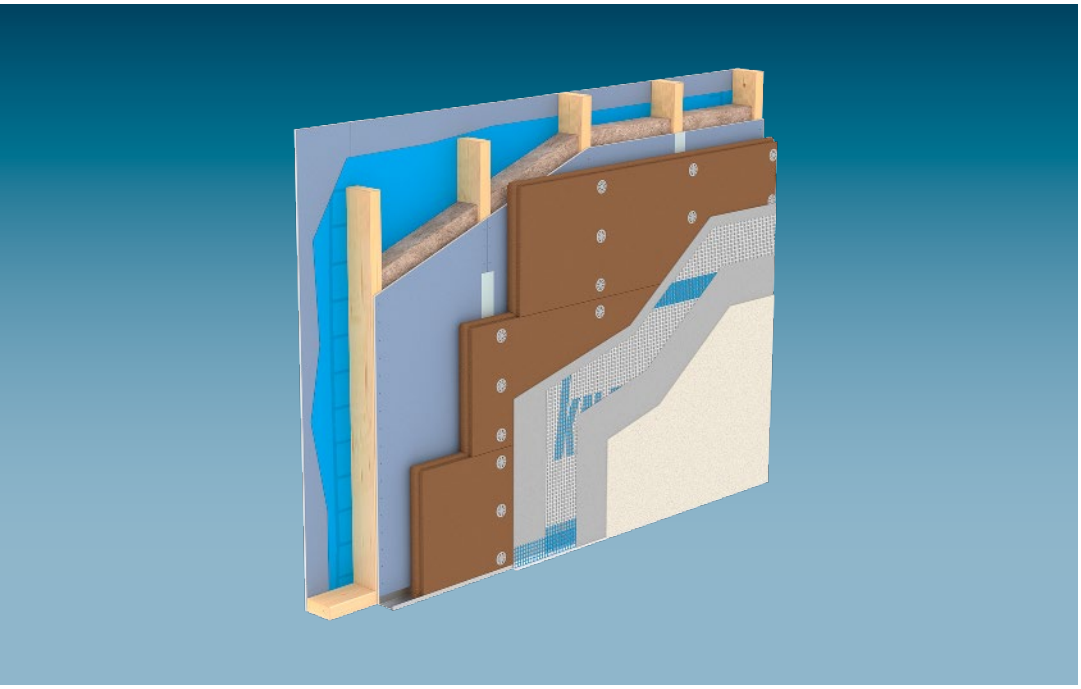


Plaster and Façade Systems

WE203D.de

System Data Sheet 2021-06

Knauf WARM WALL Natur D in Timber Construction ETICS Systems with Wood Fibre Insulation Boards

WE203Da.de – With mineral-based render system

WE203Db.de – With mineral-based / organic-based 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 wood fibre insulation panels
  - Knauf WARM WALL Natur S in Timber Construction P336.de
  - Knauf WARM WALL Natur T in Timber Construction P335.de
- Knauf structural wood frame walls W55.de

Product data sheets

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

Symbols in the system data sheet

The following symbols are used in this document:

Insulation layers

G Mineral wool insulation layer acc. to DIN EN 13162
Non-combustible
(e.g. Knauf Insulation MineralPlus HB 034 or equivalent)

S Mineral wool insulation layer acc. to DIN EN 13162
Non-combustible
Melting point ≥ 1000 °C acc. to DIN 4102-17
(e.g. Knauf Insulation Klemmplatte clamping plate KP-035/HB or equivalent)

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.

For design of timber structures, see EN 1995-1-1 in conjunction with EN 1995-1-1/NA.

To avoid thermal bridges, see DIN 4108 amendment 2.

Freedom from condensation: The assessment of the freedom from condensation (hygrothermal performance) shall be performed in accordance with DIN 4108-3 or EN 15026. A vapour retarder is required on the interior in accordance with the building physics ratings.

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 must be assured before installation of ETICS. The proof must include all loadbearing and associated positioned elements.

It is essential to ensure that the construction is airtight. Refer to DIN 4108-7 as well as the guideline “Ausführung luftdichter Konstruktionen und Anschlüsse - *Implementing airtight constructions and connections* (German only)” issued by the Fachverband der Stuckateure für Ausbau und Fassade Baden-Württemberg, Germany.

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

Before the application of a plastering system we recommend use of a handover certificate for the transfer of the site to another trade.

Terms

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. The use of moisture resistant insulation panels is recommended in this area. 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 as well as the DIN 68800-2.

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

- EPS: Expanded polystyrene
- GEG: German Buildings Energy Act
- ETICS: External thermal insulation composite system

Notes on fire resistance:

In this system data sheet, the fire resistance issue is not considered in the detail features represented unless explicitly stated.

Certificates of Usability

Knauf System	Usability	Fire resistance
Knauf WARM WALL Natur D	Z-33.47-638	
W551.de Knauf structural wood frame panel construction exterior wall, Knauf WARM WALL Natur D	Rated acc. to EN 1995-1-1 in conjunction with EN 1995-1-1/NA	AbP P-SAC-02/III-668

The stated constructional and structural properties and characteristic building physics of Knauf systems can solely be ensured with the exclusive use of Knauf system components, or other products expressly recommended by Knauf. The validity and up-to-datedness of the stated proofs have to be considered.

Notes on fire resistance

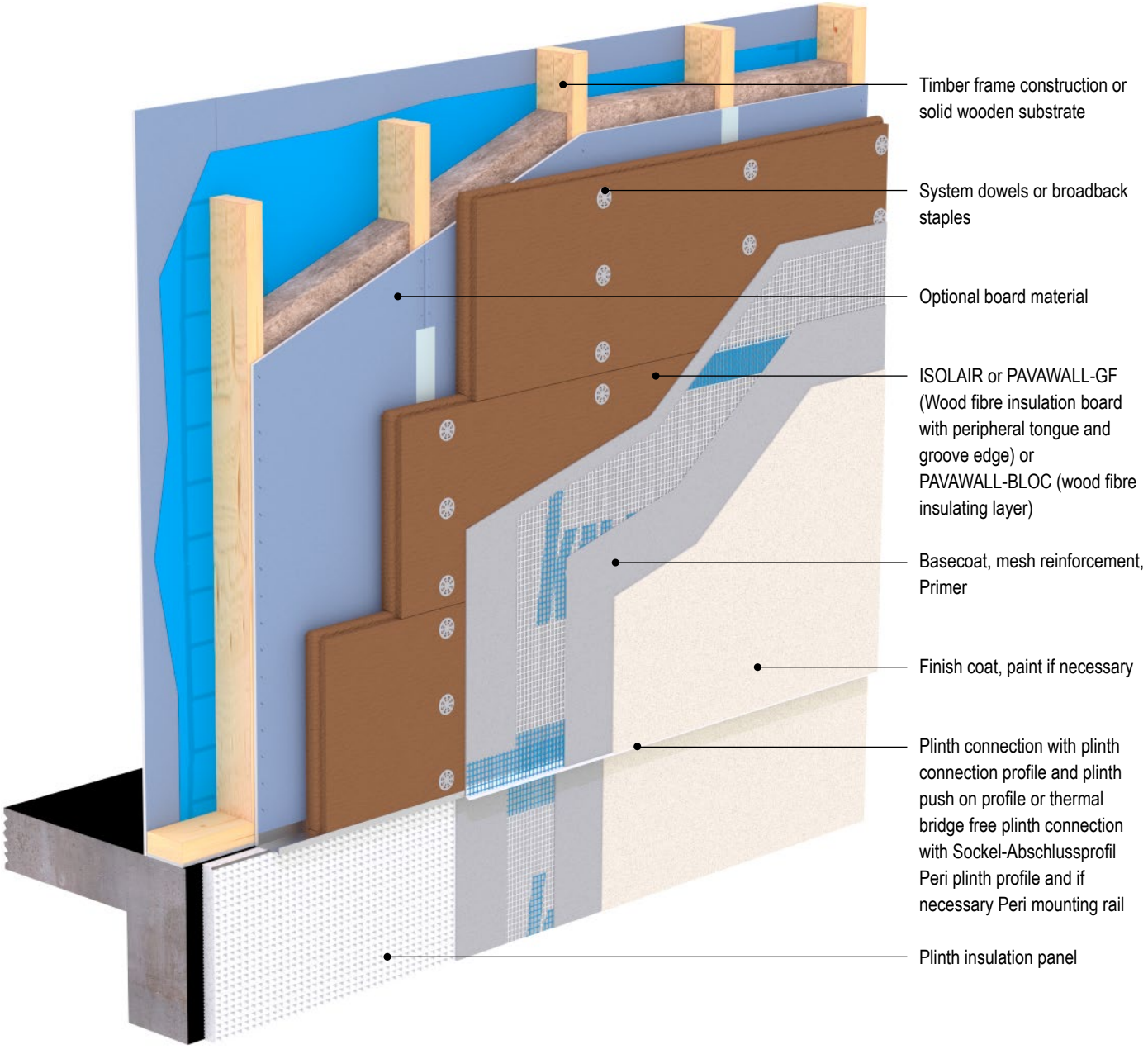
The specifications marked with plus offer additional application options, which are not directly included in the Certificate of Usability. On the basis of our technical assessments, we assume that these marked design solutions can be assessed as a non-significant divergence. We can make the documentation on which this assessment is based, such as surveyors' reports or technical assessments, available to you together with the Certificate of Usability on request. We recommend that a non-significant divergence be coordinated and authorised in advance in consultation between the persons responsible for fire resistance and/or the relevant authorities.

WARM WALL Natur D – The naturally insulated façade in timber construction

Knauf WARM WALL Natur D – The Natural Insulation Façade in Timber Construction – is a building authority approved external thermal insulation composite system (ETICS) in timber construction made of ecological wood fibre façade boards (directly clad or on board material), manufactured according to EN 13171. The peripheral tongue and groove edge type of the ISOLAIR and PAVAWALL-GF façade boards prevent heat losses in the joint area and guarantee a safe and fast insulation board bond with a flat surface. WARM WALL Natur D can be utilized up to building class 3 without any special measures. The system can also be applied for other building classes when fire protection concepts are taken into consideration.

Properties

- ETICS reaction to fire: flammable (building material class B2), see table on page 16
- Highly permeable as well as good regulation of moisture
- High heat storage capacity for protection against summer heat
- Very good sound insulation characteristics
- Insulation material thickness: permissible up to maximum 240 mm



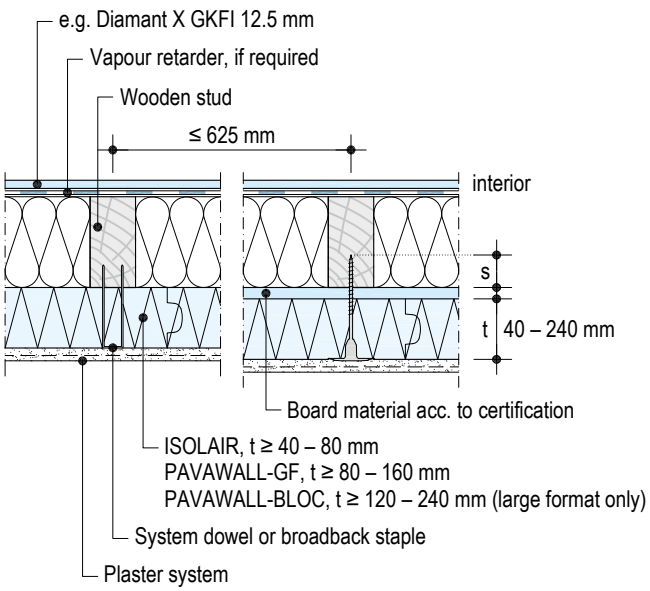
System overview

Knauf System	WE203Da.de WARM WALL Natur D Mineral	WE203Db.de WARM WALL Natur D Mineral / organic
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.
Reaction to fire/building material class ETICS	Flammable B2 (see page 16)	
Maximum total insulating material thickness t	240 mm	
Render system layer thickness (reinforcement layer and finish coat)	8.5 – 15 mm	8.5 – 13 mm
Façade		
Insulation materials WF	ISOLAIR, PAVAWALL-BLOC, PAVAWALL-GF, PAVATHERM (PAVATHERM used as the first layer with a two-layer application on a solid timber substrate)	
Fasteners	Schraubdübel STR H dowels, Schraubdübel 6H dowels, broadback staples (steel staples $w_r \geq 27.5$ mm wide, $d_n \geq 1.8$ mm, $l_n \geq 75$ mm, anchoring depth min. 30 mm, made of stainless steel acc. to EN 14592)	
Basecoat	SM700 Pro, SM300, Luis	
Reinforcing mesh	4 x 4 mm, 5 x 5 mm	
Primer	Isogrund (recommended)	Quarzgrund pro
Finish coat	SM700 Pro SP 260 Pro, RP 240 Noblo, Noblo Filz MineralAktiv Scheibenputz floated render	Conni S Addi S Kati S
Coats	Siliconharz-EG-Farbe paint[1)] Autol Minerol MineralAktiv Fassadenfarbe paint	Siliconharz-EG-Farbe paint[1)] Autol Minerol (only on Kati S) MineralAktiv Fassadenfarbe paint
Plinth / splash water area		
Adhesive	Sockel-SM Pro or Sockel-SM, SM700 Pro, Luis	
Insulation material	Sockeldämmplatte 032, Sockeldämmplatte 035	
Plinth connection (with recessed plinth)	Sockel-Abschlussprofil Peri plinth profile (free of thermal bridges) and if necessary Peri installation rail, plinth profile and push on plinth profile	
Basecoat	Sockel-SM Pro or Sockel-SM, SM700 Pro, SM300, Luis	
Mesh reinforcement, primer, finish coat and decorative coat	As with façade, 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) Coat with Siliconharz-EG-Farbe paint always required with application on board materials.

System variants

New constructions – Wooden frame constructions

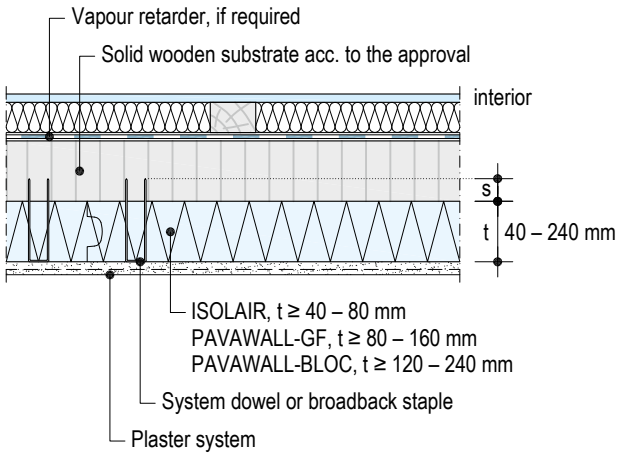
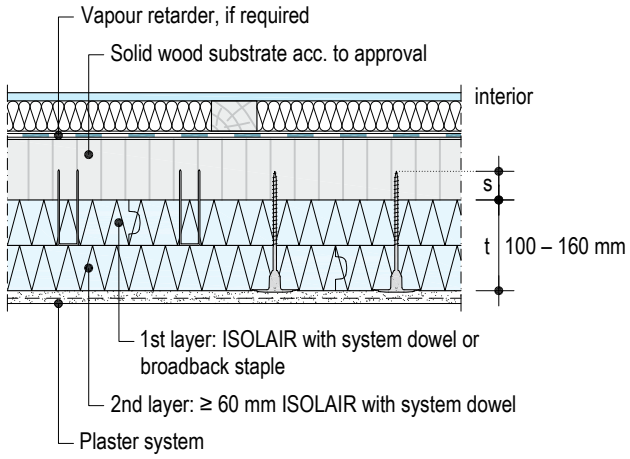
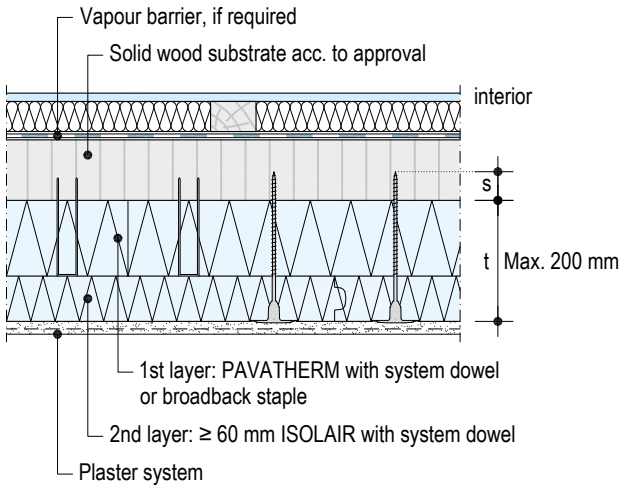
Scheme drawing	Approved substrate
	**Permissible board materials, t = 12 – 22 mm:** ■ Particle boards acc. to EN 312, type P5 or P7 ■ Plywood panels acc. to EN 636, type 2 or 3 ■ OSB boards acc. to EN 300, type 3 or 4 ■ Gypsum fibre boards t ≥ 10 mm acc. to National Technical Approval ■ Gypsum boards acc. to EN 520 with the properties EH2 or FH2 and additionally with the properties acc. to designation GKBI or GKFI acc. to DIN 18180 ■ Cementitious particle boards acc. to EN 634-2 or National Technical Approval ■ Wood fibre insulation panels acc. to EN 13171 with a short term water absorption of WS ≤ 1.0, t ≤ 28 mm ■ Dry process boards MDF wood fibreboards acc. to DIN EN 622-5 or general National Technical Approval, type MDF HLS

t = insulation material thickness

s = anchoring depth

System variants (continued)

New construction – solid wooden substrate

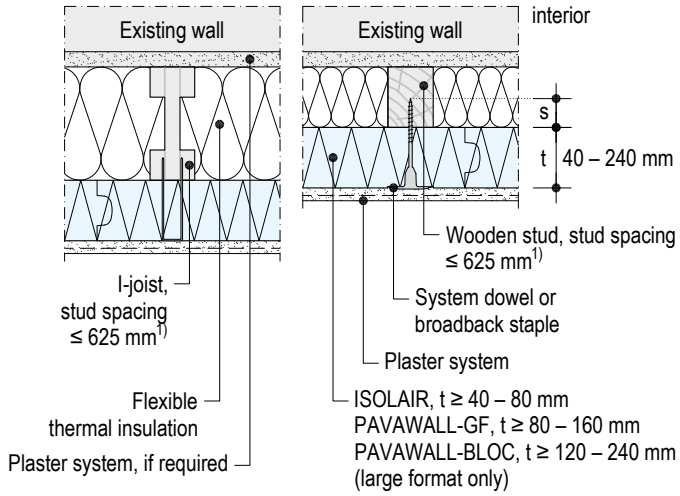
Scheme drawing	Approved substrate
Single-layer  	■ Solid wood exterior wall components made of Lignotrend elements acc. to abZ / aBG General Type Certification Z-9.1-555 ■ Wood material exterior wall components made of SWISS KRONO MAGNUMBOARD® OSB elements acc. to ETA-13/0784 ■ Solid timber boards (three- and five-layer boards made of softwood) acc. to EN 13986 ■ Stacked timber elements ■ Glulam elements and laminated beams acc. to EN 14080
Double-layer ■ ISOLAIR  ■ PAVATHERM/ISOLAIR  	

t = insulation material thickness

s = anchoring depth

System variants (continued)

Old construction – special applications following abZ Z-33.47-638

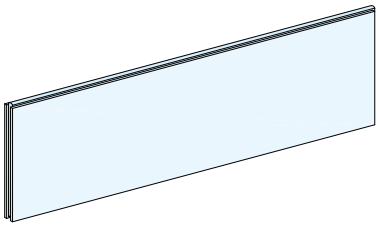
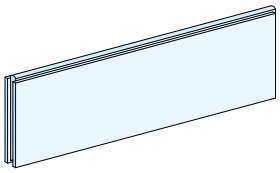
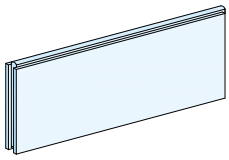
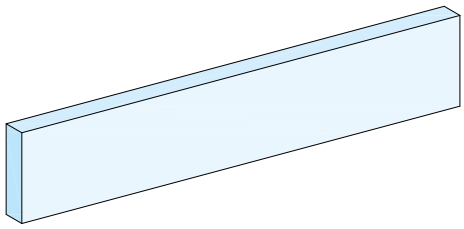
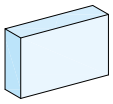
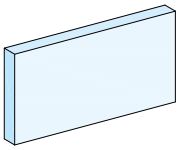
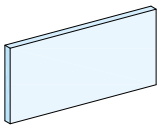
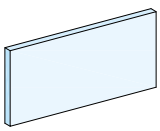
Scheme drawing	Approved substrate
Coordination with the planning office is generally necessary.  	Existing walls can be thermally retrofitted with a façade as a wood frame construction with WARM WALL Natur D, e.g. ■ Masonry ■ Timber framing

1) Cross-section of wooden studs as well as fixing with building authority approved frame dowels or connectors according to the structural certificate.

t = insulation material thickness

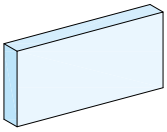
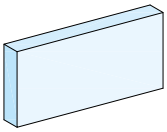
s = anchoring depth

Insulation material

Insulation material	Description	Rated value of thermal conductivity λ W/(m·K)	Board format (cover dimension) w x l mm	Application type Acc. to DIN 4108-10	Insulation material thickness mm
Façade					
	**ISOLAIR** *Wood fibre façade board with tongue and groove edge on all sides, density approx. 200 kg/m³*	0.046	**770 x 2500** (750 x 2480)	WH, WAP-zh	40 – 60
	**ISOLAIR** *Wood fibre façade board with tongue and groove edge on all sides, density approx. 200 kg/m³*	0.046	**580 x 1800** (560 x 1780)	WH, WAP-zh	40 – 80
	**PAVAWALL-GF** *Wood fibre façade board with tongue and groove edge on all sides, density approx. 130 kg/m³*	0.042	**580 x 1450** (560 x 1430)	WH, WAP-zh, WAB-dm	80 – 160
	**PAVAWALL-BLOC** *Wood fibre insulating block with end to end joints, density approx. 130 kg/m³*	0.042	**600 x 3000**	WH, WAP-zh, WAB-dm	120 – 200
	**PAVAWALL-BLOC** *Wood fibre insulating block with end to end joints, density approx. 130 kg/m³*	0.042	**400 x 600**	WH, WAP-zh, WAB-dm	120 – 240
	**PAVATHERM**[1)] *Wood fibre insulation board with end to end joints, density approx. 115 kg/m³*	0.040	**600 x 1100**	WH, WAB-dm	40 – 120
Reveal					
	**EPS Standard 035 white**	0.035	**500 x 1000**	WAP	20 – 50
	**EPS Standard 032**	0.032	**500 x 1000**	WAP	20 – 50

Insulation board may only be used as the first layer of a double-layer application.

Insulation material (continued)

Insulation material	Description	Rated value of thermal conductivity λ W/(m·K)	Board format (cover dimension) w x l mm	Application type Acc. to DIN 4108-10	Insulation material thickness mm
Plinth					
	**Sockeldämmplatte 035 plinth insulation board** *EPS, white*	0.035	**500 x 1000**	PW	30 – 240
	**Sockeldämmplatte 032 plinth insulation board** *EPS, grey*	0.032	**500 x 1000**	PW	40 – 240

Thermal resistance

Examples

Insulation material	Thermal resistance **R** in $(m^2 \cdot K)/W$ Total insulation thickness **t** in mm										
	40	**60**	**80**	**100**	**120**	**140**	**160**	**180**	**200**	**220**	**240**
ISOLAIR	0.87	1.30	1.74	2.17	2.61	3.04	3.48	–	–	–	–
PAVAWALL-GF, PAVAWALL-BLOC	–	–	1.90	2.38	2.86	3.33	3.81	4.29	4.76	5.24	5.71
PAVATHERM	1.00	1.5	2.00	2.50	3.00	–	–	–	–	–	–

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, timber construction, insulation materials, etc.) is added to the sum of the 0.17 $(m^2 \cdot K)/W$ of both thermal transfer resistances for interior and exterior and provides the resulting thermal resistance. The inverse value of the thermal resistance is the U value.

Finish coat

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 a sponged or freely textured render in natural white or pigmented finish.

MineralAktiv Scheibenputz floated render
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.

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.

Final coat (continued)

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

Properties	Mineral-based finishing plasters					Organic finishing plasters			
						Silicate render	Silicon resin renders		Resin plasters
	Noblo Filz, Noblo, SP 260 Pro, RP 240	SM700 Pro	MineralAktiv Scheiben-putz floated render	Sockel-SM Pro	Sockel-SM	Kati S	Conni S	Butz	Addi S
Binder	Lime cement	Lime cement	Hybrid binder	Cement	Cement	Potassium silicate, dispersion	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			
							Silicate render	Silicon resin renders		Resin plasters
	Noblo Filz	Noblo, SP 260 Pro	RP 240	SM700 Pro	MineralAktiv Scheibenputz floated render	Sockel-SM Pro, Sockel-SM	Kati S	Conni S	Butz	Addi S
Surfaces										
Sponged 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.

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 optimized moisture management ensures that MineralAktiv Fassadenfarbe façade paint 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 **Minerol**	Hybrid façade paint **MineralAktiv Fassadenfarbe paint**	Silicone resin paints **Autol**	**Siliconharz-EG-Farbe paint**
Binder	Potassium silicate, dispersion	Hybrid binder	Silicone resin emulsion, dispersion	Silicone resin emulsion, dispersion
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

U values and parameters for the protection against summer heat with WARM WALL Natur D

Examples

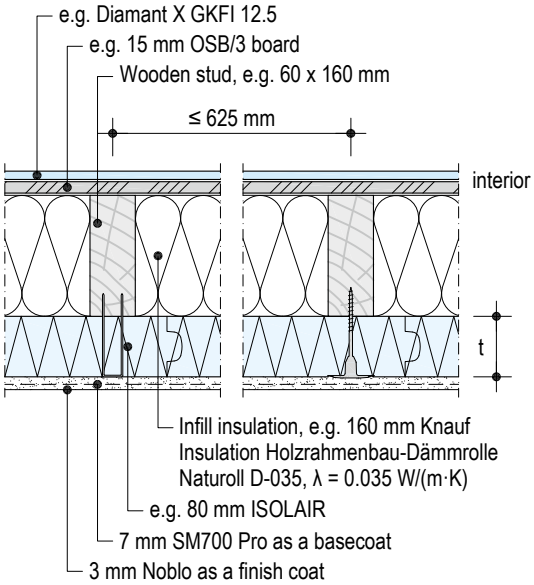
Studs	Infill insulation	With Knauf WARM WALL Natur D exterior insulation Insulation material thickness t															
		60 mm (ISOLAIR)				**80 mm** (ISOLAIR)				**100 mm** (PAVAWALL-GF)				**120 mm** (PAVAWALL-GF)			
w x h	**λ**	**U value total**	**φ**[1]	**TAR**[2]	**TAD**[3]	**U value total**	**φ**[1]	**TAR**[2]	**TAD**[3]	**U value total**	**φ**[1]	**TAR**[2]	**TAD**[3]	**U value total**	**φ**[1]	**TAR**[2]	**TAD**[3]
mm	W/(m·K)	W/(m²·K)	h			W/(m²·K)	h			W/(m²·K)	h			W/(m²·K)	h		
60 x 100	0.040	0.263	9.3	0.0836	12	0.236	10.8	0.0587	17	0.204	11.0	0.0505	20	0.186	12.3	0.0369	27
	0.035	0.247	9.5	0.0751	13	0.223	11.1	0.0526	19	0.194	11.3	0.0455	22	0.178	12.5	0.0332	30
	0.032	0.237	9.8	0.0687	15	0.214	11.4	0.0480	21	0.188	11.6	0.0415	24	0.172	12.8	0.0303	33
60 x 120	0.040	0.237	9.5	0.0731	14	0.214	11.1	0.0512	20	0.188	11.3	0.0444	23	0.172	12.5	0.0324	31
	0.035	0.221	9.8	0.0650	15	0.201	11.4	0.0454	22	0.178	11.6	0.0396	25	0.164	12.8	0.0288	35
	0.032	0.212	10.1	0.0598	17	0.193	11.7	0.0410	24	0.171	12.0	0.0357	28	0.158	13.2	0.0260	39
60 x 140	0.040	0.215	9.7	0.0648	15	0.196	11.3	0.0453	22	0.174	11.5	0.0395	25	0.161	12.7	0.0287	35
	0.035	0.201	10.0	0.0571	17	0.184	11.6	0.0398	25	0.164	11.8	0.0349	29	0.152	13.1	0.0253	39
	0.032	0.191	10.5	0.0512	20	0.176	12.1	0.0356	28	0.158	12.3	0.0311	32	0.146	13.5	0.0226	44
60 x 160	0.040	0.197	9.9	0.0580	17	0.181	11.5	0.0405	25	0.162	11.7	0.0355	28	0.150	12.9	0.0258	39
	0.035	0.184	10.2	0.0508	20	0.170	11.8	0.0353	28	0.152	12.1	0.0310	32	0.142	13.3	0.0225	44
	0.032	0.175	10.8	0.0450	22	0.162	12.4	0.0312	32	0.146	12.7	0.0273	37	0.136	13.9	0.0198	50
60 x 180	0.040	0.182	10.0	0.0524	19	0.169	11.6	0.0365	27	0.152	11.9	0.0321	31	0.141	13.1	0.0233	43
	0.035	0.169	10.5	0.0456	22	0.157	12.1	0.0316	32	0.142	12.3	0.0279	36	0.133	13.6	0.0202	50
	0.032	0.161	11.1	0.0398	25	0.150	12.7	0.0276	36	0.136	13.0	0.0242	41	0.128	14.2	0.0175	57
60 x 200	0.040	0.169	10.2	0.0478	21	0.157	11.8	0.0332	30	0.143	12.1	0.0293	34	0.133	13.3	0.0212	47
	0.035	0.157	10.7	0.0412	24	0.146	12.3	0.0285	35	0.133	12.6	0.0252	40	0.125	13.8	0.0182	55
	0.032	0.149	11.5	0.0355	28	0.139	13.1	0.0245	41	0.127	13.4	0.0215	46	0.120	14.6	0.0156	64

Calculation without correction for fasteners

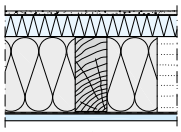
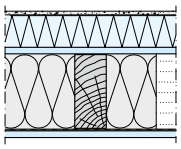
1) *Phase lag*
2) *Temperature amplitude ratio*
3) *Temperature amplitude damping*

The temperature amplitude ratio (TAR) describes the maximum temperature fluctuation (amplitude) on the interior room-side construction component surface to the maximum temperature fluctuation on the exterior construction component surface. The lower the TAR value, the higher the attenuation. The inverse value is called the temperature amplitude damping (TAD). The phase lag is the period between the occurrence of the highest temperature on the exterior outer surface of a building component until the highest temperature is achieved on the interior, and depends on the heat retention capacity of the building component layers. A phase lag of more than 10 hours should be pursued.

Design example



Knauf structural wood frame panel construction of exterior wall in conjunction with Knauf external thermal insulation composite system

Knauf System	Fire resistance class	Cladding Wall side 1 exterior: WARM WALL Natur D	Diamant / Diamant X	Minimum thickness mm	Wall side 2 interior[1]: Diamant / Diamant X	Minimum thickness mm	Wooden studs: Minimum cross-section w x h mm	Stress permissible σ_D N/mm²	Insulation layer Required for fire protection between the timber studs: Minimum thickness mm	Min. density kg/m³	Sound insulation Sound reduction index Direct cladding: R_w dB	$R_{w,R}$ dB
W551.de structural wood frame panel construction of exterior wall with Knauf WARM WALL Natur D ISOLAIR (ETICS)												Stud spacing ≤ 625 mm
Wall side 1 exterior  Wall side 2 interior	F30	•		40 plus	•	12.5	60 x 140	≤ 2.0	Mineral wool G *or* mineral wool S 60	14	–	–
Wall side 1 exterior  Wall side 2 interior	F30	•	•	60[2] + 12.5	•	12.5	60 x 140	≤ 2.5 plus	Mineral wool G 140	14	*48*	*46*
		•	•	60[2] + 12.5	•	2x 12.5					*52*	*50*
		•	•	60[2] + 12.5	•	2x 18					*48*	*46*
	F60	•	•	60[2] + 12.5	•	12.5	60 x 140	≤ 2.0	Mineral wool S 140	30	*48*	*46*

1) Implemented with air-tight level / vapour retarder e.g. Knauf Insulation LDS 10 Silk or equivalent. Required s_d value dependent on the overall design.

2) If there are no demands in terms of sound insulation, WARM WALL Natur D 40 mm is permissible.

***Sound reduction index values** represented in italics are derived values from measurements on divergent constructions.*

- The specified sound reduction index applies in conjunction with a mineral wool insulation layer acc. to DIN EN 13162:
  - Between the studs: length related flow resistance acc. to EN 29053; r ≥ 5 kPa·s/m²
- Instead of Diamant GKFI, fire resistant boards Knauf Piano GKF(I) or Knauf Fire-Resistant Board GKF(I) in the same thickness can be used. A reduction of the sound reduction index can be noted in this case.
- Additional cladding with wooden composite boards on the wooden studs does not change the fire resistance class.
- With single-layer cladding back the horizontal board joints with timber slats/metal profiles (see system data sheet W55.de Knauf Structural Wood Frame Partitions).

Partition height

Rated acc. to EN 1995-1-1 in conjunction with EN 1995-1-1/NA as well as the fire related Certificate of Usability. Maximum permissible wall height acc. to National Technical Test Certificate (abP) is 5.00 m, for wall heights exceeding 3.00 m the minimum cross-sections of the studs must be adapted to ensure the maximum streamlining of the design. With structurally effective (bracing) cladding a maximum of one horizontal board joint is permissible (see system data sheet W55.de Knauf Structural Wood Frame Partitions), observe DIN EN 1995-1-1 in conjunction with DIN EN 1995-1-1/NA.

plus **Extension of the fire resistance Certificate of Usability**
- Implement with direct fastening of the ISOLAIR on the wooden studs.
- With deviation of the permissible stress σ_D in wooden studs

Prior consultation in acc. to page 4 is recommended.

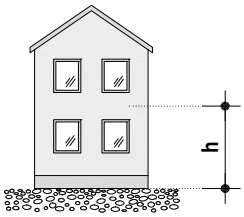
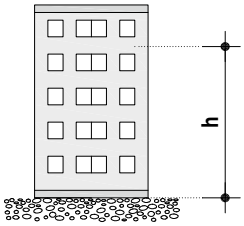
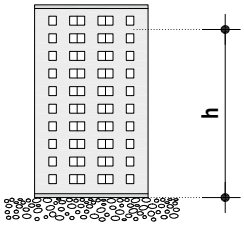
Notes

Observe the notes on pages 3 to 4.

Further notes and wall constructions W551.de Structural wood frame panel constructions exterior wall with fire resistance class see system data sheet W55.de Knauf Structural wood frame panel construction walls (German only).

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 are defined 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).

Reaction to fire Knauf WARM WALL Natur D

Insulation material thickness t	System	Reaction to fire/building material class ETICS
Up to 240 mm	Mineral Mineral / organic	Flammable **B2** (acc. to DIN 4102-1)

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 EN 1991-1-4 and EN 1991-1-4/NA	Standard method Acc. to EN 1991-1-4 and 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.

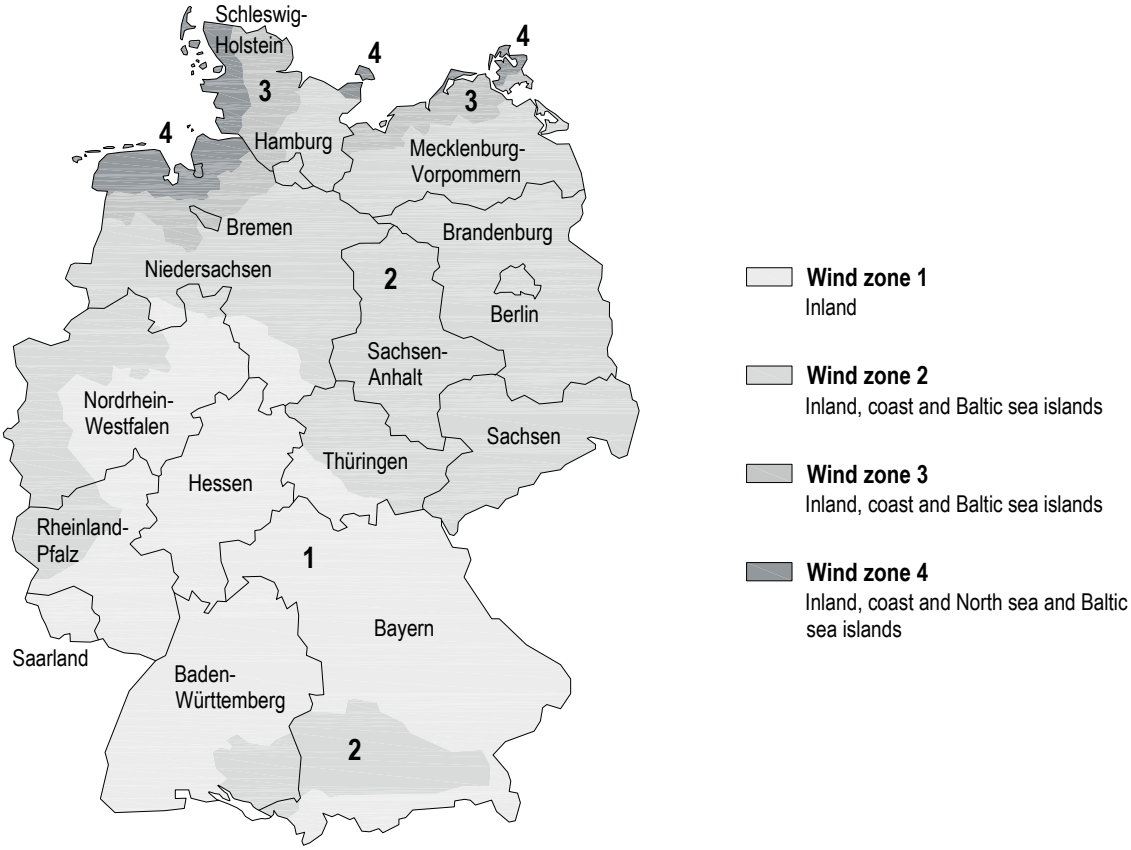
2) Deutsches Institut für Bautechnik

Procedure for determining the number and length of the fasteners

Selection of the wind zone
see graphic below
→ Determination of the width of fringe A
see page 18
→ Selection of the fasteners
→ Read off the number of fasteners required in the table
see page 18 to 20
→ Selection of the fastener length in dependence on the insulation material thickness
see page 20

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

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



Determination of the wind loads

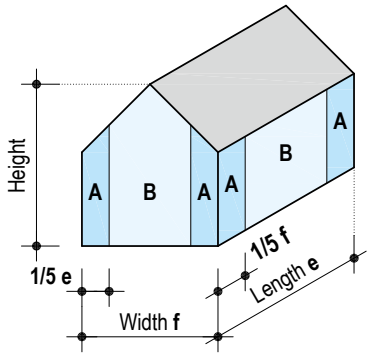
Wind suction forces w_{ek} in kN/m² acc. to EN 1991-1-4 and EN 1991-1-4/NA acc. to the simplified method

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
1	Inland	0.738	0.550	0.959	0.715	1.106	0.825
2	Inland	0.959	0.715	1.180	0.880	1.328	0.990
	Coast and Baltic Sea islands	1.245	0.935	1.475	1.100	1.623	1.210
3	Inland	1.180	0.880	1.401	1.045	1.623	1.210
	Coast and Baltic Sea islands	1.549	1.155	1.770	1.320	1.918	1.430
4	Inland	1.401	1.045	1.696	1.265	1.918	1.430
	North and Baltic Sea coasts and Baltic Sea islands	1.844	1.375	2.065	1.540	2.286	1.705
	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 coresponding value is decisive



Dimensioning of the anchors and spacings

Table 1: **ISOLAIR** (minimum number of screw-in dowels acc. to approval) Insulation material thickness 40 mm

Wind zone	Region	**Minimum number of dowels per m²** Maximum ETICS wind loads: 1.60 kN/m² Wind loads acc. to simplified method	
		Building height **0 to 10 m** Timber frame construction, solid wooden substrate	
		Fringe A	Zone B
1	Inland	8	8
2	Inland	8	8
	Coast and Baltic Sea islands	9	8
3	Inland	9	8
	Coast and Baltic Sea islands	9	9
4	Inland	9	9
	North and Baltic Sea coasts and Baltic Sea islands	–	–
	North Sea islands	–	–

Values only apply for single-layer application

Dimensioning of the fasteners and spacings (continued)

Table 2: **ISOLAIR** (minimum number of screw-in dowels acc. to approval) Insulation material thickness 60 – 160 mm

Wind zone	Region	Minimum number of dowels per m² Maximum ETICS wind loads: 1.60 kN/m² Wind loads acc. to simplified method			
		Building height **0 to 10 m** Timber frame construction, solid wooden substrate			
		Single layer application		**Two-layer application**	
		Fringe A	Zone B	Fringe A	Zone B
1	Inland	6	6	6 (8)	6 (8)
2	Inland	6	6	6 (8)	6 (8)
	Coast and Baltic Sea islands	7	6	8 (10)	6 (8)
3	Inland	7	6	8 (10)	6 (8)
	Coast and Baltic Sea islands	7	7	8 (10)	8 (10)
4	Inland	7	7	8 (10)	8 (10)
	North and Baltic Sea coasts and Baltic Sea islands	–	–	–	–
	North Sea islands	–	–	–	–

With solid wooden substrate and two-layer application, the 1st insulation board layer (ISOLAIR or PAVATHERM) should be secured with a reduced number fasteners (minimum 4 dowels/m² or 8 staples/m²). The values for staples only apply for solid wooden substrate for the 2nd layer when PAVATHERM is used as the 1st layer; total insulation material thickness max. 200 mm.

Table 3: **ISOLAIR** (minimum number of broadback staples acc. to approval) Insulation material thickness 40 – 80 mm

Wind zone	Region	Minimum number of broadback staples per m² Maximum ETICS wind loads: 1.60 kN/m² Wind loads acc. to simplified method	
		Building height **0 to 10 m** Timber frame construction, solid wooden substrate	
		Fringe A	Zone B
1	Inland	17	17
2	Inland	17	17
	Coast and Baltic Sea islands	19	17
3	Inland	19	17
	Coast and Baltic Sea islands	19	19
4	Inland	19	19
	North and Baltic Sea coasts and Baltic Sea islands	–	–
	North Sea islands	–	–

Values only apply for single-layer application

Table 4: **PAVAWALL-BLOC, PAVAWALL-GF** (minimum number of screw-in dowels acc. to approval) Insulation material thickness 80 – 240 mm

Wind zone	Region	Minimum number of dowels per m² Maximum ETICS wind loads: 1.60 kN/m² Wind loads acc. to simplified method	
		Building height **0 to 10 m** Timber frame construction, solid wooden substrate	
		Fringe A	Zone B
1	Inland	6	6
2	Inland	6	6
	Coast and Baltic Sea islands	8	6
3	Inland	8	6
	Coast and Baltic Sea islands	5	8
4	Inland	8	8
	North and Baltic Sea coasts and Baltic Sea islands	–	–
	North Sea islands	–	–

Values only apply for single-layer application

Dimensioning of the fasteners and spacings (continued)

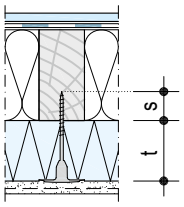
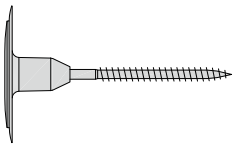
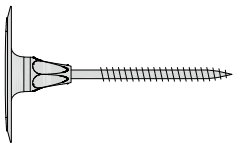
Table 5: **PAVAWALL-BLOC, PAVAWALL-GF** (minimum number of broadback staples acc. to approval) Insulation material thickness 80 – 120 mm

Wind zone	**Region**	**Minimum number of broadback staples per m²** Maximum ETICS wind loads: 1.60 kN/m² Wind loads acc. to simplified method	
		Building height **0 to 10 m** Timber frame construction, solid wooden substrate Fringe A	Zone B
1	Inland	15	15
2	Inland	15	15
	Coast and Baltic Sea islands	20	15
3	Inland	20	15
	Coast and Baltic Sea islands	20	20
4	Inland	20	20
	North and Baltic Sea coasts and Baltic Sea islands	–	–
	North Sea islands	–	–

Values only apply for single-layer application

Selection of the fasteners

Length of the fastener in dependence on the insulation material thickness

Insulation material thickness	**Length of the fastener** (without board material)		
	Schraubdübel STR H dowel (acc. to abZ)	**Schraubdübel 6H dowel**	**Broadback staple** (acc. to EN 14592)
			
t mm	**s** ≥ 30 mm mm	**s** ≥ 30 mm mm	**s** ≥ 30 mm mm
40	80	70	75
60	100	90	100
80	120	110	110
100	140	130	130
120	160	150	150
140	180	170	–
160	200	190	–
180	220	210	–
200	240	230	–
220	260	250	–
240	280	270	–

t = insulation material thickness

s = anchoring depth

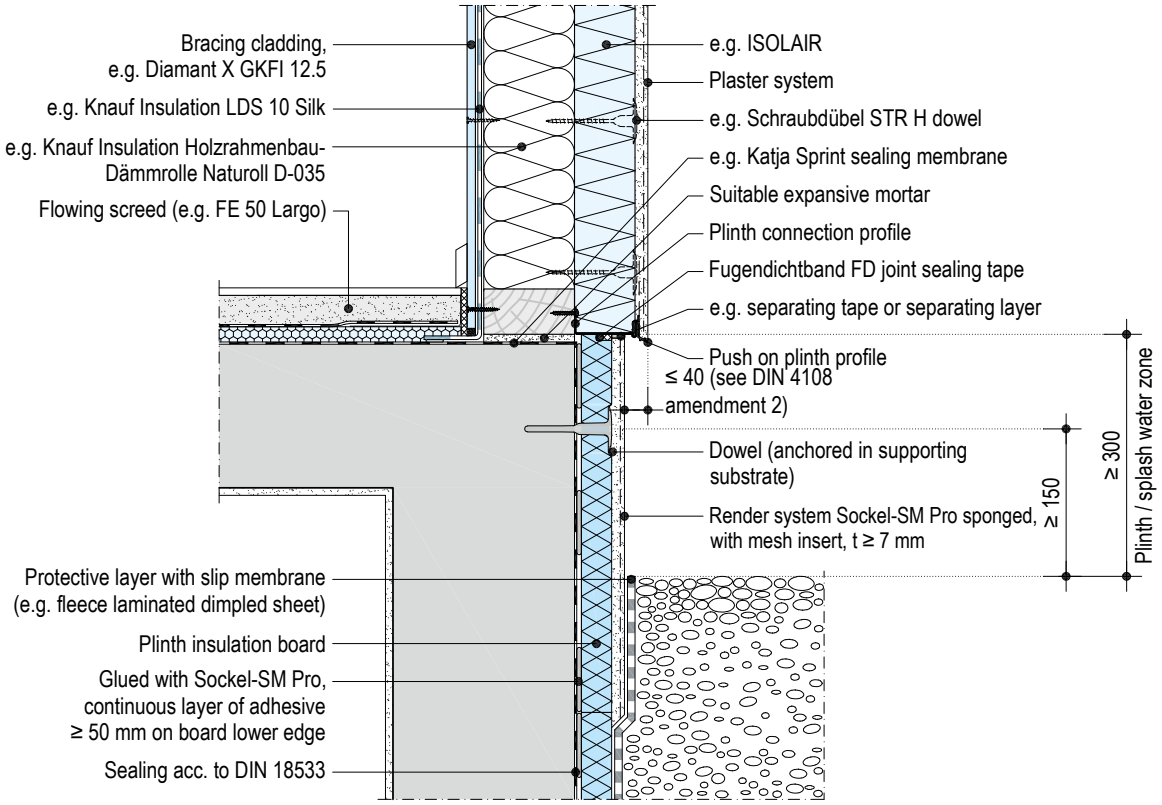
Calculation of the length:

Anchoring depth **s** + (possible board material thickness) + insulation material thickness **t**

Implemented with perimeter insulation

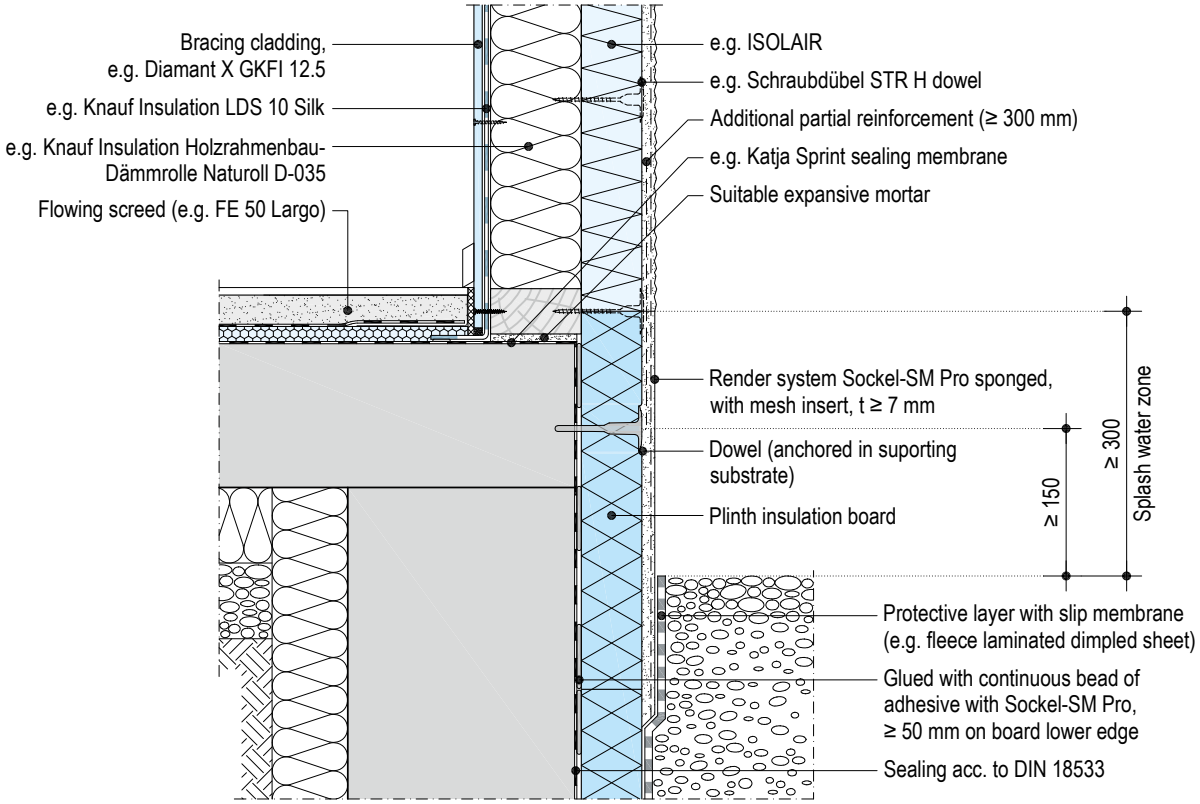
Scale 1:10 I Dimensions in mm

WE203D.de-SO-V6 Recessed plinth application



WE203D.de-SO-V12 Flush plinth application

Application with floor slab

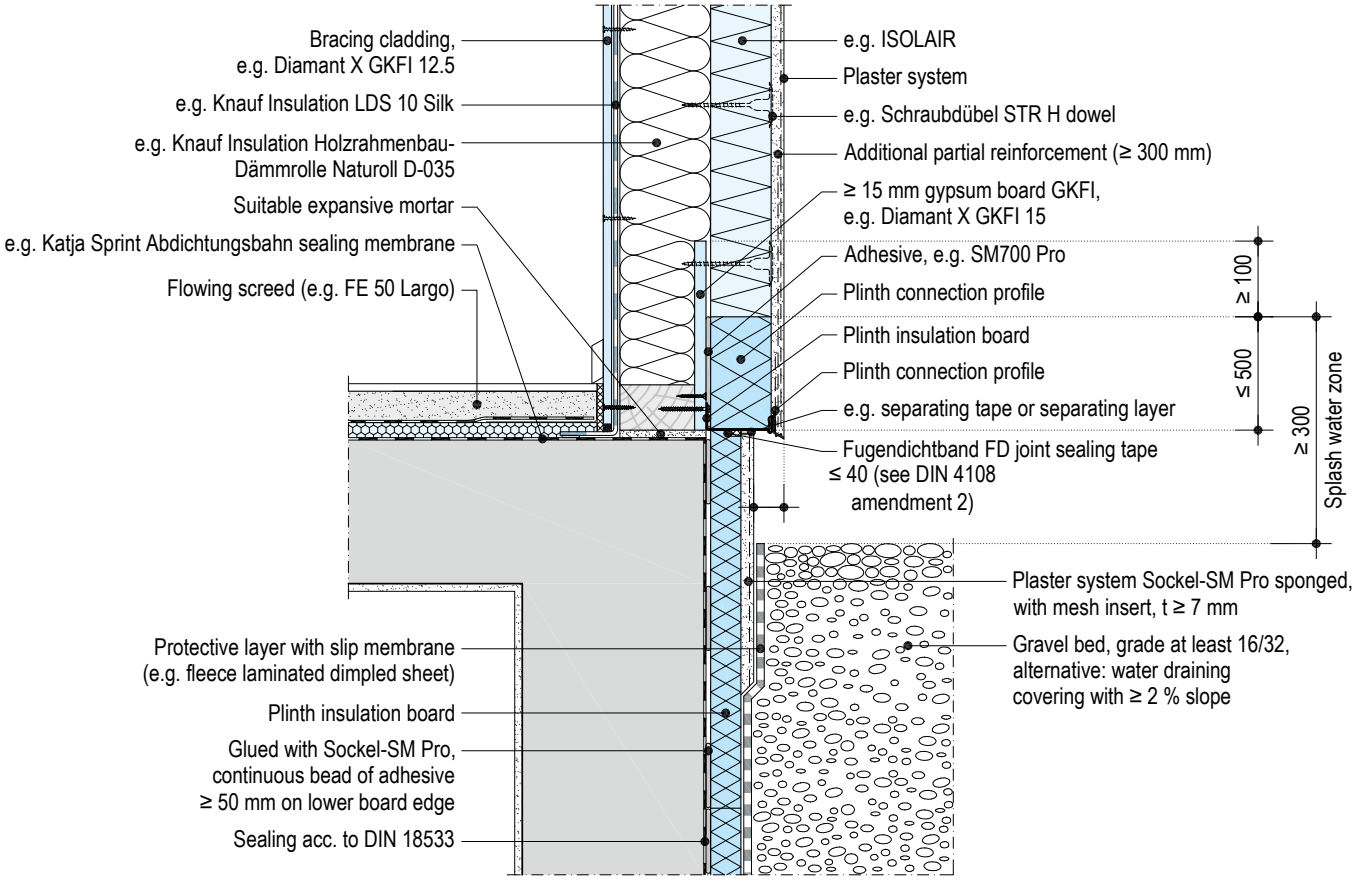


Implemented with perimeter insulation (continued)

Scale 1:10 I Dimensions in mm

WE203D.de-SO-V20 Recessed plinth application

With fire resistance F30, taking consideration of special measures acc. to DIN 68800-2



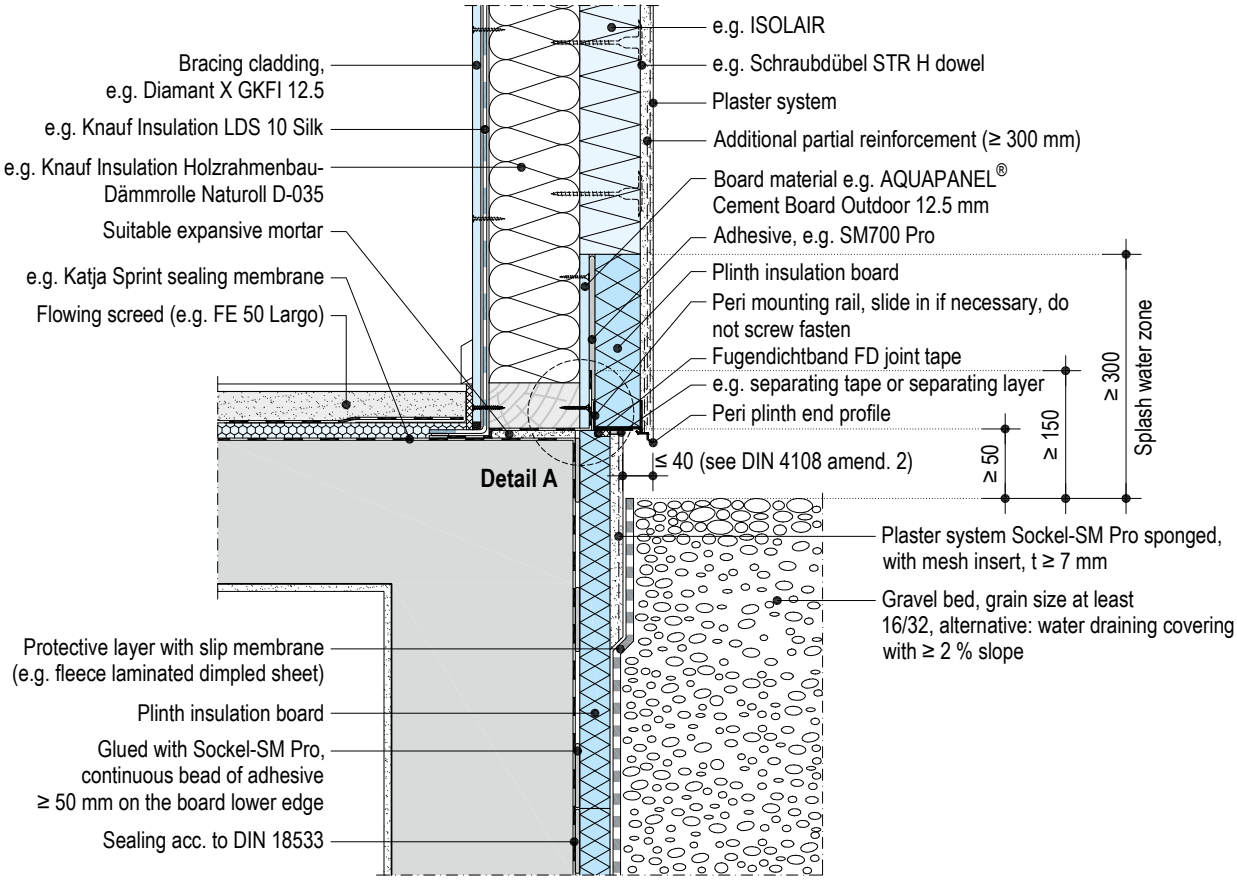
plus **Extension of the fire resistance Certificate of Usability**
Prior consultation in acc. to page 4 recommended

Implemented with perimeter insulation (continued)

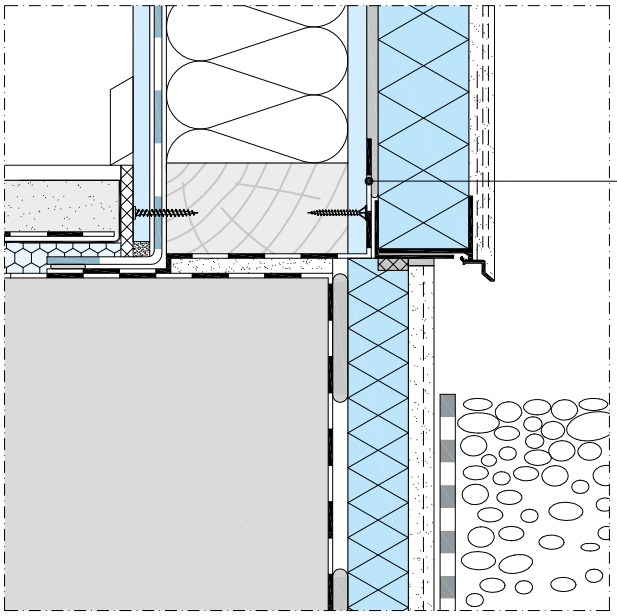
Scale 1:10 I Dimensions in mm

WE203D.de-SO-V18 Recessed plinth application

Taking consideration of special measures acc. to DIN 68800-2



Detail A Scale 1:5



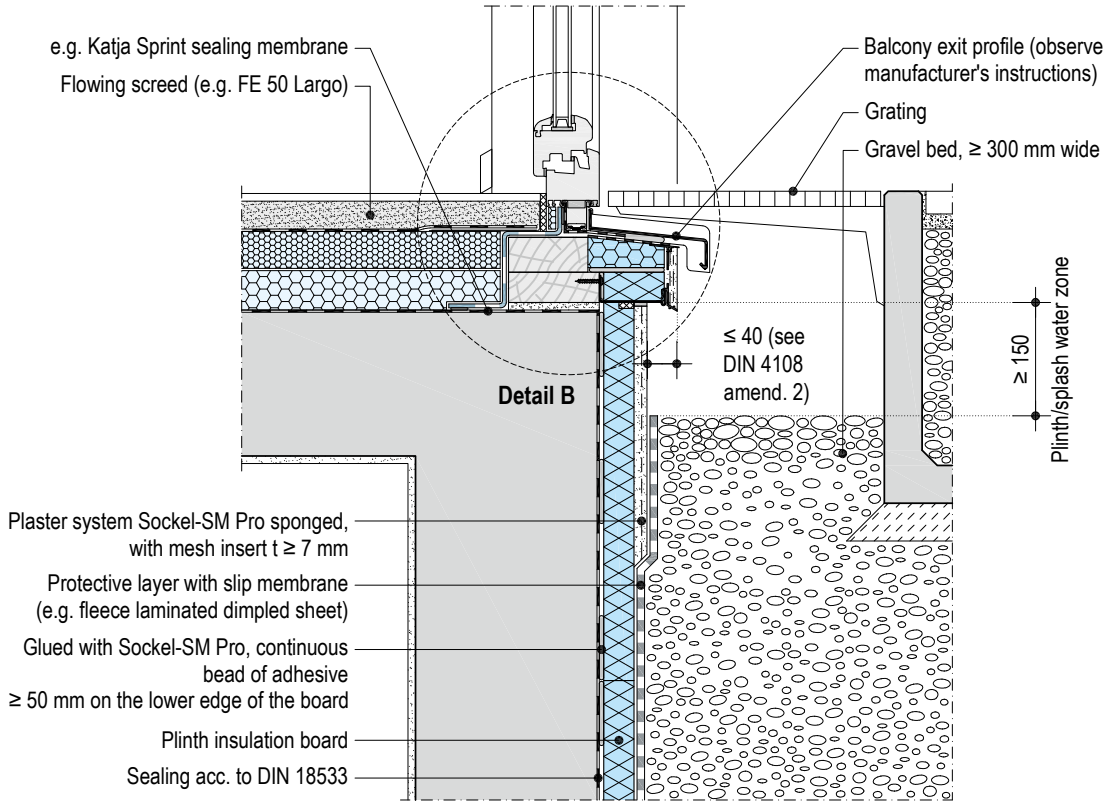
Note	Avoid penetration of the building waterproofing sealing.

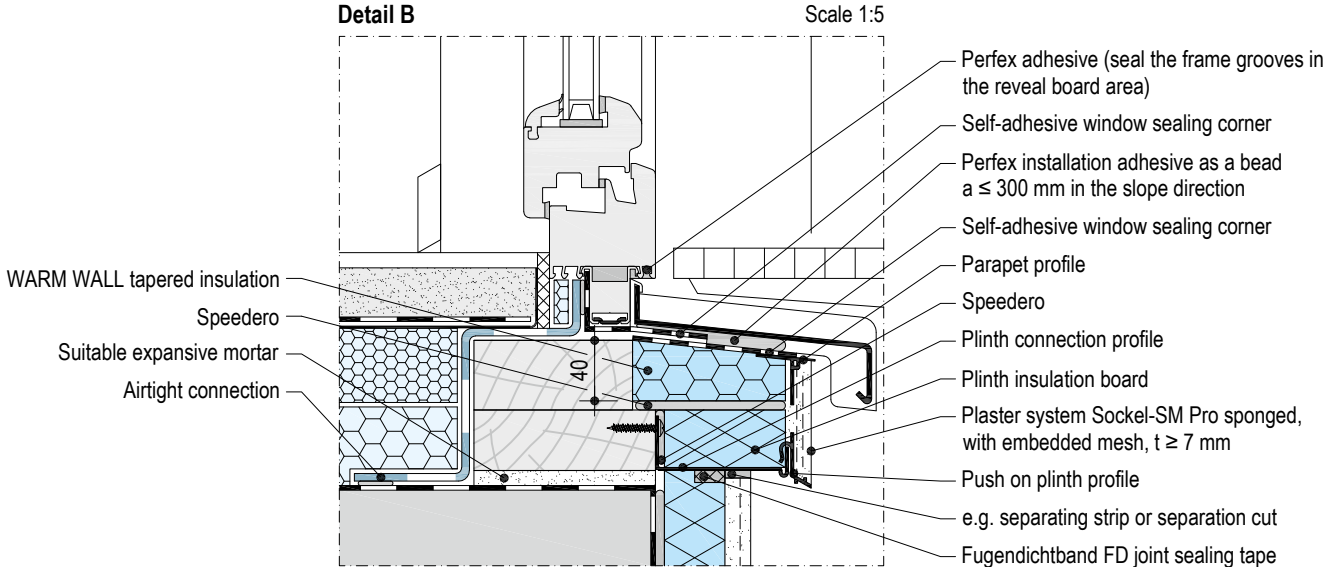
French door connections

Scale 1:10 I Dimensions in mm

WE203D.de-SO-V10 Recessed plinth application

French door exterior flush with wooden studs, not barrier free





Notes

Ensure that all openings (interface gaps) are sealed.

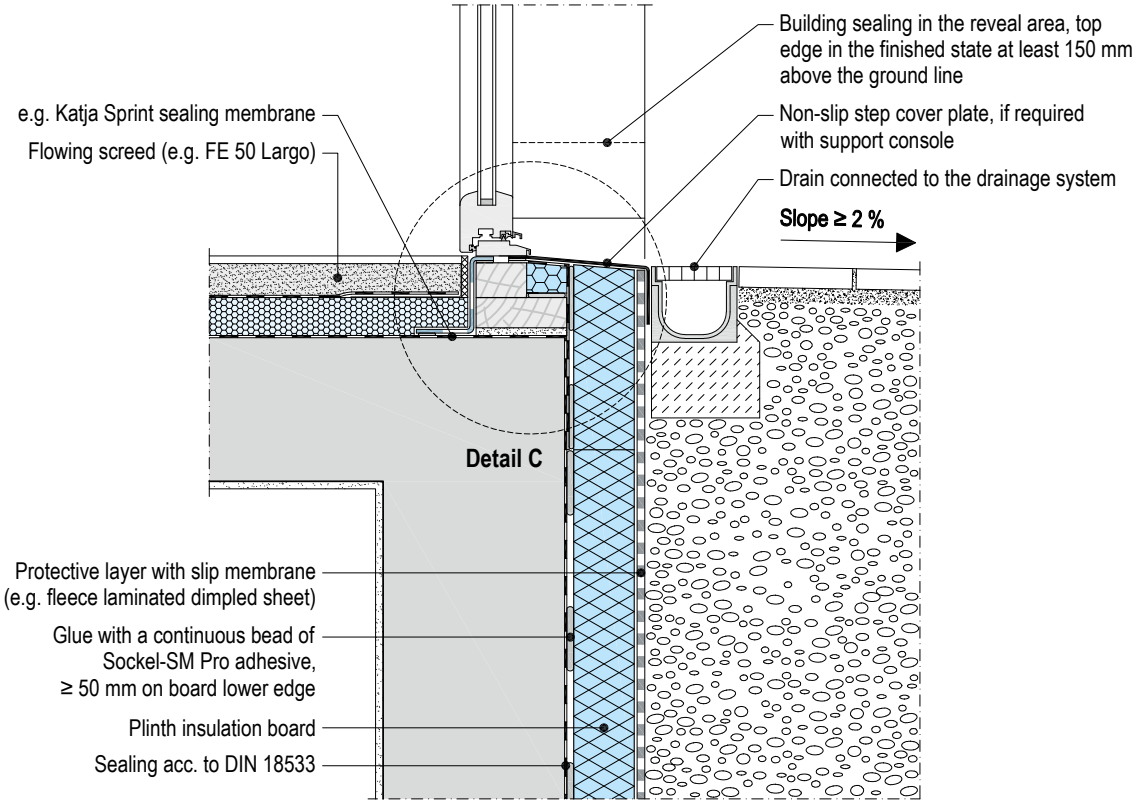
The window installation and seals are represented schematically, refer to “Guideline on the installation of windows and doors” from the RAL-Gütegemeinschaft Fenster und Haustüren e.V. (German Quality Assurance Association Windows and Doors) or the guideline “Connection of windows and roller blinds with plaster, drywall and external thermal insulation composite systems” (German only) from the Fachverband der Stuckateure für Ausbau und Fassade Baden Württemberg, Germany. The construction details shown only apply for the implementation of a second water channelling level, e.g. with Knauf WARM WALL window sealing system, see Installation Instructions P651-A01.de.

French door connections (continued)

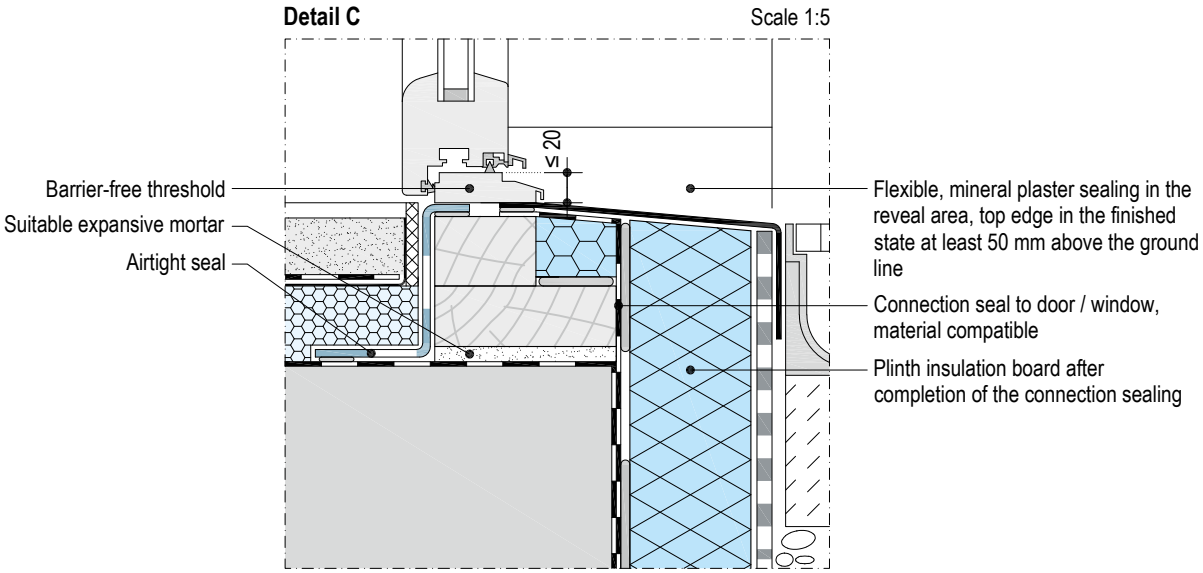
Scale 1:10 I Dimensions in mm

WE203D.de-SO-V11 Flush plinth application

French door interior flush with wooden studs, barrier free



Detail C Scale 1:5



Notes

Ground level or barrier-free entrance from the terrace should be agreed with the contractors. With the regulations governing barrier-free access, the threshold heights and non-slip surfaces, etc. must be observed. Furthermore, the investor must be informed about non-compliance to the regulations as set down in the DIN 18533 in the area of the cross-over between buildings (height at house door or French door maximum 20 mm). Also refer to the BDF leaflet 03-04 “Plinth constructions acc. to DIN 68800-2, classification in usage class GK 0”. Refer to the guideline “Façade plinth render/External components” (German only), issued by Fachverband der Stuckateure für Ausbau und Fassade Baden-Württemberg, flat roof guideline of the German roofers association or in individual cases the green roof guideline of the respective associations. Ensure that all openings (interface gaps) are sealed.

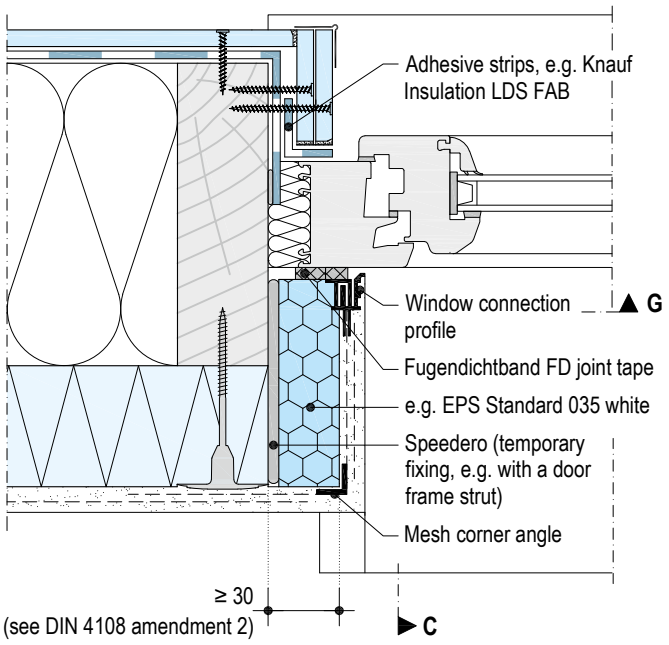
The window installation and seals are represented schematically, refer to “Guideline on the installation of windows and doors” from the RAL-Gütegemeinschaft Fenster und Haustüren e.V. (German Quality Assurance Association Windows and Doors) or the guideline “Connection of windows and roller blinds with plaster, drywall and external thermal insulation composite systems” (German only) from the Fachverband der Stuckateure für Ausbau und Fassade Baden Württemberg, Germany. The construction details shown only apply for the implementation of a second water channelling level, e.g. with Knauf WARM WALL window sealing system, see Installation Instructions P651-A01.de.

Window centred with wooden studs

Scale 1:5 I Dimensions in mm

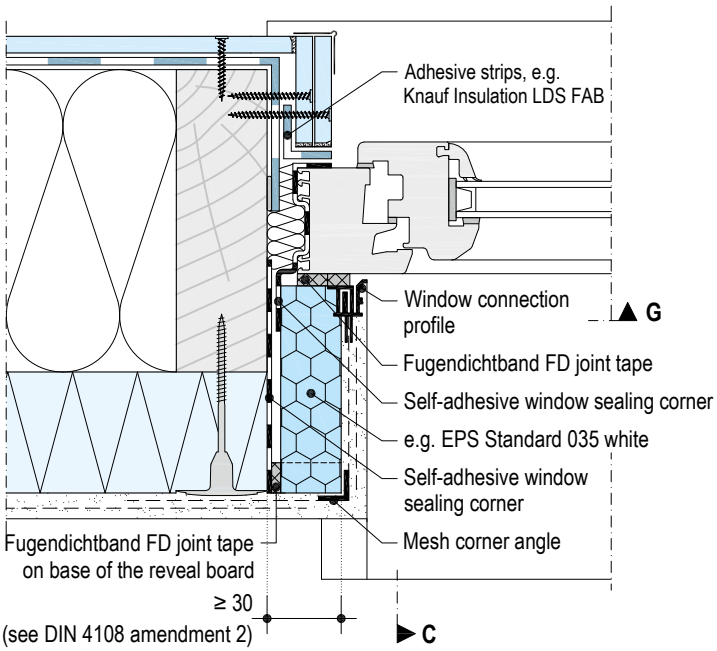
WE203D.de-FE-H1 Horizontal section

Section A



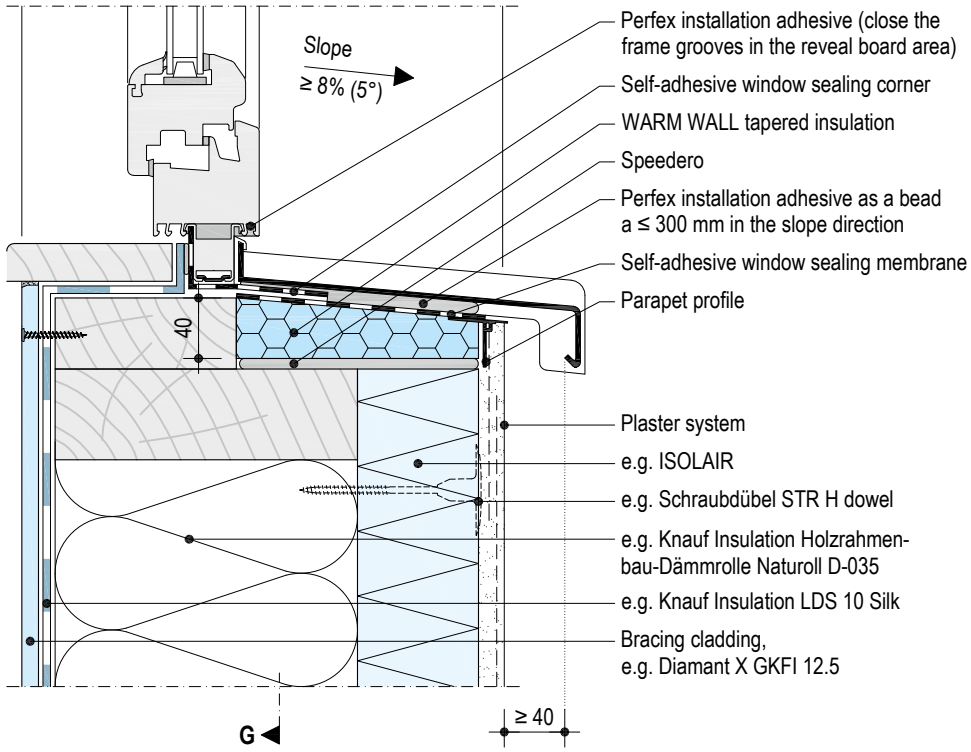
WE203D.de-FE-H4 Horizontal section

Section B (base)



WE203D.de-FE-V1 Vertical section

Section C



To facilitate drainage of any water present, a second water channeling level between the front edge of the façade insulation and the lower side of the window sill may not have any Fugendichtband FD joint sealing tape installed.

Notes

Ensure that all openings (interface gaps) are sealed.

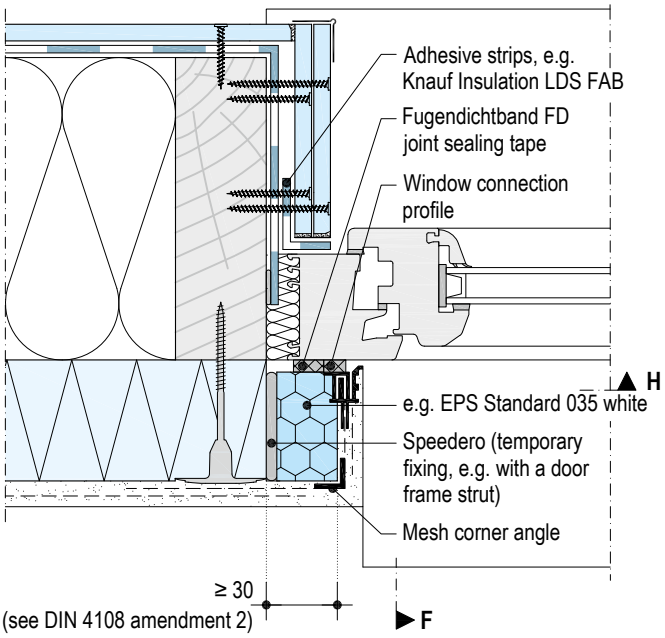
The window installation and seals are represented schematically, refer to “Guideline on the installation of windows and doors” from the RAL-Gütegemeinschaft Fenster und Haustüren e.V. (German Quality Assurance Association Windows and Doors) or the guideline “Connection of windows and roller blinds with plaster, drywall and external thermal insulation composite systems” (German only) from the Fachverband der Stuckateure für Ausbau und Fassade Baden Württemberg, Germany. The construction details shown only apply for the implementation of a second water channelling level, e.g. with Knauf WARM WALL window sealing system, see Installation Instructions P651-A01.de.

Window exterior flush with wooden studs

Scale 1:5 I Dimensions in mm

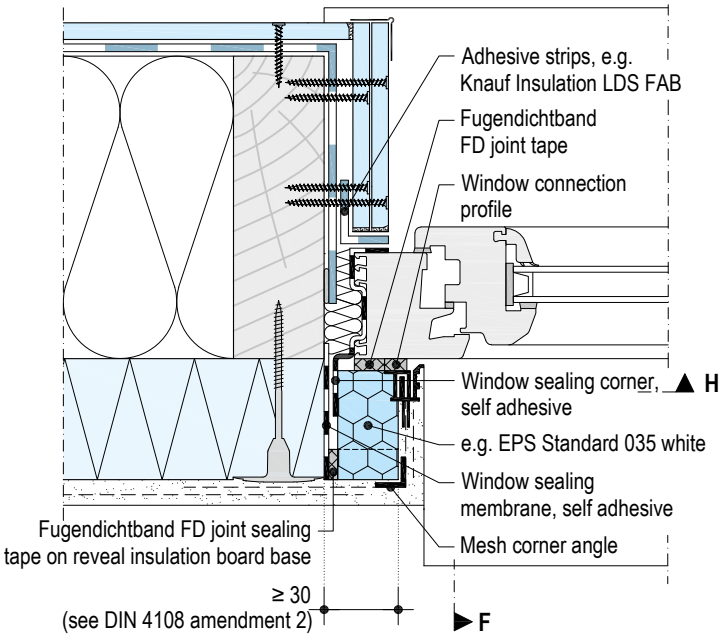
WE203D.de-FE-H2 Horizontal section

Section D



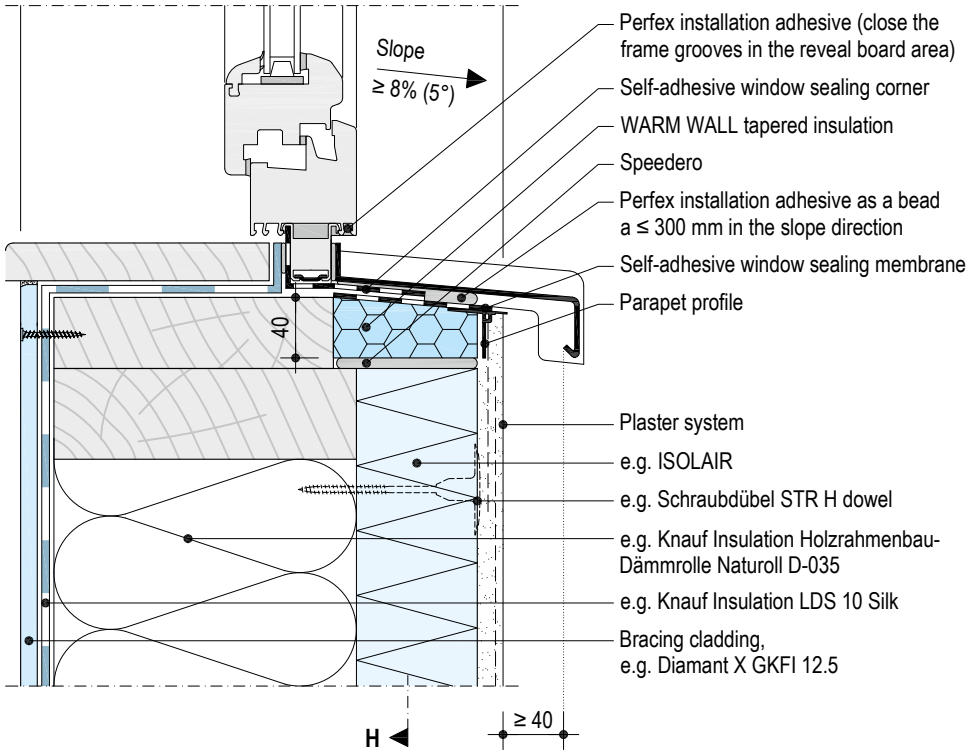
WE203D.de-FE-H5 Horizontal section

Section E (base)



WE203D.de-FE-V2 Vertical section

Section F



To facilitate drainage of any water present, a second water channeling level between the front edge of the façade insulation and the lower side of the window sill may not have any Fugendichtband FD joint sealing tape installed.

Notes

Ensure that all openings (interface gaps) are sealed.

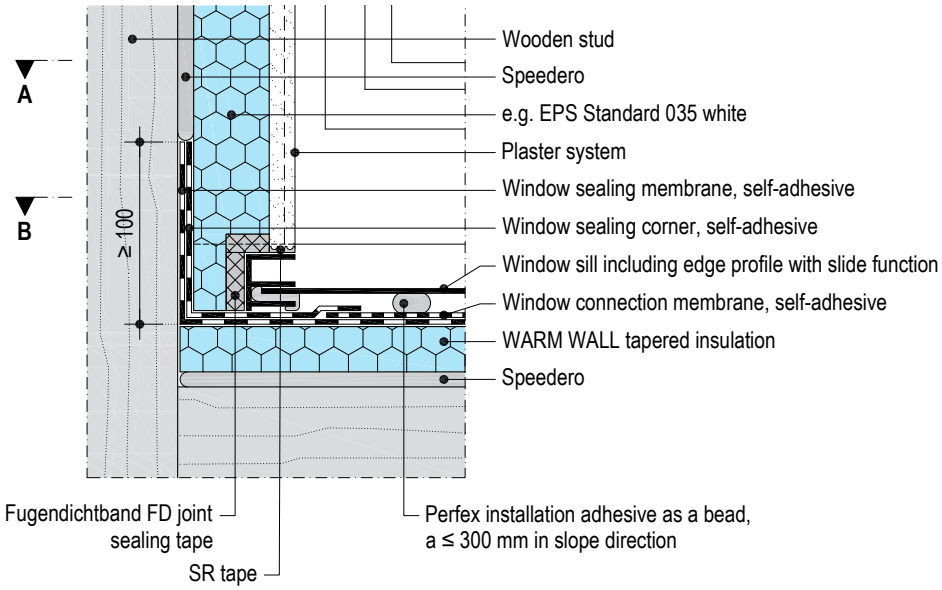
The window installation and seals are represented schematically, refer to “Guideline on the installation of windows and doors” from the RAL-Gütegemeinschaft Fenster und Haustüren e.V. (German Quality Assurance Association Windows and Doors) or the guideline “Connection of windows and roller blinds with plaster, drywall and external thermal insulation composite systems” (German only) from the Fachverband der Stuckateure für Ausbau und Fassade Baden Württemberg, Germany. The construction details shown only apply for the implementation of a second water channelling level, e.g. with Knauf WARM WALL window sealing system, see Installation Instructions P651-A01.de.

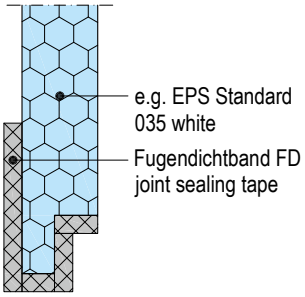
Connection to window sill side section

Scheme drawings I Dimensions in mm

WE203D.de-FE-V4 Connection to window sill including edge profile with slide function

Section G

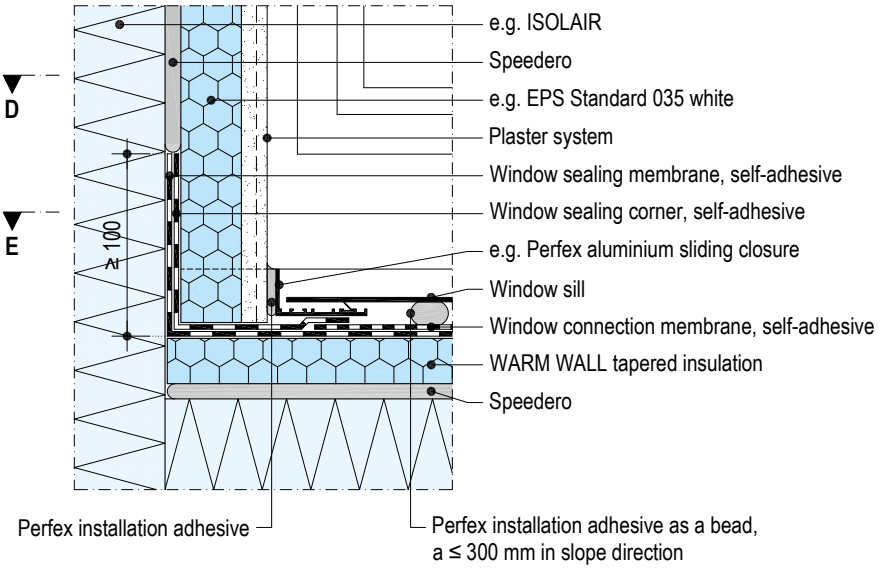


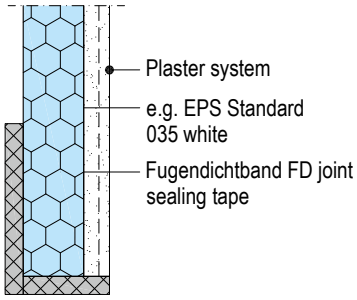


Design of the front edge of the reveal board

WE203D.de-FE-V5 Connection to window sill – subsequent window sill installation

Section H





Design of the front edge of the reveal board

Notes

The construction details shown only apply for the implementation of a second water channelling level, e.g. with Knauf WARM WALL window sealing system, see Installation Instructions P651-A01.de.

At the foot of the reveal insulation panel as well as the render system, a joint is mandatory in the connection area to the window sealing corner/window sealing membrane, to prevent waterlogging underneath the reveal board. This is achieved by attachment of the joint sealing tape FD to the base of the reveal board.

When retrofitting the window sill, do not apply full surface adhesive to the sliding closure to guarantee the water flow direction of the window sill front edge.

See also the video “Knauf – Abdichtung für Fenster bei WDVS” at youtube.com/knauf

Connection to window sill side section (continued)

Recommendation for the lateral render spacing for window sills with edge profile

Window sill colour	Window sill length	Expected movement	Lateral plaster spacing	
			Edge profile without slide function	Edge profile with slide function[1)]
	m	mm	mm	mm
Natural, white	1	± 0.5	≥ 1	≥ 1
	3	± 1.5	≥ 2	≥ 1
Dark	1	± 1.0	≥ 2	≥ 1
	3	± 2.5	≥ 3	≥ 1

Not recommended

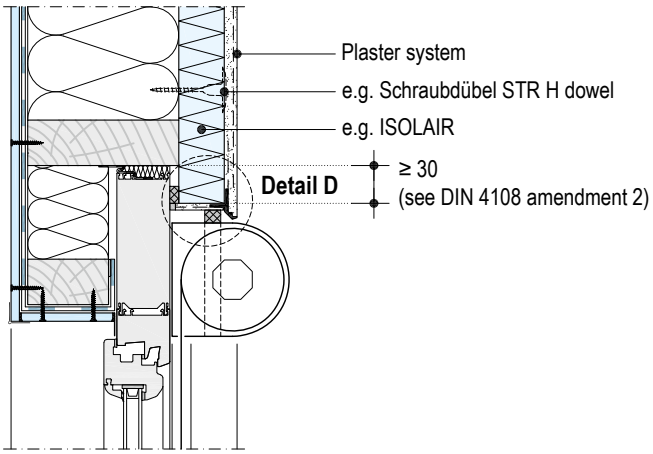
1) The constraint-free movement absorption between the edge profile and window sill must provide at least the expected range of motion.

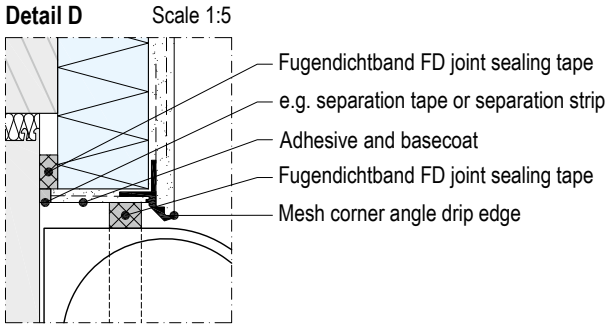
The installation of window sills with edge profile featuring a slide function; recommended when retrofitting window sills with sliding closures.

Connections to sun screening

Scale 1:10 I Dimensions in mm

WE203D.de-FE-V3 Projection roller blind unit



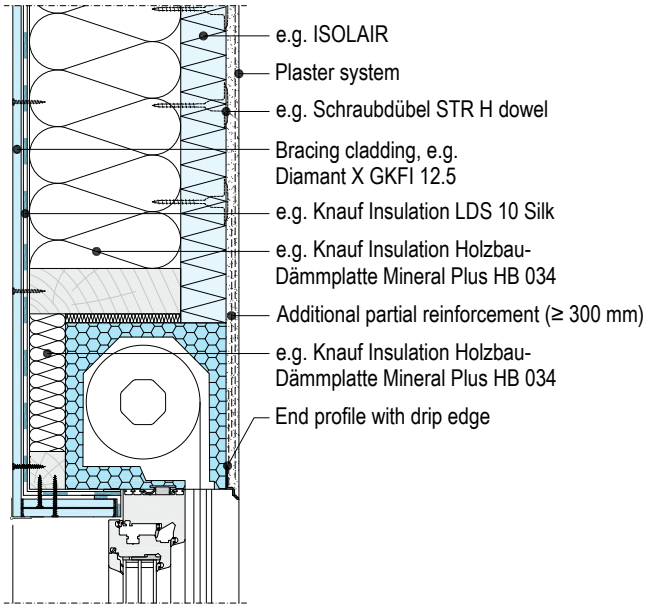


Notes	
	When installing the projection roller blind unit a driving-rain proof application should be observed (connection of the plaster façade with Fugendichtband FD joint sealing tape). Ensure that all openings (interface gaps) are sealed. The window installation and seals are represented schematically, 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.

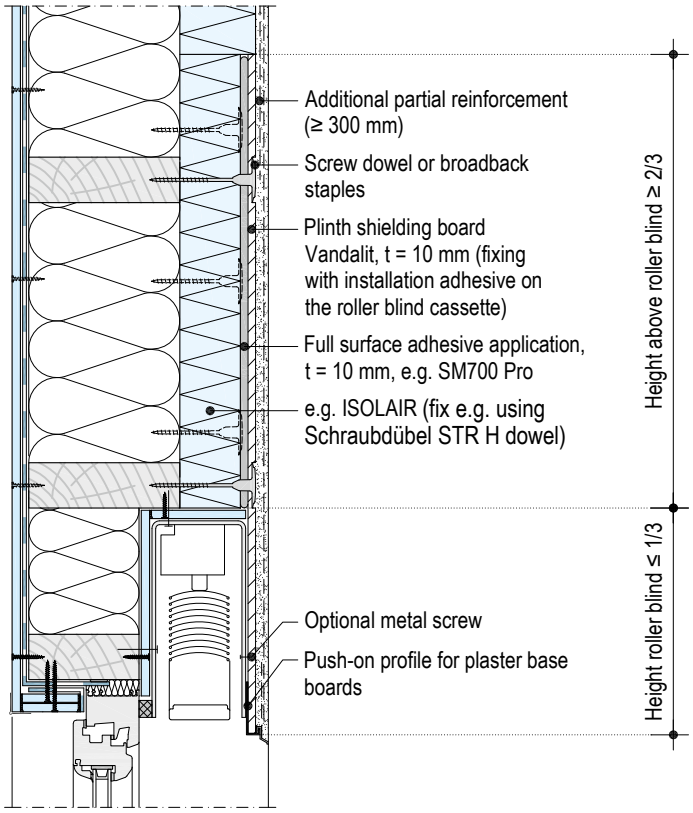
Connections to sun screening (continued)

Scale 1:10 I Dimensions in mm

WE203D.de-FE-V6 Integrated roller blind unit



WE203D.de-FE-V7 Roller blind

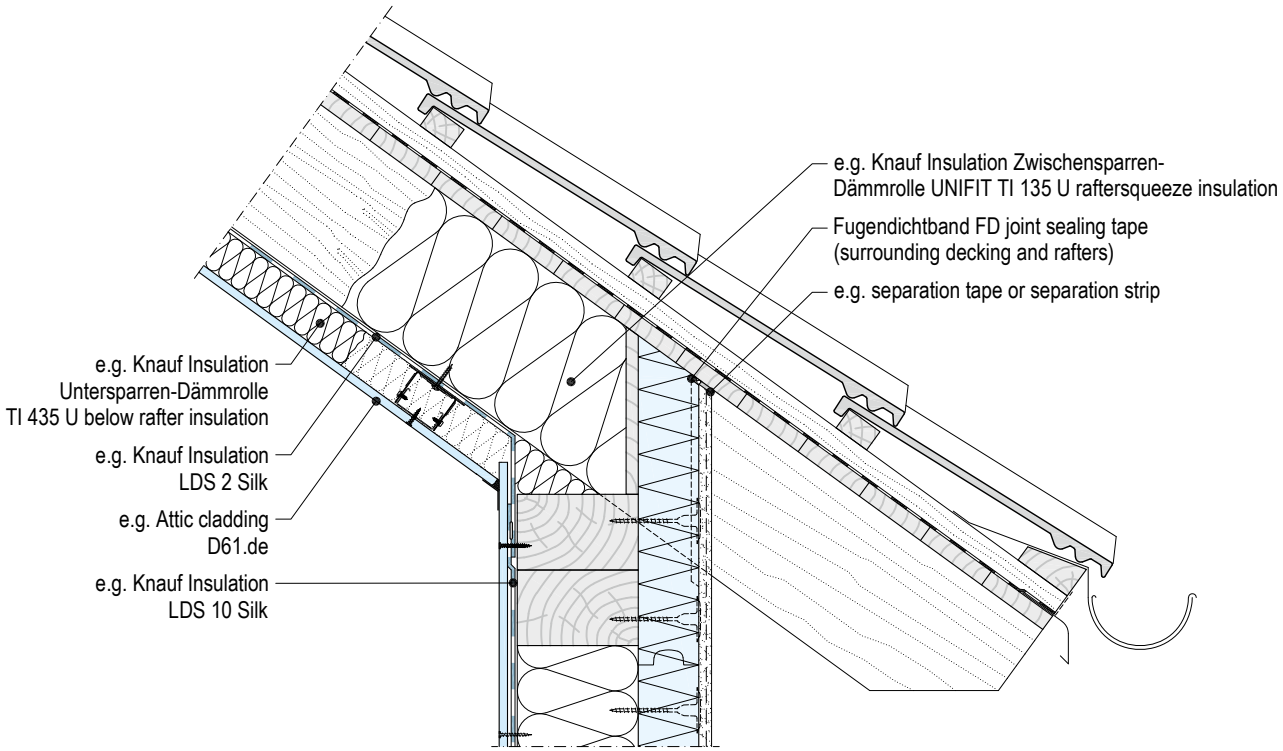


Notes	Rear-side coating of the plinth protection board Vandalit as moisture protection is recommended. Ensure that all openings (interface gaps) are sealed. The window installation and seals are represented schematically, refer to “Guideline on the installation of windows and doors” from the RAL-Gütegemeinschaft 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

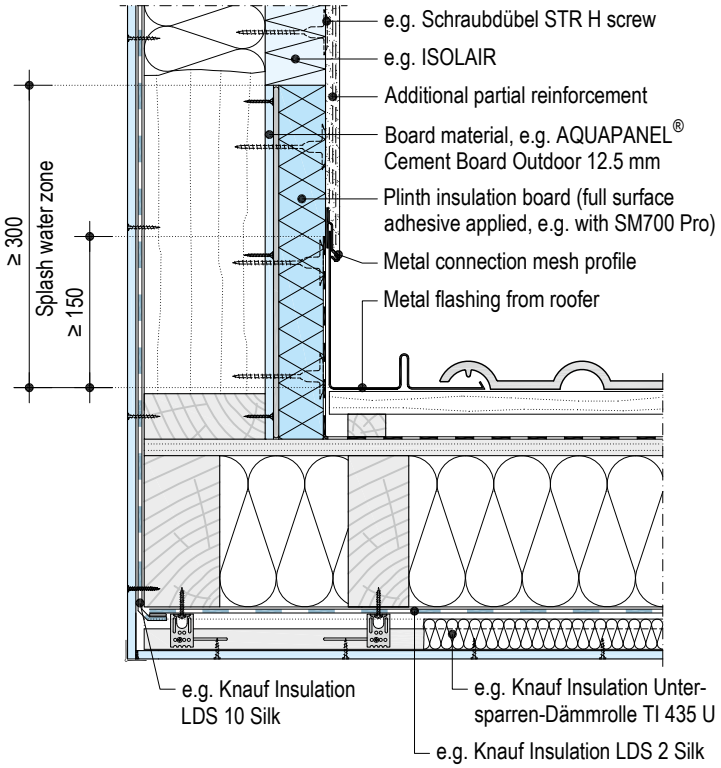
Scale 1:10 I Dimensions in mm

WE203D.de-DA-V1 Eaves connection to roof weatherboarding



WE203D.de-DA-V3 Connection to rising wall - dormer wing

With metal connection mesh profile



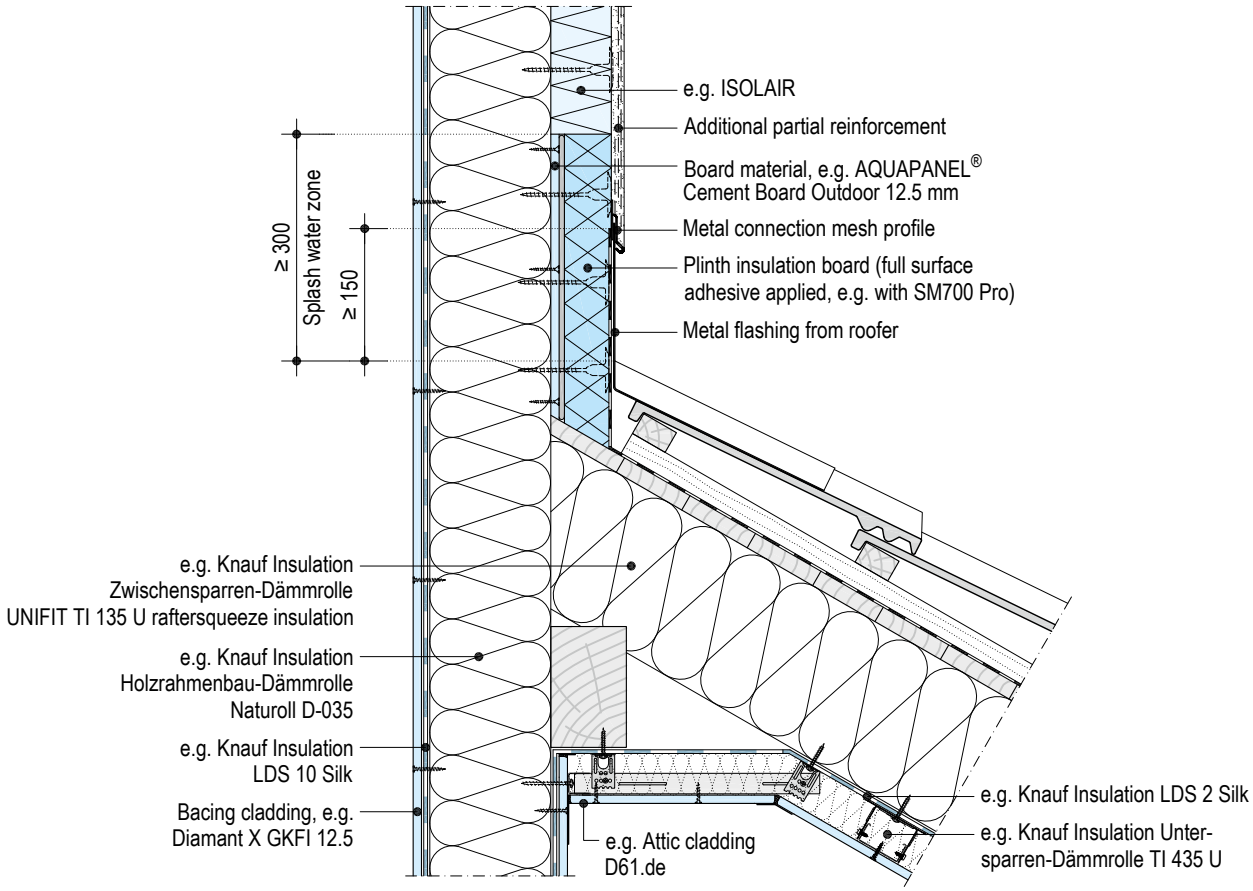
Note	Observe guideline “Metallanschlüsse an Putz und Wärmedämm-Verbundsysteme - *Metal connections to render and external thermal insulation composite systems*”, (German only) from the Fachverband der Stuckateure für Ausbau und Fassade Baden Württemberg, Germany as well as the DIN 18531.

Connections to roof (continued)

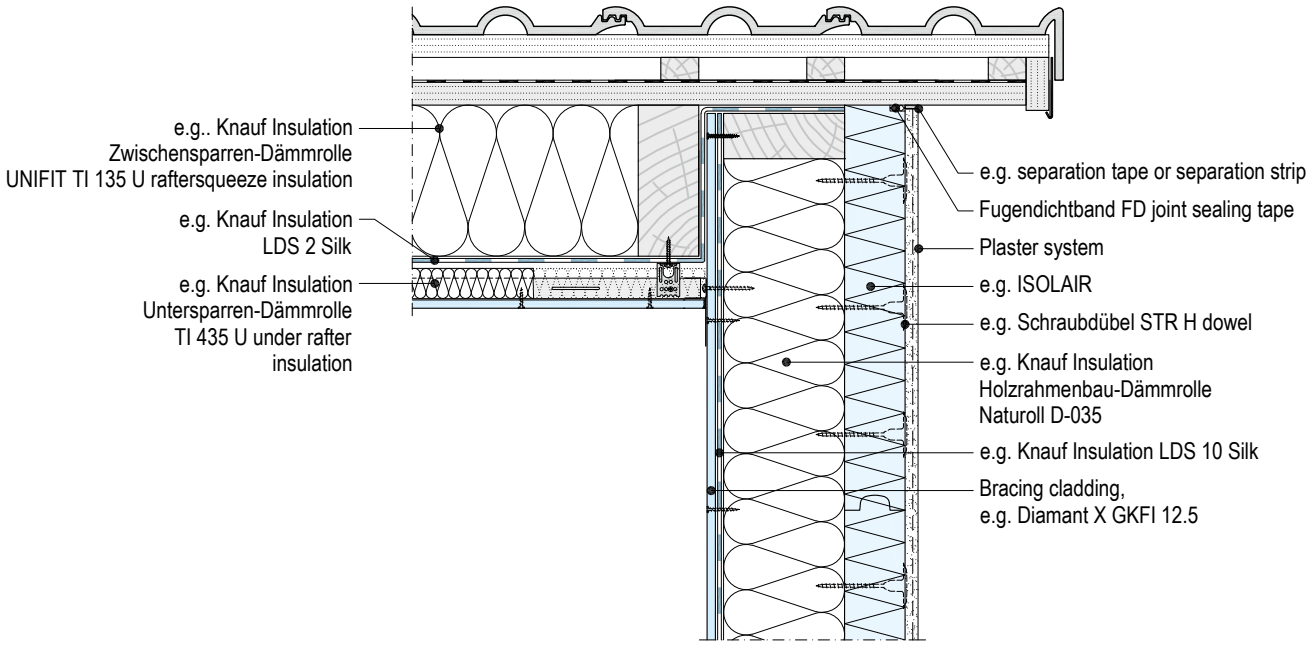
Scale 1:10 I Dimensions in mm

WE203D.de-DA-V6 Pitched roof connection to rising wall

With metal connection mesh profile



WE203D.de-DA-V5 Bargeboard connection



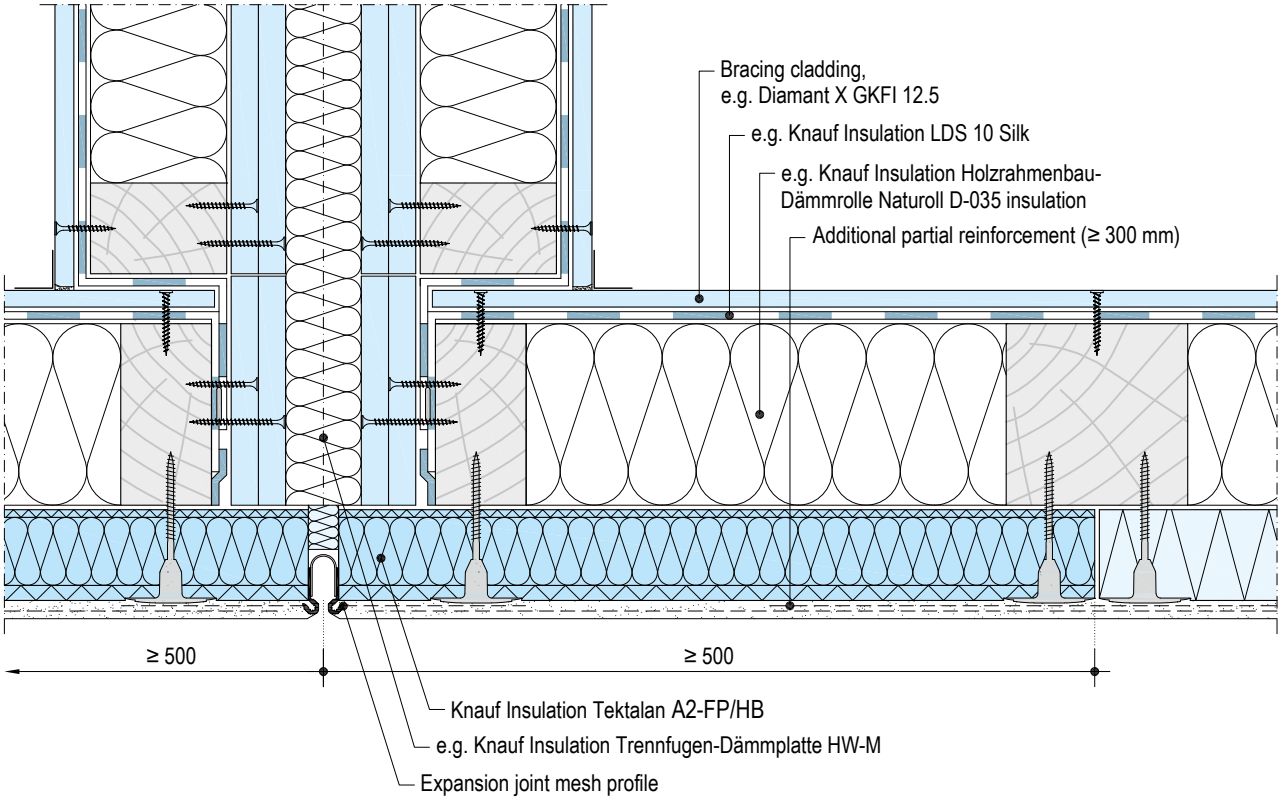
Note	Observe guideline “Metallanschlüsse an Putz und Wärmedämm-Verbundsysteme - *Metal connections to render and external thermal insulation composite systems*”, (German only) from the Fachverband der Stuckateure für Ausbau und Fassade Baden Württemberg, Germany as well as the DIN 18531.

Expansion and connection joints

Scale 1:5 I Dimensions in mm

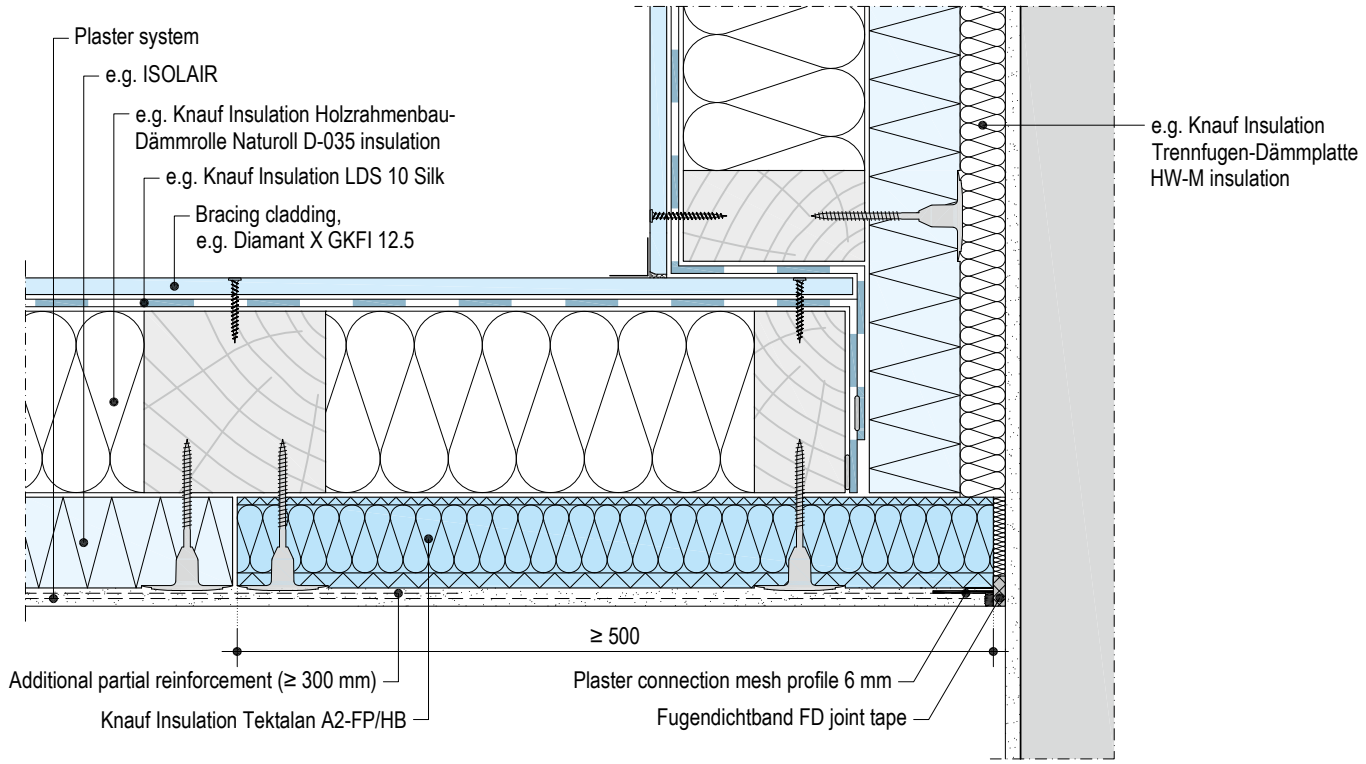
WE203D.de-FU-H1 Building Party Wall – Semidetached house

Fire flashover area with Knauf Insulation Tektalan A2-FP/HB



WE203D.de-FU-H2 Connection to existing constructional component

Fire flashover area with Knauf Insulation Tektalan A2-FP/HB

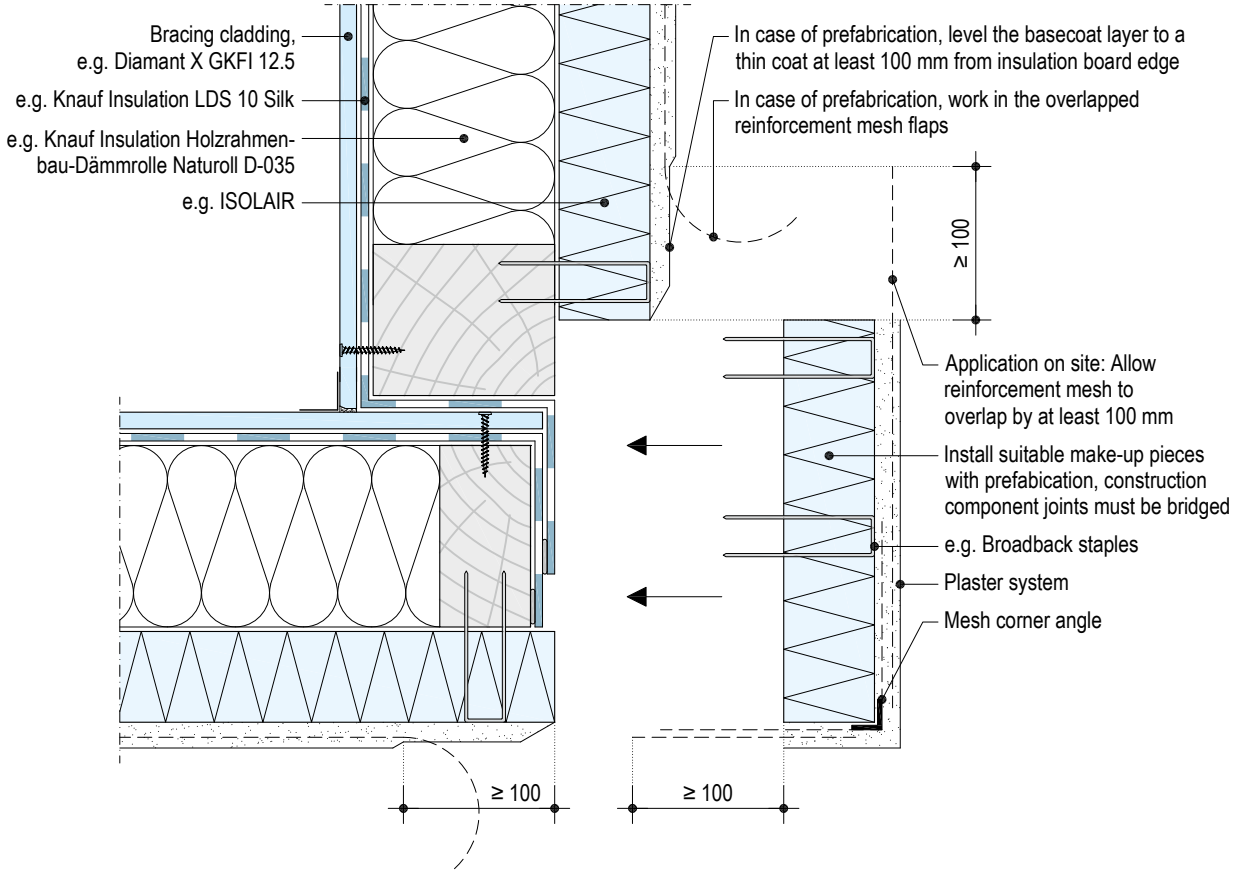


Note	The application in terms of materials and dimensions is based on the guidelines of the applicable state building code. An existing fire protection concept must be observed.

Connection to building corner

Scale 1:5 I Dimensions in mm

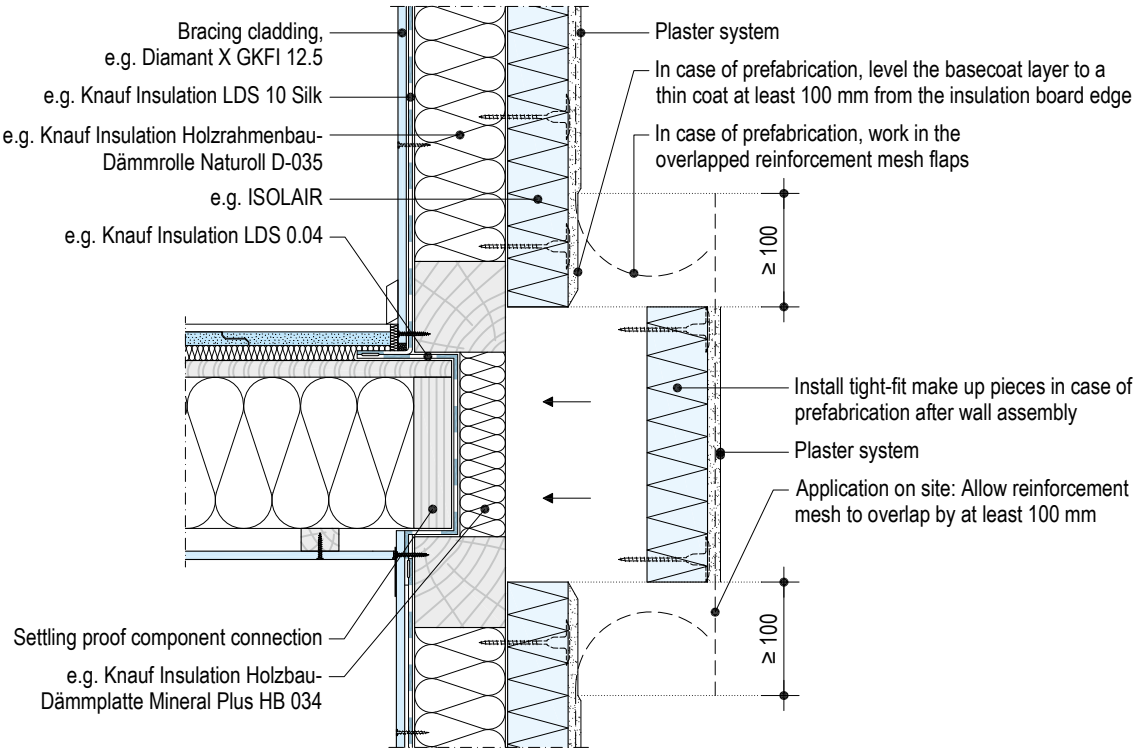
WE203D.de-EX-H1 Connection to building corner



Junction between stories

Scale 1:10 I Dimensions in mm

WE203D.de-EX-V1 Connection to junction between stories

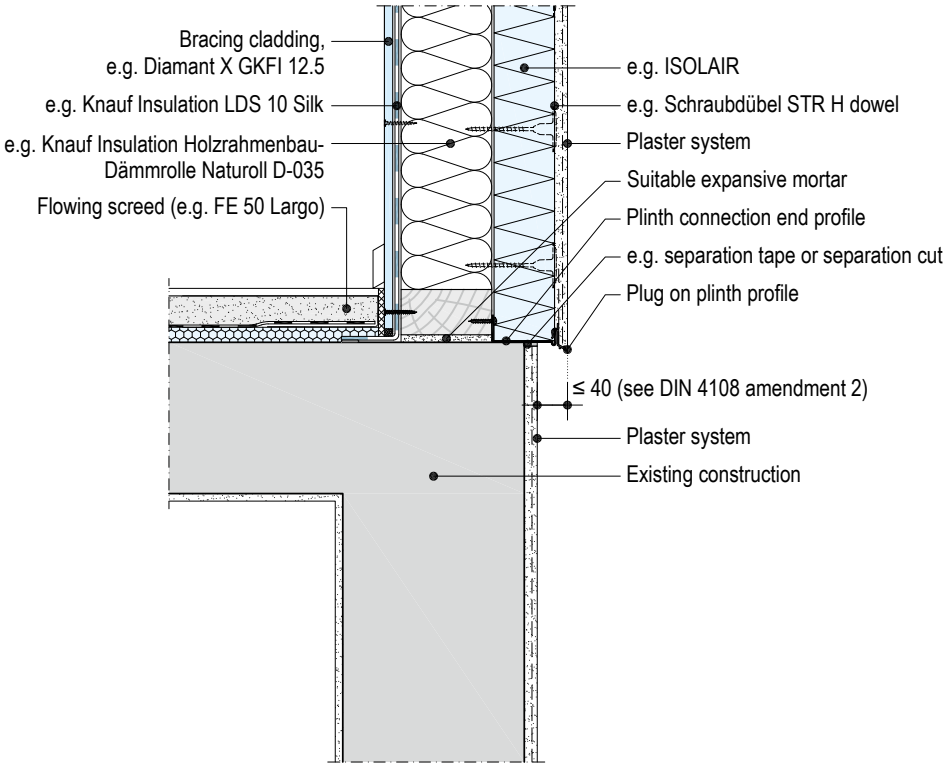


Vertical extension

Scale 1:10 I Dimensions in mm

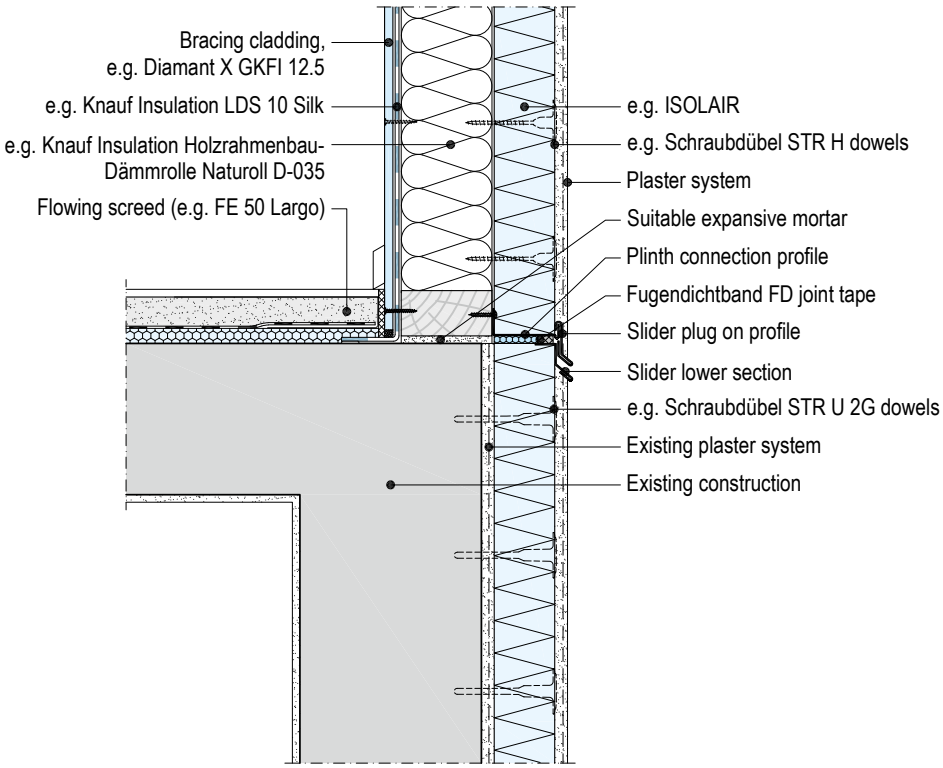
WE203D.de-EX-V2 Vertical extension on existing storey

Existing building not remodelled



WE203D.de-EX-V3 Vertical extension on existing storey

Existing building remodelled



Preconditions

Protect the insulation panels against moisture.
All connections and detail features must be clarified before application.
All substrates must be stable, dry and even.
The construction timbers or exterior wall components must have a moisture level in the wood of ≤ 20 %.
The substrate must be protected against detrimental moisture before the application of ETICS.
Joints on board substrates should be sealed acc. to manufacturers specifications using joint tape and jointing compound before ETICS are applied.
Rising damp may not be present.
Plan all applied connections as driving-rain proof with Fugendichtband FD joint sealing tape. When using driving-rain proof window connection profiles, back with additional FD joint sealing tape.
Ensure that all openings (interface gaps) are sealed.
The internal plastering and screed works as well as the introduction of loose infill insulation 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. Additional measures such as shading with suitable protective nets on the scaffolding are recommended.
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.
Please note that with the existing construction type, movements may occur due to

- drying out of materials applied when damp,
- thermal and moisture deviations within the building materials and the corresponding shrinkage and expansion behaviour,
- dynamic deformation from horizontal loads (wind load)

as well as swelling of the wood fibre insulation panels due to extremely high levels of diffusion. These influences may cause stresses in the rendering that may lead to hairline cracks in individual cases.

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	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
Luis	G4	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 etc.)	G 4	D4-3	Ø 25 mm	Up to 30 m
	RITMO L plus	B4-2L	Ø 25 mm	Up to 20 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

Insulation material – bonding

Plinth and splash water zone

Inspect / supplement the building waterproof sealing before insulation work. The application of ETICS in the splash water zone is only permissible, if it can be assured that the thermal insulation material is not exposed to moisture. Otherwise the thermal insulation material in this zone must be replaced by a suitable material (e.g. Knauf plinth insulation board or EPS insulating material). A plinth insulation board must be used in the plinth or splash water zone.

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 work.
Insulation material more than 150 mm above the edge of the ground line must be additionally anchored with dowels.

Notes

For further information on the installation and application of insulation panels and plaster system in the plinth area, see pages 38 to 59.

Observe the following guidelines:

- Guideline “Façade plinth render/External components” (German only), issued by Fachverband der Stuckateure für Ausbau und Fassade Baden-Württemberg
- DIN 18533
- DIN 68800-2
- BDF leaflet 03-04 “Plinth constructions acc. to DIN 68800-2” of the German Bundesverband Deutscher Fertigbau e. V.
- DHV leaflet “Praxisgerechte Sockelausbildung - practical plinth acc. to DIN 68800 and DIN 18533-1” of the Deutschen Holzfertigbau-Verbandes e. V.
- “Informationsdienst Holz – Holzrahmenbau - *information service or wood and wood frame construction*” from the German Informationsvereins Holz e. V.

Insulation material – application

The substrate must be stable, dry, even and sufficiently wide enough for attachment.
The construction timbers or exterior wall components must have a moisture level in the wood of ≤ 20 %.
Apply the insulation panels when dry (board moisture < 13 % by mass), dust free according to manufacturers guidelines. Observe the notes on exposure to outdoor weather (see page 40). Dry cleaning of soiled surfaces only.
The boards must be worked in the dry state. Should there be slight damage on the board ends, the loose fibre materials must be removed before joining the boards to ensure tight joints.
The substrate temperature must be ≥ 0 °C when placing a dowel.

Back-ventilation of the system level should be avoided both with the installation on a wooden frame as well as on surface substrates, so that the boards do not warp and curl due to different levels of moisture on both surfaces. This can lead to problems associated with deformation and imperfections and can impair the airtightness of the ETICS reducing the effectiveness of the insulation.

Install the plinth connection end profile horizontally and fix using suitable fasteners at spacings of approx. 300 mm. 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.
As an alternative for a thermal-bridge free plinth connection apply the Peri mounting rail with a suitable fastener (see page 58). The Peri plinth connection profile is inserted between the perimeter insulation and the façade insulation panel.

Apply the insulation panels directly to the wooden construction or onto the cladding. Bed the boards aligned with the tongue pointing upwards and joints staggered by ≥ 250 mm on the plinth connection end profile or on the Peri mounting rail (cut off the groove of the first insulation panel row or fill with insulation material strips). The reinforcement can be applied to both sides of the insulation boards. PAVATHERM may only be used as the first layer of a double-layer application on solid wooden substrates. Cross joints, e.g. on opening corners should be avoided. At corners of openings (windows, doors), the insulation boards must be applied so that the board joints are not in the direct vicinity of the corners.
There may be no offsets, open butt joints, cross joints and bed joints, flaws or unevenness present that exceed the specifications of the DIN 18202 “Tolerances in building construction”. Furthermore, there may be no unsupported joints with end to end edges in the surface and the substrate may not deform when the boards are pressed on.

Insulation thicknesses from 40 mm to 80 mm on wooden frame constructions and on solid wooden substrates can be applied with a single layer of ISOLAIR insulation boards as well as insulation thicknesses of 80 mm to 240 mm with PAVAWALL insulation boards. With solid wooden substrates, the entire insulation material thickness may be applied with ISOLAIR insulation panels to maximum of 160 mm and the insulation boards may be double-layers with a joint offset between the first and second insulation board layer of ≥ 100 mm. The second layer of ISOLAIR must be at least 60 mm thick. In case of PAVATHERM used as a first layer and when the second layer of ISOLAIR is at least 60 mm thick, the total insulation material thickness may be a maximum of 200 mm.

Minimum quantity and arrangement of the fasteners acc. to the German National Technical Approval / General type approval Z-33.47-638 (see page 18 to 20). The wind loads result in acc. with EN 1991-1-4 and EN 1991-1-4/NA. The simplified method in acc. with page 17 to 20 can be applied with the corresponding conditions.
Every insulation panel must be fixed to at least two wooden studs (spacing of studs ≤ 625 mm) using at least 6 or 9 broadback staples per stud at vertical spacings ≤ 130 mm with ISOLAIR and ≤ 40 mm or ≤ 60 mm with PAVAWALL and with a staple angle of 30 to 60° or using at least 3 dowels per stud.

Insulation material – application (continued)

With solid wooden substrate and two-layer application, the 1st insulation board layer (ISOLAIR/PAVAWALL or PAVATHERM) should be secured constructively with at least 4 dowels/m² or 8 staples/m². When broadback staples are used only the first insulation board layer may be stapled.
Apply staples and dowels so that they are flush with the surface and consider the required perimeter spacings in accordance to EN 1995-1-1 with EN 1995-1-1/NA. Placement of the fastener on the board joint is not permissible. The anchoring depth is at least 30 mm in all cases. Other fasteners not specified in the National Technical Approval / general type certification Z-33.47-638 are not permissible.
If a board joint is required on the wooden stud, ISOLAIR or PAVAWALL-GF insulation panels should create a butt joint and the staples should be applied directly on the wooden stud on the left and right beside the board joint arranged with a minimum spacing to the middle of the staple of 20 mm (stud width minimum 80 mm, see scheme drawing on pages 44 to 46).

Any joints that may occur up to a maximum width of 5 mm can be sealed with WF Adheseal. In case of joints exceeding 5 mm width, use make-up pieces made of equivalent insulation material and glue them with a frictional bond using WF Adheseal.
Grind any board joint surface unevenness smooth after application. Completely remove any grinding remnants (dust-free).
Corner grooving is unnecessary. Create a butt joint on front ends (cut back the tongues or grooves).

The wood fibre insulation panels may be applied up to 300 mm above the ground line. In case of a reduction of the spacing to the edge of the ground line, the DIN 68800-2 should be observed, see details on pages 21 to 23. Connections to adjacent constructional components should be made driving-rain proof with joint sealing tape FD. Connections, e.g. to window sills, should generally be carried out so that a second water draining or sealing level is provided. In order to allow any resulting water to drain to the exterior, no joint sealing tape FD may be used between the front edge of the façade insulation and the window sill with the second water channelling level. Furthermore, window sills must be rain-proof, e.g. with the aid of plastered in edge profiles featuring a sliding function.

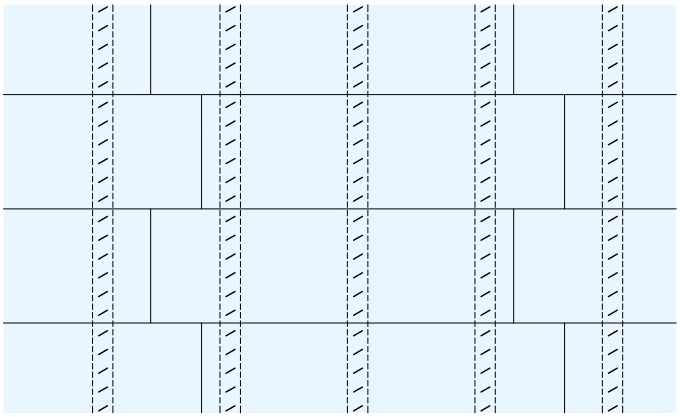
Plinth and splash water zone

Apply additional constructional, mechanical fixing of the 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 plinth (2 dowels per board).

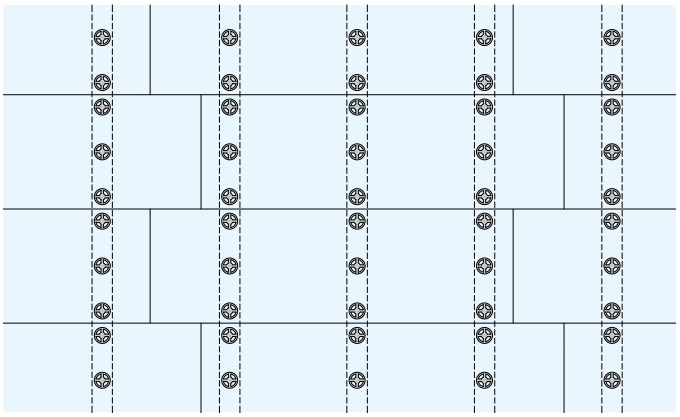
Notes	Wet, soiled or damaged insulation panels may not be installed. For rating and selection of the fasteners, see pages 17 to 20. Furthermore, the specifications on material and application of the insulation panels must be observed: pavatex.de

Non-supported joints with tongue and groove

Staples

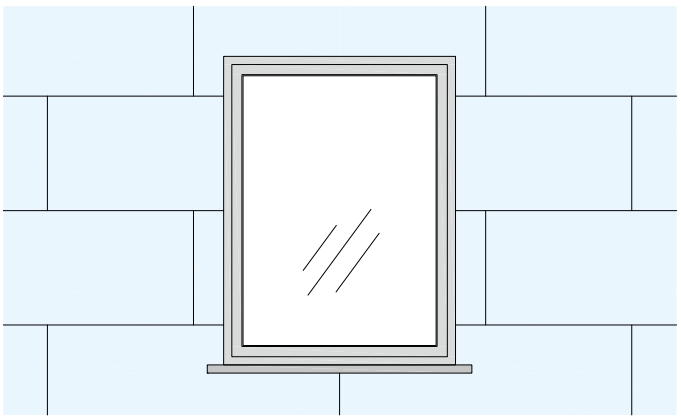


Dowels



Fix the insulation boards to at least two wooden studs, refer to tables on pages 18 to 20 for the required number of fasteners.

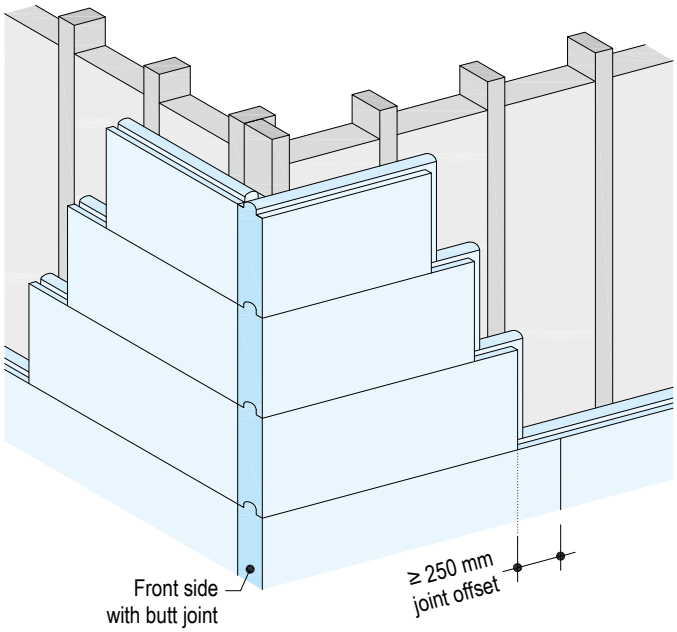
Window and door openings



Avoid cross joints

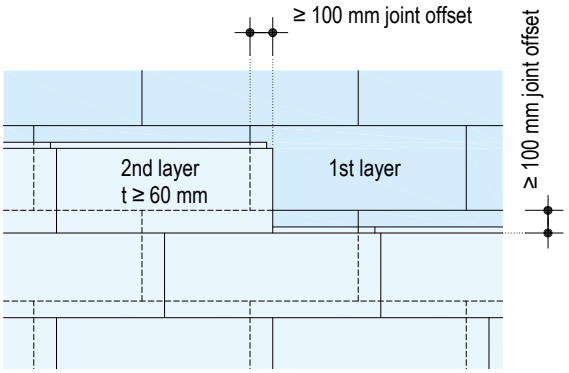
Insulation material – application (continued)

Corner configuration



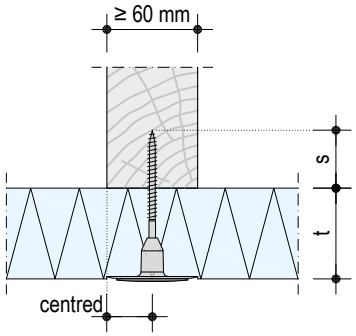
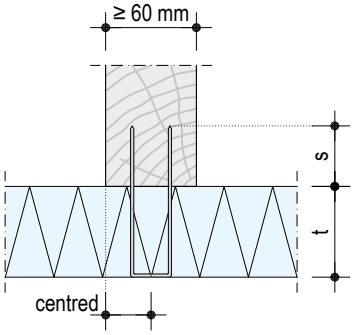
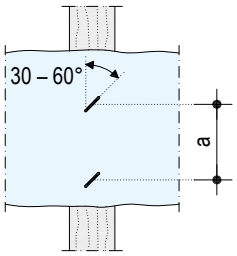
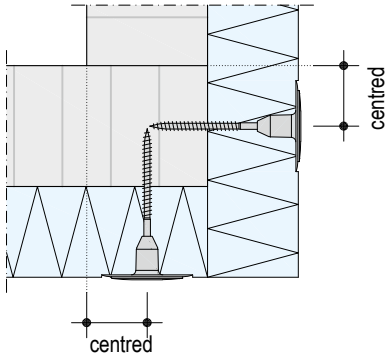
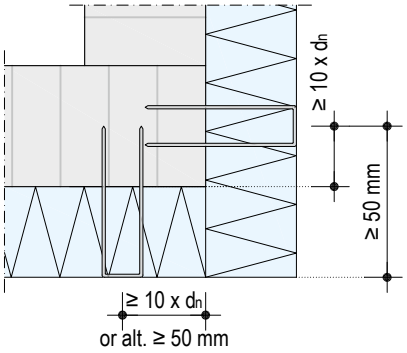
Two-layer application

Substrate	Total insulation thickness	1st layer		2nd layer	
	t mm	Insulation material	Thickness mm	Insulation material	Thickness mm
Solid wooden substrate	100 – 160	ISOLAIR	40 – 80	ISOLAIR	60 – 80
	100 – 200	PAVATHERM	40 – 120	ISOLAIR	60 – 80



Insulation material – application (continued)

Fasteners Scheme drawings

Dowels Schraubdübel STR H (acc. to abZ), **Schraubdübel 6H**	**Broadback staples** (acc. to EN 14592)
Timber frame construction 	**Timber frame construction**  
Solid wooden substrate 	**Solid wooden substrate** 
■ Dowel the 1st and/or 2nd insulation board layer respectively ■ Always place screw dowels on the board surface ■ Highest permissible vertical spacing a of the dowel with PAVAWALL-GF and PAVAWALL-BLOC: ≤ 200 mm	■ Only staple the 1st insulation board layer (always apply dowels for the 2nd layer) ■ Always place dowels on the board surface ■ Apply staples flush with the board

Highest permissible vertical spacing:
- ISOLAIR: a ≤ 130 mm
- PAVAWALL-GF, PAVAWALL-BLOC
  - Wind suction w_{ek} ≤ 1.00 kN/m²: a ≤ 60 mm
  - Wind suction w_{ek} ≤ 1.60 kN/m²: a ≤ 40 mm

t = insulation material thickness

t_n = rated diameter of a staple arm ≥ 1.8 mm

s = anchoring depth ≥ 30 mm

The EN 1995-1-1 and EN 1995-1-1/NA apply for the required perimeter spacings.

Insulation material – Exposure to outdoor weather

Boards may be exposed to outdoor weather for a maximum of 30 days. A prerequisite is the professionally applied sealing of the joints and connections to avoid damage to the overall construction. Furthermore, the board moisture directly before application of the render must be < 13 % by mass, measured e.g. with measurement device Hydromette BL H 41. The properties of the boards change with a high level of material moisture.

During unfavourable weather conditions with poor evaporation performance, the exposure to outdoor weather is limited to 14 days.

By a surface-pressed application and the application of the entire reinforcement layer render thickness of at least 7 mm with mesh reinforcement, a maximum exposure to outdoor weather of 6 months is possible.

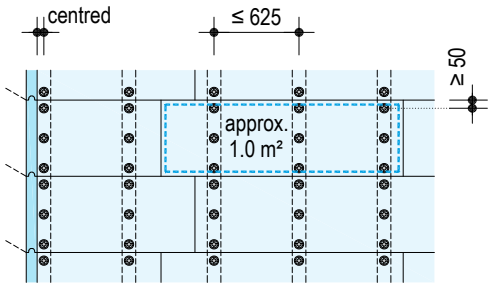
Before application of the top coat the substrate properties must be tested (suction properties, level of soiling). A suitable primer is necessary if required. Alternatively, a sheet which is open to diffusion can be used as a temporary weather protection foil. Formation of condensation must be avoided.

Open areas must be protected against permanent exposure to weather during installation (e.g. window reveals / parapets)

Insulation material – application (continued)

Timber frame construction (with/without board material) – Schraubdübel dowel

Scheme drawings I Dimensions in mm

Minimum required quantity according to the rating of the fasteners on page 17 to 20	**Single layer application** Cover dimension: 560 x 1780 mm	**Remark**
ISOLAIR		
6 – 9 dowels/m²		According to approval each insulation board (single- or double layer) has to be attached to at least two wooden studs with at least 3 dowels per stud (9 dowels/board with a board size of 1.0 m²).

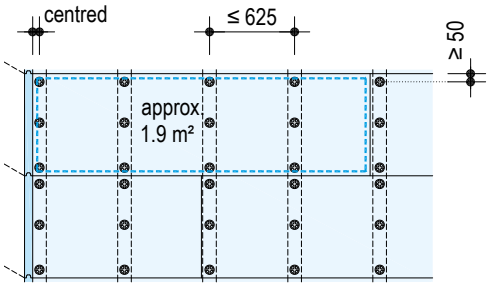
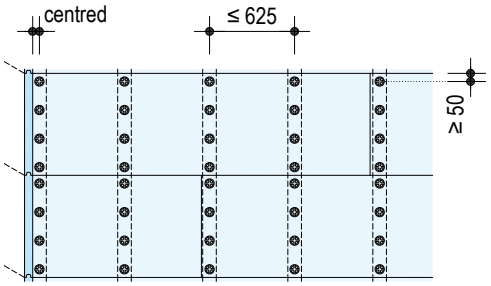
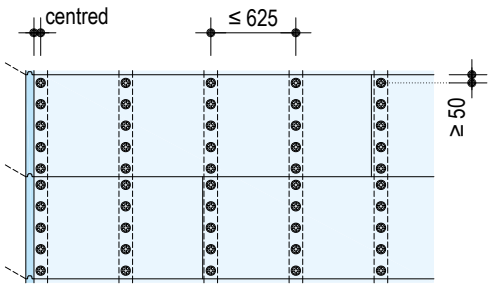
Dowel rating online see: knauf.de/duebelrechner.

Notes	The specified dimensions are based on the insulation panel edge/distance between centres of the dowel or staple centres. Placement of the fastener on the board joint is not permissible. Board joints on the wooden studs must be applied as butt joints. Required perimeter spacings acc. to EN 1995-1-1 and EN 1995-1-1/NA. For rating and selection of the fasteners, see pages 17 to 20.

Insulation material – Application (continued)

Timber frame construction (with/without board material) – Schraubdübel dowel

Scheme drawings I Dimensions in mm

Minimum required quantity according to the rating of the fasteners on page 17 to 20	Single layer application Cover dimension: 750 x 2480 mm	Remark
ISOLAIR		
6 dowels/m²		According to approval each insulation board (single- or double layer) has to be attached to at least two wooden studs with at least 3 dowels per stud (12 dowels/board with a board size of 1.9 m²).
7 – 8 dowels/m²		According to approval each insulation board (single- or double layer) has to be attached to at least two wooden studs with at least 3 dowels per stud (16 dowels/board with a board size of 1.9 m²).
9 – 10 dowels/m²		According to approval each insulation board (single- or double layer) has to be attached to at least two wooden studs with at least 3 dowels per stud (20 dowels/board with a board size of 1.9 m²).

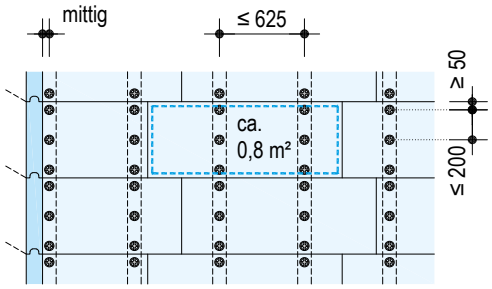
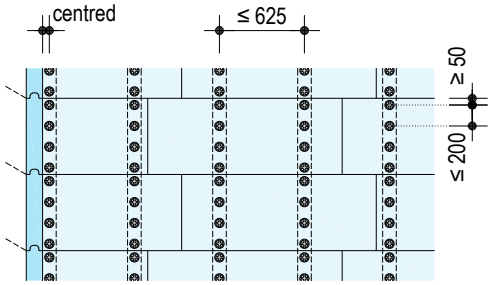
Dowel rating online see: knauf.de/duebelrechner.

Notes	The specified dimensions are based on the insulation panel edge/distance between centres of the dowel or staple centres. Placement of the fastener on the board joint is not permissible. Board joints on the wooden studs must be applied as butt joints. Required perimeter spacings acc. to EN 1995-1-1 and EN 1995-1-1/NA. For rating and selection of the fasteners, see pages 17 to 20.

Insulation material – Application (continued)

Timber frame construction (with/without board material) – Schraubdübel dowel

Scheme drawings I Dimensions in mm

Minimum required quantity according to the rating of the fasteners on page 17 to 20	Single layer application Cover dimension: 560 x 1430 mm	Remark
PAVAWALL-GF		
6 dowels/m²		According to approval each insulation board (single- or double layer) has to be attached to at least two wooden studs with at least 3 dowels per stud (6 dowels/board with a board size of 0.8 m²).
8 dowels/m²		According to approval each insulation board (single- or double layer) has to be attached to at least two wooden studs with at least 3 dowels per stud (8 dowels/board with a board size of 0.8 m²).

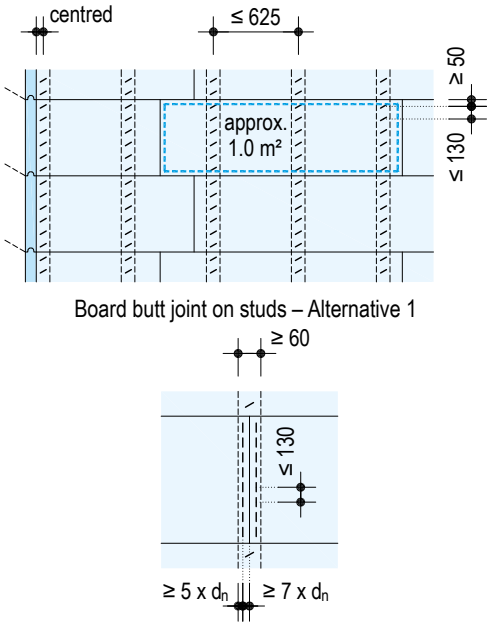
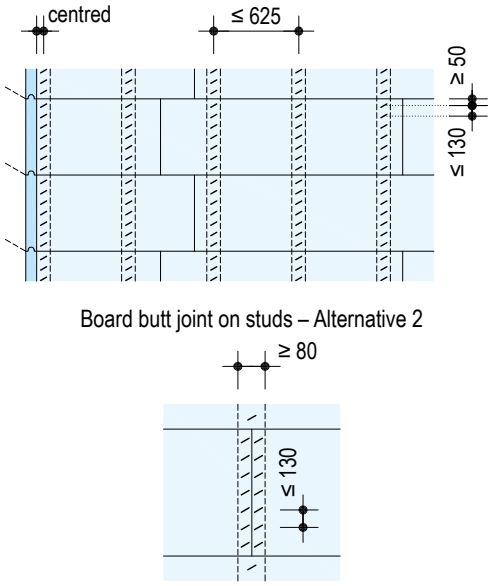
Dowel rating online see: knauf.de/duebelrechner.

Notes	The specified dimensions are based on the insulation panel edge/distance between centres of the dowel or staple centres. Placement of the fastener on the board joint is not permissible. Board joints on the wooden studs must be applied as butt joints. Required perimeter spacings acc. to EN 1995-1-1 and EN 1995-1-1/NA. For rating and selection of the fasteners, see pages 17 to 20.

Insulation material – Application (continued)

Timber frame construction (with/without board material) – broadback staples

Scheme drawings I Dimensions in mm

Minimum required quantity according to the rating of the fasteners on page 17 to 20	Single layer application Cover dimension: 560 x 1780 mm	Remark
ISOLAIR		
17 staples/m²	 Board butt joint on studs – Alternative 1	The vertical permissible stud spacings in accordance with the approval must be observed. Each insulation board has to be attached to at least two wooden studs with 6 staples per stud (18 staples/board with a board size of 1.0 m²)
19 staples/m²	 Board butt joint on studs – Alternative 2	The vertical permissible stud spacings in accordance with the approval must be observed. Each insulation board has to be attached to at least two wooden studs with 7 staples per stud (21 staples/board with a board size of 1.0 m²)

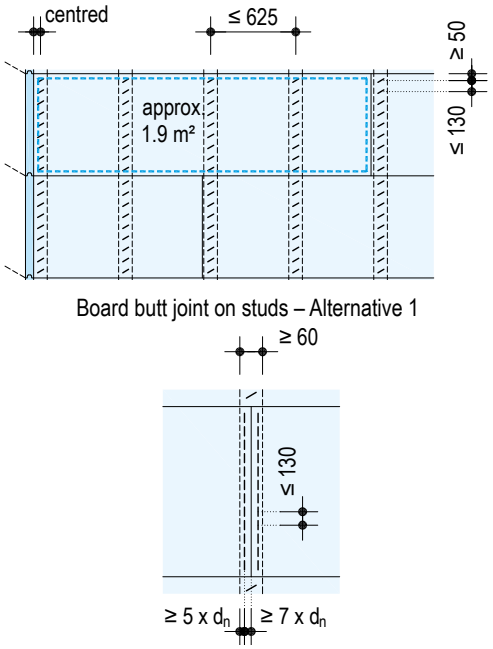
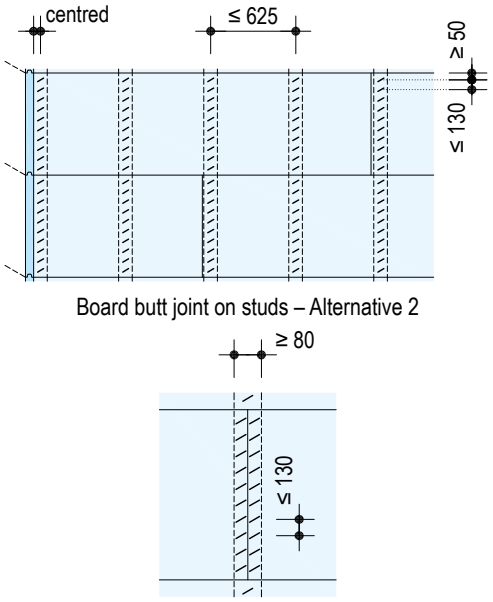
Dowel rating online see: knauf.de/duebelrechner.

Notes	The specified dimensions are based on the insulation panel edge/distance between centres of the dowel or staple centres. Placement of the fastener on the board joint is not permissible. Board joints on the wooden studs must be applied as butt joints. Required perimeter spacings acc. to EN 1995-1-1 and EN 1995-1-1/NA. If the staples are not at an angle of 30° – 60° to the wooden studs in case of board butt joints, increase the number of staples by 30 %. For rating and selection of the fasteners, see pages 17 to 20.

Insulation material – Application (continued)

Timber frame construction (with/without board material) – broadback staples

Scheme drawings I Dimensions in mm

Minimum required quantity according to the rating of the fasteners on page 17 to 20	Single layer application Cover dimension: 750 x 2480 mm	Remark
ISOLAIR		
17 staples/m²	 Board butt joint on studs – Alternative 1	The vertical permissible stud spacings in accordance with the approval must be observed. Each insulation board has to be attached to at least two wooden studs with 9 staples per stud (36 staples/board with a board size of 1.9 m²)
19 staples/m²	 Board butt joint on studs – Alternative 2	The vertical permissible stud spacings in accordance with the approval must be observed. Each insulation board has to be attached to at least two wooden studs with 10 staples per stud (40 staples/board with a board size of 1.9 m²)

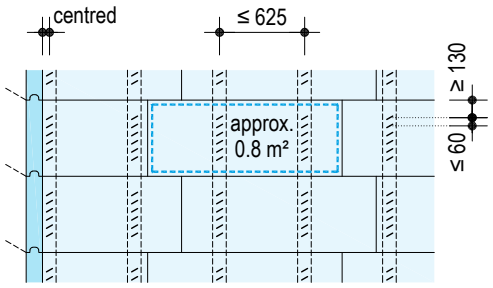
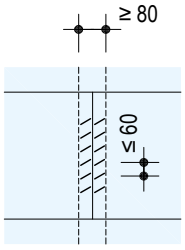
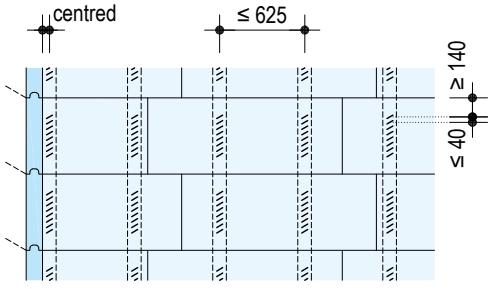
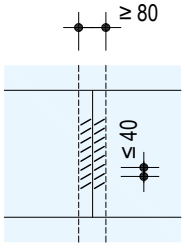
Dowel rating online see: knauf.de/duebelrechner.

Notes	The specified dimensions are based on the insulation panel edge/distance between centres of the dowel or staple centres. Placement of the fastener on the board joint is not permissible. Board joints on the wooden studs must be applied as butt joints. Required perimeter spacings acc. to EN 1995-1-1 and EN 1995-1-1/NA. If the staples are not at an angle of 30° – 60° to the wooden studs in case of board butt joints, increase the number of staples by 30 %. For rating and selection of the fasteners, see pages 17 to 20.

Insulation material – Application (continued)

Timber frame construction (with/without board material) – broadback staples

Scheme drawings I Dimensions in mm

Minimum required quantity according to the rating of the fasteners on page 17 to 20	Single layer application Cover dimension: 560 x 1430 mm	Remark
PAVAWALL-GF		
15 staples/m²	 Board butt joint on studs: 	The vertical permissible stud spacings in accordance with the approval must be observed. Each insulation board has to be attached to at least two wooden studs with 6 staples per stud (12 staples/board with a board size of 0.8 m²)
20 staples/m²	 Board butt joint on studs: 	The vertical permissible stud spacings in accordance with the approval must be observed. Each insulation board has to be attached to at least two wooden studs with 8 staples per stud (16 staples/board with a board size of 0.8 m²)

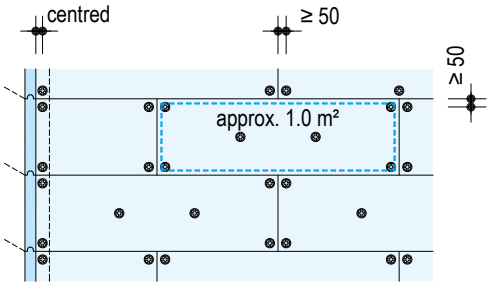
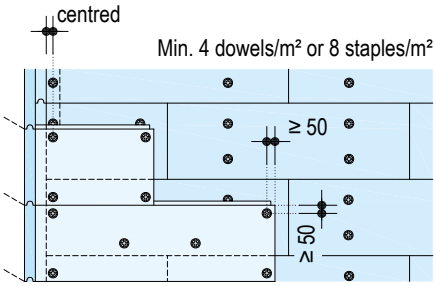
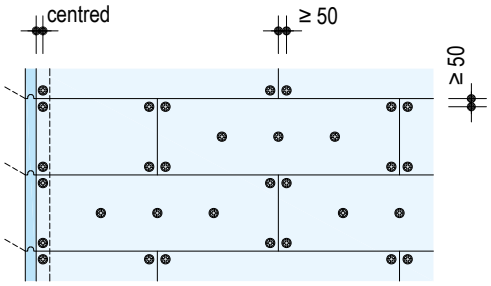
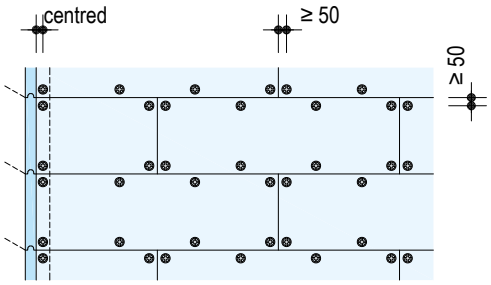
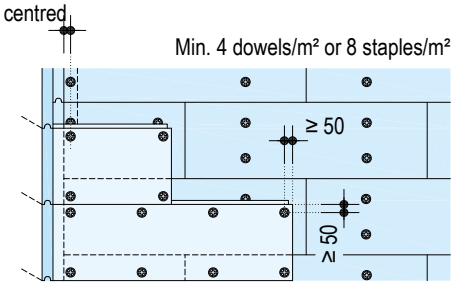
Dowel rating online see: knauf.de/duebelrechner.

Notes	The specified dimensions are based on the insulation panel edge/distance between centres of the dowel or staple centres. Placement of the fastener on the board joint is not permissible.
	Board joints on the wooden studs must be applied as butt joints.
	Required perimeter spacings acc. to EN 1995-1-1 and EN 1995-1-1/NA.
	For rating and selection of the fasteners, see pages 17 to 20.

Insulation material – Application (continued)

Solid wooden substrate – dowels

Scheme drawings I Dimensions in mm

Minimum required quantity according to the rating of the fasteners on pages 17 to 20	Single-layer or double-layer application Cover dimension: 560 x 1780 mm	Remark
ISOLAIR		
6 dowels/m²	**Single layer application** 1st layer: ISOLAIR  **Two-layer application** 1st layer: ISOLAIR 2nd layer: ISOLAIR, board thickness ≥ 60 mm 	6 dowels/board are required.
7 dowels/m²	**Single layer application** 1st layer: ISOLAIR 	7 dowels/board are required.
8 dowels/m²	**Single layer application** 1st layer: ISOLAIR  **Two-layer application** 1st layer: ISOLAIR or PAVATHERM 2nd layer: ISOLAIR, board thickness ≥ 60 mm 	8 dowels/board are required.

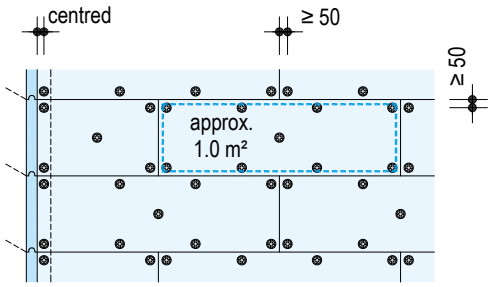
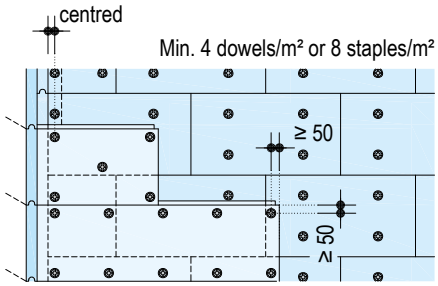
Dowel rating online see: knauf.de/duebelrechner.

Notes	
	The specified dimensions are based on the insulation panel edge/distance between centres of the dowel or staple centres. Placement of the fastener on the board joint is not permissible.
	Board joints on the wooden studs must be applied as butt joints.
	Required perimeter spacings acc. to EN 1995-1-1 and EN 1995-1-1/NA.
	For rating and selection of the fasteners, see pages 17 to 20.

Insulation material – Application (continued)

Solid wooden substrate – dowels

Scheme drawings I Dimensions in mm

Minimum required quantity according to the rating of the fasteners on pages 17 to 20	Single-layer or double-layer application Cover dimension: 560 x 1780 mm	Remark
ISOLAIR		
9 dowels/m²	**Single layer application** 1st layer: ISOLAIR 	9 dowels/board are required.
10 dowels/m²	**Two-layer application** 1st layer: PAVATHERM 2nd layer: ISOLAIR, board thickness ≥ 60 mm 	10 dowels/board are required. Application only possible for the 2nd layer when PAVATHERM is used as the 1st layer.

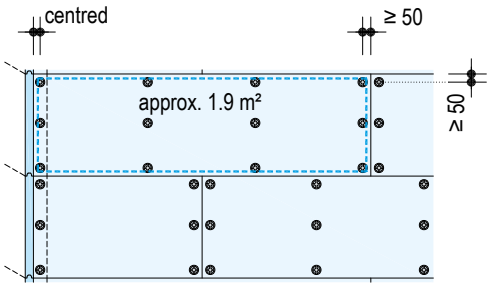
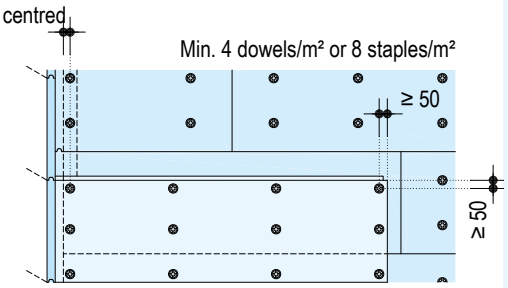
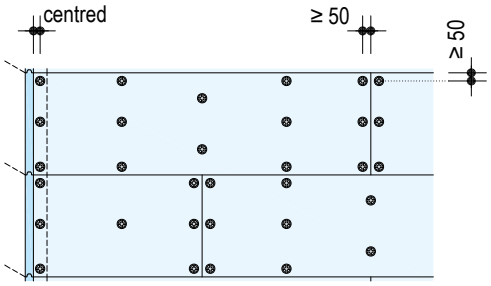
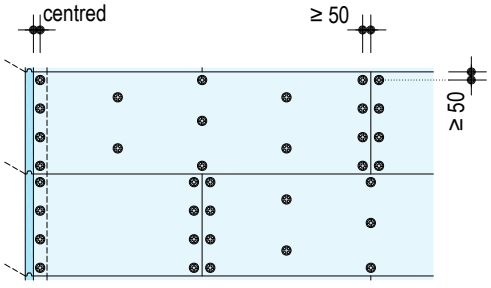
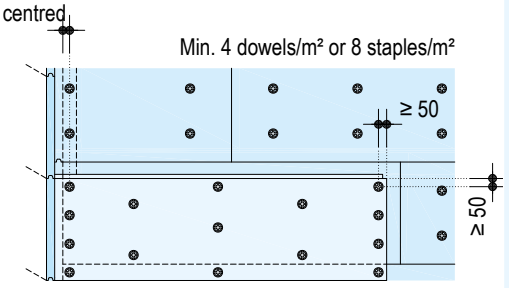
Dowel rating online see: knauf.de/duebelrechner.

Notes	The specified dimensions are based on the insulation panel edge/distance between centres of the dowel or staple centres. Placement of the fastener on the board joint is not permissible. Board joints on the wooden studs must be applied as butt joints. Required perimeter spacings acc. to EN 1995-1-1 and EN 1995-1-1/NA. For rating and selection of the fasteners, see pages 17 to 20.

Insulation material – Application (continued)

Solid wooden substrate – dowels

Scheme drawings I Dimensions in mm

Minimum required quantity according to the rating of the fasteners on pages 17 to 20	Single-layer or double-layer application Cover dimension: 750 x 2480 mm		Remark
ISOLAIR			
6 dowels/m²	**Single layer application** 1st layer: ISOLAIR 	**Two-layer application** 1st layer: ISOLAIR 2nd layer: ISOLAIR, board thickness ≥ 60 mm 	12 dowels/board are required.
7 dowels/m²	**Single layer application** 1st layer: ISOLAIR 		14 dowels/board are required.
8 dowels/m²	**Single layer application** 1st layer: ISOLAIR 	**Two-layer application** 1st layer: ISOLAIR or PAVATHERM 2nd layer: ISOLAIR, board thickness ≥ 60 mm 	15 dowels/board are required.

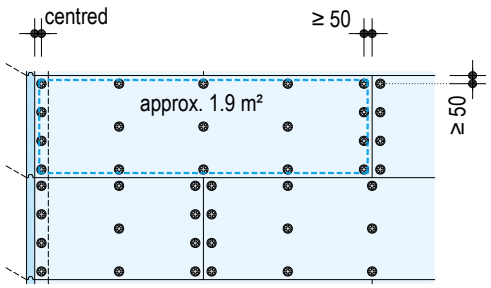
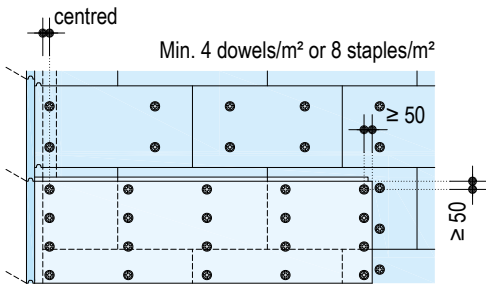
Dowel rating online see: knauf.de/duebelrechner.

Notes	
	The specified dimensions are based on the insulation panel edge/distance between centres of the dowel or staple centres. Placement of the fastener on the board joint is not permissible.
	Board joints on the wooden studs must be applied as butt joints.
	Required perimeter spacings acc. to EN 1995-1-1 and EN 1995-1-1/NA.
	For rating and selection of the fasteners, see pages 17 to 20.

Insulation material – Application (continued)

Solid wooden substrate – dowels

Scheme drawings I Dimensions in mm

Minimum required quantity according to the rating of the fasteners on pages 17 to 20	Single-layer or double-layer application Cover dimension: 750 x 2480 mm	Remark
ISOLAIR		
9 dowels/m²	**Single layer application** 1st layer: ISOLAIR 	17 dowels/board are required.
10 dowels/m²	**Two-layer application** 1st layer: PAVATHERM 2nd layer: ISOLAIR, board thickness ≥ 60 mm 	20 dowels/board are required. Application only possible for the 2nd layer when PAVATHERM is used as the 1st layer.

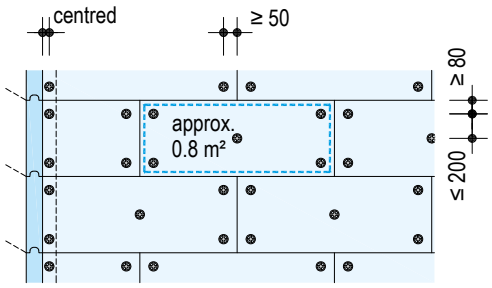
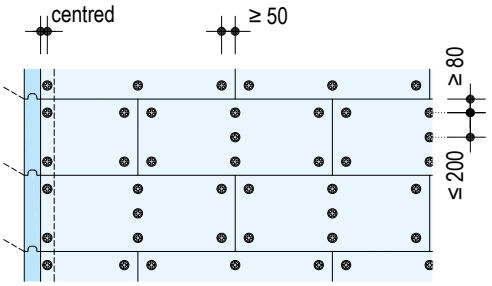
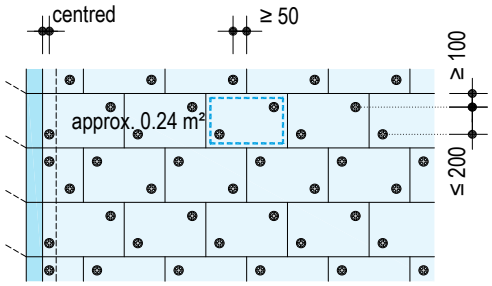
Dowel rating online see: knauf.de/duebelrechner.

Notes	The specified dimensions are based on the insulation panel edge/distance between centres of the dowel or staple centres. Placement of the fastener on the board joint is not permissible. Board joints on the wooden studs must be applied as butt joints. Required perimeter spacings acc. to EN 1995-1-1 and EN 1995-1-1/NA. For rating and selection of the fasteners, see pages 17 to 20.

Insulation material – Application (continued)

Solid wooden substrate – dowels

Scheme drawings I Dimensions in mm

Minimum required quantity according to the rating of the fasteners on page 17 to 20	Single layer application Cover dimension PAVAWALL-GF: 560 x 1430 mm Format PAVAWALL-BLOC: 400 x 600 mm	Remark
PAVAWALL-GF		
6 dowels/m²		The vertical permissible stud spacings in accordance with the approval and sufficient fastening of at least the vertical board edges must be observed. 5 dowels/board are required.
8 dowels/m²		The vertical permissible stud spacings in accordance with the approval and sufficient fastening of at least the vertical board edges must be observed. 7 dowels/board are required.
PAVAWALL-BLOC		
6 – 8 dowels/m²		The vertical permissible stud spacings in accordance with the approval and sufficient fastening of at least the vertical board edges must be observed. 2 dowels/board are required.

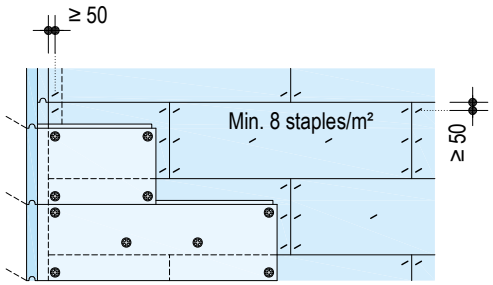
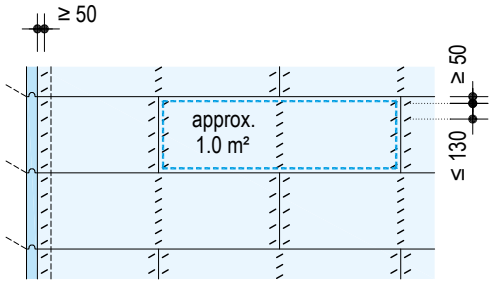
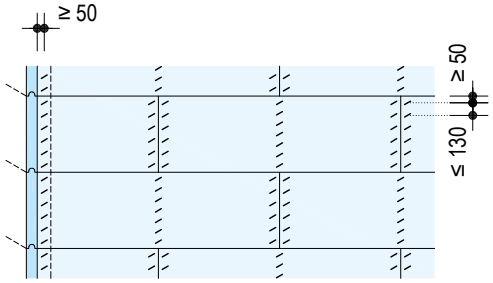
Dowel rating online see: knauf.de/duebelrechner.

Notes	
	The specified dimensions are based on the insulation panel edge/distance between centres of the dowel or staple centres. Placement of the fastener on the board joint is not permissible.
	Board joints on the wooden studs must be applied as butt joints.
	Required perimeter spacings acc. to EN 1995-1-1 and EN 1995-1-1/NA.
	For rating and selection of the fasteners, see pages 17 to 20.

Insulation material – Application (continued)

Solid wooden substrate – broadback staples

Scheme drawings I Dimensions in mm

Minimum required quantity according to the rating of the fasteners on pages 17 to 20	Single-layer or double-layer application Cover dimension: 560 x 1780 mm	Remark
ISOLAIR		
8 staples/m²	**Two-layer application** 1st layer: ISOLAIR or PAVATHERM 2nd layer: ISOLAIR, board thickness ≥ 60 mm 	With double-layer application the staples may only be applied to the first insulation board layer.
17 staples/m²	**Single layer application** 1st layer: ISOLAIR 	The vertical permissible stud spacings in accordance with the approval and sufficient fastening of at least the vertical board edges must be observed. Constructively 17 staples/board are required.
19 staples/m²	**Single layer application** 1st layer: ISOLAIR 	The vertical permissible stud spacings in accordance with the approval and sufficient fastening of at least the vertical board edges must be observed. Constructively 19 staples/board are required.

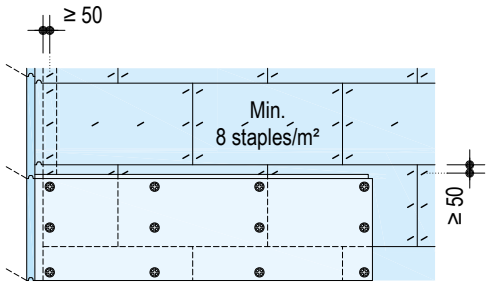
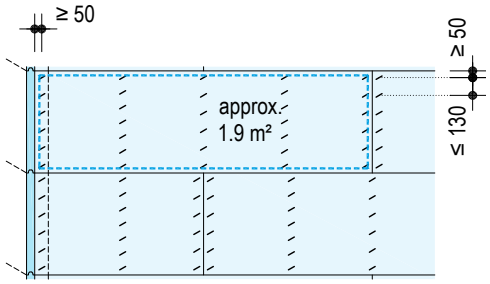
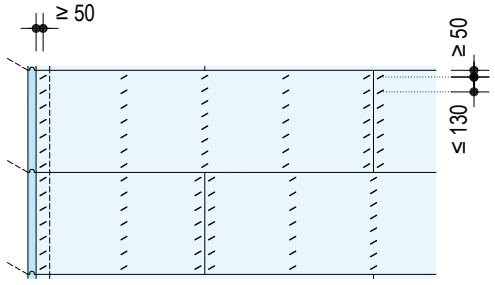
Dowel rating online see: knauf.de/duebelrechner.

Notes	
	The specified dimensions are based on the insulation panel edge/distance between centres of the dowel or staple centres. Placement of the fastener on the board joint is not permissible.
	Board joints on the wooden studs must be applied as butt joints.
	Required perimeter spacings acc. to EN 1995-1-1 and EN 1995-1-1/NA.
	For rating and selection of the fasteners, see pages 17 to 20.

Insulation material – Application (continued)

Solid wooden substrate – broadback staples

Scheme drawings I Dimensions in mm

Minimum required quantity according to the rating of the fasteners on pages 17 to 20	Single-layer or double-layer application Cover dimension: 750 x 2480 mm	Remark
ISOLAIR		
8 staples/m²	**Two-layer application** 1st layer: ISOLAIR or PAVATHERM 2nd layer: ISOLAIR, board thickness ≥ 60 mm 	With double-layer application the staples may only be applied to the first insulation board layer.
17 staples/m²	**Single layer application** 1st layer: ISOLAIR 	The vertical permissible stud spacings in accordance with the approval and sufficient fastening of at least the vertical board edges must be observed. Constructively 32 staples/board are required.
19 staples/m²	**Single layer application** 1st layer: ISOLAIR 	The vertical permissible stud spacings in accordance with the approval and sufficient fastening of at least the vertical board edges must be observed. Constructively 36 staples/board are required.

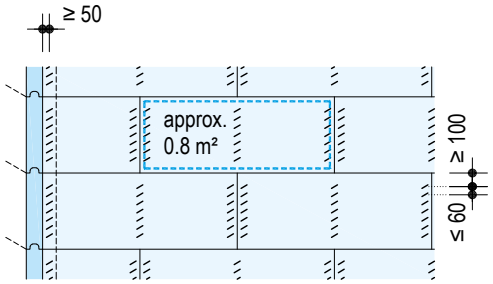
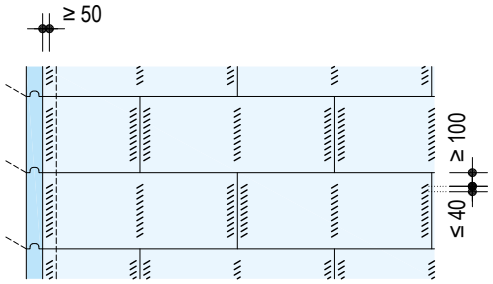
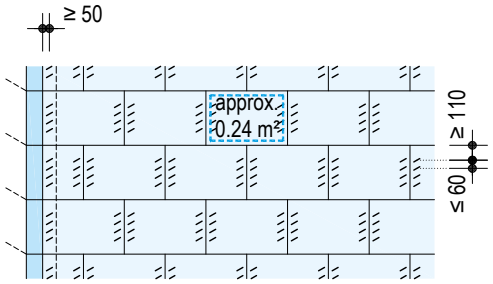
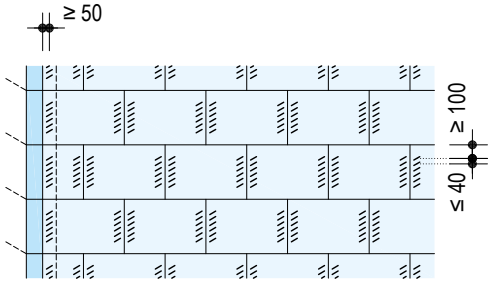
Dowel rating online see: knauf.de/duebelrechner.

Notes	
	The specified dimensions are based on the insulation panel edge/distance between centres of the dowel or staple centres. Placement of the fastener on the board joint is not permissible.
	Board joints on the wooden studs must be applied as butt joints.
	Required perimeter spacings acc. to EN 1995-1-1 and EN 1995-1-1/NA.
	For rating and selection of the fasteners, see pages 17 to 20.

Insulation material – Application (continued)

Solid wooden substrate – broadback staples

Scheme drawings I Dimensions in mm

Minimum required quantity according to the rating of the fasteners on page 17 to 20	Single layer application Cover dimension PAVAWALL-GF: 560 x 1430 mm Format PAVAWALL-BLOC: 400 x 600 mm	Remark
PAVAWALL-GF		
15 staples/m²		The vertical permissible stud spacings in accordance with the approval and sufficient fastening of at least the vertical board edges must be observed. Constructively 21 staples/board are required.
20 staples/m²		The vertical permissible stud spacings in accordance with the approval and sufficient fastening of at least the vertical board edges must be observed. Constructively 30 staples/board are required.
PAVAWALL-BLOC		
15 staples/m²		The vertical permissible stud spacings in accordance with the approval and sufficient fastening of at least the vertical board edges must be observed. Constructively 8 staples/board are required.
20 staples/m²		The vertical permissible stud spacings in accordance with the approval and sufficient fastening of at least the vertical board edges must be observed. Constructively 12 staples/board are required.

Dowel rating online see: knauf.de/duebelrechner.

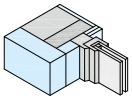
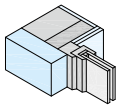
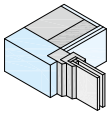
Notes	
	The specified dimensions are based on the insulation panel edge/distance between centres of the dowel or staple centres. Placement of the fastener on the board joint is not permissible.
	Board joints on the wooden studs must be applied as butt joints.
	Required perimeter spacings acc. to EN 1995-1-1 and EN 1995-1-1/NA.
	For rating and selection of the fasteners, see pages 17 to 20.

Driving-rain proof window connection profiles

Selection criteria

Window connection profiles	Features	Total plaster thickness
Duo G10	With shadow gap, two-part profile	6 – 15 mm
Duo G6	With protective lip, 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
Roma	With shadow gap, two-part profile for roller blind guide rails	6 – 10 mm

Application

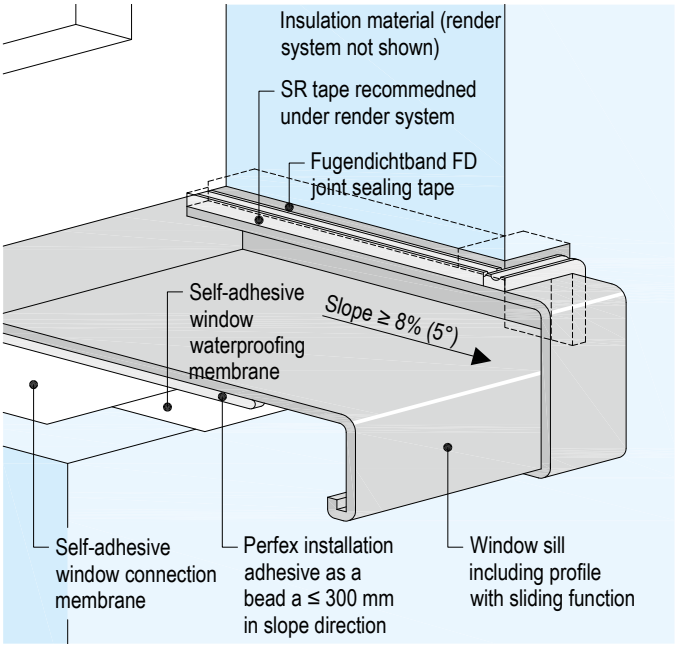
Window connection profiles	Window position in wooden stud									
	Centred			**Flush**			**Projected** (plasterable reveal necessary)			
										
	Maximum insulation material thickness in mm with window size									
	≤ 6 m²	**≤ 10 m²**	**≤ 15 m²**	**≤ 6 m²**	**≤ 10 m²**	**≤ 15 m²**	**≤ 2 m²**	**≤ 6 m²**	**≤ 10 m²**	**≤ 15 m²**
Duo G10	240	240	–	240	240	–	240	240	240	–
Duo G6	240	240	–	240	240	–	240	240	240	–
Milano	240	240	–	240	240	–	240	240	240	–
Universal Pro	240	240	240	240	240	240	240	240	240	240
Roma	240	240	–	240	240	–	240	240	240	–

Note Always apply window connection profiles in timber construction with additional joint sealing tape FD.

Use of adhesively bonded window connection profiles

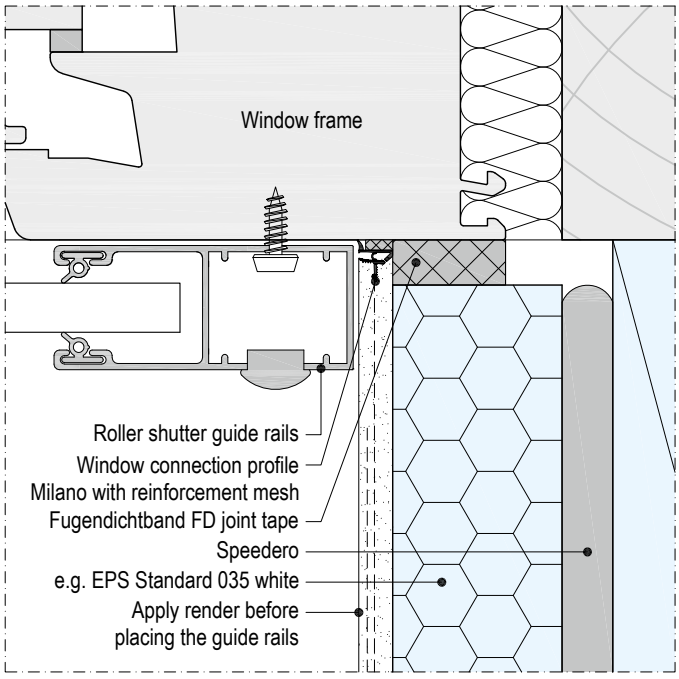
An adhesive bonding test must be performed before the use of adhesively bonded window connection profiles. For this purpose, clean a concealed location with a clean and dry cloth (without cleaning agent). The substrate should be level, dry and dust free. Residues that can affect bonding must be removed. 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 with PUR sealing tape must be used.

Connection to window sill side section



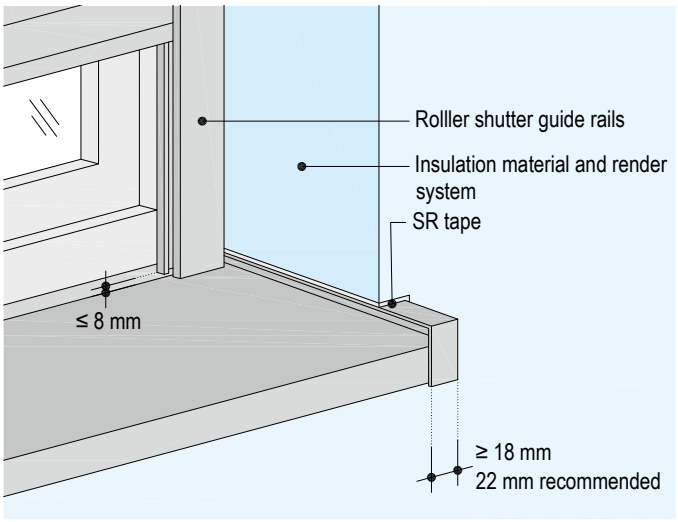
Example: Application in conjunction with a second water channelling level

Window connection with roller blind guide rails



Driving-rain proof window connection profiles (continued)

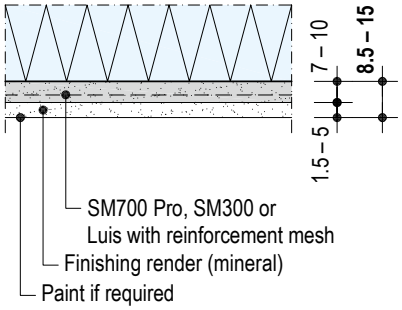
Window connection with roller blind guide rails (continued)



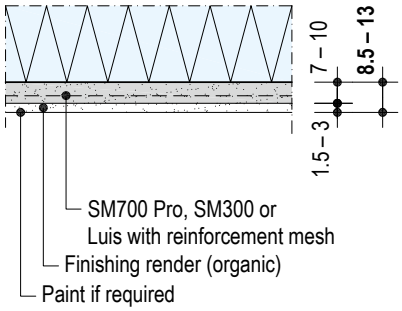
Applied render system

Dimensions in mm

Mineral based



Mineral / organic



Reinforcement layer

Façade reinforcement

System	Basecoat	Layer thickness	Reinforcing mesh	Mesh arrangement in the reinforcement layer	Mesh reinforcement joint overlap
Mineral based	SM300, Luis[1)]	7 mm	See following table[2)]	In the upper third	≥ 100 mm
Mineral / organic	SM700 Pro	7 – 10 mm			

1) The reinforcement thickness is specified in the approval with 5 mm. We always recommend a reinforcement thickness of 7 mm on wood fibre insulation panels.

2) With Noblo 1.5 mm, an additional mesh layer is recommended.

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		
	mm	**100** to **30**	**29** to **25**	**24** to **20**
Noblo Filz, SM700 Pro	1.0	●	●	●●
Noblo Filz	1.5	●	●	●●
Noblo	1.5	●●	●●	●●
	2.0 – 3.0	●	●	●
RP 240	2.0 – 5.0	●	●	●
SP 260 Pro	2.0 – 5.0	●	●	●
MineralAktiv Scheibenputz floated render	1.5 – 3.0	●	●	●
Conni S, Addi S	1.5 – 3.0	●	●	●
Kati S	2.0 – 3.0	●	●	●

● *Single-layer mesh reinforcement*

●● *Double-layer mesh reinforcement*

The insulation panels must have a moisture level of < 13 % by mass when the render is applied. Consider changes in material moisture due to air humidity.

Initially apply basecoat as a surface-pressed layer on the board surface. Then the basecoat layer is subsequently built up as wet plaster on wet plaster.

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 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 upper third of the basecoat layer. Apply a full covering of basecoat to the mesh.

If a double layer of reinforcement is required (see table above), an approx. 4 mm thick basecoat layer is applied to the existing surface-pressed layer in which the reinforcement mesh is applied crease-free and with a joint overlap of approx. 100 mm in the upper third. After the basecoat layer has hardened, the second basecoat mesh is embedded in the second layer basecoat 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 minimum 3 mm 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.

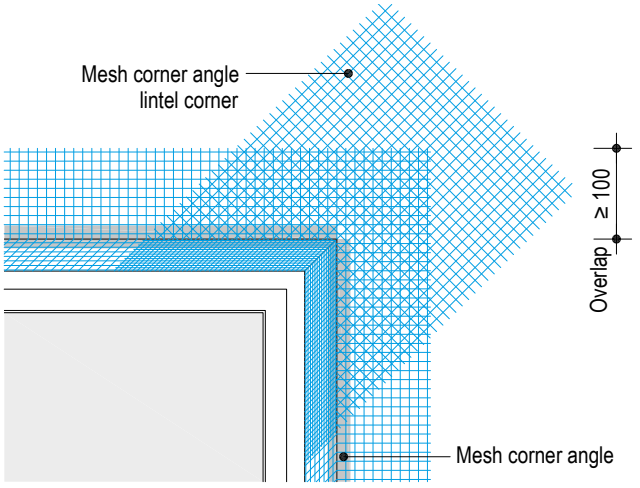
Avoid excessive smoothing of the reinforcement layer to prevent a concentration of fine particles or formation of a sinter layer on the surface. Rub off any burrs that have formed when drying.

Should natural discolourations occur on the reinforcement layer, apply Aton Sperrgrund barrier coating as a plaster primer when dry.

Plaster connections should be separated from the constructional components with a separating tape, separating layer, profiles or similar.

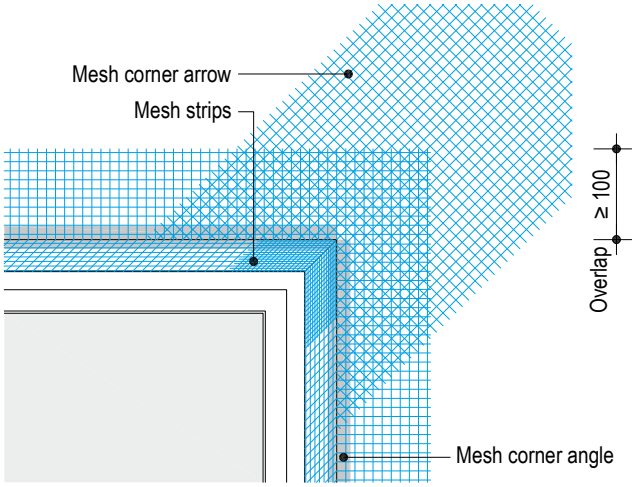
Reinforcement of window lintel/reveal

Image 1 Dimensions in mm



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

Figure 2



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

Reinforcement layer (continued)

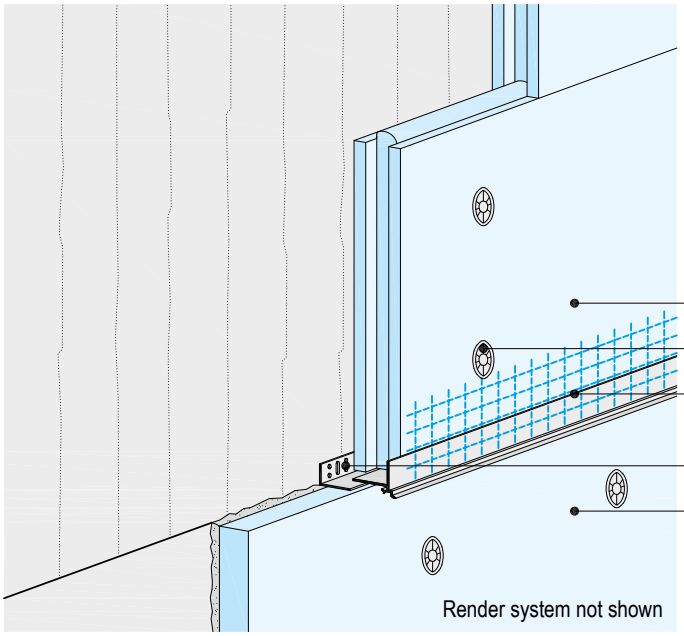
Basecoat drying time

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 a 5 mm basecoat covering the full surface and embed reinforcement mesh 4 x 4 mm or 5 x 5 mm to the entire surface in the upper third of the basecoat. Stagger the joints by 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 façade insulation board, push in the Peri plinth connection profile between the perimeter / plinth insulation and façade insulation or Peri mounting rail and façade insulation, push into the basecoat, 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

Primer

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. With Conni and Kati, apply undiluted Quarzgrund Pro uniformly using a roller or brush and spread crosswise. Avoid streaking. When applying pigmented Conni and Kati, 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	
Noblo Filz (freely styled texture)	3 – 5
Noblo Filz	2 – 5
Noblo, SP 260 Pro, RP 240	Grain size
SM700 Pro (sponged / freely styled texture)	3
Conni S, Addi S, Kati S	Grain size
MineralAktiv Scheibenputz floated render	Grain size
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.*

Final coat (continued)

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).
The plaster connections should be separated from the constructional components with a separating tape, separating layer, profiles or similar.

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 and sponged or freely textured after initial setting.

MineralAktiv Scheibenputz floated render

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.

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 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

Primer

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.
An equalization coat of Siliconharz-EG-Farbe paint must always be applied when the system is used on board materials.
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. “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 vdpm.info/services/downloads/leitfaden. See code of practice “Equalization coats on finishing plasters – colour shade equalization coating” (German only), see 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	Remark	Unit	Quantity as average value WE203Da.de Mineral based	WE203Db.de Mineral / organic
Bonding layer per m², e.g. on bituminous damp-proof membrane						
●[1]		Sockel-Dicht	Full surface application	kg	3.8	
Adhesive per m² plinth adhesive					(40 % – 100 % adhesive area ratio)	
●		SM700 Pro	Max. layer thickness 5 mm	kg	2.9 – 7.1	
●		Luis		kg	2.2 – 3.5	
●		Sockel-SM		kg	4.0 – 8.0	
●[2]		Sockel-SM Pro		kg	4.0 – 8.0	
Insulation material per m²						
●		Plinth insulation panel	Insulation thickness: Up to 200 mm → Integration into the soil: Up to 3 m	m²	1	
	●	ISOLAIR	Thickness 40 – 80 mm	m²	1	
	●	PAVAWALL-BLOC	Thickness 120 – 240 mm	m²	1	
	●	PAVAWALL-GF	Thickness 80 – 160 mm	m²	1	
	●	PAVATHERM[3]	Thickness 40 – 120 mm	m²	1	
Plinth connection per m					Only with recessed plinth	
	●	Plinth connection profile	Projection of 30 to 240 mm	m/m	1	
	●	Plinth profile	Plinth profile with drip edge and reinforcement mesh for plaster thicknesses 10 mm or 14 mm	m/m	1	
	●	Assembly kit plinth end profiles	Fasteners	Set/m	0.04	
	●	Peri plinth end profile	For plaster thicknesses 7 or 17 mm	m/m	1	
	●	Peri installation rail	Plastic profile for supporting Peri plinth connection profile, projection of 50 to 200 mm	m/m	1	
Fasteners per m² façade insulation material[4]						
●		Schlagdübel CNplus 8 insulation anchor nail	Anchoring depth s ≥ 35 mm, ≥ 55 mm for categories D and E	pcs	2 dowels per plinth insulation board from a height of 150 mm above the edge of the ground line on solid substrates	
●		Schraubdübel STR U 2G dowel	Anchoring depth s ≥ 25 mm, ≥ 65 mm for category E			
●[5]	●	Schraubdübel STR H dowel	Anchoring depth s ≥ 30 mm		Number of fasteners dependent on the wind load, see tables on pages 18 to 20	
●[5]	●	Schraubdübel 6H dowel	Anchoring depth s ≥ 30 mm			
●[5]	●	Broadback staples[6]	Anchoring depth s ≥ 30 mm			

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) Insulation board may only be used as the first layer of a double-layer application on solid wooden substrates.

4) 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.

5) For the plinth area with wooden substructure and plinth insulation board.

6) Steel staples acc. to DIN EN 14592, b_r ≥ 27.5 mm, d_n ≥ 1.8 mm, l_n ≥ 75 mm, anchoring depth at least 30 mm, made of stainless steel.

Material requirement without allowance for loss and waste (continued)

Plinth	Façade	System components		Remark	Unit	Quantity as average value WE203Da.de Mineral based	WE203Db.de Mineral / organic
Basecoat per m²							
●	●	SM300		Layer thickness 7 mm	kg	10.5	10.5
●	●	SM700 Pro		Layer thickness 7 – 10 mm	kg	10.0 – 13.0	10.0 – 13.0
●	●	Luis		Layer thickness 7 mm	kg	10.0	10.0
●		Sockel-SM		Layer thickness 5 – 7 mm	kg	7.0 – 10.0	7.0 – 10.0
●[1]		Sockel-SM Pro		Layer thickness 5 mm	kg	8.0	8.0
Reinforcement mesh per m²							
●	●	Reinforcement mesh 4 x 4 mm		100 mm joint overlap	m²	1.1	1.1
●	●	Reinforcement mesh 5 x 5 mm		100 mm joint overlap	m²	1.1	1.1
Primer per m²							
●	●	Isogrund (recommended)		Diluted: 1:1 with water	kg	(0.1)	–
●	●	Quarzgrund Pro[2]		Undiluted	kg	0.17	0.17
Finishing coat per m²							
●	●	SM700 Pro sponged / freely styled texture	**Grain size** 1.0 mm	Layer thickness 3 mm	kg	4.2	–
●	●	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	–
●	●	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[3]	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	–
●	●	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	–
●	●	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
●	●	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
●	●	Kati S	2.0 mm	Layer thickness 2 mm	kg	–	3.0
			3.0 mm	Layer thickness 3 mm	kg	–	3.8

1) Only in conjunction with Sockel-SM Pro as a final coat. In case of total thickness ≥ 7 mm, moisture protection with Sockel-Dicht is unnecessary.

2) With a coloured finishing top coat Quarzgrund Pro in the same colour shade is recommended.

3) Additional mesh layer in basecoat is recommended.

Material requirement without allowance for loss and waste (continued)

Plinth	Façade	System components		Remark	Unit	Quantity as average value WE203Da.de Mineral based	WE203Db.de Mineral / organic
Finishing coat per m²							
			Grain size				
●[1]		Sockel SM Pro (sponged)	1.0 mm	Layer thickness 2 mm	kg	3.0	–
●[2]		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
Coat per m²							
●	●	Siliconharz-EG-Farbe		Single coat[3]	l	0.17 – 0.22[4]	0.17 – 0.22[4]
●	●	Autol		Double coat	l	0.25 – 0.40	0.25 – 0.40
●	●	Minerol		Double coat	l	0.25 – 0.40	0.25 – 0.40[5]
●	●	MineralAktiv Fassadenfarbe paint		Double coat	l	0.28 – 0.40	0.28 – 0.40

1) Only in conjunction with Sockel-SM Pro as a basecoat.

2) Only in conjunction with Sockel-SM as a basecoat.

3) Recommendation: Double coat for enhanced weather-proofing (see "Code of Practice No. 9 - Coatings on mineral renders" from the Bundesausschuss Farbe und Sachwertschutz).

4) A coat of Siliconharz-EG-Farbe paint must be applied when the system is used on board materials.

5) Can only be used on Kati S.

Information on Sustainability

Knauf WARM WALL Natur D

Information on the sustainability of Knauf WARM WALL Natur D

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
- Criterion: Use of sustainable resources / wood
  The wood of the wood fibre façade boards originate from sustainable forestry, FSC certified, PEFC certified

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
- Credit: Certified Wood
  The wood of the wood fibre façade boards originate from sustainable forestry, FSC certified, PEFC certified

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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.