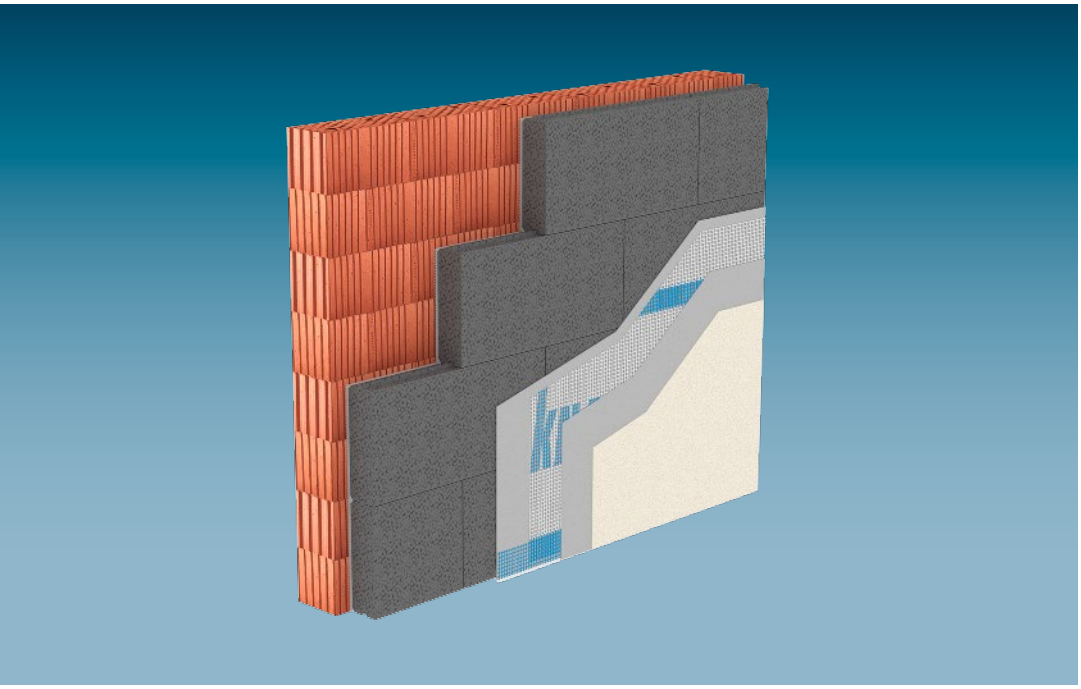


Plaster & Façade Systems

WE111.de

System Data Sheet 12/2023

Knauf WARM WALL Basis EPS in Solid Construction ETICS Systems with Polystyrene Insulation Materials

WE111a.de – With mineral-based render system
WE111b.de – With organic render system
WE111c.de – With mineral-based / organic-based render system
WE111d.de – With mineral-based scratch render system

Note on English translation / Hinweise zur englischen Fassung

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

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

Contents

Notes on the document

Using technical documentation

Knauf system data sheets are the planning and application basis for Knauf systems. The contained information and specifications, constructions, details and stated products are based 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. Furthermore, 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 if necessary to suit the constructional features on site. Ancillary trades are only represented schematically.

Explanation of terms

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

- Finish coat with paint coat instead of a final coating

Abbreviations used in the document:

- EAD: European Assessment Document
- EPS: Expanded polystyrene
- GEG: German energy saving ordinance
- GOK: Edge of the ground line
- HWL boards: Wood wool lightweight boards
- MW: Mineral wool
- VDPM: Verband für Dämmsysteme, Putz und Mörtel e. V. - Federation for Insulation Systems, Plaster and Mortar
- ETICS: External thermal insulation composite system

Proofs and technical documentation

Certificates of Usability

Proofs	Description
Z-33.41-81	WARM WALL Basis EPS in Solid Construction, glued system
Z-33.43-82	WARM WALL Basis EPS in Solid Construction, glued and dowelled system
Z-33.49-981	WARM WALL Doubling up on existing ETICS or cement-bonded wood wool panels
Z-33.49-1505	ETICS doubling up system of the VDPM (association approvals)

Knauf system documentation

Link to download	Description
Knauf WARM WALL Render Systems AWF11.de	Selection and application of suitable render products and systems
Knauf WARM WALL Basis EPS in solid constructions WE111-E01.de	ETICS doubling-up system with EPS insulation materials on old ETICS or wood wool lightweight board
Knauf WARM WALL ceramic and natural stone in solid constructions WE101e.de	ETICS systems with mineral wool and EPS insulation materials and hard cladding
Knauf WARM WALL Plus MW in solid constructions WE112.de	ETICS systems with mineral wool insulation materials and plaster lining

Knauf product data sheets

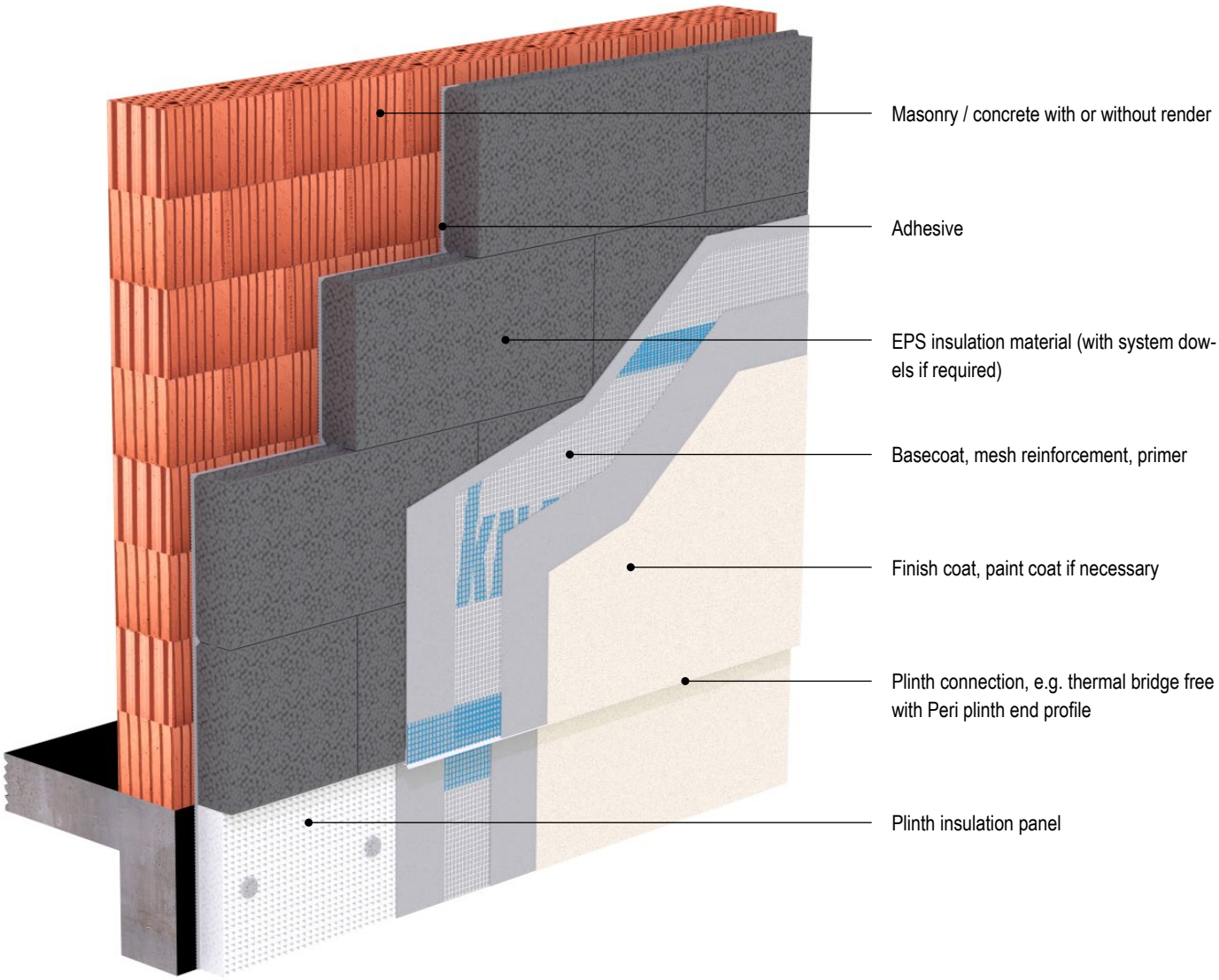
Observe the product data sheets of the Knauf system components.

Field of application

Knauf WARM WALL Basis EPS is a building authority approved external thermal insulation composite system (ETICS) with insulation materials made of expanded polystyrene (EPS) on exterior walls made of masonry and concrete with or without plaster. The façade insulation panels are either glued onto the substrate or dowelled as well as glued. In addition to panels with end to end edges, there are also panels with tongues and grooves. A tongue and groove design guarantees a safe and fast insulation panel bond with a flat surface. The mortar pocket on the back of the panel prevents thermal bridges as the adhesive does not penetrate into the panel joints. The WARM WALL Basis EPS system can be employed as a not easily flammable system up to the high-rise building limit. The building height is dependent on the respective applicable state building code.

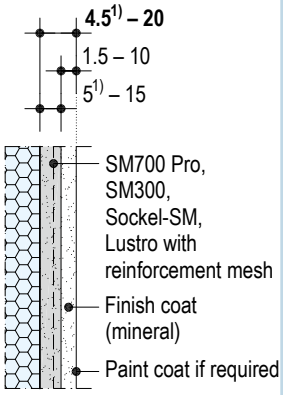
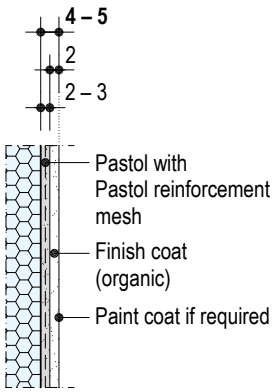
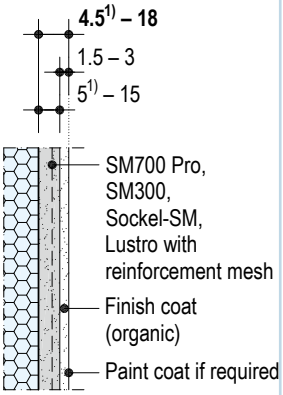
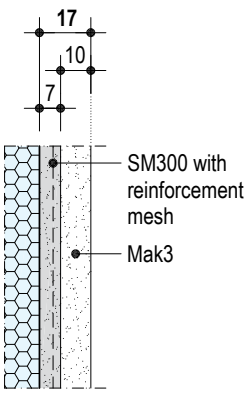
System properties

- Reaction to fire of ETICS depending on the version is not easily flammable (building material class B1) or flammable (building material class B2), refer to table page 9
- Maximum insulation material thickness: 400 mm
- Sound insulation: With enhanced requirements the use of elasticized insulation materials (EPSe) in conjunction with thick-layer plaster systems is recommended.



System components

Scheme drawings I Dimensions in mm

Knauf system	WE111a.de Mineral-based	WE111b.de Organic-based	WE111c.de Mineral-/organic-based	WE111d.de Scratch render
Render system				
Properties	Natural mineral, thin-layer rendering mortar made of high-quality mineral-based raw materials optionally available with Jura or marble graining. Robust, durable, open to diffusion with a variable design render surface. Combined with a mineral reinforcement (basecoat) layer.	Synthetic resin bonded, diffusion capable plaster system with low absorption of water. Optional use of silicon resin render or synthetic resin plaster for a larger range of colour shades.	Organically bonded finishing plaster for a more intensive range of colour shades. Combined with a mineral reinforcement (basecoat) layer.	Classic, thick-layer mineral scratch render system with an open surface structure. Natural self-cleaning effect, highly robust system and highest level of sound insulation. Combined with a mineral reinforcement (basecoat) layer.
Reaction to fire/ building material class ETICS	Flammable B2, not easily flammable B1 (see from page 9)			
Maximum total insulating material thickness t	400 mm, with elasticized panels 200 mm			
Exterior wall				
Adhesive	SM700 Pro, SM300, Pastol, Lustro, Duo-Kleber adhesive, Sockel-SM, Speedero adhesive foam			
Insulation materials EPS	Nut&Feder, Standard, SunJa (grey board with white EPS upper layer)			
System dowel (if necessary)	CNplus 8 insulation anchor nail, STR U 2G dowel, HTR-P dowel, TERMOZ SV II Ecotwist dowel			
Basecoat	SM700 Pro, SM300 Sockel-SM, Lustro	Pastol	SM700 Pro, SM300 Sockel-SM, Lustro	SM300
Reinforcement mesh	4x4 mm, 5x5 mm	Reinforcing mesh Pastol	4x4 mm, 5x5 mm	4x4 mm, 5x5 mm
Primers	Isogrund (recommended)	Quarzgrund pro	Quarzgrund pro	–
Finish coat	MineralAktiv Scheibenputz floated render, MineralAktiv Scheibenputz Dry floated render, SP 260 Pro, Noblo, Noblo Filz, RP 240 SM700 Pro	Conni S Addi S	Conni S Addi S	Mak3
Paint coat	MineralAktiv Fassadenfarbe façade paint Siliconharz-EG-Farbe paint Autol, Autol TSR Fassadol, Fassadol TSR Minerol	Autol, Autol TSR Fassadol, Fassadol TSR	Autol, Autol TSR Fassadol, Fassadol TSR	–

1) *Plaster system layer thickness from 4.5 mm: Adhesive SM300 or Speedero adhesive foam in conjunction with a layer thickness of SM300 from 3 mm, reinforcement mesh 4x4 mm and finish coats of MineralAktiv Scheibenputz floated render, MineralAktiv Scheibenputz Dry floated render, SP 260 Pro, Noblo, Noblo Filz, RP 240, Conni S or Addi S.*

System components (continued)

Knauf system	WE111a.de Mineral-based	WE111b.de Organic-based	WE111c.de Mineral-/organic-based	WE111d.de Scratch render
Plinth / splash water area				
Adhesive	Sockel-SM Pro or Sockel-SM, SM700 Pro, SM300, Duo-Kleber adhesive			
Insulation material	Sockeldämmplatte 032, Sockeldämmplatte 035			
Plinth connection (with recessed plinth)	Sockel-Abschlussprofil Peri plinth profile (free of thermal bridges), plinth profile and push on plinth profile			
Basecoat	Sockel-SM Pro or Sockel-SM, SM700 Pro, SM300			
Mesh reinforcement, primer, finish coat and decorative paint coat	Like the façade (without Mak3), Butz, Sockel-SM Pro, Sockel-SM			
Plaster seal / moisture protection	Sockel-Dicht (not necessary with Sockel-SM Pro as a basecoat and render finish with a total thickness ≥ 7 mm)			

Thermal insulation – insulation material

Permissible and available products	Application	Rated value of thermal conductivity λ_B W/(m·K)	Dimensions w x l mm	Permissible and available insulation material thicknesses mm
Façade				
EPS Standard 031	Grey, end to end edge	0.031	500 x 1000	40 – 400
EPS Standard 032	Grey, end to end edge	0.032	500 x 1000	40 – 400
EPS Standard 032 BMB	Grey, end to end edge	0.032	500 x 1000	40 – 400
EPS Nut&Feder 032	Grey, tongue and groove	0.032	500 x 1000[1)]	60 – 400
EPS SunJa 032	Grey with white upper layer, end to end edge	0.032	500 x 1000	80 – 200
EPS Standard 034	Grey, end to end edge	0.034	500 x 1000	40 – 400
EPS Standard 035 weiß	White, end to end edge	0.035	500 x 1000	40 – 400
EPSe Standard 032	Elasticized, grey, end to end edge	0.032	500 x 1000	80 – 200
EPS Nut&Feder 032	Elasticized, grey, tongue and groove	0.032	500 x 1000[1)]	80 – 200
EPSe Standard 034	Elasticized, grey, end to end edge	0.034	500 x 1000	80 – 200
Reveal				
PF Slimtherm 022	Phenolic resin, coated fleece	0.022	400 x 1200	20 – 50
PU Slimtherm 024	Polyurethane, uncoated	0.026	500 x 1000	20 – 50
EPS Standard 032	Grey, end to end edge	0.032	500 x 1000	20 – 50
EPS Standard 035 weiß	White, end to end edge	0.035	500 x 1000	20 – 50
Plinth				
Sockeldämmplatte 032[2)]	Grey, end to end edge, rebate edge with thickness > 200 mm	0.032	500 x 1000	40 – 300
Sockeldämmplatte 035[2)]	White, end to end edge, rebate edge with thickness > 200 mm	0.035	500 x 1000	30 – 400
Transoms / fire breaks				
MW Brandriegel 035 plus fire break	Mineral wool panel	0.035	200 x 1200	100 – 300[3)]
MW Wolle 035 plus M2	Mineral wool panel	0.035	400 x 1200	60 – 300
MW Wolle 035 plus LX	Mineral wool panel	0.035	625 x 800 / 400 x 1200	80 – 200
MW Volamit 040	Mineral wool lamella	0.041	200 x 1200	60 – 300

1) Cover dimension 485 mm x 1000 mm.

2) Fire resistance: For B1 system maximum height 900 mm above the edge of the ground line.

3) In case of insulation material thickness > 300 mm, MW Brandriegel 035 plus fire break is glued over the entire surface in two layers with mineral adhesive.

Thermal resistance

Examples

Insulation material	Rated design value of the thermal resistance R_U in $(m^2 \cdot K)/W$ Insulation thickness **t** in mm																		
	40	**60**	**80**	**100**	**120**	**140**	**160**	**180**	**200**	**220**	**240**	**260**	**280**	**300**	**320**	**340**	**360**	**380**	**400**
EPS Standard 031	1.29	1.94	2.58	3.23	3.87	4.52	5.16	5.81	6.45	7.10	7.74	8.39	9.03	9.68	10.32	10.97	11.61	12.26	12.90
EPS Standard 032 EPS Standard 032 BMB	1.25	1.88	2.50	3.13	3.75	4.38	5.00	5.63	6.25	6.88	7.50	8.13	8.75	9.38	10.00	10.63	11.25	11.88	12.50
EPS Nut&Feder 032	–	1.88	2.50	3.13	3.75	4.38	5.00	5.63	6.25	6.88	7.50	8.13	8.75	9.38	10.00	10.63	11.25	11.88	12.50
EPS SunJa 032	–	–	2.50	3.13	3.75	4.38	5.00	5.63	6.25	–	–	–	–	–	–	–	–	–	–
EPS Standard 034	1.18	1.76	2.35	2.94	3.53	4.12	4.71	5.29	5.88	6.47	7.06	7.65	8.24	8.82	9.41	10.00	10.59	11.18	11.76
EPS Standard 035 white	1.14	1.71	2.29	2.86	3.43	4.00	4.57	5.14	5.71	6.29	6.86	7.43	8.00	8.57	9.14	9.71	10.29	10.86	11.43
EPSe Standard 032 EPSe Nut&Feder 032	–	–	2.50	3.13	3.75	4.38	5.00	5.63	6.25	–	–	–	–	–	–	–	–	–	–
EPSe Standard 034	–	–	2.35	2.94	3.53	4.12	4.71	5.29	5.88	–	–	–	–	–	–	–	–	–	–

In the table, using the rated thermal resistance as well as the total thickness of the insulation material you can read off the rated value of the thermal resistance R_U. The sum of all thermal resistances (plaster, masonry, 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 results in the thermal resistance. The inverse value of the thermal resistance is the U value.

Thermal upgrading of existing walls

Existing walls **Exterior walls** Building type	**Density** kg/m³	**Thickness** mm	**Rated value of thermal conductivity** λ_B W/(m·K)	**U value without ETICS**[1] W/(m²·K)	**With WARM WALL Basis EPS** **Minimum insulation material thickness t** in mm With U value[2] ≤ 0.24 W/(m²·K) acc. to GEG Thermal conductivity rated value λ_B in W/(m·K) **0.035**	**0.032**	**0.031**
Concrete	2400	200	2.10	3.40	140	140	140
		250		3.15	140	140	120
Solid brick	1800	240	0.81	2.02	140	120	120
	1800	300		1.76	140	120	120
	1800	365		1.54	140	120	120
Vertical coring bricks	1200	240	0.58	1.63	140	120	120
		300		1.40	140	120	120
	1000	240	0.45	1.37	140	120	120
		300		1.16	120	120	120
Lightweight vertical coring brick	800	240	0.33	1.08	120	120	120
Lime sandstone KSV	1800	240	0.99	2.27	140	120	120
		300		1.99	140	120	120
Lime sandstone KSL	1400	240	0.70	1.85	140	120	120
		300		1.59	140	120	120
Light concrete hollow blocks	1200	240	0.60	1.67	140	120	120
		300		1.43	140	120	120
Light concrete solid brick	1000	240	0.46	1.39	140	120	120
		300		1.18	120	120	120
Normal weight concrete hollow blocks	1800	240	0.92	2.18	140	120	120
		300		1.91	140	120	120
Aerated concrete precision blocks	800	240	0.27	0.92	120	100	100
		300		0.76	120	100	100
	500	240	0.17	0.62	100	100	80
		300		0.51	80	80	80

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

2) Reduction using thermal bridge effect of the dowels not considered.

Thermal upgrading of existing walls (continuation)

Calculation of the required insulation material thickness

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

$$\text{Minimum thickness t in mm} = 1000 \cdot \lambda_{\text{Insulation material}} \cdot \left[\frac{1}{U_{\text{necessary}}} - \frac{t_{\text{Existing wall}}}{\lambda_{\text{Existing wall}}} - \frac{t_{\text{Plaster}}}{\lambda_{\text{Plaster}}} - 0.17\ (\text{m}^2\cdot\text{K})/\text{W} \right]$$

Legend	
$\lambda_{\text{Insulation material}}$	Thermal conductivity rated value of the insulation material in W/(m·K)
$U_{\text{necessary}}$	U value for exterior walls ≤ 0.24 W/(m²·K) acc. to the GEG
$t_{\text{Existing wall}}$	Thickness of the existing wall without ETICS and without plaster in m
$\lambda_{\text{Existing wall}}$	Rated value of thermal conductivity of the existing wall without ETICS and without plaster in W/(m·K)
d_{Plaster}	Thickness of the interior plaster in m
λ_{Plaster}	Thermal conductivity rated value of the interior plaster in W/(m·K)

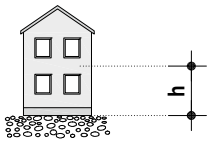
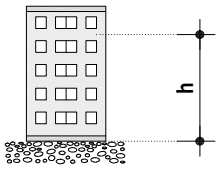
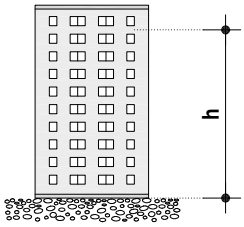
Note	Refer to fe-bis.de for state subsidies for exterior wall insulation

Notes on sound insulation

The rated improvement of the airborne noise insulation $\Delta R_{w,ETICS}$, which has to be considered for the proof of the sound insulation (protection against exterior noise) for the ETICS, is to be determined acc. to DIN 4109-34/A1:2019-12, section 4.3.

Requirements acc. to 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[2)]**

1) The specified heights can be 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).

2) Not possible with WARM WALL EPS Basis, see system data sheet Knauf WARM WALL Plus MW WE112.de.

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

Reaction to fire

When using Knauf WARM WALL Systems with EPS insulation panels, fire protection measures are necessary should the external thermal insulation composite system be configured as a not easily flammable system (B1) according to the building regulation bye-laws. The fire protection measures are intended to protect the not easily flammable façade against fires from the exterior (plinth fires) and from the interior (room fires).

Fire protection requirements for WARM WALL Basis EPS as a B1 system

Overal overview

Option							Requirements				
Adhesive	**Basecoat**	Minimum thickness mm	**Rein-force-ment mesh** mm	**Finish coat**	Minimum thickness mm	**Insulation material** Minimum thickness mm	**Total plas-ter thick-ness** mm	**Fire protection measures**			
								Plinth fire	**Room fire** Fire brakes: Lintel	Fire brakes: Lintel + reveal	Fire break: surround-ing
Adhesive (min-eral-based)	Mineral	≥ 3	4x4 / 5x5	Mineral		40 – 100	≥ 4	●			
		≥ 3	4x4 / 5x5			120 – 300	≥ 4	●	●	●	●
		≥ 3	4x4 / 5x5			320 – 400	≥ 7	●		●	
		≥ 3	4x4 / 5x5	Organic		40 – 100	≥ 4	●			
		≥ 3	4x4 / 5x5			120 – 300	≥ 4 to ≤ 14	●	●	●	●
		≥ 5	4x4 / 5x5		≤ 2	320 – 400	≥ 7	●		●	
	Organic	≥ 2	Pastol	Organic		40 – 100	≥ 4	●			
		≥ 2	Pastol			120 – 300	≥ 4	●	●	●	●
Pastol (organic)	Mineral	≥ 3	4x4 / 5x5	Mineral		40 – 100	≥ 4	●			
		≥ 3	4x4 / 5x5			120 – 300	≥ 4	●	●	●	●
		≥ 3	4x4 / 5x5	Organic		40 – 100	≥ 4	●			
		≥ 3	4x4 / 5x5			120 – 300	≥ 4 to ≤ 14	●	●	●	●
	Organic	≥ 2	Pastol	Organic		40 – 100	≥ 4	●			
		≥ 2	Pastol			120 – 300	≥ 4	●	●	●	●
Speedero (adhesive foam)	Mineral	≥ 3	4x4 / 5x5	Mineral		40 – 100	≥ 4	●			
		≥ 4	5x5		≥ 2	120 – 300	≥ 6	●	●	●	●
		≥ 4	5x5		≥ 2	320 – 400	≥ 7	●		●	
		≥ 3	4x4 / 5x5	Organic		40 – 100	≥ 4	●			
		≥ 4	5x5		≤ 2	120 – 300	≥ 6 to ≤ 14	●	●	●	●
		≥ 5	5x5		≤ 2	320 – 400	≥ 7	●		●	
	Organic	≥ 2	Pastol	Organic	≤ 2	40 – 300	≥ 4	●	●	●	

Note	An additional fire break must be arranged a maximum of 1.0 m underneath the flanking, combustible construction products (e.g. on the upper termination of the ETICS underneath the roof) in the insulation level of the ETICS, see the construction design on pages 11 to 12.

Fire protection requirements for WARM WALL Basis EPS as a B1 system (continuation)

Plinth fire protection zone (fire from the exterior)

The measures are necessary if the ETICS with EPS are to be not easily flammable (B1). Without this measure the reaction to fire is flammable.

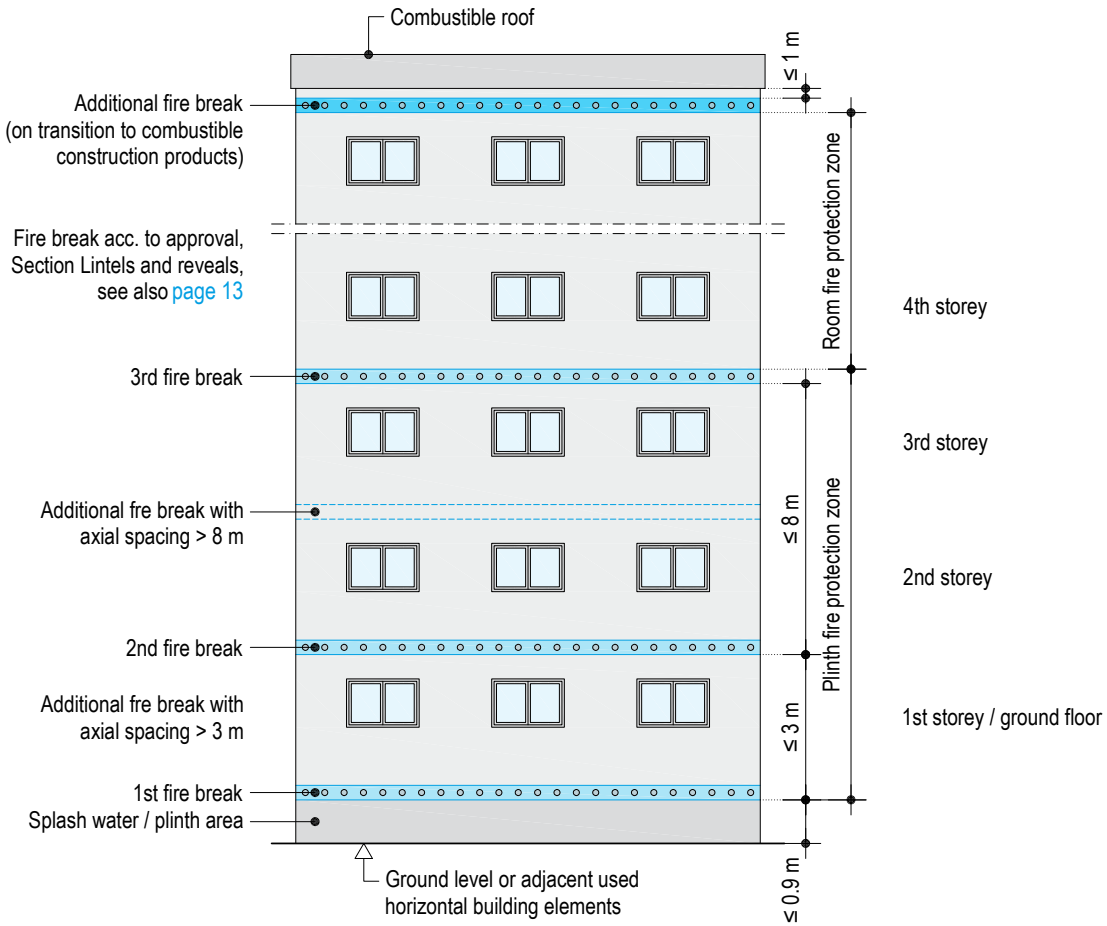
Arrangement of the fire break for insulation materials of 40 mm to 300 mm

- The first fire break is installed around the building on the lower edge of the ETICS in the plinth fire protection zone or maximum of 90 cm above the ground level or above adjacent horizontal building elements (e.g. roof parking, etc.)
- The second fire break is installed at the height of the ceiling of the 1st storey above ground level or above the used adjacent horizontal elements of the building (roof parking), but at a maximum axial spacing of 3 m from the 1st fire break below. Additional fire breaks must be provided for greater distances.
- The third fire break is installed at the height of the ceiling of the 3rd storey above ground level or above the used adjacent horizontal elements of the building (roof parking), but at a maximum axial spacing of 8 m from the 2nd fire break below. Additional fire breaks must be provided for greater distances.
- Further fire breaks are required for transitions to horizontal protruding surfaces (e.g. from openings, passages, arcades) in the area between the 1st and 3rd storey.
- At inside corners of the building, Panzereckwinkel reinforced corner angles 70/90 must be used from the lower edge of the ETICS above ground level to the fire break at the level of the ceiling of the 3rd storey (see page 14). The minimum thickness of the plaster system (reinforcement layer and finish coating) must be taken from the table on page 10.

Additional fire break

In case a flammable constructional component is located above the ETICS, a fire break at spacing of 1 m to the constructional product must be arranged in the insulation level of the ETICS surrounding the building. The fire break is glued across the full surface and, if necessary, dowelled firmly in place (see table page 14).

A plinth fire break at a maximum spacing of 1 m to the upper ETICS connection can assume the function of the additional fire break.



Fire protection requirements for WARM WALL Basis EPS as a B1 system (continuation)

Plinth fire protection zone (fire from the exterior)

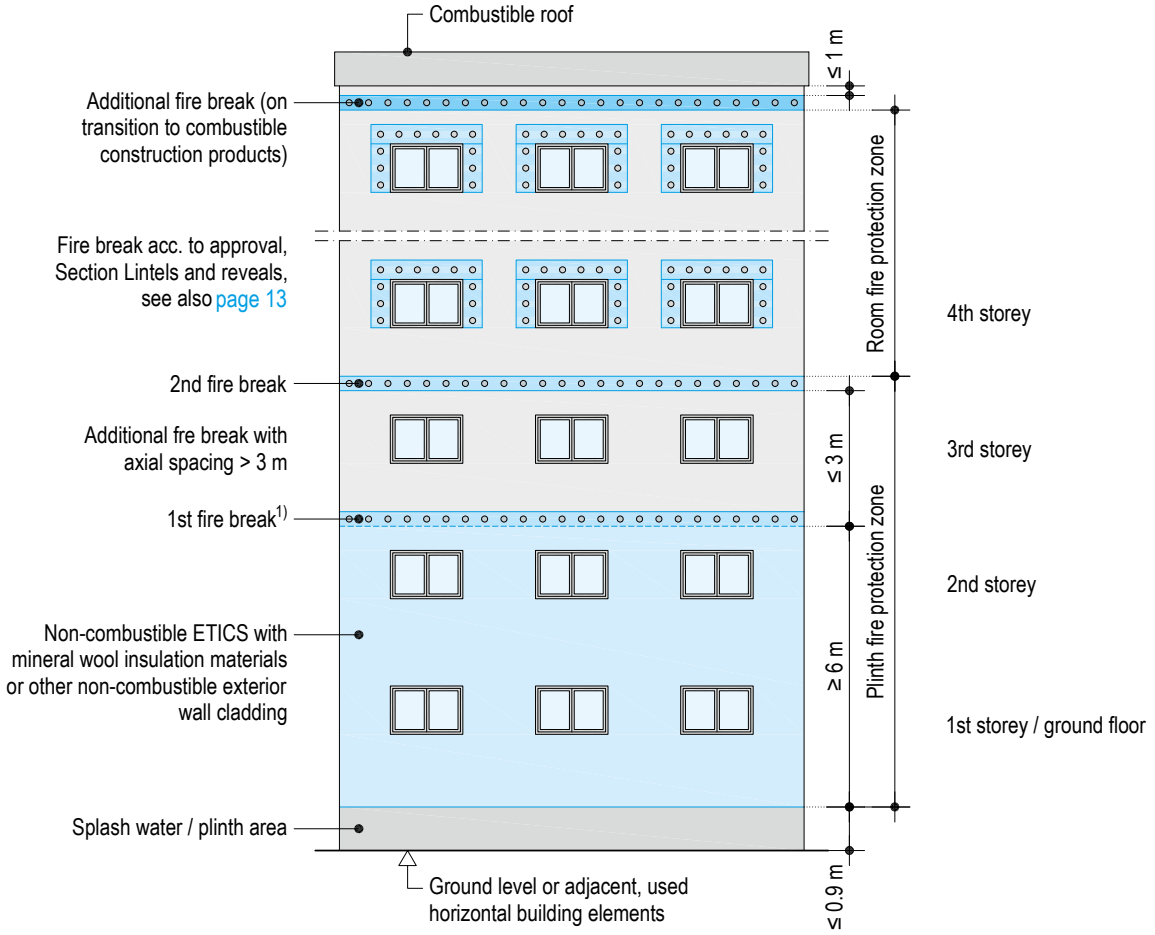
Arrangement of the fire break for insulation materials > 300 mm to 400 mm

- Apply non-combustible exterior wall cladding up to the height of the ceiling above the 2nd. storey, at least 6 m above the splash-water/plinth area. Such as ETICS with mineral wool insulation materials acc. to Z-33.43-82 or Z-33.44-83 or other non-combustible external wall cladding, above a maximum 90 cm high splash water/plinth area above ground level or above adjacent horizontal building elements used (roof parking).
- The first fire break is arranged around the building at the lower edge of the ETICS with EPS insulation panel in the plinth fire protection zone. The fire break can be omitted if the non-combustible external wall cladding is up to the height of the ceiling above the 2nd floor, at least 6 m high, a non-combustible ETICS with the same insulation thickness without any offset of the reinforcing mortar to the ETICS with EPS above.
- The 2nd fire break is arranged around the building at the height of the ceiling of the 3rd storey above ground level or above used adjacent horizontal building components (roof parking), axial spacing ≤ 3 m to the fire break below or WARM WALL with non-combustible mineral wool insulation material. If the spacing is greater, additional fire breaks must be installed.
- Further fire breaks are required for transitions to horizontal protruding surfaces (e.g. from openings, passages, arcades) in the area between the 1st and 3rd storey.
- At inside corners of the building, Panzereckwinkel reinforced corner angles 70/90 must be used from the lower edge of the ETICS above ground level to the fire break at the level of the ceiling of the 3rd storey (see page 14). The minimum thickness of the plaster system (reinforcement layer and finish coating) must be taken from the table on page 10.

Additional fire break

In case a flammable constructional component is located above the ETICS, a fire break at spacing of 1 m to the constructional product must be arranged in the insulation level of the ETICS surrounding the building. The fire break is glued across the full surface and, if necessary, dowelled firmly in place (see table page 14).

A plinth fire break at a maximum spacing of 1 m to the upper ETICS connection can assume the function of the additional fire break.



1) Unnecessary should there be non-combustible ETICS with a height of at least 6 m above the splash-water / plinth zone of the same insulation thickness and without offset of the basecoat to the ETICS with EPS above it.

Fire protection requirements for WARM WALL Basis EPS as a B1 system (continuation)

Room fire protection zone (fire from the interior)

The measures are necessary from an insulation thickness > 100 mm if the ETICS with EPS are to be not easily flammable (B1). It is necerssary to consider the measures above the fire break at the height of the ceiling of the 3rd storey above ground level or adjacent horizontal building sections (above the plinth fire protection zone). Without this measure the reaction to fire is flammable.

Arrangement of the fire break for insulation materials > 100 mm to 300 mm

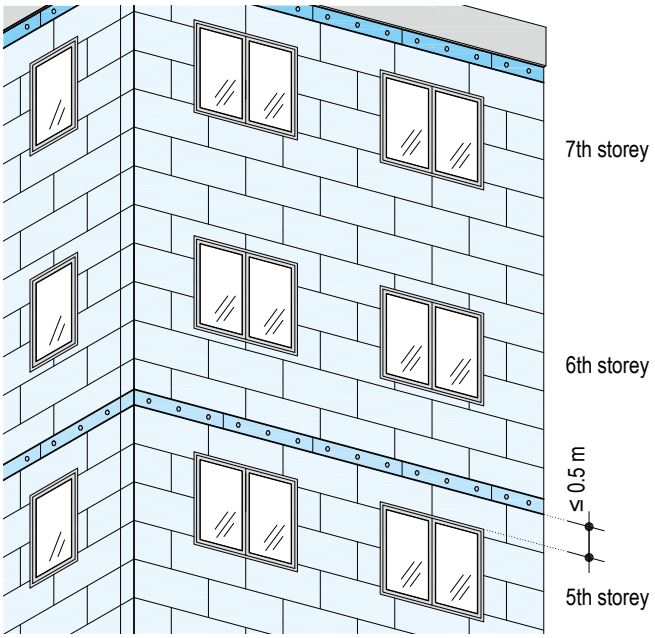
- Starting at the level of the ceiling of the 5th storey above ground level or above used adjacent horizontal building components of the building, a fire break is installed around the building in at least every second storey. Alternatively, a fire break can be installed in the lintel area or in the lintel and reveal area (on three sides) at each window.
- Edge areas located directly near openings require an additional reinforcement with Gewebeeckwinkel mesh corner angles.

Note	A maximum spacing between the lower edge of the lintel and the lower edge of the fire break of 0.5 m must be observed.

Arrangement of the fire break for insulation materials > 300 mm to 400 mm

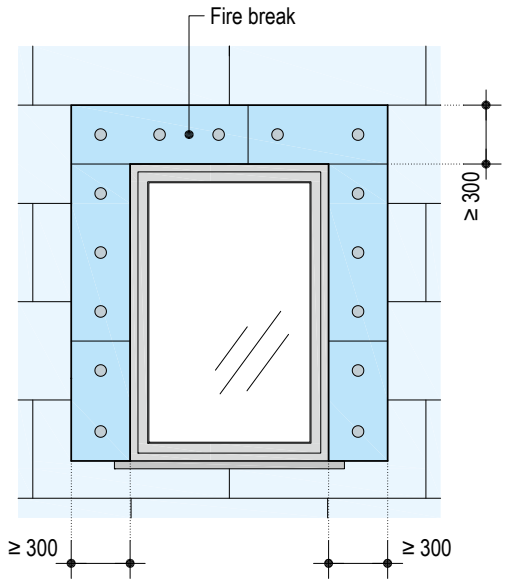
- Only one three-sided encapsulation (lintel and reveal area) of wall openings with fire breaks is possible.

Circumferential fire break for insulation materials > 100 mm to 300 mm

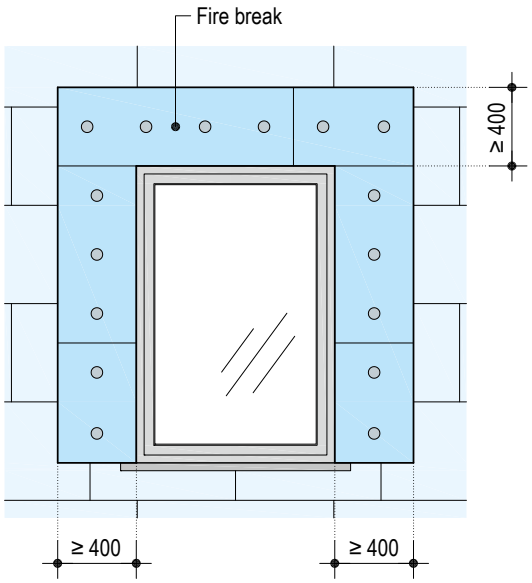


Fire break in the lintel and reveal area (on three sides) with insulation materials > 300 mm to 400 mm — Scheme Drawings I Dimensions in mm

Mineral-based plaster system



Mineral-based / organic-based plaster system



Note	WARM WALL Basis EPS from insulation material thickness 320 mm to 400 mm can only be applied as a B1 system when no organic-based adhesive and basecoat (Pastol) is used.

Fire protection requirements for WARM WALL Basis EPS as a B1 system (continuation)

Fire break – products, properties and fastening

Properties

The fire break must be non-combustible and dimensionally stable up to 1000 °C and have a minimum height of at least 200 mm. Furthermore, the following is required for

- Density ≥ 60 – 90 kg/m³ the lateral flexural strength≥ 80 kPa or with
- Density ≥ 90 kg/m³ the lateral flexural strength ≥ 5 kPa.

Products

- MW Volamit 040 (mineral wool lamella)
- MW Brandriegel 035 plus fire break (mineral wool panel)
- MW Wolle 035 plus M2 (mineral wool panel)
- MW Wolle 035 plus LX (mineral wool panel)

Bonding

- The fire break is adhesively bonded along the entire surface with an approved mineral-based adhesive.
- In case of insulation material thickness > 300 mm, fire breaks made of MW Brandriegel 035 plus can be glued to one another as two layers along the entire surface with mineral-based adhesive.

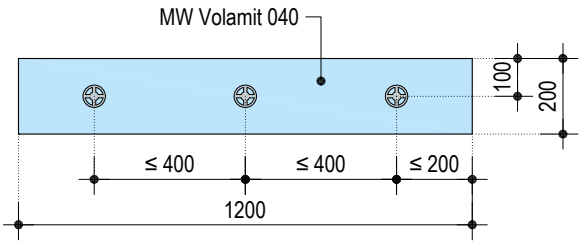
Dowels for mechanical fixing

Dowels with a steel expander, e.g. STR U 2G dowels or CNplus 8 insulation anchor nails must be used in the plinth fire protection zone and may be use in the room fire area. These dowels can be used with or without the additional rondelles. The installation method depends on the dowel and insulation material selected.

Constructional dowelling (plinth fire protection zone)

Applies for MW Volamit 040 with proven tensile adhesion strength of 0.08 N/mm². Placement and spacings must be observed (see image below).

Dimensions in mm



Structurally relevant (stable) dowelling

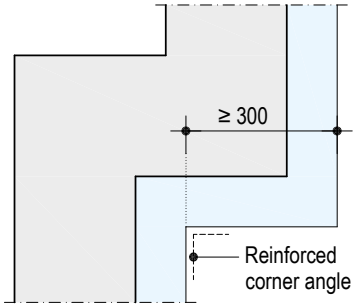
Necessary for MW Brandriegel 035 plus and other suitable mineral wool insulation panels as well as for MW Volamit 040 without proven tensile adhesion strength of 0.08 N/mm² and for the additional fire break in every case. For anchoring of MW Volamit 040 the additional dowel plate SBL 140 plus (suitable for the recommended STR U 2G dowel) or the additional rondelle DT 140 (suitable for CNplus 8 insulation anchor nail) must be used. The number of dowels is dependent on the wind load. The number and positions of the dowels can be determined with the Knauf dowel calculator.

Note	Fire break elements must be placed gap-free against one another. Subsequent filling of gaps with foam is not permissible.

Inside corners

From ground level or the foot of other adjacent horizontal building elements up to the upper edge of the fire break at the height of the ceiling of the 3rd storey, Panzereckwinkel reinforced corner angles 70/90 are to be used with building inside corners. The thickness of the reinforcement layer should be taken from the approvals. If a plinth is offset to the rear when compared to the ETICS to which it is connected above it, you can omit the Panzereckwinkel reinforcing corner angle in the plinth area.

Dimensions in mm



A step or offset of the exterior wall of less than 300 mm does not need to be considered as an inside corner.

Attachment of fire breaks

System variants	Plinth fire protection zone[1)]	Room fire protection zone	Above fire wall	Underneath combustible constructional products
Glued (Z-33.41-81)	Glue on full surface and apply dowels[2)]	Glue full surface	Glue on full surface and apply dowels[3)]	Glue on full surface and apply dowels[3)]
Glued and dowelled (Z-33.43-82)	Glue on full surface and apply stable dowels	Glue on full surface and apply stable dowels	Glue on full surface and apply stable dowels	Glue on full surface and apply stable dowels

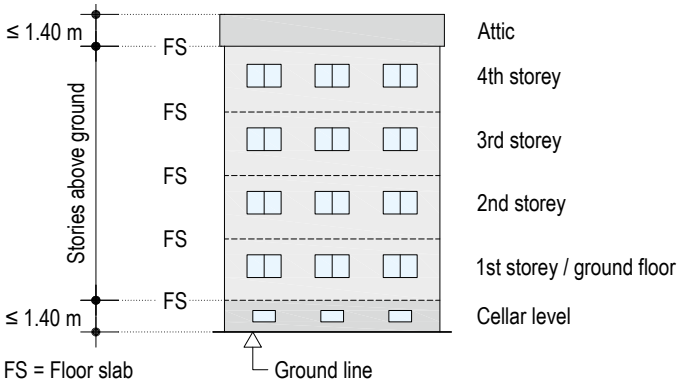
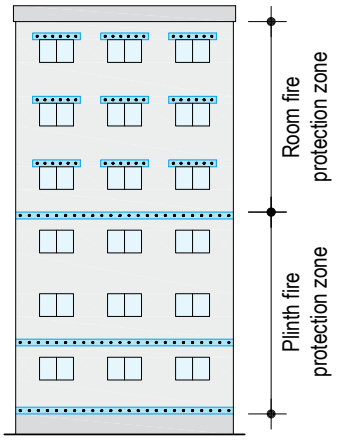
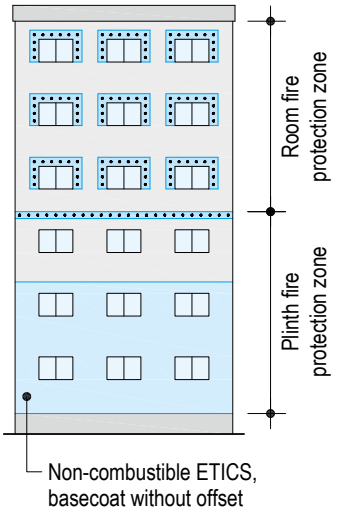
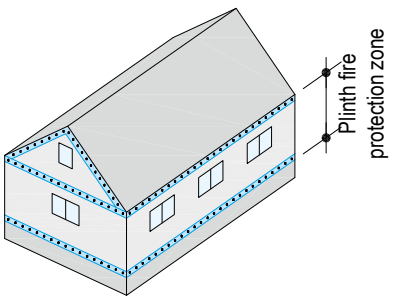
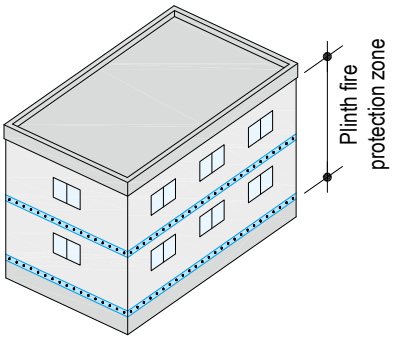
1) Also applies for areas on the transition to horizontal components with increased fire load (e.g. roof parking).

2) Apply constructional dowels for MW Volamit 040 and stable dowels for MW-Dämmplatten 035.

3) Only glue for MW Volamit 040, apply stable dowels for MW-Dämmplatten 035.

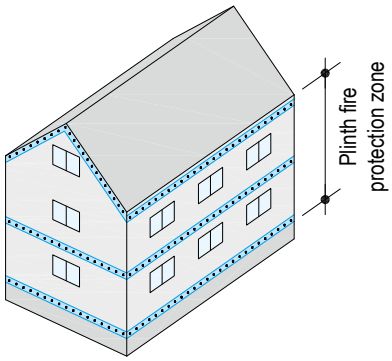
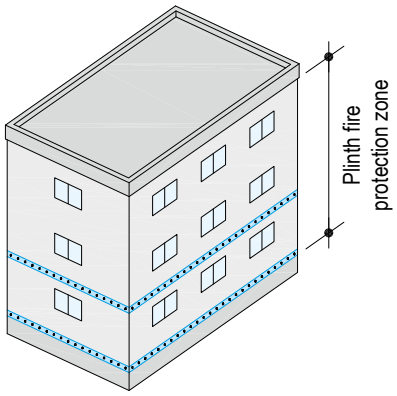
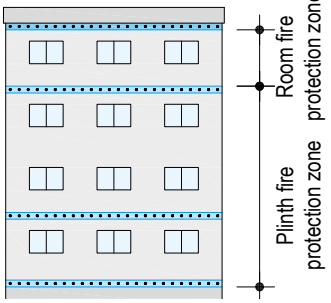
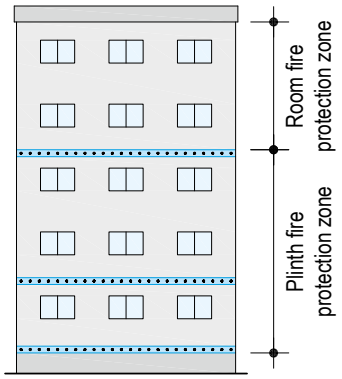
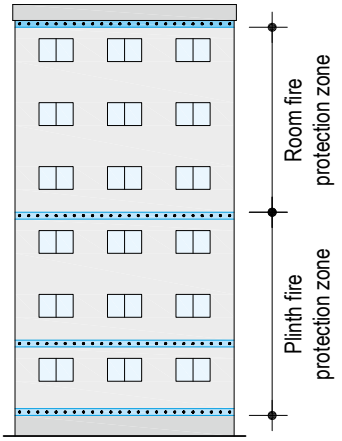
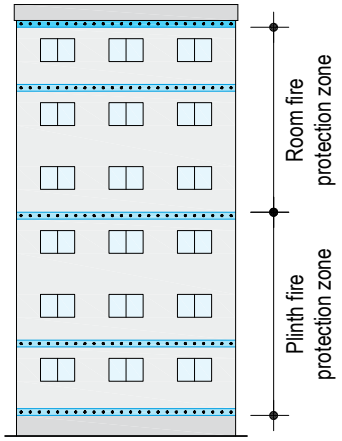
Fire protection requirements for WARM WALL Basis EPS as a B1 system (continuation)

Position of the fire break on the building

Comment	Scheme drawings
Definition of stories	
Stories above ground acc. to clause 2 (6) of the German Model Building Code (MBO). Cellar levels, where the mean cellar ceiling does not extend more than 1.40 metres above ground level, shall not be considered as a floor level (storey), as well as hollow areas (jamb walls) between the top floor and the roofing that cannot be used as common rooms. The height specifications can diverge from one another in the different state building codes.	
Use of Speedero adhesive foam	
Room fire protection zone When using mineral-based basecoat, fire protection measures start from 120 mm insulation thickness and can be applied up to 400 mm. A circumferential fire break can be applied in conjunction with a mineral-based basecoat and reinforcement mesh 5x5 up to an insulation material thickness of 300 mm. A fire break must be available in the lintel and reveal area (image on right) with insulation thickness > 300 mm to 400 mm. With Pastol as a basecoat, fire protection measures start from insulation thickness 40 mm and can be applied up to 300 mm. The fire break can only be installed in the lintel area or in the lintel and reveal area (image on left). **Plinth fire protection zone** From an insulation material thickness > 300 mm, a non-combustible exterior wall system must be applied (image on right) up to the height of the ceiling above the 2nd storey. A fire break at the start of ETICS with EPS can be omitted if the insulation material thickness of the mineral wool has the same thickness as the EPS.	Basecoat: organic Insulation thickness t ≥ 40 mm to 300 mm No roller blind or window in the insulation level Example: non-combustible roof 
	Basecoat : mineral based Insulation thickness t > 300 mm to 400 mm Example: non-combustible roof 
Two-storey building	
In case of buildings of building class 1 – 3 (low height buildings), no additional fire protection measures are required from the point of view of the building codes. In case the ETICS are still to be not easily flammable in design, additional fire protection measures against exterior fires (plinth fire) as well as an additional fire break on the connection to the combustible construction products (e.g. roof) are required. Fire protection measures against interior fires (room fire) are already incorporated due to the building height. In case of a required not easily flammable rating, an insulation material thickness > 300 mm WARM WALL Plus MW (mineral wool) must be used.	Insulation thickness t ≤ 300 mm With gabled roof (generally flammable) 
	Insulation thickness t ≤ 300 mm With flat roof (example: non-combustible) 

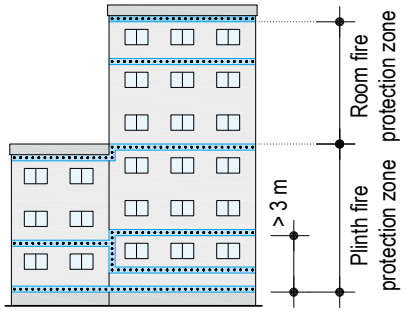
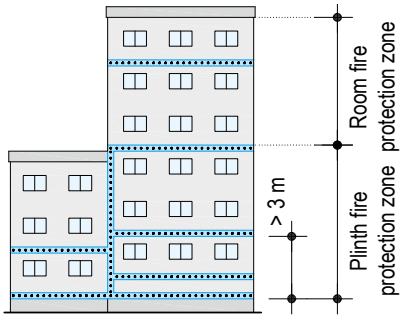
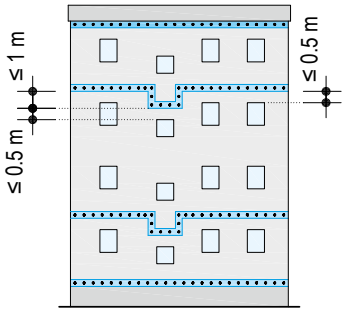
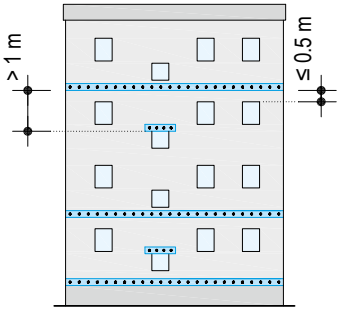
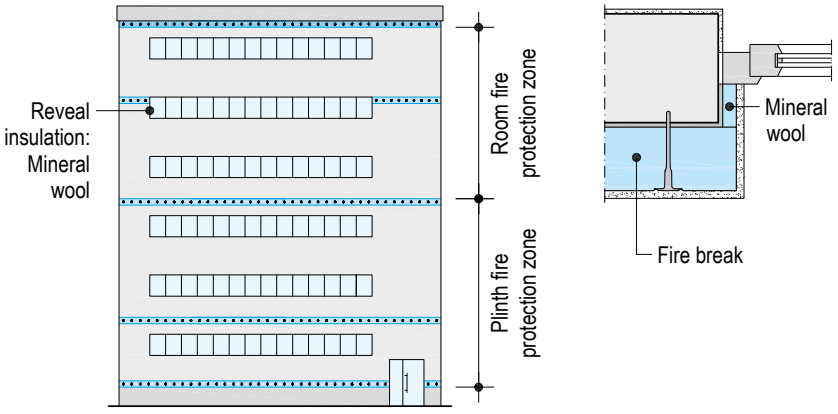
Fire protection requirements for WARM WALL Basis EPS as a B1 system (continuation)

Position of the fire break on the building (continuation)

Comment	Scheme drawings	
Three-storey building		
It is recommended that ETICS on buildings that are a maximum of three stories should be not easily flammable in their design. This necessitates the application of fire protection measures against an exterior fire (plinth fire) as well as an additional fire break at the connection to combustible construction products (e.g. roof). These provisions already cover fire protection measures against interior fires (room fire) due to the building height. In case of a required not easily flammable rating, an insulation material thickness > 300 mm WARM WALL Plus MW (mineral wool) is recommend for cost-effectiveness reasons.	Insulation thickness t ≤ 300 mm With gabled roof (generally flammable) 	Insulation thickness t ≤ 300 mm With flat roof (example: non combustible) 
Four- and five-storey buildings		
ETICS on buildings of building class 4 must always be not easily flammable in their design. In case of insulation material thicknesses up to 300 mm, no fire-protection measures against interior fires (room fire) are required above the 3rd storey. Fire protection measures against plinth fires include the fire protection measures against room fires. An upper additional fire break is only required at the transition to combustible roof constructions. From an insulation material thickness > 300 mm, a non-combustible exterior wall system must be applied up to the height of the ceiling above the 2nd storey.	Insulation thickness t ≤ 300 mm Example: combustible roof 	Insulation thickness t ≤ 300 mm Example: non-combustible roof 
Six-storey buildings and buildings up to the high-rise building limit		
Fire protection measures against interior fires (room fire) must be considered from an insulation thickness > 100 mm above the 3rd. storey above ground level or adjacent horizontal building section (image on right). An upper additional fire break is only required at the transition to combustible roof constructions. From an insulation material thickness > 300 mm, a non-combustible exterior wall system must be applied up to the height of the ceiling above the 2nd storey.	Insulation thickness t ≤ 100 mm Example: combustible roof 	Insulation thickness t > 100 mm to 300 mm. Example: combustible roof 

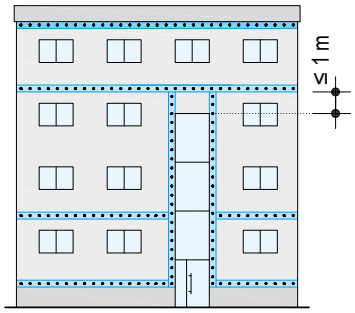
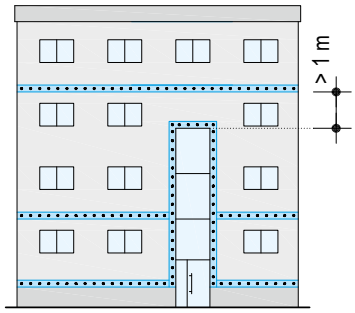
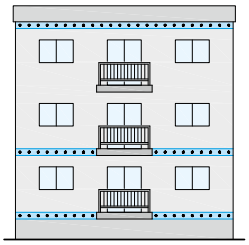
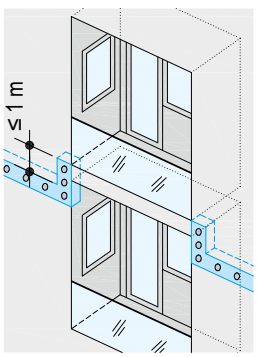
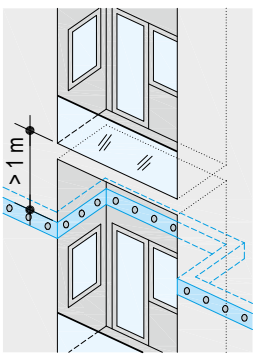
Fire protection requirements for WARM WALL Basis EPS as a B1 system (continuation)

Position of the fire break on the building (continuation)

Comment	Scheme drawings	
Height offset with fire breaks		
Offsets up to a maximum height of 1 m can be negotiated with an "upward" or "downward" offset (image on left). In case of an offset > 1 m, both areas should be full vertically separated for fire protection purposes (image on right). If the maximum fire break spacings are exceeded, an additional fire break must be installed.	Offset ≤ 1 m Use of additional fire breaks Insulation thickness > 100 mm to 300 mm. Example: combustible roof 	Offset ≤ 1 m Use of additional fire breaks Insulation thickness > 100 mm to 300 mm. Example: non-combustible roof 
Offset exterior wall openings		
A local downward offset of the fire break, e.g. with a downward offset window, up to a maximum of 1 m is possible. The spacing of 0.5 m between the fire wall and window lintel may not be exceeded (image on left). With an offset > 1 m the window lintel is separately provided with a fire break (image on right).	Offset ≤ 1 m, with downward offset Insulation thickness t ≤ 300 mm Example: combustible roof 	Offset > 1 m, without downward offset Insulation thickness t ≤ 300 mm Example: non-combustible roof 
Continuous strip windows, openings in the fire break area		
Continuous strip windows, arranged at the height of the necessary fire break and with a structural height of ≥ 1 m, can only assume the function of a fire break in the **Room fire protection zone** (insulation material thickness t > 100 mm). The opening reveal, which contacts the fire break, must be insulated along the full height with mineral wool. If storey openings, e.g. doors, interrupt circumferential fire breaks, a circumferential fire break around the opening is not necessary. The fire break must be run at the same height on both sides up to the reveal (image on right) or, if a Perfex reveal board made of mineral wool is used, up to the reveal board.	Insulation thickness t > 100 mm to 300 mm, example: combustible roof 	

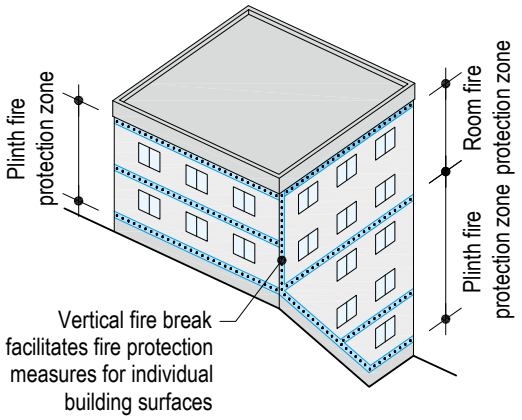
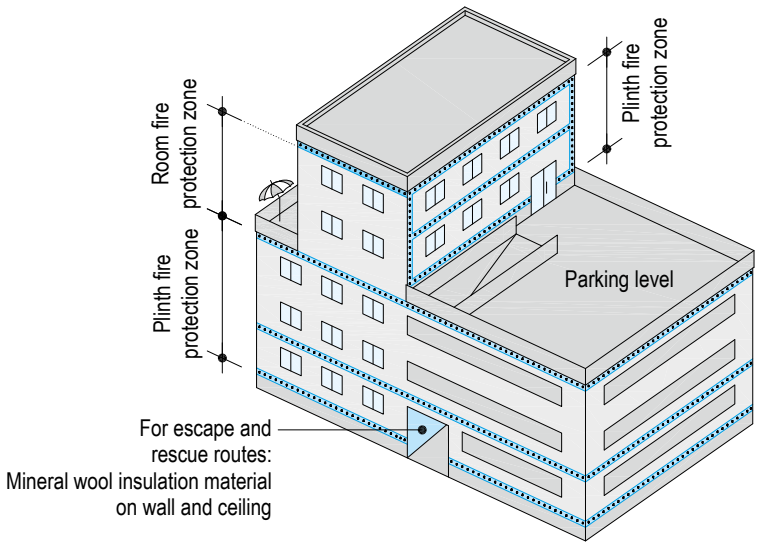
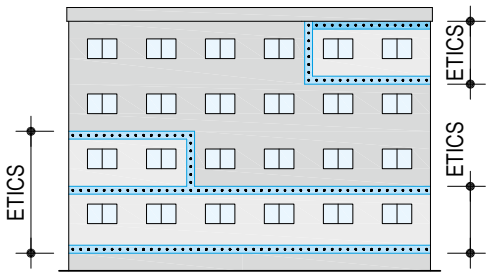
Fire protection requirements for WARM WALL Basis EPS as a B1 system (continuation)

Position of the fire break on the building (continuation)

Comment	Scheme drawings	
Glazed stairwells		
If a building features a fire protection staircase acc. to clause 35 of the German Model Building Code (MBO) with cross-floor, multi-storey glazing, the cross-floor "exterior wall openings" must be fully surrounded along the perimeter with mineral wool strips at a minimum width of 200 mm in the same way as the surrounding fire break up to the reveal and lintel (image on right). If the spacing from the lower edge of the lintel of the staircase glazing to the fire break above it does not exceed 1 m, then the vertical fire breaks can be connected directly to the continuous fire break (image on left).	Spacing lintel to fire break: ≤ 1 m Insulation thickness t ≤ 300 mm Example: combustible roof 	Spacing lintel to fire break: > 1 m Insulation thickness t ≤ 300 mm Example: non-combustible roof 
Projected boards, e.g. of balconies and loggias		
Exterior areas that project out from the façade, such as slabs from balconies and loggias, and that fully interrupt the ETICS, assume the function of a fire stop, so that the additional inclusion of fire breaks in this area is unnecessary. The fire break must connect to the side at the level of the cantilever slab. The cantilever slabs must be solid and mineral-based and at least fire resistant (F30 acc. to DIN 4102-2 or alt. REI 30 acc. to EN 13501-2). The cantilever slabs must connect completely to the exterior wall without a gap or with load bearing thermal insulation elements (e.g. ISO-Korbs), that are fire resistance rated min. F30 acc. to DIN 4102-2 or alt. REI 30 acc. to EN 13501-2, connected with the exterior wall. Otherwise the fire break should be continued under the cantilever slab. To save space, a fire-resistant board that fully penetrates the ETICS an be applied to the lower side of the cantilever slab.	Example: flammable roof, insulation material thickness t ≤ 300 mm 	
Offsets of the fire break to cantilever slab		
With offset ≤ 1 m The fire break can be connected to the side of the cantilever slab by an upward or downward offset (image on left). **With offset > 1 m** Connection to the cantilever slabs is not possible. The fire break should be continued under the cantilever slab (image on right). If continuation of the fire break under the cantilever slab is not possible, e.g. due to an existing roller blind cassette, a non-combustible fire protection panel that is at least 10 mm thick can be adhesively bonded and dowelled to the lower side of the cantilever slab in order to achieve the protective objective.	With offset ≤ 1 m 	With offset > 1 m 

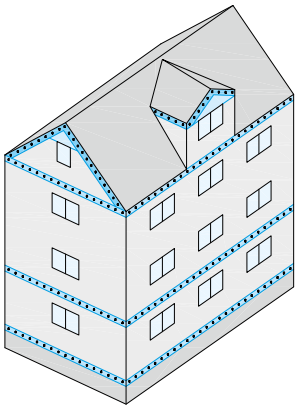
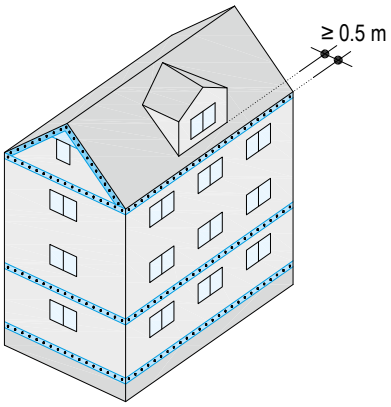
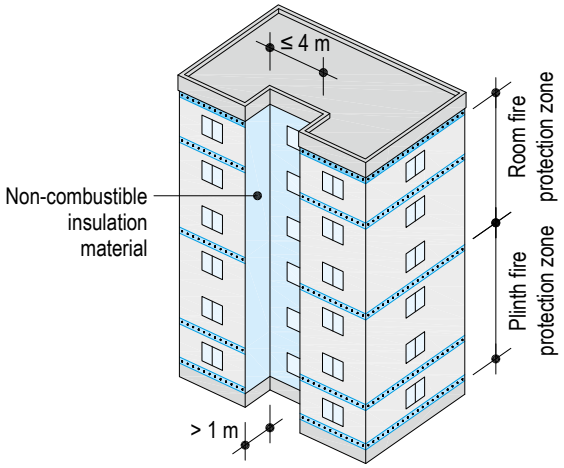
Fire protection requirements for WARM WALL Basis EPS as a B1 system (continuation)

Position of the fire break on the building (continuation)

Comment	Scheme drawings
Sloping site	
If the façade surfaces start at different heights, e.g. on slopes, it may be useful to upgrade the sides of the building separately for fire protection purposes. This can be archived by a fire break that is implemented vertically along the entire façade height at a spacing of maximum 1 m from the outer corner of the building. On the surfaces separated from one another, the fire protection measures can be planned and implemented separately. Diagonally sloped fire beaks can also be stepped.	Insulation thickness t ≤ 300 mm, example: combustible roof 
Staggered stories	
Fire protection measures against an exterior fire (plinth fire) must be implemented with staggered stories if on an adjacent area comparable fire loads such as on a building plinth can occur, e.g. on parking levels. For balconies, loggias or roof terraces used for residential purposes before staggered stories, fire protection measures must not be considered. The corresponding additional fire break is only required at the transition to combustible roofs.	Insulation thickness t ≤ 300 mm, example: combustible roof 
Combined façades	
The ETICS should feature fire protection using a fire break to separate it from other adjacent façade systems, so that in the event of a fire a flashover from a system to an adjacent façade system is excluded.	Insulation thickness t ≤ 300 mm, example: combustible roof 

Fire protection requirements for WARM WALL Basis EPS as a B1 system (continuation)

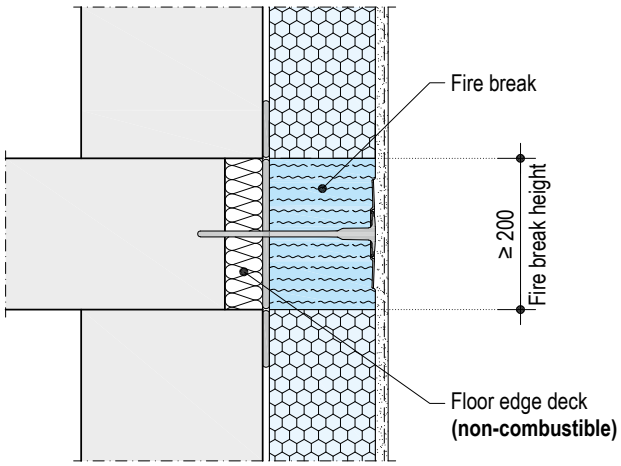
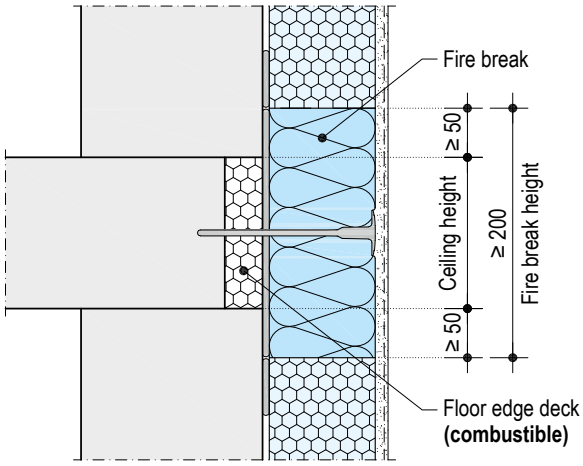
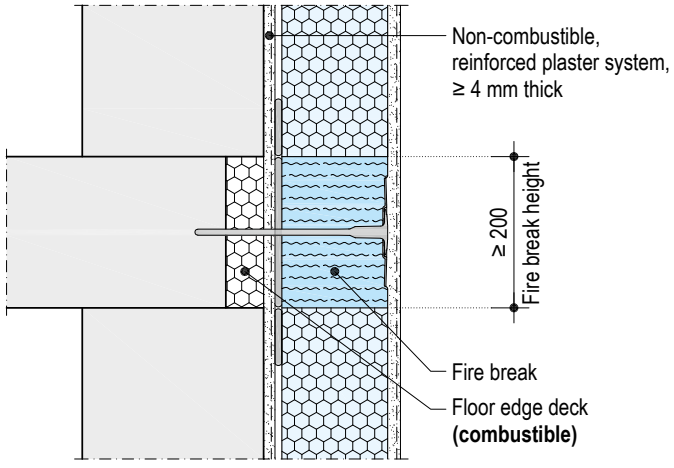
Position of the fire break on the building (continuation)

Comment	Scheme drawings	
Dormer features		
Dormer windows are part of the roof if they are recessed by at least ≥ 0.5 m to the façade surface. Fire protection measures are not required (image on right). Should dormer features be part of the façade surface from a fire protection point of view, an additional fire break must be used for the adjacent combustible building elements (image on left). It is recommended that the entire gable or dormer features are implemented with non-combustible insulation materials	< 0.5 m recessed offset, insulation material thickness t ≤ 300 mm Example: combustible roof 	< 0.5 m recessed offset, insulation material thickness t ≤ 300 mm Example: combustible roof 
Three-sided building recesses		
ETICS in three-sided building recesses, which are deeper than 1 m and do not exceed 4 m in width, should have non-combustible insulation material applied to the full surface. This applies in particular for window openings of stairwells located in these walls.	Insulation thickness t ≤ 300 mm, example: combustible roof 	

Note	Observe the "Technische Systeminformation – WDVS und Brandschutz - *Technical system information - ETICS and fire resistance*" of the VDPM (Verband für Dämmsysteme, Putz und Mörtel e. V.) (German only).

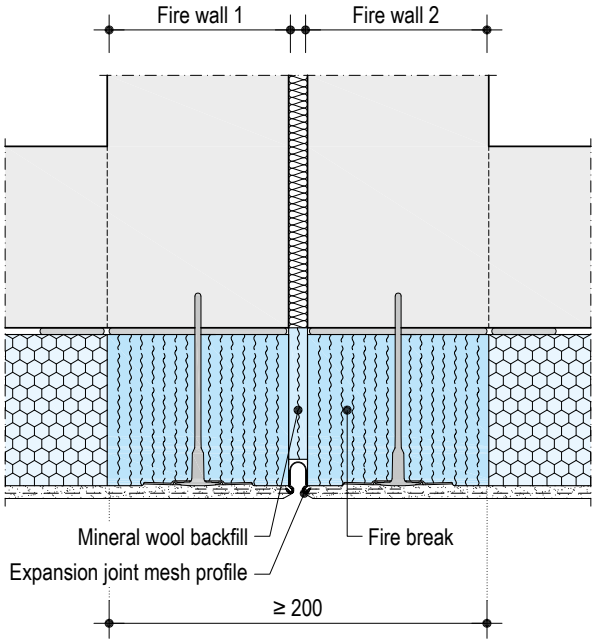
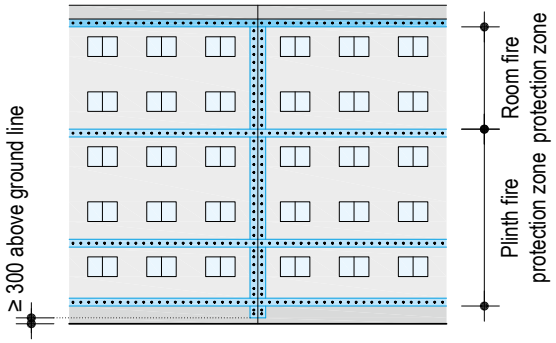
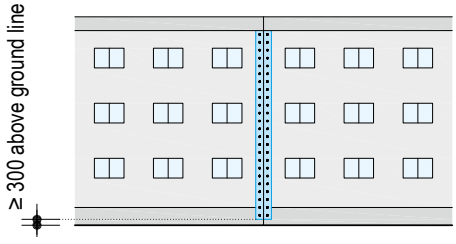
Fire protection requirements in the area of the floor edge deck

Position of the fire break on the building

Comment	Scheme drawings I Dimensions in mm
Non-combustible floor edge deck	
With a non-combustible floor edge deck the width of the fire break ≥ 200 mm is sufficient. If it is not possible to fit the fire break on the ceiling head, it may be placed alternatively in the vicinity.	
Combustible floor edge deck	
If a floor edge deck made of combustible insulation materials is located in the vicinity of a fire break, it must exceed the height of the floor deck above and below it by at least 50 mm (image above). If this measure is not possible for technical reasons, the floor edge deck must be removed. Edge decks that have a plaster covering of non-combustible, reinforced plaster systems in a thickness of at least 4 mm are treated in the same way as non-combustible floor edge decks (lower image).	
	

Fire protection requirements in the area of the fire wall

Position of the fire break on the building

Comment	Scheme drawings I Dimensions in mm
Integrating fire wall (in the expansion joint area)	
If an integrating fire wall is located in the expansion joint area, the expansion joint must be fully filled with mineral wool. Furthermore, a fire break must be installed at the height and thickness of the fire wall at least 200 mm wide. The fire break is glued across the full surface and dowelled firmly in place (see table page 14). The width of the expansion joint must be adopted across the entire ETICS. The vertical fire break can be constructed up to 300 mm above adjacent horizontal surfaces or upper edges of the ground level. For external sealing of expansion joint against driving rain, materials can be used that are classified as flammable. Vertical fire breaks are unnecessary if there are no fire walls in the expansion joint area.	 Insulation thickness t ≤ 300 mm, not easily flammable ETICS (B1), Example: combustible roof  Flamable ETICS (B2) 

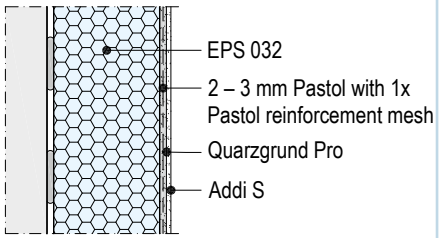
Note	The use of the vertical fire break in the area of fire walls is only permitted on the front faces of the fire walls that integrate into a even exterior wall. Separate fire protection measures that fulfil the general protection goal must be implemented on projecting or angled (< 180°) fire walls. In these cases, consultation with the Technical Advisory Service Plaster and Façade is recommended.

Impact resistances – following the European Assessment Document (EAD) 040083-00-0404

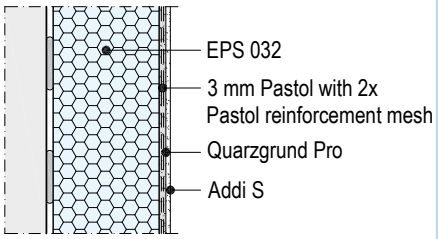
Scheme drawings

Organic system variants – partially implemented in the impact prone areas.

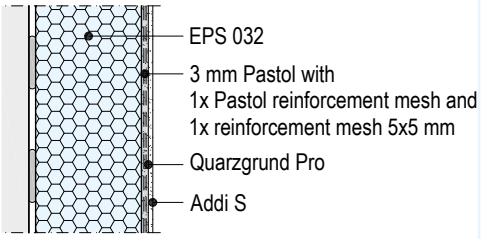
Up 20 Joules



Up 40 Joules

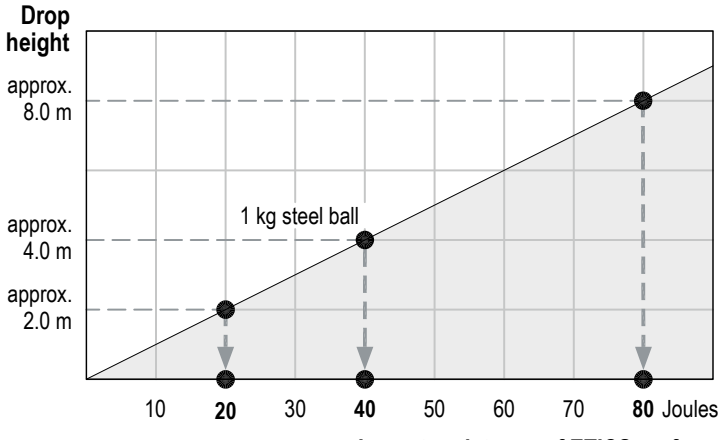


Up 80 Joules



Testing the impact resistance of ETICS surfaces

- A steel ball (1 kg mass) dropped from a height of 1.02 m corresponds to a kinetic energy of 10 Joules.
- The highest use category (I) acc. to the EAD requires an impact resistance of 10 Joules for areas subject to damage due to vandalism.



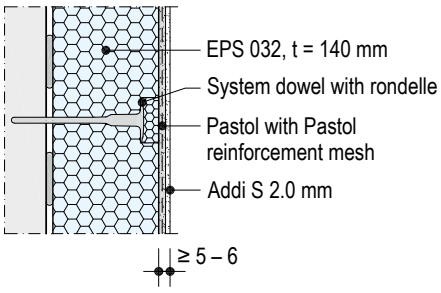
Comparative example: A hailstone with a size of 50 mm achieves an impact force of approx.27 Joules (Source: hagelregister.ch).

Hail resistance – according to the Swiss hailstone register (HSR)

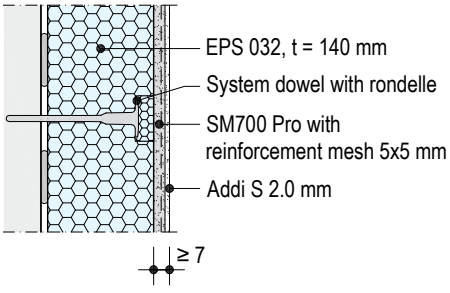
Scheme drawings I Dimensions in mm

Hail resistance classes of different design variants

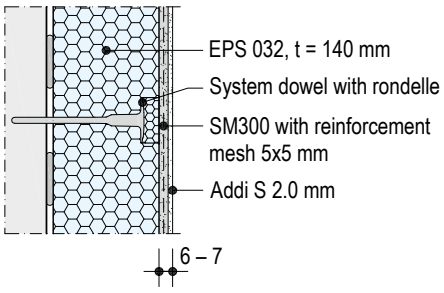
Hail resistance functionality: HW 4*
Hail resistance appearance: HW 4*



Hail resistance functionality: HW 3*
Hail resistance appearance: HW 3*



Hail resistance functionality: HW 2*
Hail resistance appearance: HW 3*



Notes	The hail resistance class is related to the diameter of the hailstone. HW 1 corresponds to a hailstone diameter of 10 mm. * Determined hail resistance on systems not subjected to ageing.

Notes on Knauf WARM WALL system

- Building physics requirements must be examined and tested in detail.
- Thermal bridges must be avoided, see DIN 4108 amendment 2.
- The assessment of the thermal insulation shall be performed in accordance with DIN 4108-2 and if required GEG (German energy saving ordinance).
- The structural stability of the existing wall must be assured before installation of ETICS. The proof must include all loadbearing and associated positioned elements.
- We recommend use of a handover certificate for transferring the site to another trade.

Planning prerequisites

- All connections and detail features must be clarified before application.
- Plan all connections to be driving-rain proof with Joint Sealing Tape FD or suitable window connection profiles (see page 34).
- The necessary substrate preparation must be undertaken on a case-by-case basis and must be described in full detail in the tender specifications.
- Any necessary fire protection measures must be described in a fire protection concept.
- Building expansion joints must be implemented in ETICS including the cladding and designed accordingly so that the same movement is possible at the same location without any hinderance.
  The joints must be sealed to be driving-rain proof.
- The ETICS is unsuitable for exposure to compressive loads due to deformation from the substrate. As long as this cannot be excluded with certainty, suitable measures (e.g. expansion joints) must ensure that they can be accepted.

On-site conditions

- The stability of the dowels in non-standard or unknown substrates must be checked.
- Rising damp may not be present.
- Ensure that all openings (interface gaps) are sealed.
- The internal plastering and screed works should be completed and the components should be dry enough so that an excessive accumulation of moisture is avoided.
- The contractor is solely responsible for inspecting the condition of the substrate and the on-site conditions.
- Unless otherwise stated in the product data sheets, ensure that the air and component temperatures are not below +5 °C during processing and setting (e.g. thumb pressure test). It is recommend that the maximum temperature does not exceed +30 °C when applying the materials.
- Stored insulation materials on building sites must be protected against moisture and direct sunlight. When glueing and applying plaster, suitable protection measures against precipitation and UV-radiation on the façade must be provided.
- 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.
- The surface of the substrate must be even, dry and free of grease and dust as well as free of any residual substances that may reduce the adhesion. Check existing coatings and linings (paints and old renders) for stability and compatibility with the adhesive, and remove unstable coatings completely if necessary.
- Uneveness > 10 mm/m with glued only EPS and > 20 mm/m with glued and dowelled systems must be equalized mechanically, using a suitable plaster layer or by grading the insulation panel thickness. The bond strength of the plaster must be tested when set.

Substrate check and pretreatment

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

1) Observe further details under Code of Practice No. 21 "Technische Richtlinien für die Planung und Verarbeitung von Wärmedämm-Verbundsystemen - Technical guidelines for planning and application of ETICS" (German only) from the German Bundesausschuss Farbe und Sachwertschutz).

We fundamentally recommend use of constructional dowelling with painted façades. If you want to dispense with dowelling in addition to bonding, the adhesive tensile strength according to DIN 18555-6 or acc. to EAD 040083-00-0404, section 2.2.11.2, must be proven.

Insulation material application

Design – plinth and splash water zone

Before insulation work, suitable building waterproof sealing must be present. The insulated plinth insulation panels with plinth splash water zone must be up to a height of at least 300 mm above the top of the ground level.

In case of application of not easily flammable ETICS, plinth insulation panels up to a height of 0.9 m above the top of the ground level can be applied with adhesive mortar on mineral or bituminous building waterproofing.

Application – façade surface

Install the plinth connection end profile horizontally and fix using anchor nails at spacings of approx. 300 mm. Compensate for substrate tolerances with washers. Connect the joints and the plinth connection end profiles with H connectors. Provide the outside corners with the appropriate mitring. Push on plinth profile made of plastic with drip edge onto the plinth connection end profile ensuring joint offsetting to the plinth connection profile.

A joint sealing tape FD is applied in the connection area between perimeter profiles / plinth insulation panel and plinth connection profile. If the ETICS are applied directly on existing perimeter / plinth insulation panels, use of a Sockel-Abschlussprofil Peri plinth connection profile is recommended without an additional Fugendichtband FD joint sealing tape.

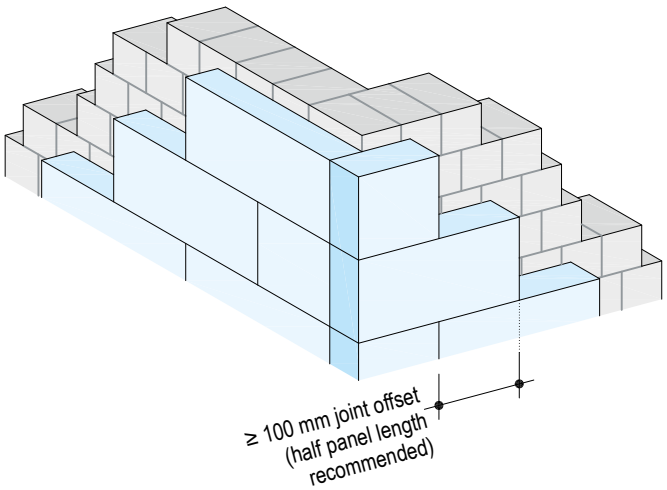
Apply insulation panels immediately to the fresh adhesive by pushing, floating and pressing. Consider the offset between the plinth push on profile and insulation panel butt joint. Apply the insulation panels precisely and continuously starting from the bottom with the joints staggered at ≥ 100 mm. A staggered insulation material layer joint offset of a half panel length is recommended. Avoid cross joints, e.g. on opening corners. At corners of openings (windows, doors), the insulation material elements are to be laid in such a way that the butt joints are preferably not present in the immediate corner.

Adhesive bonding of insulation panels up to a thickness of 200 mm without corner grooving is possible, from 220 mm with corner grooving. Adhesive may not be applied to the insulation panel joints. Open joints must be filled. Joints up to 5 mm in width can be filled with B1 foam, panel joints > 5 mm or skips can be sealed using equivalent insulation material strips.

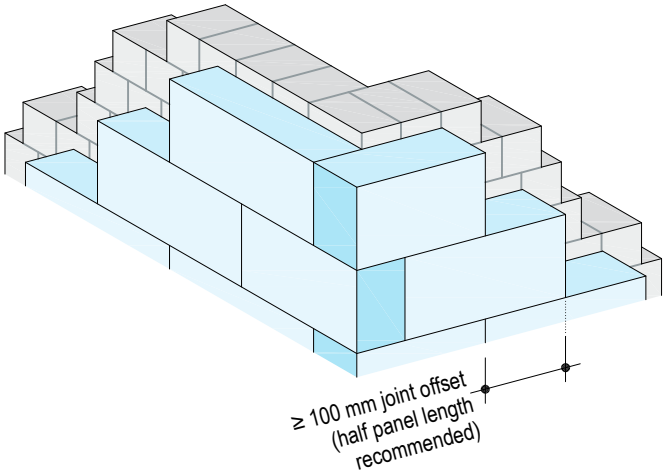
It is recommended that the lower, upper and side edges are applied by a continuous strip of adhesive to ensure that back ventilation is excluded. Connections to adjacent constructional components and penetrations should should be made driving-rain proof with joint sealing tape FD or suitable window connection profiles (see page 34). Install driving-rain proof window sills.

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

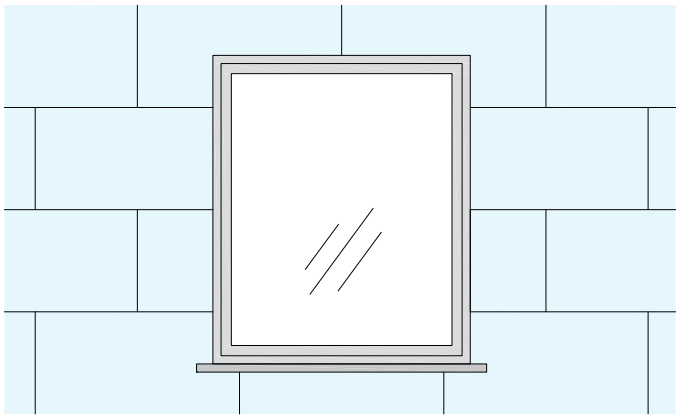
Up to 200 mm insulation material thickness without corner grooving



More than 200 mm with corner grooving



Window and door openings



Avoid cross joints

Bridging expansion joints in exterior wall surfaces

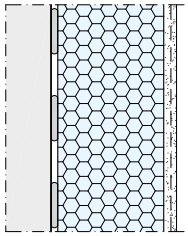
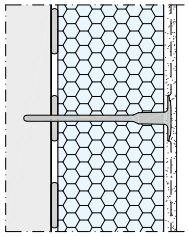
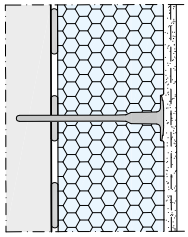
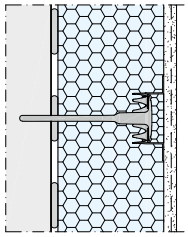
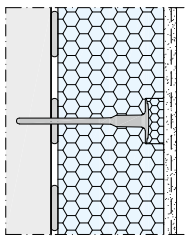
(e.g. Joints in the exterior wall surfaces of prefabricated buildings when three layer panels are used – see e.g. Z-33.41-81 and Z-33.43-82)

- Joint spacings up to 6.20 m
- Insulating material thickness at least 60 mm.
- Lustro basecoat with reinforcement mesh 4x4 and thin-layer finish coat or Pastol basecoat with Pastol reinforcement mesh and thin-layer finish coats
- The density of EPS panels must be ≤ 20 kg/m^3.

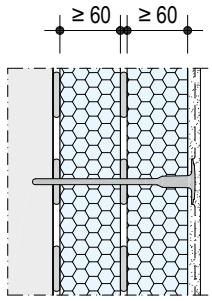
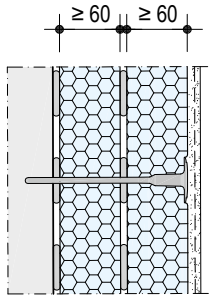
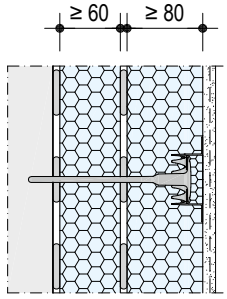
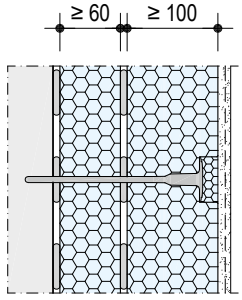
Design of building expansion joints in ETICS

Building expansion joints must be implemented in ETICS including the cladding and designed accordingly so that the same movement is possible at the same location without any hindrance.
The joints must be sealed to be driving-rain proof.

Insulation material installation – single-layer application

Scheme drawing	Insulation material	Permissible / available insulation thickness mm	Bonding	Mechanical anchoring
Glued acc. to Z-33.41-81 (substrate bond strength ≥ 0.08 N/mm²)				
	EPS Standard	40 – 400	■ Full surface ▪ Insulation material ▪ Substrate ■ Partial surface ≥ 40 % ▪ Insulation material ■ Partial surface ≥ 60 % ▪ Substrate	None
	EPS Nut&Feder	60 – 400		
	EPS SunJa	80 – 200		
	EPSe Standard	80 – 200		
	EPSe Nut&Feder	80 – 200		
Adhesively bonded and dowelled through the mesh acc. to Z-33.43-82				
	EPS Standard	40 – 400	■ Full surface ▪ Insulation material ▪ Substrate ■ Partial surface ≥ 40 % ▪ Insulation material ■ Partial surface ≥ 60 % ▪ Substrate	■ For number of dowels see Z-33.43-82 or Knauf Dowel Calculator ■ Dowel or insulation anchor nail
	EPS Nut&Feder	60 – 400		
	EPS SunJa	80 – 200		
	EPSe Standard	80 – 200		
	EPSe Nut&Feder	80 – 200		
Adhesively bonded and dowelled under the mesh acc. to Z-33.43-82				
	EPS Standard	40 – 400	■ Full surface ▪ Insulation material ▪ Substrate ■ Partial surface ≥ 40 % ▪ Insulation material ■ Partial surface ≥ 60 % ▪ Substrate	■ For number of dowels see Z-33.43-82 or Knauf Dowel Calculator ■ Dowel or insulation anchor nail
	EPS Nut&Feder	60 – 400		
	EPS SunJa	80 – 200		
	EPSe Standard	80 – 200		
	EPSe Nut&Feder	80 – 200		
Adhesively bonded and recess dowelled under the mesh acc. to Z-33.43-82				
	EPS Standard	80 – 400	■ Full surface ▪ Insulation material ▪ Substrate ■ Partial surface ≥ 40 % ▪ Insulation material ■ Partial surface ≥ 60 % ▪ Substrate	■ For number of dowels see Z-33.43-82 or Knauf Dowel Calculator ■ Schraubdübel STR U 2G dowel with dowel plate VT 2G and STR Rondelle EPS
	EPS Nut&Feder	80 – 400		
	EPS SunJa	80 – 200		
	EPSe Standard	80 – 200		
	EPSe Nut&Feder	80 – 200		
Adhesively bonded and recess dowelled (countersunk) under the mesh acc. to Z-33.43-82				
	EPS Standard	100 – 400	■ Full surface ▪ Insulation material ▪ Substrate ■ Partial surface ≥ 40 % ▪ Insulation material ■ Partial surface ≥ 60 % ▪ Substrate	■ For number of dowels see Z-33.43-82 or Knauf Dowel Calculator ■ Schraubdübel STR U 2G dowel with STR Rondelle dowel plate EPS ■ Deeply recessed installation also with TERMOZ SV II Ecotwist or Gecko U8
	EPS Nut&Feder	100 – 400		
	EPS SunJa	100 – 200		
	EPSe Standard	100 – 200		
	EPSe Nut&Feder	100 – 200		

Insulation material installation – double-layer application

Scheme drawing Dimensions in mm	Insulation material	Permissible/possible total insulation thickness mm	Bonding second insulation layer	Mechanical anchoring second insulation material layer
Adhesively bonded and dowelled through the mesh acc. to Z-33.43-82				
	EPS Standard	120 – 400	■ Full surface ▪ Insulation material ■ Partial surface ≥ 40 % ▪ Insulation material	■ For number of dowels see Z-33.43-82 or Knauf Dowel Calculator ■ Dowel or insulation anchor nail
	EPS Nut&Feder	120 – 400		
	EPS SunJa	160 – 200		
	EPSe Standard	160 – 200		
	EPSe Nut&Feder	160 – 200		
Adhesively bonded and dowelled under the mesh acc. to Z-33.43-82				
	EPS Standard	120 – 400	■ Full surface ▪ Insulation material ■ Partial surface ≥ 40 % ▪ Insulation material	■ For number of dowels see Z-33.43-82 or Knauf Dowel Calculator ■ Dowel or insulation anchor nail
	EPS Nut&Feder	120 – 400		
	EPS SunJa	160 – 200		
	EPSe Standard	160 – 200		
	EPSe Nut&Feder	160 – 200		
Adhesively bonded and recess dowelled under the mesh acc. to Z-33.43-82				
	EPS Standard	140 – 400	■ Full surface ▪ Insulation material ■ Partial surface ≥ 40 % ▪ Insulation material	■ For number of dowels see Z-33.43-82 or Knauf Dowel Calculator ■ Schraubdübel STR U 2G dowel with dowel plate VT 2G and STR Rondelle EPS
	EPS Nut&Feder	140 – 400		
	EPS SunJa	160 – 200		
	EPSe Standard	160 – 200		
	EPSe Nut&Feder	160 – 200		
Adhesively bonded and recess dowelled under the mesh acc. to Z-33.43-82				
	EPS Standard	160 – 400	■ Full surface ▪ Insulation material ■ Partial surface ≥ 40 % ▪ Insulation material	■ For number of dowels see Z-33.43-82 or Knauf Dowel Calculator ■ Schraubdübel STR U 2G dowel with STR Rondelle dowel plate EPS
	EPS Nut&Feder	160 – 400		
	EPS SunJa	180 – 200		
	EPSe Standard	180 – 200		
	EPSe Nut&Feder	180 – 200		

Notes

Both insulation material layers must consist of the same insulation material.

The second insulation material layer has an offset (horizontal) to the first insulation material layer of at least 100 mm.

Pastol is not permissible as an adhesive between first and second insulation material layer.

Deeply recessed not permissible

Machine technology from Knauf PFT for the application of adhesive and basecoats

Product	Mixing pump/ feed pump	Stator/ rotor	Mortar hoses	Wet mortar pumping distance
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
Duo-Kleber adhesive	G 4	D4-3	Ø 25 mm	Up to 30 m
	RITMO L plus	B4-2L	Ø 25 mm	Up to 20 m
Lustro	G 4	D4-3	Ø 25 mm	Up to 40 m
	RITMO L plus	B4-2L	Ø 25 mm	Up to 20 m
Pastol	RITMO L plus	B4-2 L	Ø 25 mm	Up to 20 m
	SWING M	C4-2	Ø 25 mm	Up to 20 m
	SWING L	D6-3 Twister	Ø 25 mm	Up to 30 m
	RITMO XL	D6-3 Twister	Ø 25 mm	Up to 30 m

For further information on machine engineering see: pft.net

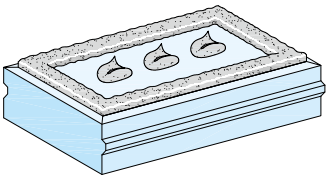
Bonding

Unevenness in the substrate up to a maximum of 20 mm can be covered with adhesive if the insulation material is additionally dowelled. Otherwise uneveness only up to 10 mm can be equalized with adhesive.

Bonding process with adhesive

Manual, partial surface on insulation panel

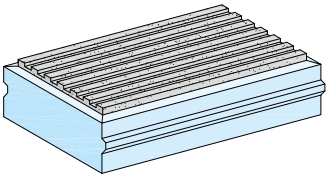
Edge ribbon and dab bonding is performed by hand. The adhesive bonding surface with the substrate is ≥ 40 % after pressing in the insulation panels.



Apply an approx. 50 mm wide ribbon of mortar around the perimeter and 3 palm-sized adhesive dabs or strips on the insulation panel.

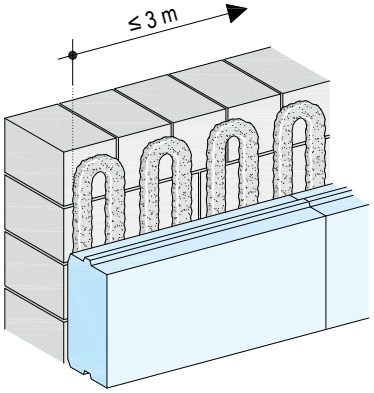
Manual, entire surface on insulation panel

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



By machine, partial surface on substrate

Apply machine applied adhesive in the form of mortar dabs directly on the substrate at spaces of maximum 100 mm using the meandering method and apply the insulation panels immediately by pushing, floating and pressing. The required adhesive bonding surface is ≥ 60 % after pressing in the insulation boards. Apply a continuous strip of adhesive in the edge areas. Only apply a maximum of 3 m of adhesive in advance.



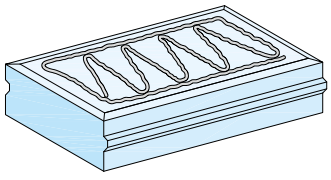
By machine, entire surface on substrate

Alternatively, the adhesive can be applied to the full surface directly on even substrates. Run a notched trowel through the adhesive directly before applying the insulation panels.

Bonding process with adhesive foam

Manual, partial surface on insulation panel

When using Speedero adhesive foam, the insulation panels must be provided by applying a circumferential string close to the edge and with an enclosed string in an M or W shape so that bonding of at least 40 % of the surface is achieved. A possible post-expansion of the not yet set adhesive foam in insulation panels without tongue and groove should be prevented.



Bonding in plinth and splash water zone

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 to bevel the lower edge of the plinth insulation panel if it is only slightly embedded into the soil (up to 500 mm below ground level), see documents in the notes section. Allow a setting time of at least 48 hours before continuing work.

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

Notes	Observe the following guidelines: ■ Guideline “Façade plinth render/External components” (German only), issued by Fachverband der Stuckateure für Ausbau und Fassade Baden-Württemberg ■ VDPM Code of Practice “Ausführung von Sockelbereichen bei Wärmedämm-Verbundsystemen und Putzsystemen - *Design of plinths with ETICS and plaster systems*” (German only). ■ DIN 18533

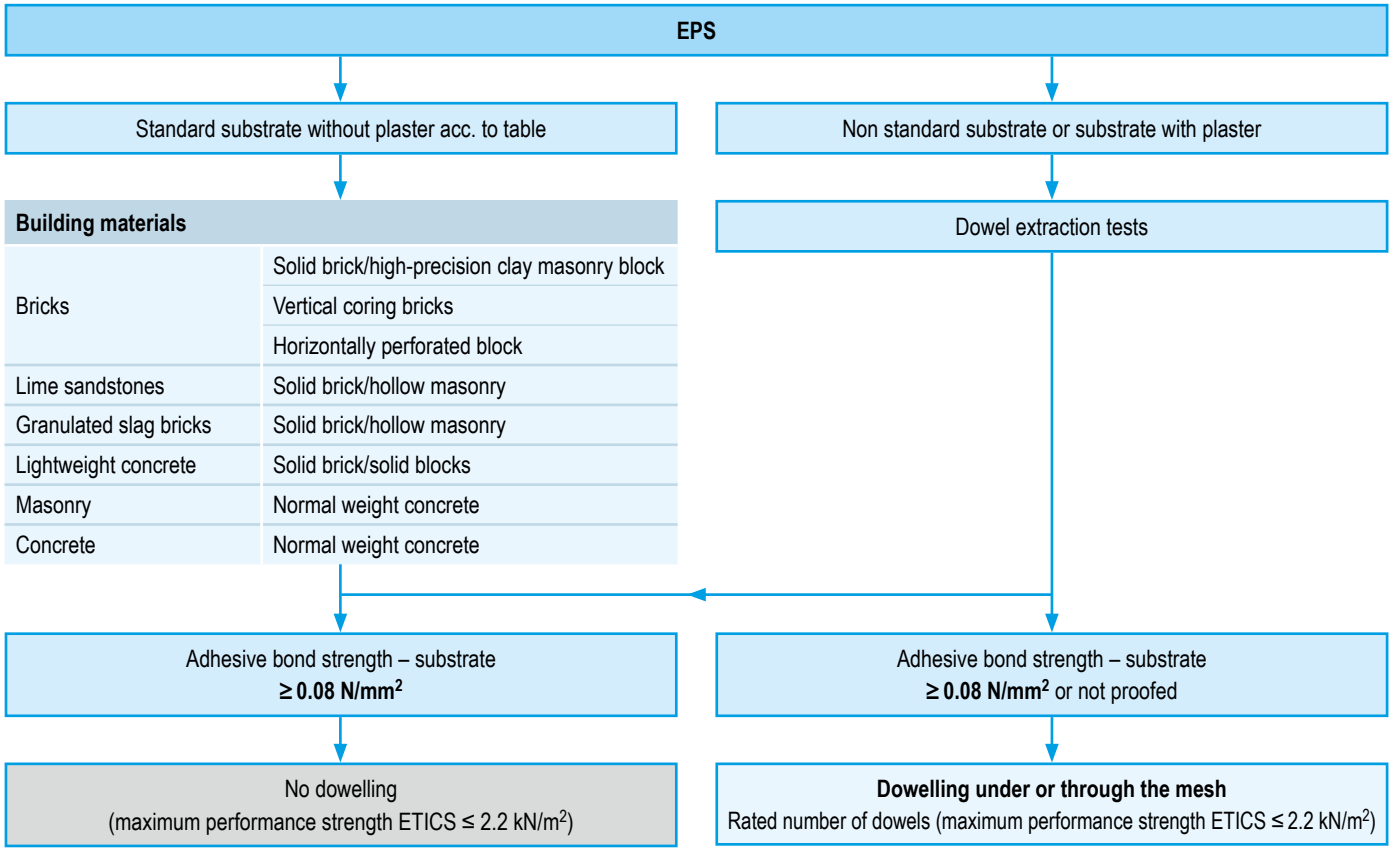
Bonding two insulation material layers

Bonding process with adhesive

Manual, on second insulation material layer

Application of a second insulation material layer is only possible if the system has been dowelled as well as adhesively bonded. The second insulation material layer must be offset to the first insulation material layer. The minimum thickness of the first and second layer is 60 mm. The total insulation material thickness may not exceed max. 400 mm. The installation method and the number of dowels in accordance with the wind load table is dependent on the thickness of the second layer. Both insulation material layers must consist of the same EPS insulation material. Bonding between the individual layers is exclusively with a mineral-based adhesive. The adhesive share must be at least 40 %. A countersunk dowel installation (TERMOZ SV II Ecotwist dowel or Gecko U8 dowel) is not permissible.

Overview of necessary dowelling



Note	Dowel extraction tests are required in case of dowelling on non standard substrates.

Dowelling in the substrate

Method for determination of wind loads

For use with	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	Not specified
Wind zone	1 to 4	1 to 4
Building layout	Rectangular	Any
Height / width ratio	≤ 2	Any
Elevation of site	≤ 800 m above sea level, flat terrain	Any

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

Wind zone 1
Inland

Wind zone 2
Inland, coast and Baltic Sea islands

Wind zone 3
Inland, coast and Baltic Sea islands

Wind zone 4
Inland, coast and islands of the North Sea and Baltic Sea

Dowelling in the substrate (continuation)

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

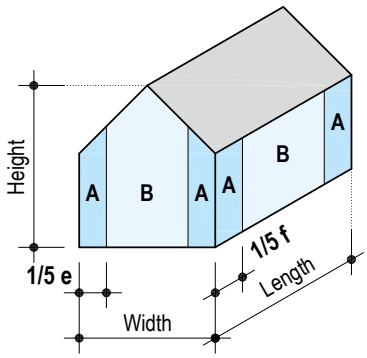
Wind zone	Region	Wind suction forces w_{ek} in kN/m²					
		Building height					
		0 to 10 m		0 to 18 m		0 to 25 m	
		Fringe A	Zone B	Fringe A	Zone B	Fringe A	Zone B
1	Inland	0.738	0.550	0.959	0.715	1.106	0.825
2	Inland	0.959	0.715	1.180	0.880	1.328	0.990
	Coast and Baltic sea islands	1.245	0.935	1.475	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 width of fringe A

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

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

The smallest corresponding value is decisive.



Determination of the dowel quantity and length

The Knauf dowel calculator is a predimensioning program and can determine, calculate and display the following:

- Wind loads in dependence on the postal code and building geometry for the fringes and central areas of the building according to the simplified method.
- Width of the fringe and central area on the building in dependence on the building geometry
- Number of dowels in dependence on wind load, dowel type, dowel plate and installation method.
- Dowel placement on the insulation panel in dependence on the installation method.
- Dowel loadbearing capacity of the selected dowel type in dependence on the anchoring substrate.
- Dowel length in dependence on the dowel type, substrate, insulation material thickness and possible other non-load-bearing layers

Determination of the wind load, the number of dowels and dowel arrangement schemes at: knauf.de/duebelrechner

General installation instructions

- The wall must be sufficiently stable to allow the use of dowels. Dowel extraction tests must be carried out for substrates that are not regulated in the respective dowel approvals or whose characteristic values are unknown.
- The dowels / anchors used must be listed in the system approva (Z-33.43-82).
- The permissible installation types depending on the insulation thickness can be found in the pages 27 and 28.
- If the insulation panels are applied in two layers, the dowels must be inserted through the entire thickness of the insulation material.
- The substrate temperature must be ≥ 0 °C when placing a dowel. The exposure to UV light with direct exposure to sunlight for the dowel and insulation panel may not exceed 6 weeks.
- Dowelling through the insulation material into the supporting substrate can commence as soon as the adhesive has hardened sufficiently.
- The rated diameter of the drill must be 8 mm. In case of perforated brick masonry and aerated concrete, only drill a hole in the turning direction. Position the drill holes so that the concrete reinforcement is not damaged.
- Drill hole depth from the surface of the insulating material or basecoat surface = dowel length + 10 mm (or + 25 mm for countersunk dowel installation). Clean the drill holes before the dowels are applied. Do not use worn drill bits. Resharpening the drill bit is not permissible.
- The specifications in the system approvals or the DIN 55699:2017-08, appendix A must be observed for the arrangement of the dowels.

General installation instructions (continued)

- In case of dowel placement just on the surface, the minimum spacing of the dowel shaft to the edge of the panel is 150 mm. The dowels must be evenly distributed across the surface.
- For EPS boards in conjunction with the use of the VT 2G additional dowel plate, the dowels that are placed in the panel surface must have a minimum spacing of 250 mm between the dowel shaft and the edge of the panel and at least 500 mm to the other dowel shafts.

Installation methods

- The selection depends on the insulation thickness, dowel type and wind load and can lead to a differing number of dowels.

Through the mesh

- A basecoat must be applied in two layers when dowelling through the reinforcement mesh. The mesh is worked into the first layer. Subsequently, dowels are installed in the fresh mortar and a second basecoat is then applied. The dowels must be evenly distributed across the surface.
- When dowelling through the reinforcement mesh, the dowels can only be placed and on the surface.
- Additional rondelles are not used for installation here.

Under the mesh – surface flush

- Ensure that the dowel plates are flush with the surface of the insulation material and, if necessary, use EPS plugs to seal the dowel shaft. The application of the reinforced basecoat can then begin.
- It is possible that use of dowel plates can reduce the number of dowels. Only the additional dowel plates approved for the dowels can be used.

Under the mesh – recessed or countersunk

- For recessed dowel installation, use the STR U 2G dowel with STR Rondelle EPS and an installation tool. The drill hole must be drilled at least 25 mm deeper than the seat of the dowel in the anchoring substrate.
- The TERMOZ SV II Ecotwist, HTH or Gecko U8 dowels must be used for recessed installation.

Under the mesh – recessed

- Recessed installation can be carried out using the STR U 2G dowel and the VT 2G additional dowel plate as well as an STR Rondelle EPS. In this method of installation, the dowel is placed in the same way as with a recessed dowel installation and structurally assessed in the same way as a flush surface installation with additional dowel plate.

Dowelling in the plinth and splash water zone

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

Dowel selection

Schraubdübel STR U 2G dowel

The STR U 2G dowel is used for flush or countersunk installation using an installation tool and can be combined with the VT 2G dowel plate. The pre-assembled dowel screw is made of galvanised steel. The dowel sleeve consists of a high-grade synthetic with predefined crumple zone for countersunk dowel installation.

The anchoring depths are 25 mm in masonry and concrete and 65 mm in aerated concrete. The dowel guarantees safety thanks to its very high characteristic load-bearing capacity.

CNplus 8 insulation anchor nail

Insulation anchor nail CNplus 8 is used for installation flush with the surface. The anchor can be installed using impact or screw-in installation. It is characterised by a very low impact energy. The pre-assembled screw nail consists of a combination of glass fibre-reinforced polyamide and galvanised steel in the expansion area. The dowel shank consists of a high-grade synthetic.

The anchoring depths are 35 mm in masonry and concrete and 55 mm in porous lightweight concrete and aerated concrete.

Schraubdübel HTR-P dowel

The HTR-P dowel is used for flush surface installation using a setting tool. The HTR-P dowel is an anchor with a pre-assembled fully synthetic screw as the expansion element. The dowel has a very low insertion torque, which facilitates optimum installation with a cordless screwdriver.

The anchoring depths are 25 mm in masonry and concrete and 45 mm in aerated concrete.

TERMOZ SV II Ecotwist dowel

The TERMOZ SV II Ecotwist dowel is used for countersunk installation. The dowel consists of a synthetic element made of polyamide and a special screw made of galvanised steel. It can be used as an anchor length for all insulation thicknesses from 100 mm. Depending on possible tolerances (plaster layer in old buildings), the dowel is available in 3 lengths. The dowel is installed using a setting tool by cutting cleanly into the dowel plate to protect the insulation material.

The anchoring depth is 35 mm in all substrates.

Determination of dowel length

The necessary dowel length can be determined in the Knauf Dowel Calculator.

Caclulation of the dowel length (applies for surface flush, recessed or countersunk):

- New building: Anchoring depth + 5 mm façade equalization + 5 mm adhesive thickness + insulation material thickness
- Old building: Anchoring depth + (possibly. 20 mm old plaster thickness) + 5 mm façade equalization + 5 mm adhesive thickness + insulation material thickness

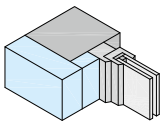
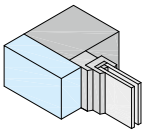
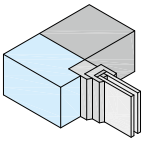
Note	Observe the VDPM Code of Practice “Dowels in ETICS: Notes on planning and application”.

Driving-rain proof window connection profile

Profile selection

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

Application

Window connection profiles	Movement absorption capacity	Window position in masonry Centred			Flush			Projected (plasterable reveal necessary)		
										
		Maximum insulation material thickness in mm with window size (Installation without an additional Fugendichtband FD joint sealing tape)								
		≤ 6 m²	≤ 10 m²	≤ 15 m²	≤ 6 m²	≤ 10 m²	≤ 15 m²	≤ 6 m²	≤ 10 m²	≤ 15 m²
Flexible	A	300	300	–	300	300	–	300	300	–
Duo G6	B	300	300	–	240	240	–	240	240	–
Duo G10	A	300	300	–	300	300	–	300	300	–
Milano	A	300	300	–	300	300	–	300	300	–
Universal Pro	A	400	400	400	400	400	400	400	400	400
Universal-K Pro	A	400	400	400	400	400	400	400	400	400
Front mounted roller shutters	A	300	300	–	300	300	–	300	300	–

Notes

An additional Joint sealing tape FD must be used in case of insulation materials that are larger than specified in the table.

VDPM Code of Practice "Formation of details with profiles and joint sealing tapes in external rendering and ETICS" (German only) and window guideline of the German Fachverband der Stuckateure "Connections windows and roller shutters in rendering, external thermal insulation composite system and drywalling" (German only) must observed.

For coloured metal and plastic windows, the use of profiles with high shear resistance (higher movement class, e.g. instead of class B → class A) is recommended.

Use of adhesively bonded window connection profiles

An adhesive bonding test must always 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 must be level, dry, frost-free, dust-free and free of grease as well as suitable for an adhesive. 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. 100 mm), 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. Documenting the adhesive bonding test is recommended. The substrate is suitable if the self-adhesive PE-Dichtband sealing tape on the one hand remains completely attached to the profile and on the other hand completely to the substrate (continuous foam rupture).

If this is not the case, the desired window connection profile must be installed with a Joint Sealing Tape FD or the Universal Pro or Universal-K Pro window connection profile where PUR sealing tape is used. A primer pen can be used to improve adhesion to coated surfaces, for example.

Window connection profiles must always be bonded stress-free. A high compression pressure is crucial for the adhesive strength and decisive for the bonding of the profiles. Cavities in the ETICS behind profiles must be avoided.

Butt jointing of profiles

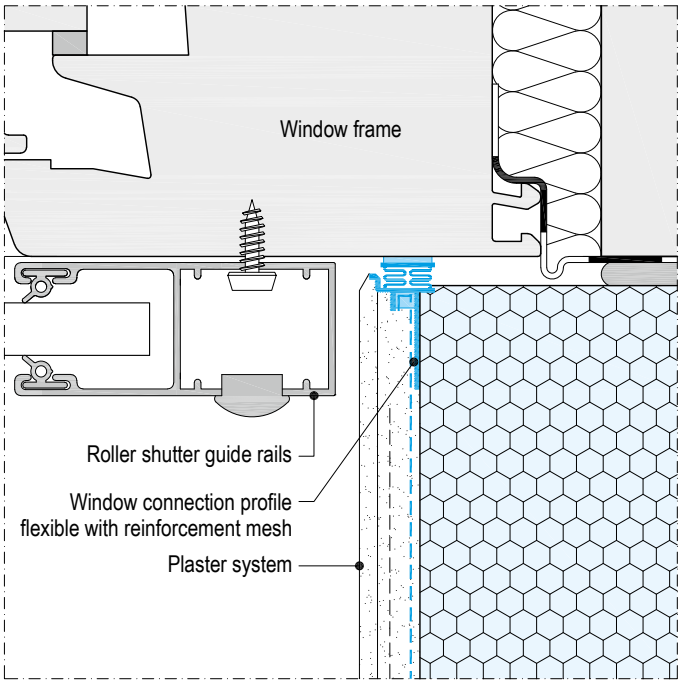
If profiles have to be butt-jointed, they must be backed with Joint sealing tape FD. The following must be observed:
Vertically installed profiles (window reveals): Press the joints together. Overlap the mesh strips by 100 mm in the joint area. Insert the profile in its original length at the bottom of the reveal and insert the cut-out above it. The window lintel protects the vertical profile joint better against driving rain. Subsequently fit the horizontal profile between the vertical profiles.

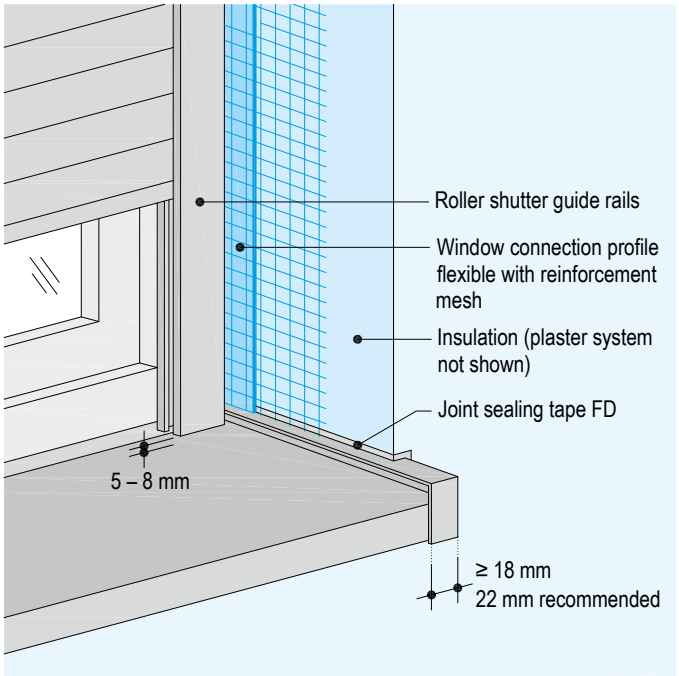
Backing for Universal Pro and Universal-K Pro is not necessary (observe the product data sheet).

Driving-rain sealed connections in the window area

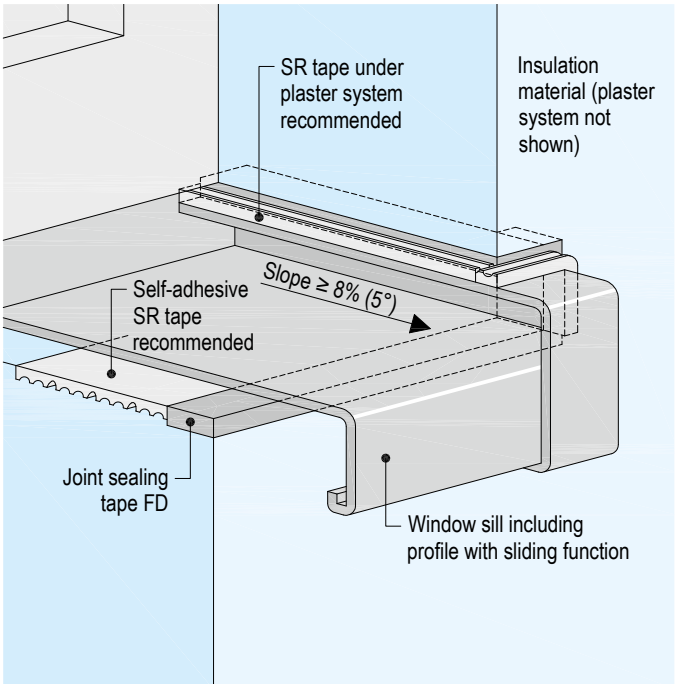
Scheme drawings

Roller blind guide rails and ETICS





Connection to window sill side section



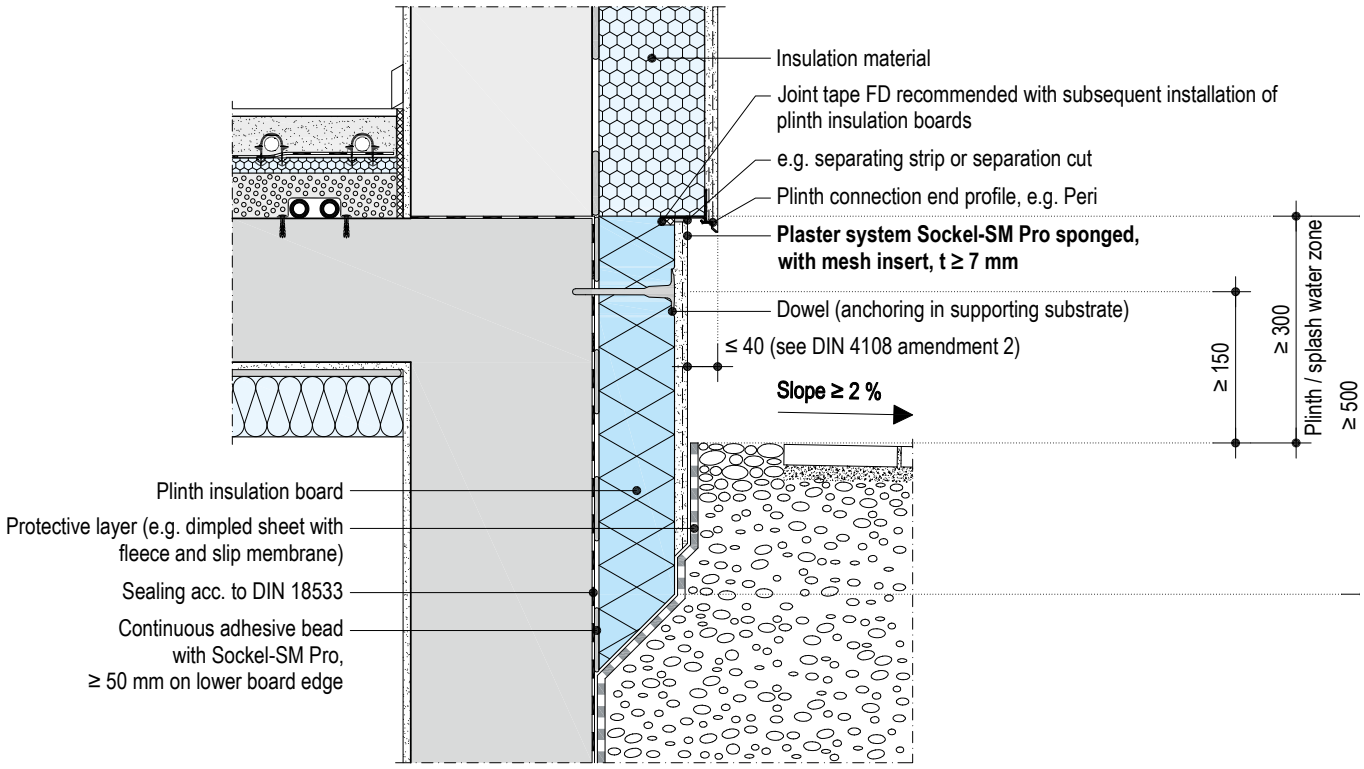
Note	Second waterproofing level is required if the window sill is not driving-rain proof certified, see VDPM Code of Practice "Formation of details with profiles and joint sealing tapes in external rendering and ETICS" (German only)".

Minimal integration depth in the soil

Scale 1:10 I Dimensions in mm

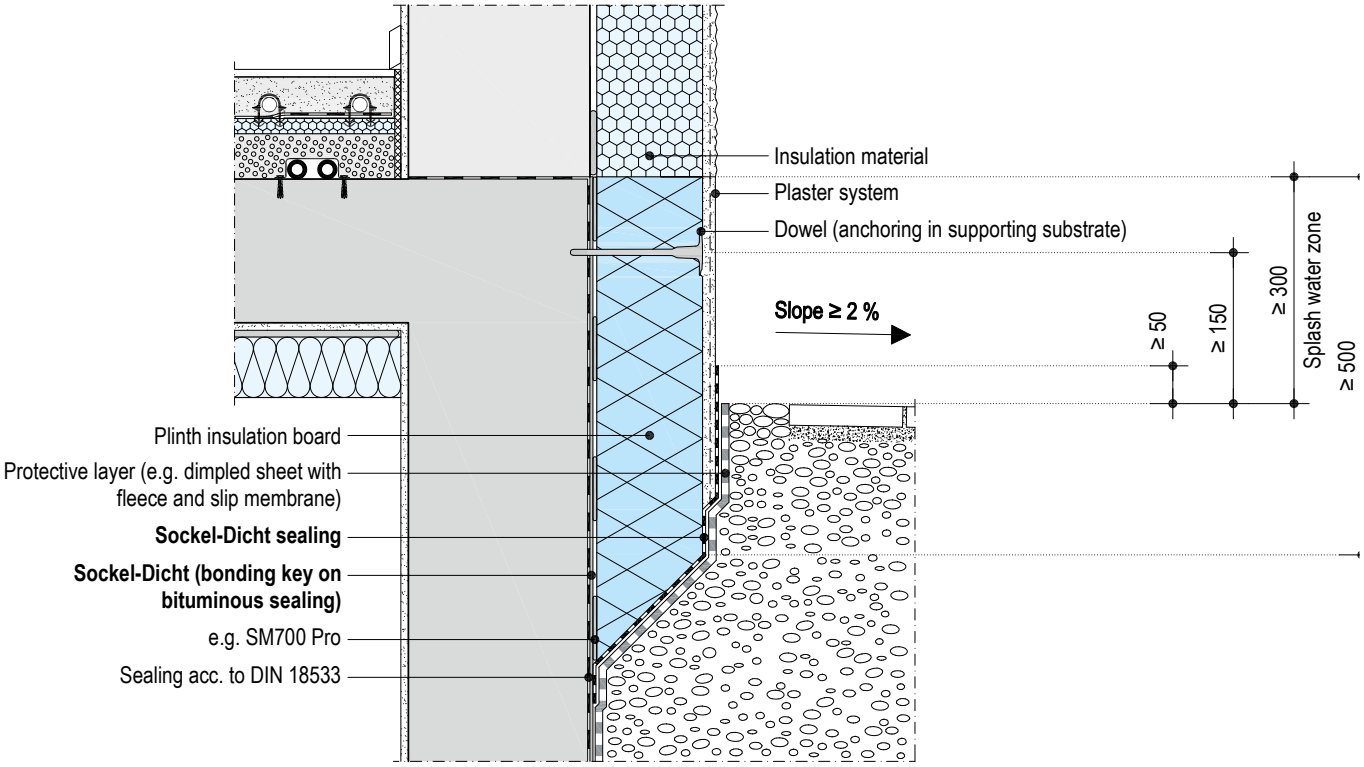
WE111.de-SO-V17 Recessed plinth application

Application with Sockel-SM Pro



WE111.de-SO-V18 Flush plinth application

Application without Sockel-SM Pro



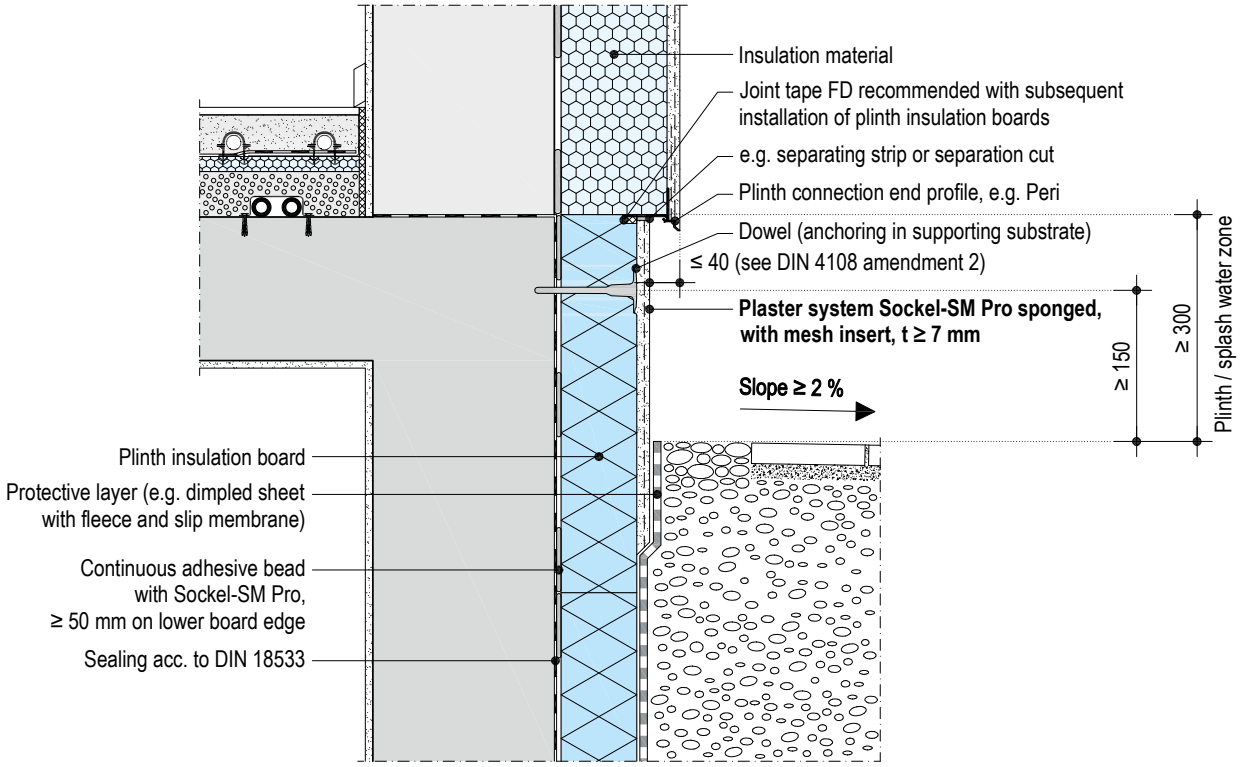
1) Height ≤ 0.9 m when configured as a not easily flammable ETICS system (B1).

Connection to perimeter insulation

Scale 1:10 I Dimensions in mm

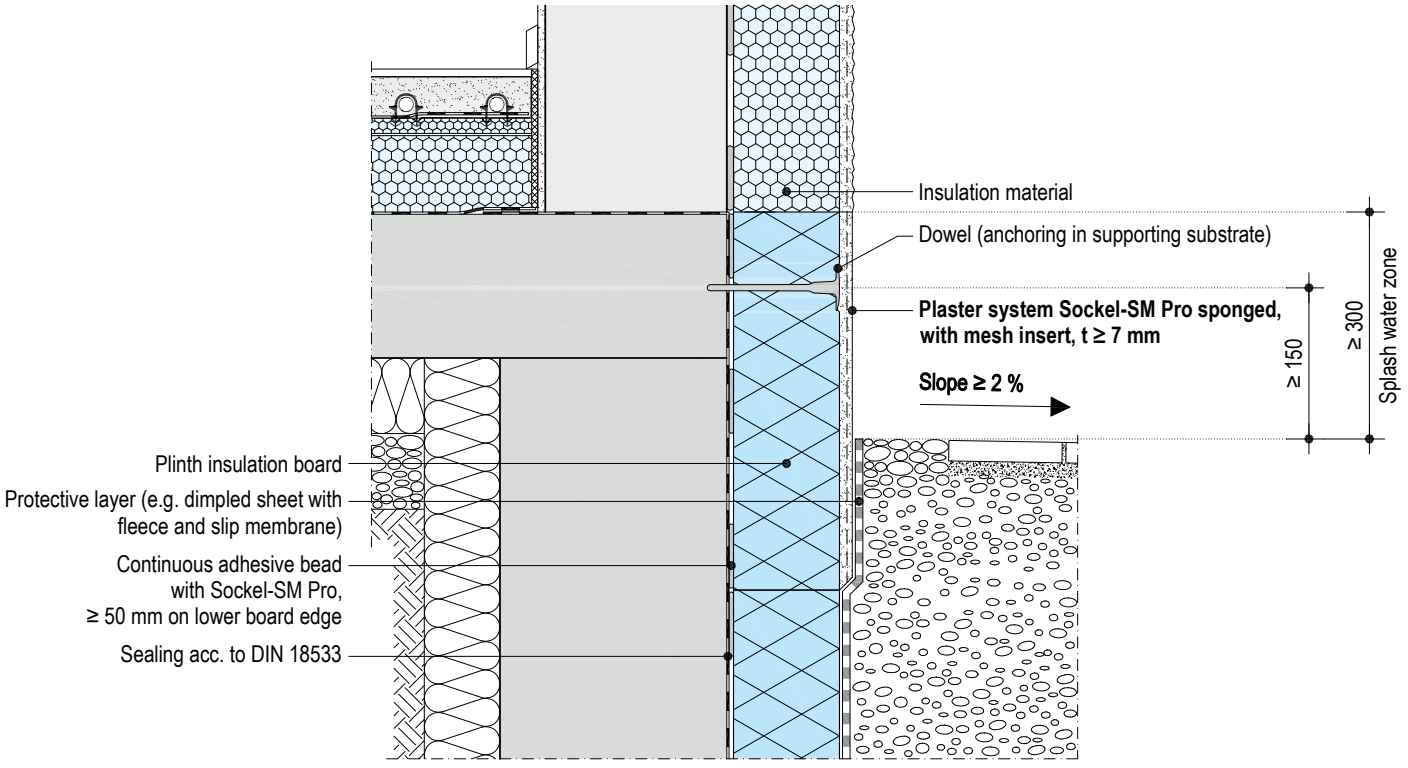
WE111.de-SO-V19 Recessed plinth application

Application with Sockel-SM Pro



WE111.de-SO-V20 Flush plinth application

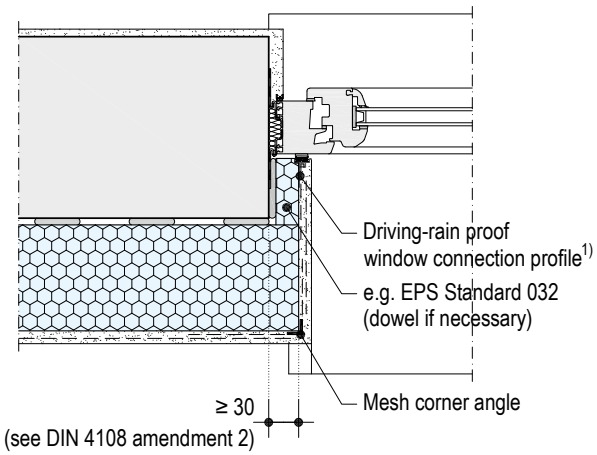
Application with floor slab and Sockel-SM Pro



1) Height ≤ 0.9 m when configured as a not easily flammable ETICS system (B1).

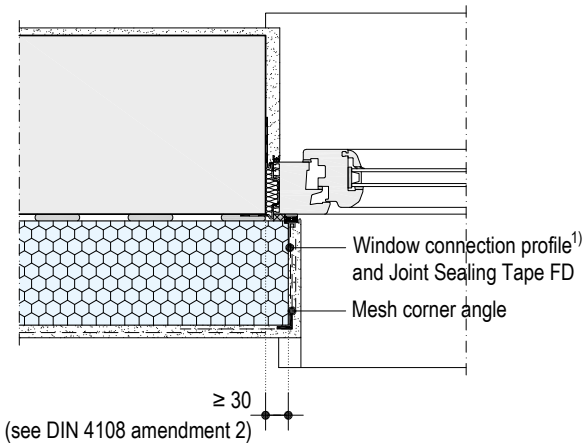
Window in centre of masonry

WE111.de-FE-H1 Horizontal section



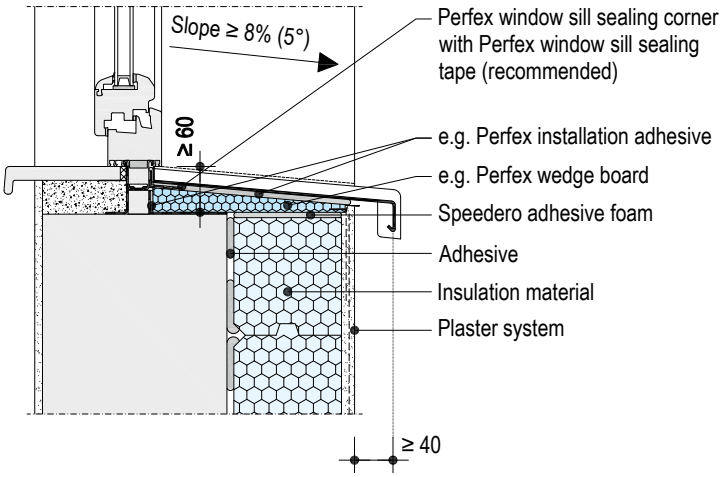
Window exterior flush with masonry

WE111.de-FE-H2 Horizontal section

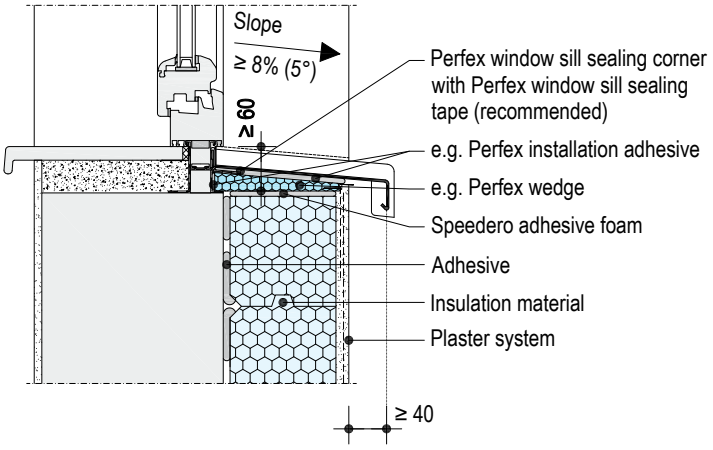


Scale 1:10 I Dimensions in mm

WE111.de-FE-V12 Vertical section



WE111.de-FE-V2 Vertical section



1) In case driving-rain proofing has not been certified, an additional Fugendichtband FD joint sealing tape must be installed (see detail at WE111.de-FE-H2 as well as page 34).

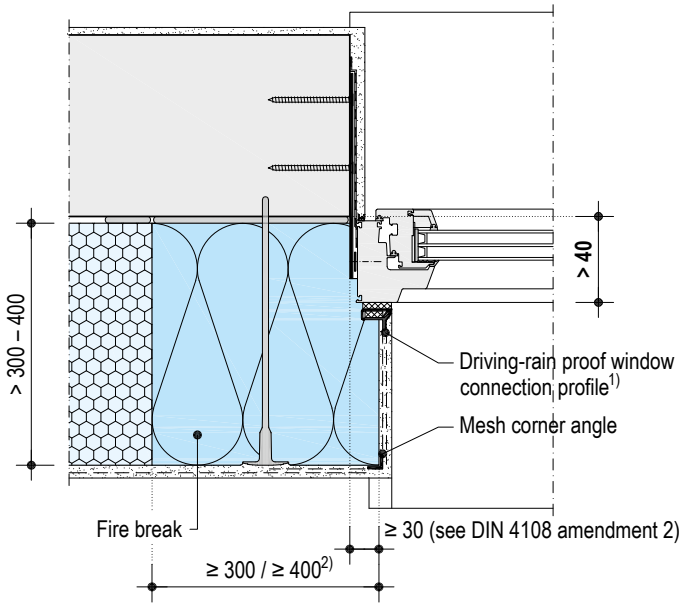
Notes	Take care to ensure fully sealed openings (interface gaps) and ensure that filling is applied under window frames. The window installation and seals are represented schematically – refer to “Guideline on the installation of windows and doors” from the RAL-Gütegemeinschaft Fenster und Haustüren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

Window before the masonry

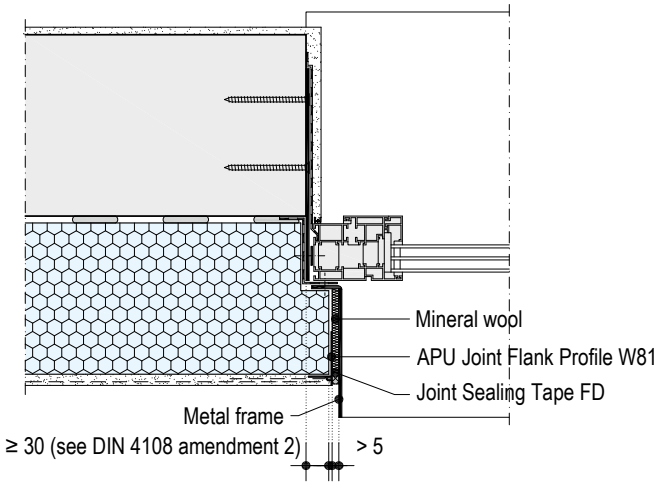
Scale 1:10 I Dimensions in mm

WE111.de-FE-H4 Horizontal section

Fire break in lintel and reveal, insulation material thickness > 300 to 400 mm

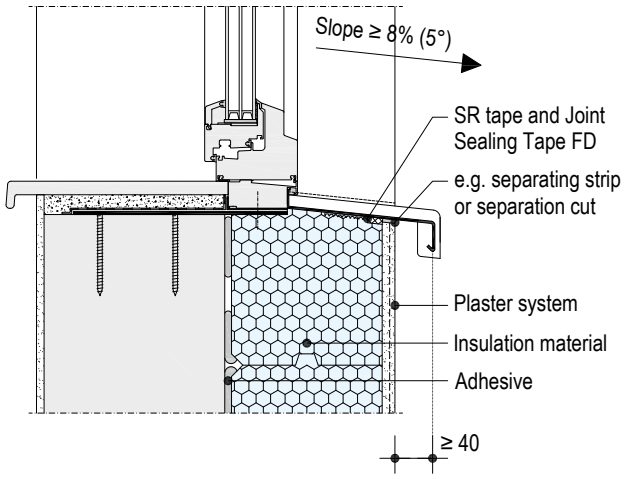


WE111.de-FE-H12 Connection to metal frames



Project related detailed planning must be undertaken (see VDPM Code of Practice (German only) - Formation of details with profiles and joint sealing tapes in external rendering and ETICS, page 18.

WE111.de-FE-V3 Vertical section



1) *In case driving-rain proofing has not been certified, an additional Joint sealing tape FD must be installed (see detail at WE111.de-FE-H2 on page 38 as well as page 34).*

2) *300 mm wide fire break only with mineral plaster systems, otherwise 400 mm wide.*

3) *At least 5 mm spacing with a maximum 3 m long frame.*

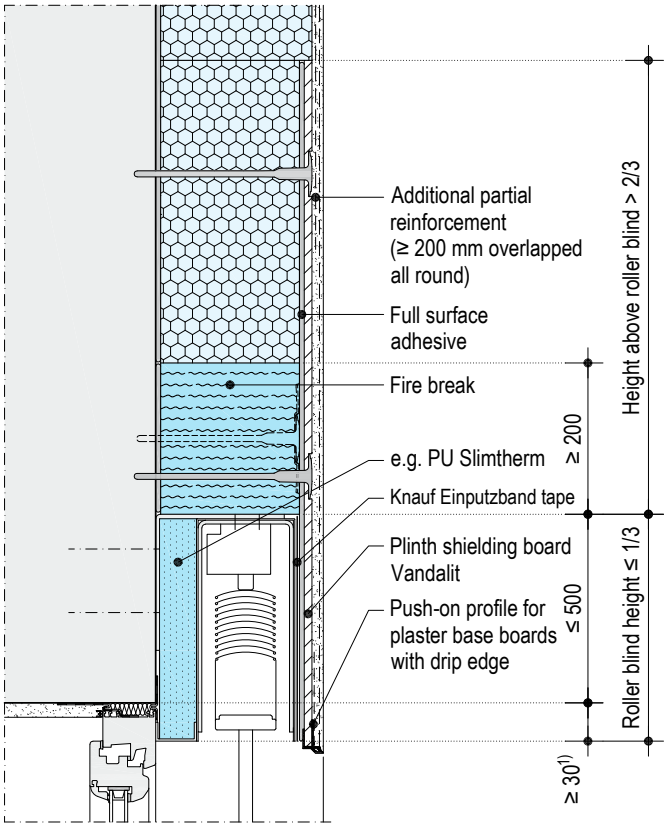
Notes	Take care to ensure fully sealed openings (interface gaps) and ensure that filling is applied under window frames. The window installation and seals are represented schematically – refer to “Guideline on the installation of windows and doors” from the RAL-Gütegemeinschaft Fenster und Haustüren 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.

Lintel design for sun screening with fire break

Scale 1:10 I Dimensions in mm

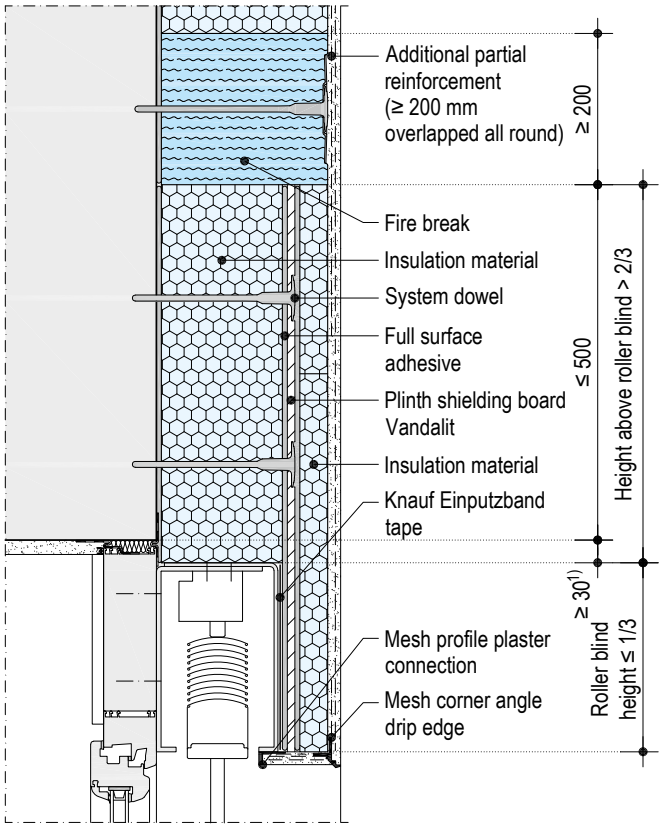
WE111.de-FE-V7 Roller blind with plastered cover

With fire protection measures against room fire



WE111.de-FE-V12 Roller blind with insulated and plastered cover

With fire protection measures against room fire



1) See DIN 4108 amendment 2.

Notes

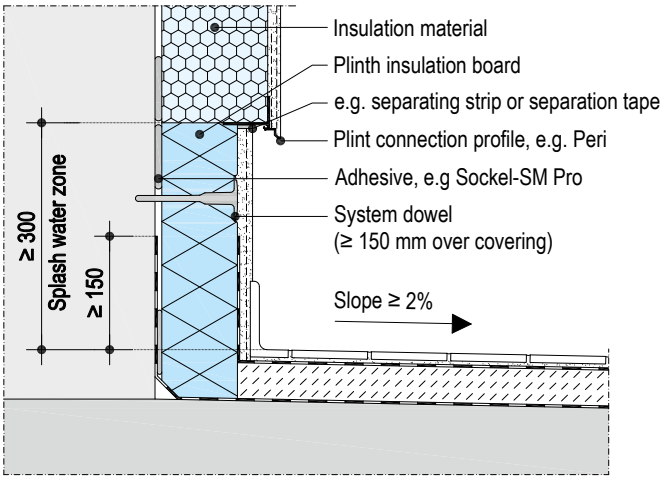
Take care to ensure fully sealed openings (interface gaps) and ensure that filling is applied under window frames.

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.

Balcony and terrace area

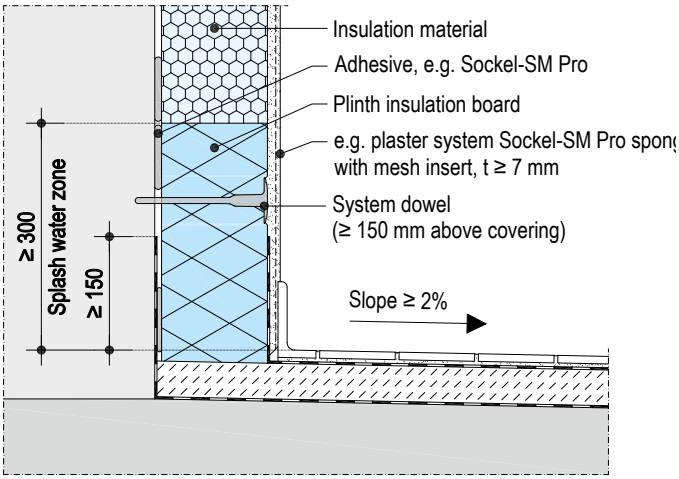
WE111.de-BA-V3 Projecting balcony slab or terrace

Recessed plinth application



WE111.de-BA-V4 Projecting balcony slab or terrace

Flush plinth application



2) Excellent building waterproofing in finished state.

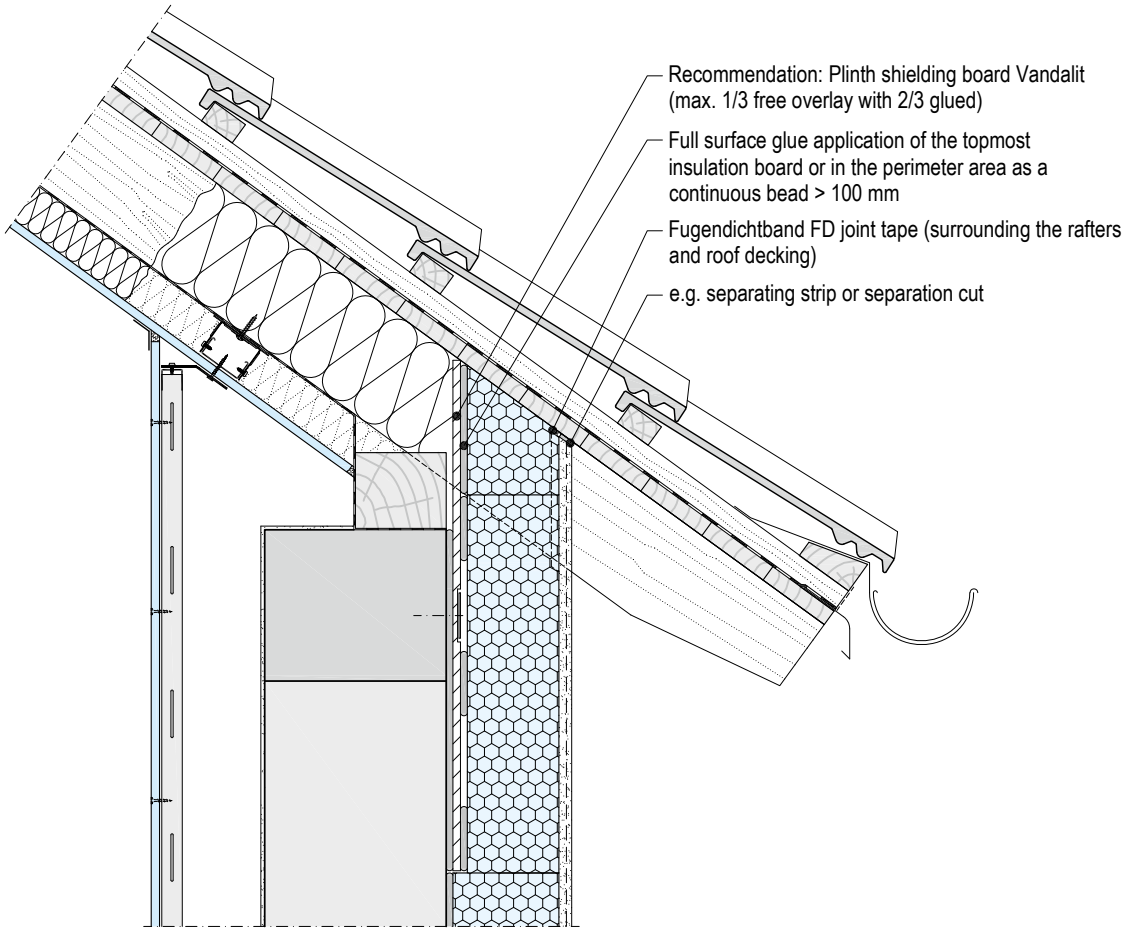
Note

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

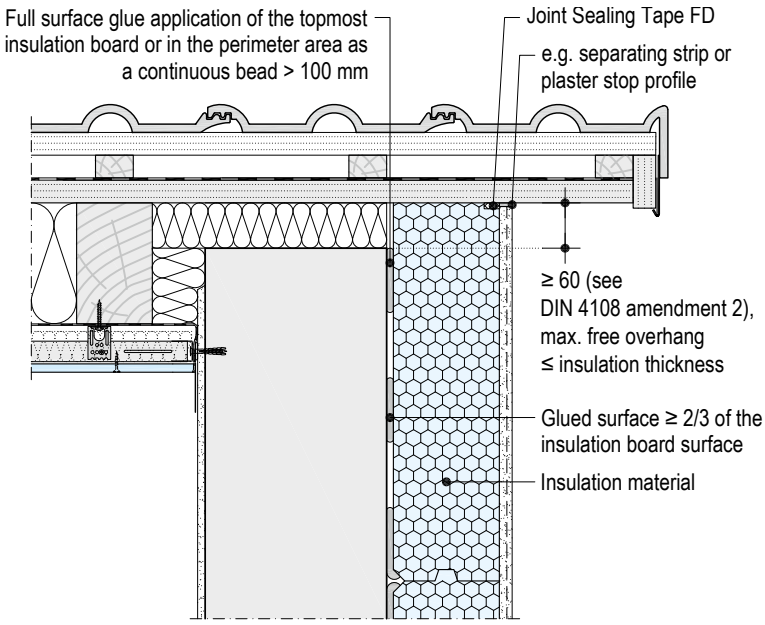
Roof area

WE111.de-DA-V1 Eaves connection to roof weatherboarding

Scale 1:10 I Dimensions in mm



WE111.de-DA-V5 Bargeboard connection



1) *Refer to "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.*

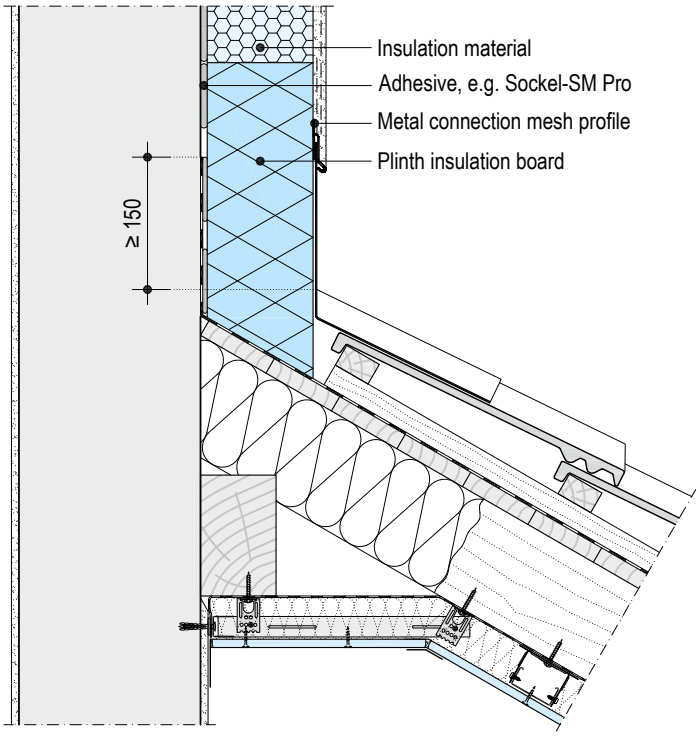
Note	Observe guideline "Metallanschlüsse an Putz und Wärmedämm-Verbundsysteme - *Metal connections to render and external thermal insulation composite systems*", (German only) from the Fachverband der Stuckateure für Ausbau und Fassade Baden Württemberg, Germany as well as the DIN 18531.

Roof area (continuation)

Scale 1:10 I Dimensions in mm

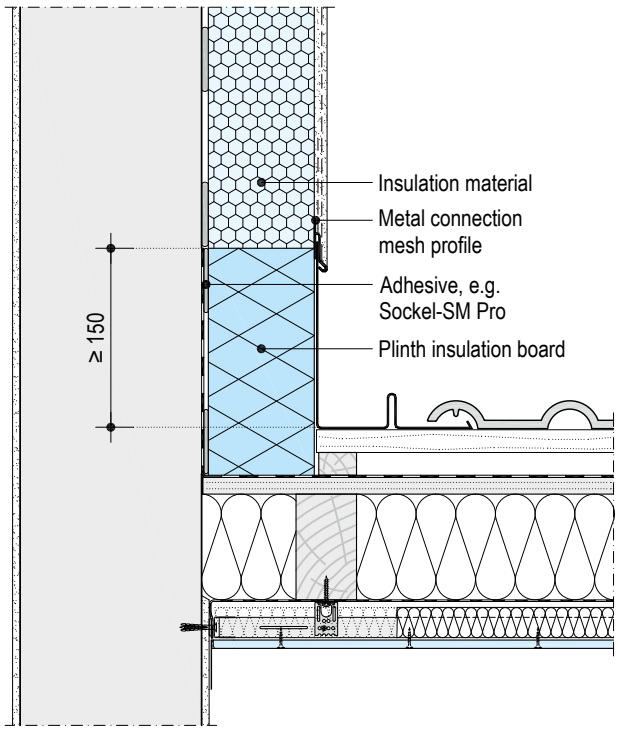
WE111.de-DA-V18 Roof connection to rising wall

Rafters lateral to rising wall



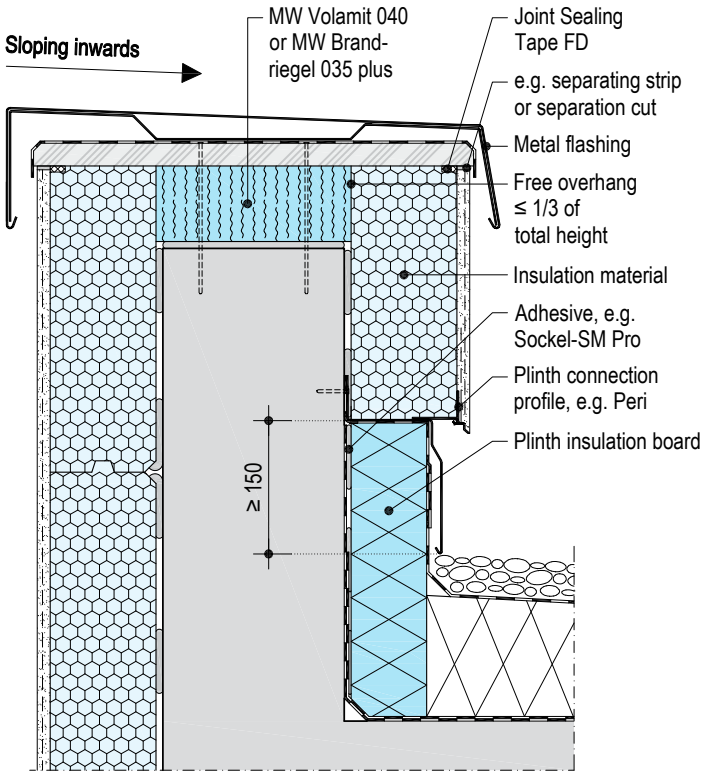
WE111.de-DA-V3 Roof connection to rising wall

Rafters parallel to rising wall



WE111.de-DA-V12 Roof connection to fascia

When configured as a not easily flammable ETICS system B1



1) For spacings and heights of upstands and chamfers on covers as well as drip edge spacings refer to the specialist rules of the plumbing/roofing trade.

Properties

The typical stucco profiles, coving elements and flashings made of coated rigid polystyrene foam are matched to all Knauf WARM WALL systems. They are easy to handle, robust, weather and UV-resistant. And they can be manufactured in any desired size and shape after a detailed drawing has been produced. High-quality coated façade profiles made of EPS with a very low self-weight for easy processing and quick realisation of elegant design concepts.

Thanks to the mesh-reinforced, cement-free coating, the profiles have a high elongation capacity and impact resistance. The scratch-resistant surface is highly resistant to weathering and ageing and is optimally matched to WARM WALL systems.

Application

EPS profiles with paintable surface coatings must be adhesively bonded with Flex tile adhesive or Duo-Kleber adhesive in an edge ribbon and dab bonding method (adhesive surface share ≥ 60 % or full surface) on a sufficiently set, dry and even reinforcement layer. Seal the transitions.

Adhesively bond profile joints with Perfex assembly adhesive, apply self-adhesive mesh strips (in scope of delivery) and fill the joints with a paste-like joint filler (in scope of delivery).

With a projection > 50 mm, we recommend a sheet metal cover should be adhesively bonded onto coated profile surface using Perfex assembly adhesive to protect against soiling and hail.

Adhesive bonding and fixing of the profiles only on wall surfaces, no connection, e.g. with roof connection.

Paint profiles with at least two coats of Autol.

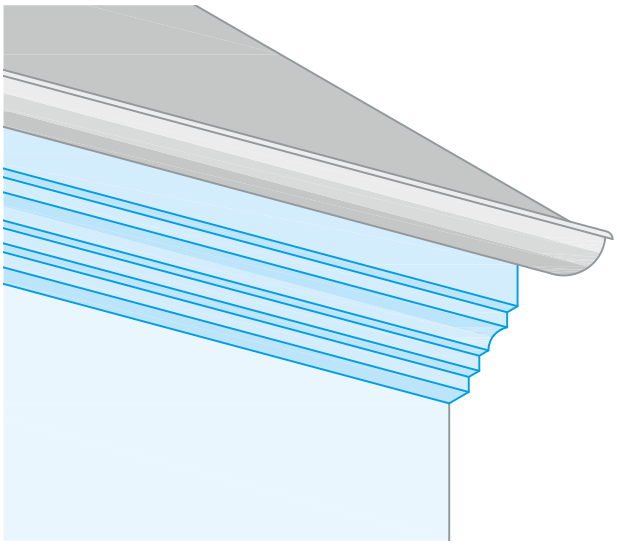
Do not use materials that contain solvents.

Note

Further information on products, areas of application and installation see “Recommendations for the installation/replacement of natural stone and plastic window sills (ETICS façade) from the German Gütegemeinschaft Wärmedämmung von Fassaden e.V.

- Product portfolio Plaster and Façade Systems PuFa74.de
- Price List Plaster and Façade Systems 03/2023
- Product data sheet Knauf Façade Profiles P384.de

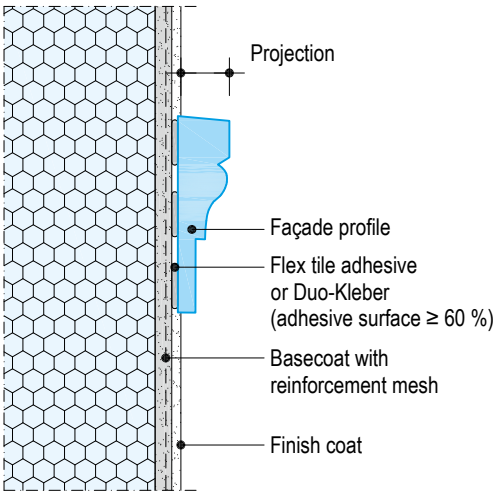
Example of a stylish façade design



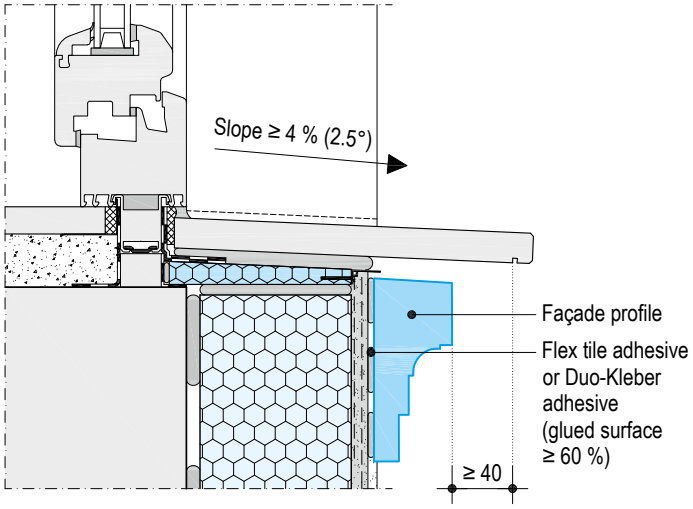
Details

Scale 1:5 I Dimensions in mm

WE111.de-EX-V1 Cornice profile, façade area

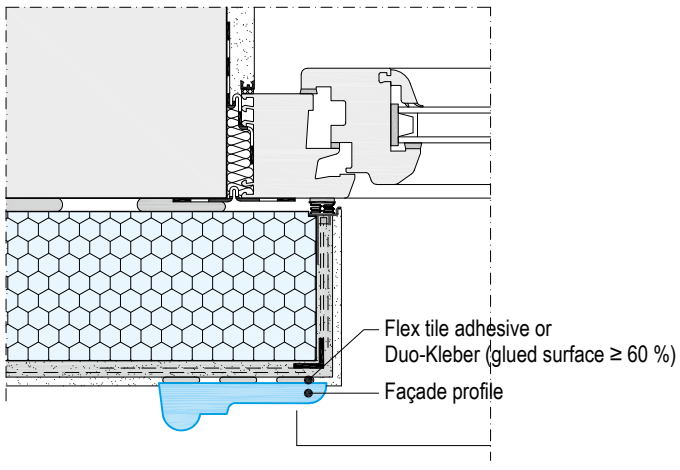


WE111.de-EX-V3 Cornice profile, window sill



Window sill holder recommended, window sill overhang max. 1/3 x sill width.

WE111.de-EX-H1 Cornice profile, window opening



In case of a driving-rain proof window connection profile the installation of an additional joint sealing tape can be omitted.

Material requirement

The material requirement relates to 1 m² façade surface or 1 m plinth length. Allowance for loss and waste must also be considered.

Plinth	Façade	System components	Comment	Unit	Quantity as average value WE111a.de Mineral based	WE111b.de Organic	WE111c.de Mineral / organic	WE111d.de Scratch render
Bonding primer per m², if Sockel-SM Pro is not used as an adhesive								
●		Sockel-Dicht	Wet layer thickness 1.2 mm (dry layer thickness 1 mm)	kg	1.8			
Adhesive per m²								40 %–100 % adhesive area ratio)
●	●	SM300	Max. layer thickness 5 mm	kg	3.1 – 7.7			
●	●	SM700 Pro		kg	2.9 – 7.1			
●	●	Sockel-SM		kg	4.0 – 8.0			
●		Sockel-SM Pro		kg	4.0 – 8.0			
●	●	Duo-Kleber adhesive		kg	2.7 – 6.8			
	●	Lustro		kg	1.8 – 4.4			
	●	Pastol	Layer thickness 2 – 3 mm	kg	2.8 – 4.2			
	●	Speedero adhesive foam	30 mm wide adhesive strip	ml/m²	66.0 – 200.0			
Insulation material per m²								
●		Plinth insulation panel	Insulation thickness: Up to 300 mm → Integration into the soil: Up to 3 m; > 300 mm → Up to 0.5 m	m²	1			
	●	EPS Standard 031	Thickness 40 – 400 mm	m²	1			
	●	EPS Standard 032	Thickness 40 – 400 mm	m²	1			
	●	EPS Standard 032 BMB	Thickness 40 – 400 mm	m²	1			
	●	EPS Nut&Feder 032[1)]	Thickness 60 – 400 mm	m²	1			
	●	EPS SunJa 032	Thickness 80 – 200 mm	m²	1			
	●	EPS Standard 034	Thickness 40 – 400 mm	m²	1			
	●	EPS Standard 035 white	Thickness 40 – 400 mm	m²	1			
	●	EPSe Standard 032	Thickness 80 – 200 mm	m²	1			
	●	EPSe Nut&Feder 032[1)]	Thickness 80 – 200 mm	m²	1			
	●	EPSe Standard 034	Thickness 80 – 200 mm	m²	1			
Plinth connection per m								Only with recessed plinth
	●	Plinth connection profile	Projection of 30 to 300 mm	m/m	1			
	●	Plinth profile	Plinth profile with drip edge and reinforcement mesh for layer thickness 6 mm, 10 mm or 14 mm	m/m	1			
	●	Assembly kit plinth end profiles	Fasteners	Set/m	0.04			
	●	Peri plinth end profile	For layer thickness 3 mm , 7 mm or 17 mm	m/m	1			
Dowels per m²								
●	●	Schraubdübel STR U 2G dowel	Installation: surface flush/recessed/ countersunk, fastening of EPS insulation panels and fire breaks, possible additional dowel plates: VT 2G (recessed installation), VT 90, SBL 140 plus	pcs.	■ Façade surface: For number of dowels see Z-33.43-82 or Knauf Dowel Calculator ■ Plinth area: Set 2 dowels/plates (4 dowels/m²) constructively from a height of 150 mm above the top edge of the ground line			

1) Cover dimension 485 x 1000 mm.

Material requirement (continued)

The material requirement relates to 1 m² façade surface or 1 m plinth length. Allowance for loss and waste must also be considered.

Plinth	Façade	System components		Comment	Unit	Quantity as average value WE111a.de Mineral based	WE111b.de Organic	WE111c.de Mineral / organic	WE111d.de Scratch render
Dowels per m²									
●	●	Stopper elements for STR U 2G		Grey or white rondelles made of EPS for countersunk or recessed or installation, STR stopper for surface flush installation	pcs.	■ Façade surface: For number of dowels see Z-33.43-82 or Knauf Dowel Calculator ■ Plinth area: Set 2 dowels/plates (4 dowels/m²) constructively from a height of 150 mm above the top edge of the ground line			
●	●	CNplus 8 insulation anchor nail		Installation: surface flush, fastening of EPS insulation panels and fire breaks, possible additional dowel plates: DT 90, DT 140					
●	●	Schraubdübel HTR-P dowel		Installation: surface flush, fastening of EPS insulation panels, possible additional dowel plates: HDT 90, HDT 140					
●	●	TERMOZ SV II Ecotwist dowel		Installation, countersunk, fastening of EPS insulation panels					
●	●	Stopper element for TERMOZ SV II Ecotwist		TERMOZ SV II Ecotwist plugs					
Basecoat per m²									
●	●	SM300		Layer thickness 3 – 5 mm[1], 5 – 7 mm, 7 mm with scratch render	kg	4.5 – 10.5	–	4.5 – 10.5	10.5
●	●	SM700 Pro		Layer thickness 5 – 10 mm	kg	7.0 – 13.0	–	7.0 – 13.0	–
●	●	Sockel-SM		Layer thickness 5 – 7 mm	kg	7.0 – 10.0	–	7.0 – 10.0	–
●		Sockel-SM Pro		Layer thickness 5 mm	kg	8.0	–	8.0	–
	●	Lustro		Layer thickness 5 – 15 mm (> 10 mm double-layer)	kg	4.3 – 13.0	–	4.3 – 13.0	–
●	●	Pastol		Layer thickness 2 – 3 mm	kg	–	2.8 – 4.2	–	–
Reinforcement mesh per m²									
●	●	Reinforcing mesh 4x4 mm		100 mm joint overlap	m²	1.1	–	1.1	1.1
●	●	Reinforcing mesh 5x5 mm			m²	1.1	–	1.1	1.1
●	●	Reinforcing mesh Pastol			m²	–	1.1	–	–
Primer per m²									
●	●	Isogrund (recommended)		Diluted: 1:1 with water	kg	(0.1)	–	–	–
●	●	Quarzgrund Pro[2]		Undiluted	kg	0.17	0.17	0.17	–
Finish coat per m²									
●	●	MineralAktiv Scheibenputz floated render	**Grain size**						
			1.5 mm	Layer thickness 1.5 mm	kg	2.4	–	–	–
			2.0 mm	Layer thickness 2 mm	kg	3.2	–	–	–
			3.0 mm	Layer thickness 3 mm	kg	4.2	–	–	–
●	●	MineralAktiv Scheibenputz Dry floated render	2.0 mm	Layer thickness 2 mm	kg	2.4	–	–	–
			3.0 mm	Layer thickness 3 mm	kg	3.4	–	–	–
●	●	SM 260 Pro	2.0 mm	Layer thickness 2 mm	kg	3.2	–	–	–
			3.0 mm	Layer thickness 3 mm	kg	3.4	–	–	–
			5.0 mm	Layer thickness 5 mm	kg	5.0	–	–	–

1) *Plaster system layer thickness from 4.5 mm: Adhesive SM300 or Speedero adhesive foam in conjunction with a layer thickness of SM300 from 3 mm, reinforcement mesh 4x4 mm and finish coats of MineralAktiv Scheibenputz floated render, MineralAktiv Scheibenputz Dry floated render, SP 260 Pro, Noblo, Noblo Filz, RP 240, Conni S or Addi S.*

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

Material requirement (continued)

The material requirement relates to 1 m² façade surface or 1 m plinth length. Allowance for loss and waste must also be considered.

Plinth	Façade	System components		Comment	Unit	Quantity as average value WE111a.de Mineral	WE111b.de Organic	WE111c.de Mineral / organic	WE111d.de Scratch render
Finish coat per m²									
●	●	Noblo	**Grain size** 1.5 mm[1)] 2.0 mm 3.0 mm	 Layer thickness 1.5 mm Layer thickness 2 mm Layer thickness 3 mm	 kg kg kg	 2.3 2.8 3.4	 – – –	 – – –	 – – –
●	●	Noblo Filz	1.0 mm	Layer thickness 2 mm	kg	3.2	–	–	–
●	●	RP 240	2.0 mm 3.0 mm 5.0 mm	Layer thickness 2 mm Layer thickness 3 mm Layer thickness 5 mm	kg kg kg	3.1 3.8 5.0	– – –	– – –	– – –
●	●	SM700 Pro Sponged Combed trowel finish Freely styled texture	 1.0 mm 1.0 mm 1.0 mm	 Layer thickness 3 mm Average layer thickness 10 mm Layer thickness 4 – 10 mm	 kg kg kg	 4.2 14.0 4.2 – 14.0	 – – –	 – – –	 – – –
	●	Mak3	2.0 mm 3.0 mm	Unscratched layer thickness: 12 mm Unscratched layer thickness: 13 mm	kg kg	– –	– –	– –	22.0[2)] 23.0[2)]
●	●	Conni S	1.5 mm 2.0 mm 3.0 mm	Layer thickness 1.5 mm Layer thickness 2 mm Layer thickness 3 mm	kg kg kg	– – –	– 2-8 –	2.2 2.8 3.7	– – –
●	●	Addi S	1.5 mm 2.0 mm 3.0 mm	Layer thickness 1.5 mm Layer thickness 2 mm Layer thickness 3 mm	kg kg kg	– – –	– 2-8 –	2.2 2.8 3.7	– – –
●[3)]		Sockel SM Pro (sponged)	1.0 mm	Layer thickness 2 mm	kg	3.0	–	–	–
●[4)]		Sockel SM (sponged)	1.0 mm	Layer thickness 2 mm	kg	3.0	–	–	–
●		Butz	2.0 mm	Layer thickness 2 mm	kg	–	4.5	4.5	–
Plaster seal / moisture protection per m²									
●		Sockel-Dicht		Layer thickness min. 1.0 mm (two coats)	kg	1.8	1.8	1.8	1.8
Primer per m²									
●	●	Casiol Grund		Undiluted	l	0.17	–	–	–
Paint coat per m²									
●	●	MineralAktiv Fassadenfarbe paint		Double coat	l	0.28 – 0.40	–	–	–
●	●	Siliconharz-EG-Farbe paint		Double coat[5)]	l	0.25 – 0.34	–	0.25 – 0.34	–
●	●	Autol		Double coat	l	0.25 – 0.40	0.25 – 0.40	0.25 – 0.40	–
●	●	Autol TSR[6)]		Double coat	l	0.25 – 0.40	0.25 – 0.40	0.25 – 0.40	–
●	●	Fassadol		Double coat	l	0.30 – 0.45	0.30 – 0.45	0.30 – 0.45	–
●	●	Fassadol TSR[6)]		Double coat	l	0.35 – 0.45	0.35 – 0.45	0.35 – 0.45	–
●	●	Minerol		Double coat	l	0.25 – 0.40	–	–	–

1) Additional mesh layer in basecoat is recommended.

2) A suitable impregnation is recommended in exposed locations and in the vicinity of waterbodies.

3) Only in conjunction with Sockel-SM Pro as a basecoat and with a total layer thickness ≥ 7 mm Sockel-Dicht is not required.

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

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

6) Functionality only on at least 5 mm thick mineral reinforcement layer and only on white, newly created finish coats possible.

Maintenance

General instructions

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

Perform an inspection of the plaster surfaces on the basis of the standard DIN 18550-1. Here the continuous good state of the plaster system and the permanent weather 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) and 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.

Information on Sustainability

Knauf WARM WALL Basis EPS

Information on the sustainability of Knauf WARM WALL Basis EPS

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
- BNB
  Bewertungssystem Nachhaltiges Bauen - Quality rating system for environmentally sustainable building)
- QNG
  Quality seal for sustainable buildings
- LEED
  Leadership in Energy and Environmental Design

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

DGNB/BNB/QNG

Ecological quality

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

Economic quality

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

Sociocultural and functional quality

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

Technical quality

- Premium quality thermal and moisture protection for the building shell:
  With WARM WALL systems significantly exceeding GEG requirements

LEED

Materials and Resources

- Regional Materials:
  Regional material availability depending on location of building.
  Information on request

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

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

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