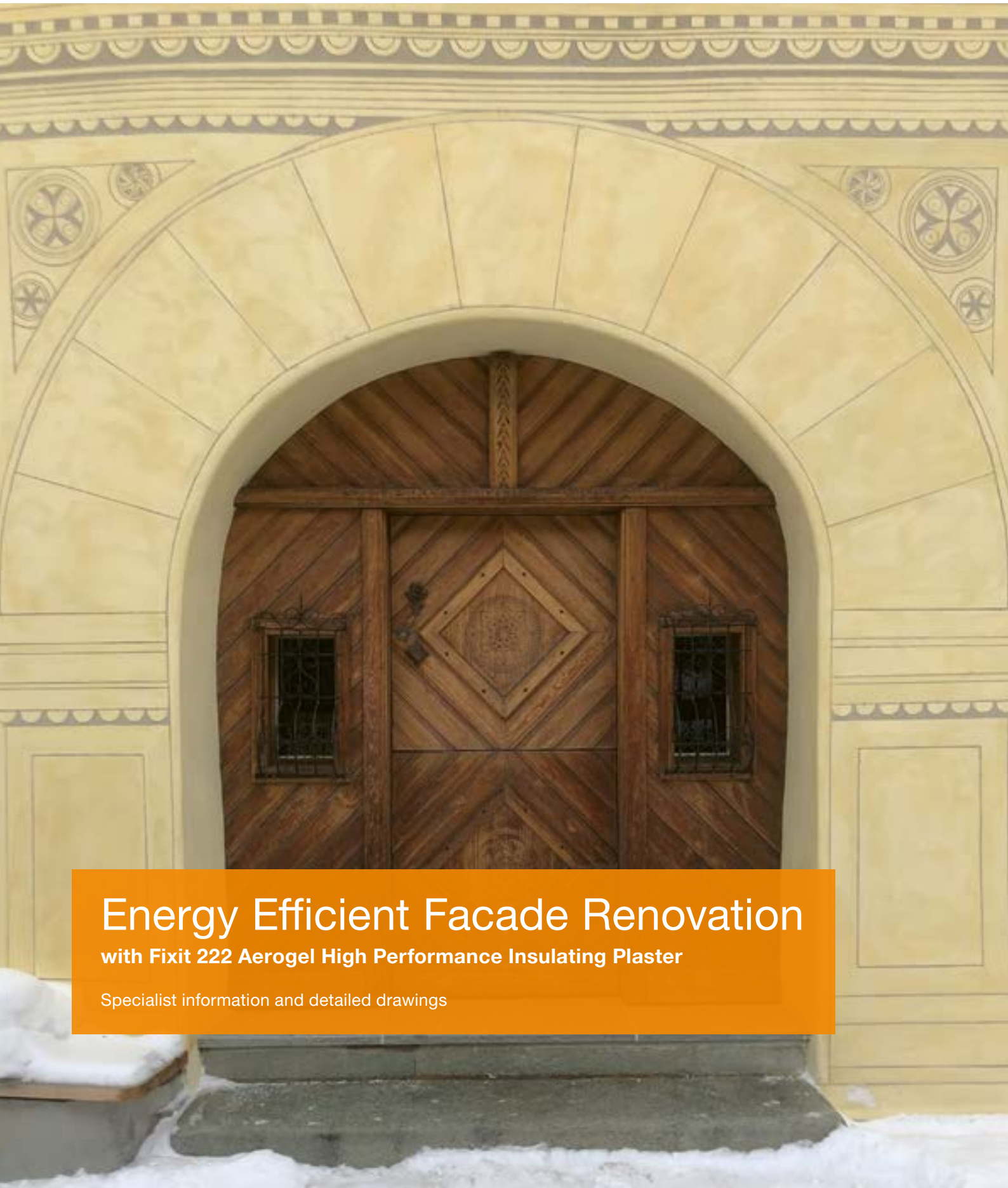
FIXIT
Schweiz. Suisse. Svizzera.



Energy Efficient Facade Renovation

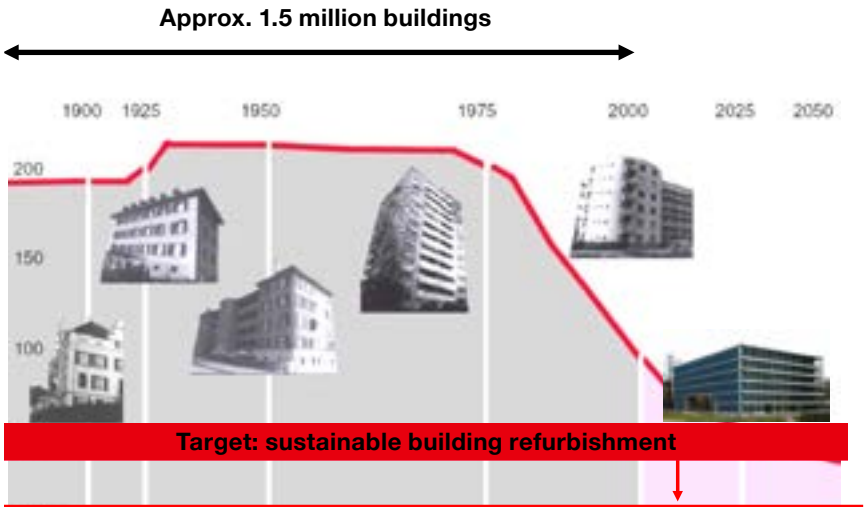
with Fixit 222 Aerogel High Performance Insulating Plaster

Specialist information and detailed drawings

Contents

Energy efficient renovation and local heritage protection

Two thirds of the buildings standing today in Switzerland were built between 1940 and 1970. These aging structures were often constructed with either inadequate thermal insulation, or sometimes none at all. If current energy consumption and CO2 emissions are to be reduced, then these building must be renovated to improve their energy efficiency. Whilst the potential energy savings are exceedingly high, the use of external thermal insulation layers is often not possible.



These residential buildings and settlements shape entire villages and town districts, and are important identification symbols for inhabitants and residential areas. Although most are not listed as protected historical building, they are of great importance in terms of local heritage preservation and therefore also likely to be of interest to the conservation authorities. Conventional thermal insulation material applied externally to building walls results in thick layers leading to deep window rebates, distorting the aesthetic proportions of old buildings and changing their appearance. It is therefore not possible to renovate the façade of such buildings in an energy efficient manner using conventional materials whilst maintaining unchanged their characteristic appearance.

It is, however, possible to carry out energy efficient renovation of the façades of historic buildings without changing their appearance (and thus remaining within local authority planning requirements). If the interests and requirements of all the stakeholders involved are taken into consideration at a very early stage in the project, then, in addition, comprehensive total renovation is feasible which includes non-protected buildings too.

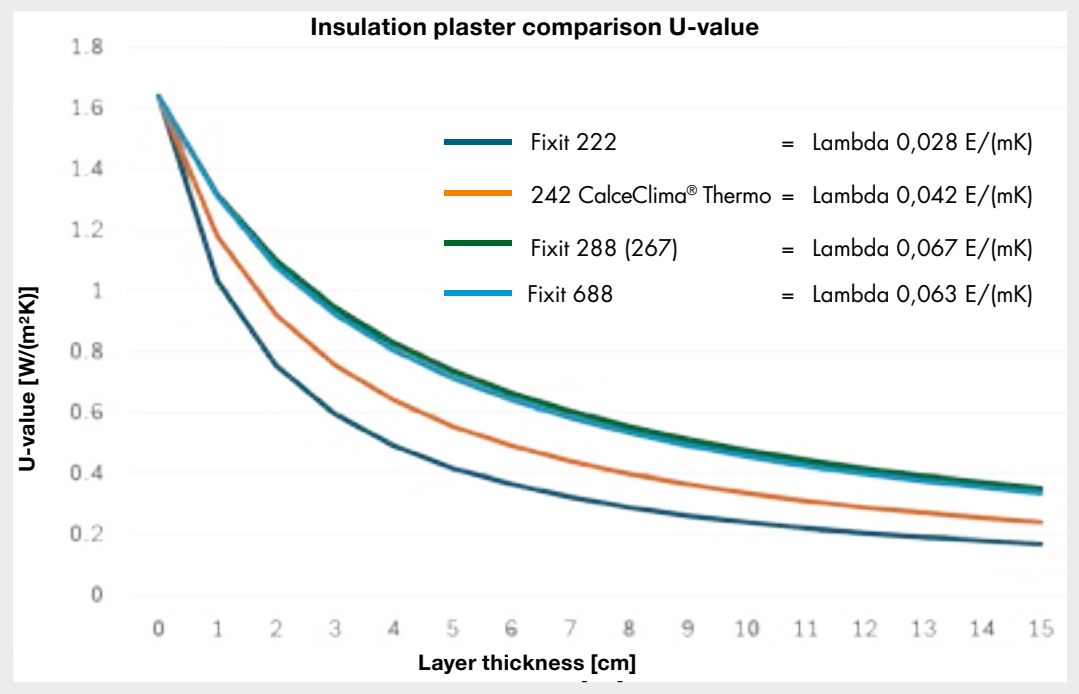
This brochure is intended to assist building owners, conservation and local heritage protection authorities, and planners involved in an energy efficient renovation project to complete the work to the satisfaction of all concerned.

High performance insulating plaster solves problems

Fixit 222 Aerogel High Performance Insulating Plaster was developed in collaboration with Empa as a solution to the problem faced by users of conventional external insulation materials – namely, the visually unacceptable result caused by the application of the thick layers necessary to achieve the required thermal performance. Thanks to its excellent thermal insulation performance of 0.028 W/(mK), the application of a layer of just 3 cm thick – about the thickness of the old plaster which must be removed – halves heat transmission through the outside wall. This makes energy efficient renovation to outside walls possible while leaving the appearance of the building unchanged. Maintaining the historic appearance of a building and renovating its façade in an energy efficient manner are now complementary aspects of a project instead of mutually exclusive activities!

Fixit 222 Aerogel High Performance Insulating Plaster is also, however, suitable for the comprehensive, total renovation of old buildings. In such cases, the limiting parameter to be met is the heating requirement of the entire building, as laid down in the SIA 380/1 standard. In the case of buildings not under preservation orders, the layer thickness of the insulating render on the façade (and therefore the resulting U-value) can be chosen at will. As an example, a layer thickness of 8cm reduces the energy requirements by two thirds.

Fixit 222 is perfectly suited to outdoor insulation work.



Evaluation by the Fraunhofer Institute

Calculation Frongartenstreet, St. Gallen

Additional advantages are:

- Lower heating costs while maintaining the appearance of the original façade.
- Individually tailored insulation thicknesses possible depending on requirements.
- Non-flammable material, so no danger where buildings stand in close proximity i.e. in historic old towns.

Properties of Fixit 222

Lambda value

Maintaining the lambda values of insulating materials is of extreme importance. Independently monitored products guarantee that these values are correct. Fixit AG maintains such independent monitoring, confirmed by the responsible department of the SIA.

European Technical Assessment

Uniqueness

Aerogel High Performance Insulating Plaster is ideal for use in renovating old buildings because it is mineral based and therefore well suited for application onto historic building materials.

References

Capillary active and water vapour permeable

A further advantage of this insulating render is that it is capillary active and permeable to water vapour. This means that there is no need to fear attack by algae or fungus on external wall surfaces, leading to a reduction in maintenance costs. Paint layers applied over the render need not contain biocides, obviating the need for protective equipment and special measures during renovation. Costs remain the same as for a biocide-free façade renewal, and there are no special additional costs to be reckoned with.

Film showing diffusion properties

Non-flammable

Aerogel High Performance Insulating Plaster is a Class A2 building material and so is non-flammable.

MPA Report on Flammability Characteristics

Aerogel High Performance Insulating Plaster is non-flammable.

Property	Unit	Mean measured value
Dry bulk density	kg/m³	220
Porosity	%	90
Diffusion resistance coefficient μ	-	4 – 5
Water absorption coefficient	kg/m²√h	12,6
Thickness	mm	49,4
Moisture content at 23°C and 80% RH	Vol.-%	0,83
Free water saturation	Vol.-%	46,2

Execution

General points

When carrying out outdoor rendering work, the scaffolding must be adequately covered to protect the wall surface from wind and direct sunlight. During application and the subsequent drying period, the air and substrate temperature must not drop below +5°C nor exceed +30°C.

The interfaces to adjacent surfaces and elements of standard materials such as wood, aluminium or steel must be decoupled by the use of a thermal barrier.

Application

Fixit 222 Aerogel High Performance Insulating Plaster should be applied using a suitable plastering machine (two-stage worm gear drive and plaster application spiral suited to insulating plaster).

In order to prevent the render from drying out too quickly, which will cause shrinkage cracking, Fixit 222 Aerogel High Performance Insulating Plaster must be kept moist for at least one week. Drying time is dependent on local conditions and weather. Generally, a drying rate of 3mm per day under ideal conditions is typical. In order to allow Fixit 222 Aerogel High Performance Insulating Plaster to reach adequate strength, allow a curing time of at least three weeks before applying any subsequent layers.

In order to create a sufficiently strong surface on the render, its surface must be roughened before the next layer is applied. After removing all dust and particulate matter with a vacuum cleaner, Fixit 493 Mineral-Based Undercoat Stabilizer should be applied to the roughened surface. Ideally this step is completed 24 hours before the textile mesh embedding is carried out. Fixit 223 Special Embedding Mortar is applied with the textile mesh. Depending on the final render to be used, apply with brush strokes (for mineral based final render) or smoothed down (silicate based final render). If the wall has a base cladding, the perimeter insulating panels must be roughened. The drying time is 10 days.

Only those final renders and paints which are in accordance with Fixit guidelines may be used with the Aerogel Insulating Plaster System. Hard final layers such as rough finish render or washed plaster rendering may not be used, as the surface tension is excessive and secure adhesion cannot be guaranteed.

More info

Inventory checklist

BFE Thermal Bridge Catalog

IABP Final Report

Journal of Building Engineering

Applications Special Report

Building up the layer structure

Checking the substrate

The first step is to check what layer thickness is possible with the insulating render. In addition, various pre-treatments may be required depending on the substrate:

Substrate	Fixit 211	Fixit 281	Fixit 670	Fixit 462	Fixit 210	Welnet
Brickwork	✓	✓	✓			
Concrete	✓			✓		✓
Quarry stone	✓	✓	✓			
Tamped concrete	✓					✓
Sandstone		✓				
Half-timbered work						✓**
Lime plaster		✓*		✓		✓
Cement plaster	✓*			✓		✓
Synthetic plaster	Substrate not suitable and must be removed!					
Efflorescence					✓	
Mildew & algae growth	Must be removed!					
Soot deposits	Must be removed!					

✓* = if the surface cannot be removed, apply to adequately stable substrate.

✓** = cover wooden beams with roofing paper, fix Welnet to masonry only.

With base cladding areas, balconies, where contact with earth exists or situations where standing water occurs, then base cladding insulation panels must be fitted beforehand. The panels must extend between min. 10 to max. 25 cm above the soil level. The interface between render and base cladding panels must be carried out in accordance with the detailed drawings for Fixit 222 Aerogel High Performance Insulating Plaster.

Wall loads and installations

If it is intended to attach loads to the exterior walls after the insulating plaster has been applied, this must be taken into consideration during the planning phase. It is important to know in advance what these loads are.

Light loads

Mounting discs with transverse load max 5 kg

- Motion sensors
- Light signage
- Retainers

Mounting cylinders with transverse load max 15 kg and tensile load 30 kg

- Light lamps
- Pipe clamps
- Window shade fittings
- Coat hanger brackets

Electrical fittings

Thermal-bridge free montage of electrical switches and power outlets for indoor insulated rooms

- Electrical switchboxes
- Power sockets
- Motion sensors

Support blocks

Quadroline®-PU-support blocks

- Porch roofs
- Awnings
- Pipe clamps
- Retainers
- Advertising panels
- Coat hanger brackets

Medium loads

Supporting brackets with transverse load max 100 kg and tensile load 160 kg (fixed into masonry)

- Heavy pictures
- Heavy lamps
- Hand rails

Heavy loads

Heavy duty brackets with transverse load max 600 kg (depending on mounting surface)

- Stairways
- Awnings
- Porch roofs

If details of the required loads only become known after the application of the insulating plaster, please follow the barcode link given to access information on available fixing components. The fixing components must if possible be attached in advance to the substrate. Adhesive should be applied over the entire contact surface. Afterwards, if necessary, reinforce by using anchor bolts.

Link Hilti fixing components

Detail drawings

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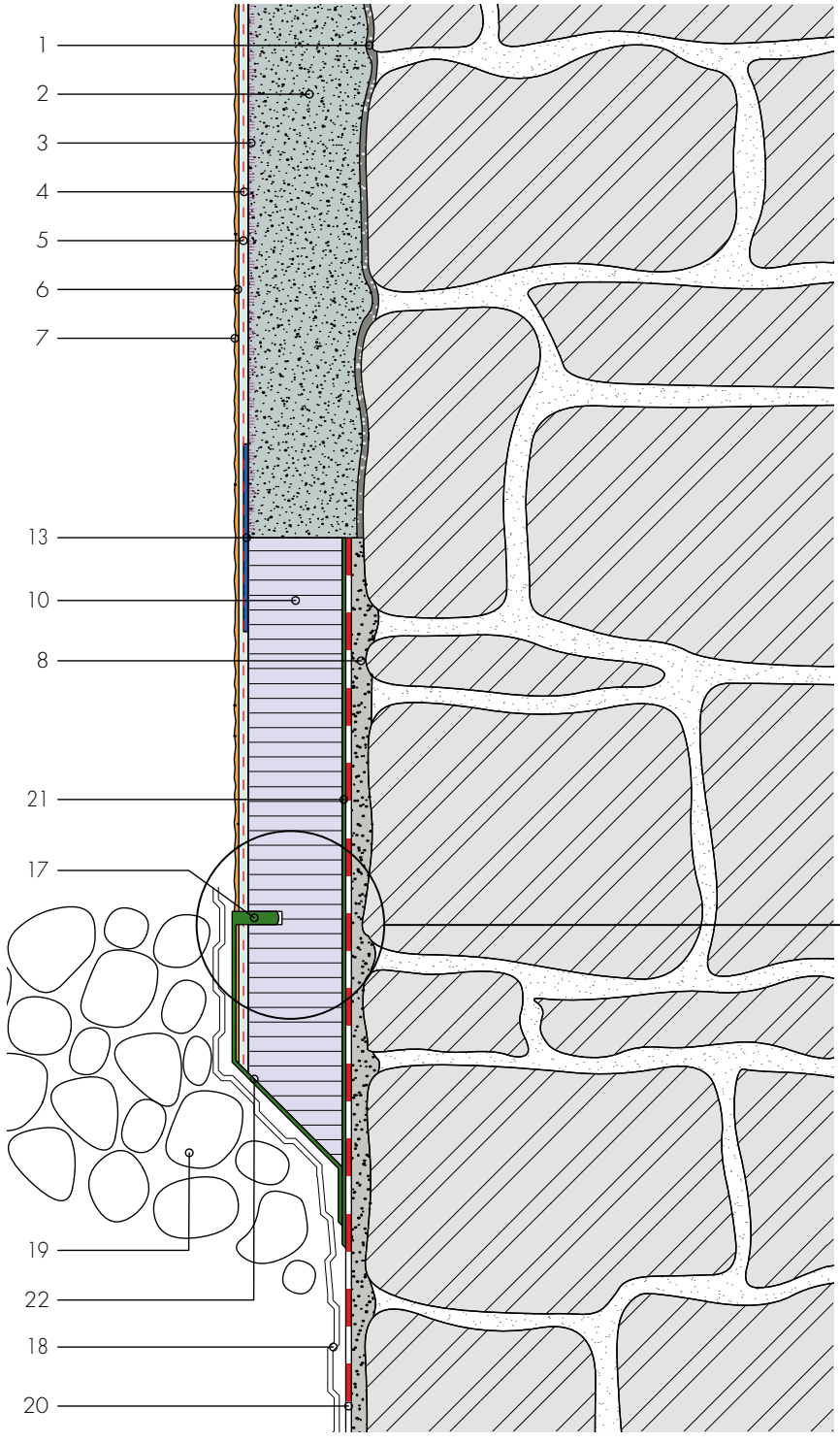
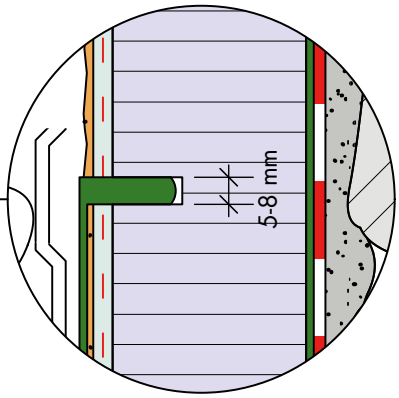
Base

Flush fitting base cladding with perimeter insulation

Detail A1



Detail of capillary break 5-8 mm, filled with Fixit 373 Multiflex base flagstone adhesive



1 Roughcast mortar Fixit 211, Fixit 670 or Röfix CalceClima pre-spraying mortar
2 Aerogel Insulating Plaster Fixit 222
3 Layer of undercoat stabilizer Fixit 493
4 Reinforcing textile mesh
5 Special embedding mortar Fixit 223
6 Mineral-based final render
7 Paint layer (suitable for final render)
8 Levelling layer Fixit 207 base plaster hydraulic lime
10 Base cladding panel
13 Barrier textile
17 Capillary break
18 Protective layer
19 Drainage rubble fill
20 Vertical sealing layer, (provided on-site by contractor)
21 Attach with adhesive Fixit 373 Multiflex 2K Grey or bitumen coating 2K
22 Cover surface with layer of: Bitumen coating 1K, 2K, Fixit Multi-flex 2K Grey, or Optiflex 1K

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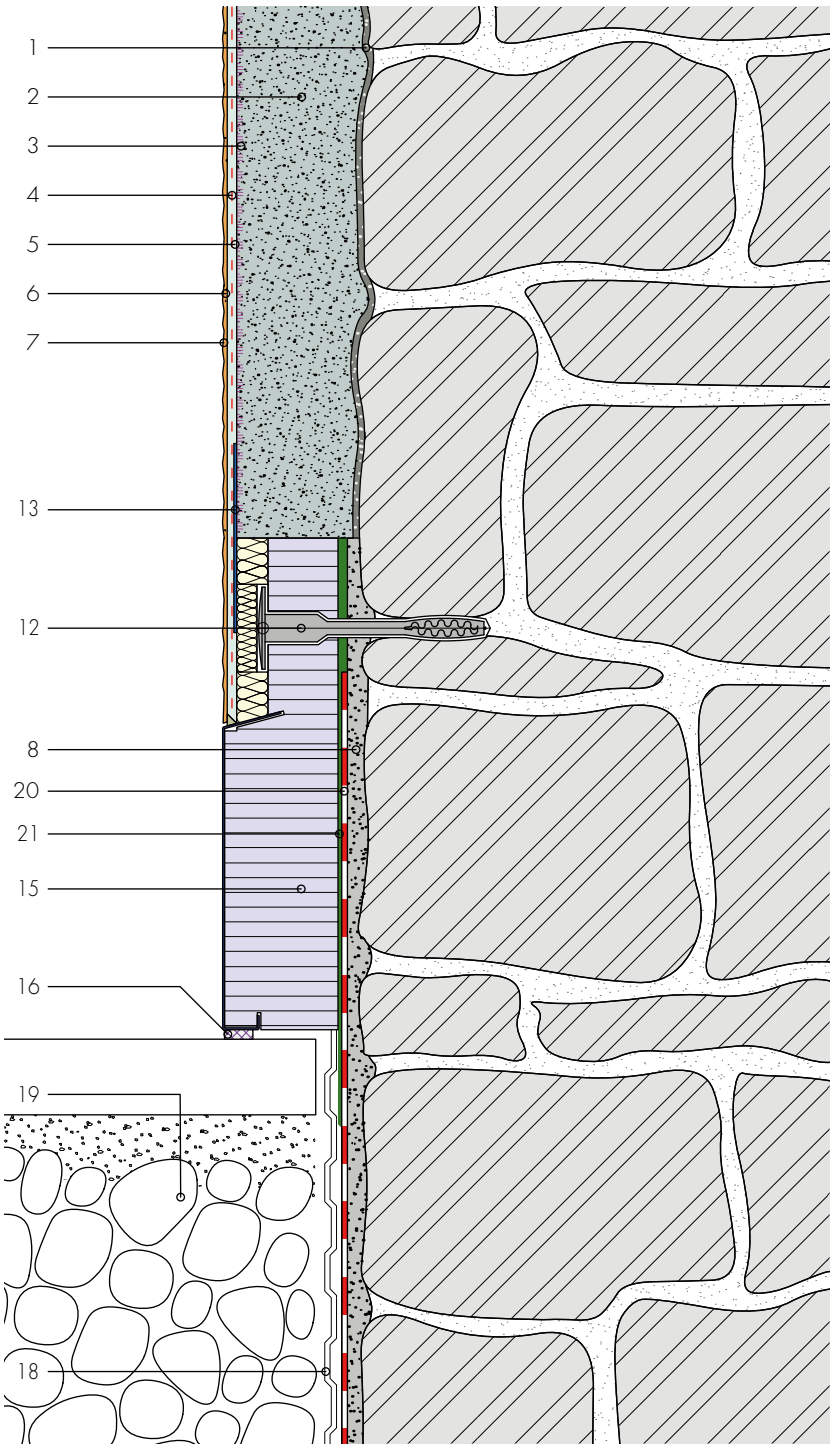
Base

Sheet-metal base cladding element mounted on existing substrate

Detail A2



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7 Paint layer (suitable for final render)
8 Levelling layer Fixit 207 base plaster hydraulic lime
10 Base cladding panel
12 Mounting anchor bolt
13 Barrier textile
15 Base cladding panel of sheet metal
16 Joint sealing tape BG1
18 Protective layer
19 Drainage rubble fill
20 Vertical sealing layer, (provided on-site by contractor)
21 Attach with adhesive Fixit 373 Multiflex 2K Grey or bitumen coating 2K

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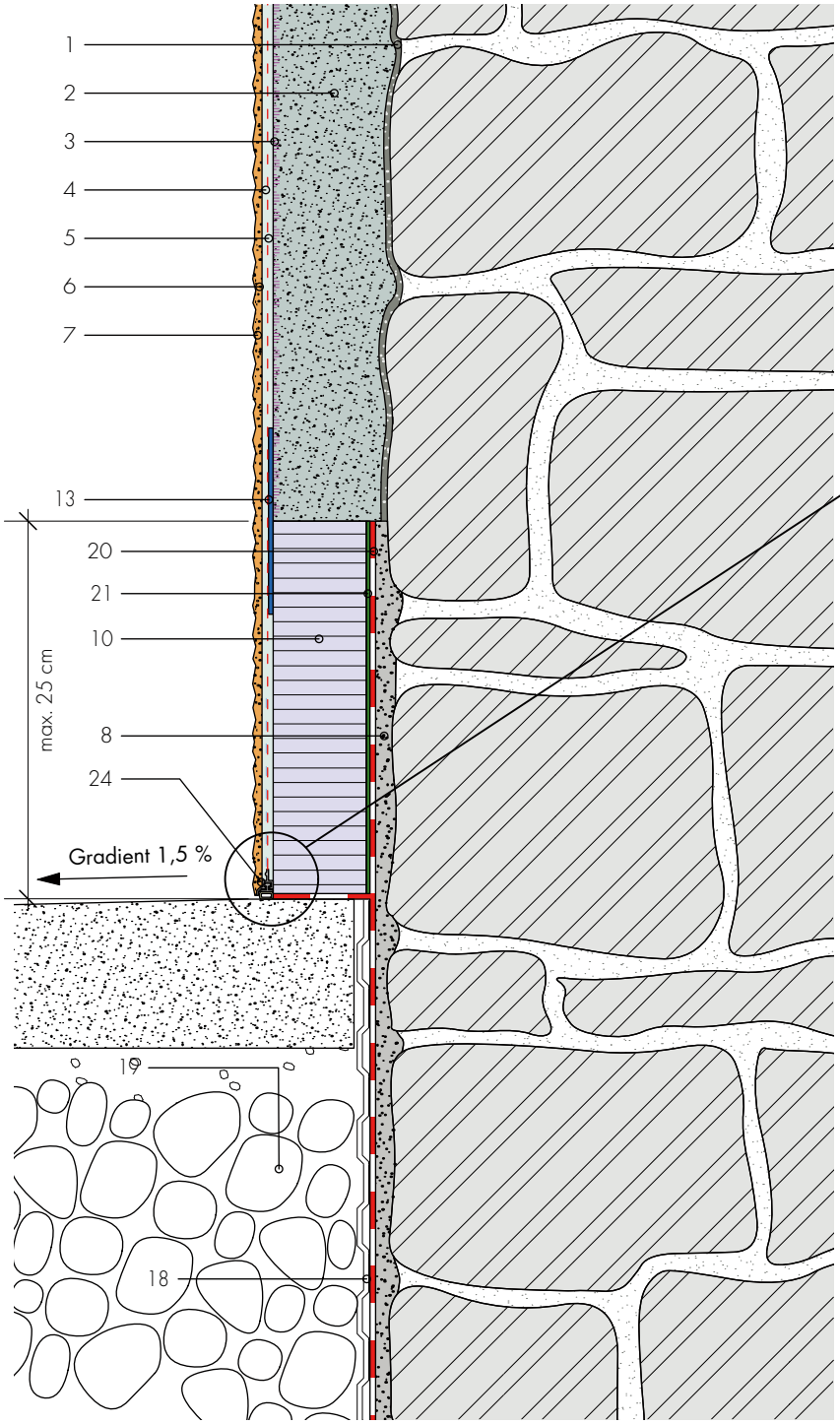
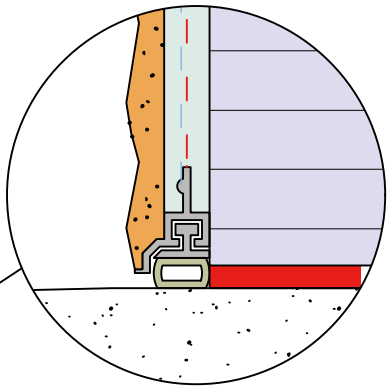
Base

Base cladding with joining profile

Detail A3





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18 Protective layer
19 Drainage rubble fill
20 Vertical sealing layer (provided on-site by contractor)
21 Attach with adhesive Fixit 373 Multiflex 2K Grey or bitumen coating 2K

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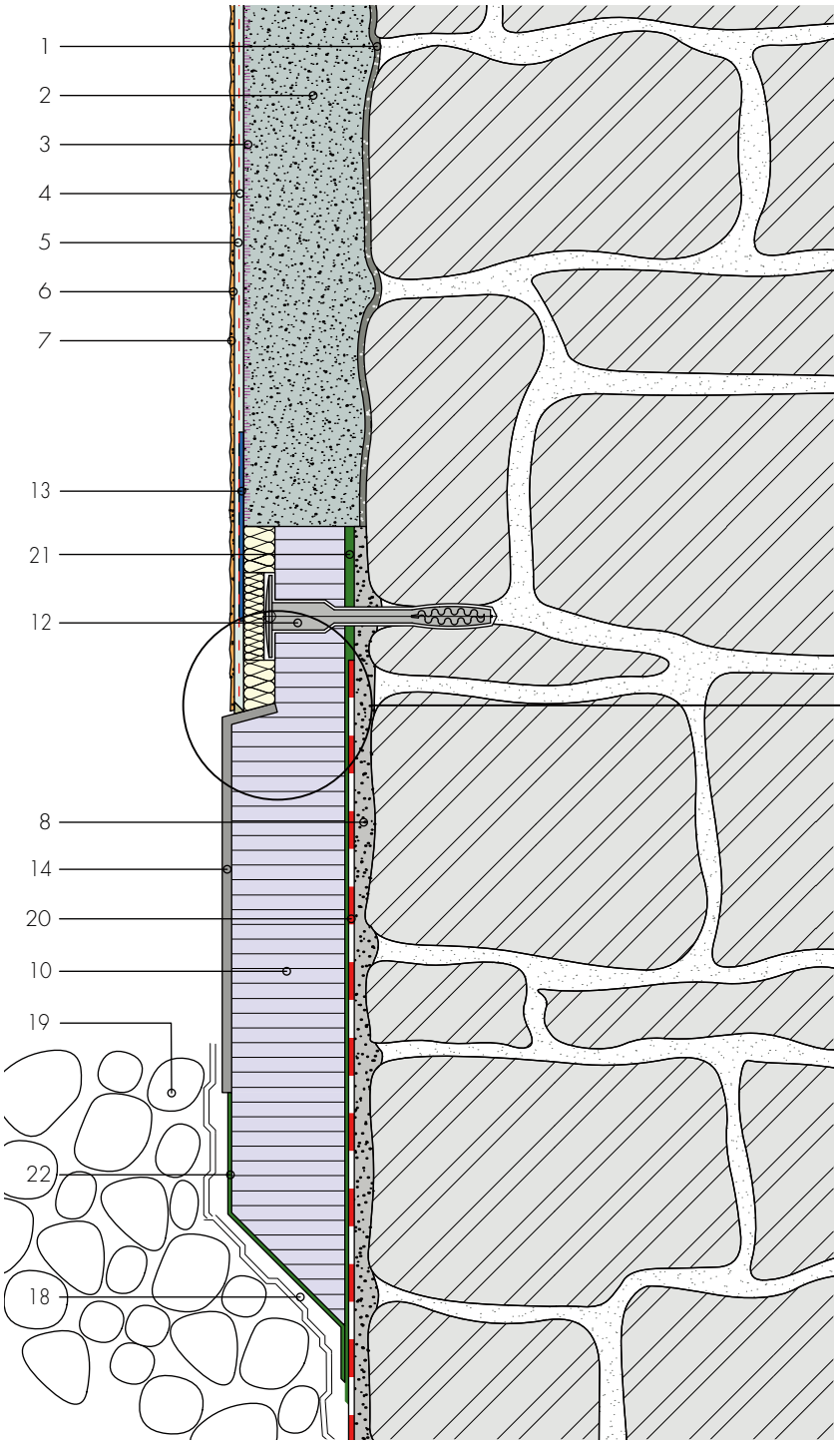
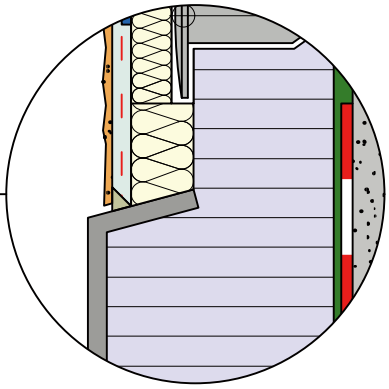
Base

Base cladding element made of glass-fibre reinforced concrete

Detail A4



Joint with concealed mastic filler and separating cut in final coating



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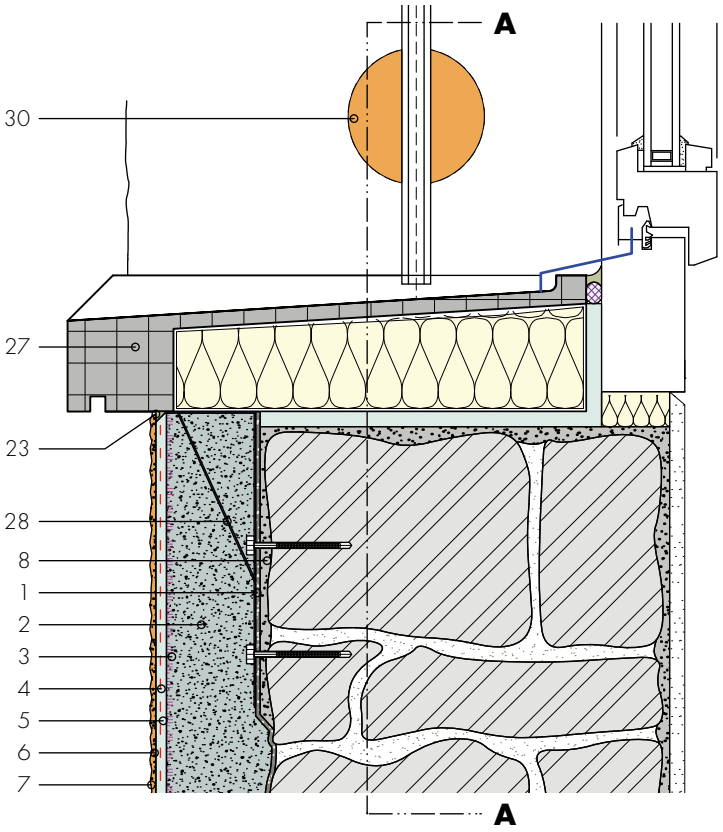
8 Levelling layer Fixit 207 base plaster hydraulic lime
10 Base cladding panel
12 Mounting anchor bolt
13 Barrier textile
14 Base cladding panel of glass-fibre reinforced concrete
18 Protective layer
19 Drainage rubble fill
20 Vertical sealing layer, (provided on-site by contractor)
21 Attach with adhesive Fixit 373 Multiflex 2K, Grey or bitumen coating 2K
22 Cover surface with layer of: Bitumen coating 1K, Bitumen coating 2K, Fixit Multiflex 2K Grey

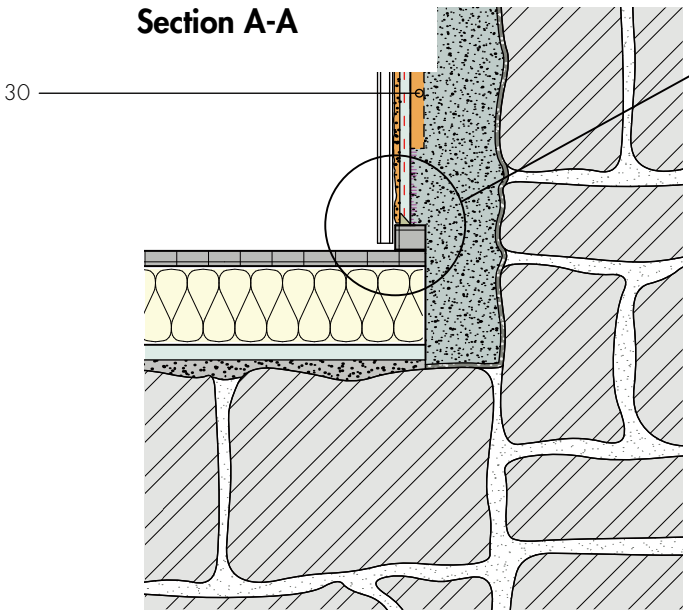
Window sill

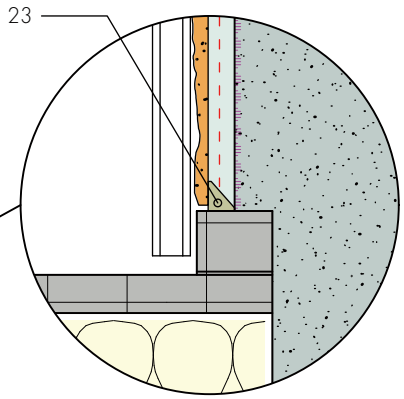
Glass-fibre reinforced concrete window sill

Detail B1



Section A-A





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5 Special embedding mortar Fixit 223
6 Mineral-based final render
7 Paint layer (suitable for final render)
8 Levelling layer Fixit 207 base plaster hydraulic lime
23 Concealed mastic joint and separating cut
27 GFRC window sill
28 Supporting angle
30 Mounting disc DoRondo PE

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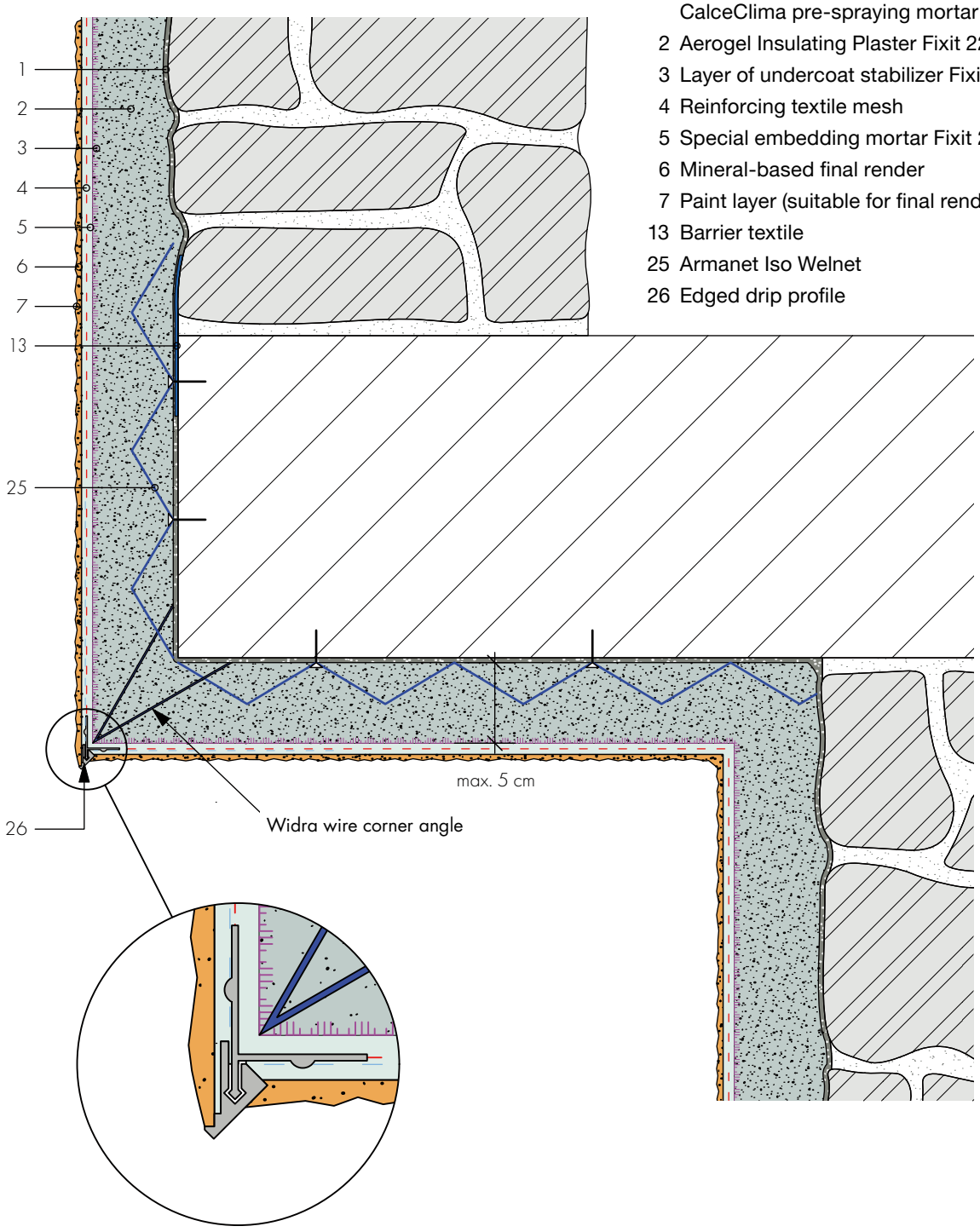
Bottom view

Overhanding edge formation with drip profile

Detail F1



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4 Reinforcing textile mesh
5 Special embedding mortar Fixit 223
6 Mineral-based final render
7 Paint layer (suitable for final render)
13 Barrier textile
25 Armanet Iso Welnet
26 Edged drip profile

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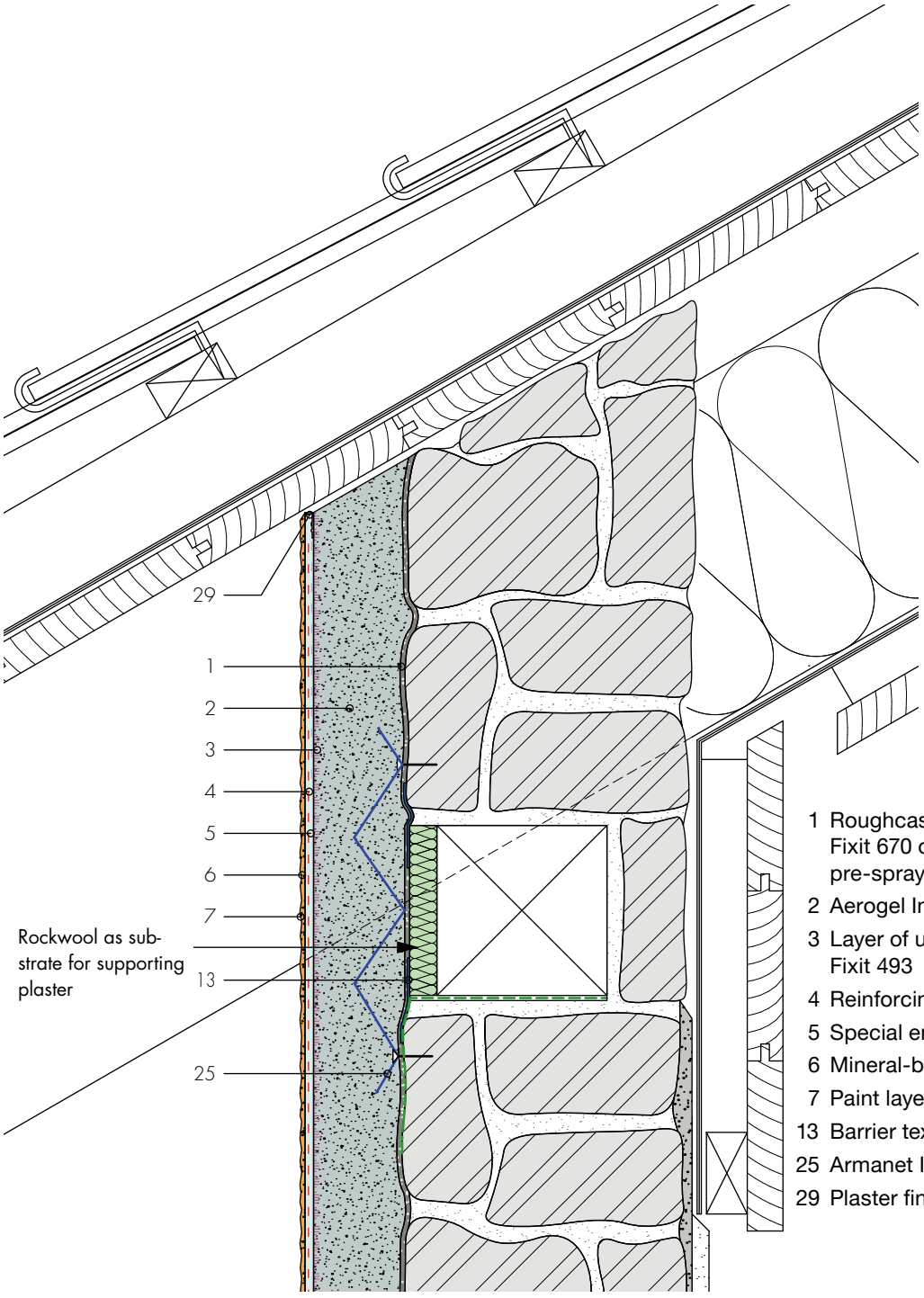
Pitched roof

Connection to twin skin ventilated roof

Detail H1



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3 Layer of undercoat stabilizer Fixit 493
4 Reinforcing textile mesh
5 Special embedding mortar Fixit 223
6 Mineral-based final render
7 Paint layer (suitable for final render)
13 Barrier textile
25 Armanet Iso Welnet
29 Plaster finishing profile

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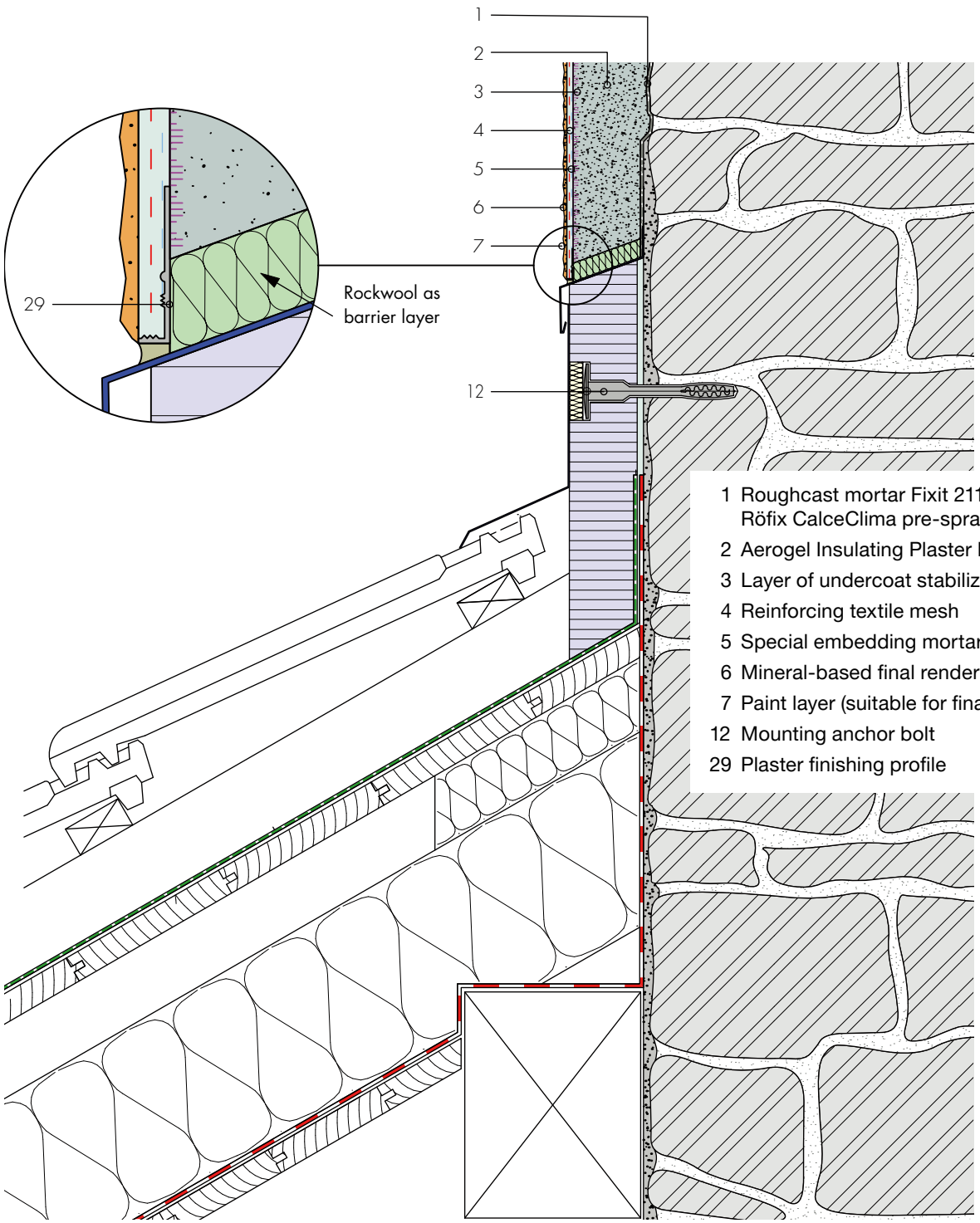
Pitched roof

Connection to pitched roof

Detail H2



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4 Reinforcing textile mesh
5 Special embedding mortar Fixit 223
6 Mineral-based final render
7 Paint layer (suitable for final render)
12 Mounting anchor bolt
29 Plaster finishing profile

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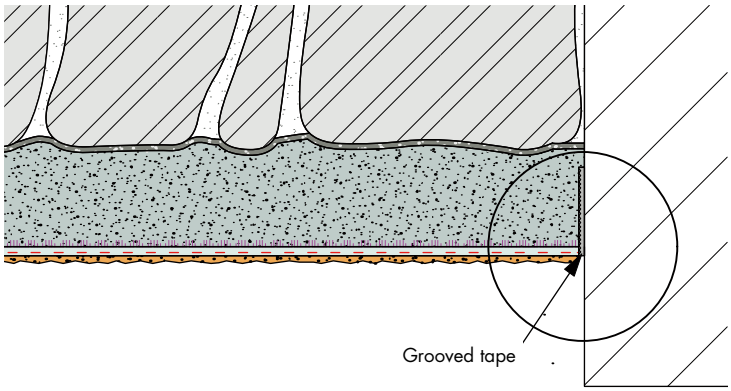
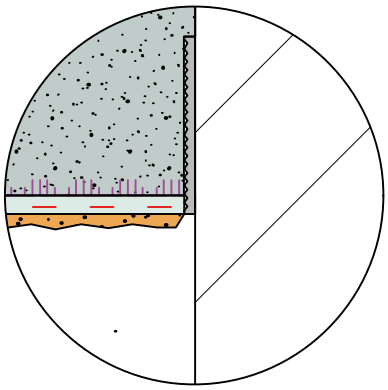
Connections

Detail I1 & I2

Detail I1

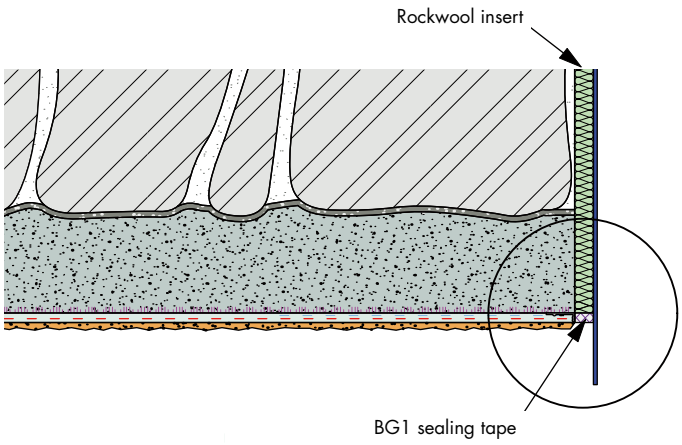
Butt joint with grooved tape

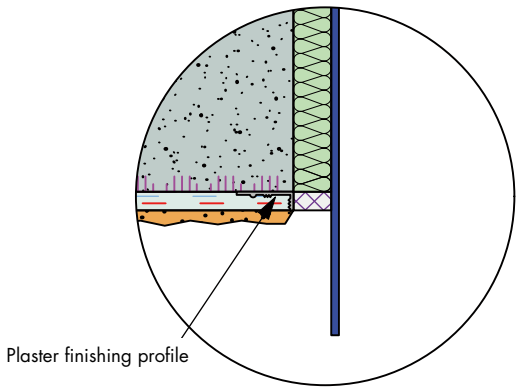




Detail I2

Joint to metal frame with BG1 sealing tape

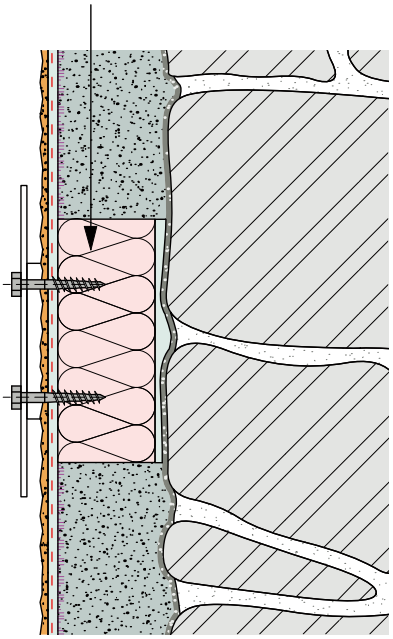




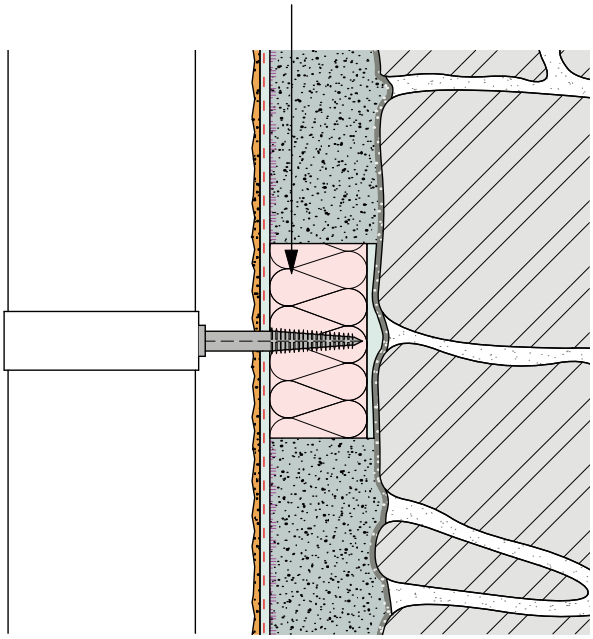
External assembly

Detail K1

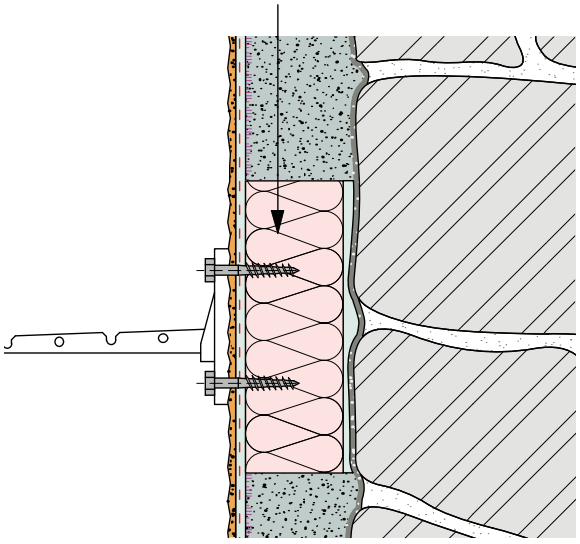
Mounting disc DoRondo PE



Quadroline EPS 100 x 100 mm

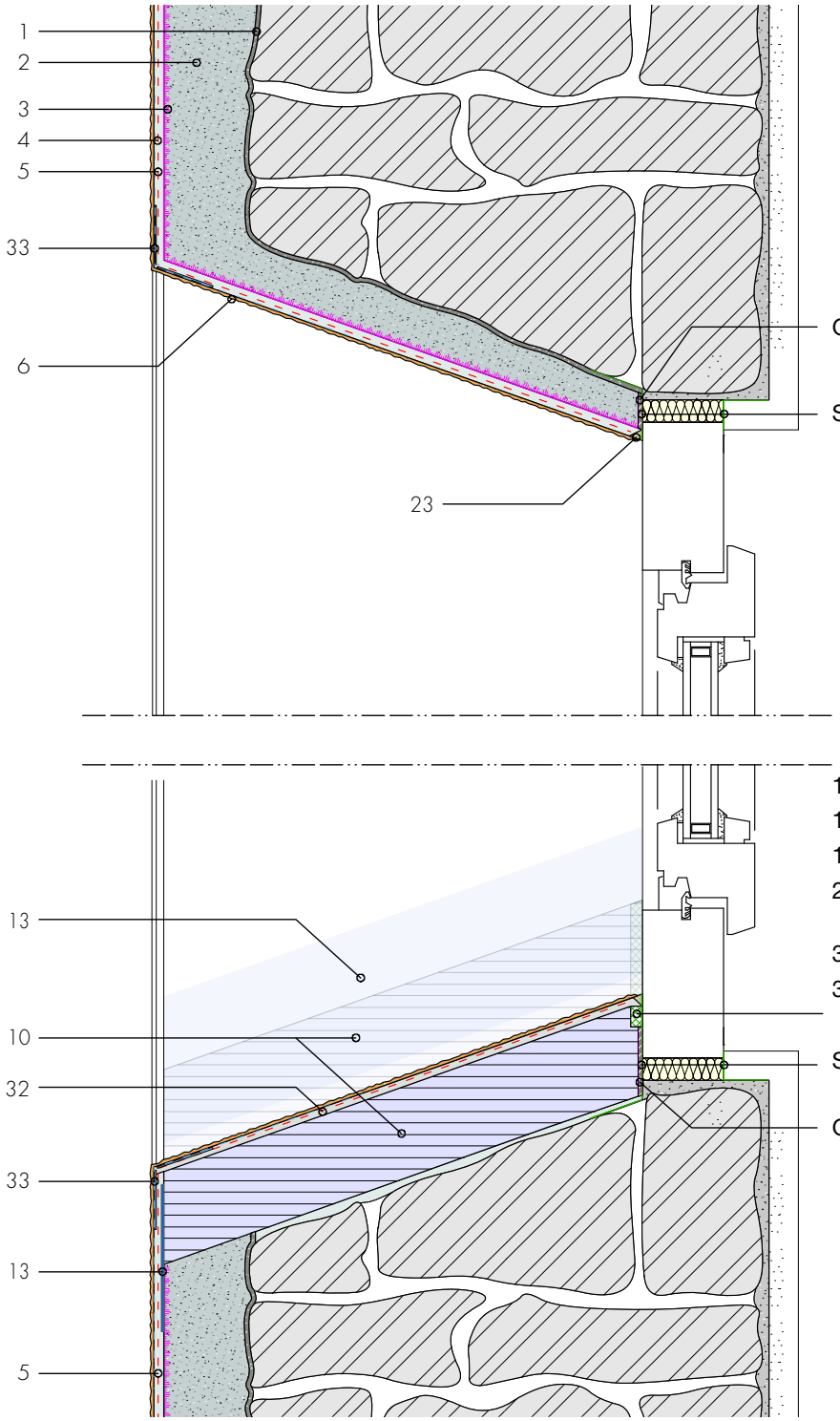


Quadroline EPS 100 x 150 mm



Engadine window

Engadine window plastered, design with plinth insulation panel



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6 Mineral-based final render
10 Base cladding panel
13 Barrier textile
16 Joint sealing tape BG1
23 Concealed mastic joint and separating cut
32 Base and embedding mortar Fixit 469
33 Roll corner bracket


BLACKBIRD HOUSE
nachher


vorher

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