



Warmth



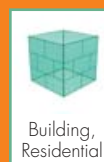
Quietness



Protection



Come inside...
Solid External Walls: Residential



Building,
Residential



External
Walls

Warmth



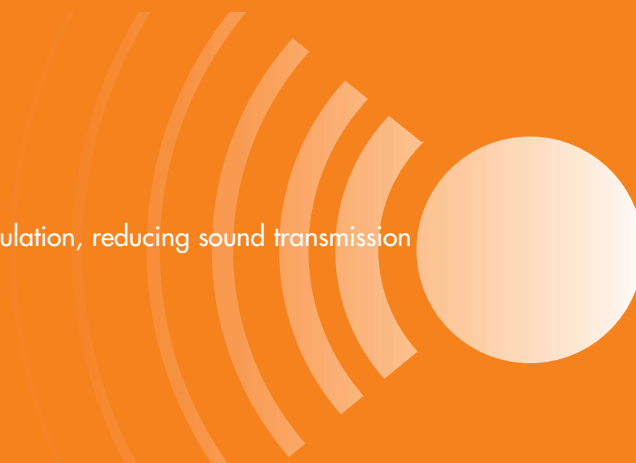
...From Thermal Insulation, giving energy efficiency



Quietness



...from Acoustic Insulation, reducing sound transmission



Protection



...from Fire Resistant Products, increasing safety



Overview

Solid masonry walls can occur in both older properties and system built houses and flats constructed in the mid 20th century. In older properties the wall could vary from being a minimum of two bricks (225mm) thick right through to solid stone walls in excess of 500mm. Alternatively in the system built properties the walls could be solid concrete panels only 100mm thick.

All these different types of walls may be clad with a weather proofing layer such as render or tile hanging to ensure the wall is able to resist the passage of liquid water. Whatever the construction or original cladding of a solid wall it is unlikely to offer a satisfactory thermal insulation judged against current standards.



There is a large and varied stock of solid walled housing.

Advantages

Building with solid masonry walls has been a traditional method of construction for many centuries. It allows for massive structures with high levels of structural integrity. The weakness has been the difficulty in preventing water penetration, particularly when the wall was built from brick. This was the reason for the introduction of cavities into walls.

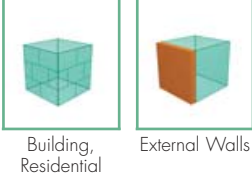
Solid masonry walls offer little thermal insulation and cannot be upgraded by injecting cavity wall insulation. The upgrade of a solid wall requires an insulation layer to be installed either on the inner or outer face of the wall. These options will alter either the internal dimensions or the exterior appearance of the building. Positioning the insulation on the outside of the wall means that the mass of the wall will be heated creating a thermal store in the walls. This is desirable if the property is occupied 24

hours a day, eg for retired persons. However in a property where the occupants are out for large parts of the day a quick warm up period is desirable, this can be achieved by placing the insulation on the inside of the wall.

To prevent the ingress of moisture through solid walls a number of cladding techniques are used. These can include render coats, tile hanging, timber cladding, and rainscreen cladding.

Knauf Insulation Products

- **Crown Dritherm Cavity Slab** is a lightweight, semi-rigid or rigid slab of glass mineral wool with a water-repellent additive.
- **Crown Universal Slab CS24** is a semi-rigid slab of shot free, non-combustible, unfaced glass mineral wool.
- **Crown Acoustitherm Wall Roll** is a roll of high density glass mineral wool, faced on one side with a vapour control layer of Kraft paper/ polyethylene which has markings to help when measuring and cutting to size.
- **Rocksil Universal Slab RS60** is a semi-rigid slab of rock mineral wool.
- **Polyfoam Linerboard** is a laminate of Polyfoam high performance, 100% ozone friendly, extruded polystyrene, rigid board insulation and 9.5mm tapered edge plasterboard.
- **Polyfoam Cavityboard** is a high performance, 100% ozone friendly, extruded polystyrene, rigid board insulation.



Summary

Knauf Insulation provides a range of products that can be used for both internal and external wall insulation, and gives options to meet the requirements of the thermal Building Regulations.

System	1) Internal Insulated Dry Lining	2) Internal Insulation: Independent Lining		
Advantages	<ul style="list-style-type: none"> • Simple fixing method • Internal insulation allows for fast building warm up • Does not alter external appearance of building 	<ul style="list-style-type: none"> • Especially suitable for walls where internal face is unsuitable for dry lining due to uneven surface, damp or incompatibility with plaster adhesive • Achieves exceptionally high thermal performance and allows for fast building warm up • Does not alter external appearance of building 		
Insulation type	Polyfoam Linerboard 45.5/9.5	100mm Acoustitherm Wall Roll in independent lining	75mm Crown Universal Slab CS24 between studs and Polyfoam Linerboard 30/9.5	65mm Crown Dritherm Cavity Slab with 50mm Crown Dritherm Cavity Slab between studs
U-value				
0.20				
0.30				
0.40				
0.50				
0.60				
0.70				
System Dimensions	300mm	347mm	374mm	361mm
Page Number	10-11	12-13	14-15	14-15

The U-values illustrate the performance range of each insulation system when used with 215mm thick blockwork varying from lightweight aircrete to dense concrete.

3) External Wall Insulation:

a) External only

b) External and Internal

- Installed without damaging internal finishes
- High thermal mass ideal for properties in continuous occupation
- Includes creation of weatherproof render

- Achieves exceptional thermal performance
- Includes creation of weatherproof render

4) External Insulation Behind Cladding

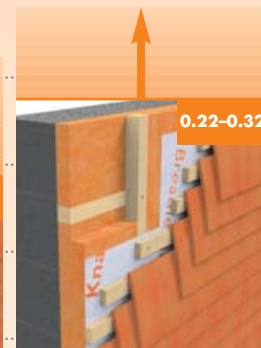
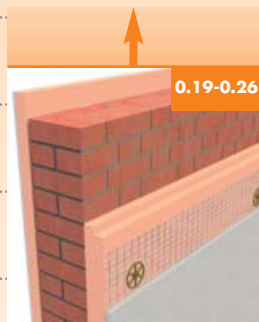
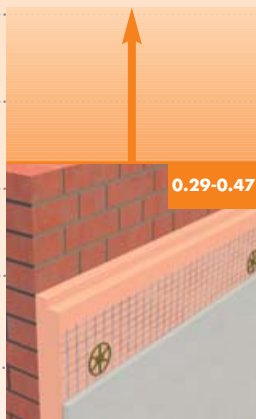
- Improves weather tightness of wall whilst creating an insulation zone against the outside of the wall
- Constructed from common building materials
- Creates a system with high thermal mass ideal for properties in continuous occupation

50mm Polyfoam Cavityboard

50mm Polyfoam Cavityboard and Polyfoam Linerboard 45.5/9.5

75mm Crown Universal Slab CS24 between battens

Double layer of 50mm Crown Universal Slab CS24 between two sets of battens



Best

Better

Good

312mm

354mm

318mm

343mm

16-17

16-17

18-19

18-19



With a cladding or render finish, the structural external wall need not be of cavity construction.

Detailed Design Considerations: External Wall Insulation

Building Regulations

The maximum allowable Elemental U-values for external walls are shown below:

	U-value (W/m ² K)
England, Wales and Northern Ireland	0.35
Scotland	0.30 or 0.27
Ireland	0.27

When substantially replacing external walls or their external render, cladding or internal surface finishes as part of a material alteration or change of use, the Regulations say "a reasonable thickness of insulation" should be provided.

External Wall Insulation

Many system built properties, particularly high rise housing built

during the 1950s and 60s, are suffering from the deterioration of external wall fabric, rain penetration, condensation, mould growth, and excessive heat loss due to the lack of adequate insulation.

These problems can be overcome with external wall insulation systems incorporating insulation behind a new render finish or cladding.

External insulation is especially useful in refurbishment projects as it can be installed without affecting the day to day activities of the occupants, and with no need for decanting.

The addition of external insulation is often combined with the replacement of windows, which provides a good

opportunity to return the insulation into the reveals to avoid thermal bridging.

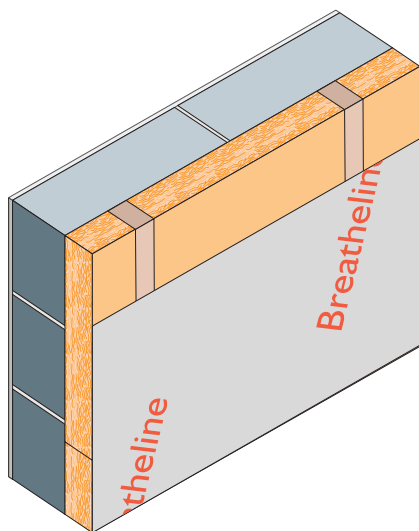
With external insulation, the thermal mass of the masonry external walls helps to keep temperatures stable – storing heat in the winter and dissipating solar gains in the summer.

Render Finishes

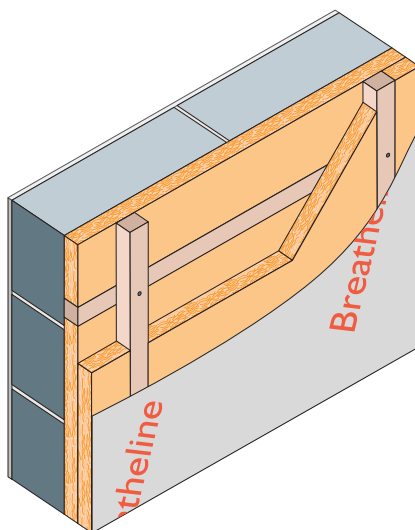
The wide variety of colour and texture available in renders offers architects great scope in creating attractive yet practical designs.

A number of proprietary renders are available as alternatives to traditional sand/cement renders. Specialist manufacturers should be consulted regarding the specific requirements for their products.

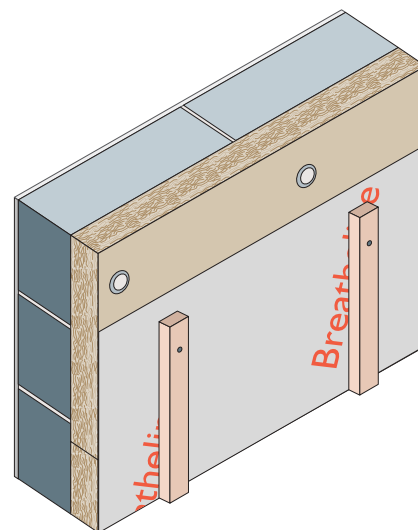
Alternative methods for insulating behind cladding



Insulation slab (eg Crown Universal Slab CS24) friction fitted between timber battens, with breather membrane



Insulation slab (eg Crown Universal Slab CS24) friction fitted between a double layer of battens at right angles to each other, with breather membrane



Compression resistant insulation slab (eg Rocksil Universal Slab RS60) fixed independently to wall, breather membrane stapled to insulation and held in place by timber battens screwed and plugged to blockwork

Render on insulation is subject to greater temperature fluctuations than render applied direct to masonry. The following precautions should be adopted to minimise cracking:

- reinforce the render with a mesh
- provide movement joints at maximum 5m centres
- use a light coloured finish to minimise the effects of solar gain
- use a render incorporating a polymer and/or reinforcement fibres

Galvanised or stainless steel beads should be provided at structural joints, at angle changes and around structural openings, as well as at movement joints. In refurbishment projects, sill and head drips are likely to need extending or reforming.

The insulation should be returned into reveals and soffits at openings to avoid thermal bridging.

Other Cladding

Insulation can also be incorporated behind cladding such as tile hanging and weatherboarding. The drawings above show alternative ways of installing the insulation and providing fixing battens for the cladding.

In the first drawing, the timber battens form thermal bridges through the insulation. The other two drawings show ways of minimising the thermal bridging.

Fire

Where a combustible insulation is used behind render, the reinforcement mesh must be securely fixed through the insulation to the substrate. In addition,

non-combustible cavity barriers must be provided at each storey to comply with the Building Regulations.



The most practical way of insulating ornate solid brick buildings is with internal insulation.

Detailed Design Considerations: Internal Wall Insulation

Thermal Insulation

An insulated lining can be used for:

- lining new solid walls which have an external cladding or render
- upgrading existing solid walls to improve their thermal insulation

Placing insulation on the inside of the external wall reduces the thermal capacity of the building and so improves the response time when an intermittent form of heating is used.

The following design issues need to be addressed when applying dry lining to improve thermal insulation:

- dampness – some existing solid walls may be temporarily damp

- thermal bridging – where insulation is interrupted at the junctions with partitions, separating walls and openings
- air infiltration – preventing air passing through the cavity behind the insulated lining
- interstitial condensation – incorporating a vapour control layer on the warm side of the insulation

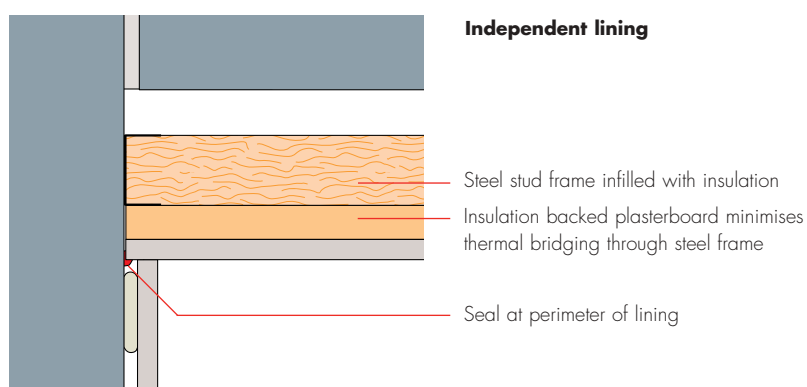
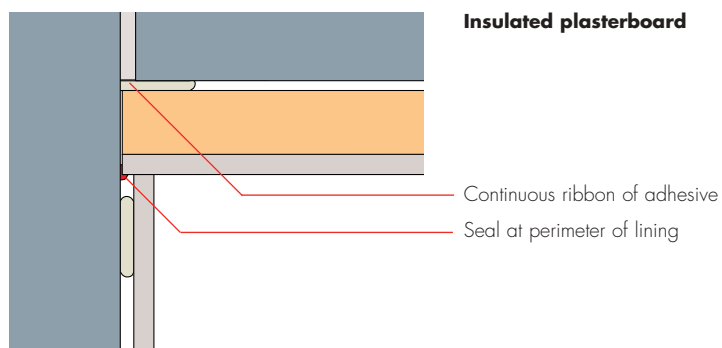
Dampness in Existing Walls

An insulated lining should not be used to isolate a dampness problem. Any dampness in an existing wall should be cured before an insulated lining is applied. Existing solid walls may temporarily be suffering from damp following treatment for rising damp or after curing rain penetration.

Where dampness has not had time to dry out, the use of an independent lining can be used to create a small cavity to provide a break in the moisture transmission path.

Where, despite repointing or rendering, doubts remain about the resistance of the wall to rain penetration, an independent timber or metal frame should be specified. The framework should be at least 25mm clear of the existing masonry and the resulting cavity should be ventilated to the outside at high and low level. Particular care is needed to seal the insulated lining at the perimeter, at all service penetrations and around openings.

Alternative insulated dry linings



Avoiding Thermal Bridging

When a wall is insulated with an insulated lining there are unavoidable thermal bridges at the junctions with internal partitions, separating walls and floors.

To minimise thermal bridging, a dry lining can be returned a short distance along partition or separating walls, where this is practicable.

In new construction, the thermal bridge at the junction with partitions can be minimised if the blockwork in the external wall has a low thermal conductivity.

At window and door openings, the insulation should always be returned into the reveal and the soffit, otherwise there is a high risk of condensation occurring on the uninsulated reveals.

Avoiding Air Infiltration

Air infiltration behind an insulated lining and through gaps and cracks in the wall behind can significantly reduce the thermal performance of the wall.

The key design points are:

- seal all gaps at the junction between the insulated lining and the skirting board and where services, such as waste pipes, penetrate the plasterboard finish
- with dry linings, ensure there is a continuous ribbon of adhesive at the perimeter of each area of wall, at window and door openings and around service penetrations such as electrical socket outlets

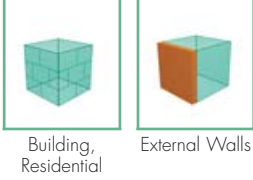
Avoiding Condensation

The main way to prevent condensation forming is to specify a vapour control membrane on the warm side of the insulation.

With an independent lining, specify a board with an integral vapour control layer.

In addition the following detailing points will help to reduce the amount of warm room air getting behind the insulation:

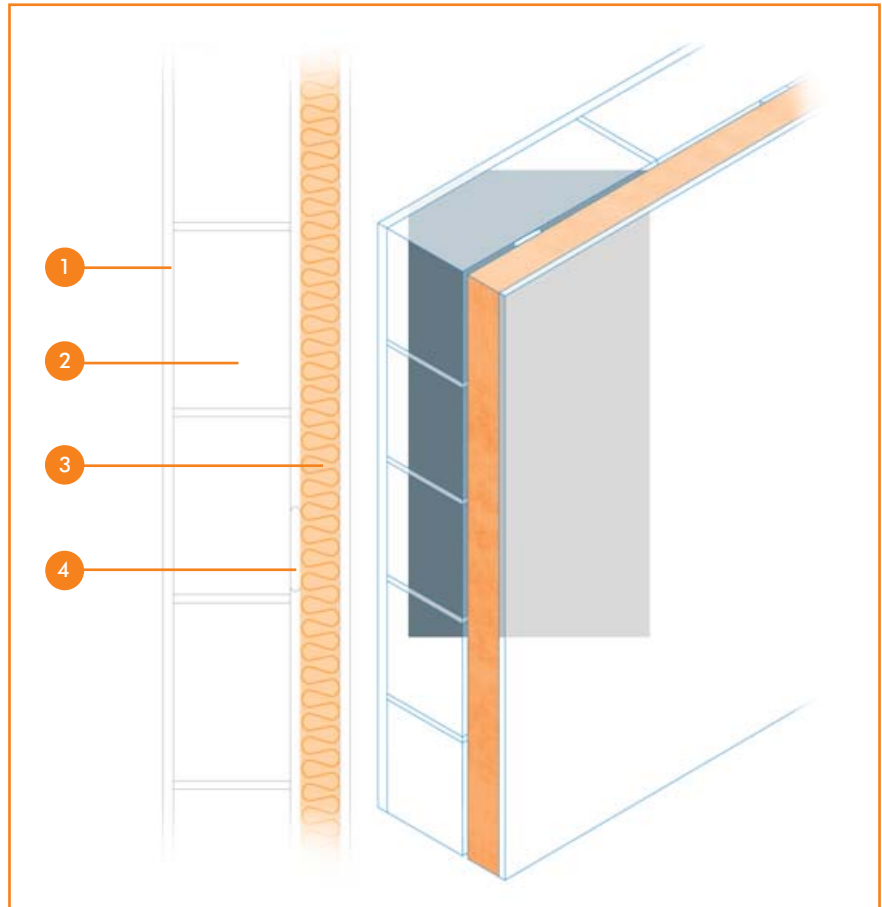
- seal the joints at the junctions between the insulated lining and surrounding walls and floors
- keep the number of service penetrations to a minimum
- seal around penetrations, such as waste pipes, with an expanding foam

Building,
Residential

External Walls

Dry lining to solid masonry external wall

- 1 External cladding
- 2 Solid blockwork wall
- 3 Polyfoam Linerboard
- 4 Plaster adhesive dabs



Product

- Polyfoam Linerboard is a laminate of Polyfoam high performance, 100% ozone friendly, extruded polystyrene, rigid board insulation and 9.5mm tapered edge plasterboard.

Typical Construction

New or existing masonry solid walls, lined internally with Polyfoam Linerboard.

Polyfoam Linerboards can be fixed with adhesive plaster dabs or mechanically fixed. Where dabs or adhesive are used, secondary mechanical fixings are needed to secure the plasterboard in case of fire.

Installation

Before fitting the dry lining, the ceiling lining should be in place. The surface to be lined should be clean and dry with all wallpaper and loose plaster removed. If heavy fixtures, such as wash basins, are to be fixed to the wall, timber battens should be provided to accept the fixings.

Holes for services should be cut before fixing the board. To accommodate

services or obstructions on the wall, cut away the insulation to the depth of the obstruction. Boards can be either cut or sawn. When cutting the boards, use a sharp knife to cut through the insulation and score the board. The score is then snapped open to give a clean edge.

Adhesive fixing

Where the walls are even with a sound plaster finish, Polyfoam Linerboard can be fixed directly with plaster or cement based adhesives.

The adhesive is applied in vertical bands at the board edge and down the centre of the board. Bands of adhesive should also be applied around openings, service penetrations and at the junctions with ceilings and floors. This is to reduce air infiltration.

Typical U-values (W/m²K) for solid masonry walls dry lined with Polyfoam Linerboard

Polyfoam Linerboard thickness (mm)	U-value (W/m ² K) for 215mm Solid masonry wall of:					
	Dense block (λ=1.13)	Medium block (λ=0.51)	Lightweight aggregate (λ=0.34)	Standard aircrete (λ=0.16)	Lightweight aircrete (λ=0.11)	Brick (λ=0.77)
45.5/9.5	0.48	0.44	0.41	0.33	0.29	0.46
36/9.5	0.57	0.51	0.46	0.37	0.32	0.54
30.5/9.5	0.63	0.56	0.51	0.40	0.34	0.60
25/9.5	0.72	0.62	0.56	0.43	0.37	0.68
17.5/9.5	0.87	0.74	0.65	0.48	0.41	0.81

Note: The U-values have been calculated to BS EN ISO 6946: 1997 and assume a 19mm sand cement render external finish.

Advantages

- Robust nature of Polyfoam in Linerboard supports plasterboard, improving its impact performance
- Simple drylining techniques used for fixing and finishing boards

Plaster dabs fixing

Where the wall is uneven, such as unplastered blockwork, the boards should be fixed by means of plaster dabs. Again, there should be a continuous band of adhesive around the perimeter of each wall area to minimise air infiltration.

Immediately offer the board to the wall and adjust with a footlifter as necessary. Insert packing strips at the base. Tap the board to align with pre-determined guidelines and adjacent boards. A neat and close line should be achieved at the wall/ceiling junction. Fill any gap at the base with proprietary bonding compound or sealant.

When fixing Polyfoam Linerboard with adhesive or dabs, secondary mechanical fixings are required. Two fixings are recommended at the top of each board, 25mm in from the edge. The fixings should penetrate at least 35mm into a solid background.

All PVC insulated electrical cables should be run in trunking or conduit behind the dry lining to avoid direct contact with the insulation.

Performance

• Thermal performance

The insulation element of Polyfoam Linerboard has an aged quoted thermal conductivity of 0.030 W/mK and the plasterboard has a thermal conductivity of 0.19 W/mK.

The table gives U-values for typical constructions.

• Fire performance

Polyfoam Linerboard consists of a 9.5mm plasterboard which offers excellent fire performance as a facing material and Polyfoam insulation which contains a flame retardant to inhibit localised ignition.

When installed on dabs the secondary fixings at the top of each board will ensure the integrity of the application during evacuation in case of fire.

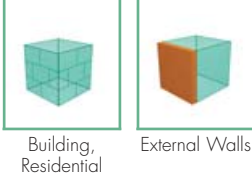
• Compression resistance

The rigidity of the Polyfoam board behind the plasterboard will offer an excellent support to the finished internal lining and assist in the resistance of impact damage, helping to prolong its service life.

• Moisture resistance

Walls should be sound and weatherproof before applying a thermal plasterboard laminate. Damp walls could have a detrimental effect on insulation and adhesive performance.

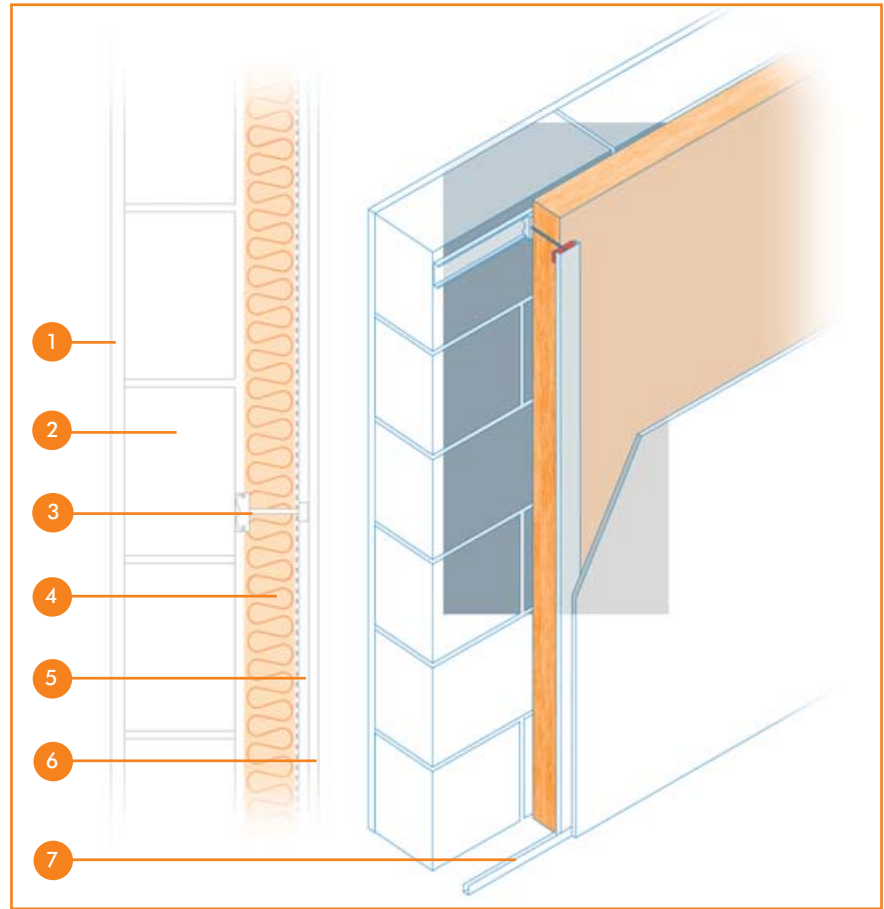
When lining internal walls in refurbishment projects the existing wall is often in a state of disrepair, which can mean dampness. The Polyfoam insulation backing to the plasterboard is resistant to moisture absorption and can offer the best piece of mind solution for an application where any potential moisture ingress is a concern. Moisture has a minimal impact on the performance of the product. If in any doubt about adhesive use mechanical fixings.

Building,
Residential

External Walls

Acoustitherm Independent Lining System

- 1 External render/cladding
- 2 Masonry block external wall
- 3 Acoustitherm Wall Clip N
- 4 Crown Acoustitherm Wall Roll
- 5 Knauf 'C' Channel, 47x17mm, 0.5 Gauge
- 6 Plasterboard lining
- 7 Knauf 'U' Channel, 30x20mm, 0.55 Gauge



Product

- Acoustitherm Independent Lining System is an internal lining system incorporating a metal framework, intermediate supports, glass wool insulation and plasterboard, which ensures perfect thermal continuity across the surface of external walls.
- Crown Acoustitherm Wall Roll is a roll of high density glass mineral wool, faced on one side with a vapour control layer of Kraft paper/polyethylene which has markings to help when measuring and cutting to size.
- Acoustitherm Wall Clip N is the fixing spacer unit in the Acoustitherm Independent Lining System. It comprises one metal clip, one nylon clip and a separating spindle.

- Acoustitherm Wall Clip R is an alternative to Acoustitherm Wall Clip N, developed specifically for refurbishment of non perpendicular walls. It includes an insulation support clip to ensure the Acoustitherm Wall Roll will not slump.

Typical Construction

Masonry solid wall, with an independent internal lining, which is formed by the Acoustitherm Clip N system, infilled with Crown Acoustitherm Wall Roll and faced in plasterboard.

The system is quick to install and also provides good acoustic insulation.

Installation

Installing the 'U' channels

Mark the location of the 'U' channel on the floor using a builders' line, allowing for the thickness of the insulation. The channel to be Knauf 'U' Channel 30x20mm, 0.55 gauge.

Mark the corresponding position of the 'U' channel on the ceiling with the help of a plumb line or a laser. Fix the 'U' channels using plugs and screws, or power nails, every 600mm.

Mark the floor to indicate the positions of the vertical 'C' channels at 600mm centres.

Fixing the Acoustitherm Wall Clip N

Fix one of the 'C' channels horizontally on the background wall about 1200mm above the floor level. The 'C' channels to be Knauf 'C' Channel, 47x17mm, 0.5 Gauge.

Typical U-values (W/m²K) for solid masonry wall insulated with the Acoustitherm Independent Lining System

Insulation thickness (mm)	U-value (W/m ² K) for 215mm Solid masonry wall of:					
	Dense block (λ=1.13)	Medium block (λ=0.51)	Lightweight aggregate (λ=0.34)	Standard aircrete (λ=0.16)	Lightweight aircrete (λ=0.11)	Brick (λ=0.77)
Crown Acoustitherm Wall Roll						
100	0.35	0.33	0.31	0.26	0.23	0.34
85	0.40	0.36	0.34	0.28	0.25	0.38
75	0.43	0.39	0.36	0.30	0.26	0.42

Note: The U-values have been calculated in accordance with BRE Digest 465 and assume a 19mm sand cement render external finish.

Manually, clip the Acoustitherm Wall Clip N units (without their nylon heads) into the horizontal 'C' channel at 600mm centres. The Acoustitherm Wall Clip N units can be attached without the need for tools.

Placing the Acoustitherm insulation

Cut the Crown Acoustitherm Wall Roll insulation to the height from floor to ceiling, plus 10mm, making use of the measuring/cutting marks on the vapour control layer side.

Offer the lengths of insulation up to the wall and hang them on the Acoustitherm Wall Clip N units by pushing their spindles through the insulation, then replace their nylon heads.

Installing the vertical 'C' channels

Cut the vertical 'C' channels to the height from floor to ceiling, less 10mm.

Clip the 'C' channels onto the nylon heads of the Acoustitherm Wall Clip N units (with the 'C' channels spaced at 600mm centres). Slide the 'C' channels into the 'U' channels at the floor and ceiling.

Check that the 'C' channels are absolutely perpendicular.

It is not necessary to screw the 'C' channels to the 'U' channels. They are held in place by the mechanical pressure of the 'U' channels.

Adjustment of the Acoustitherm Wall Clip N units

Using a level in one hand, adjust the position of the 'C' channel, sliding the nylon head along the spindle of the Acoustitherm Wall Clip N unit until the channel is perfectly vertical. With the other hand, press the spring within the nylon head of the fixing/spacer unit onto its threaded spindle to finally fix the 'C' channel in position.

Applying the wall lining

Make provision for services between the insulation and the wall lining.

Install the wall lining (plasterboard) using recognised practice for fixing to metal studwork and finish as required.

Advantages

- Greatly reduced thermal bridging when compared to other single insulation layer wall lining systems.
- Fast and simple installation
- The Clip system is very easy to adjust to obtain a vertical frame
- Insulation fitted in 1200mm wide full height pieces

Performance

• Thermal performance

Crown Acoustitherm Wall Roll has thermal conductivity of 0.032 W/mK. The Acoustitherm Clip N fixing/spacer unit acts as a thermal break due to its nylon head.

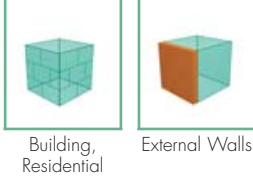
The table gives U-values for typical Acoustitherm Independent Lining Systems.

• Water vapour transmission

Crown Acoustitherm Wall Roll incorporates a vapour control layer.

• Fire performance

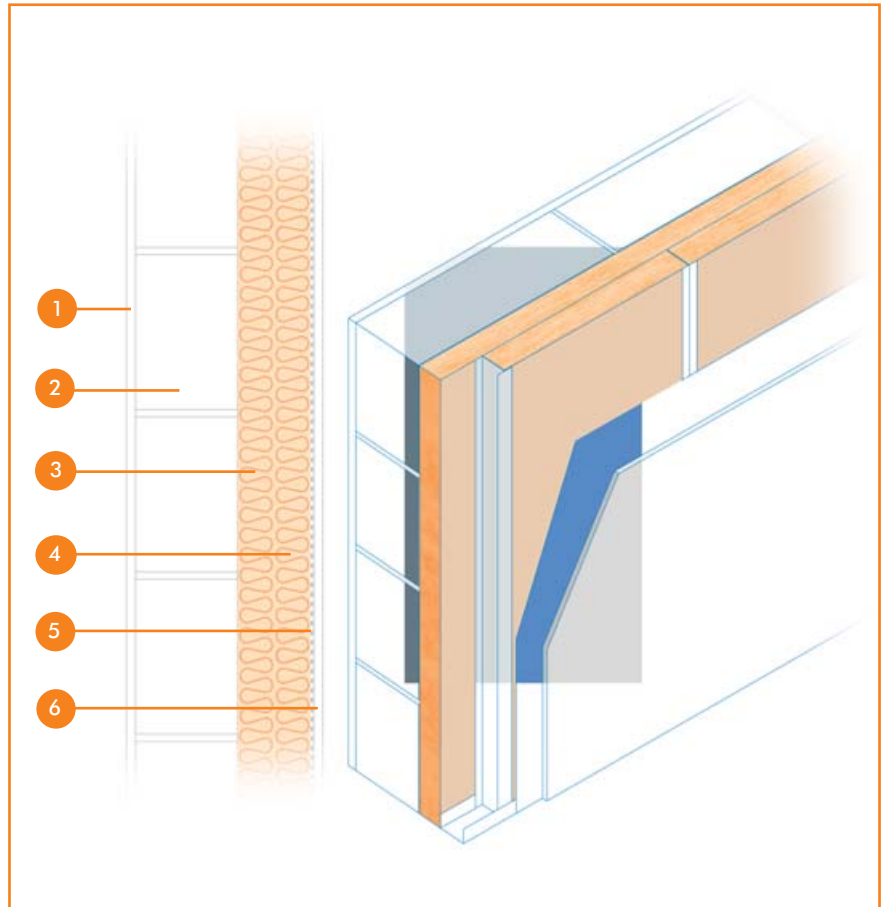
The glass mineral wool in Crown Acoustitherm Wall Roll is classified as Euroclass A1 to BS EN ISO 13501-1.

Building,
Residential

External Walls

Independent Internal Lining

- 1 External render/cladding
- 2 Masonry block external wall
- 3 Crown Dritherm Cavity Slab in cavity
- 4 Crown Dritherm Cavity Slab between Knauf I studs
- 5 Vapour control layer
- 6 12.5mm Plasterboard



Products

- Crown Dritherm Cavity Slab is a lightweight, semi-rigid or rigid slab of glass mineral wool with a water-repellent additive.
- Crown Universal Slab CS24 is a semi-rigid, shot-free, non-combustible, unfaced glass mineral wool slab.

Typical Construction

Masonry solid wall, with an independent internal lining, which can be:

- Knauf I studs, infilled and backed with Crown Dritherm Cavity Slab (as shown)
- Knauf I studs, infilled with Crown Universal Slab CS24 and lined with Polyfoam Linerboard to reduce thermal bridging
- Timber studs infilled with Crown Universal Slab CS24

An independent lining is ideal for existing solid walls that are out of true or new build solid masonry walls where a high level of thermal performance is required.

Knauf I studs are available 50, 60, 70, 92 and 146mm deep.

Installation

Twin layer Crown Dritherm Cavity Slab

Construct the Knauf I stud independent lining 50mm from the internal face of the external wall. Space the studs at 600mm centres. Insert 50mm thick Crown Dritherm Cavity Slab horizontally, in broken bond into the cavity between the steel frame and the external wall. Cut as necessary and insert a second layer of Crown Dritherm Cavity Slab between the I studs of the metal frame.

Fix a vapour control layer to the studs before screwing 12.5mm plasterboard to the metal frame and finish using standard drylining techniques.

Where there is a need to install services in the outer wall, select a 70, or 92mm deep I stud and place 50mm thick Crown Dritherm Cavity Slab to the back of the frame to provide a services void.

Typical U-values (W/m²K) for solid masonry wall with independent internal lining

Insulation thickness (mm)	U-value (W/m ² K) for 215mm Solid masonry wall of:					
	Dense block (λ=1.13)	Medium block (λ=0.51)	Lightweight aggregate (λ=0.34)	Standard aircrete (λ=0.16)	Lightweight aircrete (λ=0.11)	Brick (λ=0.77)
Crown Dritherm Cavity Slab in two layers (in front of and between 50mm deep steel studs)						
50+50	0.33	0.31	0.29	0.25	0.23	0.33
65+50	0.30	0.28	0.26	0.23	0.21	0.29
Crown Universal Slab CS24 between steel studs and Polyfoam Linerboard 30.5/9.5						
75	0.34	0.32	0.30	0.25	0.23	0.33
Crown Universal Slab CS24 between 100x38mm timber studs (9% bridging)						
100	0.34	0.31	0.29	0.25	0.23	0.33

Note: The U-values have been calculated to BS EN ISO 6946: 1997 and assume a 19mm sand cement render external finish. Steel studs assumed to have 50mm wide flanges. All studs at 600mm centres.

Advantages

Twin layer Crown Dritherm Cavity Slab

- Will not allow damp penetration
- Non combustible insulation product
- Keeps frame warm
- Narrow system width

Twin layer Crown Universal Slab/

Polyfoam Linerboard

- Linerboard prevents cold bridging
- Robust nature of Polyfoam in Linerboard supports plasterboard, improving its impact performance

Timber studs with Crown Universal Slab

- Insulation friction fits between studs
- Single layer insulation
- Readily available materials

Twin layer Crown Universal Slab/ Polyfoam Linerboard

Construct the Knauf I stud independent lining at least 25mm from the internal face of the external wall. Space the studs at 600mm centres. Insert Crown Universal Slab CS24 between the I studs of the metal frame.

Screw fix Polyfoam Linerboard to the steel frame at maximum 150mm centres at least 12mm in from the board edge.

Timber stud with Crown Universal Slab CS24

Construct a timber stud frame at least 25mm from the internal face of the external wall, with studs at 600mm centres. Insert Crown Universal Slab CS24 between the timber studs.

Fix a vapour control layer to the studs before nailing 12.5mm plasterboard in place and finish using standard drylining techniques.

Performance

• Thermal performance

50mm Crown Dritherm Cavity Slab has thermal conductivity of 0.035 W/mK.

65mm Crown Dritherm Cavity Slab has thermal conductivity of 0.036 W/mK.

Crown Universal Slab CS24 has a thermal conductivity of 0.035 W/mK.

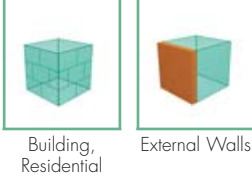
The insulation element of Polyfoam Linerboard has an aged quoted thermal conductivity of 0.030 W/mK and the plasterboard has a thermal conductivity of 0.19 W/mK.

The table gives U-values for typical independent lining systems.

• Fire performance

Crown Dritherm Cavity Slab and Crown Universal Slab are classified as Euroclass A1 to BS EN ISO 13501-1.

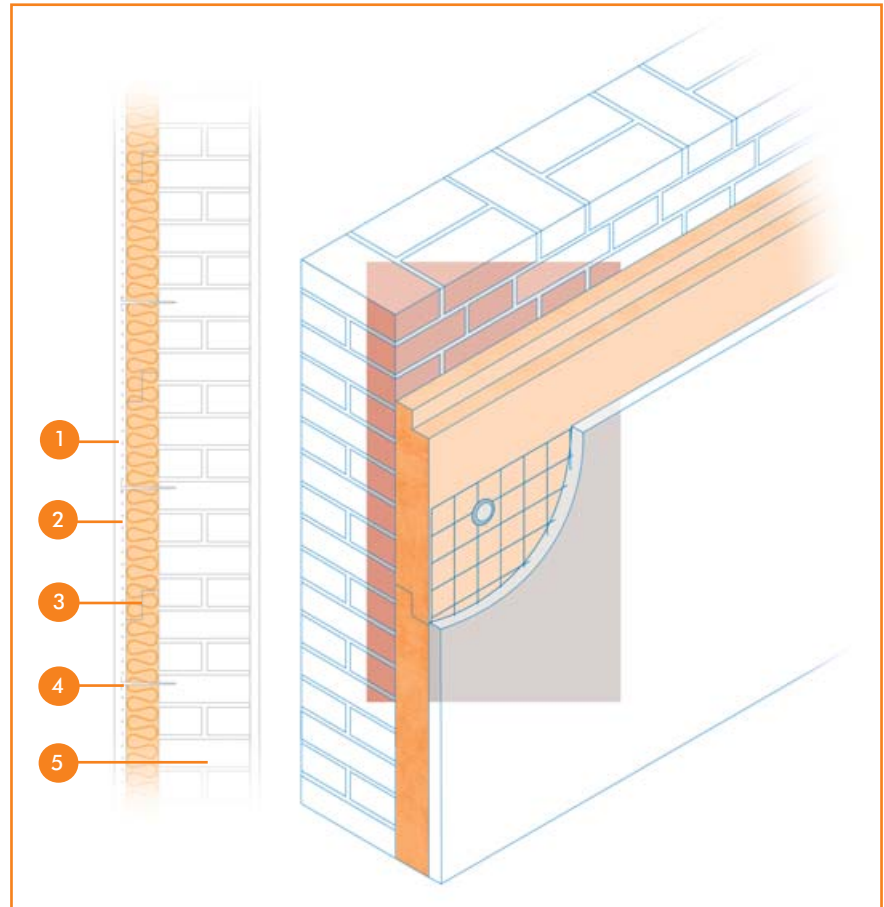
Polyfoam Linerboard consists of a 9.5mm plasterboard which offers excellent fire performance as a facing material and Polyfoam insulation which contains a flame retardant to inhibit localised ignition.

Building,
Residential

External Walls

External walls insulated with Polyfoam Cavityboard

- 1 External render
- 2 Reinforcing mesh
- 3 Polyfoam Cavityboard
- 4 Insulation fastener
- 5 Existing wall



Products

- Polyfoam Cavityboard is a high performance, 100% ozone friendly, extruded polystyrene, rigid board insulation. It is lightweight, yet has excellent rigidity and long term effectiveness, even when exposed to moisture.

Polyfoam Cavityboard is supplied with interlocking rebated edges that help to create a complete insulated envelope with fewer gaps and also help to restrict moisture ingress across the finished construction.

- Polyfoam Linerboard is a laminate of Polyfoam high performance, 100% ozone friendly, extruded polystyrene, rigid board insulation and 9.5mm tapered edge plasterboard.

Typical installation

Existing or new solid masonry wall with external wall insulation of Polyfoam Cavityboard with a render finish. For improved U-values, Polyfoam Linerboard may be used as the internal lining.

Installation

Polyfoam Cavityboard board is easy to cut with a knife or saw to fit around openings.

Remove all loose and flaking materials from the wall, making good all hollow areas to give a smooth, stable substrate.

Temporarily fix Polyfoam Cavityboard using simple friction fit mechanical fixings. These are sufficient as temporary fixings but must not be relied upon as the final structural fixing. Use one or two fixings per board. The rebate in the edge of Polyfoam Cavityboard should be orientated so that it sheds water outwards.

Secure expanded metal lath using expanding fixings, such as Fischer DP, which extend through the insulation into the masonry wall. Normally nine fixings per square metre are required, but this largely depends on the pull-out force achieved by the particular fixing being used and the nature of the substrate. Please refer to fixing manufacturer for further information.

Provide beads around openings, at corners and at the perimeter of the insulated area, at structural joints and to form expansion joints. Where they occur, DPCs should be extended through the insulation and render.

Apply render in two coats. Proprietary renders should be applied in accordance with manufacturer's instructions.

See page 10 for installing Polyfoam Linerboard.

Typical U-values (W/m²K) for external walls insulated with Polyfoam Cavityboard and a render finish

Polyfoam Cavityboard thickness (mm)	U-value (W/m ² K) for 215mm Solid masonry wall of:					
	Dense block (λ=1.13)	Medium block (λ=0.51)	Lightweight aggregate (λ=0.34)	Standard aircrete (λ=0.16)	Lightweight aircrete (λ=0.11)	Brick (λ=0.77)
With internal lining of 12.5mm plasterboard on dabs						
60	0.40	0.37	0.35	0.29	0.26	0.39
50	0.47	0.42	0.39	0.33	0.29	0.45
With internal lining of Polyfoam Linerboard 17/9.5						
50	0.35	0.32	0.31	0.26	0.24	0.34
With internal lining of Polyfoam Linerboard 45.5/9.5						
50	0.26	0.25	0.24	0.21	0.19	0.26

Note: Fixings assumed to be plastic insulation holders with 5mm dia. steel expansion pin. The U-values have been calculated to BS EN ISO 6946: 1997

Performance

• Compression resistance

The rigidity of Polyfoam Cavityboard makes the board easy to handle and less prone to site damage than less robust materials.

In external render systems the rigidity of the Polyfoam board behind the lath and render will offer an excellent support to the lath and assist in the resistance of impact, helping to prolong its service life.

• Moisture resistance

Polyfoam Cavityboard is highly resistant to moisture absorption.

• Thermal insulation

Polyfoam Cavityboard is a high performance insulant, with aged quoted thermal performance value of 0.029 W/mK.

• Fire performance

Polyfoam Cavityboard contains a flame retardant to inhibit localised ignition.

With a protective render Polyfoam Cavityboard will not contribute to the development stages of a fire or present a smoke or toxic hazard. Fixing the mesh reinforcement to the masonry backing will prevent premature collapse of the render. Install cavity barriers across the insulation to comply with Building Regulations.

For information on Fischer fixings, telephone the Fischer Technical Helpline on 01491 833 000.

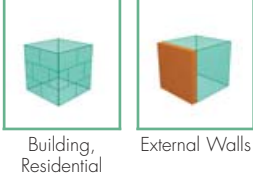
Advantages

Polyfoam Cavityboard

- Compression resistant product offering high level of support to external render
- Lap joint detail reduces cold bridging
- No moisture absorption in the insulation board

Polyfoam Cavityboard and Polyfoam Linerboard

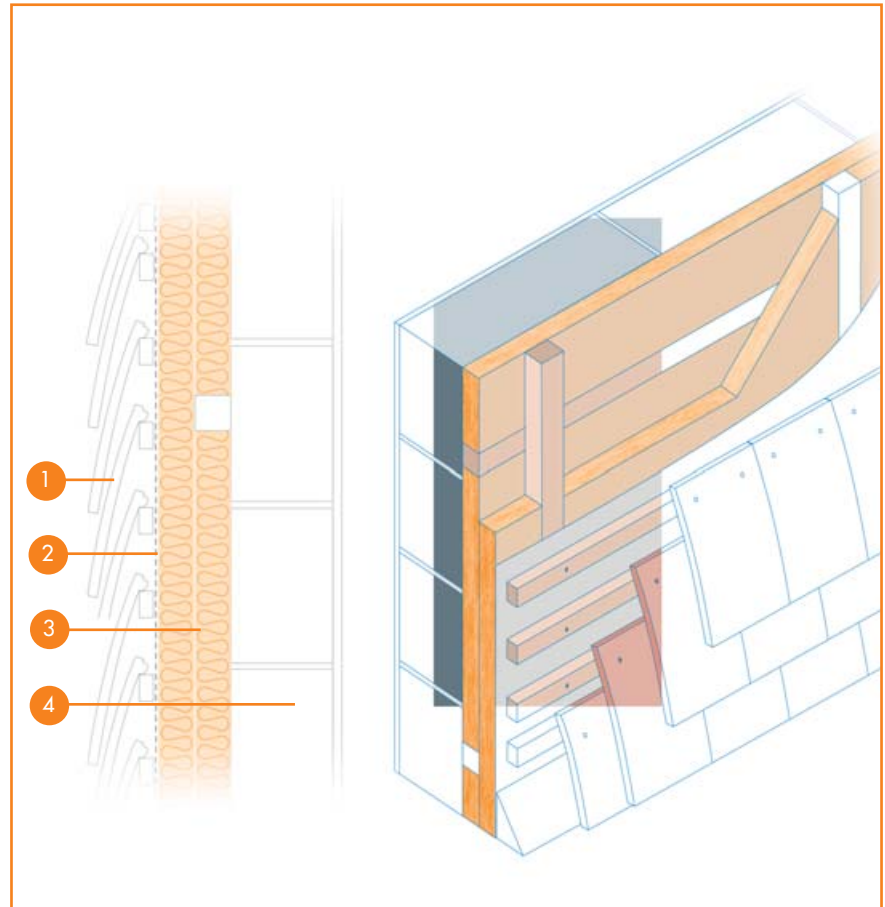
- Exceptionally Low U-values
- Compression resistant robust materials used throughout

Building,
Residential

External Walls

External cladding

- 1 Outer cladding (several options)
- 2 Knauf Breatheline
- 3 Crown Universal Slab CS24 between timber battens in two layers, with battens at right angles
- 4 Blockwork wall



Products

- Crown Universal Slab CS24 is a semi-rigid slab of shot-free, non-combustible, unfaced glass mineral wool.
- Rocksil Universal Slab RS60 is a semi-rigid slab of rock mineral wool.

Typical Construction

A solid masonry or concrete wall with insulation fixed to the outer face and overlaid with tile hanging, timber boarding, terracotta tiles etc.

The insulation can be fixed in three ways:

- Timber battens screwed and plugged to the blockwork and infilled with Crown Universal Slab CS24.
- Timber battens screwed and plugged to the blockwork and infilled with Crown Universal Slab CS24, with second layer of battens at right angles also filled with Crown Universal Slab CS24 (as shown above). This minimises thermal bridging through the battens.
- Rocksil Universal Slab RS60 slab fixed directly to blockwork with insulation fixings, Knauf Breatheline stapled to insulation and timber

battens plugged and screwed to blockwork with spacer screws, such as Fischer type ASL.

Installation

Single layer battens

Plug and screw timber battens (eg 75x50mm) to the brickwork at 600mm centres. Friction fit Crown Universal Slab CS24 between the battens.

Staple Knauf Breatheline breather membrane to the battens. Fix the specified cladding system using the timber battens as the structural support.

Double layer battens

Plug and screw timber battens (eg 50x50mm) to the brickwork at 600mm centres. Friction fit Crown Universal Slab CS24 between the battens. Nail or screw a second layer of timber battens (eg 50x50mm) at right angles to the first

Typical U-values (W/m²K) for insulation behind cladding on a solid masonry wall

Insulation thickness (mm)	U-value (W/m ² K) for 215mm Solid masonry wall of:					
	Dense block (λ=1.13)	Medium block (λ=0.51)	Lightweight aggregate (λ=0.34)	Standard aircrete (λ=0.16)	Lightweight aircrete (λ=0.11)	Brick (λ=0.77)
Crown Universal Slab CS24 between 50mm wide timber studs at 600mm centres						
100	0.33	0.31	0.29	0.25	0.22	0.31
75	0.41	0.37	0.35	0.29	0.26	0.38
50	0.54	0.48	0.44	0.36	0.31	0.50
Crown Universal Slab CS24 between 50mm wide timber studs in two layers						
100+50	0.23	0.22	0.21	0.19	0.18	0.22
75+50	0.27	0.25	0.24	0.21	0.20	0.26
50+50	0.32	0.30	0.29	0.25	0.22	0.31
Rocksil Universal Slab RS 60 with timber battens fixed using 8mm dia spacer screws						
100	0.33	0.31	0.29	0.25	0.22	0.31
75	0.41	0.37	0.35	0.29	0.26	0.38

Note: The U-values have been calculated to BS EN ISO 6946: 1997 and assume an internal finish of 12.5mm plasterboard on dabs.

and friction fit Crown Universal Slab CS24 between the battens.

Staple Knauf Breatheline breather membrane to the battens. Fix the specified cladding system using the timber battens as the structural support.

Face-off battens

Fix Rocksil Universal Slabs in broken bond against the wall using plastic insulation supports, such as Fischer type DHK. Usually two supports per slab are sufficient.

Staple Knauf Breatheline breather membrane to the Rocksil Universal Slabs.

Fix timber battens through the insulation into the masonry substrate using spacer screws, such as Fischer type ASL. The position and spacing of the battens will depend on the type of cladding specified.

Performance

• Thermal performance

Crown Universal Slab CS24 has a thermal conductivity of 0.035 W/mK.

Rocksil Universal Slab RS60 has a thermal conductivity of 0.035 W/mK.

The table gives U-values for a range of solid wall constructions.

• Fire performance

Crown Universal Slab CS24 and Rocksil Universal Slab RS60 are classified as Euroclass A1 to BS EN ISO 13501-1.

Advantages

Single layer battens

- Quick and simple installation

Double layer battens

- Reduced thermal bridging

Face-off battens

- Insulation layer unbridged by timber battens

Typical Specification Clauses

1) Internal Dry Lining

Polyfoam Linerboard of insulation thicknessmm with integral 9.5mm plasterboard to be fixed directly to the external walls by adhesive*/plaster dabs*/mechanical fixing* using the method and materials recommended in Knauf Insulation literature.
(*delete as required)

When the adhesive has set, secure with two (manufacturer/reference) mechanical fixings along the top edge of each board (for adhesive/plaster dabs).

Alternatively, refer to NBS clause: K10/185

2) Acoustitherm Independent Lining System

Construct an internal lining using steel framing system.

Impale the Crown Acoustitherm Wall Rollmm thick onto the mid height Acoustitherm Wall Clips. Crown Acoustitherm Wall Roll to be cut as necessary and installed with butt joints.

Screw fix plasterboard to the steel framing as specified.

2) Independent Internal Lining

Construct a timber*/steel* stud framework mm away from the internal face of the blockwork.

- a) Infill the gap between the steel frame and the block wall with Crown Dritherm Cavity Slabmm thick, laid in broken bond. Crown Dritherm Cavity Slabmm thick to be cut as necessary and friction fitted between the steel studs.
- b) The independent lining to be insulated with Crown Universal Slab CS24mm thick. Insulation to be friction fitted between the studs. The wall panel to be lined internally with Polyfoam Linerboard of insulation thicknessmm with integral 9.5mm vapourcheck plasterboard screwed to the steel studs at 150mm centres.
- c) The independent lining to be insulated with Crown Universal Slab CS24mm thick. Insulation to be cut as necessary and friction fitted between the studs.

Alternatively, refer to NBS clause: K10/145 or K10/155

3) External wall insulation

Fix Polyfoam Cavityboardmm thick to the substrate with temporary fixings, with the rebate orientated to shed water outwards.

Expanded metal lath (material/reference) to be fixed through the insulation into the wall using fixings. Provide stop and drip beads around openings, at corners, at base of insulation and at DPC level. Form expansion joints using beads at minimumm horizontal andm vertical centres. Horizontal joints to align with(eg window heads).

Apply two coat render as specification clause

4) External cladding

a) Single layer batten

Plug and screw timber battensx.....mm atmm centres to the substrate. Crown Universal Slab CS24mm thick to be cut as necessary and friction fitted between the battens. Staple Knauf Breatheline to the timber battens and extend below the lowest timber member.

b) Double layer batten

Plug and screw timber battensx.....mm atmm centres to the masonry substrate. Crown Universal Slab CS24mm thick to be cut as necessary and friction fitted between the battens.

Nail second layer of timber battensx.....mm atmm centres at right angles to the first. Crown Universal Slab CS24mm thick to be cut as necessary and friction fitted between the second layer of battens. Staple the breather membrane to the timber battens and extend below the lowest timber member.

c) Face-off battens

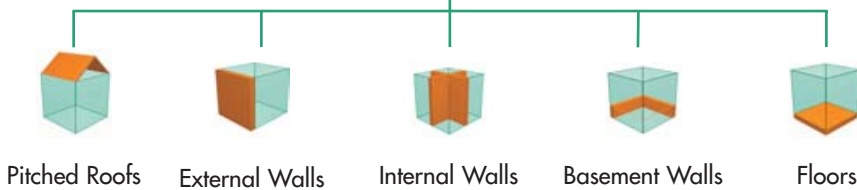
Fix Rocksil Universal Slab RS 60 mm thick to the substrate with temporary fixings, as manufactured by , two fixings per board. Staple Knauf Breatheline to the insulation. Fixx.....mm timber battens to the substrate with (manufacturer/reference) spacer screws.





Building & Construction

Residential



<p>B/R/PR/1</p> <p>New Build and Upgrade (N) Solutions for new build "room in roof", warm roof and ceiling level cold roof insulation and upgrading existing cold roof insulation</p>	<p>B/R/XW/1</p> <p>Masonry Cavity (N&C) Solutions for masonry cavity wall construction full and part fill</p> <p>B/R/XW/2</p> <p>Timber Frame (N) Solutions for insulation in modern timber frame homes</p>	<p>B/R/IW/1</p> <p>Partition Walls (N&C) Solutions for dividing internal rooms in single dwelling construction</p> <p>B/R/IW/2</p> <p>Separating Walls (N&C) Solutions for high performance separating walls between separate, but attached dwellings</p>	<p>B/R/BW/1</p> <p>Masonry Solid (N&C) Solutions for external basement wall to prevent thermal transition to the earth</p>	<p>B/R/F/1</p> <p>Ground Floor (N) Solutions for insulating both slab on and suspended ground floors in both concrete and timber construction</p> <p>B/R/F/2</p> <p>Upper Floors (N&C) Solutions for insulating exposed above ground floors in both timber and concrete construction</p>
<p>B/R/PR/2</p> <p>Loft Conversion - Room in Roof (C) Solutions for converting existing attic space into living area</p>	<p>B/R/XW/3</p> <p>Masonry Solid (N&C) Solutions for internal and external insulation applied to solid masonry walls</p>			<p>B/R/F/3</p> <p>Separating and Internal Floors (N&C) Acoustic solutions for floors separating two dwellings and floors within a single dwelling</p>

Legend

Each green "box" reference means that a dedicated brochure is available on this application

B/NR/CS/1

N= New Build C= Conversion

This information booklet is complemented by comprehensive specification and application system recommendations in the Knauf Insulation Guide, available through visiting our website.

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B/R/XW/3