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Agrément Certificate No 02/3964
*Second issue**

BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

Designated by Government to issue European Technical Approvals

RENOTHERM

Mousse projetée pour réparation de toiture
Dachreparatur — Spritzschaum

Product

- *THIS CERTIFICATE RELATES TO RENOTHERM, A SPRAY-APPLIED HFC BLOWN RIGID POLYURETHANE FOAM, FOR THERMAL INSULATION.*
- *The product is for use in:*

(a) timber frame walls,

(b) pitched and flat timber roof constructions

(c) timber and concrete ground-floor constructions.

- *The product also minimises unwanted air infiltration.*
- *The product is installed by Renotherm Ltd's own installers or agents, where operatives have received the appropriate training.*

Regulations

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

The Secretary of State has agreed with the British Board of Agrément the aspects of performance to be used by the BBA in assessing the compliance of thermal insulation with the Building Regulations. In the opinion of the BBA, Renotherm, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements.

Requirement:	B3(4)	Internal fire spread (structure)
Comment:		Junctions between roofs and compartment walls must be fire-stopped. See section 10.6 of this Certificate. Walls incorporating the product can satisfy this Standard. See section 10.3 of this Certificate. Voids in floors, roofs and walls must incorporate cavity barriers. See section 10.5 of this Certificate.
Requirement:	B4(2)	External fire spread
Comment:		The product will not affect the external fire rating of a tiled or slated roof in which it is incorporated. See section 10.7 of this Certificate.
Requirement:	C2(c)	Resistance to moisture
Comment:		Roofs incorporating the product can meet this Requirement. See sections 9.1 and 9.3 of this Certificate.

Requirement:	L1(a)(i)	Dwellings
Requirement:	L2(a)	Buildings other than dwellings
Comment:		The product can meet or contribute to meeting these Requirements. See sections 8.2 to 8.4 of this Certificate.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The product is acceptable. See section 14 of this Certificate.

2 The Building (Scotland) Regulations 2004

In the opinion of the BBA, Renotherm, if used in accordance with the provisions of this Certificate, will satisfy or contribute to satisfying the various Regulations and related Mandatory Standards listed below.

Regulation:	8	Fitness and durability of materials and workmanship
Regulation:	8(1)	Fitness and durability of materials and workmanship
Comment:		The product can contribute to a construction satisfying this Regulation. See section 14 and the *Installation* part of this Certificate.
Regulation:	9	Building standards — construction
Standard:	2.1	Compartmentation
Standard:	2.2	Separation
Comment:		Junctions between roofs and compartment walls, separating walls or wall enclosing a protected zone must be fire-stopped to satisfy these Standards with reference to clauses 2.1.13(2), 2.1.15(2), 2.1.16(2) and 2.2.10(1) respectively. See section 10.6 of this Certificate.
Standard:	2.3	Structural protection
Standard:	2.6	Spread to neighbouring buildings
Comment:		Walls incorporating the product can satisfy these Standards with reference to clause 2.3.1(2). See section 10.3 of this Certificate. The product may be used in walls in accordance with the exceptions permitted by the Table to these Standards with reference to clause 2.3.2(1)(2), 2.6.5(1) and 2.6.6(2) respectively. See Section 10.8 of this Certificate.
Standard:	2.4	Cavities
Comment:		Voids in floors, roofs and walls must incorporate cavity barriers with reference to clauses 2.4.1(1)(2), 2.4.2 (1)(2), 2.4.9(2) and 2.4.7(1)(2) and annex 2.B4. See section 10.5 of this Certificate.
Standard:	2.8	Spread from neighbouring buildings
Comment:		The product will not affect the external fire rating of a tiled or slated roof in which it is incorporated with reference to clause 2.8.1(1)(2). See section 10.7 of this Certificate.
Standard:	3.15	Condensation
Comment:		Constructions incorporating the product can satisfy this Standard with reference to clauses 3.15.1(1), 3.15.2(1), 3.15.3(1) and 3.15.4(1). See sections 9.1 and 9.3 of this Certificate.
Standard:	6.2	Building insulation envelope
Comment:		The product can satisfy or contribute to satisfying this Standard with reference to clause 6.2.1(1)(2) (Table 1) 6.2.4(1)(2) and 6.2.5(1)(2). See sections 8.2 to 8.4 of this Certificate.

(1) Technical Handbook (Domestic).
(2) Technical Handbook (Non-Domestic).

3 The Building Regulations (Northern Ireland) 2000

In the opinion of the BBA, Renotherm, if used in accordance with the provisions of this Certificate, will satisfy or contribute to satisfying the various Building Regulations as listed below.

Regulation:	B2	Fitness of materials and workmanship
Comment:		The product is acceptable. See section 14 of this Certificate.
Regulation:	C5	Condensation
Comment:		Constructions incorporating the product can satisfy this Regulation. See sections 9.1 and 9.3 of this Certificate.
Regulation:	E4	Internal fire spread — Structure
Comment:		Junctions between roofs and compartment walls must be fire-stopped. See section 10.6 of this Certificate. Walls incorporating the product can satisfy this Standard. See section 10.3 of this Certificate. Voids in floors, roofs and walls must incorporate cavity barriers. See section 10.5 of this Certificate.

Regulation:	E5	External fire spread
Comment:		The product will not affect the external fire rating of a tiled or slated roof in which it is incorporated. See section 10.7 of this Certificate.
Regulation:	F2	Building fabric
Comment:		The product can satisfy or contribute to satisfying this Regulation. See sections 8.2 to 8.4 of this Certificate.

4 Construction (Design and Management) Regulations 1994 (as amended)

Construction (Design and Management) Regulations (Northern Ireland) 1995 (as amended)

Information in this Certificate may assist the client, planning supervisor, designer and contractors to address their obligations under these Regulations.

See sections: 6 *Delivery and site handling* (6.1 and 6.3) and 15 *Precautions* (15.1 to 15.6).

Technical Specification

5 Description

5.1 Renotherm is a spray-applied HFC blown rigid polyurethane foam, for thermal insulation. It is applied to various substrates and built up in layers, not exceeding 20 mm in thickness, to achieve the required level of thermal insulation.

5.2 The foam is prepared from two liquid components mixed within the nozzle of the spray gun during the spraying process.

5.3 Quality control arrangements on site include checks on density and appearance.

6 Delivery and site handling

6.1 The two components of the product are delivered to site in drums (up to 250 kg capacity) bearing the product name, batch number and the BBA identification mark incorporating a BBA Certificate number.

6.2 Drums should be stored in a well-ventilated area, away from possible ignition sources. The drums must be protected from frost and conditioned at temperatures of between 18°C and 22°C prior to use.

6.3 The resin and isocyanate components are classified as 'Irritant' and 'Harmful', respectively under the Chemicals (Hazard Information and Packaging for Supply) Regulations 2002 (CHIP3) and the packaging bears the appropriate hazard warning labels. When fully cured, Renotherm does not constitute a hazard, under normal conditions.

Design Data

7 General

7.1 Renotherm is effective in reducing the U value (thermal transmittance) of walls, roofs and floors of dwellings or buildings of similar occupancy, type and condition when used:

- between the studs of conventional timber frame wall constructions.
- between timber rafters, and over the underside of rafters, in tiled or slated pitched roofs and in flat roofs, with suitable internal lining board.
- between rafters in pitched roofs which enclose a non-habitable and unventilated loft space with additional thermal insulation between horizontal ceiling joists as required
- on new or existing ground supported, suspended or semi-exposed (including over cellars) concrete floors, or between joists in timber floors.

7.2 It is essential that elements are designed and constructed to incorporate normal precautions against moisture ingress before the application of the product.

7.3 New constructions(1) must be designed in accordance with the relevant recommendations of BS 5268-6.1 : 1996, BS 5268-3 : 1998, BS 6229 : 2003.

(1) Further information is given in BRE report No (BR 262 : 2002) *Thermal insulation : avoiding the risks*.

7.4 Where constructions need to comply with NHBC Standards or the following sections of the *Zurich Building Guarantee Technical Manual*, Section 3 *Substructure*, Sub-section *Floors*,

Section 4 *Superstructure*, Sub-sections *External walls — Timber frame, pitched roofs*, and *Flat roofs* specifiers should observe the requirements of these documents.

7.5 Existing constructions must be in a good state of repair with no evidence of rain penetration or damp. Defects should be made good prior to installing the product.

7.6 Installation must be carried out by the Certificate holder's own installers or agents, whose operatives have received the appropriate training (see also section 15).

7.7 The product forms a strong bond with clean and dry substrates. This should be taken into account when specifying the product or anticipating future alterations.

7.8 Where the product is required to repair and stabilise unfelted tiled or slated roofs suffering from the effects of nail corrosion, reference should be made to Certificate No 93/2939(1).

(1) Users are advised to check the validity of BBA Certificates.

8 Thermal insulation

8.1 For the purpose of U value calculations to determine if the requirements of the Building (or other statutory) Regulations are met, the thermal conductivity (λ value) of the product (in $Wm^{-1}K$) may be taken as shown in Table 1.

Table 1 Thermal conductivity

Thickness (mm)	Thermal conductivity ($Wm^{-1}K^{-1}$)
<80	0.028
80 to 120	0.026
>120	0.025

8.2 The requirement for limiting heat loss through the building fabric can be satisfied if the U values of the building elements, including thermal bridging, do not exceed the maximum values in the relevant Elemental Methods given in the national Building Regulations:

England and Wales

Approved Documents L1 and L2, Table 1

Scotland

Mandatory Standard 6.2

Northern Ireland

Technical Booklet F, Table 1.2 or 1.4.

8.3 Guidance is also given in these documents on selecting the thickness of insulation required to enable a wall, roof or floor to achieve the desired U value. Alternative approaches are also described which allow for some flexibility in design of U values for individual constructional elements.

8.4 The product expands to fill voids and forms a bond with adjacent substrates. It therefore minimises unwanted air infiltration.

8.5 The ultimate thermal performance of the system will depend on the wall, roof or floor in which it is installed. The dynamic thermal performance of a structure can be determined by the admittance procedure given in CIBSE Guide A : 1999 Environmental design.

8.6 The dynamic thermal performance of a building can be expressed as a ratio called the response factor (CIBSE Guide A, equation 5.13). Factors <4 are achieved for thermally lightweight buildings and factors >4 for a heavyweight building. The use of any form of insulation will affect this factor and it should be considered when designing heating systems for new buildings. Modifications to existing heating systems may also have to be considered in buildings upgraded by the application of the product. Methods of sizing heating plant are given in CIBSE Guide A : 1999.

8.7 Where the product is used to upgrade existing ceilings it is essential that services, such as pipework, water tanks, existing in a cold space above are insulated.

9 Condensation risk

9.1 The unfaced product has a water vapour resistivity of 140 $MNs(gm^{-1})$. In normal situations the risk of interstitial condensation will therefore be minimal. Particular constructions should be favourably assessed in accordance with BS 5250 : 2002.

9.2 If the product is to be used in external walls of rooms expected to have high humidities, care must be taken to provide adequate permanent ventilation in order to avoid possible problems with the formation of interstitial condensation in the internal wall leaf.

9.3 For unventilated (non-habitable) roof spaces with insulation in the pitch of the roof and additional insulation at ceiling level, it is essential that the movement of moisture from the occupied space below by diffusion and by convection is restricted, as follows:

- ceiling lining board with filled/sealed joints or vapour control layer
- sealing of all penetrations into the loft space
- covering of water tanks in the loft space
- provision of ventilation to the dwelling space below in accordance with current national Building Regulations.

10 Properties in relation to fire

10.1 When tested in accordance with BS 476-7 : 1997 the internal face of sample specimens of Renotherm achieved a Class 1 spread of flame rating.

10.2 When installed in a floor, wall or ceiling, the product will be contained by the floor finish or lining board 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.

10.3 When installed between studs in loadbearing timber stud partitions and lined with a minimum of 12.5 mm thick Type 5 plasterboard, a period of fire resistance, from inside to out, in excess of 30 minutes will be achieved.

10.4 When installed between and over the underside of timber roof rafters, a lining of a minimum 12.5 mm thick Type 5 plasterboard is applied. Alternatively, where the rafters are to remain exposed, the foam may receive a suitable paint or bonding plaster decorative finish.

10.5 Where voids within elements are only partially filled with insulation, cavity barriers must be provided in accordance with the national Building Regulations.

10.6 The product must not be carried over junctions between roofs and walls required to provide a minimum period of fire resistance. The continuity of fire resistance must be maintained, for example as described in:

England and Wales

Approved Document B, paragraphs 9.28 to 9.31

Scotland

Mandatory Standards 2.1 and 2.2

Northern Ireland

Technical Booklet E, paragraph 3.15.

10.7 The use of the product in a pitched roof will not affect the rating obtained by tiled roofs when evaluated by assessment or test to BS 476-3 : 1958.

10.8 The product is combustible but it may be used in a wall on or less than one metre from a relevant boundary in accordance with the exceptions permitted in Mandatory Standard 2.6 to The Building (Scotland) Regulations 2004.

10.9 The product must be protected from naked flames and other ignition sources during and after installation (see also sections 13.2 and 13.3.

11 Proximity of flues and appliances

When installing the product in close proximity to certain flue pipes and / or heat producing appliances, the relevant provisions of the national Building Regulations are acceptable:

England and Wales

Approved Document J

Scotland

Mandatory Standard 3.19

Northern Ireland

Technical Booklet L.

12 Floor loading

12.1 The design loadings for self-contained dwelling units, as defined in BS 6399-1 : 1996 are:

intensity of distributed load (kPa)	1.5
concentrated load (kN)	1.4

12.2 The product, covered with screed, can support these design loadings without undue deflection.

12.3 A BRE survey of imposed floor loading in domestic buildings (see BRE current paper 2 / 77) indicated that loadings in flats are commonly in the region of 0.6 kPa and loadings of 1.5 kPa are associated with fixed items.

13 Materials in contact — Wiring installations

13.1 The product is compatible with materials in contact.

13.2 De-rating of electric cables should be considered in areas where the product restricts the flow of air. The use of suitable conduit or trunking is recommended.

13.3 Where recessed lighting is used, provision should be made to prevent the fitting overheating, or ventilated fittings used.

14 Durability

The durability of the product is satisfactory and will have a life equivalent to that of the structure in which it is incorporated (see also section 7.8).

Installation

15 Precautions

15.1 The Renotherm process may produce a build-up of harmful vapours. It is required that all personnel in the area wear the correct protective clothing, breathing equipment and gloves. The Certificate holder's instructions must be followed at all times.

15.2 Vapours given off by certain components of the system, ie 4,4' diphenylmethane diisocyanate (MDI), are generally heavier than air and will tend to move to lower parts of the dwelling. These parts should be ventilated by opening windows and doors to prevent the build-up of toxic vapours.

15.3 If vapour levels need to be measured, methods should be those recommended by the Health and Safety Executive. Certain applications, ie confined roofs, require the use of extractor fans as recommended by the Certificate holder.

15.4 To comply with the requirements of Section 4 of the Health and Safety at Work Act 1974, it is essential that there is an exchange of information between the client and the installer

before spray operations commence on any site. Existing health hazards at the premises and those likely to be brought into the client's environment by the Certificate holder should be discussed and measures agreed to deal with them effectively.

15.5 After installation in loft voids, fire warning labels are placed in prominent positions if the foam is to be left exposed. Although Renotherm is more difficult to ignite than timber, the foam is still a combustible material; adequate precautions should be taken to avoid ignition at all times.

15.6 To prevent the product from entering the occupied space, the loft hatch / cover must be kept closed during the spraying process. Protective covers must be placed over water tanks to prevent contamination during application, and should not be removed until sufficient time has elapsed for potentially harmful vapours to be ventilated from the roof space.

16 Procedure

General

16.1 Building elements to be insulated should be assessed as suitable and any necessary repairs carried out. The positioning and access to services should also be considered.

16.2 The product should be spray applied to clean and dry substrates in a flash coat, <10 mm thick. Once the reaction has taken place and the surface is hard the next layer is applied in a thickness not exceeding 20 mm thick and allowed to cure.

16.3 Subsequent layers not exceeding 20 mm thick are applied until the required total thickness is achieved.

Timber frame walls

16.4 The product is sprayed between the timber studs onto the surface of the cavity sheathing board. Once cured an appropriate internal lining board is applied over in the conventional manner.

Pitched roof constructions

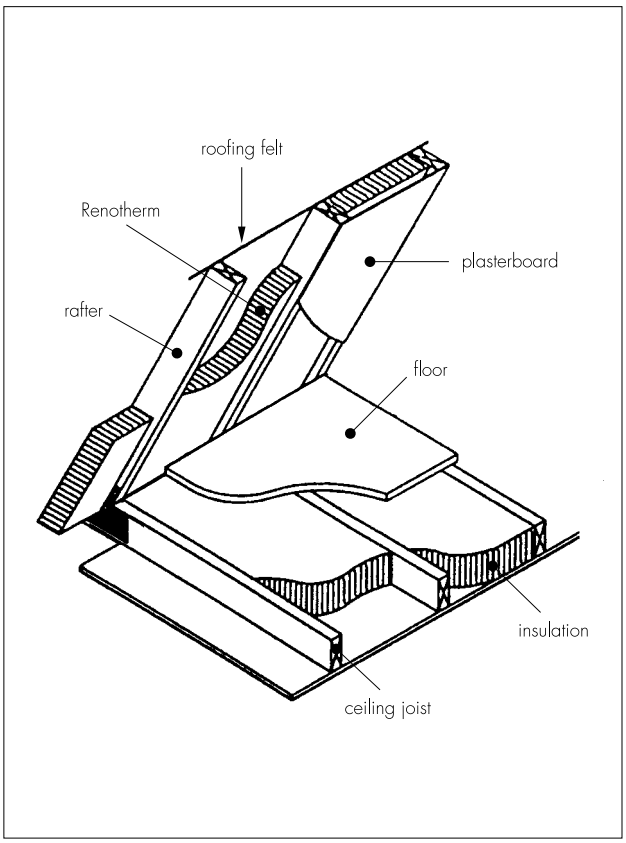
16.5 The product is spray applied to the underside of the roof tile underlay or sarking board.

Pitched roof constructions with additional ceiling insulation (see Figure 1)

16.6 Where additional insulation to that provided in sections 16.2 to 16.4 is required, insulation can be placed between the horizontal ceiling joists in the form of mineral wool or spray-applied Renotherm.

16.7 Where there is no provision made for ventilation of the space, care should be taken to ensure that ingress of moisture vapour from the dwelling space below is restricted (see also section 9.2).

Figure 1 Typical application



Technical Investigations

The following is a summary of the technical investigations carried out on Renotherm.

17 Investigations

17.1 A re-evaluation was made of relevant data generated in support of Agrément Certificate No 93 / 2939, in the context of the applications covered by this Certificate.

17.2 An examination was made of independent data relating to:

- thermal conductivity
- load compression characteristics
- behaviour in relation to fire
- compatibility with materials in contact
- water vapour permeability.

17.3 Visits were made to sites in progress and existing sites to assess the methods of application and the material's behaviour in use.

17.4 A theoretical analysis of the hygrothermal behaviour of various constructions incorporating the product was carried out.

17.5 The methods adopted for quality control, relating to incoming materials and the installed product, were examined and found to be satisfactory.

Bibliography

BS 476-3 : 1958 *Fire tests on building materials and structures — External fire exposure roof test*
BS 476-7 : 1997 *Fire tests on building materials and structures — Method of test to determine the classification of the surface spread of flame of products*

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

BS 5268-3 : 1998 *Structural use of timber — Code of practice for trussed rafter roofs*
BS 5268-6.1 : 1996 *Structural use of timber — Code of practice for timber frame walls — Dwellings not exceeding four storeys*

BS 6229 : 2003 *Flat roofs with continuously supported coverings — Code of practice*

BS 6399-1 : 1996 *Loading for buildings — Code of practice for dead and imposed loads*

Conditions of Certification

18 Conditions

18.1 This Certificate:

(a) relates only to the product that is named, described, installed, used and maintained as set out in this Certificate;

(b) is granted only to the company, firm or person identified on the front cover — no other company, firm or person may hold or claim any entitlement to this Certificate;

(c) is valid only within the UK;

(d) has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective;

(e) is copyright of the BBA;

(f) is subject to English law.

18.2 References in this Certificate to any Act of Parliament, Regulation made thereunder, Directive or Regulation of the European Union, Statutory Instrument, Code of Practice, British Standard, manufacturers' instructions or similar publication, are references to such publication in the form in which it was current at the date of this Certificate.

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

(a) are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA;

(b) continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine; and

(c) are reviewed by the BBA as and when it considers appropriate.

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

(a) the presence or absence of any patent, intellectual property or similar rights subsisting in the product or any other product;

(b) the right of the Certificate holder to market, supply, install or maintain the product; and

(c) the actual works in which the product is installed, used and maintained, including the nature, design, methods and workmanship of such works.

18.5 Any recommendations relating to the use or installation of this product which are contained or referred to in this Certificate are the minimum standards required to be met when the product is used. They do 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 or in the future; nor is conformity with such recommendations to be taken as satisfying the requirements of the 1974 Act or of any present or future 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 installation and use of this product.

BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

In the opinion of the British Board of Agrément, Renotherm is fit for its intended use provided it is installed, used and maintained as set out in this Certificate. Certificate No 02/3964 is accordingly awarded to Renotherm Ltd.

On behalf of the British Board of Agrément

Date of Second issue: 5th December 2005

Chief Executive

**Original Certificate issued 14th October 2002. This amended version includes updated Building Regulations, revised Thermal conductivity values and* Condensation risk *statement and new* Conditions of Certification.

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