

Knauf WARM WALL Plus – Doubling In Solid Construction on ETICS or Wood Wool Lightweight Panels

P323a.de – With mineral-based render system

P323b.de – With mineral-based / organic-based render system

P323c.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.

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Notes on the document

Knauf system data sheets are the basis for planning and application for planners and professional installers when applying Knauf systems. The contained information and specifications, constructions, details and stated products are based, unless otherwise stated, on the Certificates of Usability (e.g. general national technical approvals abZ and general type approvals aBG) valid at the date they are published as well as on the applicable standards. In addition, design and structural requirements and those regarding building physics (fire protection and sound insulation) are considered.

The details shown are solution suggestions intended for general orientation in the subject matter and must be adapted accordingly to suit the constructional features on site. Ancillary trades are only represented schematically.

References to other documents

System data sheets

- WARM WALL Plus in Solid Construction with Mineral Wool Insulation Materials, see system data sheet P323.de.
- WARM WALL Basis in solid construction with EPS insulation materials, see system data sheet P321.de

Product data sheets

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

Intended use of Knauf systems

Please observe the following:

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

Type and condition of the existing wall construction including old system or wood wool lightweight panels, whose structural stability, loadbearing capacity and suitability for doubling-up must be determined beforehand by a competent expert. The proof must include all loadbearing and associated positioned elements. Fire classification and self weight of the old system, in particular the render lining as well as existing insulation material thicknesses or wood wool lightweight panel thicknesses, must be determined.

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 EnEV (German energy saving ordinance).

Special care must be taken, particularly with the application of the connections.

Terms

Splash water zone

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

Explanation of terms

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

- Finish coat with paint coat instead of a final coating

Certificates of Usability

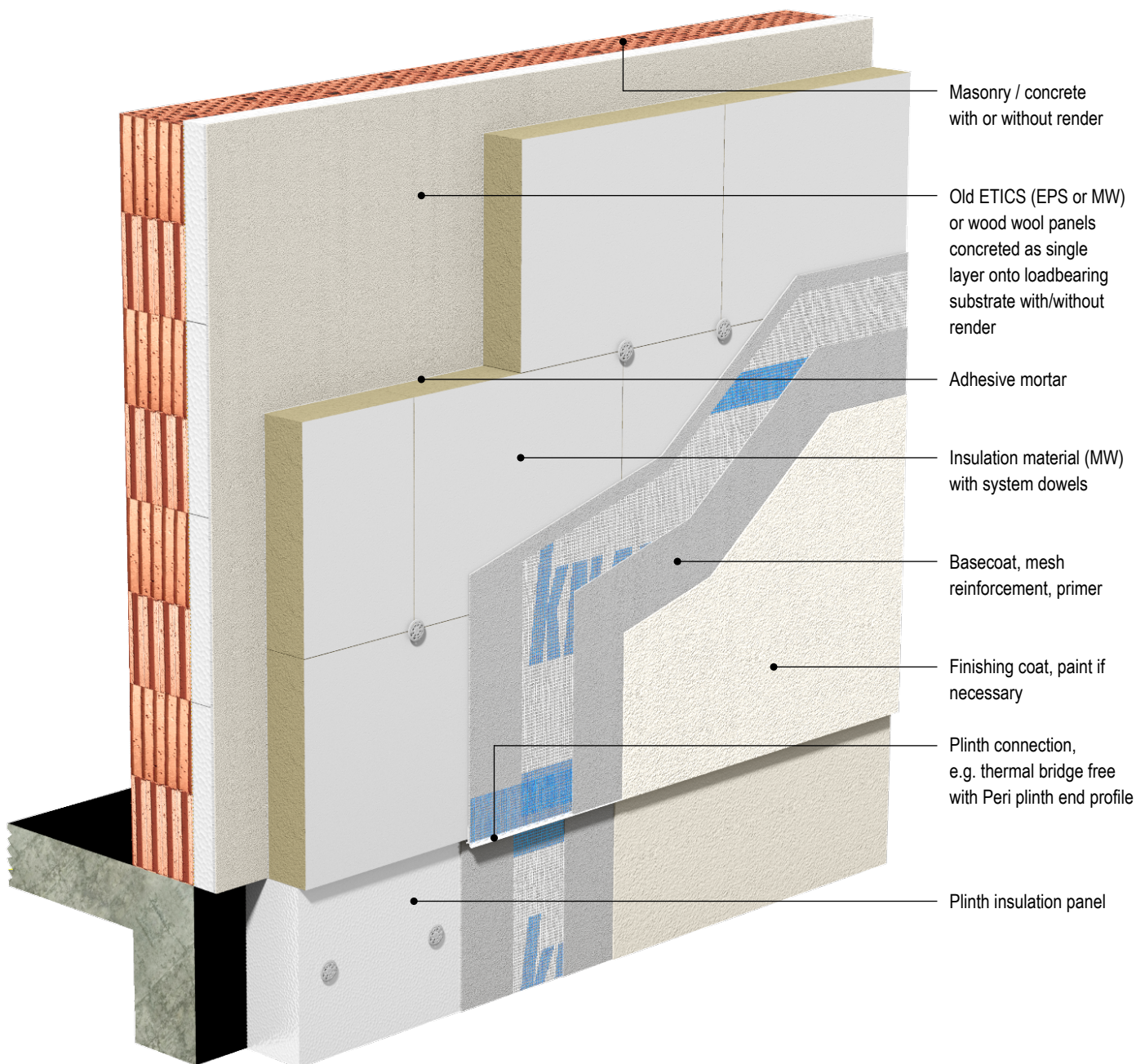
Knauf System	Proof
WARM WALL doubling up on existing ETICS or wood wool lightweight panels	Z-33.49-981
WARM WALL Plus MW in Solid Construction	Z-33.43-82
General type approval of the VDPM (German association for insulation systems, plaster and mortar)	Z-33.49-1505

Knauf WARM WALL Plus – Doubling in Solid Construction – with Mineral Wool Insulation Materials on old ETICS or Wood Wool Lightweight Panels

Knauf WARM WALL Plus – Doubling in Solid Construction – is a building authority certified external thermal insulation composite system (ETICS) and can be used for doubling-up for energy-related and design related renovation applied on existing ETICS (old ETICS) or on wood wool lightweight panels. The new system is glued onto the substrate and anchored with dowels.

Properties

- Reaction to fire of the doubling-up system (new and old system) depending on whether classed as non-combustible, not easily flammable or flammable, see table on page 7
- Permissible total thickness of the insulation material up to max. 200 mm



Notes

Multiple upgrading (doubling-up) as well as upgrading on the ETICS connected using rails is not permissible. Observe the provisions of approval Z-33.43-82 of the new system.

System variants

Scheme drawings	Insulation material of the old system	Insulation material of the new system	Maximum insulation material thickness (total = old system + new system) $t_1 + t_2$	Maximum weight (dry) of the render linings (total = old system + new system)
<p>Existing EPS insulation material / wood wool lightweight panels Existing render system Adhesive Insulation material (mineral wool) System dowel, if necessary with rondelle Render system</p>	<p>EPS</p> <p>Concrete cast wood wool panel (lost furring) as a single layer on the substrate with or without render</p>	<p>Mineral wool (glued and dowelled)</p>	<p>≤ 200 mm</p>	<ul style="list-style-type: none"> ■ ≤ 30 kg/m² doubling up with mineral wool boards ■ ≤ 50 kg/m² doubling up with MW Volamit 040
<p>Existing mineral wool insulation material Existing render system Adhesive Insulation material (mineral wool) System dowel, if necessary with rondelle Render system</p>	<p>Mineral wool</p>	<p>Mineral wool (glued and dowelled)</p>	<p>≤ 200 mm</p>	<p>≤ 30 kg/m²</p>

t_1 = Insulation material thickness of the old system

t_2 = Insulation material thickness of the new system

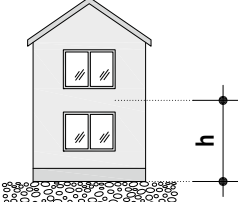
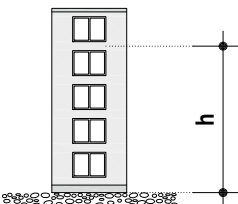
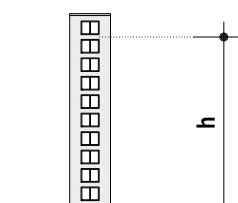
s = anchoring depth (see table on page 10)

Reaction to fire

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).

Building regulation minimum requirements

Height range	Upper edge of the floor ¹⁾	Required fire behaviour of ETICS
 <p>Building class 1 - 3 (Low height buildings)</p>	$h = 0 - 7 \text{ m}$	Flammable
 <p>Building class 4 - 5 (Medium height buildings)</p>	$h = 7 - 22 \text{ m}$	Not easily flammable
 <p>High-rise buildings</p>	$h > 22 \text{ m}$	Non-combustible

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

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 (continued)

Reaction to fire of the doubling-up system with WARM WALL Plus application

In case of an old system with EPS insulation panels or concrete cast wood wool lightweight panels, additional 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).

Old system		+	New system (A)	=	Overall system			
Insulation material	Current reaction to fire of ETICS		Insulation material		Total insulation thickness $t_1 + t_2$ mm	Overall reaction to fire of ETICS without additional measures	Additional fire protection measures old system	Resulting overall ETICS reaction to fire
EPS	Flammable	+	Mineral wool	=	Up to 100	Flammable	Plinth fire	Not easily flammable
					> 100 to 200	Flammable	Plinth fire + room fire ¹⁾	Not easily flammable
	Not easily flammable		Mineral wool		Up to 100	Not easily flammable	–	Not easily flammable
					> 100 to 200	Not easily flammable	–	Not easily flammable
Wood wool panels	Flammable	+	Mineral wool	=	Up to 100	Flammable	Plinth fire	Not easily flammable
					> 100 to 200	Flammable	Plinth fire + room fire ¹⁾	Not easily flammable
	Not easily flammable		Mineral wool		Up to 200	Not easily flammable	20 mm mineral render or adhesive directly on wood wool lightweight panels + room fire ²⁾	Non-combustible ³⁾
Mineral wool	Not easily flammable	+	Mineral wool	=	Up to 200	Not easily flammable	–	Not easily flammable
	Non-combustible				Up to 200	Non-combustible	–	Non-combustible

t_1 = Insulation material thickness of the old system

t_2 = Insulation material thickness of the new system

1) Mesh loop not permissible

2) Application as a fire break lintel above every opening or as a circumferential fire break acc. to Z-33.49-981

3) Approval by the building regulator required

Fire classification of the old system

Insulation material	Proof of reaction to fire	Reaction to fire
EPS	–	Flammable
	At hand	Not easily flammable
Concrete cast wood wool panel ≥ 25 mm and ≤ 100 mm with or without render	–	Flammable
	At hand	Not easily flammable
Concrete cast wood wool panel ≥ 25 mm and ≤ 100 mm with mineral basecoat ≥ 20 mm	–	Non-combustible ³⁾
Mineral wool panels/laminations	–	Not easily flammable
	At hand	Non-combustible

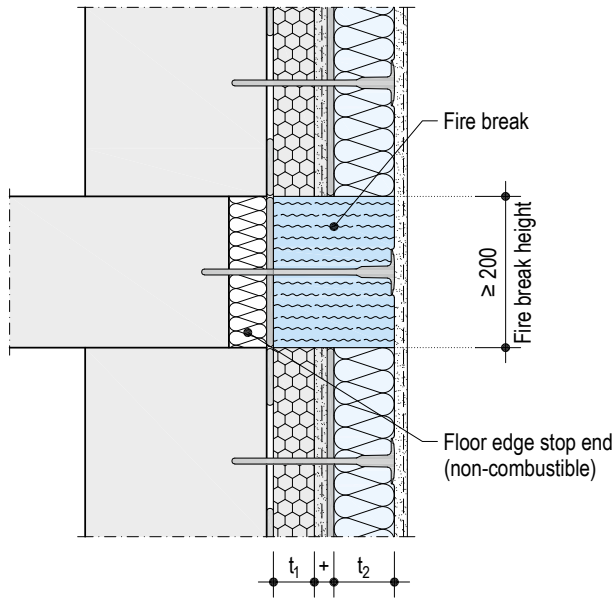
Fire resistance against fire from the exterior (plinth fire)

Fire break – material and anchoring

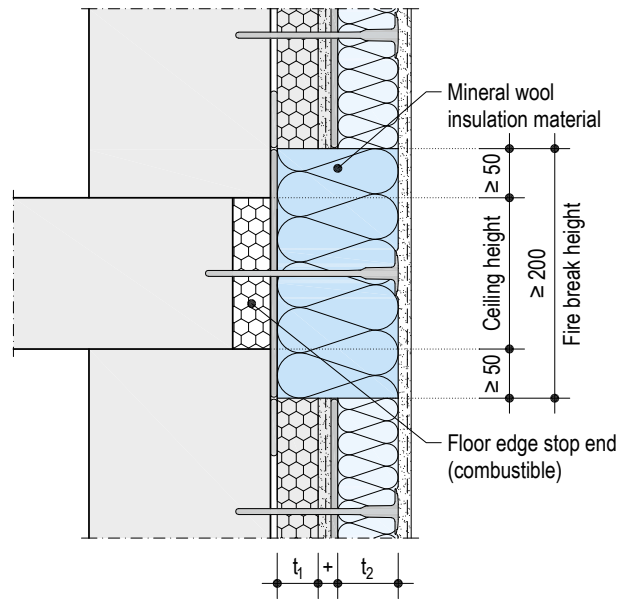
On old systems, which are classified as flammable, insulation materials in the fire break area must be fully milled out and the fire break must be glued and dowelled directly onto the supporting mineral-based solid wall.

Fire break at height of intermediate ceiling – application

Non-combustible floor edge deck



Combustible floor edge deck



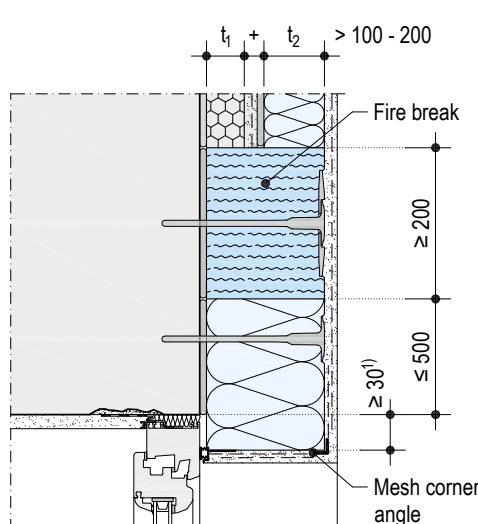
Scale 1:10 | Dimensions in mm

Design of the fire break against room fire

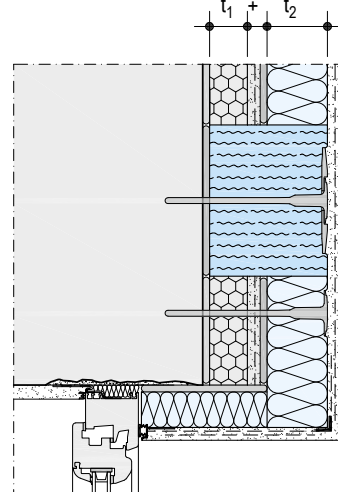
On old systems, which are classified as flammable, insulation materials in the fire break area must be fully milled out and the fire break must be glued and dowelled directly onto the supporting mineral-based solid wall.

Details

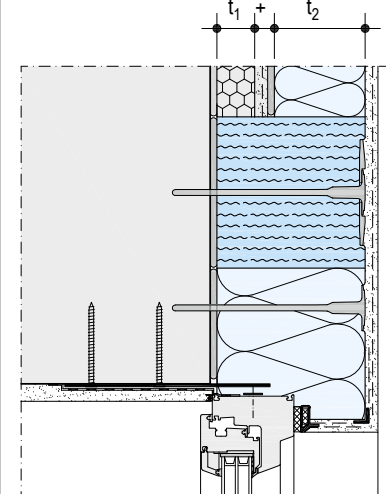
Window frame flush with the masonry



Window frame in the middle of the masonry



Window frame projected or partly in the insulation level



Scale 1:10 | Dimensions in mm

t_1 = Insulation material thickness of the old system

t_2 = Insulation material thickness of the new system

1) See DIN 4108 amendment 2

Note For design with additional fire protection measures against plinth fire and room fire, see system data sheet P321.de.

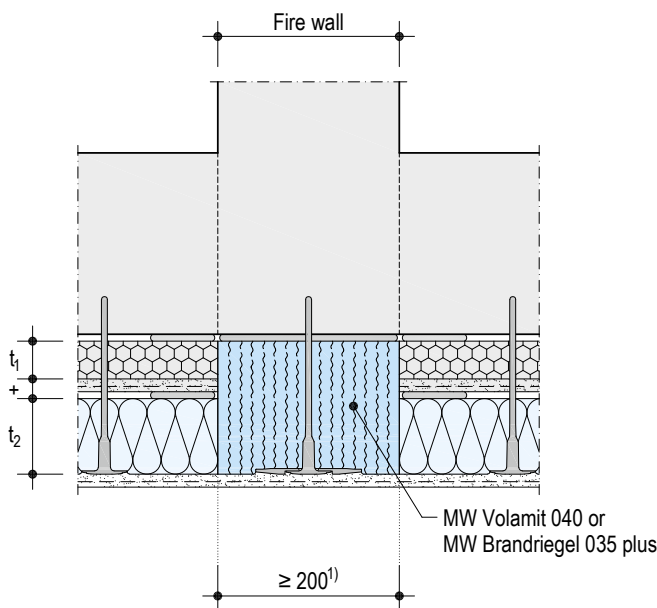
Fire protection, transition of integrated fire walls

Details

Scale 1:10 | Dimensions in mm

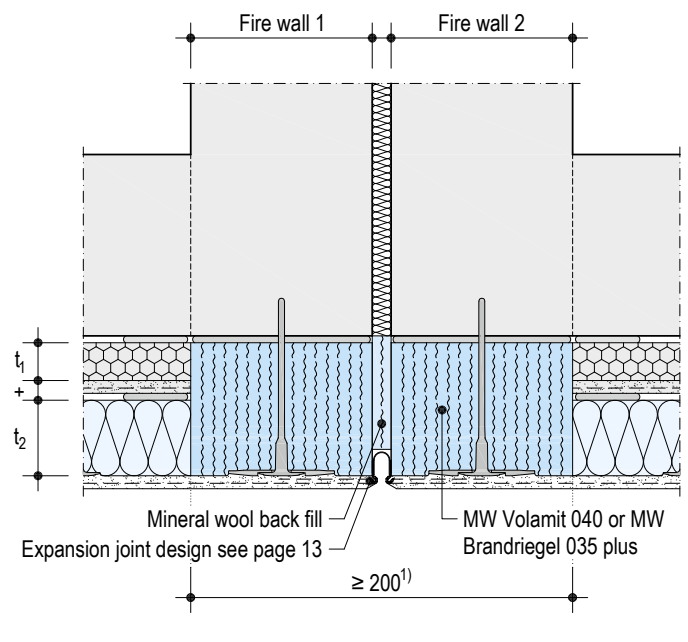
Without expansion joint

- MW Brandriegel 035 plus fire break or MW Volamit 040 should be adhesively bonded on the full surface at the height of the fire wall in a width of at least 20 cm, and at least as wide as the fire wall is thick, and dowelling for the system requires 2 dowels for each element fitted in the centre at a spacing of 60 cm. The insulation strips on old systems with EPS insulation panels or wood wool lightweight panels classified as flammable, must penetrate through the entire insulation material.
- MW Brandriegel 035 plus fire break: Mechanical fastening using Schraubdübel STR U 2G screw-in dowels or Schlagdübel CNplus 8 anchor nails. MW Volamit 040: For dowelling, use additional Dübelteller DT 140 dowel plates or SBL 140 plus where dowels are required for structural reasons.



With expansion joint

- Both sides of the fire break MW Brandriegel 035 plus fire break or MW Volamit 040 should be adhesively bonded on the full surface at the height of the fire wall and apply 2 dowels for each element fitted in the centre at a spacing of 60 cm. The insulation strips on old systems with EPS insulation panels or wood wool lightweight panels classified as flammable, must penetrate through the entire insulation material.
- MW Brandriegel 035 plus fire break: Mechanical fastening using Schraubdübel STR U 2G screw-in dowels or Schlagdübel CNplus 8 anchor nails. MW Volamit 040: For dowelling, use additional Dübelteller DT 140 dowel plates or SBL 140 plus where dowels are required for structural reasons.
- Fill expansion joint cavities completely with mineral wool.



t_1 = Insulation material thickness of the old system

t_2 = Insulation material thickness of the new system

1) Observe regional building authority requirements: Thickness of the vertical fire break \geq thickness of the entire fire wall

Source: "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))

Note

Use of a vertical fire break in the fire wall areas on projecting or angular ($< 180^\circ$) building façade lines is not permissible. In these cases, consultation with the Technical Advisory Service Plaster and Façade (see page 20) is necessary.

Dowel selection

Dowel lengths in dependence on the insulation material thickness (Tolerance compensation max. 5 mm)

Thickness t = old system + new system without plaster up to loadbearing substrate	Dowel length		Thickness t = old system + new system without plaster up to loadbearing substrate	Dowel length	
	Dowel position Surface flush Schlagdübel CNplus 8 insulation anchor nail			Dowel position Surface flush / recessed Schraubdübel STR U 2G dowel	
t ≤ mm	A, B, C s ≥ 35 mm mm	D, E s ≥ 55 mm mm	t ≤ mm	A, B, C, D s ≥ 25 mm mm	E s ≥ 65 mm mm
95	130	150	90	115	155
115	150	170	110	135	175
135	170	190	130	155	195
155	190	210	150	175	215
175	210	230	170	195	235
195	230	250	190	215	255
215	250	270	210	235	275
235	270	290	230	255	295
255	290	310	250	275	315

A to E = Use categories acc. to EAD 330196-00-0604

s = anchoring depth

Dowel length = anchoring depth s + any old render thickness + old system thickness incl. 5 mm old adhesive thickness + tolerance compensation + 5 mm adhesive thickness + insulation material thickness of the new system

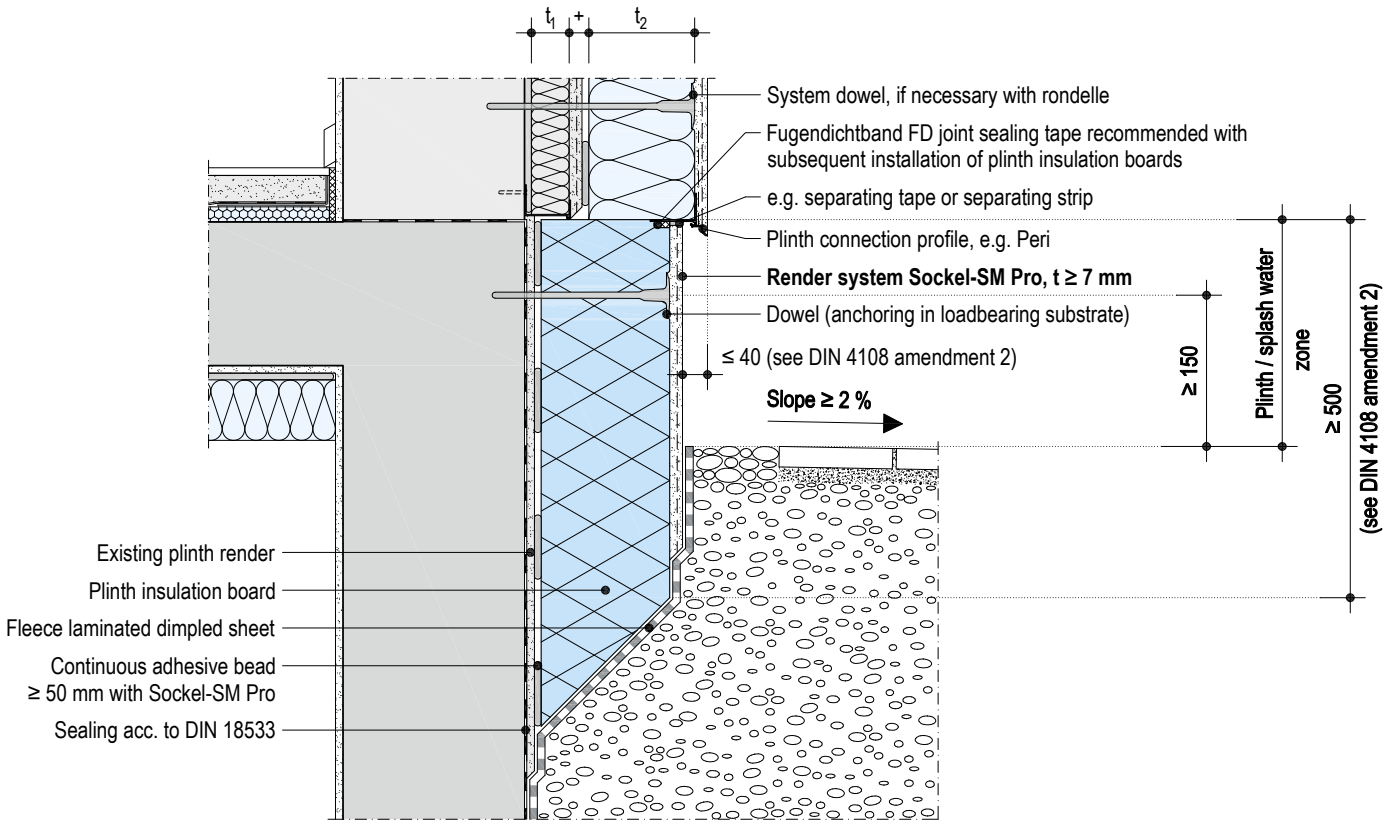
Calculation of the dowel length: Anchoring depth s + thickness t

Minimal integration depth in the soil

P323.de-SO-V11 Recessed plinth application

Application with Sockel-SM Pro

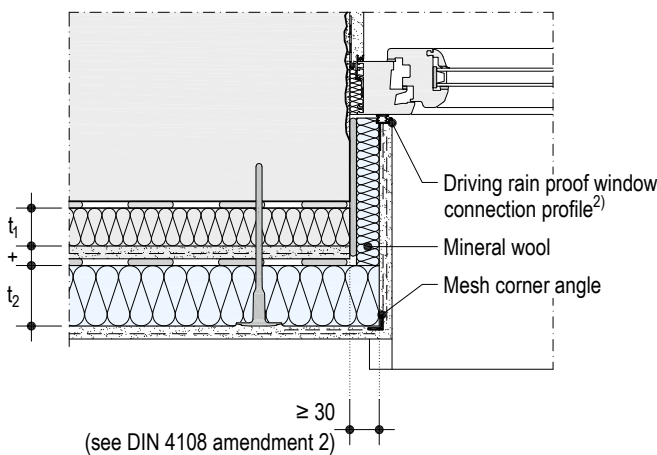
Scale 1:10 | Dimensions in mm



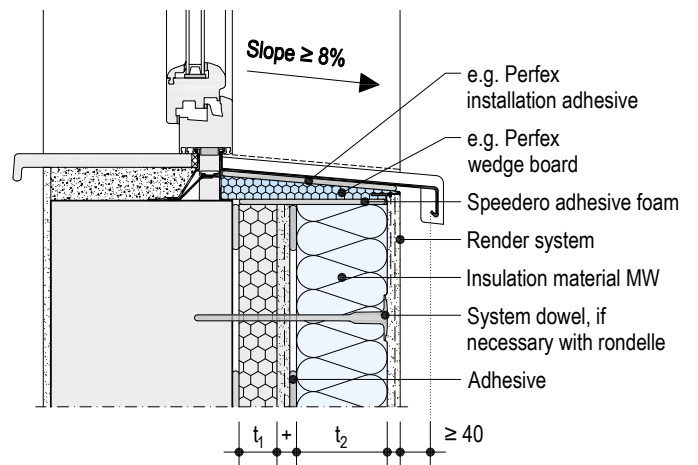
Window in the middle of the masonry

P323.de-FE-H4 Horizontal section

Scale 1:10 | Dimensions in mm



P323.de-FE-V4 Vertical section



t_1 = Insulation material thickness of the old system

t_2 = Insulation material thickness of the new system

1) Height ≤ 0.9 m when configured as a not easily flammable ETICS system, height ≥ 0.3 m up to maximum 0.6 m when configured as a non-combustible ETICS system.

2) In case driving-rain proofing has not been certified, an additional Fugendichtband FD joint sealing tape must be installed (see detail at P323.de-FE-H5 as well as tables "Driving-rain proof window connection profiles" in the system data sheet P323.de on page 42).

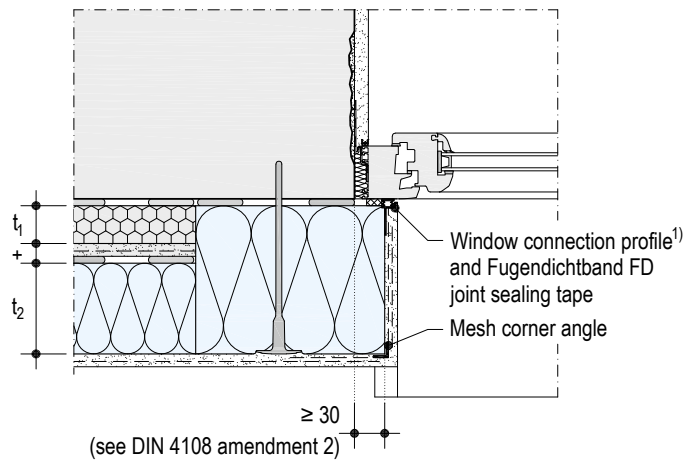
Notes

Ensure that all openings (interface gaps) are sealed.

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

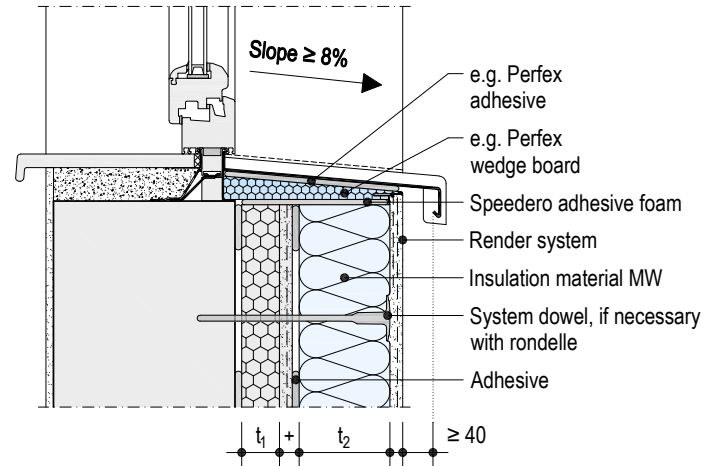
Window exterior flush with masonry

P323.de-FE-H5 Horizontal section



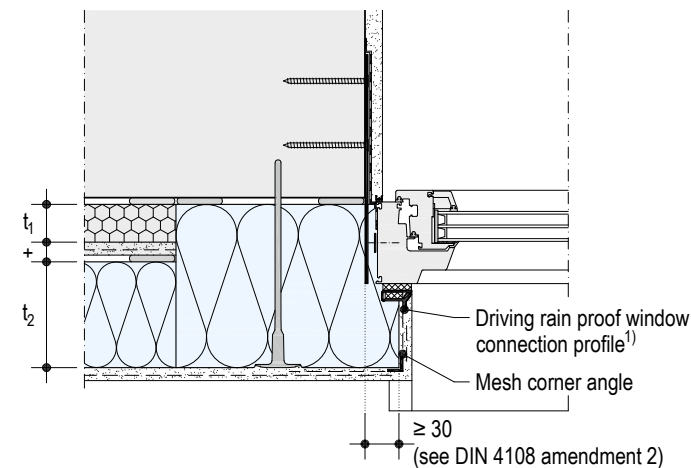
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P323.de-FE-V5 Vertical section

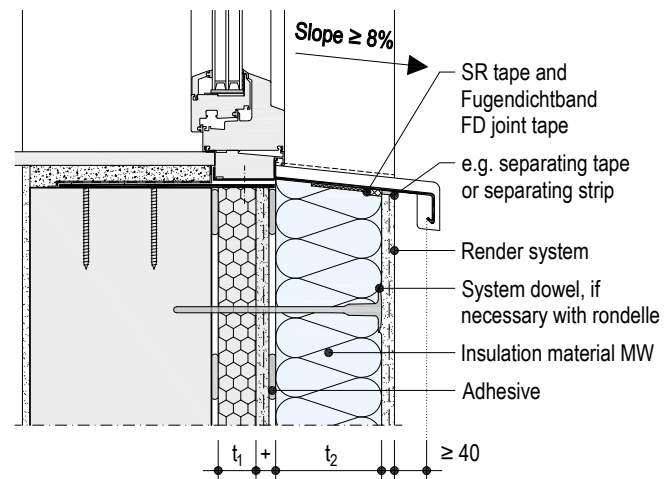


Window before the masonry

P323.de-FE-H6 Horizontal section



P323.de-FE-V6 Vertical section



t_1 = Insulation material thickness of the old system

t_2 = Insulation material thickness of the new system

1) In case driving-rain proofing has not been certified, an additional Fugendichtband FD joint sealing tape must be installed (see detail at P323.de-FE-H5 as well as tables "Driving-rain proof window connection profiles" in the system data sheet P323.de on page 42).

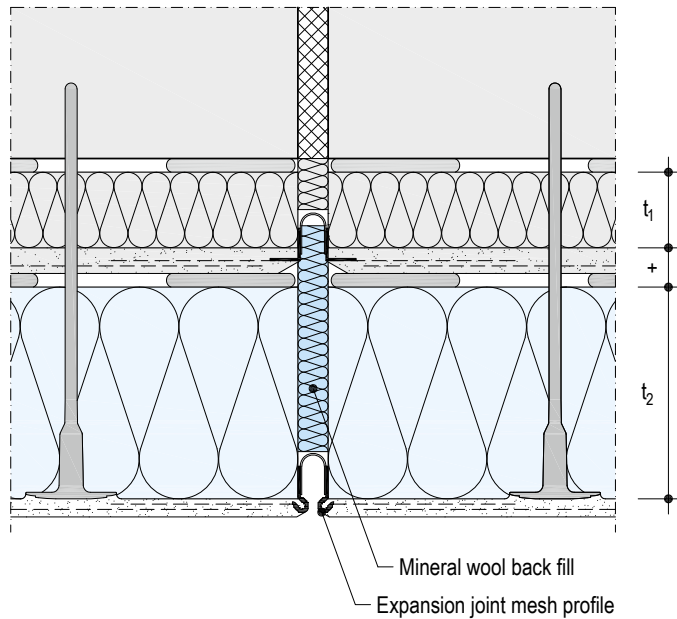
Notes	Ensure that all openings (interface gaps) are sealed.
	The window installation and seals are represented schematically – refer to "Guideline on the installation of windows and doors" from the RAL-Gütegemeinschaft Fenster und Haustüren e.V. (German Quality Assurance Association Windows and Doors)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

Expansion and connection joints

P323.de-FU-H3 Building expansion joint

Not in the fire wall area

Scale 1:5



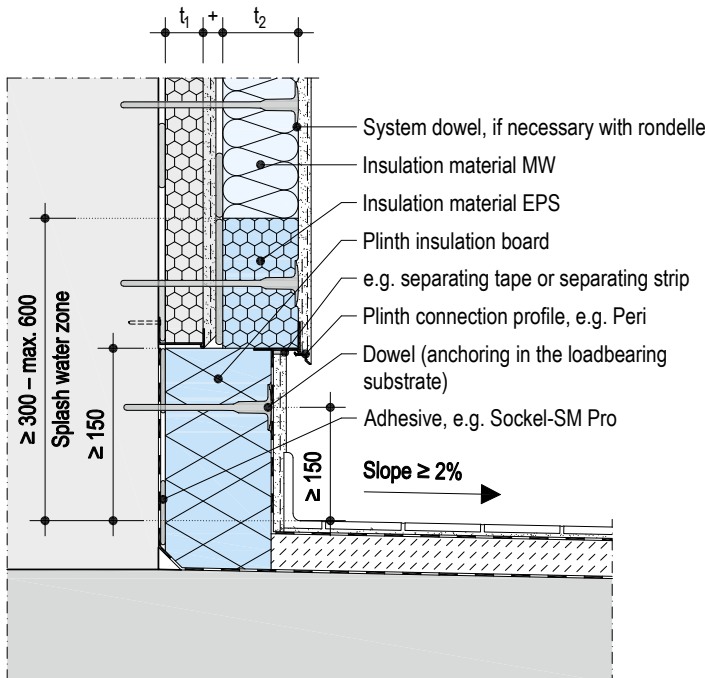
Fire break transition with expansion joints: see details on page page 9

Balcony and terrace connection

Scale 1:10 | Dimensions in mm

P323.de-BA-V3 Projecting balcony slab

Recessed plinth application



t_1 = Insulation material thickness of the old system

t_2 = Insulation material thickness of the new system

Notes

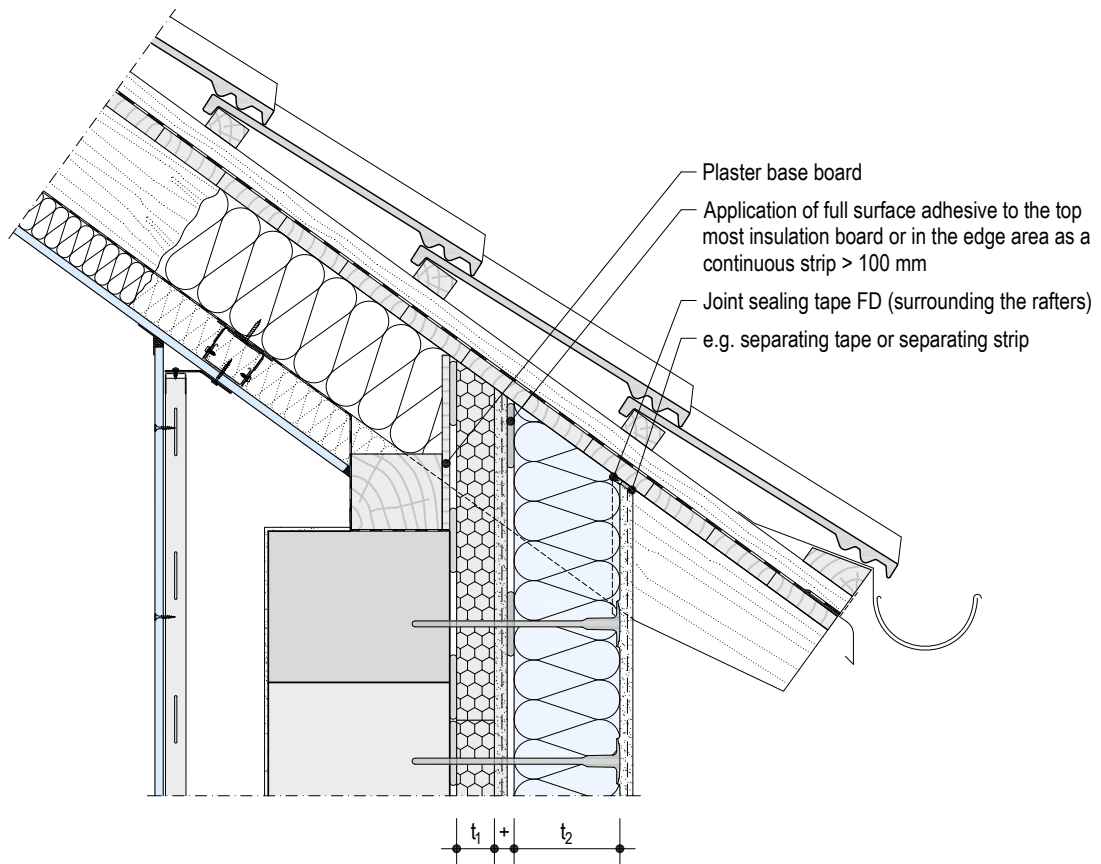
In case of application of WARM WALL Plus, the application of EPS insulation materials in the splash water zone is limited to a maximum height of 0.6 m above solid fire-resistant cantilever slabs. In case of walkways and escape routes the maximum height of the EPS insulation materials in the splash water zone is limited to 0.3 m.

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.

Connection to roof

Scale 1:10 | Dimensions in mm

P323.de-DA-V7 Eaves connection to roof weatherboarding



t_1 = Insulation material thickness of the old system

t_2 = Insulation material thickness of the new system

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

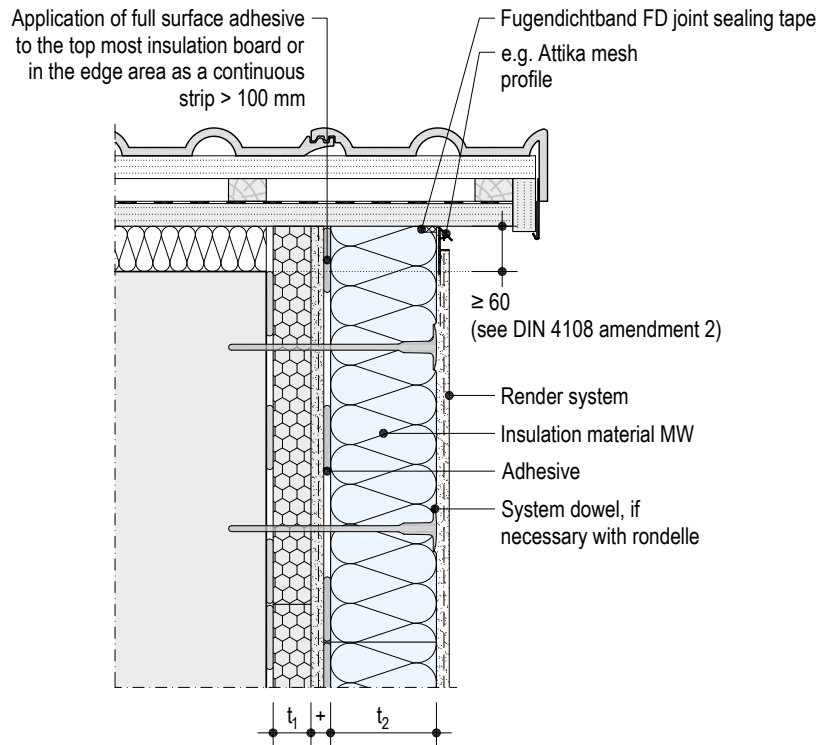
Note

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.

Connection to roof (continued)

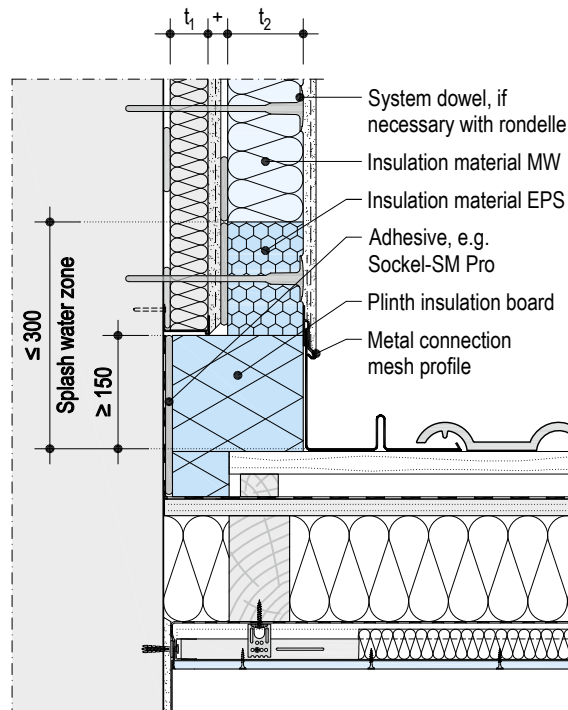
P323.de-DA-V8 Bargeboard connection

Scale 1:10 | Dimensions in mm



P323.de-DA-V9 Steep roof connection to rising wall

With metal connection mesh profile



t_1 = Insulation material thickness of the old system

t_2 = Insulation material thickness of the new system

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

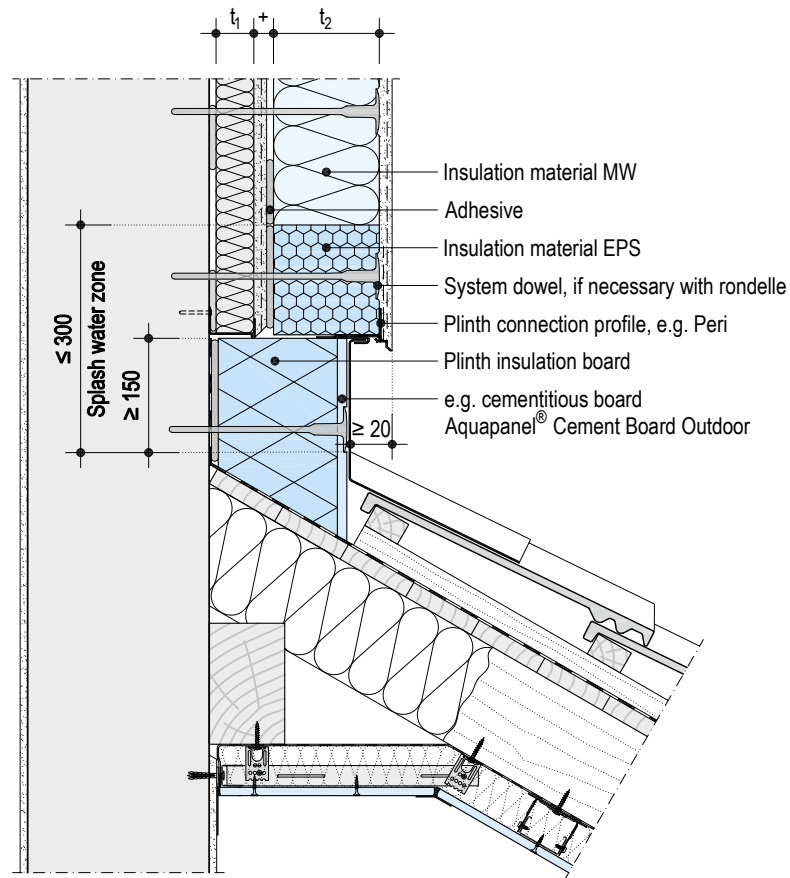
Note

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.

Connection to roof (continued)

P323.de-DA-V10 Pitched roof connection to rising wall

Scale 1:10 | Dimensions in mm



t_1 = Insulation material thickness of the old system

t_2 = Insulation material thickness of the new system

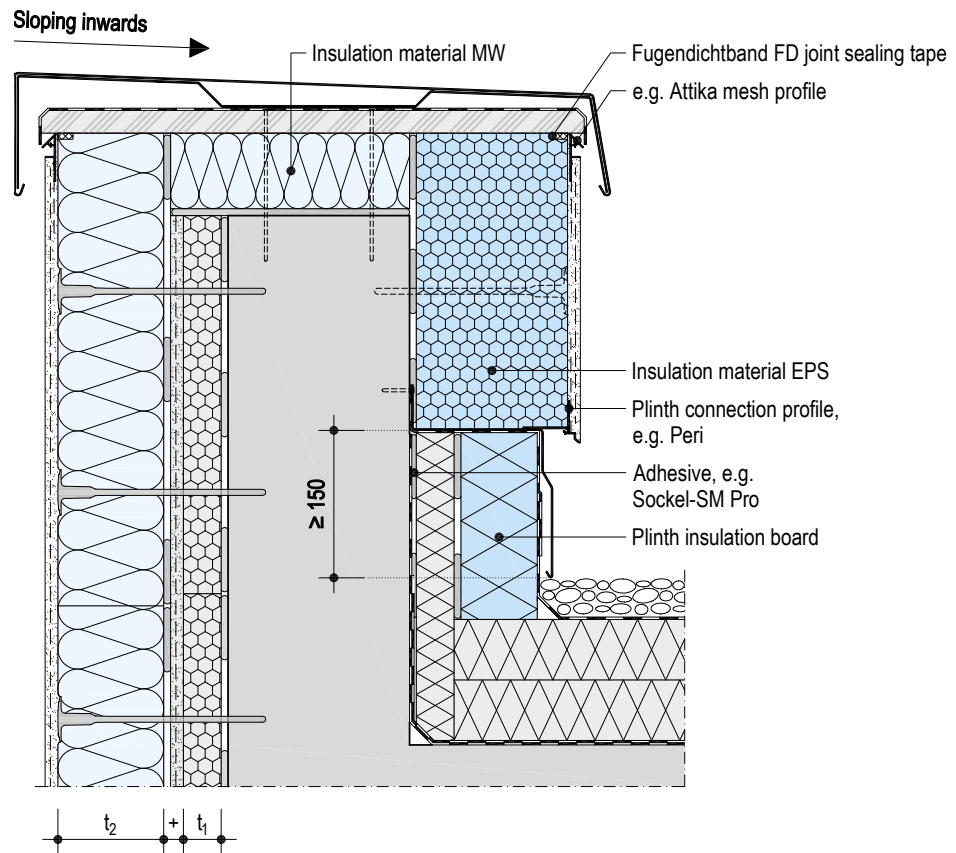
Note

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.

Connection to roof (continued)

P323.de-DA-V11 Flat roof connection, attic coverings

Scale 1:10 | Dimensions in mm



t_1 = Insulation material thickness of the old system
 t_2 = Insulation material thickness of the new system

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.

Preconditions

Protect the insulation material against moisture.

All connections and detail features must be clarified before application.

The necessary substrate preparation must be undertaken on a case-by-case basis and must be described in full detail in the tender specifications.

Substrate tests and possible measures are listed in system data sheet P323.de on page 35.

The ETICS (old system) must be stable overall and in terms of the fastening and properties of the insulation panels as well as the application of the ETICS and must correspond with the requirements of comparable approved ETICS with adhesively fixed or dowelled and glued insulation material. The wood wool lightweight boards must be stable and firmly connected to the wall.

The surface of the old system / wood wool lightweight board substrate to be doubled-up must be dry, even and free of grease and dust as well as free of any residual substances that may reduce adhesion. Check existing coatings and linings (paints and old renders) for stability and compatibility with the adhesive of the new system, and remove unstable coatings completely if necessary. Check beforehand, if necessary, to ensure that the adhesive sets correctly.

Check the stability of the dowel in the supporting base substrate.

Unevenness in the substrate up to 20 mm can be compensated for with the adhesive and dowelled system. For larger tolerances, a separate equalization, e.g. application of a basecoat, will be necessary. Please observe the permissible overall weight of the render system in case of application of an additional basecoat.

Rising damp may not be present.

All applied connections must be planned as driving-rain proof.

Ensure that all openings (interface gaps) are sealed.

The internal plastering and screed works should be completed and the components should be dry enough so that an excessive accumulation of moisture is avoided.

The contractor is solely responsible for inspecting the condition of the substrate and the on-site conditions.

The ambient temperature, substrate and material temperature must be at least +5 °C and may not exceed +30 °C during the entire application, drying and setting phase (if Kati is used as a finishing coat, at least +8 °C).

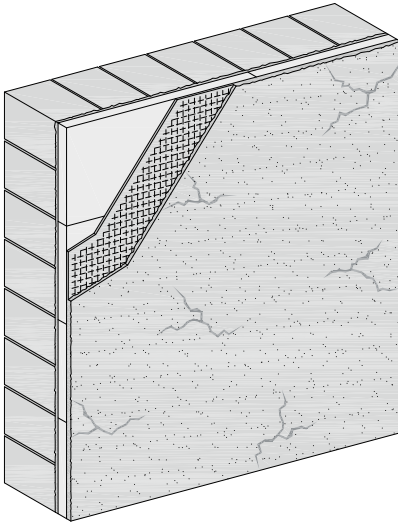
Unfavourable weather influences such as high temperatures, wind or direct sunlight can negatively affect the application conditions. Protect the insulation materials against exposure to direct sunlight and UV exposure as well as moisture during storage and application until the adhesive has fully set.

Only cold, clean water (drinking water quality) may be used as mixing water. Water up to a temperature of +30 °C may be used on building sites in spring and autumn.

Cover or apply a watertight covering to easily-soiled building components (e.g. window sills) prior to application. Observe the Code of Practice "Abklebe- und Abdekarbeiten 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.

Suitability test

Suitability of the existing façade for doubling-up



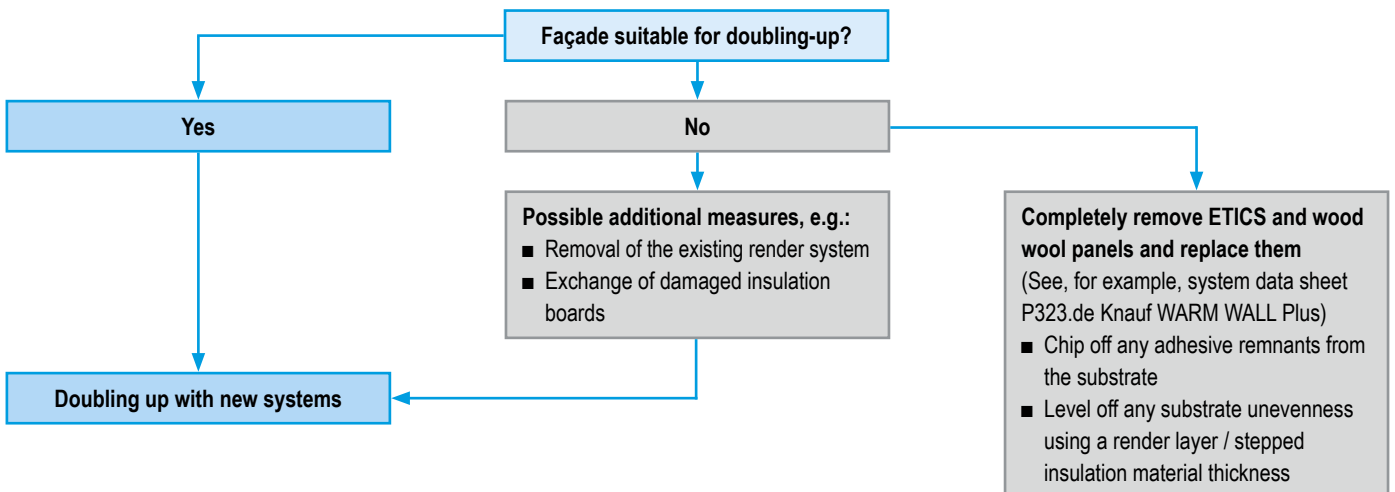
The existing façade with external thermal insulation composite system (ETICS) or wood wool lightweight panels should be assessed by a competent expert:

- EPS or mineral wool (MW) adequately adhesively bonded or adhesively bonded and dowelled?
- Type and state of the wall and ETICS design or wood wool lightweight panels?
- Structural stability and loadbearing capacity of ETICS or wood wool lightweight panels?

- Self weight of the old system, particularly the render system (basecoat and finish coat) and existing insulation material thickness of the ETICS or wood wool lightweight panel thickness – if necessary proof of reaction to fire of the insulation material?
- Exclusion of back ventilation of the insulation layer, e.g. due to skips in the adhesive or absence of continuous adhesive strips near the board perimeters?

Observe with doubling up

- No multiple doubling-up as well as doubling-up on the ETICS connected using rails
- Overall thickness of the insulation material including doubling-up ≤ 200 mm
- If necessary introduce fire protection measures (see page 7) to achieve "not easily flammable" or "non-combustible" reaction to fire
- Clean the surface
- Dowelling through all insulation material layers in loadbearing masonry/ concrete
- Adapt built-ins such as window sills to the new insulation material thickness
- Observe roof overhangs
- When necessary, adapt reveals, plinth insulation and fascia insulation etc, to avoid thermal bridges
- All applied connections must be driving-rain proof
- Ensure that all openings (gaps and holes from other trades e.g. plumbers, electricians) are sealed.



Information on the sustainability of Knauf WARM WALL Plus – Doubling Up

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

In Germany the following certification systems are of particular relevance:

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

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

DGNB/BNB

Ecological quality

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

Economic quality

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

Sociocultural and functional quality

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

Technical quality

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

LEED

Materials and resources

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



Videos for Knauf systems and products can be found under the following link:

www.youtube.com/knauf



Tender specifications for all Knauf systems and products featuring export functions for Word, PDF and GAEB

www.ausschreibungcenter.de



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