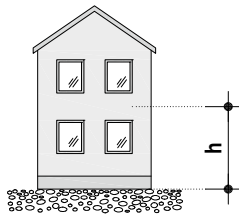
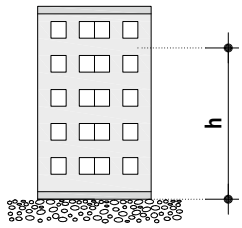
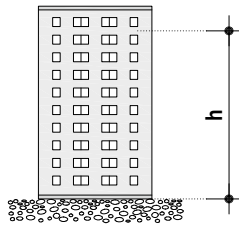
$$\text{Min. insulation thickness t in mm} = 1000 \cdot \lambda_{\text{insulation}} \cdot \left[\frac{1}{U_{\text{required}}} - \frac{t_{\text{existing wall}}}{\lambda_{\text{existing wall}}} - \frac{t_{\text{plaster}}}{\lambda_{\text{plaster}}} - 0.17\ (\text{m}^2\cdot\text{K})/\text{W} \right]$$

Legend

$\lambda_{\text{insulation material}}$	*Design thermal conductivity of the insulating material in W/(m·K)*
U_{required}	*U value for exterior walls ≤ 0.24 W/(m²·K) acc. to GEG*
$t_{\text{existing wall}}$	*Thickness of the existing wall without ETICS and without plaster in m*
$\lambda_{\text{pxisting wall}}$	*Design thermal conductivity of the existing wall without ETICS and without plaster in W/(m·K)*
t_{plaster}	*Thickness of the plaster in m*
λ_{plaster}	*Design thermal conductivity of the plaster in W/(m·K)*

Fire protection requirements acc. to the building regulation bye-laws

The demands on the reaction to fire of the façade lining are defined in the state building codes (LBO) and the corresponding fire prevention regulations of the German states. They are differentiated in dependence on the building height and/or building classes.
Additional special guidelines or regulations must be observed for special constructions and buildings such as hospitals, meeting halls, residential care homes, schools, shopping centres, etc. ETICS in scenarios such as firewalls, building party walls, access galleries, escape routes, fire service passage routes, etc. must be designed as non-combustible according to the state building codes (building material class A according to DIN 4102-1).

Height range		Upper edge of the floor[1)]	Required fire behaviour of ETICS	Building material class of ETICS Acc. to DIN 4102-1
	Building class 1 - 3 (Low height buildings)	**h = 0 – 7 m**	Flammable	**B2**
	Building class 4 - 5 (Medium height buildings)	**h = 7 – 22 m**	Not easily flammable	**B1**
	High-rise buildings	**h > 22 m**	Non-combustible	**A**

1) The specified heights can be specified differently in the individual German states. They can be found in the respective state building codes. The height specifications refer to the dimension of the upper edge of the highest floor on which common rooms can be built, measured from the average terrain height (clause 2, paragraph 3 of the Musterbauordnung [German model building code] as well as the respective state building code).

Building regulation minimum requirements with other building types: see “Technische Systeminformation – WDVS und Brandschutz - Technical system information - ETICS and fire resistance” of the VDPM (German association for insulation systems, plaster and mortar (German only).

Reaction to fire Knauf WARM WALL Plus

Insulation material	System	Reaction to fire/building material class ETICS
MW Volamit MW Wolle 035 MW Wolle 035 plus MW Wolle 035 plus L MW Wolle 035 plus M2	Mineral based Scratch render	Non-combustible **A2** (acc. to DIN 4102-1)
	Mineral / organic with basecoat SM700 Pro, SM700, SM300	Non-combustible **A2-s1, d0** (acc. to EN 13501-1)
	Mineral / organic with basecoat Lustro, Sockel-SM, Luis	Not easily flammable **B1** (acc. to DIN 4102-1)

Note	In case of use of plinth insulation boards made of EPS on non-combustible façades, prior consultation with those with fire protection responsibility or building authorities is required. Otherwise suitable non-combustible insulation materials have to be used.

Insulation material – bonding

Adhesive bonding to the wall surfaces

Application method	Adhesive surface	Application on	Mineral wool boards Uncoated MW Wolle 035[1)]	Mineral wool boards Coated MW Wolle 035 plus[1)] MW Wolle 035 plus L MW Wolle 035 plus M2	Mineral wool lamella Coated MW Volamit 040
Manual	Surface press filling	Insulation material	●[2)]		
	Partial surface ≥ 40 %		●	●	
	Full surface		●	●	●[3)]
By machine	Partial surface ≥ 50 %	Substrate		●	●[4)]
	Partial surface ≥ 70 %				●[5)]
	Full surface			●	●

Adhesive bonding to the ceiling underside

Application method	Adhesive surface	Application on	Mineral wool boards Uncoated MW Wolle 035[1)]	Mineral wool boards Coated MW Wolle 035 plus[1)] MW Wolle 035 plus L MW Wolle 035 plus M2	Mineral wool lamella Coated MW Volamit 040
Manual	Surface press filling	Insulation material	●[2)]		
	Full surface		●	●	●
By machine	Partial surface ≥ 50 %	Substrate		●	●

1) Adhesive application on non-compacted side

2) After surface-pressed filling, the adhesive is applied wet on wet to the entire surface of the insulation panel using a notched trowel.

3) Possible up to an insulation material thickness of 200 mm

4) In case of insulation material thickness exceeding 200 mm maximum wind suction w_{ek} up to 1.1 kN/m²

5) In case of insulation material thickness exceeding 200 mm maximum wind suction w_{ek} up to 1.6 kN/m²

Insulation material – single or double-layer application on exterior walls

Insulation material	Total insulation material thickness t mm	Board application	Insulation material thickness with double-layer application mm	Adhesive surface between the individual layers in %
MW Wolle 035 plus M2	60 – 100	Single-layer	60 – 180	≥ 50
	120 – 300	Single-layer or double-layer		
	320 – 340	Double-layer		
MW Wolle 035 MW Wolle 035 plus	60 – 100	Single-layer	60 – 200	≥ 40
	120 – 300	Single-layer or double-layer		
	320 – 400	Double-layer		

Adhesive bonding and dowel application of the insulation materials

Exterior wall – Fastened to suit insulation material type

MW Volamit 040

Non standardized substrate or substrate with plaster

Dowel extraction tests

Adhesive bond strength – substrate

- < 0.08 N/mm² or not certified → System approval Z-33.43-82 → Insulation thickness → ≤ 200 mm → **Glue and dowel** Number of dowels to suit dowel rating
- ≥ 0.08 N/mm² → System approval Z-33.44-83 → Insulation material thickness
  - ≤ 200 mm → Surface share of applied adhesive ≥ 50 %
    - Wind suction w_{ek} ≤ 1.6 kN/m² → **Adhesive**
    - Wind suction w_{ek} 1.6 to 2.2 kN/m² → Plaster system weight ≤ 10 kg/m²: → **Glue and dowel** with at least 5 dowels/m²
  - > 200 mm → Surface share of applied adhesive ≥ 50 % at max. wind suction w_{ek} ≤ 1.1 kN/m² → ■ 3 dowels/insulation board in the upper insulation board layer ■ 5 dowels / 2 m vertical in the building perimeter area up to 2 m width → Insulation width / height of a partial surface → > 2x insulation material thickness → **Adhesive**

Standardized substrate without render

Building materials	
Building bricks	Solid brick/masonry blocks
	Vertical coring bricks
	Horizontally perforated bricks
Lime sandstones	Solid bricks / perforated bricks
Slag bricks	Solid bricks / perforated bricks
Light concrete	Solid bricks / solid blocks
Masonry	Normal concrete
Concrete	Normal concrete

→ System approval Z-33.44-83 → Insulation material thickness

- ≤ 200 mm → Surface share of applied adhesive ≥ 50 %
  - Wind suction w_{ek} ≤ 1.6 kN/m² → **Adhesive**
  - Wind suction w_{ek} 1.6 to 2.2 kN/m² → Plaster system weight ≤ 10 kg/m²: → **Glue and dowel** with at least 5 dowels/m²
- > 200 mm → Surface share of applied adhesive ≥ 70 % at max. wind suction w_{ek} ≤ 1.6 kN/m² → ■ 3 dowels/insulation board in the upper insulation board layer ■ 5 dowels / 2 m vertical in the building perimeter area up to 2 m width → Insulation width / height of a partial surface → > 2x insulation material thickness → **Glue and dowel** with 3 dowels/insulation board

MW Wolle 035
MW Wolle 035 plus
MW Wolle 035 plus L
MW Wolle 035 plus M2

→ System approval Z-33.43-82 → **Glue and dowel** Number of dowels to suit dowel rating

Note	Dowel extraction tests will be necessary for dowelling on non-standardized substrates.

Ceiling underside – fastening

Mineral wool insulation material 80 – 200 mm

↓

Concrete with/without plaster

↓

System approval Z-33.43-82, appendix 2.2.1 or 2.2.2

↓

System weight ≤ 70 kg/m²

↓

Wind suction w_{ek} ≤ 2.0 kN/m²

↓

Glue and dowel through the mesh
At least 6 Schraubdübel STR U 2G dowels per m²,
number of dowels to suit dowel rating

Note	Example for determination of the system weight, see page 30

Method for determination of wind loads

For use with	**Practice-based method** Acc. to the recommendations of the VDPM[1] and the DIBt[2]	**Simplified method** Acc. to DIN EN 1991-1-4 and DIN EN 1991-1-4/NA	**Standard method** Acc. to DIN EN 1991-1-4 and DIN EN 1991-1-4/NA
Building height	≤ 25 m	≤ 25 m	Not specified
Wind zone	1 to 3	1 to 4	1 to 4
Building layout	Rectangular	Rectangular	Any
Height / width ratio	≤ 2	≤ 2	Any
Elevation of site	≤ 800 m above sea level, flat terrain	≤ 800 m above sea level, flat terrain	Any

1) Verband für Dämmsysteme, Putz und Mörtel e.V.

2) Deutsches Institut für Bautechnik

Method for determination of dowel quantity and dowel length

Selection of the wind zone → see page 20

→ Selection of the insulation material and the dowelling type → see page 18

→ Determination of the width of fringe A → see page 20

→ Read off the number of dowels from the table → see page 21 to 29

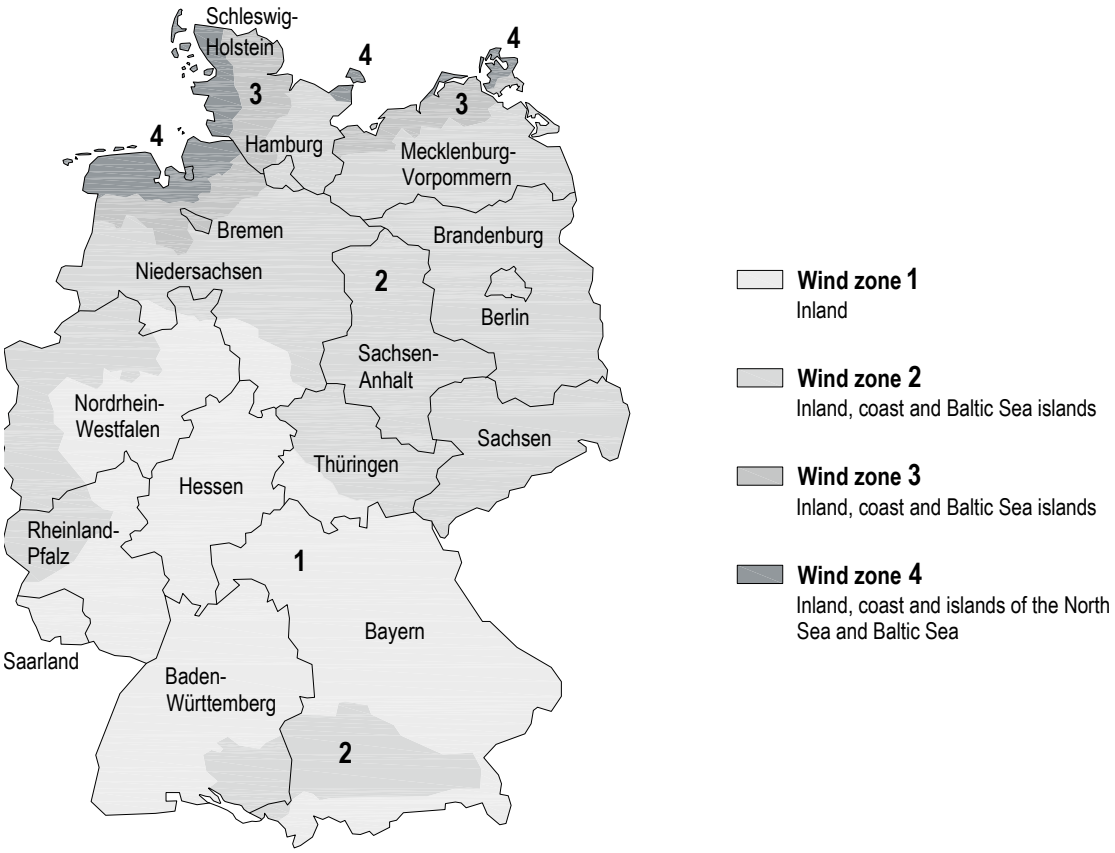
→ Selection of the dowel in dependence on the substrate and type of installation → see page 29

→ Selection of the dowel length in dependence on the insulating material thickness → see page 32

Calculation of the number of dowels: refer also to knauf.de/duebelrechner.

Determination of the wind loads

Wind zones acc. to EN 1991-1-4/NA



Wind suction forces w_{ek} in kN/m² acc. to EN 1991-1-4 and EN 1991-1-4/NA acc. to the simplified method

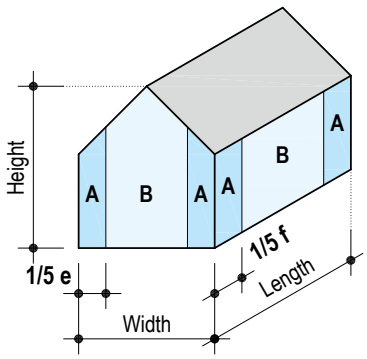
Wind zone	Region	Wind suction forces w_{ek} in kN/m²					
		Building height					
		0 to 10 m		0 to 18 m		0 to 25 m	
		Fringe A	Zone B	Fringe A	Zone B	Fringe A	Zone B
1a	Inland	0.738	0.550	0.959	0.715	1.106	0.825
2a	Inland	0.959	0.715	1.180	0.880	1.328	0.990
2b	Coast and Baltic Sea islands	1.245	0.935	1.475	1.100	1.623	1.210
3a	Inland	1.180	0.880	1.401	1.045	1.623	1.210
3b	Coast and Baltic Sea islands	1.549	1.155	1.770	1.320	1.918	1.430
4a	Inland	1.401	1.045	1.696	1.265	1.918	1.430
4b	North and Baltic Sea coasts and Baltic Sea islands	1.844	1.375	2.065	1.540	2.286	1.705
4c	North Sea islands	2.065	1.540	–	–	–	–

Determination of the width of fringe A

Width of fringe A:
1/5 e or 1/5 f

e = 2 x height *or* **e = length**
f = 2 x height *or* **f = width**

The smallest corresponding value is decisive.



Determination of the number of dowels in the exterior wall area

The number of dowels to be used as listed in the following table applies when the dowels to be used have the required characteristic resistance, see table on page 31. Should the characteristic resistance be lower, an individual rating of the basis of the DIN EN 1991-1-4 and DIN EN 1991-1-4/NA is required. The basis for determination of the number of dowels is the wind load according to the simplified method.

Table 1: **MW Volamit 040** (in case of non-certified adhesive strength of 0.08 N/mm²) Insulation material thickness 40 mm to 200 mm

Wind zone	Minimum number of dowels per m² Wind loads acc. to simplified method																										
	Building height																										
	0 to 10 m										0 to 18 m										0 to 25 m						
	Fringe A					Zone B					Fringe A					Zone B					Fringe A					Zone B				
	Installation type																										
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
1a	6	4	–	–	–	4	4	–	–	–	7	5	–	–	–	6	4	–	–	–	10	8	–	–	–	7	5	–	–	–
2a	7	5	–	–	–	6	4	–	–	–	10	8	–	–	–	7	5	–	–	–	10	8	–	–	–	7	5	–	–	–
2b	10	8	–	–	–	7	5	–	–	–	10	8	–	–	–	10	8	–	–	–	14	11	–	–	–	10	8	–	–	–
3a	10	8	–	–	–	7	5	–	–	–	10	8	–	–	–	10	8	–	–	–	14	11	–	–	–	10	8	–	–	–
3b	10	8	–	–	–	10	8	–	–	–	14	11	–	–	–	10	8	–	–	–	14	11	–	–	–	10	8	–	–	–
4a	10	8	–	–	–	10	8	–	–	–	14	11	–	–	–	10	8	–	–	–	14	11	–	–	–	10	8	–	–	–
4b	14	11	–	–	–	10	8	–	–	–	14	11	–	–	–	10	8	–	–	–	–	–	–	–	–	14	11	–	–	–
4c	14	11	–	–	–	10	8	–	–	–	Not applicable																			

Installation type legend

Number	Installation type	Dowel placement	Ø dowel plates in mm	Load capacity dowel N_{Rk} in kN / dowel
1	Surface flush	Surface + joint	140	0.45
2	Surface flush	Surface + joint	140	0.60

Notes

For dowel selection see page 31.

Optional dowelling through the mesh: without dowel plate.

Observe system approval Z-33.43-82.

In case of wind suction w_{ek} > 1.59 kN/m² or with insulation material thicknesses > 200 mm, observe additional dowel requirement acc. to Z-33.44-83, see overview on page 18.

Determination of the number of dowels in the exterior wall area (continuation)

Table 2: **MW Wolle 035 / MW Wolle 035 plus** (single-layer application) Insulation material thickness 60 mm

Wind zone	Minimum number of dowels per m² Wind loads acc. to simplified method																										
	Building height																										
	0 to 10 m										0 to 18 m										0 to 25 m						
	Fringe A					Zone B					Fringe A					Zone B					Fringe A					Zone B				
	Installation type																										
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
1a	6	6	–	–	–	4	4	–	–	–	8	8	–	–	–	6	6	–	–	–	8	8	–	–	–	6	6	–	–	–
2a	8	8	–	–	–	6	6	–	–	–	10	10	–	–	–	8	8	–	–	–	10	10	–	–	–	8	8	–	–	–
2b	10	10	–	–	–	8	8	–	–	–	12	12	–	–	–	8	8	–	–	–	14	14	–	–	–	10	10	–	–	–
3a	10	10	–	–	–	8	8	–	–	–	12	12	–	–	–	8	8	–	–	–	14	14	–	–	–	10	10	–	–	–
3b	12	12	–	–	–	10	10	–	–	–	16	16	–	–	–	10	10	–	–	–	–	–	–	–	–	12	12	–	–	–
4a	12	12	–	–	–	8	8	–	–	–	14	14	–	–	–	10	10	–	–	–	–	–	–	–	–	12	12	–	–	–
4b	16	16	–	–	–	12	12	–	–	–	–	–	–	–	–	12	12	–	–	–	–	–	–	–	–	14	14	–	–	–
4c	–	–	–	–	–	12	12	–	–	–	Not applicable																			

Table 3: **MW Wolle 035 / MW Wolle 035 plus** (single-layer application) Insulation material thickness 80 mm to 100 mm

Wind zone	Minimum number of dowels per m² Wind loads acc. to simplified method																										
	Building height																										
	0 to 10 m										0 to 18 m										0 to 25 m						
	Fringe A					Zone B					Fringe A					Zone B					Fringe A					Zone B				
	Installation type																										
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
1a	6	6	4	4	7	4	4	4	4	5	8	8	4	5	8	6	6	4	4	6	8	8	5	6	10	6	6	4	5	7
2a	8	8	4	5	8	6	6	4	4	6	10	10	5	6	10	8	8	4	5	8	10	10	6	7	12	8	8	4	5	9
2b	10	10	5	6	11	8	8	4	5	8	12	12	6	7	–	8	8	5	6	10	14	14	7	8	–	10	10	5	6	11
3a	10	10	5	6	10	8	8	4	5	8	12	12	6	7	12	8	8	5	5	9	14	14	7	8	–	10	10	5	6	11
3b	12	12	7	7	–	10	10	5	6	10	16	16	8	8	–	10	10	6	7	11	–	–	8	9	–	12	12	6	7	12
4a	12	12	6	7	12	8	8	5	5	9	14	14	7	8	–	10	10	6	6	11	–	–	8	9	–	12	12	6	7	12
4b	16	16	8	9	–	12	12	6	7	12	–	–	9	10	–	12	12	7	7	–	–	–	–	–	–	14	14	7	8	–
4c	–	–	9	10	–	12	12	7	7	–	Not applicable																			

Installation type legend

Number	Installation type	Dowel placement	Ø dowel plates in mm	Load capacity dowel N_{Rk} in kN / dowel
1	Surface flush	Surface	60	0.45
2	Surface flush	Surface + joint	60	0.45
3	Surface flush	Surface	90	0.75
4	Surface flush	Surface + joint	90	0.75
5	Recessed	Surface	60	0.36

Notes	
	For dowel selection see page 31. Optional dowelling through the mesh: without dowel plate. Observe system approval Z-33.43-82.

Determination of the number of dowels in the exterior wall area (continuation)

Table 4: **MW Wolle 035 / MW Wolle 035 plus** (single-layer or double-layer application) Insulation material thickness 120 mm to 200 mm

Wind zone	Minimum number of dowels per m² Wind loads acc. to simplified method																												
	Building height																												
	0 to 10 m										**0 to 18 m**										**0 to 25 m**								
	Fringe A					Zone B					Fringe A					Zone B					Fringe A					Zone B				
	Installation type																												
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
1a	6	6	4	4	7	4	4	4	4	5	8	8	4	5	8	6	6	4	4	6	8	8	5	6	10	6	6	4	5	7
2a	8	8	4	5	8	6	6	4	4	6	8	8	5	6	10	6	6	4	5	8	10	10	6	7	12	8	8	4	5	9
2b	10	10	5	6	11	8	8	4	5	8	10	12	6	7	–	8	8	5	6	10	12	12	7	8	–	8	10	5	6	11
3a	8	8	5	6	10	6	6	4	5	8	10	10	6	7	12	8	8	5	5	9	12	12	7	8	–	8	10	5	6	11
3b	12	12	7	7	–	8	8	5	6	10	14	14	8	8	–	10	10	6	7	11	16	16	8	9	–	10	10	6	7	12
4a	10	10	6	7	12	8	8	5	5	9	12	14	7	8	–	10	10	6	6	11	16	16	8	9	–	10	10	6	7	12
4b	14	14	8	9	–	10	10	6	7	12	16	16	9	10	–	12	12	7	7	–	–	–	–	–	–	14	14	7	8	–
4c	16	16	9	10	–	12	12	7	7	–	Not applicable																			

Installation type legend

Number	Installation type	Dowel placement	Ø dowel plates in mm	Load capacity dowel N_{Rk} in kN / dowel
1	Surface flush	Surface	60	0.60
2	Surface flush	Surface + joint	60	0.60
3	Surface flush	Surface	90	0.75
4	Surface flush	Surface + joint	90	0.75
5	Recessed	Surface	60	0.36

Table 5: **MW Wolle 035 / MW Wolle 035 plus** (single-layer or double-layer application) Insulation material thickness 220 mm to 400 mm

Wind zone	Minimum number of dowels per m² Wind loads acc. to simplified method																												
	Building height																												
	0 to 10 m										**0 to 18 m**										**0 to 25 m**								
	Fringe A					Zone B					Fringe A					Zone B					Fringe A					Zone B				
	Installation type																												
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
1a	–	–	6	–	–	–	–	6	–	–	–	–	6	–	–	–	–	6	–	–	–	–	7	–	–	–	–	6	–	–
2a	–	–	6	–	–	–	–	6	–	–	–	–	7	–	–	–	–	6	–	–	–	–	8	–	–	–	–	6	–	–
2b	–	–	8	–	–	–	–	6	–	–	–	–	10	–	–	–	–	6	–	–	–	–	12	–	–	–	–	7	–	–
3a	–	–	7	–	–	–	–	6	–	–	–	–	9	–	–	–	–	6	–	–	–	–	12	–	–	–	–	7	–	–
3b	–	–	11	–	–	–	–	7	–	–	–	–	–	–	–	–	–	8	–	–	–	–	–	–	–	–	–	9	–	–
4a	–	–	9	–	–	–	–	6	–	–	–	–	–	–	–	–	–	8	–	–	–	–	–	–	–	–	–	9	–	–
4b	–	–	–	–	–	–	–	9	–	–	–	–	–	–	–	–	–	11	–	–	–	–	–	–	–	–	–	–	–	–
4c	–	–	–	–	–	–	–	11	–	–	Not applicable																			

Installation type legend

Number	Installation type	Dowel placement	Ø dowel plates in mm	Load capacity dowel N_{Rk} in kN / dowel
3	Surface flush	Surface	90	0.60

Notes	For dowel selection see page 31. Optional dowelling through the mesh: without dowel plate. Observe system approval Z-33.43-82.

Determination of the number of dowels in the exterior wall area (continuation)

Table 6: **MW Wolle 035 plus L** (single-layer application) Insulation material thickness 60 mm to 100 mm

Wind zone	Minimum number of dowels per m² Wind loads acc. to simplified method																										
	Building height																										
	0 to 10 m										**0 to 18 m**										**0 to 25 m**						
	Fringe A					Zone B					Fringe A					Zone B					Fringe A					Zone B				
	Installation type																										
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
1a	8	8	6	7	6	6	7	5	6	5	10	10	8	8	8	8	8	6	7	6	11	12	9	10	10	9	9	7	8	7
2a	10	10	8	8	8	8	8	6	7	6	11	12	9	10	11	9	9	7	8	8	13	14	10	11	13	10	10	8	8	9
2b	12	13	10	11	12	10	10	8	8	8	14	15	11	12	15	10	11	8	9	10	16	16	13	13	–	12	13	10	11	11
3a	11	12	9	10	11	9	9	7	8	8	14	15	11	12	14	10	11	8	9	9	16	16	13	13	–	12	13	10	11	11
3b	15	16	12	13	16	11	12	9	10	11	–	–	13	14	–	13	14	10	11	12	–	–	15	16	–	14	15	11	12	14
4a	14	15	11	12	14	10	11	8	9	9	16	–	13	13	–	12	13	10	11	12	–	–	15	16	–	14	15	11	12	14
4b	–	–	14	15	–	13	14	10	11	13	–	–	15	16	–	15	16	12	13	15	–	–	–	–	–	16	–	13	14	–
4c	–	–	15	16	–	15	16	12	13	15	Not applicable																			

Installation type legend

Number	Installation type	Dowel placement	Ø dowel plates in mm	Load capacity dowel N_{Rk} in kN / dowel
1	Surface flush	Surface	60	0.40
2	Surface flush	Surface + joint	60	0.40
3	Surface flush	Surface	90	0.45
4	Surface flush	Surface + joint	90	0.45
5	Recessed from 100 mm insulation material thickness	Surface	60	0.50

Notes	For dowel selection see page 31. Optional dowelling through the mesh: without dowel plate. Observe system approval Z-33.43-82.

Determination of the number of dowels in the exterior wall area (continuation)

Table 7: **MW Wolle 035 plus L** (single-layer application) — Insulation material thickness 120 mm

Wind zone	Minimum number of dowels per m² Wind loads acc. to simplified method																										
	Building height 0 to 10 m										0 to 18 m										0 to 25 m						
	Fringe A					Zone B					Fringe A					Zone B					Fringe A					Zone B				
	Installation type																										
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
1a	4	6	4	4	6	4	5	4	4	5	5	7	4	5	8	4	6	4	4	6	6	8	5	6	10	5	6	4	5	7
2a	5	7	4	5	8	4	6	4	4	6	6	8	5	6	11	5	6	4	5	8	7	9	5	7	13	5	7	4	5	9
2b	7	8	5	6	12	5	7	4	5	8	8	10	6	7	15	6	8	4	5	10	9	11	7	8	–	7	8	5	6	11
3a	6	8	5	6	11	5	6	4	5	8	8	10	6	7	14	6	8	4	5	9	9	11	7	8	–	7	8	5	6	11
3b	8	10	6	7	16	6	8	5	6	11	10	12	7	8	–	7	9	5	7	12	12	14	8	–	–	8	10	6	7	14
4a	8	10	6	7	14	6	8	4	5	9	9	11	7	8	–	7	8	5	6	12	12	14	8	–	–	8	10	6	7	14
4b	11	12	8	8	–	7	9	5	7	13	13	16	8	–	–	8	10	6	7	15	–	–	–	–	–	10	11	7	8	–
4c	13	16	8	–	–	8	10	6	7	15	Not applicable																			

Table 8: **MW Wolle 035 plus L** (single-layer application) — Insulation material thickness 140 mm to 200 mm

Wind zone	Minimum number of dowels per m² Wind loads acc. to simplified method																										
	Building height 0 to 10 m										0 to 18 m										0 to 25 m						
	Fringe A					Zone B					Fringe A					Zone B					Fringe A					Zone B				
	Installation type																										
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
1a	4	6	4	4	5	4	5	4	4	4	5	7	4	5	6	4	6	4	4	5	6	8	5	6	7	5	6	4	5	6
2a	5	7	4	5	6	4	6	4	4	5	6	8	5	6	8	5	6	4	5	6	7	9	5	7	9	5	7	4	5	7
2b	7	8	5	6	8	5	7	4	5	6	8	10	6	7	10	6	8	4	5	7	9	11	7	8	10	7	8	5	6	8
3a	6	8	5	6	8	5	6	4	5	6	8	10	6	7	9	6	8	4	5	7	9	11	7	8	10	7	8	5	6	8
3b	8	10	6	7	10	6	8	5	6	8	10	12	7	8	11	7	9	5	7	9	12	14	8	–	12	8	10	6	7	9
4a	8	10	6	7	9	6	8	4	5	7	9	11	7	8	11	7	8	5	6	8	12	14	8	–	12	8	10	6	7	9
4b	11	12	8	8	12	7	9	5	7	9	13	16	8	–	–	8	10	6	7	10	–	–	–	–	–	10	11	7	8	11
4c	13	16	8	–	–	8	10	6	7	10	Not applicable																			

Installation type legend

Number	Installation type	Dowel placement	Ø dowel plates in mm	Load capacity dowel N_{Rk} in kN / dowel
1	Surface flush	Surface	60	0.60
2	Surface flush	Surface + joint	60	0.60
3	Surface flush	Surface	90	0.90
4	Surface flush	Surface + joint	90	0.90
5	Recessed	Surface	60	0.50

Notes	
	For dowel selection see page 31.
	Optional dowelling through the mesh: without dowel plate.
	Observe system approval Z-33.43-82.

Determination of the number of dowels in the exterior wall area (continuation)

Table 9: **MW Wolle 035 plus M2** (single-layer application) Insulation material thickness 60 mm

Wind zone	Minimum number of dowels per m² Wind loads acc. to simplified method																												
	Building height																												
	0 to 10 m										**0 to 18 m**										**0 to 25 m**								
	Fringe A					Zone B					Fringe A					Zone B					Fringe A					Zone B				
	Installation type																												
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
1a	–	–	7	–	–	–	–	5	–	–	–	–	8	–	–	–	–	7	–	–	–	–	10	–	–	–	–	8	–	–
2a	–	–	8	–	–	–	–	7	–	–	–	–	10	–	–	–	–	8	–	–	–	–	12	–	–	–	–	8	–	–
2b	–	–	11	–	–	–	–	8	–	–	–	–	12	–	–	–	–	10	–	–	–	–	14	–	–	–	–	11	–	–
3a	–	–	10	–	–	–	–	8	–	–	–	–	12	–	–	–	–	10	–	–	–	–	14	–	–	–	–	11	–	–
3b	–	–	12	–	–	–	–	10	–	–	–	–	16	–	–	–	–	11	–	–	–	–	16	–	–	–	–	12	–	–
4a	–	–	12	–	–	–	–	10	–	–	–	–	14	–	–	–	–	11	–	–	–	–	16	–	–	–	–	12	–	–
4b	–	–	16	–	–	–	–	12	–	–	–	–	16	–	–	–	–	12	–	–	–	–	–	–	–	–	–	16	–	–
4c	–	–	16	–	–	–	–	12	–	–	Not applicable																		

Installation type legend

Number	Installation type	Dowel placement	Ø dowel plates in mm	Load capacity dowel N_{Rk} in kN / dowel
3	Surface flush	Surface	90	0.45

Notes	For dowel selection see page 31. Optional dowelling through the mesh: without dowel plate. Observe system approval Z-33.43-82.

Determination of the number of dowels in the exterior wall area (continuation)

Table 10: **MW Wolle 035 plus M2** (single-layer application) Insulation material thickness 80 mm

Wind zone	Minimum number of dowels per m² Wind loads acc. to simplified method																										
	Building height																										
	0 to 10 m										**0 to 18 m**										**0 to 25 m**									
	Fringe A					Zone B					Fringe A					Zone B					Fringe A					Zone B				
	Installation type																										
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
1a	4	6	4	5	–	4	5	4	4	–	5	7	5	6	–	4	6	4	5	–	6	8	5	7	–	5	6	4	6	–
2a	5	7	5	6	–	4	6	4	5	–	6	8	5	7	–	5	6	4	6	–	9	9	6	8	–	5	7	5	6	–
2b	8	9	6	8	–	5	7	5	6	–	10	10	8	9	–	6	8	5	7	–	11	11	9	10	–	8	9	6	8	–
3a	6	8	5	7	–	5	6	4	6	–	10	10	8	9	–	6	8	5	7	–	11	11	9	10	–	8	9	6	8	–
3b	10	11	8	9	–	6	8	5	7	–	12	12	9	10	–	9	9	6	8	–	12	–	10	–	–	10	10	8	9	–
4a	10	10	8	9	–	6	8	5	7	–	11	11	9	10	–	8	9	6	8	–	12	–	10	–	–	10	10	8	9	–
4b	12	–	10	–	–	9	10	6	8	–	–	–	–	–	–	10	11	8	9	–	–	–	–	–	–	12	12	9	10	–
4c	–	–	–	–	–	10	11	8	9	–	Not applicable																			

Table 11: **MW Wolle 035 plus M2** (single-layer application) Insulation material thickness 100 mm

Wind zone	Minimum number of dowels per m² Wind loads acc. to simplified method																										
	Building height																										
	0 to 10 m										**0 to 18 m**										**0 to 25 m**									
	Fringe A					Zone B					Fringe A					Zone B					Fringe A					Zone B				
	Installation type																										
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
1a	4	6	4	5	5	4	5	4	4	4	5	7	5	6	6	4	6	4	5	5	6	8	5	7	7	5	6	4	6	6
2a	5	7	5	6	6	4	6	4	5	5	6	8	5	7	8	5	6	4	6	6	9	9	6	8	9	5	7	5	6	6
2b	8	9	6	8	8	5	7	5	6	6	10	10	8	9	10	6	8	5	7	7	11	11	9	10	11	8	9	6	8	8
3a	6	8	5	7	8	5	6	4	6	6	10	10	8	9	10	6	8	5	7	7	11	11	9	10	11	8	9	6	8	8
3b	10	11	8	9	10	6	8	5	7	8	12	12	9	10	12	9	9	6	8	9	12	–	10	–	12	10	10	8	9	10
4a	10	10	8	9	10	6	8	5	7	7	11	11	9	10	11	8	9	6	8	8	12	–	10	–	12	10	10	8	9	10
4b	12	–	10	–	12	9	10	6	8	9	–	–	–	–	–	10	11	8	9	10	–	–	–	–	–	12	12	9	10	12
4c	–	–	–	–	–	10	11	8	9	10	Not applicable																			

Installation type legend

Number	Installation type	Dowel placement	Ø dowel plates in mm	Load capacity dowel N_{Rk} in kN / dowel
1	Surface flush	Surface	60	0.60
2	Surface flush	Surface + joint	60	0.60
3	Surface flush	Surface	90	0.75
4	Surface flush	Surface + joint	90	0.75
5	Recessed	Surface	60	0.60

Notes	For dowel selection see page 31. Optional dowelling through the mesh: without dowel plate. Observe system approval Z-33.43-82.

Determination of the number of dowels in the exterior wall area (continuation)

Table 12: **MW Wolle 035 plus M2** (single-layer or double-layer application) Insulation material thickness 120 mm to 200 mm

Wind zone	Minimum number of dowels per m² Wind loads acc. to simplified method																										
	Building height																										
	0 to 10 m										**0 to 18 m**										**0 to 25 m**									
	Fringe A					Zone B					Fringe A					Zone B					Fringe A					Zone B				
	Installation type																										
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
1a	4	5	4	4	5	4	4	4	4	4	5	6	4	4	6	4	5	4	4	5	6	7	4	5	7	5	6	4	4	6
2a	5	6	4	4	6	4	5	4	4	5	6	7	4	5	8	5	6	4	4	6	7	8	5	6	9	5	6	4	4	6
2b	7	8	5	5	8	5	6	4	4	6	8	9	6	6	10	6	7	4	5	7	9	10	6	7	11	7	8	5	5	8
3a	6	7	4	5	8	5	6	4	4	6	8	9	6	6	10	6	7	4	5	7	9	10	6	7	11	7	8	5	5	8
3b	8	9	6	6	10	6	7	4	5	8	9	10	6	7	12	7	8	5	6	9	10	11	7	8	12	8	9	6	6	10
4a	8	9	6	6	10	6	7	4	5	7	9	10	6	7	11	7	8	5	5	8	10	11	7	8	12	8	9	6	6	10
4b	10	11	7	8	12	7	8	5	6	9	11	12	8	8	–	8	9	6	6	10	–	–	–	–	–	9	10	6	7	12
4c	11	12	8	8	–	8	9	6	6	10	Not applicable																			

Installation type legend

Number	Installation type	Dowel placement	Ø dowel plates in mm	Load capacity dowel N_{Rk} in kN / dowel
1	Surface flush	Surface	60	0.75
2	Surface flush	Surface + joint	60	0.75
3	Surface flush	Surface	90	0.90
4	Surface flush	Surface + joint	90	0.90
5	Recessed	Surface	60	0.60

Notes	For dowel selection see page 31. Optional dowelling through the mesh: without dowel plate. Observe system approval Z-33.43-82.

Determination of the number of dowels in the exterior wall area (continuation)

Table 13: **MW Wolle 035 plus M2** (single-layer or double-layer application) Insulation material thickness 220 mm to 340 mm

Wind zone	Minimum number of dowels per m² Wind loads acc. to simplified method																												
	Building height																												
	0 to 10 m										0 to 18 m										0 to 25 m								
	Fringe A					Zone B					Fringe A					Zone B					Fringe A					Zone B				
	Installation type																												
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
1a	–	–	6	6	–	–	–	6	6	–	–	–	6	7	–	–	–	6	6	–	–	–	6	8	–	–	–	6	6	–
2a	–	–	6	7	–	–	–	6	6	–	–	–	7	8	–	–	–	6	6	–	–	–	8	9	–	–	–	6	7	–
2b	–	–	7	8	–	–	–	6	7	–	–	–	8	9	–	–	–	6	7	–	–	–	9	10	–	–	–	7	8	–
3a	–	–	7	8	–	–	–	6	6	–	–	–	8	9	–	–	–	6	7	–	–	–	9	10	–	–	–	7	8	–
3b	–	–	9	10	–	–	–	7	8	–	–	–	10	11	–	–	–	8	9	–	–	–	11	12	–	–	–	8	9	–
4a	–	–	8	9	–	–	–	6	7	–	–	–	9	10	–	–	–	7	8	–	–	–	11	12	–	–	–	8	9	–
4b	–	–	10	11	–	–	–	8	9	–	–	–	12	12	–	–	–	9	10	–	–	–	–	–	–	–	–	10	11	–
4c	–	–	12	12	–	–	–	9	10	–	Not applicable																		

Installation type legend

Number	Installation type	Dowel placement	Ø dowel plates in mm	Load capacity dowel N_{Rk} in kN / dowel
3	Surface flush	Surface	90	0.60
4	Surface flush	Surface + joint	90	0.60

Notes

For dowel selection see page 31.

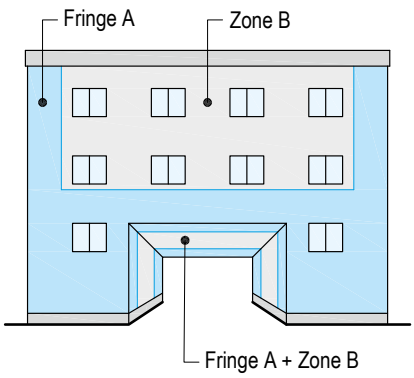
Optional dowelling through the mesh: without dowel plate.

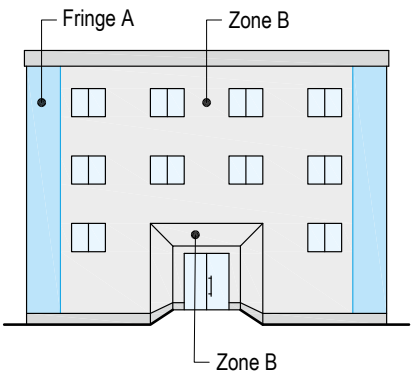
Observe system approval Z-33.43-82.

Determination of the number of dowels in the ceiling underside

Dowelling on the ceiling undersides

Comment	Scheme drawing	
The installation of dowels on the ceiling underside is undertaken through the mesh using Schraubdübel STR U 2G dowels. The substrate is concrete with or without plaster. The basis for determination of the number of dowels is the wind load according to the simplified method and the weight of the overall system (insulation material, basecoat/adhesive and finish coat). If the perimeters of passageway areas are to be taken into account must be determined by a structural engineer. With other ceiling undersides/ soffits (e.g. recesses, arcades, garages, balconies, loggias, walkways, exits), the number of dowels from the wall can also be used for the ceiling undersides/soffits.	Ceiling underside/soffit of a passageway possible taking consideration of the edge and central areas	Ceiling underside/soffit of an exit





Determination of the number of dowels in the ceiling underside area (continuation)

Table 14: **Mineral wool insulation material** (single layer application) Insulation material thickness 80 mm to 200 mm

Wind zone	Minimum number of dowels per m² Wind loads acc. to simplified method																							
	Building height **0 to 10 m** Fringe A												Zone B											
	System weight g_{ek} in kg/m²																							
	15	20	25	30	35	40	45	50	55	60	65	70	15	20	25	30	35	40	45	50	55	60	65	70
1a	6	6	7	7	7	8	8	8	9	9	9	9	6	6	6	6	6	6	7	7	7	8	8	8
2a	7	8	8	8	9	9	9	10	10	10	11	11	6	6	7	7	7	8	8	8	9	9	9	9
2b	9	9	10	10	10	11	11	11	12	12	12	12	7	7	8	8	8	9	9	9	10	10	10	11
3a	9	9	9	10	10	10	11	11	11	12	12	12	7	7	7	8	8	8	9	9	9	10	10	10
3b	11	11	11	12	12	12	13	13	13	14	–	–	9	9	9	10	10	10	11	11	11	12	12	12
4a	10	10	11	11	11	12	12	12	13	13	13	14	8	8	8	9	9	9	10	10	10	11	11	11
4b	13	13	13	14	–	–	–	–	–	–	–	–	10	10	10	11	11	11	12	12	12	13	13	13
4c	–	–	–	–	–	–	–	–	–	–	–	–	11	11	11	12	12	12	13	13	13	14	–	–

Wind zone	Minimum number of dowels per m² Wind loads acc. to simplified method																							
	Building height **0 to 18 m** Fringe A												Zone B											
	System weight g_{ek} in kg/m²																							
	15	20	25	30	35	40	45	50	55	60	65	70	15	20	25	30	35	40	45	50	55	60	65	70
1a	7	8	8	8	9	9	9	10	10	10	11	11	6	6	7	7	7	8	8	8	9	9	9	9
2a	9	9	9	10	10	10	11	11	11	12	12	12	7	7	7	8	8	8	9	9	9	10	10	10
2b	10	11	11	11	12	12	12	13	13	13	14	–	8	8	9	9	9	10	10	10	11	11	11	12
3a	10	10	11	11	11	12	12	12	13	13	13	14	8	8	8	9	9	9	10	10	10	11	11	11
3b	12	13	13	13	14	–	–	–	–	–	–	–	10	10	10	11	11	11	11	12	12	12	13	13
4a	12	12	12	13	13	13	14	–	–	–	–	–	9	10	10	10	11	11	11	11	12	12	12	13
4b	–	–	–	–	–	–	–	–	–	–	–	–	11	11	11	12	12	12	13	13	13	14	–	–
4c	Not applicable																							

Wind zone	Minimum number of dowels per m² Wind loads acc. to simplified method																							
	Building height **0 to 25 m** Fringe A												Zone B											
	System weight g_{ek} in kg/m²																							
	15	20	25	30	35	40	45	50	55	60	65	70	15	20	25	30	35	40	45	50	55	60	65	70
1a	8	9	9	9	10	10	10	11	11	11	12	12	7	7	7	8	8	8	8	9	9	9	10	10
2a	10	10	10	11	11	11	11	12	12	12	13	13	7	8	8	8	9	9	9	10	10	10	11	11
2b	11	12	12	12	13	13	13	14	–	–	–	–	9	9	10	10	10	11	11	11	12	12	12	12
3a	11	12	12	12	13	13	13	14	–	–	–	–	9	9	10	10	10	11	11	11	12	12	12	12
3b	13	13	–	–	–	–	–	–	–	–	–	–	10	10	11	11	11	12	12	12	13	13	13	14
4a	13	13	–	–	–	–	–	–	–	–	–	–	10	10	11	11	11	12	12	12	13	13	13	14
4b	–	–	–	–	–	–	–	–	–	–	–	–	12	12	13	13	13	14	–	–	–	–	–	–
4c	Not applicable																							

Determination of the number of dowels in the ceiling underside area (continuation)

Calculation example system weight g_{ek}

System components	Values from approval	Thickness in mm	Formula	Weight per m^2 in kg
MW Wolle 035 plus M2	105.0 kg/m^3	160	105.0 kg/m^3 x 0.16 m	16.8
Basecoat SM700 Pro	7.0 – 14.0 kg/m^2 (5 – 10 mm thickness)	6	(7.0 kg/m^2 ÷ 5 mm) x 6 mm	8.4
Final coat SP 260 Pro	3.2 – 5.0 kg/m^2 (2 – 5 mm thickness)	2	(3.2 kg/m^2 ÷ 2 mm) x 2 mm	3.2
			System weight g_{ek}	**28.4**

Notes	Only Schraubdübel STR U 2G dowel permissible. Dowelling through the mesh: without dowel plate. Observe system approval Z-33.43-82.

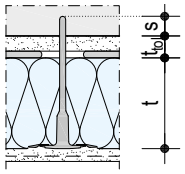
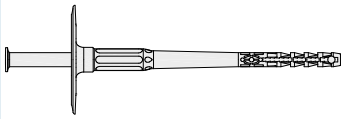
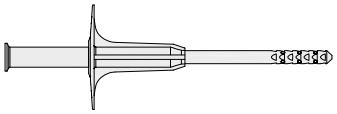
Selection of dowels/anchors for exterior walls and ceiling undersides/soffit

Selection of a suitable dowel

Base material group acc. to EAD 330196-00-0604	**Wall material**	**Dowel characteristic resistance N_{Rk}** in kN/dowel		
		Schlagdübel CNplus 8 insulation anchor nail ETA-18/0366 Surface flush: Chi = 0.001 W/K	**Schraubdübel HTR-P dowel Schraubdübel HTR-M dowel** ETA-16/0116 Surface flush: Chi = 0.000 W/K	**Schraubdübel STR U 2G dowel** ETA-04/0023 Surface flush: Chi = 0.002 W/K Recessed: Chi = 0.001 W/K
A	Concrete	0.90	1.00 – 1.50	1.50
B	Solid bricks, limestone blocks, solid brick/blocks made of light concrete	0.75 – 0.90	1.20 – 1.50	0.60 – 1.50
C	Sand-lime perforated bricks, vertical coring bricks, hollow blocks made of light concrete	0.50 – 0.75	0.70 – 1.20	0.60 – 1.50
D	Lightweight aggregate concrete	0.40	0.90	0.90
E	Aerated concrete (P2 – P7)	0.30	0.50 – 0.75	0.75
Field of application				
Exterior wall		•	•	•
Ceiling bottom				•

Selection of dowels/anchors for exterior walls and ceiling undersides/soffit (continued)

Dowel lengths – Selection dependent on the insulation material thickness and further non-load-bearing layers

Insulation material thickness	Dowel length											
	Dowel installation Surface flush **Schlagdübel CNplus 8 insulation anchor nail** Façade equalization 10 mm				**Schraubdübel HTR-P/HTR-M dowel** Façade equalization 10 mm				Surface flush or recessed **Schraubdübel STR U 2G dowel** Façade equalization 5 mm			
												
	New building A, B, C	Old building[1] A, B, C	New building D, E	Old building[1] D, E	New building A, B, C, D	Old building[1] A, B, C, D	New building E	Old building[1] E	New building A, B, C, D	Old building[1] A, B, C, D	New building E	Old building[1] E
t mm	**s** ≥ 35 mm mm	**s** ≥ 35 mm mm	**s** ≥ 55 mm mm	**s** ≥ 55 mm mm	**s** ≥ 25 mm mm	**s** ≥ 25 mm mm	**s** ≥ 45 mm mm	**s** ≥ 45 mm mm	**s** ≥ 25 mm mm	**s** ≥ 25 mm mm	**s** ≥ 65 mm mm	**s** ≥ 65 mm mm
60	110	130	130	150	100	120	120	140	115[2]	115[2]	135[2]	155[2]
80	130	150	150	170	120	140	140	160	115[3]	135[3]	155[3]	175[3]
100	150	170	170	190	140	160	160	180	135	155	175	195
120	170	190	190	210	160	180	180	200	155	175	195	215
140	190	210	210	230	180	200	200	220	175	195	215	235
160	210	230	230	250	200	220	220	240	195	215	235	255
180	230	250	250	270	220	240	240	260	215	235	255	275
200	250	270	270	290	240	260	260	280	235	255	275	295
220	270	290	290	310	260	280	280	300	255	275	295	315
240	290	310	310	330	280	300	300	–	275	295	315	335
260	310	330	330	350	300	–	–	–	295	315	335	355
280	330	350	350	370	–	–	–	–	315	335	355	375
300	350	370	370	390	–	–	–	–	335	355	375	395
320	370	390	390	–	–	–	–	–	355	375	395	415
340	390	–	–	–	–	–	–	–	375	395	415	435
360	–	–	–	–	–	–	–	–	395	415	435	455
380	–	–	–	–	–	–	–	–	415	435	455	–
400	–	–	–	–	–	–	–	–	435	455	–	–

1) Including 20 mm old plaster

2) Recessed installation not possible, dowels can only be placed surface flush

3) Recessed installation for MW Wolle 035 plus L and MW Wolle 035 plus M2 not possible

t = insulation material thickness

s = anchoring depth

t_{tol} = tolerance equalization = (possible 20 mm old render) + façade equalization + 5 mm adhesive thickness

Calculation of the dowel length:

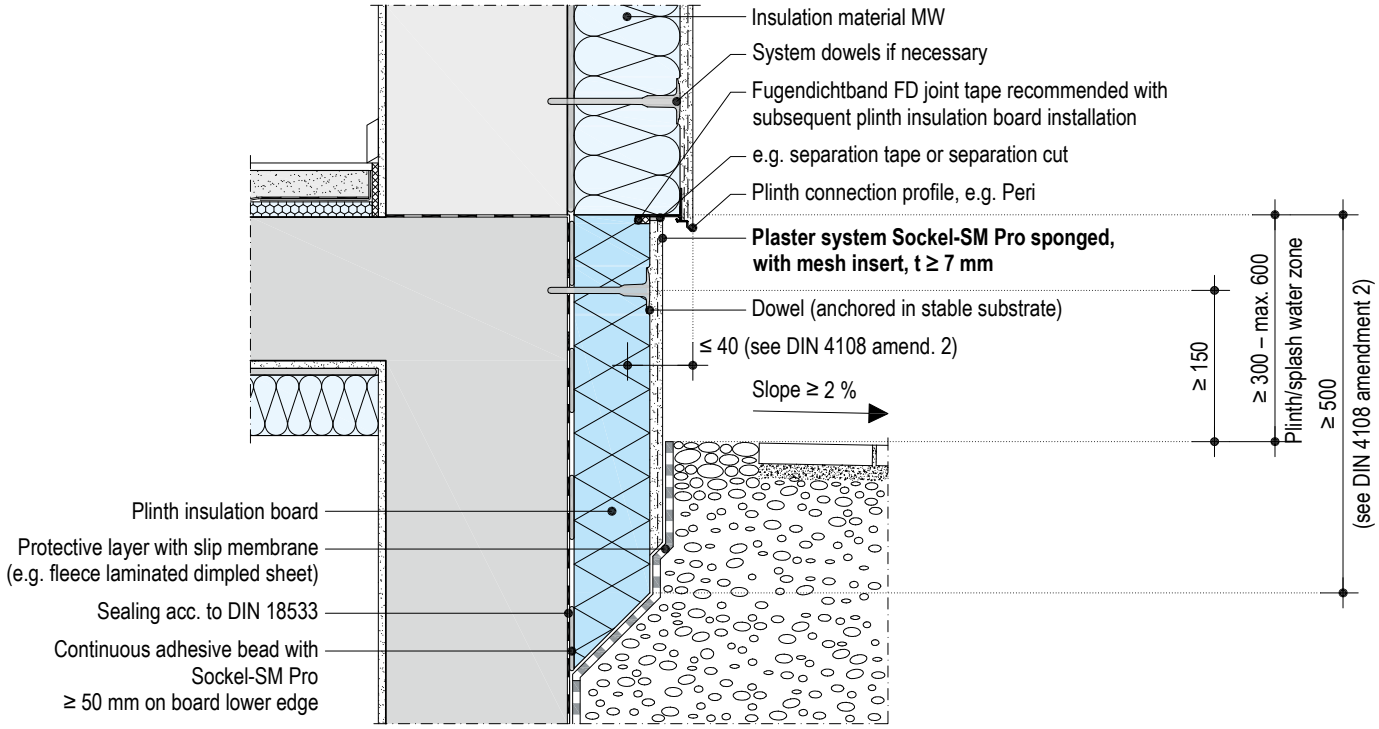
Anchoring depth **s** + (possibly 20 mm old render thickness) + façade equalization + 5 mm adhesive thickness + insulation material thickness **t**

Minimal integration depth in the soil – application with Sockel-SM Pro

Scale 1:10 I Dimensions in mm

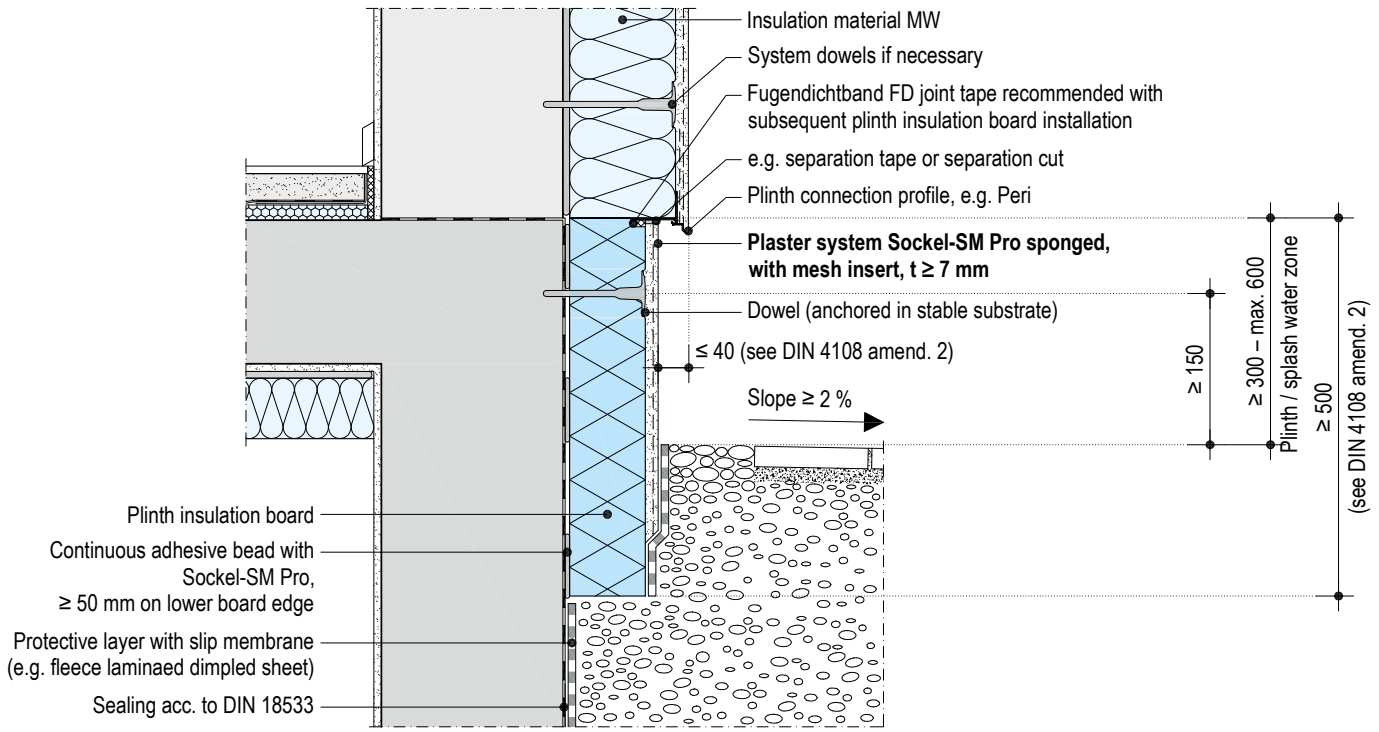
WE112.de-SO-V5 Recessed plinth application

Plinth application with slanted connection



WE112.de-SO-V6 Recessed plinth application

Plinth application with straight connection, e.g. with retrofitting

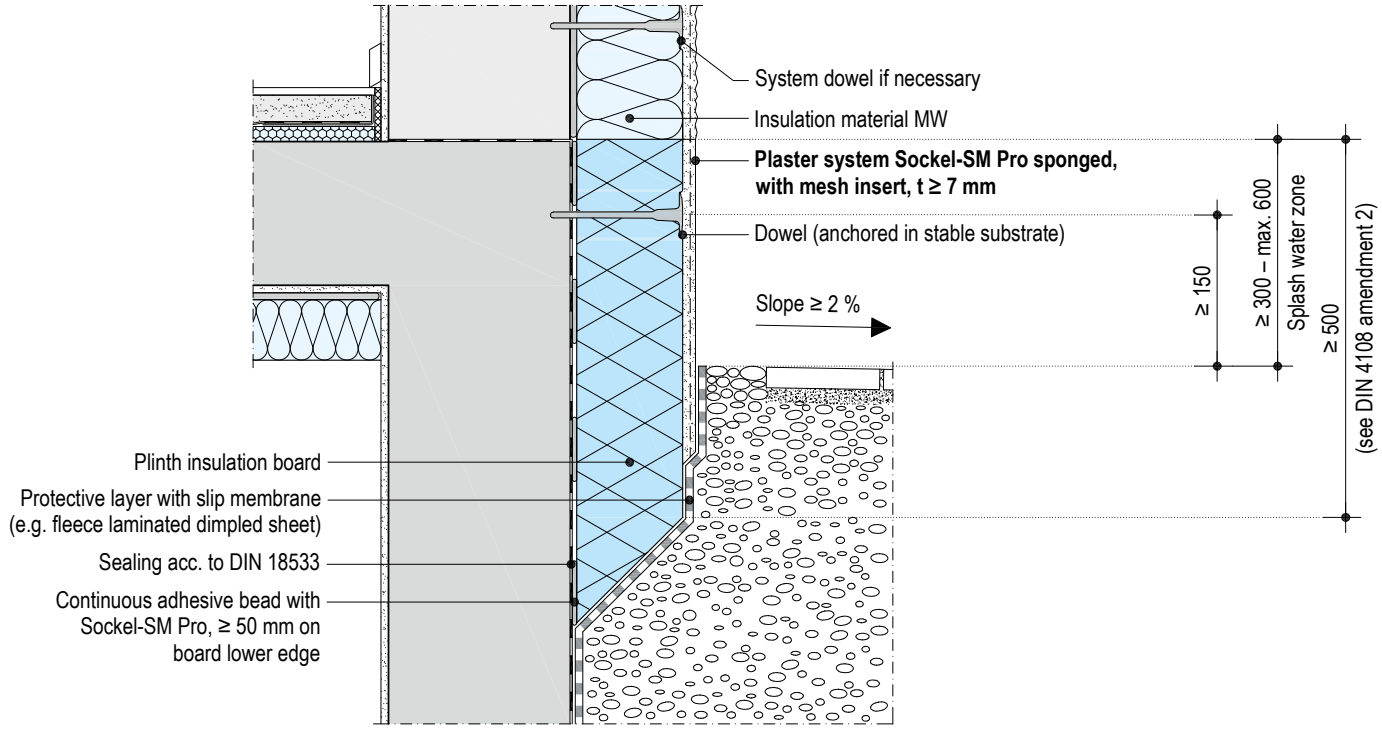


Note	In case of use of plinth insulation boards (EPS) on non-combustible façades, prior consultation with those with fire protection responsibility or building authorities is required. Otherwise suitable non-combustible insulation materials have to be used in the plinth area.

Minimal integration depth in the soil – application with Sockel-SM Pro (continued)

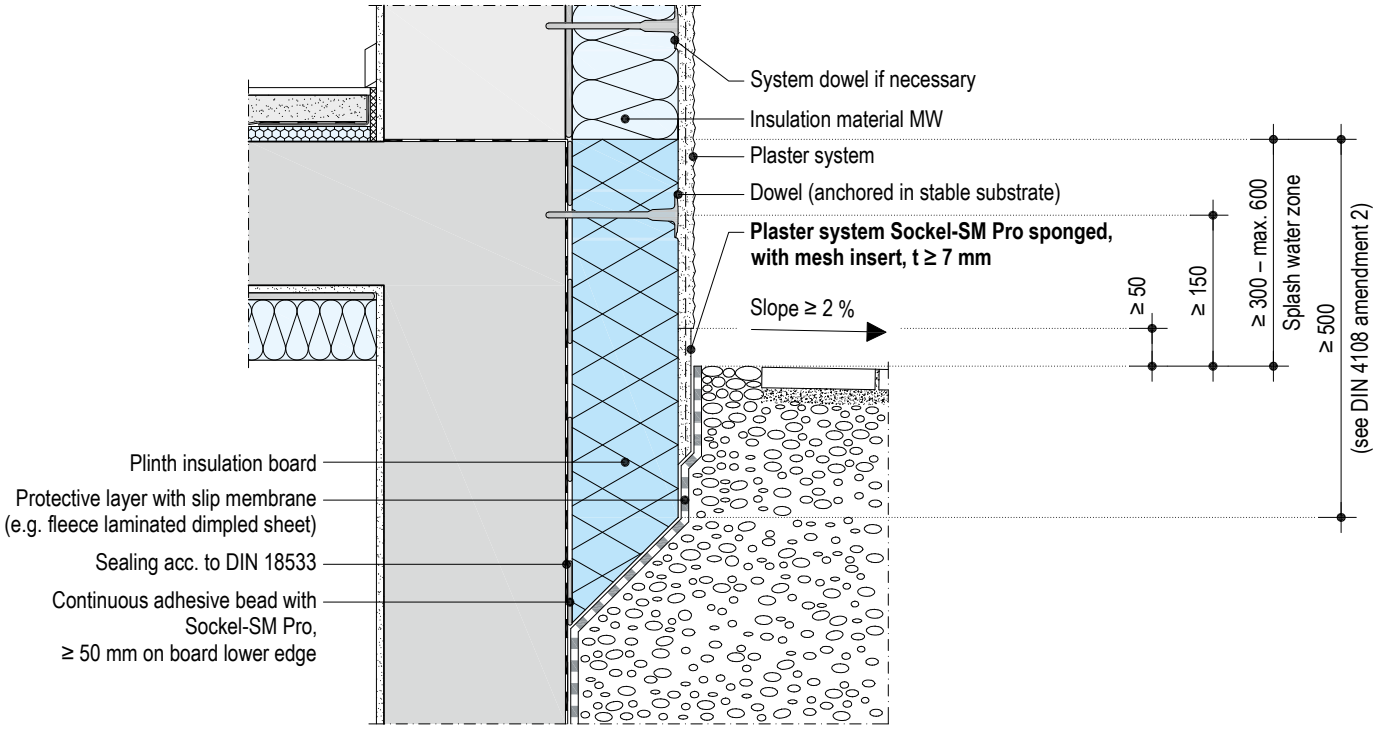
Scale 1:10 I Dimensions in mm

WE112.de-SO-V7 Flush plinth application



WE112.de-SO-V8 Flush plinth application

Application of render after completion of covering work



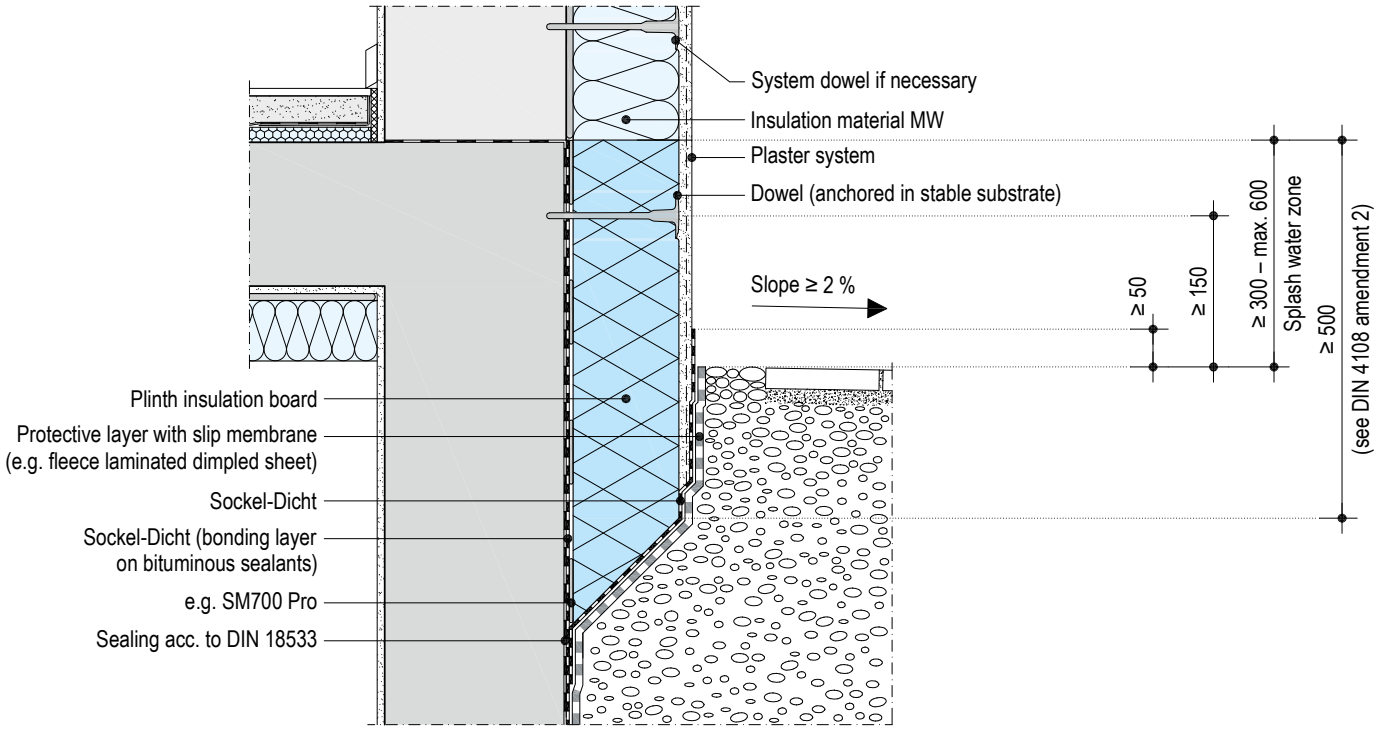
Note	In case of use of plinth insulation boards (EPS) on non-combustible façades, prior consultation with those with fire protection responsibility or building authorities is required. Otherwise suitable non-combustible insulation materials have to be used in the plinth area.

Minimal integration depth in the soil

Scale 1:10 I Dimensions in mm

WE112.de-SO-V2 Flush plinth application

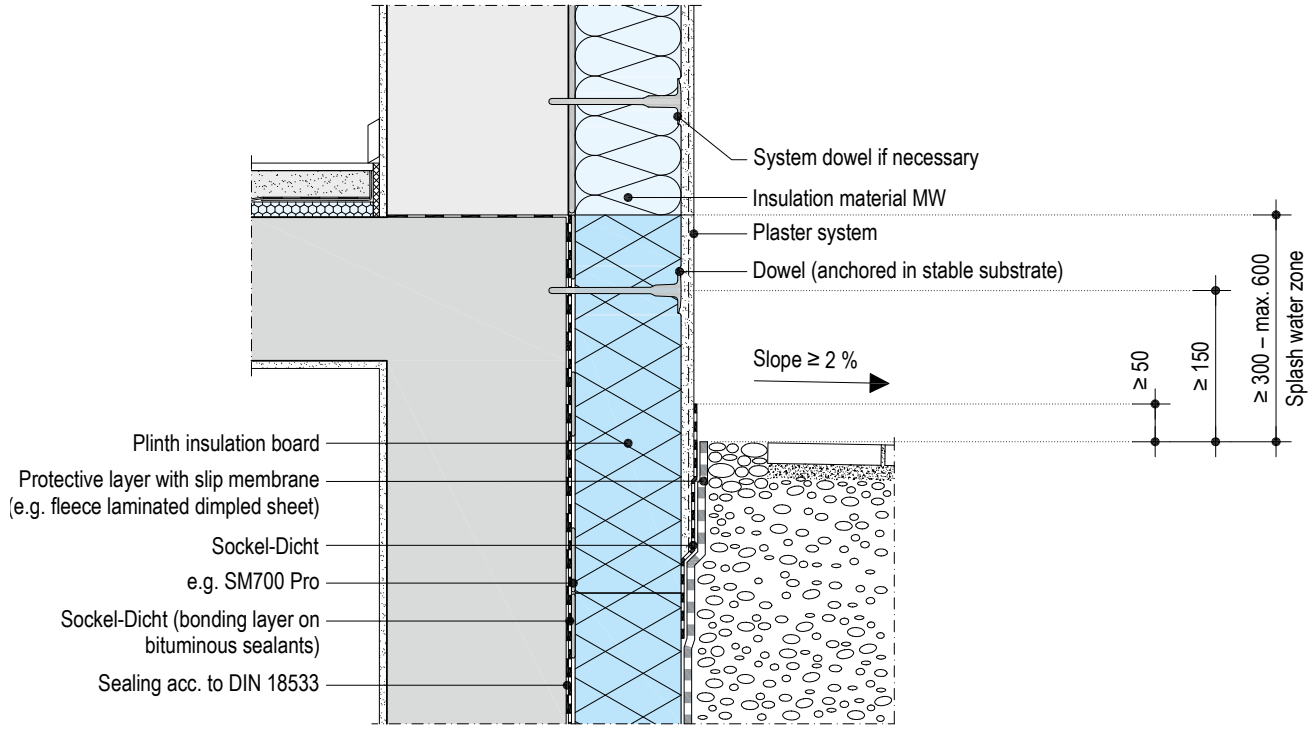
Application without Sockel-SM Pro



Implemented with perimeter insulation

WE112.de-SO-V4 Flush plinth application

Application without Sockel-SM Pro

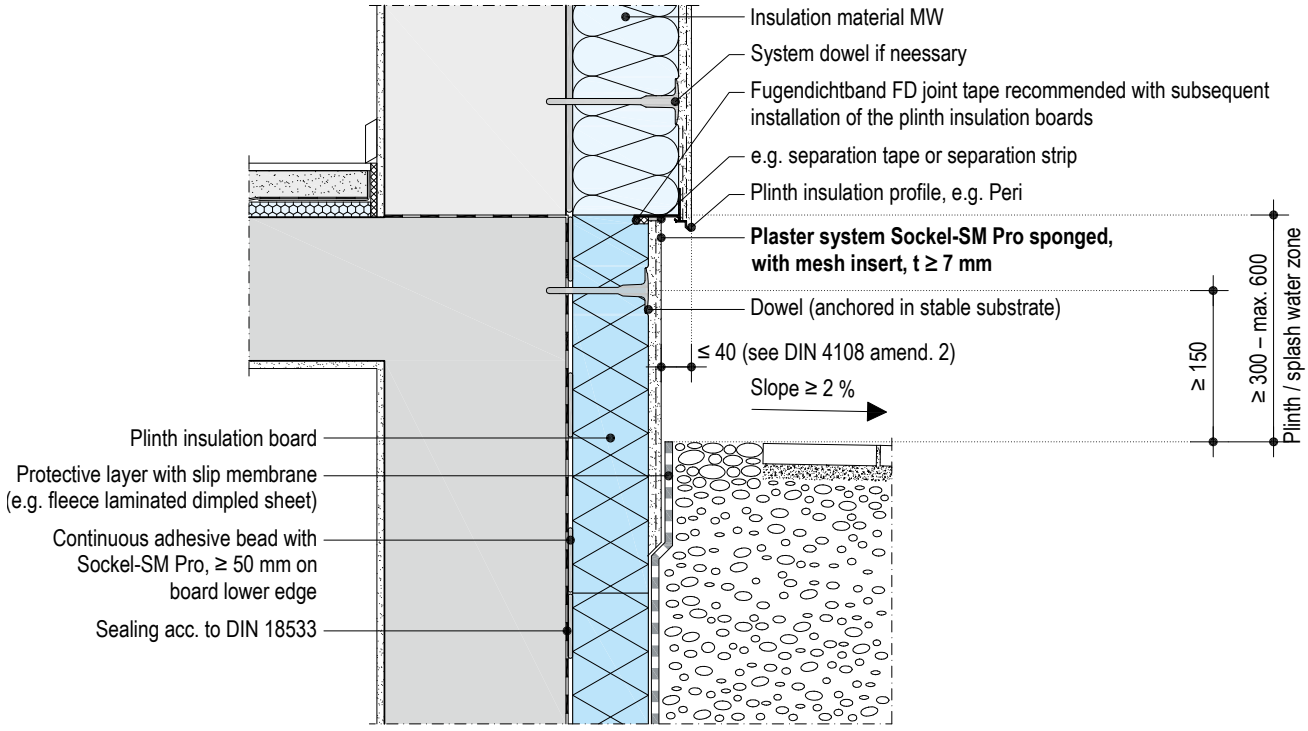


Note	In case of use of plinth insulation boards (EPS) on non-combustible façades, prior consultation with those with fire protection responsibility or building authorities is required. Otherwise suitable non-combustible insulation materials have to be used in the plinth area.

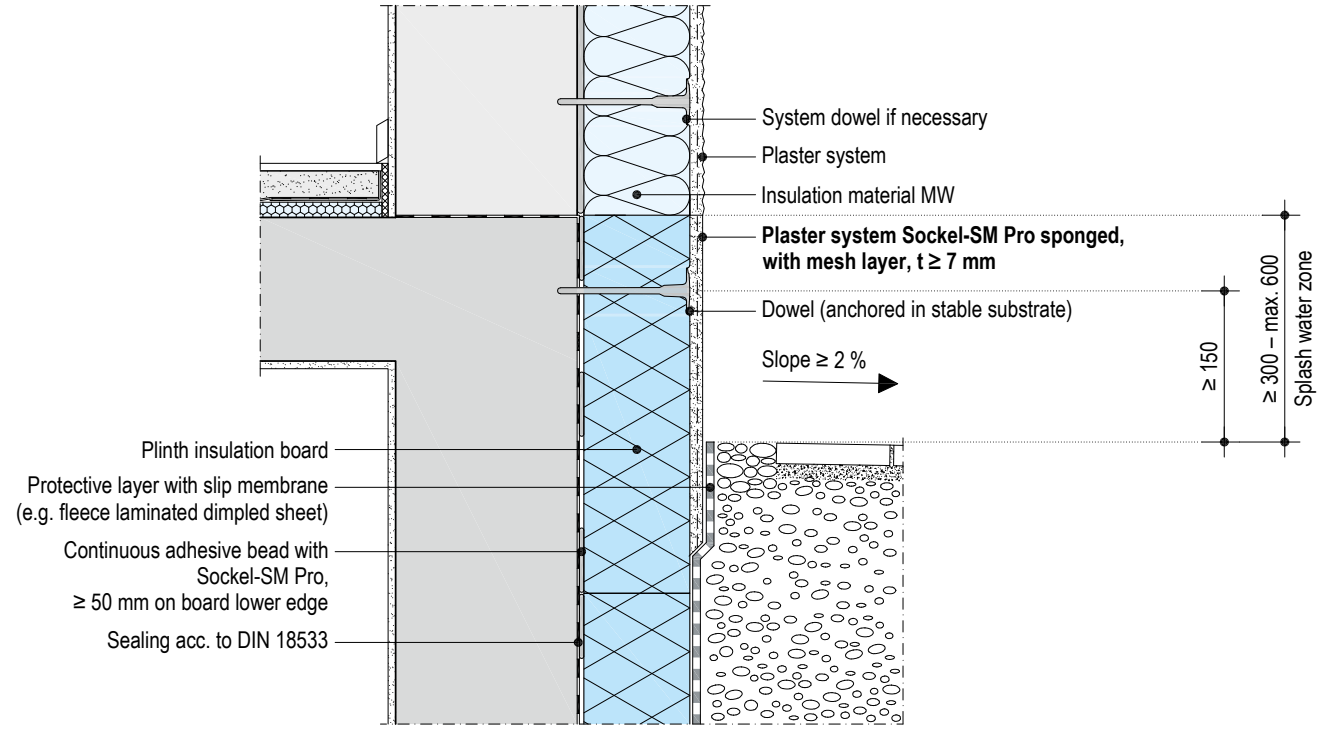
Application with perimeter insulation – Application with Sockel-SM Pro

Scale 1:10 I Dimensions in mm

WE112.de-SO-V9 Recessed plinth application



WE112.de-SO-V10 Flush plinth application

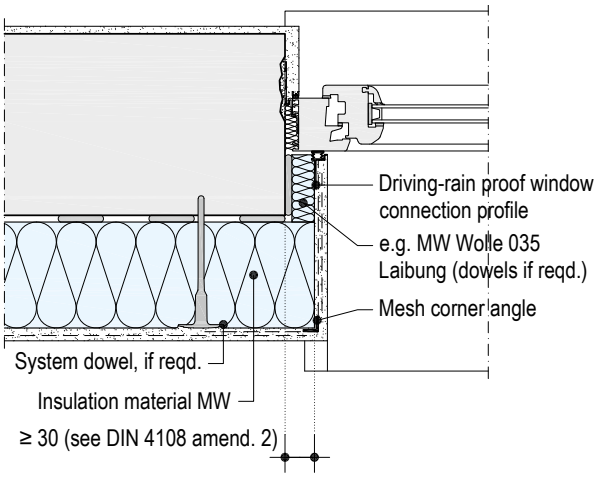


Note	In case of use of plinth insulation boards (EPS) on non-combustible façades, prior consultation with those with fire protection responsibility or building authorities is required. Otherwise suitable non-combustible insulation materials have to be used in the plinth area.

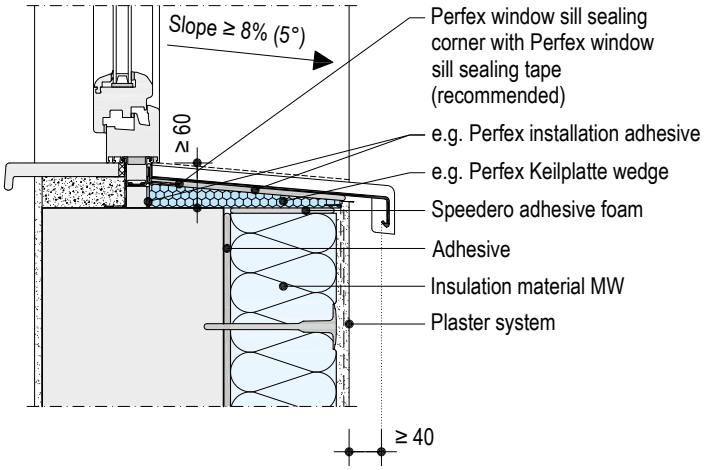
Window in the middle of the masonry

Scale 1:10 I Dimensions in mm

WE112.de-FE-H1 Horizontal section

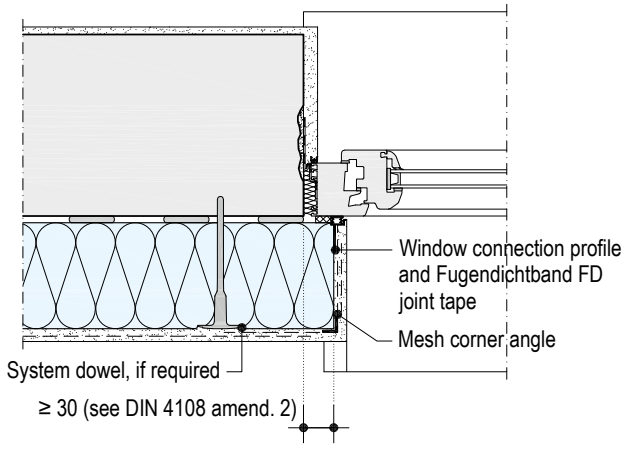


WE112.de-FE-V1 Vertical section

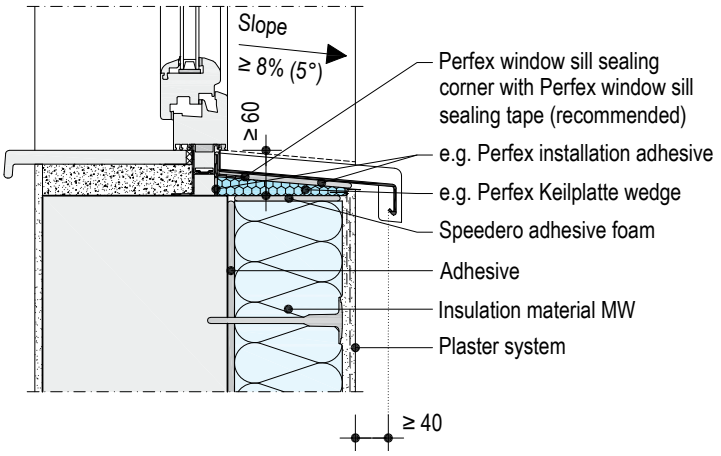


Window exterior flush with masonry

WE112.de-FE-H2 Horizontal section



WE112.de-FE-V2 Vertical section



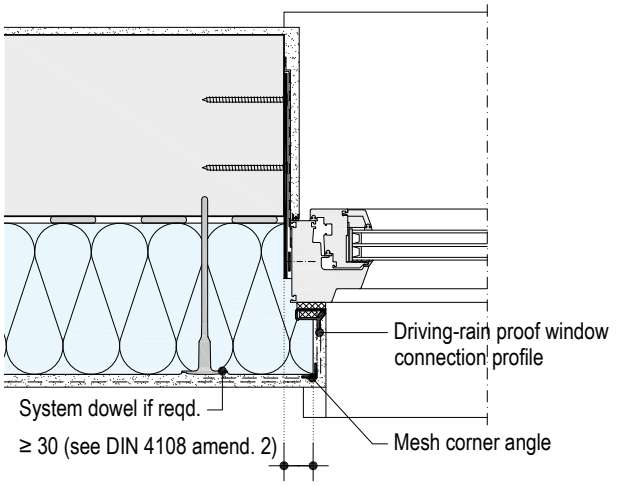
1) In case driving-rain proofing has not been certified, an additional Fugendichtband FD joint sealing tape must be installed (see detail for WE112.de-FE-H2 as well as page 54).

Notes	Ensure that all openings (interface gaps) are sealed. The window installation and seals are represented schematically – refer to “Guideline on the installation of windows and doors” from the RAL-Gütegemeinschaft Fenster und Haustüren e.V. (German Quality Assurance Association Windows and Doors) or the guideline “Connection of windows and roller blinds with plaster, drywall and external thermal insulation composite systems” (German only) from the Fachverband der Stuckateure für Ausbau und Fassade Baden Württemberg, Germany.

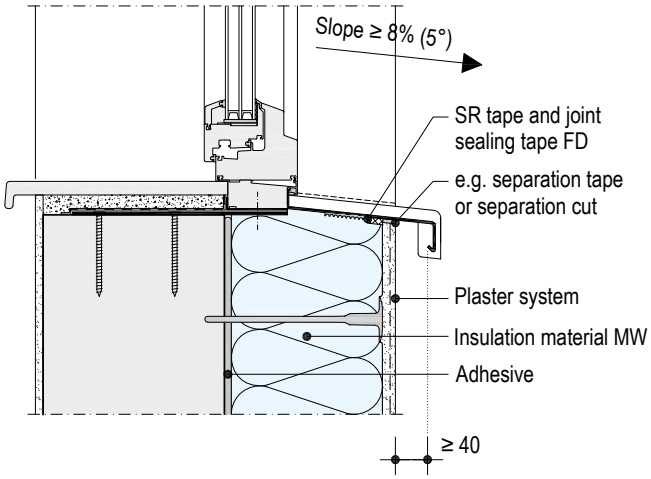
Window before the masonry

Scale 1:10 I Dimensions in mm

WE112.de-FE-H3 Horizontal section



WE112.de-FE-V3 Vertical section



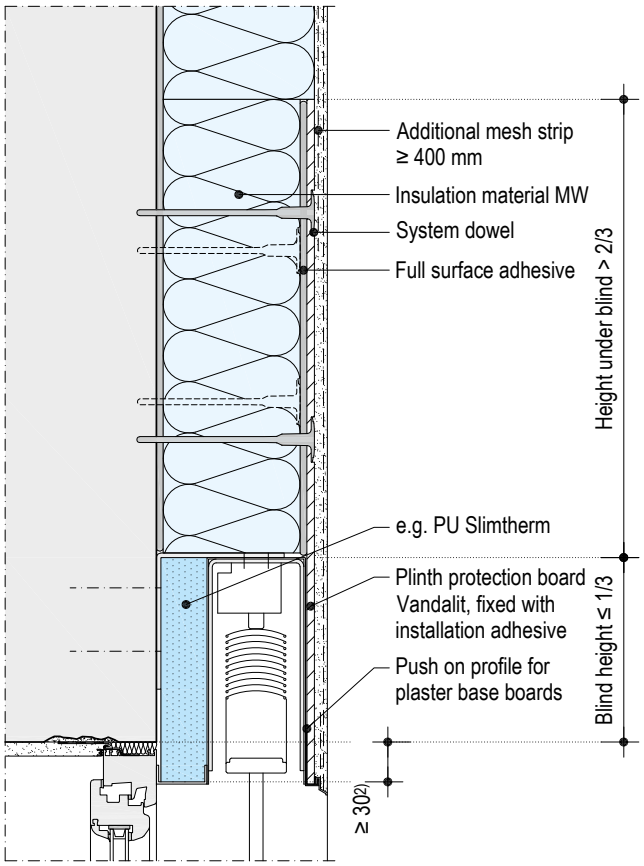
1) *In case driving-rain proofing has not been certified, an additional Fugendichtband FD joint sealing tape must be installed (see detail at WE112.de-FE-H2 as well as page 54).*

Lintel design for sun screening

Scale 1:10 I Dimensions in mm

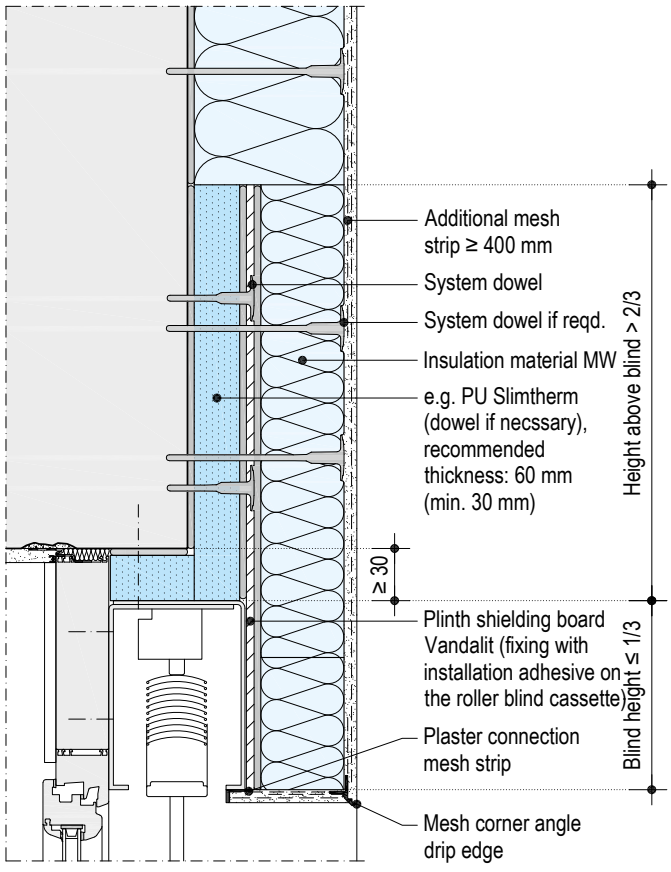
WE112.de-FE-V7 Roller blind

Without insulation covering



WE112.de-FE-V8 Roller blind

With insulation covering



2) *See DIN 4108 amendment 2*

Notes

Rear-side coating of the plinth protection board Vandalit as moisture protection is recommended.

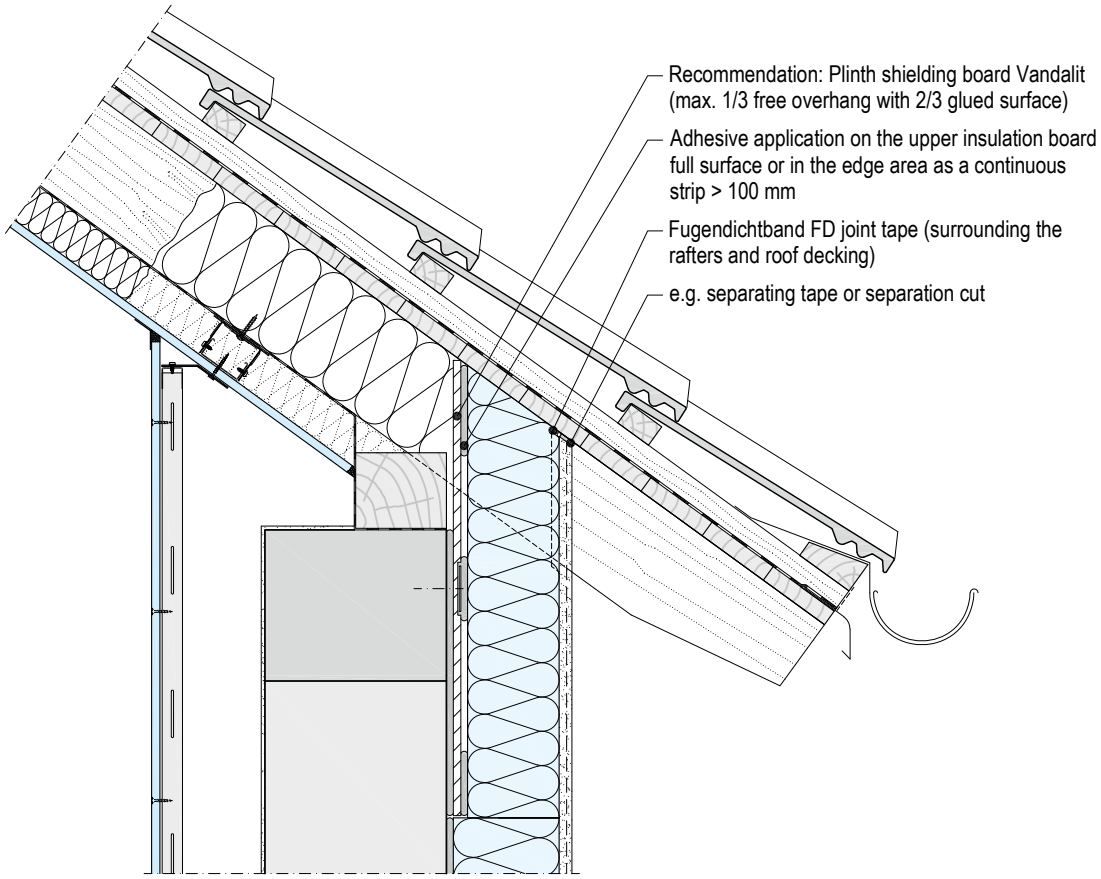
Ensure that all openings (interface gaps) are sealed.

The window installation and seals are represented schematically – refer to “Guideline on the installation of windows and doors” from the RAL-Gütegemeinschaft Fenster und Haustüren e.V. (German Quality Assurance Association Windows and Doors) or the guideline “Connection of windows and roller blinds with plaster, drywall and external thermal insulation composite systems” (German only) from the Fachverband der Stuckateure für Ausbau und Fassade Baden Württemberg, Germany.

Connections to roof

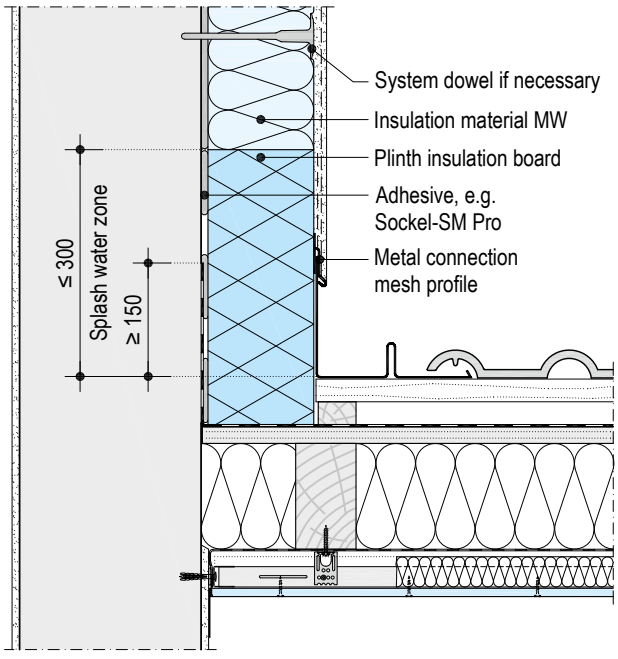
Scale 1:10 I Dimensions in mm

WE112.de-DA-V1 Eaves connection to roof weatherboarding

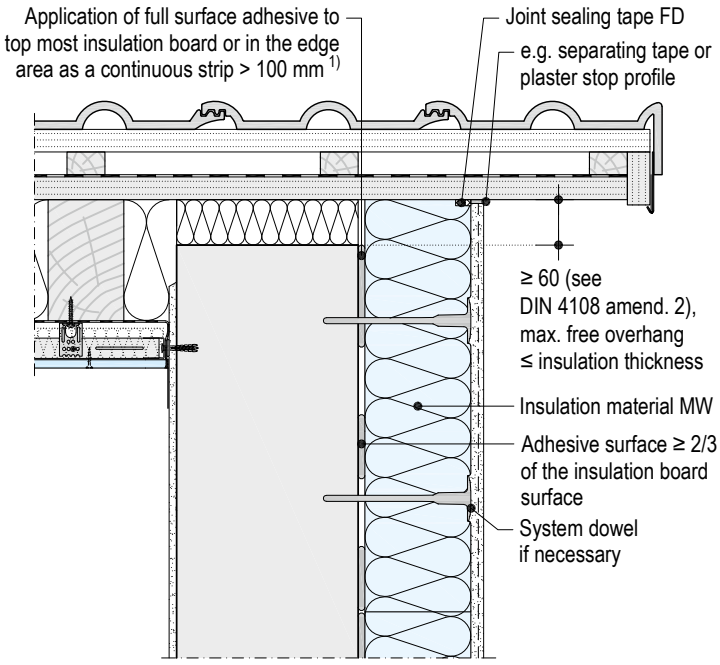


WE112.de-DA-V3 Steep roof connection to rising wall

With metal connection mesh profile



WE112.de-DA-V5 Bargeboard connection



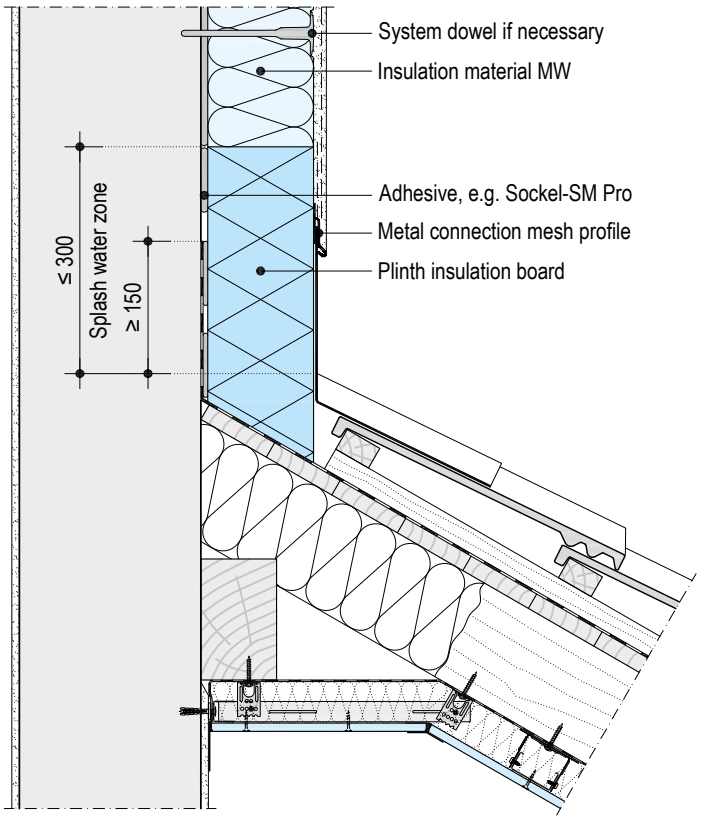
1) Refer to "Implementing airtight constructions and connections issued by the Fachverband der Stuckateure für Ausbau und Fassade Baden-Württemberg, Germany

Note	Observe guideline "Metallanschlüsse an Putz und Wärmedämm-Verbundsysteme - *Metal connections to render and external thermal insulation composite systems*", (German only) from the Fachverband der Stuckateure für Ausbau und Fassade Baden Württemberg, Germany as well as the DIN 18531.

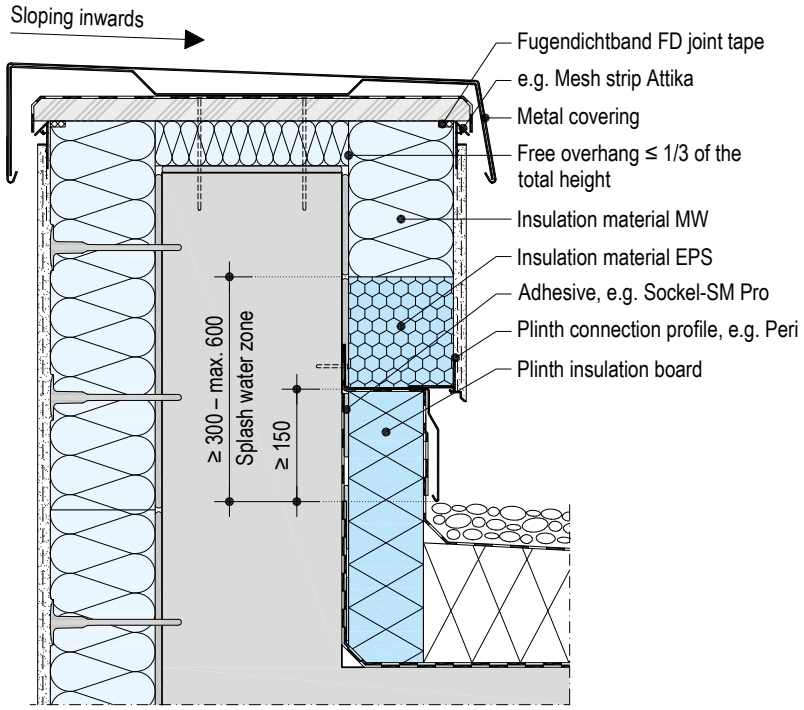
Connections to roof (continued)

Scale 1:10 I Dimensions in mm

WE112.de-DA-V12 Pitched roof connection to rising wall



WE112.de-DA-V6 Flat roof connection, attic coverings



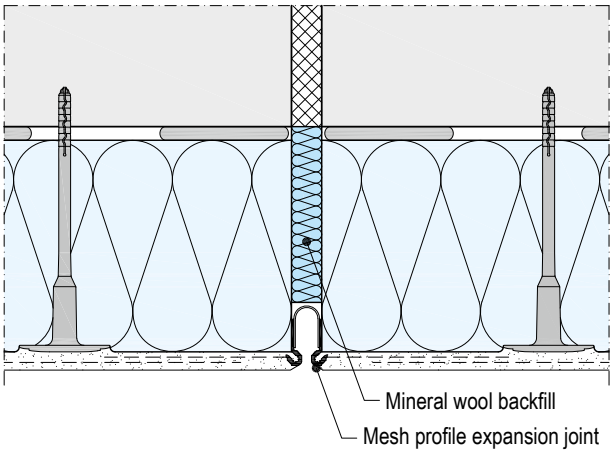
1) Spacing and heights of bevelled ends and borders to coverings as well as drip edge spacings are subject to the technical regulations for plumbers and roofers

Note	Observe guideline “Metallanschlüsse an Putz und Wärmedämm-Verbundsysteme - *Metal connections to render and external thermal insulation composite systems*”, (German only) from the Fachverband der Stuckateure für Ausbau und Fassade Baden Württemberg, Germany as well as the DIN 18531.

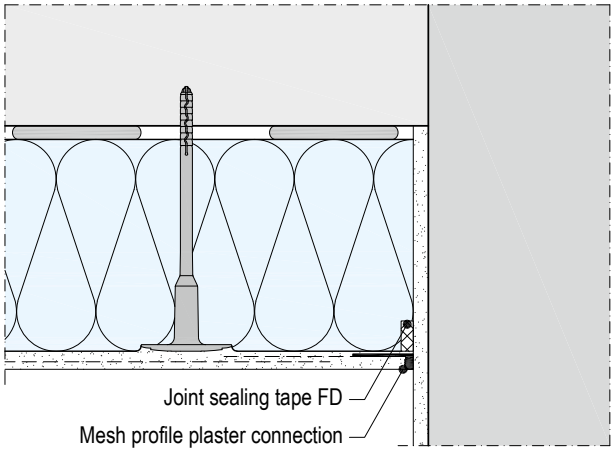
Expansion and connection joints

Scale 1:5

WE112.de-FU-H1 Building expansion joint



WE112.de-FU-H2 Connection to existing constructional component

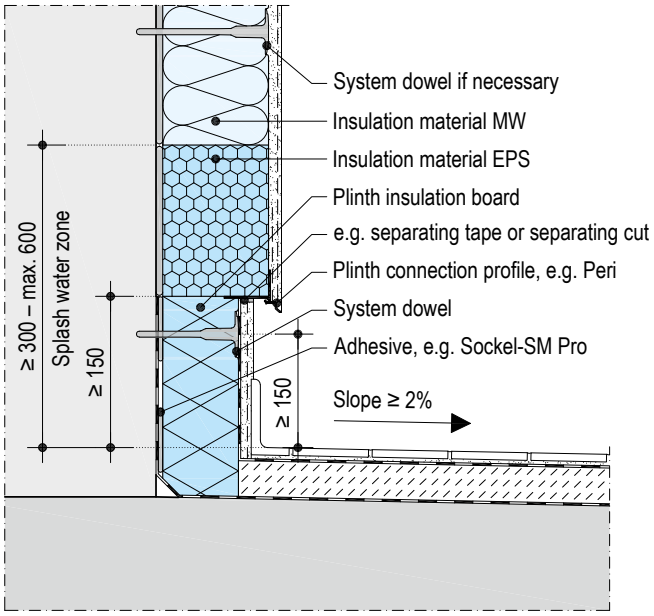


Scale 1:10 I Dimensions in mm

Balcony and terrace connections

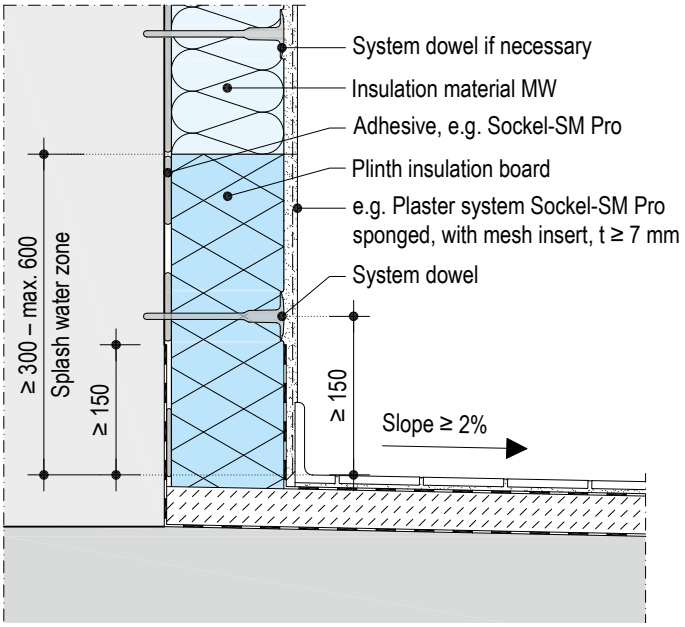
WE112.de-BA-V1 Projecting balcony slab or terrace

Recessed plinth application



WE112.de-BA-V2 Projecting balcony slab or terrace

Flush plinth application



Notes

Application of area boundary joints: See system approvals Z-33.43-82 and Z-33.44-83.

In case of use of plinth insulation boards (EPS) on non-combustible façades, prior consultation with those with fire protection responsibility or building authorities is required. Otherwise suitable non-combustible insulation materials have to be used in the plinth area.

Observe the “Façade plinth render/External components” (German only), issued by Fachverband der Stuckateure für Ausbau und Fassade Baden-Württemberg, as well as the DIN 18531.

Preconditions

Protect the insulation material against moisture.
All connections and detail features as well as the arrangement of the expansion joints must be clarified before application.
The necessary substrate preparation must be undertaken on a case-by-case basis and must be described in full detail in the tender specifications. Substrate tests and possible measures are listed in this system data sheet on page 43.
The surface of the substrate must be firm, dry, even and free of grease and dust as well as free of any residual substances that may reduce the adhesion. Check the stability of existing coatings (paint coatings and old plasters) and compatibility with adhesive, and remove unstable coatings completely if necessary.
The stability and loadbearing capacity of the dowel (exterior wall area) must be tested in non-standardized substrates.
Rising damp may not be present.
All applied connections must be planned as driving-rain proof.
Ensure that all openings (interface gaps) are sealed.
The internal plastering and screed works should be completed and the components should be dry enough so that an excessive accumulation of moisture is avoided.
The contractor is solely responsible for inspecting the condition of the substrate and the on-site conditions.
The ambient temperature, substrate and material temperature must be at least +5 °C and may not exceed +30 °C during the entire application, drying and setting phase (if Kati is used as a finishing coat, at least +8 °C).
Unfavourable weather influences such as high temperatures, wind or direct sunlight can change the application conditions. Protect the insulation materials against exposure to direct sunlight and UV exposure as well as moisture during storage and application until the adhesive has fully set.
Only cold, clean water (drinking water quality) may be used as mixing water. Water up to a temperature of +30 °C may be used on building sites in spring and autumn.
Cover or apply a watertight covering to easily-soiled building components (e.g. window sills) prior to application. Observe the Code of Practice "Abklebe- und Abdeckarbeiten für Maler- und Stuckateurarbeiten - *Masking and covering for painting and stucco work*" issued by the German Bundesverband Ausbau und Fassade. Protect surfaces from precipitation and direct sunlight.

Machine technology from Knauf PFT for the application of ETICS

Product	Mixing pump/ feed pump	Stator/ rotor	Mortar hoses	Wet mortar pumping distance
Bonding and reinforcement mortar				
SM700 Pro, SM700	G 4	D4-3 with Rotoquirl	Ø 25 mm	Up to 30 m
	RITMO L plus	B4-2L with Rotomix	Ø 25 mm	Up to 20 m
SM300	G 4	D4-3	Ø 25 mm	Up to 30 m
	RITMO L plus	B4-2L	Ø 25 mm	Up to 20 m
	PuMax	Ex-works	Ø 35 + 25 mm	Up to 65 m
Sockel-SM Pro, Sockel-SM	G 4	D4-3 with Rotoquirl	Ø 25 mm	Up to 30 m
	RITMO L plus	B4-2L with Rotomix	Ø 25 mm	Up to 15 m
Duo-Kleber adhesive	G 4	D4-3	Ø 25 mm	Up to 30 m
	RITMO L plus	B4-2L	Ø 25 mm	Up to 20 m
Lustro	G 4	D4-3	Ø 25 mm	Up to 40 m
	RITMO L plus	B4-2L	Ø 25 mm	Up to 20 m
Luis	G 4	D4-3 1/2 capacity	Ø 25 mm	Up to 40 m
Finishing plasters				
Mineral, thin-layer finishing coats (e.g. SP 260 Pro, RP 240, MineralAktiv Dry, etc.)	G 4	D4-3	Ø 25 mm	Up to 30 m
	RITMO L plus	B4-2L	Ø 25 mm	Up to 20 m
Scratch render (Mak3)	MA-MA	Ex-works	Ø 50 + 35 + 35 + 25 mm	Up to 50 m
	G 4	D6-3	Ø 35 + 35 + 25 mm	Up to 36 m
	PuMax	Ex-works	Ø 50 + 35 + 35 + 35 + 25 mm	Up to 65 m
Paste-like finishing coats (e.g. Addi S, Kati S, Conni S, MineralAktiv Scheibenputz floated render)	SWING	C4-2	Ø 25 mm	Up to 20 m
	RITMO L plus	B4-2L	Ø 25 mm	Up to 20 m

For further information on machine engineering see: pft.net.

Substrate inspection and preparation

The surface of the substrate must be flat, dry and free of grease and dust. With MW Volamit 040, if it is just adhesively bonded, a minimum bond strength of ≥ 0.08 N/mm^2 is necessary. Mineral wool insulation sheets always require additional dowelling.
In case coatings (e.g. Paint coats) are applied to the substrate, it is necessary to professionally assess their compatibility with the adhesive.
Unevenness in the substrate up to a maximum of 20 mm can be covered with the adhesive if dowelling is used additionally, in case of MW Volamit 040 (adhesively bonded only) up to maximum 10 mm. Major unevenness should be equalized mechanically using a suitable layer or render or by staggering the insulation panel thickness. The bond strength of the plaster should be tested after it has set.

Substrate inspection and preparation for adhesive application of ETICS

Inspect for	Test method	Indication	Technical instructions and measures
Surface strength	Scratch test with a solid, angular object	Surface is damaged with moderate pressure	Remove loose, crumbling or brittle parts manually or with a machine; soft layers are not a stable substrate for ETICS.
	Rubbing off by hand	Low abrasion	Treat the constructional component surface with a plaster reinforcing priming layer (Grundol – silicone reinforced deep primer E.L.F.).
		With strong abrasion, extensive abrasion	Select additional dowelling for the insulation panels; remove the non-stable plaster / coating.
	Wet until saturation with water and apply scratch test	The surface softens with a wetting capacity spot test	Remove the non-stable plaster / coating.
Stability of existing older layers	Cross-cut test	Coating components splinter with moderate pressure; scratch impression is jagged or bulged	Remove the old coating / plaster, if necessary use additional mechanical fixing
Compatibility with existing old coating	Tear-off test	Detachment[1)]	Remove the old coating / plaster, if necessary use additional mechanical fixing
Moisture[1)]	Visual inspection and scratch test if required	Damp areas, stains, discolouration's are evident	Technical / physical building causes should be remedied on the construction; allow to dry
Blooming (efflorescence)	Visual inspection	Usually white salts or leaching of lime deposits	Technical / physical building causes should be remedied on the construction; then allow to dry off and remove dry salt deposits
Moss, algae, mould[1)]	Visual inspection	Green or dark fouling	Remove mechanically or by using a high pressure hot water cleaning jet, disinfect the affected area if necessary.
Other soiling	Visual inspection, haptic test (touch test)	Colour, smearing, tackiness	Remove soiling.
Absorbency	Wetting capacity spot test with water	With high absorbency, quick absorption of water and quick darkening of the surfaces	Highly absorbent substrates or substrates with varying levels of absorbency should be treated with a primer to balance the rates of absorption.

1) *Observe further details in acc. with Code of Practice No. 21 "Technische Richtlinien für die Planung und Verarbeitung von Wärmedämm-Verbundsystemen - Technical guidelines for planning and application of external thermal insulation composite systems" issued by the Bundesausschuss Farbe und Sachwertschutz (German only)*

For painted façades we always recommend use of constructional dowelling.

Bridging expansion joints in the exterior wall surfaces

(e.g. the joints in the exterior surfaces of large-panel construction using three-layer panels, see e.g. Z-33.43-82 and Z-33.44-83)

- Joint spacings up to 6.20 m
- Insulation material thickness at least 60 mm
- Basecoat Lustro or SM700 with reinforcement mesh 4x4 mm and thin-layer finishing coats or basecoat SM700 (t = approx. 7 mm) with reinforcement mesh 5x5 mm and thin-layer finishing coats

Building expansion joints in ETICS

Building expansion joints must be integrated into ETICS right up to the cladding and designed accordingly, so that at the same position the same constraint-free movement options are available. The joints must be sealed and driving rain proof.

Insulation material – adhesive bonding

Mix adhesive with clean water according to the instructions in the current product data sheet.

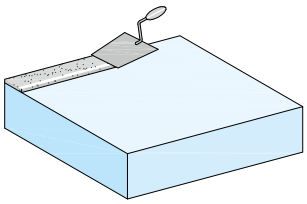
Adhesive side of the insulation panels

Apply the adhesive to the marked or non compacted insulation material side. In case of one-sided coated insulation boards, adhesively bond the non-coated side.

Manual application of mortar on insulation material

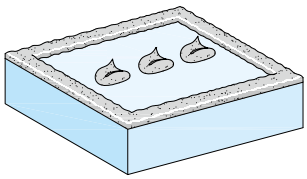
Surface press filling

Application is performed by hand and should always occur when the insulation board is not laminated on the adhesive side. In case of one-sided coated insulation boards, the laminated side always faces outwards and is coated with basecoat in a system. Before the application of the adhesive, press on a thin layer of adhesive. In a second work step apply adhesive wet on wet to the insulation board.



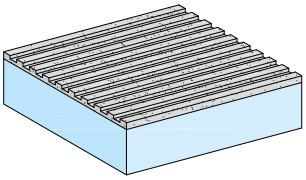
Partial surface adhesive bonding

The adhesive bonding surface share between insulation material and substrate is ≥ 40 % after pressing in the insulation panels. Apply an approx. 50 mm wide ribbon of mortar around the perimeter and 3 palm-sized adhesive dabs or strips on the insulation panel.



Full-surface adhesive bonding

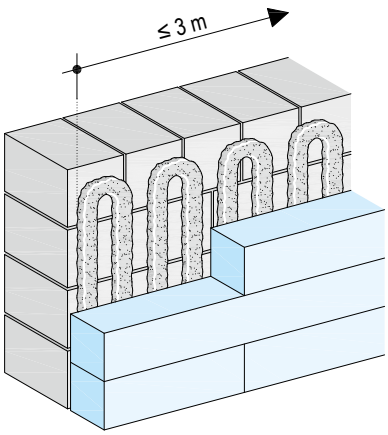
On even substrates, it is possible to apply the adhesive on the entire surface of the insulation panel with a notched trowel.



Machine mortar application on substrate

Partial surface adhesive bonding

The adhesive bonding surface share between insulation material and substrate is ≥ 50 % after pressing in the insulation panels. In case of mineral wool lamella with a thickness of > 200 mm, the adhesive surface share can be ≥ 70 % depending on the wind load. Apply adhesive in the form of mortar dabs directly on the substrate at spaces of maximum 100 mm using the meandering method and apply the insulation boards with the marked panel side immediately by pushing, floating and pressing. Apply a continuous strip of adhesive in the edge areas. Only apply a maximum of 3 m of adhesive in advance to the surface being worked.



Full-surface bonding

Run a notched trowel through the adhesive directly before applying the insulation panels.

Two layer application of mineral wool panels on exterior walls

Application should be end to end. The permissible insulation material thicknesses can be combined. Combination of different board types is not permissible. The adhesive is applied exclusively by hand using a mineral adhesive.

Plinth and splash water zone

Inspect / supplement the building waterproof sealing before insulation work. The splash water zone insulated with plinth insulation boards must be applied up to a height of at least 300 mm above ground level.
With a requirement for not easily flammable with ETICS, the plinth and spash water zone can be applied using plinth insulation boards (EPS). The requirement for not easily flammable ETICS requires that the use of plinth insulation boards made of EPS is clarified in advance with those with fire protection responsibility. Otherwise non-combustible insulation materials have to be used in the plinth area.
Adhesively bond plinth insulation panels using adhesive mortar on mineral or bituminous waterproofing of buildings. The adhesive application is across the entire surface or using an edge ribbon and dab bonding method with an adhesive surface of at least 40 %. The lower edge of the plinth insulation panel must have a continuous strip applied at least 50 mm wide. It is recommended that the lower edge of the plinth insulation panel has a slope cut with minimal integration into the soil (up to 500 mm above the ground line), see guideline “Façade plinth render/External components” (German only), issued by Fachverband der Stuckateure für Ausbau und Fassade Baden-Württemberg. Allow a setting time of at least 48 hours before continuing work.

Adhesive bonding on bituminous substrates

In case of mineral adhesives (not necessary with Sockel-SM Pro), apply Sockel-Dicht on two component, bituminous substrates as a bonding layer and roughen the surface with a broom. Allow to dry and set fully before continuing.
Insulation material more than 150 mm above the edge of the ground line must be anchored with dowels.

Notes	For further information on the installation and application of insulation panels and plaster system in the plinth area, see pages 46 to 59. Observe the “Façade plinth render/External components” (German only), issued by Fachverband der Stuckateure für Ausbau und Fassade Baden-Württemberg, as well as the DIN 18533.

ETICS façade surface

Install the plinth connection end profile horizontally and fix using anchor nails at spacings of approx. 300 mm. Compensate for substrate tolerances with washers. Connect the joints and the plinth connection end profiles with H connectors. Provide the outside corners with the appropriate mitring. Push on plinth profile made of plastic with drip edge and integrated reinforcement mesh strips on the plinth connection end profile ensuring joint offsetting to the insulation panel and plinth connection end profile.
In case of perimeter insulation boards / plinth insulation boards on existing ETICS or if a plinth connection profile is used, insert Fugendichtband FD joint sealing tape between the perimeter insulation board / plinth insulation board and the plinth connection profile. In case of ETICS connected to existing perimeter insulation boards / plinth insulation boards, use of a Peri plinth profile is recommended. Embedding a joint sealing tape is unnecessary (see

Insulation material – adhesive bonding (continued)

page 57).

Apply insulation boards immediately to the fresh adhesive by pushing, floating and pressing.

Apply the insulation boards precisely and continuously starting from the bottom with the joints staggered at ≥ 100 mm (half board length recommended for joint staggering). Avoid cross joints, e.g. on opening corners. At corners of openings(windows, doors), the insulation boards must be applied so that the joint connections are not in the direct vicinity of the corners.

Adhesive bonding up to a thickness of 200 mm without corner grooving possible, however, adhesively bond from 220 mm with corner grooving.

Adhesive may not be applied to the board joints. Open joints must be filled. Joints up to 5 mm in width can be filled with B1 foam, joints > 5 mm or skips can be cleanly sealed using equivalent insulation material strips.

Apply the lower, upper and lateral edges of the insulation surface with a continuous strip of adhesive applied to ensure that back ventilation is excluded.

Do not use mineral wool insulation material in the splash water zone.

Connections to adjacent constructional components and penetrations should made driving-rain proof with joint sealing tape FD. Install window sills to be driving-rain proof.

Allow a setting time of at least 48 hours before continuing work.

ETICS – ceiling/soffit underside

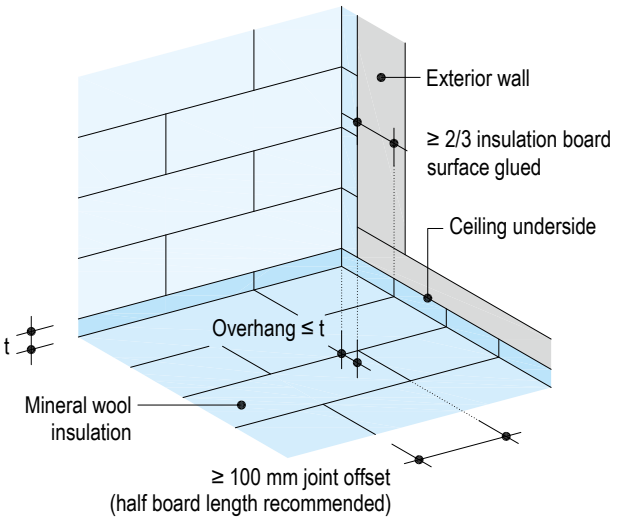
Mineral wool insulating materials in a thickness of 80 mm up to a maximum of 200 mm are glued with a perfect fit end to end with ≥ 100 mm continuous joint offset to the underside of the ceiling/soffit on a partial or full surface with SM700 Pro or Duo-Kleber adhesive. From an insulation material thickness exceeding 180 mm the insulation materials fully glued using Duo-Kleber adhesive.

The maximum protrusion is the thickness of the mineral wool on the ceiling underside. Ensure that at least 2/3 of the surface of the insulation board serves as an adhesive surface.

It may be beneficial to mechanically support freshly glued insulation boards until the adhesive has set in order to achieve enhanced installation with adhesive bonding.

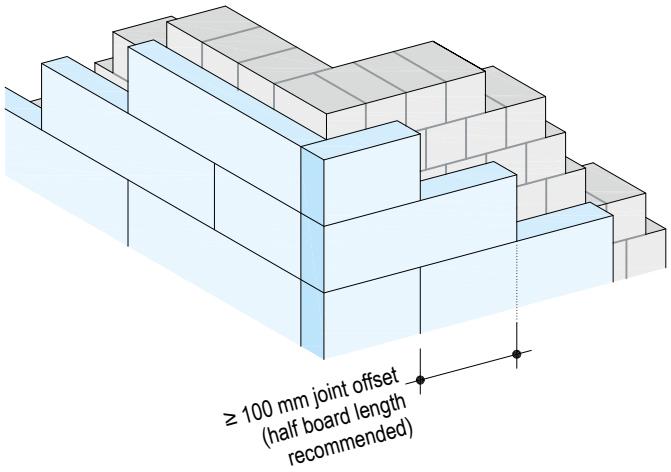
A double-layer application of the mineral wool insulation materials on the undersides of the ceiling/soffit is not permissible.

Corner design at transition soffit/exterior wall

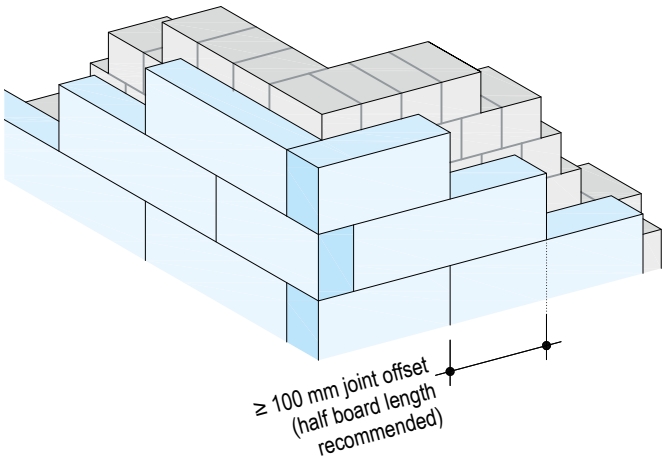


Corner design on exterior walls

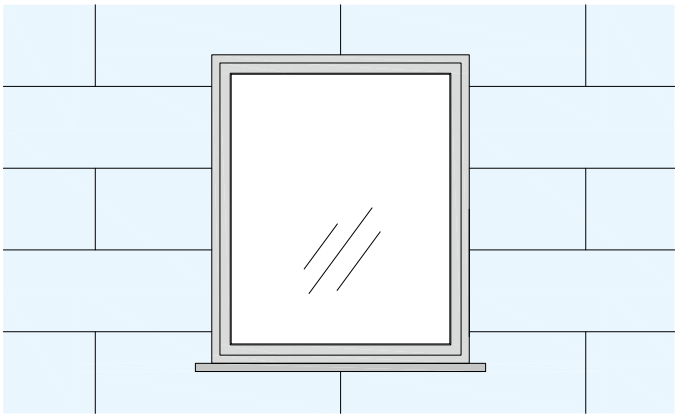
Up to 200 mm insulation material thickness without corner grooving



More than 200 mm with corner grooving



Window and door openings



Avoid cross joints

Insulation material – Section sizes without expansion joints on exterior walls

Insulation material	Feature 1	Feature 2	Render system thickness	Maximum section size	Maximum weight of the render system (wet)
MW Volamit 040	> 200 mm	–	> 10 mm	9 m x 9 m	22 kg/m²
		–	≤ 10 mm	50 m x 25 m	
MW Wolle 035 plus M2	≤ 200 mm	Deeply recessed dowel installation with Schraubdübel Termoz SV II Ecotwist, HTH or Gecko U8 dowels	> 9 mm	10 m x 12 m	30 kg/m²
		Recessed dowel installation with Schraubdübel STR U 2G dowels	> 9 mm	50 m x 25 m	22 kg/m²
		Recessed dowel installation with Schraubdübel STR U 2G dowels, deeply recessed dowel installation with Termoz SV II Ecotwist, HTH or Gecko U8 dowels	≤ 9 mm	50 m x 25 m	
	> 200 mm	–	> 9 mm	7.5 m x 7.5 m	30 kg/m²
		–	> 9 mm	10 m x 12 m	22 kg/m²
		–	≤ 9 mm	50 m x 25 m	
MW Wolle 035 MW Wolle 035 plus	> 200 mm	–	≤ 25 mm	7.5 m x 7.5 m	30 kg/m²
		–	≤ 8 mm	50 m x 25 m	22 kg/m²

Insulation material – Dowelling

The substrate must be sufficiently stable to allow the use of dowels. Insulation materials are to be fastened using certified dowels to ensure structural compliance. The scheme overview on page 18 indicates which dowelling and the number of dowels that are required in the exterior wall. Dowel extraction tests are to be performed for substrates not stipulated in the respective dowel certifications or whose characteristics are unknown.
The number of dowels for installation on exterior walls and soffits can be found in the tables on pages 21 to 30. The wind loads acc. to the simplified method are can read off on page 20. The wind loads can be determined in acc. with DIN EN 1991-1-4 and DIN EN 1991-1-4/NA. If not otherwise specified in the system approvals, the arrangement of the dowels must be compliant to appendix A of the DIN 55699:2017-08 standard.
In case of dowel positioning only on the surface, the minimum spacing to the board edge is 150 mm. The dowels must be distributed uniformly across the surface.
The rated diameter of the drill bit must be 8 mm.
For perforated brick masonry the bore should only be drilled no hammer drill action. Drill holes should be arranged so that the concrete reinforcement is not damaged. Drill hole depth from insulation material or basecoat mortar surface = dowel length + 10 mm (or + 25 mm with recessed dowel installation). Clean the drill holes before the dowels are applied.
Do not use worn drill bits. Resharpening of the drill bit is not permissible.
The substrate temperature must be ≥ 0 °C when placing a dowel. The exposure to UV light with direct exposure to sunlight for the dowel and insulation panel may not exceed 6 weeks.

Dowels under the mesh

Application of the dowels can commence after the adhesive has hardened sufficiently. The dowel patterns on pages 47 to 53 are to be considered.

Dowels through the mesh (e.g. installation under the soffit)

The dowel must be set in the fresh basecoat layer after the application of the basecoat and the embedding of the reinforcing mesh. Then immediately (wet plaster on wet plaster) apply a second layer of basecoat. The dowels should be distributed evenly across the surface. With the installation on the ceiling soffit the valid dowel pattern on page 53 must be observed

MW Wolle 035 / MW Wolle 035 plus / MW Wolle 035 plus L / MW Wolle 035 plus M2

In addition to adhesive bonding, insulation boards must be generally fixed with dowels. In case of double-layer application of the insulation boards the dowels must be set across the entire thickness. Under the mesh (exterior wall), the installation can be flush to the surface, recessed or deeply recessed or integrated deep into the surface. When applying dowels through the reinforcement mesh the dowels can only be placed surface flush. Recessed installation is possible when using Schraubdübel STR U 2G dowels with the additional Dübelteller VT 2G dowel plate and the STR-Rondelle MW dowel plate/rondelle. The use of additional dowel plates / rondelles with 90 mm diameter can lead to a reduction of the number of dowels. Recessed installation is possible when using Schraubdübel STR U 2G dowels with the STR-Rondelle MW dowel plate/rondelle.

MW Volamit 040

On ceiling soffits or in case the minimum adhesive tensile strength of 0.08 N/mm² is not achieved when adhesively bonded or the wind load is ≥ 1.6 kN/m², mineral wool lamellae should always be dowelled in addition to adhesive bonding, see overview on page 18. In case of insulation material thickness > 200 mm further dowels must be applied constructionally, see overview on page 18. Dowelling is always the preferred option on painted or plastered substrates. When applying dowels under the reinforcing mesh an additional dowel plate (diameter 140 mm) must be used.

Selection of the installation method

The selection depends on a range of factors. It is necessary to consider the chosen insulation board, the insulation thickness, the dowel type, the existing substrate, the wind load and the building surface (wall or soffit). See page 18 to 32.

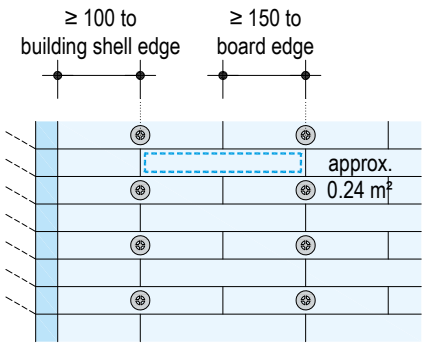
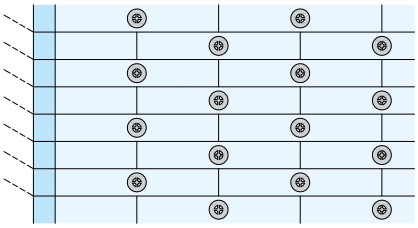
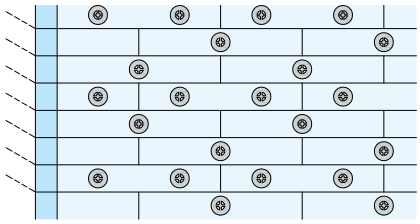
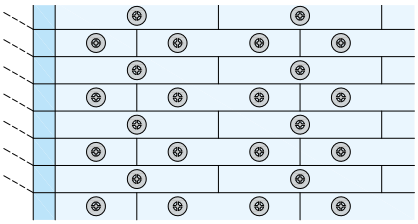
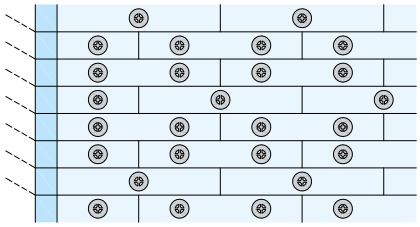
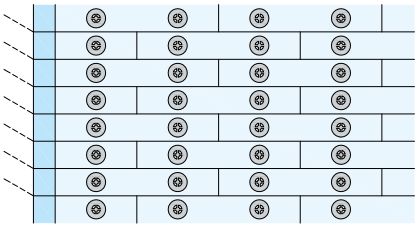
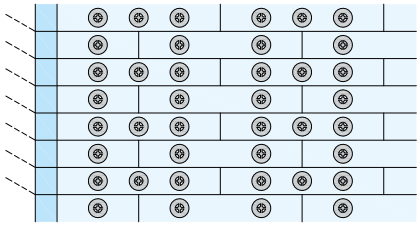
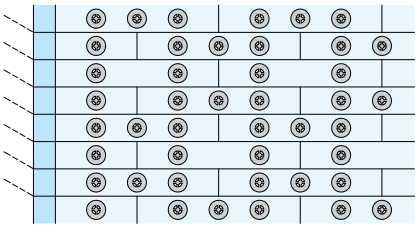
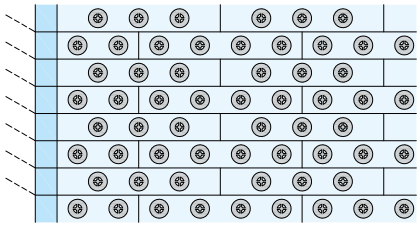
Plinth and splash water zone

Apply additional constructional, mechanical fixing of the plinth insulation boards from a height of 150 mm measured above the edge of the ground line, e.g. for bituminous or painted substrates with general building authority approved dowels (2 dowels per panel).

Exterior wall – board format 1200 mm x 200 mm

Scheme drawings I Dimensions in mm

Dowelling flush under the mesh taking the DIN 55699:2017-08 into consideration

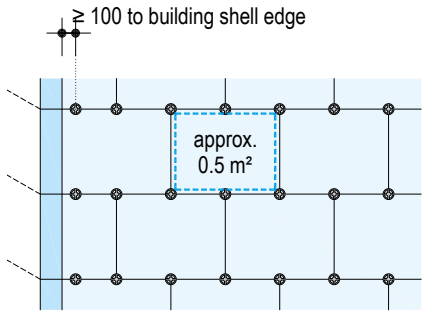
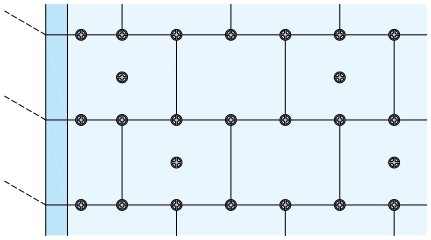
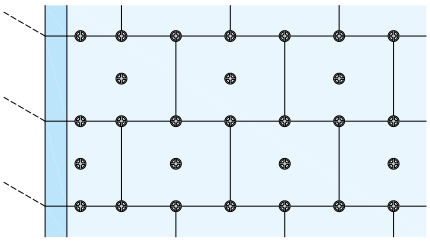
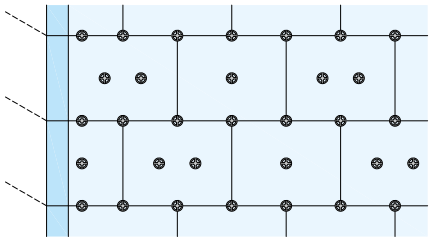
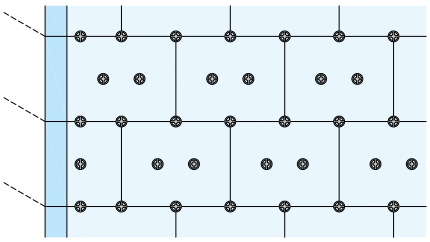
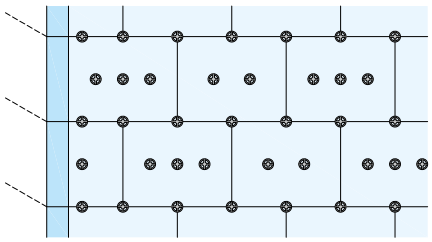
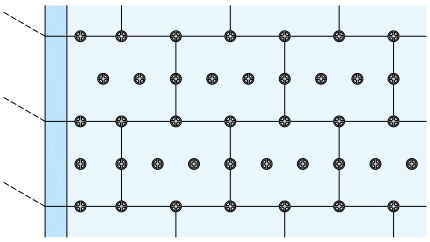
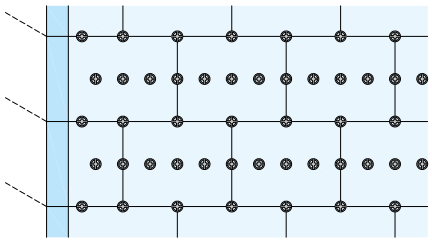
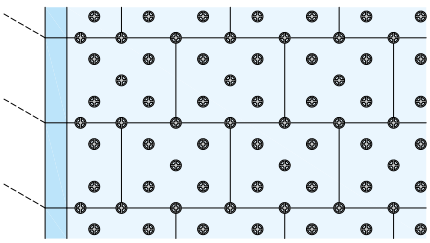
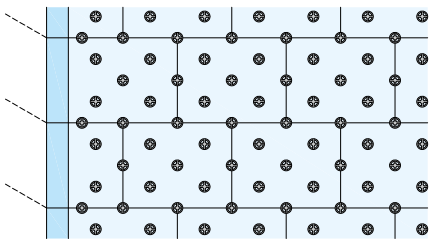
Number of dowels	Dowel arrangement on board surface	Number of dowels	Dowel arrangement on board surface
3 dowels/m²		**4** dowels/m²	
5 dowels/m²		**6** dowels/m²	
7 dowels/m²		**8** dowels/m²	
10 dowels/m²		**11** dowels/m²	
14 dowels/m²			

Dowel rating online see: knauf.de/duebelrechner.

Exterior wall – board format 800 mm x 625 mm

Scheme drawings I Dimensions in mm

Dowelling flush under the mesh taking the DIN 55699:2017-08 into consideration

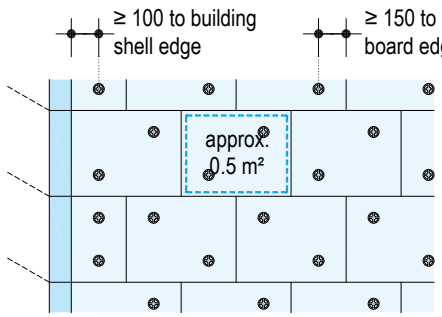
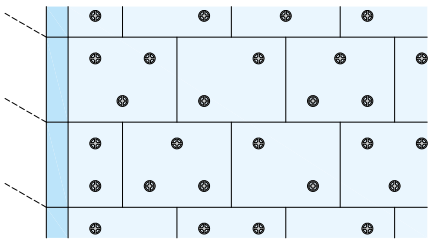
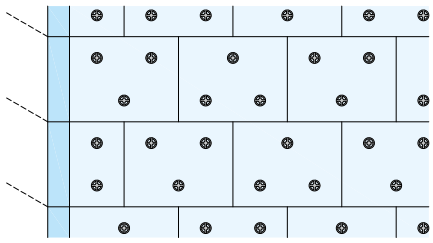
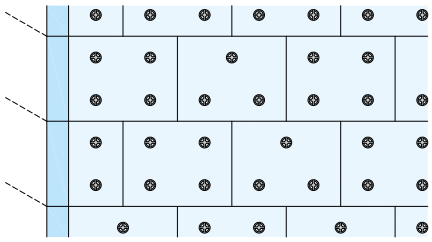
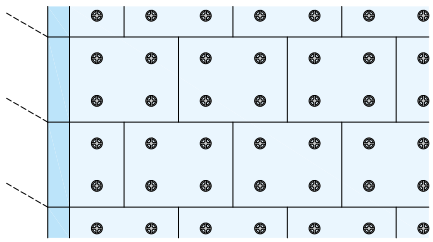
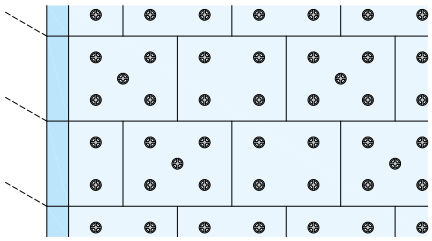
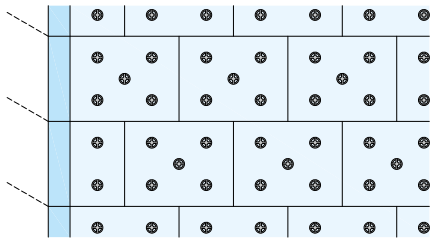
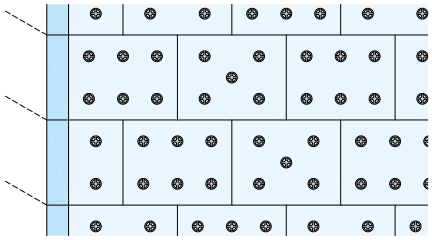
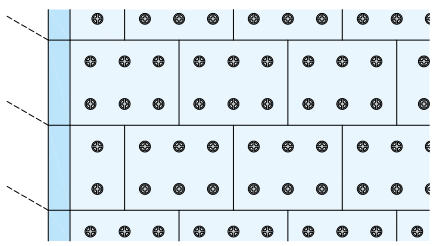
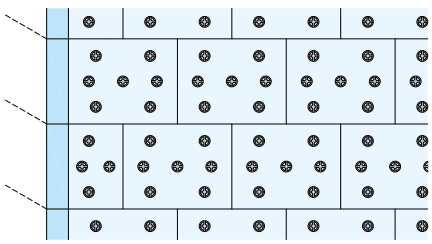
Number of dowels	Dowel arrangement on board surface and joint	Number of dowels	Dowel arrangement on board surface and joint
4 dowels/m²		**5** dowels/m²	
6 dowels/m²		**7** dowels/m²	
8 dowels/m²		**9** dowels/m²	
10 dowels/m²		**12** dowels/m²	
14 dowels/m²		**16** dowels/m²	

Dowel rating online see: knauf.de/duebelrechner.

Exterior wall – board format 800 mm x 625 mm (continued)

Scheme drawings I Dimensions in mm

Dowelling flush under the mesh taking the DIN 55699:2017-08 into consideration

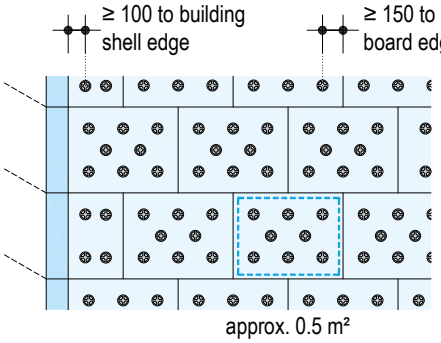
Number of dowels	Dowel arrangement on board surface	Number of dowels	Dowel arrangement on board surface
4 dowels/m²		**5** dowels/m²	
6 dowels/m²		**7** dowels/m²	
8 dowels/m²		**9** dowels/m²	
10 dowels/m²		**11** dowels/m²	
12 dowels/m²		**14** dowels/m²	

Dowel rating online see: knauf.de/duebelrechner.

Exterior wall – board format 800 mm x 625 mm (continued)

Scheme drawings I Dimensions in mm

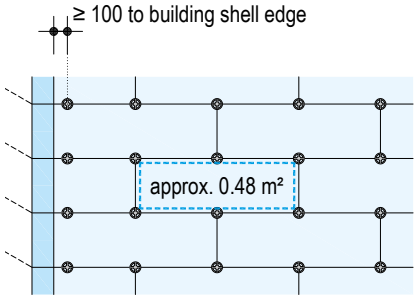
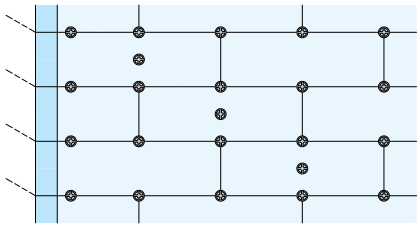
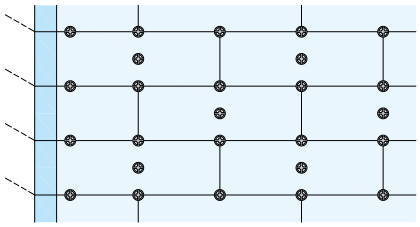
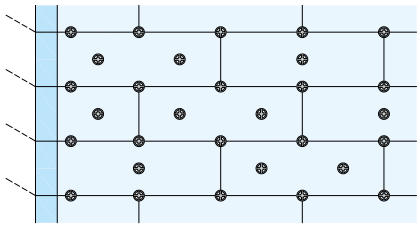
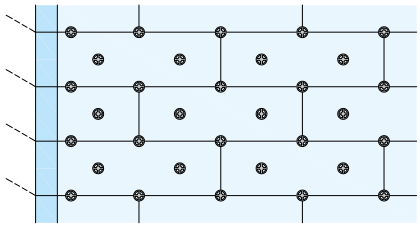
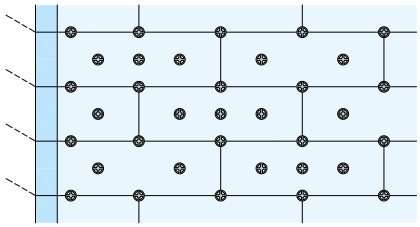
Dowelling flush under the mesh taking the DIN 55699:2017-08 into consideration

Number of dowels	Dowel arrangement on board surface
16 dowels/m²	

Exterior wall – board format 1200 mm x 400 mm

Scheme drawings I Dimensions in mm

Dowelling flush under the mesh taking the DIN 55699:2017-08 into consideration

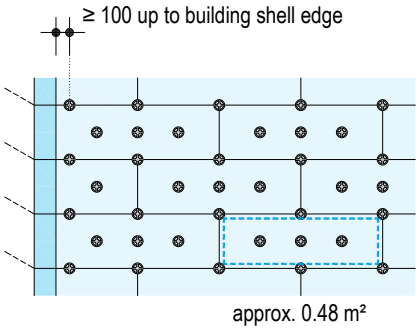
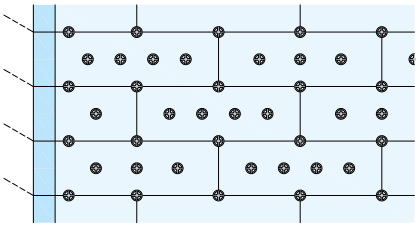
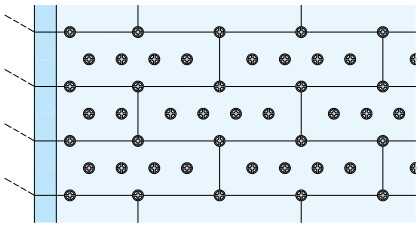
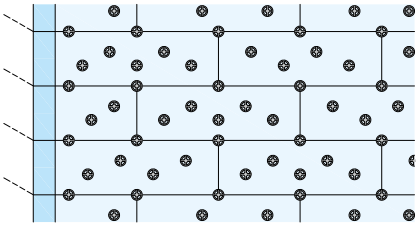
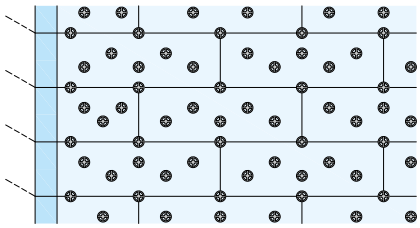
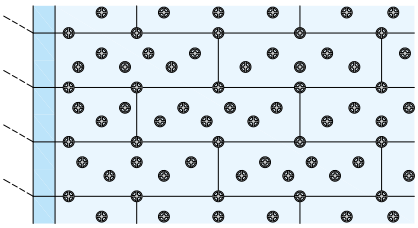
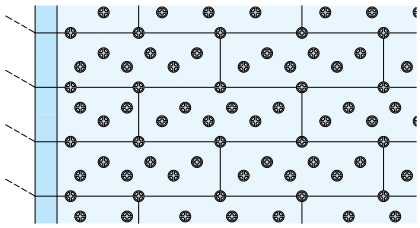
Number of dowels	Dowel arrangement on board surface and joint	Number of dowels	Dowel arrangement on board surface and joint
4 dowels/m²		**5** dowels/m²	
6 dowels/m²		**7** dowels/m²	
8 dowels/m²		**9** dowels/m²	

Dowel rating online see: knauf.de/duebelrechner.

Exterior wall – board format 1200 mm x 400 mm (continued)

Scheme drawings I Dimensions in mm

Dowelling flush under the mesh taking the DIN 55699:2017-08 into consideration

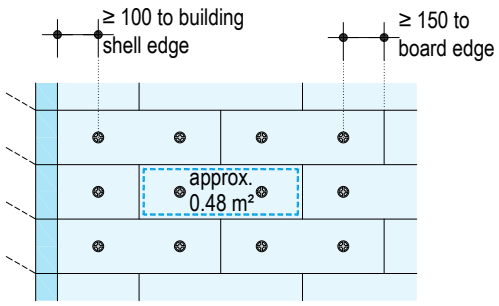
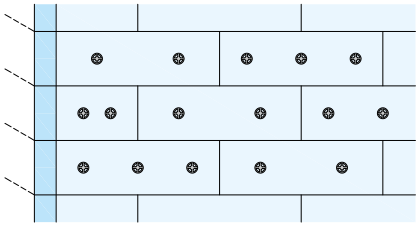
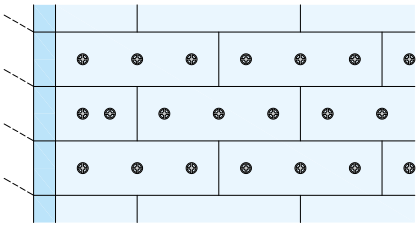
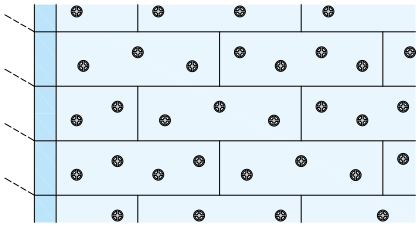
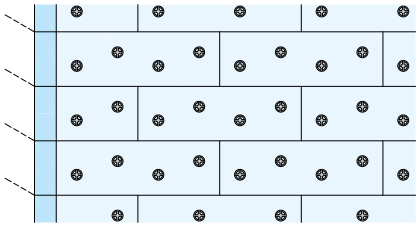
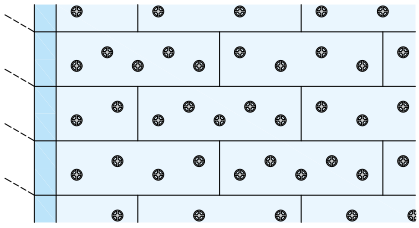
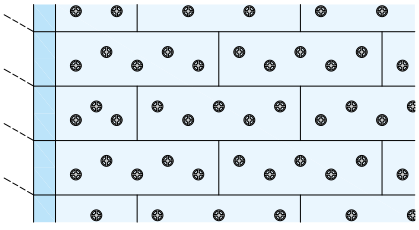
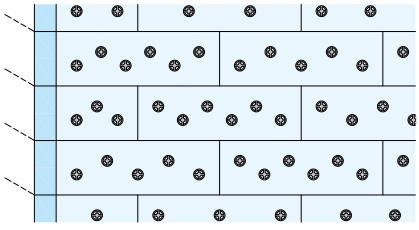
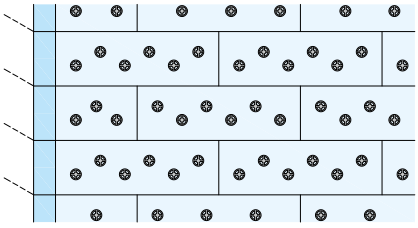
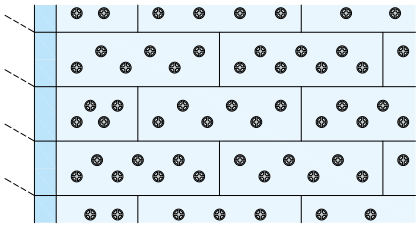
Number of dowels	Dowel arrangement on board surface and joint	Number of dowels	Dowel arrangement on board surface and joint
10 dowels/m²		**11** dowels/m²	
12 dowels/m²		**13** dowels/m²	
14 dowels/m²		**15** dowels/m²	
16 dowels/m²			

Dowel rating online see: knauf.de/duebelrechner.

Exterior wall – board format 1200 mm x 400 mm (continued)

Scheme drawings I Dimensions in mm

Dowelling flush under the mesh taking the DIN 55699:2017-08 into consideration

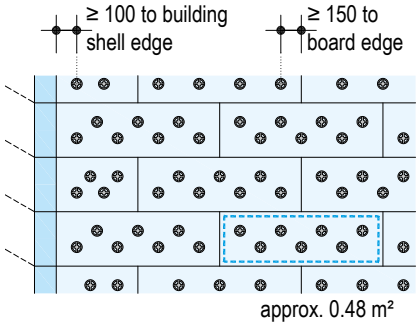
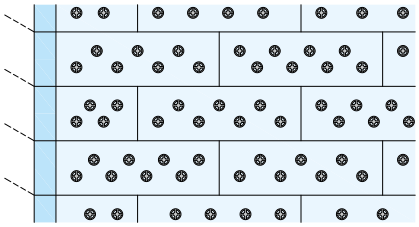
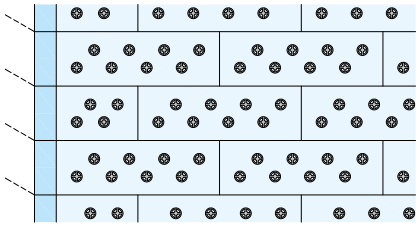
Number of dowels	Dowel arrangement on board surface	Number of dowels	Dowel arrangement on board surface
4 dowels/m²		**5** dowels/m²	
6 dowels/m²		**7** dowels/m²	
8 dowels/m²		**9** dowels/m²	
10 dowels/m²		**11** dowels/m²	
12 dowels/m²		**13** dowels/m²	

Dowel rating online see: knauf.de/duebelrechner.

Exterior wall – board format 1200 mm x 400 mm (continued)

Scheme drawings I Dimensions in mm

Dowelling flush under the mesh taking the DIN 55699:2017-08 into consideration

Number of dowels	Dowel arrangement on board surface	Number of dowels	Dowel arrangement on board surface
14 dowels/m²		**15** dowels/m²	
16 dowels/m²			

Dowel rating online see: knauf.de/duebelrechner.

Ceiling underside

Dowelling through the mesh

Number of dowels Dowels/m²	Dowel grid[1)] cm x cm
6	41 x 41
7	38 x 38
8	35 x 35
9	33 x 33
10	32 x 32
11	30 x 30
12	29 x 29
13	28 x 28
14	27 x 27

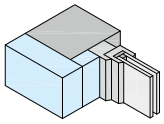
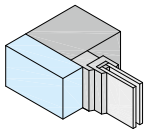
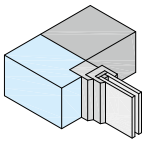
1) The grid can be adapted to rectangular spacings while observing the quantity of dowels.

Driving-rain proof window connection profiles

Selection criteria

Window connection profiles	Features	Total plaster thickness
Flexible	With shadow gap, single-part profile	6 – 12 mm
Duo G10	With shadow gap, two-part profile	6 – 15 mm
Duo G6	With shadow gap, two-part profile	6 – 12 mm
Milano	With protective lip, two-part profile	6 – 10 mm
Universal Pro	With shadow gap and integrated PUR sealing tape	6 – 12 mm
Universal-K Pro	With shadow gap and integrated PUR sealing tape for scratch render	15 – 18 mm
Roma	With shadow gap, two-part profile for roller blind guide rails	6 – 10 mm

Application

Window connection profiles	Window position in masonry									
	Centred			**Flush**			**Projected** (plasterable reveal necessary)			
										
	Maximum insulation material thickness in mm with window size									
	≤ 6 m²	**≤ 10 m²**	**≤ 15 m²**	**≤ 6 m²**	**≤ 10 m²**	**≤ 15 m²**	**≤ 2 m²**	**≤ 6 m²**	**≤ 10 m²**	**≤ 15 m²**
Flexible	200	200	–	200	200	–	100	–	–	–
Duo G10	300	300	–	300	300	–	300	300	300	–
Duo G6	300	300	–	240	240	–	240	240	240	–
Milano	300	300	–	300	300	–	300	300	300	–
Universal Pro	400	400	400	400	400	400	400	400	400	400
Universal-K Pro	200	200	200	200	200	200	200	200	200	200
Roma	300	300	–	300	300	–	300	300	300	–

Notes

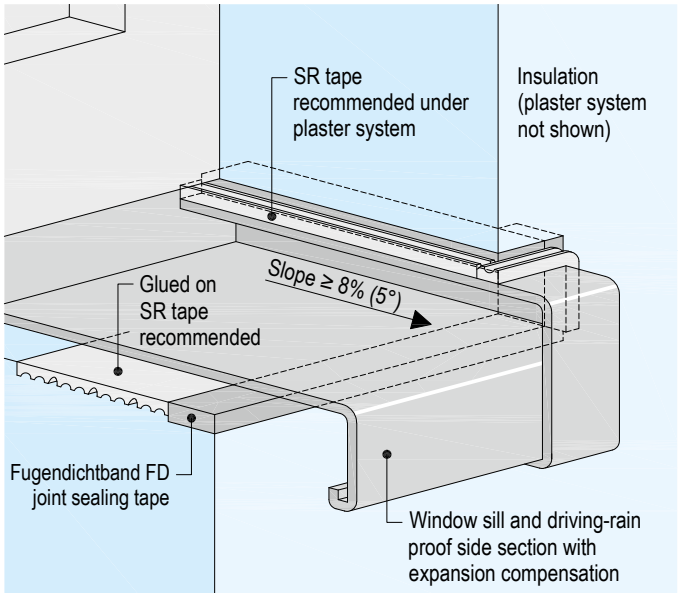
Window connection profiles are certified up to the stated insulation material thicknesses without additional joint sealing tape. For larger insulation material thickness an additional Fugendichtband FD joint sealing tape is required.

Back profile joints with Fugendichtband FD joint sealing tape. Backing for Universal Pro and Universal-K Pro is not necessary (observe the product data sheet).

In case of window connection profiles, the current code of practice from the VDPM "Ausbildung von Details mit Profilen und Fugendichtungsbändern bei Außenputz und WDVS - *Incorporation of details with profiles and joint sealing tapes with render and ETICS*" and the current window guidelines of Fachverband der Stuckateure "Anschlüsse an Fenster und Rollläden bei Putz, Wärmedämm-Verbundsystem und Trockenbau - *Connection to windows and roller blinds with render, external thermal insulation composite systems and drywalling*" (German only) must be observed in Germany.

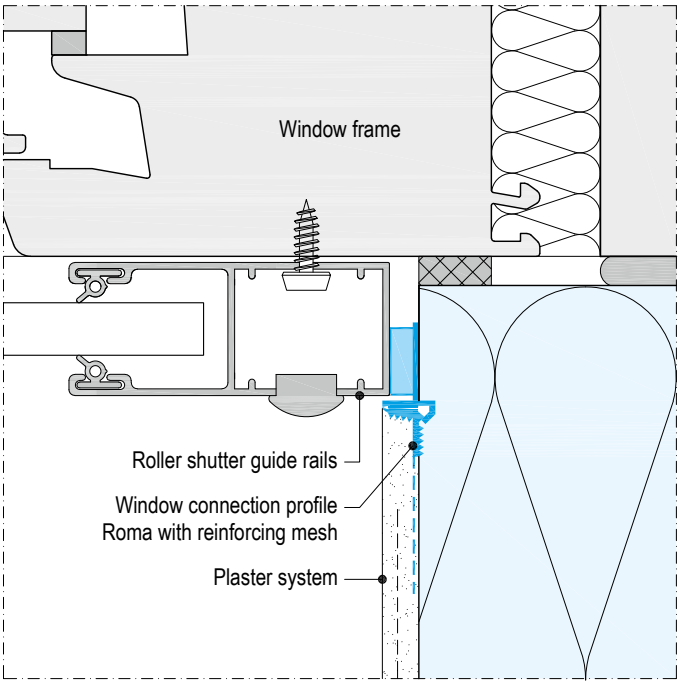
Use of adhesively bonded window connection profiles

An adhesive bonding test must be performed before the use of adhesively bonded window connection profiles. For this purpose, clean a concealed location with a clean and dry cloth (without cleaning agent). The substrate should be level, dry and dust free. Residues that can affect bonding must be removed. The temperature must be between +5 °C and +40 °C. Cut off a short section of the profile (approx. 10 cm), peel off the protective paper of the PE-Dichtband sealing tape and push the profile section firmly on. Wait 10 minutes and then tear the profile with force away from the substrate.
The self-adhesive PE-Dichtband sealing tape must on the one hand remain completely attached to the profile and on the other hand completely to the substrate (continuous foam rupture). Thus the substrate is suitable for adhesive bonding.
Should this not be the case, the window connection profile Universal Pro or Universal-K Pro with PUR sealing tape must be used.

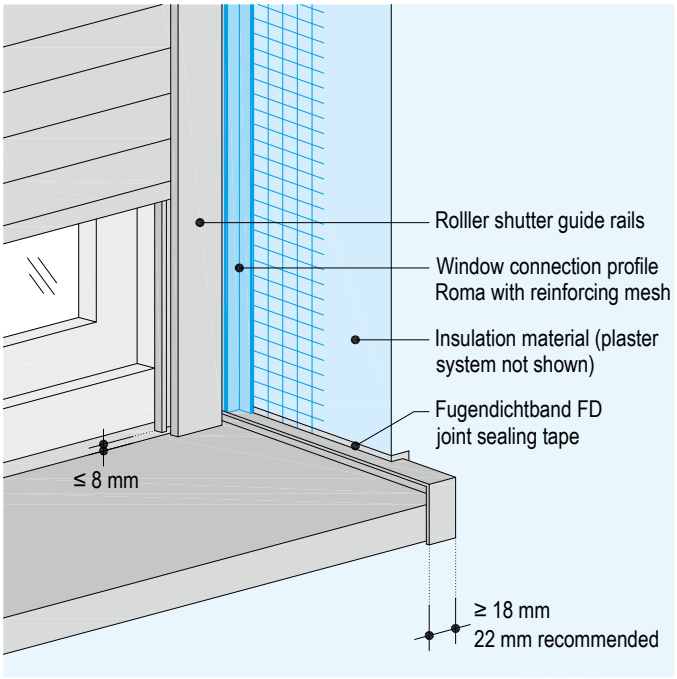


Driving-rain proof window connection profiles (continued)

Window connection with roller blind guide rails



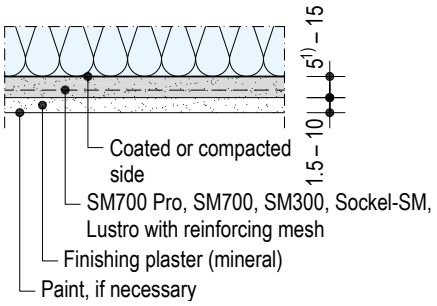
Scheme drawings



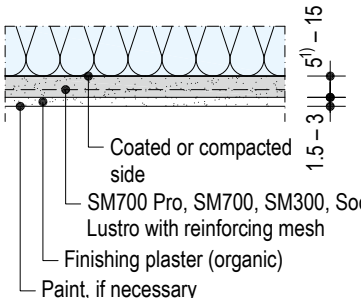
Applied render system

Dimensions in mm

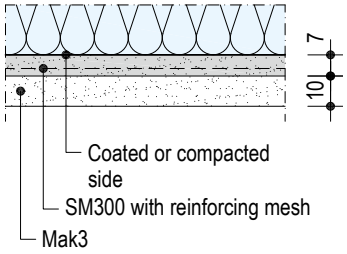
Mineral based



Mineral / organic



Scratch render



1) *Plaster system layer thickness from 4.5 mm: only on mineral wool insulation boards in conjunction with adhesive and reinforcing mortar SM300, reinforcement mesh 4x4 mm and final coats Noblo, Noblo Filz, RP 240, SP 260 Pro, Conni S, Addi S, MineralAktiv Scheibenputz floated render or MineralAktiv Scheibenputz Dry floated render*

Reinforcement layer

Façade reinforcement

System	Basecoat	Layer thickness	Reinforcing mesh	Mesh arrangement in the reinforcement layer	Mesh reinforcement joint overlap
Scratch render	SM300	7 mm	Reinforcing mesh 4x4 mm or 5x5 mm	Upper half	≥ 100 mm
Mineral based Mineral / organic	SM700 Pro	5 – 10 mm		■ Up to 4 mm: centred ■ > 4 to 7 mm: upper half ■ > 7 mm: outer third	
	SM700, SM300, Sockel-SM	5 – 7 mm			
	Lustro	5 – 15 mm (> 10 mm double-layer)			
	SM300	3 – 5 mm	Reinforcing mesh 4x4 mm		

Reinforcement layer (continued)

Reinforcement in dependence on the finishing plaster and luminosity of the final coating

Finish coat	Graining	Luminosity of the final coating					
		Siliconharz-EG-Farbe paint, Autol, Fassadol, Minerol, MineralAktiv Fassadenfarbe paint					Fassadol TSR[1]
	mm	100 to 30	29 to 25	24 to 20	19 to 15	14 to 10	< 20
Noblo Filz, SM700 Pro	1.0	●	●	●●	●●●	●●●	●●
SM700 Pro (trowel finish)	1.0	●	On request	On request	On request	On request	On request
Noblo Filz	1.5	●	●	●●	●●●	●●●	●●
Noblo	1.5	●●	●●	●●	●●●	On request	●●
Noblo	2.0 – 3.0	●	●	●	●●●	On request	●
RP 240, SP 260 Pro	2.0 – 5.0	●	●	●	●●●	On request	●
Mak3	2.0 – 3.0	●	On request	On request	On request	On request	–
Carrara	1.0	●●	●●●	On request	On request	On request	On request
MineralAktiv Scheibenputz floated render	1.5 – 3.0	●	●	●	●●●	On request	●
MineralAktiv Scheibenputz Dry floated render	2.0 – 3.0	●	●	●	●●●	On request	●
Conni S, Addi S	1.5 – 2.0	●	●	●	●●●	●●●	●
Kati S	2.0	●	●	●	●●●	●●●	●
Conni S, Addi S, Kati S	3.0	●	●	●	●●	●●●	●

1) Functionality only with at least 5 mm thicker mineral reinforcement layer and newly created white top coat possible

- ● *Single-layer mesh reinforcement*
- ●● *Double-layer mesh reinforcement*
- ●●● *Double layer mesh reinforcement only on small surfaces, larger surfaces on request*

Embed strips of reinforcement mesh or Gewebeeckwinkel Sturzecke mesh corner angle for lintel corners at the inner corners of openings (e.g. between the window reveal and window lintel) fully in the basecoat. Subsequently apply Gewebeeckwinkel mesh corner angles perpendicular and flush. Apply the reinforcement layer and level it.
Except when using the Gewebeeckwinkel Sturzecke mesh corner angle for lintel corner and extending diagonally from all opening corners Gewebeeckpfeile mesh corner arrows or approx. 300 x 500 mm strips of reinforcement mesh are embeded in the fresh mortar.
Subsequently embed Armiergewebe reinforcement mesh on the entire surface with at least a joint overlap of 100 mm fresh-in-fresh in the basecoat layer. Apply a full covering of basecoat to the mesh.
The mesh is arranged up to 4 mm basecoat thickness in the center, in case of 5 to 7 mm layer thickness in the upper half of the basecoat and at > 7 mm in the outer third.

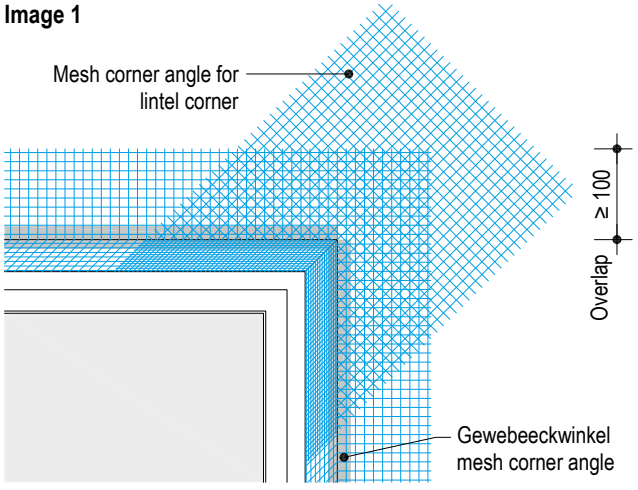
For scratch render the layer thickness of SM300 must be 7 mm. On the reinforcing mesh, apply minimum 2 to 3 mm of SM300 and after initial setting roughen the surface horizontally with a brush.

If a double reinforcement is necessary (see table above), the lower reinforcing mesh is applied with a respective overlap of approx 100 mm in the first basecoat layer of 2 to 3 mm without creases. After the basecoat layer has hardened, the second basecoat mesh is embedded in the second layer of reinforcing mesh with a joint overlap of ≥ 100 mm to the first mesh and a joint overlap of ≥ 100 mm. The position of the second mesh corresponds to the position of a simple reinforcement with a mesh. Alternatively, the second reinforcement layer can also be applied onto the fresh first reinforcement layer. For this purpose, apply of basecoat as wet plaster on wet plaster onto the first basecoat layer and apply reinforcement mesh with staggered joints. The diagonal reinforcements are embedded before the second mesh layer.

Avoid excessive smoothing of the reinforcement layer to prevent a concentration of fine particles or formation of a sinter layer on the surface. Rub off any burrs that have formed when drying.
Plaster connections should be separated from the constructional components with a separating tape, separating layer, profiles or similar.

Reinforcement of window lintel/reveal Dimensions in mm

Image 1

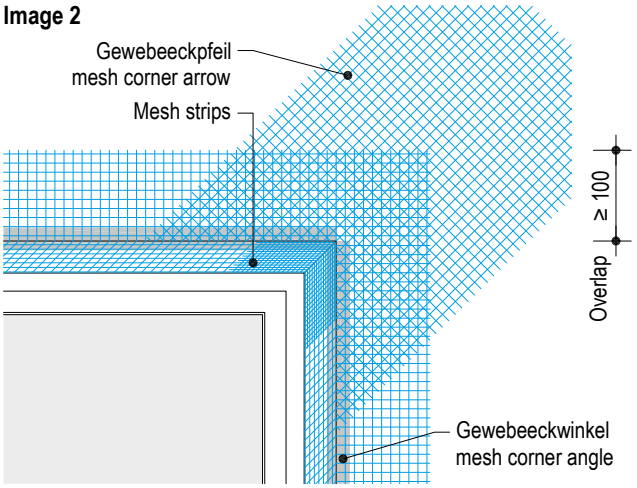


The lintel / reveal corner areas require additional Gewebeeckwinkel Sturzecke mesh corner angle reinforcement.

Reinforcement layer (continued)

Dimensions in mm

Image 2



Alternatively, the lintel/reveal corner areas can be reinforced with Gewebeeckpfeile mesh corner arrow or reinforcement mesh strips.

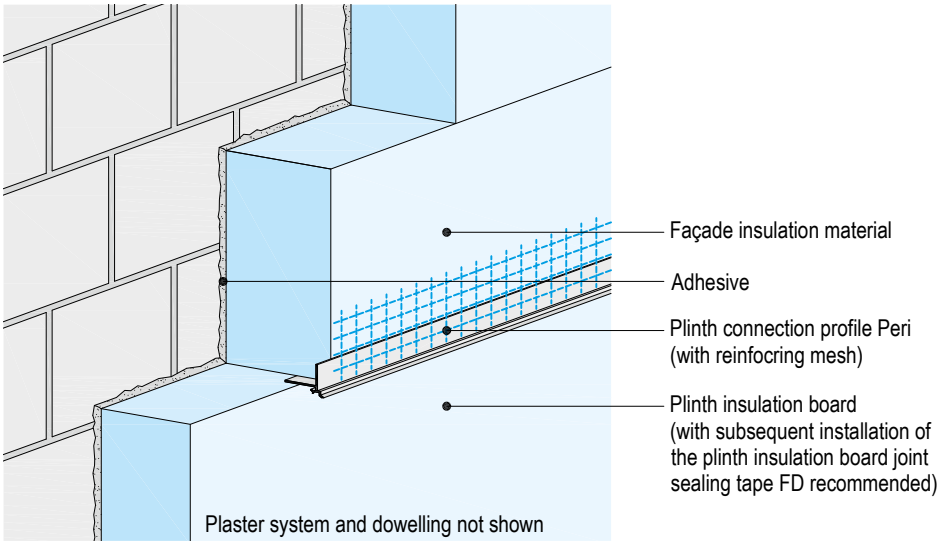
Basecoat drying time

Before application of a further coating (primer / basecoat) it is important to ensure that the surface is fully dry. The minimum drying time is generally approx. 1 day/mm layer thickness. With unfavourable weather conditions (e.g. high levels of air humidity or low temperatures) the drying time is extended, e.g. the drying time at +5 °C is around double so long. For further information please refer to the product data sheets of the subsequent coatings.

Plinth and splash water zone

Apply preferably at least 5 mm basecoat covering the full surface and embed reinforcement mesh 4x4 mm or 5x5 mm to the entire surface in the upper third of the basecoat. Joint overlap at least 100 mm.
When insulation is applied in areas contacting the soil, the reinforcement layer ends underneath the edge of the future ground line.

Thermal bridge free Peri plinth end profile



Apply the basecoat on the insulation material, push in the Peri plinth connection profile between the perimeter / plinth insulation and the façade insulation, align flush and embed the reinforcement mesh. Connect the profiles with the supplied connectors. Provide the outside corners with the appropriate mitring or use suitable corner pieces.
Constructional separation of the plinth plaster, e.g. by using a separating strip, separation cut, profile or similar. When implementing the transition between the façade insulation and the plinth insulation, driving-rain proofing must be observed. If necessary apply a Fugendichtband FD joint sealing tape.

Finish coat

Priming

Stir the contents of the container thoroughly and repeat occasionally.
In case of thin-layer mineral-based finishing coats, if required apply Quarzgrund Pro undiluted or Isogrund diluted 1:1 with clean water and apply uniformly with a roller to the entire surface or apply using a suitable spray device. For Conni, Kati and Addi, apply Quarzgrund Pro spread crosswise evenly and undiluted using a roller or brush. Avoid streaking. When applying pigmented Conni, Kati and Addi, Quarzgrund Pro pigmented in the same or similar colour shade is recommended.
Allow a drying time of at least 2 hours before applying the finishing coat with Quarzgrund Pro and at least 12 hours for Isogrund.

Plaster application

Finish coat	Layer thickness in mm
Façade	
Carrara, Noblo Filz (freely styled texture)	3 – 5
Noblo Filz	2 – 5
Noblo, SP 260 Pro, RP 240	Grain size
SM700 Pro (sponged)	3
SM700 Pro (trowel finish)	10 (average layer thickness)
SM700 Pro (freely styled texture)	3 – 10
Conni S, Addi S, Kati S	Grain size
MineralAktiv Scheibenputz MineralAktiv Scheibenputz Dry floated renders	Grain size
Mak3	10 (scratched finish)
Plinth area	
Sockel-SM Pro (sponged)[1)] Sockel-SM (sponged)[2)]	2
Butz	2

1) *Only in conjunction with Sockel-SM Pro as a basecoat. Sockel-Dicht is unnecessary in case Sockel-SM Pro is used as a render system (basecoat and finish coat) in a total thickness ≥ 7 mm.*
2) *Only in conjunction with Sockel-SM as a basecoat*

Required water quantity and mixing the mortar in acc. with the current product data sheet.
Check the containers before use to ensure that the colour shades are correct. When applying a shaded finish coat, ensure that the batch numbers are the same or only mix sufficient render required to finish a full rendered surface.
Slight differences in colour hues can occur due to the use of natural aggregates. When reordering, always state the consignment number of the previous delivery.
Ensure uniform grain distribution.
The type of tool used influences the surface roughness and it is therefore essential to use the same tool for a consistent finish.
Ensure that there are sufficient workers available on every scaffolding level to avoid bothersome structural effects. Work quickly fresh in fresh and do not rework hardened surfaces. Avoid interruptions when working on continuous surfaces and always complete the work on self-contained surfaces.
Observe Code of Practice no. 26 “Farbveränderungen von Beschichtungen im Außenbereich - *Colour changes in exterior coatings*” of the Bundesausschuss Farbe und Sachwertschutz (Federal Paint and Property Protection Committee).
Plaster connections should be separated from the constructional components with a separating tape, separating layer, profiles or similar.

Carrara
Apply / spray an approx. 5 mm (at least 3 mm on recesses) layer of Carrara onto a continuous surface and spread flush with a straight edge or finish trowel and texture it immediately using the required tool (sponge, trowel, brush, roller, etc.)

Noblo Filz
Apply a fully covering coat of Noblo Filz in grain thickness, allow to dry and then apply a second coat in grain thickness, and immediately sponge / felt, without using water. Apply approx. 3 to 5 mm for free textures, spread flush and texture immediately with the required tool.

Noblo, SP 260 Pro, RP 240
Apply the render with a stainless steel finishing trowel or trowel, spread flush in grain size and texture immediately as required using a suitable tool.

SM700 Pro
For sponged surfaces, SM700 Pro is applied in a layer thickness of approx. 3 mm on the basecoat. The drying time of the basecoat can be reduced to 1 day if the basecoat layer is applied with SM700 Pro. Start sponging or free texturing with initial setting of the SM700 Pro.
For surfaces with a trowel finish, apply SM700 Pro in an average layer thickness of 10 mm and create the surface.
For surfaces with a broom finish, apply approx. 3 mm SM700 Pro, level and use a texturing broom and pull a single stroke through the wet / damp surface.

MineralAktiv Scheibenputz MineralAktiv Scheibenputz Dry floated renders
Knauf MineralAktiv Scheibenputz floated render is applied over the entire surface in grain thickness with a stainless steel trowel, and directly after application it is worked uniformly and without interruption to the desired texture using a hard plastic trowel. A sponge rubber float produces a coarser more rustic texture finish.

Conni S, Addi S, Kati S
Ready-to-use, paste-like final coat must be mixed thoroughly. When necessary, a small quantity of water may be added to set the application consistence. Apply Conni S, Addi S or Kati S (floated render texture) with a stainless steel trowel in grain size to the entire surface and trowel smooth with circular movements without interruption using a hard plastic trowel.

Mak3
Apply the scratch render layer of approx. 13 or 14 mm by machine (application by hand only on small surfaces), level with the notched scraper and smoothen with the wide spatula and consolidate (danger of trapped air bubbles). When initial setting commences, possible on the same day but usually on the following day, scratch in circular motions and remove small unevenness's with the scraper. The optimum scratch time is when the grain cracks when scratched. Working the scratch render prematurely will result in a dark colour shade and undefined texture.

Plinth and splash water zone

Apply a primer to suit the selected top coat, observe the required drying times. Apply plinth renders, e.g. Sockel-SM Pro or Sockel-SM on the following day on the system-compatible reinforcement layer and sponge.

Sockel-SM
After the top coat in the area contacting the soil has dried, apply moisture protection. For this purpose, Sockel-Dicht is applied in two layers at a minimum thickness of 2.5 mm, commencing with the building sealing (overlapping by approx. 50 mm to 100 mm) up to at least 50 mm above the

Final coat (continued)

edge of the ground line over the perimeter insulation boards / plinth insulation boards and the subsequent finish coat.

Sockel-SM Pro

When applying the Sockel-SM Pro render system in a total layer thickness (basecoat and finish coat) of at least 7 mm, additional moisture protection with Sockel-Dicht is unnecessary.

Butz

Allow a drying time of at least 2 hours before applying Butz on Quarzgrund Pro. Mix the contents of the container well, apply using a stainless steel trowel slightly thicker than the grain size and level in one direction.

Mechanical protection in the plinth area

As protection for the plinth in the area contacting the soil against mechanical influences of the soil or gravel bed, use of a fleece laminated dimpled sheet up to the edge of the ground line is recommended.

Coats

Priming

The appropriate primer for a façade paint can be found in the product data sheets.

Façade paint

Use a trial coat to ensure the colour shade is correct. Never apply the content from different buckets together on a common wall. Mix the contents together in a clean bucket beforehand. Stir the contents of the bucket thoroughly.

The application consistence can be modified in acc. with the product data sheet.

Apply a thin and even paint coat crosswise without joints on the fully hardened and dried final coat.

Always complete surfaces that can be viewed together on the same day.

Notes	All the products listed here are formulated, so that a preventative and retarding action against soiling is in effect. Permanent protection against soiling caused by microorganisms such as algae and fungus cannot be guaranteed. The susceptibility depends on the local and environmental conditions. Loss of the technical function of the finish coat and/or the paint coat due to fouling of the surface with mould and mildew is practically excluded. Observe the “Leitfaden zu Prüfpflichten bei Anlieferung von Tönware im Rahmen der Untersuchungs- und Rügepflicht (§ 377 HGB) - *Guideline on the duties of care for the delivery of crockery with the duty to examine and provide notice of defects (§ 377 German civil code)*”, (German only) see also vdpm.info/services/downloads/leitfaden. See code of practice “Equalization coats on finishing plasters – colour shade equalization coating” (German only), see also vdpm.info/services/downloads/broschueren-und-merkblaetter.

Maintenance

Maintenance of the façade surface should be performed at regular intervals taking the size, architecture and location into consideration.
Maintenance is understood to mean cleaning, painting or, if required, renewing of connections (maintenance joints) on the intact External Thermal Insulation Composite Systems (ETICS). It is necessary to undertake corrective measures as quickly as possible if a maintenance issue is identified in order to assure the ETICS service life and protect the visual appearance. We generally recommend consulting experienced and qualified specialist companies if a maintenance issue is identified.

Plaster surfaces

An assessment of the plaster surfaces should be carried out on the basis of the stipulations in the DIN 18550-1. In every case, the driving rain-proofing of the masonry and the permanent weathering resistance of the overall system must be assured.

Inspect for	Technical instructions and measures
Soiling	Clean using a high-pressure water jet (water temperature below +60 °C, observe the regional wastewater discharge regulations) and if required, apply a new coat of paint to the façade with a system-conform paint once sufficiently dry.
Microbiological growth (e.g. algae, mould)	Clean using a high-pressure water jet (water temperature below +60 °C, observe the regional wastewater discharge regulations), apply Algizid (ready-to-use remediation solution) and if required, apply a new coat of paint to the façade with a system-conform paint once sufficiently dry.
Sealing of elastic connections (windows, doors, expansion joints, façade penetrations)	Joints applied with permanently-elastic materials are maintenance joints and should be inspected and replaced at regular intervals, if required, or sealed to repel moisture.
Mechanical damage	Fill with equivalent insulation materials, reapply the render including the reinforcement mesh, and if necessary, apply a new coat of paint with a system-conform paint. Repairs to small areas and spots may stand out visually from the rest of the surface. Differences in texture and colour of the finishing coat may be visible.

Material requirement without allowance for loss and waste

Plinth	Façade	System components	Comment	Unit	Quantity as average value WE112a.de Mineral based	WE112b.de Mineral / organic	WE112c.de Scratch render
Bonding layer per m², e.g. on bituminous damp-proof membrane							
●[1]		Sockel-Dicht	Full surface application	kg	3.8		
Adhesive per m²					(40 % – 100 % adhesive area ratio)		
●	●	SM300	Max. layer thickness 5 mm	kg	3.1 – 7.7		
●	●	SM700 Pro		kg	2.9 – 7.1		
●	●	SM700		kg	2.8 – 6.9		
●	●	Sockel-SM		kg	4.0 – 8.0		
●[2]		Sockel-SM Pro		kg	4.0 – 8.0		
●	●	Duo-Kleber adhesive		kg	2.7 – 6.8		
	●	Lustro		kg	1.8 – 4.4		
Insulation material per m²							
●		Plinth insulation panel	Insulation material thickness: → Integration into the soil: Up to 200 mm → Up to 3 m > 200 mm → Up to 0.5 m	m²	1		
	●	MW Volamit 040	Thickness 60 – 400 mm	m²	1		
	●	MW Wolle 035	Thickness 60 – 400 mm	m²	1		
	●	MW Wolle 035 plus	Thickness 60 – 400 mm	m²	1		
	●	MW Wolle 035 plus L	Thickness 60 – 200 mm	m²	1		
	●	MW Wolle 035 plus M2	Thickness 60 – 340 mm	m²	1		
Plinth connection per m					Only with recessed plinth		
	●	Plinth connection profile	Projection of 30 to 300 mm	m/m	1		
	●	Plinth profile	Plinth profile with drip edge and reinforcement mesh for layer thicknesses 6 mm, 10 mm or 14 mm	m/m	1		
	●	Assembly kit plinth end profiles	Fasteners	Set/m	0.04		
	●	Peri plinth end profile	For layer thicknesses 3 mm, 7 mm or 17 mm	m/m	1		
Dowels per m² façade insulation[3]							
●	●	Schlagdübel CNplus 8 insulation anchor nail	Anchoring depth s ≥ 35 mm, ≥ 55 mm for categories D and E	≥ 4 pcs	Number of dowels[3] dependent on the wind load, see tables page 21 to 30		
●	●	Schraubdübel STR U 2G dowel	Anchoring depth s ≥ 25 mm, ≥ 65 mm for category E				
●	●	Schraubdübel HTR-P/HTR-M dowels	Anchoring depth s ≥ 25 mm, ≥ 45 mm for category E				
●	●	Termoz SV II Ecotwist	Anchoring depth s ≥ 35 mm for categories A, B, C, D and E				
	●	STR - Rondelle MW dowel plate	Rondelle (dowel plates) made of mineral wool for recessed dowel installation when using Schraubdübel STR U 2G dowels				
●		STR Rondelle EPS dowel plate	Rondelle made of EPS for recessed dowel fitting of plinth insulation panels				

1) When bonding on bituminous waterproofing apply Sockel-Dicht as a bonding layer, in case Sockel-SM Pro is not used.

2) When using Sockel-SM Pro as an adhesive, a bonding layer with Sockel-Dicht is not required on bituminous sealants.

3) Plinth insulation boards that are glued onto waterproofing of buildings, are dowelled constructively with 2 dowels / board from a height of 150 mm above the edge of the ground line.

Material requirement without allowance for loss and waste (continued)

Plinth	Façade	System components	Comment	Unit	Quantity as average value WE112a.de Mineral based	WE112b.de Mineral / organic	WE112c.de Scratch render
Dowels per m² façade insulation							
	●	Dübelteller VT 2G dowel plate	In combination with Schraubdübel STR U 2G dowel	≥ 4 pcs	Number of fasteners dependent on the wind load, see tables on pages 21 to 30		
	●	Dübelteller DT 90 dowel plate	In combination with Schlagdübel CNplus 8 insulation anchor nail				
	●	Dübelteller HDT 90 dowel plate	In combination with Schraubdübel HTR-P/HTR-M dowels				
	●	Dübelteller SBL 140 plus dowel plate	In combination with Schraubdübel STR U 2G dowel (for fixing MW Volamit 040)				
	●	Dübelteller DT 140 dowel plate	In combination with Schlagdübel CNplus 8 insulation anchor nails (for fixing MW Volamit 040)				
	●	Dübelteller HDT 140 dowel plate	In combination with Schraubdübel HTR-P/HTR-M dowels (for fixing MW Volamit 040)				
Basecoat per m²							
●	●	SM300	Layer thickness 3 – 5 mm[1], 5 – 7 mm, 7 mm with scratch render	kg	4.5 – 10.5	4.5 – 10.5	10.5
●	●	SM700 Pro	Layer thickness 5 – 10 mm	kg	7.0 – 13.0	7.0 – 13.0	–
●	●	SM700	Layer thickness 5 – 7 mm	kg	7.0 – 10.0	7.0 – 10.0	–
●	●	Sockel-SM	Layer thickness 5 – 7 mm	kg	7.0 – 10.0	7.0 – 10.0	–
●[2]		Sockel-SM Pro	Layer thickness 5 mm	kg	8.0	8.0	–
	●	Lustro	Layer thickness 5 – 15 mm (> 10 mm double-layer)	kg	4.3 – 13.0	4.3 – 13.0	–
Reinforcement mesh per m²							
●	●	Reinforcing mesh 4x4 mm	100 mm joint overlap	m²	1.1	1.1	1.1
●	●	Reinforcing mesh 5x5 mm		m²	1.1	1.1	1.1
Primer per m²							
●	●	Isogrund (recommended)	Diluted: 1:1 with water	kg	(0.1)	–	–
●	●	Quarzgrund Pro[3]	Undiluted	kg	0.17	0.17	–
Finishing coat per m²							
		SM700 Pro **Grain size**					
●	●	Sponged 1.0 mm	Layer thickness 3 mm	kg	4.2	–	–
		Trowel finish 1.0 mm	Average layer thickness 10 mm	kg	14.0	–	–
		Freely styled texture 1.0 mm	Layer thickness 4– 10 mm	kg	4.2 – 14.0	–	–
●	●	SP 260 Pro 2.0 mm	Layer thickness 2 mm	kg	3.2	–	–
		3.0 mm	Layer thickness 3 mm	kg	3.4	–	–
		5.0 mm	Layer thickness 5 mm	kg	5.0	–	–

1) *Plaster system layer thickness from 4.5 mm: only on mineral wool insulation boards in conjunction with adhesive and reinforcing mortar SM300, reinforcement mesh 4x4 mm and final coats Noblo, Noblo Filz, RP 240, SP 260 Pro, Conni S, Addi S, MineralAktiv Scheibenputz floated render or MineralAktiv Scheibenputz Dry floated render*

2) *In conjunction with Sockel-SM Pro as a finish coat. In case of total thickness ≥ 7 mm, moisture protection with Sockel-Dicht is unnecessary.*

3) *For a coloured finishing coat Quarzgrund Pro in the same colour shade is recommended.*

Material requirement without allowance for loss and waste (continued)

Plinth	Façade	System components		Comment	Unit	Quantity as average value WE112a.de Mineral based	WE112b.de Mineral / organic	WE112c.de Scratch render
Finishing coat per m²								
			Grain size					
•	•	RP 240	2.0 mm	Layer thickness 2 mm	kg	3.1	–	–
			3.0 mm	Layer thickness 3 mm	kg	3.8	–	–
			5.0 mm	Layer thickness 5 mm	kg	5.0	–	–
•	•	Noblo	1.5 mm[1)]	Layer thickness 1.5 mm	kg	2.3	–	–
			2.0 mm	Layer thickness 2 mm	kg	3.0	–	–
			3.0 mm	Layer thickness 3 mm	kg	3.7	–	–
•	•	Noblo Filz	1.0 mm	Layer thickness 2 mm	kg	3.2	–	–
			1.5 mm	Layer thickness 3 mm	kg	4.6	–	–
•	•	Carrara	1.0 mm[1)]	Layer thickness 3 – 5 mm	kg	3.8 – 6.5	–	–
•	•	MineralAktiv Scheibenputz floated render	1.5 mm	Layer thickness 1.5 mm	kg	2.4	–	–
			2.0 mm	Layer thickness 2 mm	kg	3.2	–	–
			3.0 mm	Layer thickness 3 mm	kg	4.2	–	–
•	•	MineralAktiv Scheibenputz Dry floated render	2.0 mm	Layer thickness 2 mm	kg	2.4	–	–
			3.0 mm	Layer thickness 3 mm	kg	3.4	–	–
•	•	Conni S	1.5 mm	Layer thickness 1.5 mm	kg	–	2.2	–
			2.0 mm	Layer thickness 2 mm	kg	–	2.8	–
			3.0 mm	Layer thickness 3 mm	kg	–	3.7	–
•	•	Addi S	1.5 mm	Layer thickness 1.5 mm	kg	–	2.2	–
			2.0 mm	Layer thickness 2 mm	kg	–	2.8	–
			3.0 mm	Layer thickness 3 mm	kg	–	3.7	–
•	•	Kati S	2.0 mm	Layer thickness 2 mm	kg	–	3.0	–
			3.0 mm	Layer thickness 3 mm	kg	–	3.8	–
	•	Mak3	2.0 mm	Layer thickness unscratched: 12 mm	kg	–	–	22.0[2)]
			3.0 mm	layer thickness unscratched: 13 mm	kg	–	–	23.0[2)]
•[3)]		Sockel SM Pro (sponged)	1.0 mm	Layer thickness 2 mm	kg	3.0	–	–
•[4)]		Sockel SM (sponged)	1.0 mm	Layer thickness 2 mm	kg	3.0	–	–
•		Butz	2.0 mm	Layer thickness 2 mm	kg	–	4.5	–
Moisture protection per m²								
•		Sockel-Dicht		Layer thickness min. 2.5 mm (two coats)	kg	3.8	3.8	3.8
Coat per m²								
•	•	Siliconharz-EG-Farbe		Single coat[5)]	l	0.17 – 0.22	0.17 – 0.22	–
•	•	Autol		Double coat	l	0.25 – 0.40	0.25 – 0.40	–
•	•	Fassadol		Double coat	l	0.30 – 0.45	0.30 – 0.45	–
•	•	Fassadol TSR[6)]		Double coat	l	0.35 – 0.45	0.35 – 0.45	–
•	•	Minerol		Double coat	l	0.25 – 0.40	0.25 – 0.40[7)]	–
•	•	MineralAktiv Fassadenfarbe paint		Double coat	l	0.28 – 0.40	0.28 – 0.40	–

1) *Additional mesh layer in basecoat is recommended*
2) *Suitable impregnation is recommended in exposed locations and in the vicinity of waterbodies.*
3) *Only in conjunction with Sockel-SM Pro as a basecoat*
4) *Only in conjunction with Sockel-SM as a basecoat*
5) *Recommendation: Double coat for enhanced weather-proofing (see "Code of Practice No. 9 - Coatings on mineral renders" from the Bundesausschuss Farbe und Sachwertschutz)*
6) *Functionality only with at least 5 mm thicker mineral reinforcement layer and newly created white top coat possible*
7) *Can only be used on Kati S.*

Information on Sustainability

Knauf WARM WALL Plus

Information on the sustainability of Knauf WARM WALL Plus

Building assessment systems ensure the sustainable quality of buildings and constructional structures by a detailed assessment of ecological, economic, social, functional and technical aspects.

In Germany, the following certification systems are of particular relevance:

- DGNB system
  Deutsches Gütesiegel Nachhaltiges Bauen der DGNB (*German association for environmentally sustainable building*)
- BNB
  (Quality rating system for environmentally sustainable building)
- LEED
  (Leadership in Energy and Environmental Design).

Knauf WARM WALL systems can positively influence many of these criteria.

DGNB/BNB

Ecological quality

- Criterion: Total primary energy requirement
  Reduction of the building energy requirement over the entire lifecycle due to efficient WARM WALL systems

Economic quality

- Criterion: Building related life-cycle costs
  Reduction of the operating costs due to cost-effective WARM WALL systems

Sociocultural and functional quality

- Criterion: Thermal comfort in summer or winter
  Cozy room climate with WARM WALL systems

Technical quality

- Criterion: Premium quality thermal and moisture protection for the building shell
  With WARM WALL systems significantly exceeding the GEG (German Buildings Energy Act) requirements

LEED

Materials and resources

- Credit: Regional materials
  Availability depending on location of building. Information on request

Videos for Knauf systems and products can be found under the following link:
youtube.com/knauf

Find the right systems for your requirements!
knauf.de/systemfinder

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The stated constructional and structural design specifications and characteristics of building physics of Knauf systems can only be ensured with the exclusive use of Knauf system components, or other products expressly recommended by Knauf.