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Agrément Certificate  
**94/3027**  
Product Sheet 2

## EXCEL INDUSTRIES' RECYCLED CELLULOSE INSULATION FOR TIMBER-FRAME DWELLINGS

### WARMCEL 500 — PITCHED ROOF INSULATION

#### PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate relates to Warmcel 500 — Pitched Roof Insulation, a cellulose fibre insulation blown in loose form for use in timber pitched roofs with rafters with a depth of at least 220 mm. The product is blown in loose form between the plasterboard and the breather membrane.

#### AGRÉMENT 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

**Environmental information** — the product has been the subject of an Environmental Profile Certificate and the recycled content has been verified by the BBA (see section 3).

**Practicability of installation** — the product is to be installed by trained installers using the approved blowing machine (see section 5).

**Thermal performance** — the product has a declared thermal conductivity value of  $0.040 \text{ W} \cdot \text{m}^{-1} \cdot \text{K}^{-1}$  (see section 6).

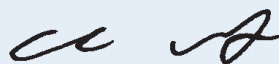
**Condensation** — the product can limit the risk of condensation. It has a water vapour resistance factor ( $\mu$ ) = 2 (EN 12524 : 2000) and must be used in conjunction with an effective vapour control layer (see section 7).

**Behaviour in relation to fire** — the product is classified class E to BS EN 13501-1: 2002, but will be contained within the ceiling lining and the breather membrane (see section 8).

**Durability** — the product will remain effective as an insulant for the life of the building (see section 11).

The BBA has awarded this Agrément Certificate to the company named above for the product described herein. The product 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



Chris Hunt  
Head of Approvals — Physics



Greg Cooper  
Chief Executive

Date of First issue: 7 December 2009

*Certificate amended on 28 July 2011 to make an editorial change to the Durability statement.*

*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](http://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, Warmcel 500 — Pitched Roof Insulation, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements of the following Building Regulations:



## The Building Regulations 2000 (as amended) (England and Wales)

Requirement:	C2(c)	Resistance to moisture
Comment:		The product can contribute to meeting this Requirement. See sections 7.2 and 7.4 of this Certificate.
Requirement:	L1(a)(i)	Conservation of fuel and power
Comment:		The product can contribute to a building meeting its Target Emission Rate. See sections 6.2 to 6.5 of this Certificate.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The product is acceptable. See section 11 and the <i>Installation</i> part of this Certificate.



## The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)	Fitness and durability of materials and workmanship
Comment:		The product can contribute to a construction meeting this Regulation. See section 11 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards — construction
Standard:	3.15	Condensation
Comment:		The product can contribute to satisfying this Standard, with reference to clauses 3.15.1 <sup>(1)</sup> , 3.15.3 <sup>(1)</sup> . See sections 7.3 and 7.4 of this Certificate.
Standard:	6.1(a)(b)	Carbon dioxide emissions
Standard:	6.2	Building insulation envelope
Comment:		The product can contribute to satisfying clauses, or parts of, 6.1.2 <sup>(1)</sup> , 6.1.6 <sup>(1)</sup> , 6.2.1 <sup>(1)</sup> , 6.2.3 <sup>(1)</sup> , 6.2.4 <sup>(1)</sup> and 6.2.5 <sup>(1)</sup> of these Standards. See sections 6.2 to 6.5 of this Certificate.
Regulation:	12	Building standards — conversions
Comment:		All comments given for this product under Regulation 9, also apply to this Regulation, with reference to clause 0.12.1 <sup>(1)</sup> and Schedule 6 <sup>(1)</sup> . (1) Technical Handbook (Domestic).



## The Building Regulations (Northern Ireland) 2000 (as amended)

Regulation:	B2	Fitness of materials and workmanship
Comment:		The product is an acceptable material. See section 11 and the <i>Installation</i> part of this Certificate.
Regulation:	C5	Condensation
Comment:		Pitched roofs incorporating the product can satisfy this Regulation. See section 7.4 of this Certificate.
Regulation:	F2(a)(i)	Conservation measures
Regulation:	F3	Target carbon dioxide Emission Rate
Comment:		Pitched roofs incorporating the product can contribute to satisfying these Regulations. See sections 6.2 to 6.5 of this Certificate.

## Construction (Design and Management) Regulations 2007

## Construction (Design and Management) Regulations (Northern Ireland) 2007

Information in this Certificate may assist the client, CDM co-ordinator, designer and contractors to address their obligations under these Regulations.

See section: 2 *Delivery and site handling* (2.1).

# Non-regulatory Information

## NHBC Standards 2008

NHBC accepts the use of Warmcel 500 — Pitched Roof Insulation, when installed and used in accordance with this Certificate, in relation to *NHBC Standards*, Chapter 7.2 *Pitched roofs*, Clauses D10–D11.

# General

This Certificate relates to Warmcel 500 — Pitched Roof Insulation, a cellulose fibre insulation blown in loose form between rafters of 220 mm to 400 mm in depth at 400 mm or 600 mm centres, enclosed by the breather membrane. Either solid rafters or I-beams are used.

## 1 Description

1.1 Warmcel 500 — Pitched Roof Insulation, a cellulose fibre insulation, is manufactured in accordance with BS 5803-3 : 1985. It comprises recycled newsprint and inorganic fire retardants. It has an installed density of from 45 to 55 ( $\pm 5\%$ )  $\text{kg}\cdot\text{m}^{-3}$ .

1.2 The product is for use in pitched roof constructions where the ceiling follows the pitch of the roof and encloses a habitable space.

1.3 The product is blown in the void created between the breather membrane (the advice of the Certificate holder may be sought for alternatives) and the sacrificial ply board (6 mm thick).

1.4 Ancillary items used but outside the scope of this Certificate include:

- vapour control layer
- roof tile underlay/breather membrane with small elongation value
- pre-treated counter battens, softwood battens
- 6 mm thick ply sheet (sacrificial board)
- butyl nail sealing tape
- tile battens
- roofing slates or tiles.

## 2 Delivery and site handling

2.1 The product is delivered to site in sealed plastic bags weighing approximately 13 kg. Each bag carries a label bearing the manufacturer's name, product name, type of material and the BBA identification mark incorporating the number of this Certificate.

2.2 Bags must be kept dry and unopened until ready for use.

## 3 Environmental information

3.1 The environmental profile for the product has been calculated using the BRE Environmental Profiles Methodology and an Environmental Profile Certificate has been awarded by BRE, Certificate No 278 (Appendix 278a only) dated 2 December 2008, achieving the following:

- an Eco-point score Cradle to Gate per tonne of product, of 1.68
- an Eco-point score Cradle to Grave per  $\text{m}^2$  of Warmcel 500 damp spray over a 60-year study period, of 0.03.

3.2. The recycled content has been calculated in accordance with the Waste & Resources Action Programme (WRAP) *Rules of Thumb Guide to the Calculation and Declaration of Recycled Content in Construction Products* (see Table 1).

*Table 1 Recycled content*

Recycled input material	Input mass per tonne of product (tonne) <sup>(1)</sup>	Yield factor (%) <sup>(2)</sup>	Recycled content (%) <sup>(3)</sup>
Recycled newsprint	0.80	95	76

(1) Input mass per tonne of recycled material is verified by the BBA as part of post-Certification auditing and calculated in accordance with BS EN ISO 14021: 2001, Clause 7.8.4.

(2) Yield factor is an estimated allowance for the moisture content of paper. It is not measured as part of the manufacturing process and does not form part of the BBA post-Certification auditing.

(3) Recycled content in the final product minus the estimated moisture content.

3.3 The recycled input material is described as recycled newspaper from post-consumer sources and meets criteria A and B for a recycled material as defined in WRAP.

## Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Warmcel 500 — Pitched Roof Insulation.

## 4 General

- 4.1 When installed, Warmcel 500 — Pitched Roof Insulation is effective in reducing the thermal transmittance (U value) of pitched roofs of existing dwellings. It is essential that such roofs are designed and constructed to incorporate the normal precautions against moisture ingress.
- 4.2 Installation must not be carried out until the moisture content of the timber frame is less than 20%.
- 4.3 The product is suitable for use between, the rafters in conjunction with approved (BBA or equivalent) breathable membrane and vapour control layer, timber counter battens and tiling battens in tiled or slated, pitched roofs, designed and constructed in accordance with the relevant Clauses of BS 5534 : 2003 for dwellings or other buildings with similar temperature and humidity conditions.
- 4.4 New buildings subject to the national Building Regulations should be designed in accordance with the relevant recommendations of BS 5268-2 : 2002.
- 4.5 It is essential that proper care and attention is given to maintaining the integrity/continuity of vapour control layers, see section 13.
- 4.6 De-rating of any electrical cables in areas where the product restricts the flow of air should be considered.

## 5 Practicability of installation

The product should only be installed by installers who have been trained and approved by the Certificate holder. The records relating to this will be audited by the BBA as part of its programme of surveillance on the Certificate, see section 12.

## 6 Thermal performance

6.1 Calculations of the thermal transmittance (U value) of specific roof constructions should be carried out in accordance with BS EN ISO 6946 : 2007 and BRE report (BR 443 : 2006) *Conventions for U-value calculations*, using the declared thermal conductivity ( $\lambda_{90/90}$  value)  $0.040 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$  of the product. Example U values (based on 220 mm solid and I-beam rafters at 400 mm or 600 mm centres, BR 443) are given in Table 2.

Table 2 U values for typical roof constructions

Construction	U value ( $\text{W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$ )
Solid <sup>(1)</sup> rafters at 400 mm centres	0.22
Solid rafters at 600 mm centres	0.20
Masonite I-beam <sup>(2)</sup> at 400 mm centres	0.19
Masonite I-beam at 600 mm centres	0.18

(1) Solid rafters are at 400 mm (12.5%) or 600 mm (8.3%) centres.

(2) I-beam rafters are at 400 mm (11.75%) or 600 mm (7.83%) centres and the I-beam consists of 47 mm by 47 mm flanges and 8 mm web, made of wood.



6.2 The product can contribute to achieving the design U values shown in Tables 3 and 4.

6.3 Roofs with U values lower than (or the same as for Scottish dwellings) the relevant 'notional' value as specified in section 6.2 will contribute to a building meeting its target overall reduction in carbon dioxide emissions of about 20% (or 18% to 25% in Scotland) for dwellings and 23% to 28% for buildings other than dwellings. Walls with higher U values will require additional energy saving measures in the building envelope and/or services.

6.4 The product can maintain or contribute to maintaining continuity of thermal insulation at junctions between the external wall and the other building elements. Guidance in this respect, and on limiting heat loss by air infiltration, can be found in:

**England and Wales** — *Limiting thermal bridging and air leakage: Robust construction details for dwellings and similar buildings* TSO 2002 and Accredited Construction Details, version 1.0

**Scotland** — Accredited Construction Details (Scotland).

**Northern Ireland** — Accredited Construction Details (version 1.0).

6.5 Compliance with the guidance referred to in section 6.4 will allow the use of the default psi values from BRE Information Paper IP 1/06 *Assessing the effects of thermal bridging at junctions and around openings*, Table 3, and *The Government's Standard Assessment Procedure for Energy Rating of Dwellings* (SAP 2005), Table K1, in Target Emission Rate calculations to SAP 2005 or the Simplified Building Energy Model (SBEM).

Table 3 Typical design U values for pitched roofs — England and Wales, and Northern Ireland

Construction type	U value ( $\text{W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$ )
'Notional' mean in SAP and new dwellings	0.16
Limit mean for extensions, new and replacement elements,	0.20
Limit mean for renovated, retained elements and material change of use <sup>(1)</sup> or energy status <sup>(2)</sup>	0.20
Limit mean for domestic extensions <sup>(1)</sup> and new dwellings	0.25
Limit individual for domestic extensions <sup>(1)</sup> and new domestic	0.35

(1) Alternative or flexible approaches are given in the relevant documents supporting the national Building Regulations.

(2) England and Wales only.

Table 4 Typical design U values for pitched roofs — Scotland

Construction type	U value ( $\text{W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$ )
Limit mean for new dwellings simplified approach (all fuel packages) and notional dwellings in SAP	0.16
Limit mean for new domestic	0.20
Limit individual element value	0.20
Limit mean for conversions, extensions and alterations <sup>(1)</sup>	0.35

(1) Alternative or flexible approaches are given in the relevant documents supporting the national Building Regulations.

## 7 Condensation

7.1 The product has a water vapour resistance factor ( $\mu$ ) = 2 (EN 12524 : 2000).

### Surface condensation

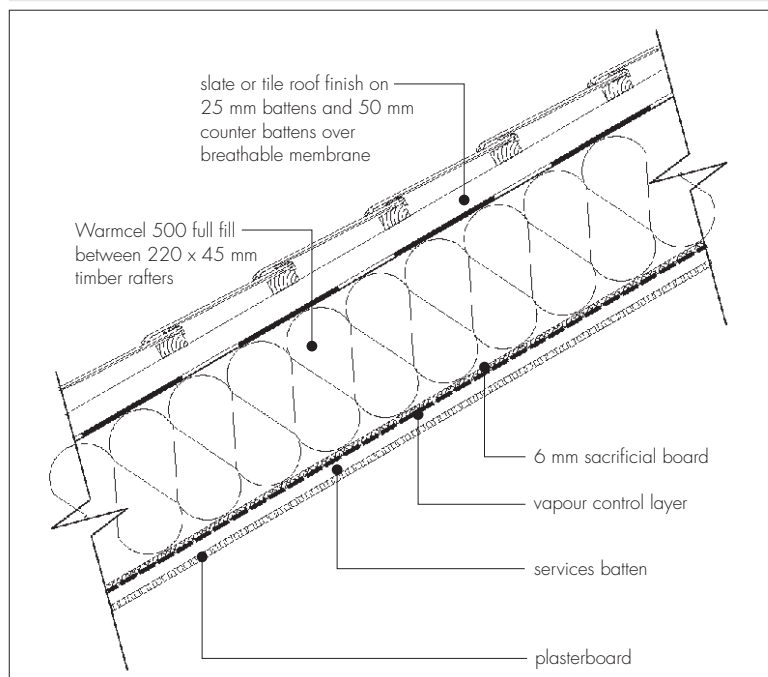
7.2 Roofs will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed  $0.35 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$  at any point and the junctions with walls are designed in accordance with the relevant requirements of *Limiting thermal bridging and air leakage : Robust construction details for dwellings and similar buildings* TSO 2002, or BRE Information Paper IP 1/06.

7.3 Roofs will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed  $1.2 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$  at any point. Guidance may be obtained from BS 5250 : 2002, Section 8, and BRE Report (BR 262 : 2002) *Thermal insulation : avoiding risks*.

### Interstitial condensation

7.4 Roofs incorporating the product (as shown in Figure 1) will adequately limit the risk of interstitial condensation when designed and constructed in accordance with BS 5250 : 2002, Section 8.4 and Appendix D.

Figure 1 Roof cross-section



7.5 The risk of interstitial condensation is greatest when the building is drying out after construction. Guidance on preventing condensation from this and other sources is given in BRE Digest 369 *Interstitial condensation and fabric degradation* and BRE report (BR 262 : 2002).

7.6 The pitched roof construction must always contain a vapour control layer with an equivalent air layer thickness  $S_d = 50$  (to EN 12524 : 2000).

## 8 Behaviour in relation to fire

8.1 The product contains inorganic fire-retardants which inhibit flaming and smouldering combustion.

8.2 The product has a fire classification rating Class E for reaction to fire, containing flame-retardant additive, in accordance with BS EN 13501-1 : 2002.

8.3 When installed, the product will be contained between the breather membrane and the plasterboard until these layers are destroyed. Therefore, the product will not contribute to the development stages of a fire or present a smoke or toxic hazard.

8.4 The continuity of fire resistance must be maintained as described in:

**England and Wales** — Approved Document B, paragraphs 5.11 and 5.12

**Scotland** — Mandatory Standard 2.2, clauses 2.2.7<sup>(2)</sup> and 2.2.10<sup>(1)</sup>.

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

**Northern Ireland** — Technical Booklet E, Table 3.2.1

## 9 Proximity of flues and appliances

When the product is installed in close proximity to certain flue pipes and/or heat-producing appliances, for buildings subject to national Building Regulations, the relevant provisions and guidance given below should be met:

**England and Wales** — Approved Document J

**Scotland** — Mandatory Standard 3.19, clauses 3.19.1<sup>(1)(2)</sup> to 3.19.9<sup>(1)(2)</sup>

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

**Northern Ireland** — Technical Booklet L.

## 10 Maintenance

As the product is confined within the boards and it has suitable durability (see section 11), maintenance is not required.

## 11 Durability



The product, provided it does not become accidentally wetted, may be expected to remain effective as an insulant for a life equivalent to that of the roof structure.

# Installation

## 12 General

12.1 Installation of Warmcel 500 — Pitched Roof Insulation is to be carried out in accordance with the relevant requirements of the Warmcel Installation Manual *Timber Frame Walls and Sloping Ceilings*.

12.2 For *NHBC Standards*, only techniques that do not damage the linings may be used in order to minimise disturbances to the linings.

## 13 Procedure

13.1 Rafter depth to be used can be from 220 mm to 400 mm for I-beam rafters and a depth of 220 mm for solid rafters.

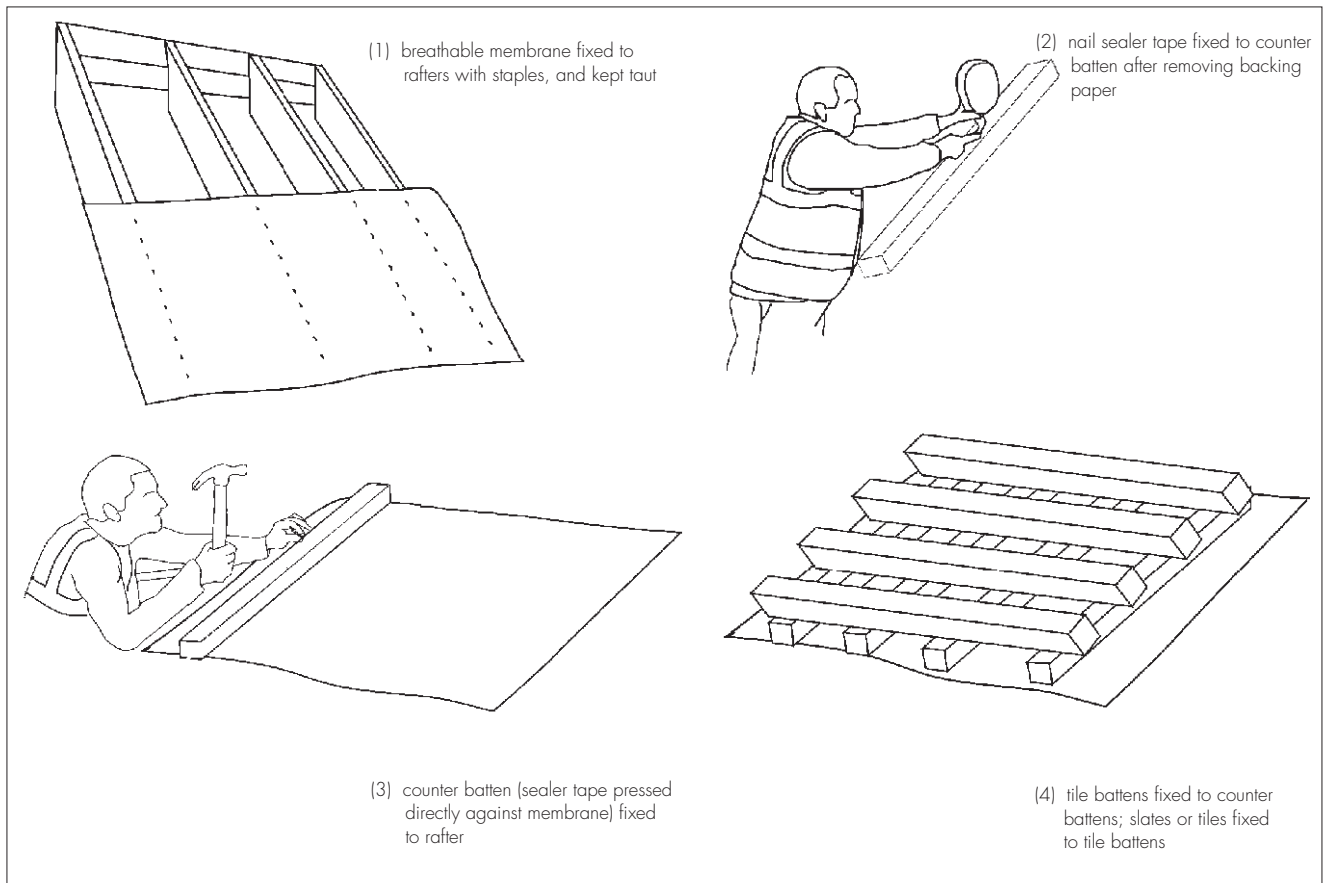
13.2 A sacrificial timber board (minimum thickness of 6 mm) is nailed to the underside of the rafters (see Figure 1).

13.3 The breathable roof tile underlay is pulled taut and fixed over the rafters.

13.4 The breather membrane should be covered by a BBA Certificate, with preferably a low elongation value to minimise on bulging, and used with a butyl nail sealing tape. For advice on using alternative membranes and nail sealing tapes, the Certificate holder should be consulted.

13.5 The silicon backing paper is removed from the butyl tape and glued to the underside of the counter battens (50 mm deep) as shown in Figure 2.

Figure 2 Installation of breathable membrane and counter battens



13.6 The counter battens with the taped side are nailed onto the breathable roof tile underlay into the rafter.

13.7 The nail sealing tapes are used to seal the holes at the nails entrance<sup>(1)</sup>.

(1) Details are given in the Certificate holder's instruction manual.

13.8 The tile battens (25 mm deep) are fixed onto the counter battens.

13.9 The cellulose fibres are blown by dry injection in between the sacrificial board and the breather membrane by the method detailed in sections 13.12 to 13.17. The filling can be undertaken by the eaves or the ridge.

13.10 To avoid water running towards the rafters and cause rotting, it must be ensured that the breathable roof tile underlay does not bulge upwards or has as little bulging as possible. To minimise the risk of this happening, the holes around the nails should be sealed with the appropriate sealing tapes as described in section 13.5.

13.11 The VCL is stapled and battened down onto the underside of the sacrificial board.

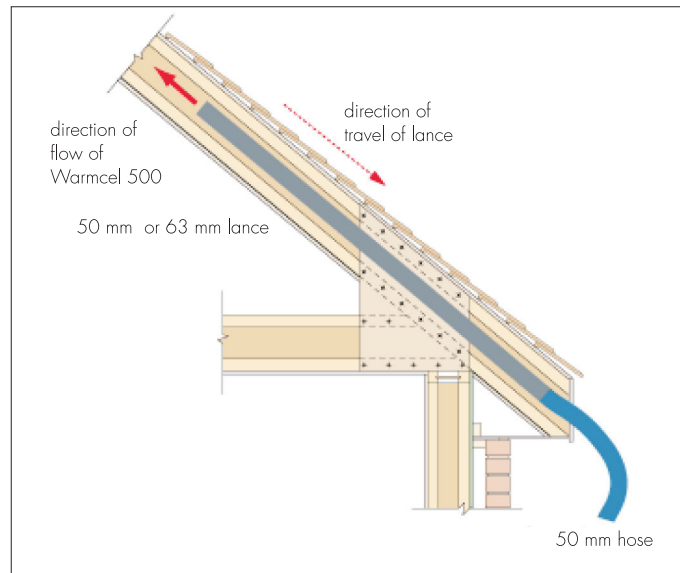
### Dry injection method

13.12 A lance is normally used for dry injecting the insulation into pitched roofs and can be carried out in one of three ways:

#### Method 1

- at the eaves — preferred access in sloping roof sections is via the eaves or from the horizontal loft area above the sloping section at the ridge (if this exists), so that the sacrificial board is not disturbed (see Figure 3).

Figure 3 Lance application — eaves to ridge



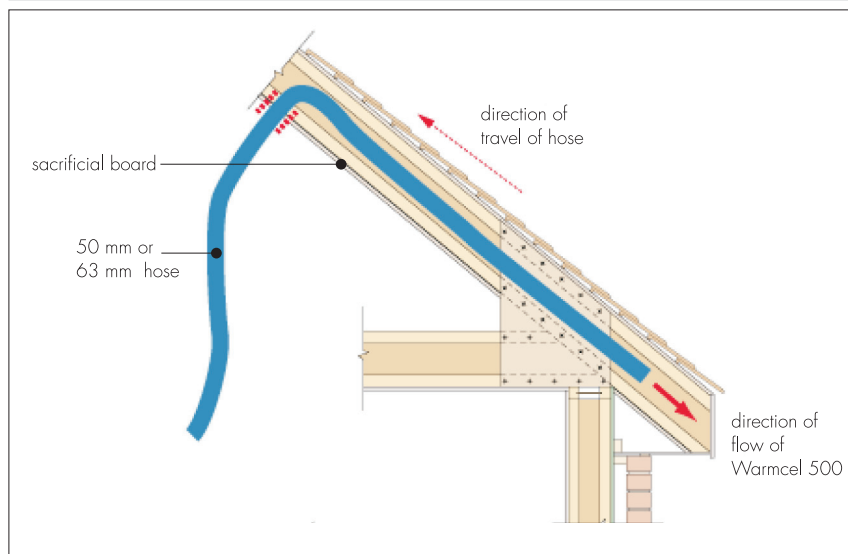
### Method 2

- at the ridge — blowing can be carried out from the ridge by temporarily removing the sacrificial board and replacing it by a scrim below the rafters. A hole is drilled in the scrim for each void between rafters. Once the product has been blown in completely, the board is replaced.

### Method 3

- access holes are drilled through the sacrificial board near to the top edge of the rafter void (see Figure 4).

Figure 4 Hose application — ridge to eaves



13.13 If the blowing hose is used without a lance to insulate fully enclosed panels, the core cutter diameter should be 15 mm to 25 mm larger than the diameter of the hose. This allows the hose to be easily fed in and allows air to escape past the hose while the void is being filled.

13.14 Ideally, the blowing machine should be mounted in a high top van or box trailer, so that it need not be removed for every job.

13.15 An 85 mm—106 mm long hole cutter is used and the core retained for making the hole good, using silicone sealant or adhesive as appropriate. One hole is required per section (ridge to eaves).

13.16 The hose or lance is inserted into the void to within 200 mm of the end of the rafter void and filling proceeds until the fibre flow rate slows. The hose is withdrawn about 200 mm until the flow rate slows again; the process continues until the void is full.

13.17 Any accidental damage to a roof tile underlay or vapour control layer must be made good.

### 14 Investigations

14.1 The manufacturing process of Warmcel 500 — Pitched Roof Insulation was examined, including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

14.2 A visit was made to a site in progress to establish the practicability of installation.

14.3 An examination was made of independent data relating to:

- $\lambda$  value
- settlement under vibration
- settlement under high humidity
- condensation risk analysis.

## Bibliography

BS 5250 : 2002 *Code of practice for control of condensation in buildings*

BS 5268-2 : 2002 *Structural use of timber — Code of practice for permissible stress design, materials and workmanship*

BS 5534 : 2003 *Code of practice for slating and tiling (including shingles)*

BS 5803-3 : 1985 *Thermal insulation for use in pitched roof spaces in dwellings — Specification for cellulose fibre thermal insulation for application by blowing*

BS EN 13501-1 : 2002 *Fire classification of construction products and building elements. Classification using test data from reaction to fire tests*

BS EN ISO 6946 : 2007 *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method*

BS EN ISO 14021 : 2001 *Environmental labels and declarations — Self declared environmental claims (Type II environmental labelling)*

EN 12524 : 2000 *Building materials and products — Hygrothermal properties — Tabulated design values*

## 15 Conditions

15.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is granted only to the company, firm or person named on the front page — no other company, firm or person may hold or claim any entitlement to this Certificate
- is valid only within the UK
- has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English law.

15.2 Publications and documents referred to in this Certificate are those that the BBA deems to be relevant at the date of issue or re-issue of this Certificate and include any: Act of Parliament; Statutory Instrument; Directive; Regulation; British, European or International Standard; Code of Practice; manufacturers' instructions; or any other publication or document similar or related to the aforementioned.

15.3 This Certificate will remain valid for an unlimited period provided that the product/system and the manufacture and/or fabrication including all related and relevant processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

15.4 In granting this Certificate, the BBA is not responsible for:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product/system
- individual installations of the product/system, including the nature, design, methods and workmanship of or related to the installation
- the actual works in which the product/system is installed, used and maintained, including the nature, design, methods and workmanship of such works.

15.5 Any information relating to the manufacture, supply, installation, use and maintenance of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used and maintained. It does not purport in any way to restate the requirements of the Health & Safety at Work etc Act 1974, or of any other statutory, common law or other duty which may exist at the date of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care. In granting this Certificate, the BBA does not accept responsibility to any person or body for any loss or damage, including personal injury, arising as a direct or indirect result of the manufacture, supply, installation, use and maintenance of this product/system.

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