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Agrément Certificate
16/5299
Product Sheet 8

KINGSPAN KOOLTHERM RANGE FOR FLOORS, WALLS AND PITCHED ROOFS

KOOLTHERM K1 18 INSULATED DRY LINING SYSTEM

This Agrément Certificate Product Sheet⁽¹⁾ relates to the Kooltherm K1 18 Insulated Dry Lining System, comprising Kooltherm rigid phenolic board faced on one side with a perforated foil and on the other with an unperforated foil which is bonded to the plasterboard. The system is for use as an insulating dry lining to masonry (solid and cavity) walls and the underside of timber or steel rafters in pitched roofs, in existing and new dwellings and buildings of similar occupancy.

(1) Hereinafter referred to as 'Certificate'.

CERTIFICATION INCLUDES:

- factors relating to compliance with Building Regulations where applicable
- factors relating to additional non-regulatory information where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.

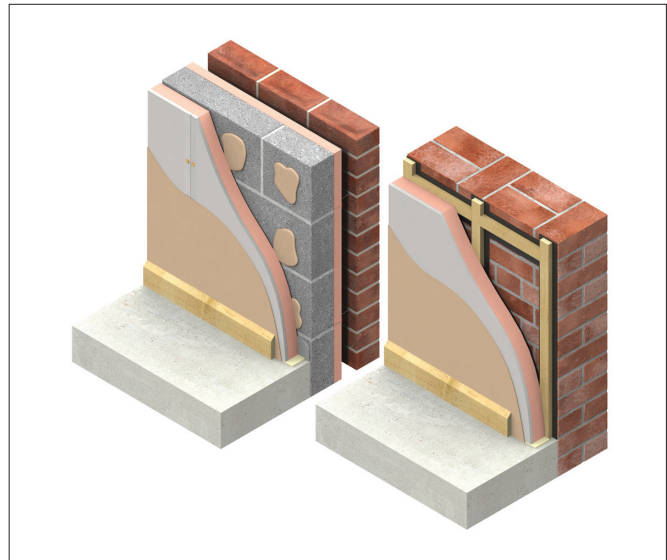
KEY FACTORS ASSESSED

Thermal performance — the insulation component of the system has a declared thermal conductivity λ_D of $0.018 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ (see section 6).

Condensation — the system can limit the risk of surface condensation; however, the risk of interstitial condensation should be assessed for each case (see section 7).

Behaviour in relation to fire — Kooltherm K1 18 has a fire classification* of Class B-s1, d0 to BS EN 13501-1 : 2007 (see section 8).

Durability — under normal conditions, the board is rot proof, dimensionally stable and durable and will remain effective for the life of the building in which it is installed (see section 14).



The BBA has awarded this Certificate to the company named above for the system described herein. This system has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of First issue: 2 September 2016

John Albon — Head of Approvals
Construction Products

Claire Curtis-Thomas
Chief Executive

The BBA is a UKAS accredited certification body — Number 113. The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at www.bbacerts.co.uk

Readers are advised to check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct.

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Regulations

In the opinion of the BBA, the Kooltherm K118 Insulated Dry Lining System, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):



The Building Regulations 2010 (England and Wales) (as amended)

Requirement: B2(1)	Internal fire spread (linings)
Comment:	The system is unrestricted under this Requirement. See section 8.1 of this Certificate.
Requirement: C2(c)	Resistance to moisture
Comment:	The system can contribute to satisfying this Requirement. See sections 7.1 and 7.5 of this Certificate.
Requirement: L1(a)(i)	Conservation of fuel and power
Comment:	The system can contribute to satisfying this Requirement. See sections 6.1 and 6.3 of this Certificate.
Regulation: 7	Materials and workmanship
Comment:	The system is acceptable. See section 14 and the <i>Installation</i> part of this Certificate.
Regulation: 26	CO₂ emission rates for new buildings
Regulation: 26A	Fabric energy efficiency rates for new dwellings (applicable to England only)
Regulation: 26A	Primary energy consumption rates for new buildings (applicable to Wales only)
Regulation: 26B	Fabric performance values for new dwellings (applicable to Wales only)
Comment:	The system can contribute to satisfying these Regulations. See sections 6.1 and 6.3 of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation: 8(1)(2)	Durability, workmanship and fitness of materials
Comment:	The system is acceptable. See section 14 and the <i>Installation</i> part of this Certificate.
Regulation: 9	Building standards applicable to construction
Standard: 2.5	Internal linings
Comment:	The system is unrestricted under this Standard, with reference to clause 2.5.1 ⁽¹⁾ . See section 8.1 of this Certificate.
Standard: 3.15	Condensation
Comment:	The system can contribute to satisfying this Standard, with reference to clauses 3.15.1 ⁽¹⁾⁽²⁾ , 3.15.4 ⁽¹⁾⁽²⁾ and 3.15.5 ⁽¹⁾⁽²⁾ . See sections 7.1 and 7.6 of this Certificate.
Standard: 6.1(b)	Carbon dioxide emissions.
Standard: 6.2	Building insulation envelope
Comment:	The system can contribute to satisfying clauses, or parts of, 6.1.1 ⁽¹⁾ , 6.1.6 ⁽¹⁾ , 6.2.1 ⁽¹⁾⁽²⁾ , 6.2.3 ⁽¹⁾⁽²⁾ , 6.2.4 ⁽¹⁾⁽²⁾ , 6.2.5 ⁽¹⁾⁽²⁾ , 6.2.6 ⁽¹⁾⁽²⁾ , 6.2.7 ⁽¹⁾ , 6.2.8 ⁽²⁾ , 6.2.9 ⁽¹⁾⁽²⁾ , 6.2.10 ⁽¹⁾ , 6.2.11 ⁽¹⁾⁽²⁾ , 6.2.12 ⁽²⁾ and 6.2.13 ⁽¹⁾⁽²⁾ of these Standards. See sections 6.1 and 6.3 of this Certificate.
Standard: 7.1(a)(b)	Statement of sustainability
Comment:	The system can contribute to satisfying the relevant requirements of Regulation 9, Standards 1 to 6, and therefore will contribute to a construction meeting a bronze level of sustainability as defined in this Standard. In addition, the system can contribute to a construction meeting a higher level of sustainability as defined in this Standard, with reference to clauses 7.1.4 ⁽¹⁾⁽²⁾ [Aspects 1 ⁽¹⁾⁽²⁾ and 2 ⁽¹⁾], 7.1.6 ⁽¹⁾ [Aspects 1 ⁽¹⁾⁽²⁾ and 2 ⁽¹⁾] and 7.1.7 ⁽¹⁾⁽²⁾ [Aspect 1 ⁽¹⁾⁽²⁾]. See section 6.1 of this Certificate.
Regulation: 12	Building standards applicable to conversions
Comment:	Comments in relation to the product under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12.1 ⁽¹⁾ and Schedule 6 ⁽¹⁾ . (1) Technical Handbook (Domestic). (2) Technical Handbook (Non-Domestic).



The Building Regulations (Northern Ireland) 2012 (as amended)

Regulation: 23	Fitness of materials and workmanship
Comment:	The system is acceptable. See section 14 and the <i>Installation</i> part of this Certificate.
Regulation: 29	Condensation
Comment:	The system can contribute to satisfying this Regulation. See section 7.1 of this Certificate.
Regulation: 34	Internal fire spread – linings
Comment:	The system is unrestricted under this Regulation. See section 8.1 of this Certificate.
Regulation: 39(a)(i)	Conservation measures
Regulation: 40(2)	Target carbon dioxide emission rate
Comment:	The system can contribute to meeting these Regulations. See sections 6.1 and 6.3 of this Certificate.

Additional Information

NHBC Standards 2016

NHBC accepts the use of the Kooltherm K118 Insulated Dry Lining System, provided it is installed, used and maintained in accordance with this Certificate, in relation to *NHBC Standards*, Chapters 6.1 *External masonry walls*, 7.2 *Pitched roofs* and 9.2 *Wall and ceiling finishes*.

CE marking

The Certificate holder has taken the responsibility of CE marking the system components in accordance with harmonised European Standard BS EN 13950 : 2014. An asterisk (*) appearing in this Certificate indicates that data shown is given in the manufacturer's Declaration of Performance.

Technical Specification

1 Description

1.1 The Kooltherm K118 Insulated Dry Lining System consists of plasterboard, perforated and unperforated composite foil-facings and insulation as shown in Table 1.

1.2 The system is available with the nominal characteristics shown in Table 1.

Table 1 *Nominal characteristics*

Characteristic	Measure
Length	2400 mm
Width	1200 mm
Insulation thickness	20 mm to 80 mm
Nominal density of insulation	35 kg·m ⁻³
Thickness of plasterboard	12.5 mm
Weight of plasterboard	24 kg
Edge profile	square and tapered edged
Minimum compressive strength for the insulation at 10% compression*	120 kPa

1.3 Ancillary items, which are outside the scope of this Certificate, include:

- gypsum-based drywall adhesive
- bonding agent
- acrylic sealant adhesive/sealant
- PU foam adhesive/sealant
- metal wall liner system
- pre-treated timber battens and dpc strips
- appropriate fixings
- edge, stop, movement and corner beads
- scrim tape, jointing tape, jointing compounds or plaster skim
- air grate louvres, vent duct covers
- fungicidal wash treatment.

2 Manufacture

2.1 Raw materials are injected onto the lower foil-facer on a conveyor belt. The exothermic reaction expands the foam, which then comes into contact with the upper foil-facer. An automated process cures and cuts the product to the required size.

2.2 As part of the assessment and ongoing surveillance of product quality, the BBA has:

- agreed with the manufacturer the quality control procedures and product testing to be undertaken
- assessed and agreed the quality control operated over batches of incoming materials
- monitored the production process and verified that it is in accordance with the documented process
- evaluated the process for management of nonconformities
- checked that equipment has been properly tested and calibrated
- undertaken to carry out the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control being operated by the manufacturer are being maintained.

2.3 The management system of Kingspan Insulation Limited has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 by the Loss Prevention Certification Board (LPCB) (Certificate 388).

3 Delivery and site handling

3.1 The boards are delivered to site shrink-wrapped in polythene on pallets. Each board has the manufacturing code printed on the surface and each pack carries a label with the product description and characteristics, manufacturer's name and the BBA logo incorporating the number of this Certificate.

3.2 It is essential that the boards are raised off the ground and stored inside or under cover on a flat, dry, level surface in a well-ventilated area. The boards must be protected from rain, snow and prolonged exposure to sunlight and any that become wet should not be used.

3.3 The boards must not be exposed to a naked flame or other ignition sources.

3.4 The boards can be cut using a fine-toothed saw, or by cutting through the insulation and paper backing of the plasterboard, then snapping the system face down over a straight edge and cutting the paper facing of the plasterboard on the other side.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the Kooltherm K118 Insulated Dry Lining System.

Design Considerations

4 General

4.1 Kooltherm K118 is installed using various adhesives and/or can be mechanically fixed, either directly onto the wall or onto the timber battens or metal furring (see the *Installation* part of this Certificate). The system is for use as an insulating dry lining to masonry (solid and cavity) walls and the underside of timber or steel rafters in pitched roofs, in existing and new dwellings and buildings of similar occupancy and in non-load bearing partitions.

4.2 The foil bonded to the plasterboard provides the integral vapour check for the system. It should be installed in accordance with the Certificate holder's instructions.

4.3 It is recommended that services which penetrate the dry lining, eg light switches and power outlets, are kept to a minimum to limit damage to vapour checks.

4.4 It is essential that proper care and attention is given to maintaining the integrity/continuity of the vapour control layer (VCL) (see section 1.5).

Masonry walls

4.5 The system may be installed on masonry construction including clay and calcium silicate bricks, concrete blocks and natural and reconstituted stone blocks.

4.6 Walls should be designed and constructed in accordance with the relevant recommendations of:

- BS EN 1996-1-1 : 2005, BS EN 1996-1-2 : 2005, BS EN 1996-2 : 2006 and BS EN 1996-3 : 2006 and their respective UK National Annexes
- BS 8000-3 : 2001.

4.7 Since insulating dry lining is not intended to offer resistance to rain penetration, walls to be insulated with dry lining must already be rain resistant and show no signs of water ingress.

4.8 If present, mould or fungal growth should be treated prior to the application of the system.

4.9 With dry lining installations that form a void of 20 mm or more (ie timber batten or metal liner stud system and drywall adhesive dabs), services can be incorporated behind the dry lining, making the chasing of the wall unnecessary. Where the services have a greater depth than the void, the wall should be chased rather than the insulation. Suitable isolation methods, such as a conduit or capping, must be used to ensure cables do not come into contact with the insulation.

4.10 The installation of an insulating dry lining system requires careful detailing around doors and windows to achieve a satisfactory surface for finishing. In addition, every attempt should be made to minimise the risk of thermal bridging at reveals and where heavy separating walls are attached to the external wall. New work must be designed to accommodate the thickness of the dry lining, particularly at reveals, heads and sills and in relation to ceiling height. Where the dimensions of fixtures are critical (eg bathrooms), these should be checked before installation.

Pitched roofs

4.11 Pitched roofs should be designed and constructed in accordance with BS 5534 : 2003 (see sections 16.6 to 16.10) and incorporate normal precautions against moisture ingress.

4.12 In tiled or slated pitched roofs designed and constructed as stated in section 4.11, the system is suitable for use beneath the rafters in conjunction with a BBA-approved breathable membrane and, when necessary, a VCL (see section 7.3).

4.13 New constructions subject to the national Building Regulations should be designed in accordance with the relevant recommendations of BS 5268-2 : 2002 and Eurocode 3.

5 Practicability of installation

The system is designed to be installed by a competent general builder, or a contractor experienced with this type of system.

6 Thermal performance

6.1 Calculations of the thermal transmittance (U value) of a specific construction using insulated dry lining should be carried out in accordance with BS EN ISO 6946 : 2007, BRE Report BR 443 : 2006 and BRE Digest 465 : 2002, using the declared thermal conductivity* (λ_D value) of 0.018 $W \cdot m^{-1} \cdot K^{-1}$ for the insulation component and a design value of 0.19 $W \cdot m^{-1} \cdot K^{-1}$ for the plasterboard, and an emissivity of 0.05 for the foil-facer.

6.2 The U value of a typical wall construction will depend on the insulation value of the wall and its finish. Example U values are given in Table 2.

Table 2 Example $U^{(1)}$ values for walls and sloping sides of the pitched roofs

Board thickness (mm)	Phenolic foam thickness (mm)	U value for lining to walls ($W \cdot m^{-2} \cdot K^{-1}$)		U value for lining ⁽²⁾⁽³⁾ to pitched roofs ($W \cdot m^{-2} \cdot K^{-1}$)
		Adhesively fixed ⁽⁴⁾ (dots and dabs)	Mechanically fixed ⁽⁵⁾	
32.5	20	0.53	0.56	0.75
42.5	30	0.41	0.46	0.61
52.5	40	0.33	0.39	0.51
62.5	50	0.28	0.34	0.44
72.5	60	0.24	0.30	0.38
82.5	70	0.22	0.27	0.34
92.5	80	0.19	0.24	0.30

(1) These calculations have been done on solid walls and pitched roofs without any existing insulation.

(2) Fixing correction is included as its contribution to U values is $\geq 3\%$ (steel fixings – $\lambda = 50 W \cdot m^{-1} \cdot K^{-1}$, 16.66 fixings per m^2 , $d = 4.8$ mm and fixings fully penetrate insulation).

(3) Includes 150 mm airspace between the 150 mm rafters.

(4) Adhesively fixed with no fixing correction applied as the contribution of the supplementary fixings to U values is $< 3\%$.

(5) Includes fixing correction $\geq 3\%$ (steel fixings – $\lambda = 50 W \cdot m^{-1} \cdot K^{-1}$, 10.76 fixings per m^2 , $d = 4.8$ mm and fixings fully penetrate insulation).

6.3 Care must be taken in the overall design and construction of junctions with other elements and openings to minimise thermal bridges and air infiltration. Detailed guidance can be found in the documents supporting the national Building Regulations.

7 Condensation

Interstitial condensation

7.1 Walls and roofs incorporating the systems will adequately limit the risk of interstitial condensation when they are designed and constructed in accordance with BS 5250 : 2011, Annexes G and H.

7.2 For condensation risk analysis, the water vapour transmission factors for each component from Table 3 are to be used as separate layers for the insulation part and a design book value for the plasterboard.

Table 3 Water vapour characteristics of the insulation core

Material	Water vapour resistance ($MN \cdot s \cdot g^{-1}$)
Perforated composite foil	3
Phenolic foam	18.5
Unperforated composite foil	80

7.3 Where calculations to Annex D of BS 5250 : 2011 indicate a risk of persistent condensation, a site-specific dynamic analysis to BS EN 15026 : 2007 should be considered.

7.4 Provided all joints between the system are sealed in accordance with the Certificate holder's literature, they can offer a significant resistance to water vapour transmission. This can be conducted by application of either a skim coat or taping and filling of the tapered edges of the plasterboards.

Surface condensation



7.5 Walls and roofs incorporating the system will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed $0.7 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$ and $0.35 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$ respectively at any point and the junctions with other elements are designed in accordance with the guidance referred to section 6.3.



7.6 For buildings in Scotland, wall and roof constructions will be acceptable when the thermal transmittance (U value) does not exceed $1.2 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$ at any point, and the junctions with other elements are designed in accordance with the guidance referred to in BS 5250 : 2011 Annexes G and H. Further guidance may be obtained from BRE Report BR 262 : 2002 and section 6.3.

8 Behaviour in relation to fire



8.1 Kooltherm K118 has been classified* as Class B-s1,d0 to BS EN 13501-1 : 2007 and is unrestricted with regard to surface spread of flame under the national Building Regulations.

8.2 When properly installed, the insulation will be contained between the wall or roof and internal lining board until one is compromised. The insulation will not therefore contribute to the development of a fire or present a smoke or toxic hazard as the fire develops.

9 Proximity of flues and appliances

When the systems are installed in close proximity to certain flue pipes and or heat-producing appliances, the relevant provisions of the national Building Regulations should be met:

England and Wales — Approved Document J

Scotland — Mandatory Standard 3.19, clauses 3.19.1⁽¹⁾⁽²⁾ to 3.19.9⁽¹⁾⁽²⁾

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

Northern Ireland — Technical Booklet L, sections 1 to 6.

10 Materials in contact — wiring installations

10.1 Electrical cables that are likely to come into contact with the insulation component of the thermal liner are not required to be protected by a suitable conduit or PVC-U trunking.

10.2 As with any other form of insulation, de-rating of electrical cables should be considered where the insulation restricts the air cooling of cables.

11 Infestation

Use of the system does not in itself promote infestation. The creation of voids within the structure, for example gaps between the wall or roof lining and the system, may provide habitation for insects or vermin in areas already infested. Care should be taken to ensure, wherever possible, that all voids are sealed, as any infestation may be difficult to eradicate. There is no food value in the materials used.

12 Wall-mounted fittings

The recommendations of the Certificate holder must be followed. Any object fixed to the wall, other than lightweight items, eg framed pictures, should be fixed through the lining board into the wall behind, using recommended proprietary fixings.

13 Maintenance

If the system is damaged during use, it can be readily removed and replaced.

14 Durability



The durability of the materials is satisfactory. Provided the system is fixed to satisfactory stable and durable backgrounds, the system will have a life equal to the building in which it is installed. Under normal conditions of occupancy it is unlikely to suffer damage but, if damage does occur, repairs are readily carried out.

Installation

15 Pre-installation survey

15.1 The Certificate Holder's instructions must be followed.

15.2 A detailed survey of the property should be carried out before work starts. The walls must be made good if required and be dry and structurally sound with no evidence of damp, contamination or frost damage, before the system and its ancillary items are installed.

15.3 The survey should include a detailed examination of the internal and external fabric of the building, ensuring that any leaking external pipework and blocked gutters are made good. The efficiency, type and continuity of existing

damp-proof course materials (if any) should be checked. For existing buildings where there is no dpc, the requirement for one must be determined.

15.4 The suitability of projecting window sills, verge and eaves overhangs should be checked. Mortar joints should also be examined and repointed, if required.

15.5 The existing ventilation provision should be assessed and updated if necessary.

15.6 There should be no gaps at the perimeter (such as floors and ceilings) or junctions (such as internal corners), or around openings or service penetrations. Existing gaps should be sealed before lining commences.

15.7 A detailed inspection of existing timbers for dry or wet rot and insect attack should also be carried out, eg the timber floor joists. Existing metal studs or joists should be inspected for corrosion. Decayed timbers or corroded metal must be replaced.

16 General

16.1 A qualified plumber is required to make alterations to heating systems. A qualified electrician must be used to make good the electrical wirings and services.

16.2 Before fixing the system, sufficient time must be allowed for damp-proofing treatments, where applied, to dry out (see BS 6576 : 2005 for dry lining in conjunction with a chemical dpc application).

16.3 Existing wallpaper, skirting, picture rails, gloss paint and projecting window boards may need to be removed. The amount of preparation and removal of such items depends on the method of attachment. The wall surface should be dry and stable, and any friable materials removed if required. Existing finishes such as vinyl wallpaper, gloss paint etc can be scored or sanded as an alternative to complete removal.

16.4 All penetrations through the system are sealed using flexible polyurethane foam and/or flexible sealant or equivalent.

16.5 Guidance provided by the manufacturer on the adhesive, metal wall liner system etc. should be followed. In the absence of such guidance, an installation procedure which follows the principles and recommendations of BS 8212 : 1995 should be followed.

16.6 Installation of the system to a wall must be carried out with the K118 fixed with its long edges running vertically. When installed horizontally, the number of noggins or straps or bands of adhesive should be increased as per the Certificate Holder's instruction, in order to provide more support to the board edges.

16.7 The boards can be cut using a fine-toothed saw. Cutting should be done in a ventilated space, outside or in an area with dust extraction.

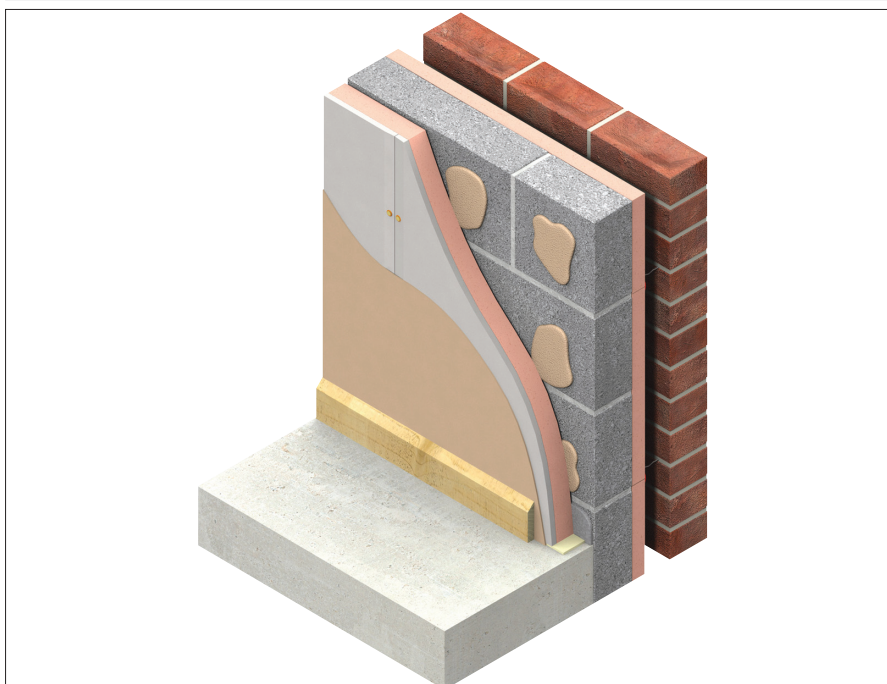
16.8 Appropriate Personal Protective Equipment (PPE) must be used when cutting the boards.

16.9 All joints between the Kooltherm K118 are sealed in accordance with the Certificate holder's literature, either by application of a skim coat or by taping and filling tapered edge plasterboard.

17 Installation procedures

The system secured with dry wall adhesive and supplementary fixings onto fair-faced brick, block or concrete cavity walls or rendered (or equivalent) solid walls (see Figure 1)

Figure 1 Kooltherm K118 secured with drywall adhesive dabs



17.1 If required, the mechanical key or suction can be reduced or improved by the application of a bonding agent (PVAc conforming to BS 5270-1 : 1989 or equivalent for low or high suction surfaces and/or backgrounds).

17.2 A distance of 10 mm plus the thickness of the Kooltherm K118 must be allowed away from the wall's high point and a line must be drawn across the floor. It must then be plumbed for alignment before transferring the line to the ceiling, extending to the room corners. A mark must be made on the walls at 1200 mm centres to indicate the Kooltherm K118 positioning.

17.3. A band of adhesive is applied around the perimeter, services and openings. The adhesive must be approximately 25 mm in from the edge, to avoid bridging the joint.

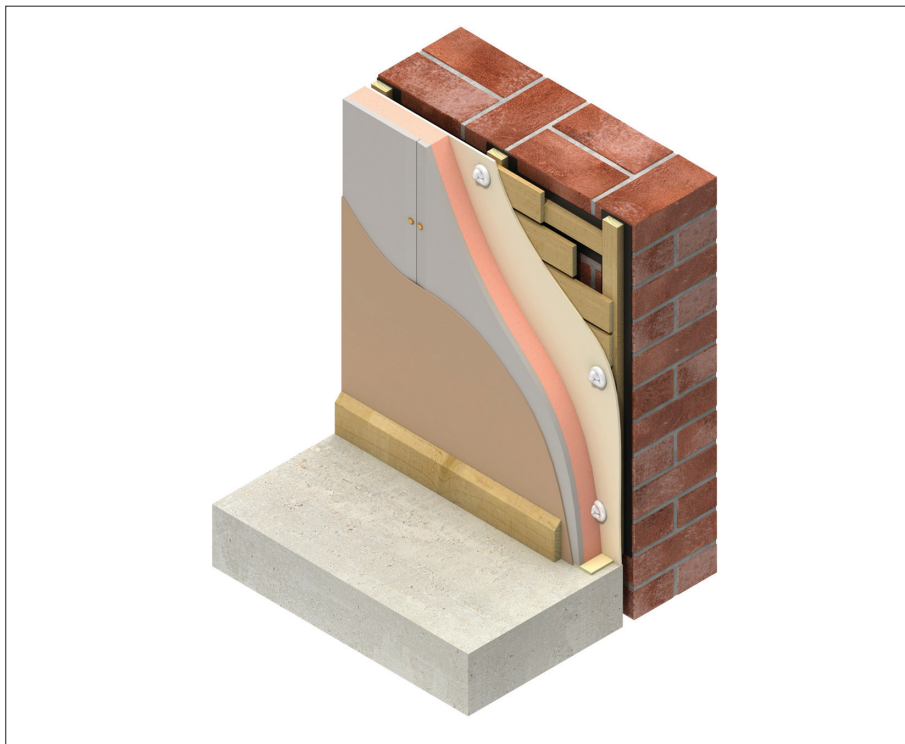
17.4 Dabs are applied in three rows, as appropriate, but with a 20% minimum coverage per board. Each dab should be 50 mm to 75 mm wide, approximately 250 mm long and positioned vertically at 300 mm centres and horizontally at 600 mm centres.

17.5 Kooltherm K118 is cut approximately 15 mm short of the floor to ceiling height The boards are taped into position and supported by packers until the adhesive is set.

17.6 Once the adhesive sets (generally 1.5 to 3 hours), a minimum of 6 appropriate fixings per sheet are added and positioned no less than 15 mm in from the edges. The Certificate holder's instructions must be sought if less than 6 fixings per sheet are to be used. Fixings should be selected to provide a 25 mm penetration into the masonry wall.

The system secured with proprietary appropriate adhesive and fixings onto existing linings (plaster, lath and plaster or plasterboard on framework) or flat fair-faced brick, block or concrete cavity walls or rendered (or equivalent) solid walls (see Figure 2)

Figure 2 Kooltherm K118 secured with acrylic sealant or PU foam adhesive



17.7 A distance of 2 mm to 3 mm plus the thickness the Kooltherm K118 must be allowed away from the wall's high point and a line must be drawn across the floor. It must then be plumbed for alignment before transferring the line to the ceiling, extending to the room corners. A mark must be made on the walls at 1200 mm centres to indicate the board positioning.

17.8 Kooltherm K118 is cut approximately 15 mm short of the floor to the ceiling height. Acrylic sealant adhesive or PU foam adhesive is applied to the substrate or back of the board. Acrylic adhesive should be applied in blobs approximately 25 mm in diameter and positioned at 300 mm centres horizontally and vertically. PU foam adhesive should be applied in beads approximately 20 mm to 25 mm wide. A continuous bead of the PU foam adhesive is also applied around the perimeter of the board, plus a further bead of PU foam adhesive is applied down the middle of each board. Guidance should be sought from the adhesive manufacturers as the adhesive pattern and quantity may increase.

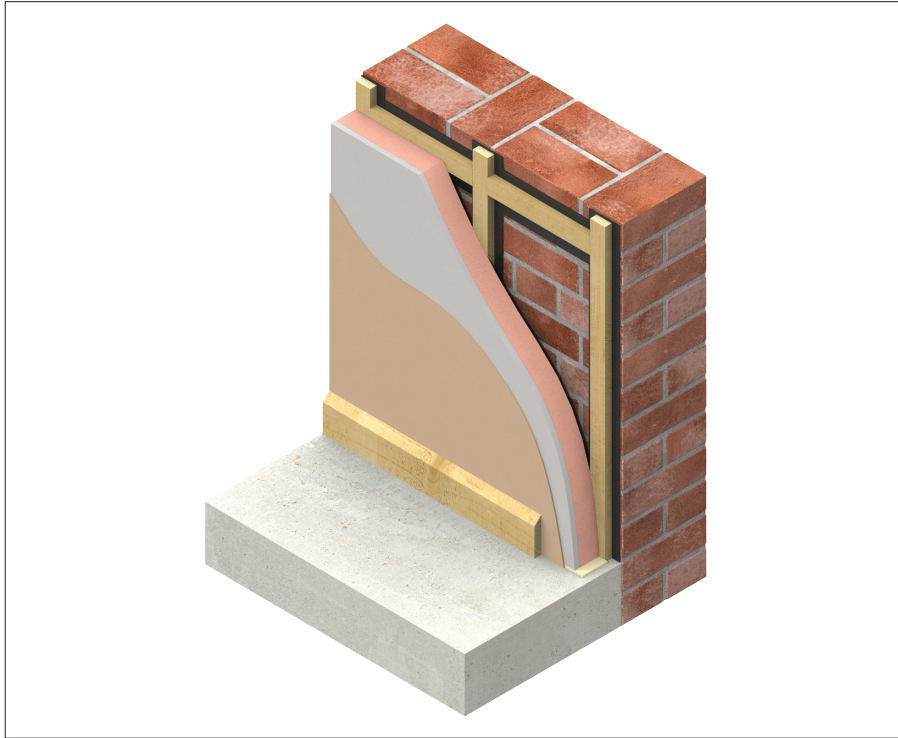
17.9 The adhesive should be applied approximately 25 mm in from the edge of the boards to avoid bridging the joint. Boards are tapped into position and supported until the adhesive is set. Once the adhesive is set, no less than 2 appropriate fixings per sheet must be added, no less than 15 mm from each edge.

17.10 Appropriate fixings of sufficient length must be selected to give a 25 mm penetration into the masonry (excluding the plaster) or timber framework (excluding plasterboard or lath and plaster) and to give a 10 mm penetration into metal framework (excluding plasterboard).

17.11 Alternatively, the Kooltherm K118 may be mechanically fixed directly onto flat masonry substrates with appropriate fixings. The same guidelines as above would apply, except a minimum of 12 fixings per board are required.

The system secured to pre-treated timber battens lined with dpc strips onto any dry, stable masonry construction (see Figure 3)

Figure 3 Kooltherm K118 fixed to pre-treated timber battens



17.12 Timber battens are fixed around the perimeter of the wall, openings and services, then vertically at maximum 600 mm centres.

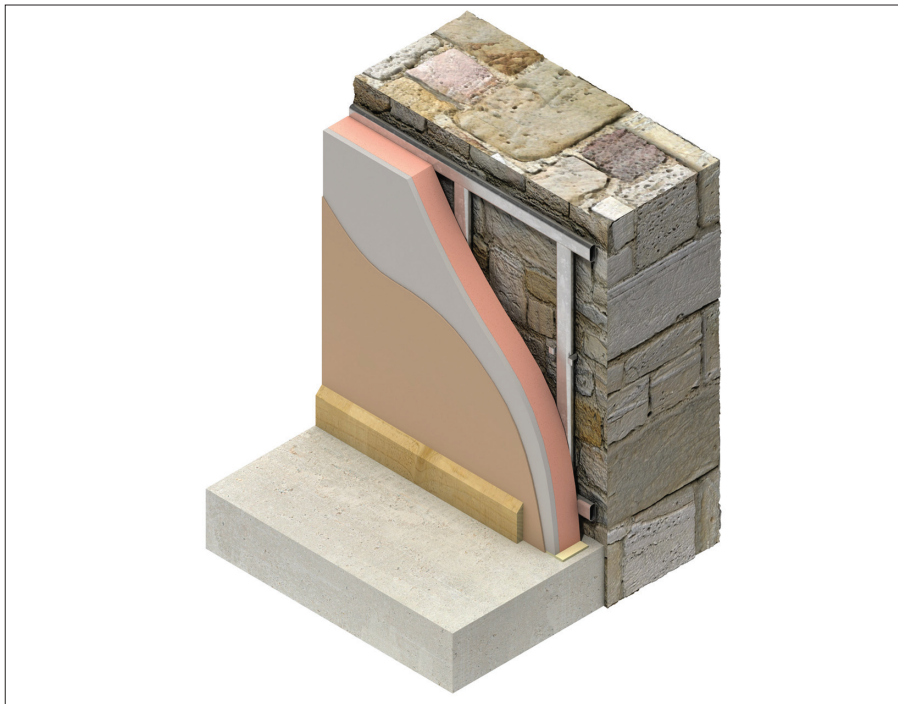
17.13 All timbers are screwed with the dpc to the substrate using appropriate fixings. Fixings are made approximately 75 mm from the ends and positioned no more than 600 mm centres apart.

17.14 Timber battens must provide a minimum 19 mm bearing to support the board edge. The Kooltherm K118 is cut approximately 5 mm short of the floor to the ceiling height, then located centrally over the timber battens.

17.15 The system is fixed with drywall screws located at 300 mm centres, reducing to 200 mm centres for external corners. Alternatively, the system can be fixed with plasterboard nails located at 150 mm centres. The length of screw or nail used should be at least 25 mm greater than the thickness of the system (22.5 mm when using 25 mm deep battens).

The system secured to a proprietary metal wall liner (brackets, tracks and lining channels stud system) onto any dry, stable masonry construction (see Figure 4).

Figure 4 Kooltherm K118 fixed to metal wall liner



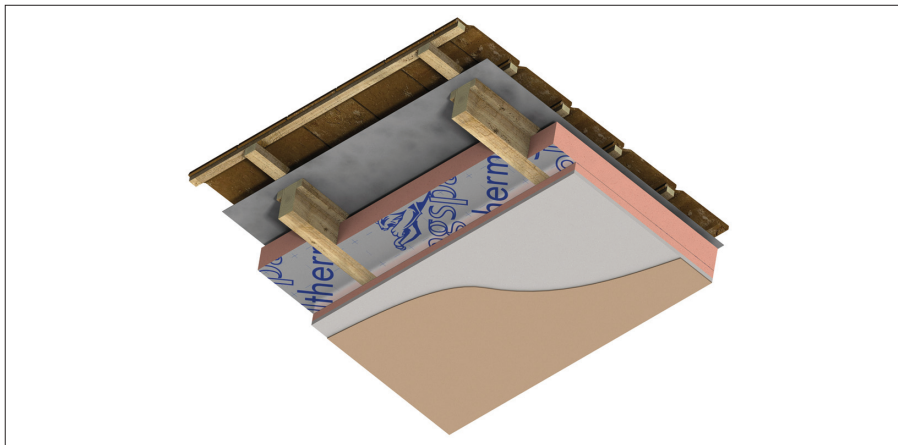
17.16 The maximum undulation (high point) of the substrate or service protrusion is identified, to enable the required cavity depth to be determined. Lines are marked to the floor and ceiling to indicate the position of the metal tracks, which are then fixed in place using appropriate fixings.

17.17 Brackets should be fixed using appropriate fixings.

17.18 The Kooltherm K118 should be cut approximately 5 mm short of the floor to ceiling height, then the board is located centrally over the lining channels with the system fixed with self-tapping drywall screws at 300 mm centres, reduced to 200 mm centres at external corners. The length of screw used when fixing to metal should be at least 10 mm greater than the thickness of the system.

Roof dry lining system – the system fixed to timber rafters or ceiling joists (see Figure 5)

Figure 5 Kooltherm K118 fixed to rafters or joists



17.19 Kooltherm K118 should be placed below the rafters with no air gap between the boards and the already existing insulation boards between the rafters or ceiling joists.

17.20 The framing should be set at a maximum of 600 mm centres, and the framing should be wide enough to provide at least a 19 mm bearing in order to support each board edge. Noggins or straps will be required at the perimeter. When the joists/rafters are set at 600 mm centres, additional noggins or straps will be required perpendicular to the main framing in order to provide the necessary support for board edges.

17.21 The system should be cut to allow for a 5 mm height clearance and fixed using plasterboard nails located at 150 mm centres for timber only or drywall screws located at 230 mm centres maximum for timber or metal framing. Penetration depths into the framework should be a minimum of 25 mm for timber or 10 mm for metal.

Additional installation procedures

17.22 Flexible polyurethane foam and/or flexible sealant or equivalent must be applied around the perimeter of the system where the board abuts adjacent surfaces, window/door frames, ceilings and floors.

17.23 Window or door reveals should be insulated with a minimum thickness of 32.5 mm Kooltherm K118.

17.24 At external angles, the system should be extended past the corner and the insulation cut back.

17.25 Where required, additional bands of adhesive, horizontal fixing T's, fixing straps, metal tracks/lining channels on timber noggins are placed to support unsupported board edges.

17.26 For medium to heavy weight wall-mounted fittings, appropriate fixings are used to fix through the system into the masonry or timber noggins, steel fixing straps or plywood patressing.

Technical Investigations

18 Tests

Tests were carried out to determine:

- interlaminar bond strength
- hard and soft body impact resistance.

19 Investigations

19.1 An assessment was made of the results of test data relating to:

- squareness
- vapour resistance
- density
- flatness
- dimension
- thermal conductivity (λ_D)
- dimensional stability at specific temperatures and humidity
- behaviour in relation to fire
- U value calculations and condensation risk analysis.

19.2 The manufacturing process was evaluated, including methods for quality control, and details were obtained of the quality and composition of materials used.

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