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**Agrément
Certificate
No 93/2939**

*Fourth issue**

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 POLYURETHANE RIGID FOAM, USED AS A REPAIR MEDIUM ON TILED AND SLATED PITCHED ROOFS SUFFERING FROM NAIL FATIGUE.

- The product, applied to the underside of the roof, bonds slates or tiles to each other and to structural or supporting timbers to replace the anchorage of fixing nails.

- Renotherm also seals the gaps between slates or tiles, preventing the ingress of wind-blown rain, snow and dust.

- The product is installed by Renotherm Ltd's own installers, whose 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 roof repair materials with the Building Regulations. In the opinion of the BBA, the use of this product in an existing building is not subject to these Regulations, but action to satisfy Requirement C4 and Regulation 7 may be necessary for a 'Material change of use' as defined in Regulation 5(a).

Requirement: C2(b)

Resistance to moisture

Comment:

The product can contribute towards a roof meeting this Requirement. See section 9 of this Certificate.

Requirement: Regulation 7

Materials and workmanship

Comment:

The product is acceptable. See sections 13.1 to 13.3 of this Certificate.

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2 The Building Standards (Scotland) Regulations 1990 (as amended)



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 Technical Standards listed below.

| | | |
|-------------|------|---|
| Regulation: | 10 | Fitness of materials and workmanship |
| Standard: | B2.1 | Selection and use of materials, fittings, and components, and workmanship |
| Comment: | | The product is acceptable. See the <i>Installation</i> part of this Certificate. |
| Standard: | B2.2 | Selection and use of materials, fittings, and components, and workmanship |
| Comment: | | The product is an acceptable material. See sections 13.1 to 13.3 of this Certificate. |
| Regulation: | 17 | Resistance to moisture |
| Standard: | G3.1 | Resistance to precipitation — Resistance to precipitation |
| Comment: | | The product can contribute towards a roof meeting this Standard. See section 9 of this Certificate. |

3 The Building Regulations (Northern Ireland) 2000



In the opinion of the BBA, the use of this product in an existing building is not controlled by these Regulations, but action to satisfy Regulation B2 and C4 may be necessary for a 'Material change of use' under Regulation A9.

| | | |
|-------------|----|---|
| Regulation: | B2 | Fitness of materials and workmanship |
| Comment: | | The product is acceptable. See sections 13.1 to 13.3 of this Certificate. |
| Regulation: | C4 | Resistance to ground moisture and weather |
| Comment: | | The product can contribute towards a roof meeting this Regulation. See section 9 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 *14 Installation — Precautions* (14.1 to 14.6).

Technical Specification

5 Description

5.1 Renotherm is an HFC blown polyurethane rigid foam, spray applied to the underside of tiles and slates. The foam is built up to a total thickness of between 25 mm and 35 mm, in two or more passes. The maximum thickness of one pass should not exceed 20 mm.

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 Renotherm are delivered to site in drums (up to 250 kg capacity) bearing the product name, batch number and the BBA identification mark incorporating the number of this Certificate.

6.2 Drums should be stored in a dry and 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 suitable for use as a repair and stabilising system on unfelted slate or tiled pitched roofs suffering from the effects of nail corrosion. The anchorage originally supplied by the fixing nails is replaced by the adhesive properties of the foam.

7.2 Installation must be carried out only by Renotherm Ltd's own installers, whose operatives have received the appropriate training.

7.3 Roof spaces should have ventilation openings at eaves level to promote cross-flow of air such that the area provided is at least equal to that of an opening of 10 mm running the full length of the eaves. Alternatively, the relevant recommendations given in Clause 9.4.7 of BS 5250 : 2002 should be met.

7.4 Where the ventilation of the roof space is inadequate or where airflow across the roof space is restricted by design features, additional passages for ventilation to the roof space must be provided at eaves or ridges, as appropriate.

7.5 Renotherm must not come into direct contact with flue pipes or chimneys within the loft space. Approved Document J 1/2/3 *Heat producing appliances* gives advice as to the required actions to be taken with regard to the separation of flue pipes or chimneys from combustible materials.

7.6 Where the temperature of the flue gases, under the worst operating conditions, is unlikely to exceed 260°C, flue pipes to gas or oil burning appliances should be separated from the foam by a non-combustible sleeve enclosing an air space of at least 25 mm around the pipe.

7.7 With all other flue pipes one of the following actions must be taken:

- an air space of at least three times the diameter of the pipe must be left between the pipe and the foam
- a minimum thickness of 200 mm of solid non-combustible material must separate the pipe from the foam
- the pipe must be lagged with a minimum thickness of 25 mm of non-combustible material extending 150 mm above and below the proposed foam thickness, and an air space of at least 1½ times the diameter of the pipe, or at least 115 mm thickness of solid non-combustible material, must separate the pipe from the foam, or
- an air space of at least 1½ times the diameter of the pipe must be left between the pipe and the foam, with a non-combustible shield placed 12.5 mm away from the foam.

7.8 Damaged, dislodged or missing slates or tiles must be replaced prior to the installation of Renotherm to ensure that the risk of subsequent water penetration is kept to an absolute minimum.

7.9 Renotherm must not be installed over wet or rotting timbers. These timbers should be renewed prior to installation of the foam.

7.10 Renotherm must not be applied over electrical cables or existing vents or ventilation gaps. Where accidental coverage occurs the foam must be removed immediately after installation. Water tanks must be covered to prevent contamination during installation.

7.11 Pitched roofs are defined for the purpose of this Certificate as those roofs having a pitch in excess of 15°.

7.12 Non-combustible materials are defined for the purposes of this Certificate as those materials classified as non-combustible by test or assessment by a UKAS⁽¹⁾ accredited laboratory, BRE, or an independent consultant with appropriate experience.

(1) United Kingdom Accreditation Service.

8 Adhesion

8.1 Test data indicate that the adhesive properties to a slate or clay tile roof are sufficient to withstand

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the expected wind loads, thermal cycling and minor structural movements likely to occur in practice.

8.2 Where the roof covering is of other than clay or slate, ie concrete tiles, synthetic slate, or where the quality of the surfaces to which Renotherm is to be applied is in doubt, ie soft slate, the adhesive characteristics of foam to these surfaces must be established.

8.3 Foam adhering to the underside of slates or tiles will significantly increase their attachment. The likelihood of future alterations to the roof, including removal of slates or tiles for re-use, should be taken into account when considering the use of the product.

9 Weathertightness



Test data confirm that when Renotherm is correctly applied it will contribute towards the roof covering resisting the passage of water, wind-blown snow and dust into the interior of a building.

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 In the opinion of the BBA, Renotherm, should not affect the external fire rating of a slated or tiled roof.

10.3 The product should be considered as a combustible material and must be kept away from flue pipes, as described in sections 7.5 to 7.7. The product must always be protected from naked flames and other ignition sources, even after installation.

11 Thermal characteristics and condensation risk

11.1 Renotherm can modify the hygrothermal characteristics of a slated or tiled roof with no existing underlay, by eliminating the free passage of air through the tiles and slates.

11.2 Where the roof space has inadequate ventilation, the provision for additional ventilation passages must be made prior to installation of the foam.

11.3 Where inadequate ventilation is unavoidable, ie in structurally confined areas, increased risk of condensation may result and the advice of the Certificate holder should be sought. Consideration must be given to the treatment of timbers, at roof and ceiling levels in these cases. However, such treatment, eg use of preservatives on timber, may reduce the adhesive characteristics of the foam in areas of contact.

11.4 The insulation properties of Renotherm have not been assessed and the advice of the Certificate holder should be sought regarding the use of insulation at ceiling level.

11.5 It is good practice when installing the product to take steps to reduce the level of moisture vapour penetrating the roof space (eg by sealing any penetrations through the ceiling and fitting weatherstripping to hatch covers).

12 Maintenance and repair

12.1 Slates and tiles treated with Renotherm will be less prone to damage by impact due to the foam distributing the forces.

12.2 Where slates and tiles are damaged after installation, they may be replaced by cutting away the foam from the underside, replacing the slate or tile and re-treating the affected area.

13 Durability



13.1 From accelerated weathering tests it is confirmed that a satisfactory retention of physical properties is achieved.

13.2 All available evidence, including the examination of the product's performance in use, suggests that the life of a slated or tiled roof will be extended by at least 20 years.

13.3 Test data confirm that a roof treated with Renotherm has sufficient cohesive and compressive strength to transfer the loads imposed by the roof covering to the roof structure should the tiling battens become damaged at a later date.

Installation

14 Precautions

14.1 To prevent Renotherm 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.

14.2 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 manufacturer's instructions must be followed at all times.

14.3 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.

14.4 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 manufacturer.

14.5 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 Renotherm Ltd should be discussed and measures agreed to deal with them effectively.

14.6 After installation, fire warning labels must be placed in prominent positions. 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 Preparation

15.1 A site survey should be performed by the Certificate holder's own surveyors to establish whether preliminary repairs are required and to check that the roof void is adequately ventilated. The positioning of access and power points is also established prior to work commencing.

15.2 Preliminary repairs should be made to structural timbers, and to the slates or tiles. Damp and rotting timbers should be renewed. Dislodged, damaged or missing slates or tiles are re-positioned or replaced and held in position using a silicone mastic.

15.3 Access boards and lighting should be positioned in the roof void. Water tanks are covered to prevent contamination and blockage due to overspray.

15.4 Contamination in the form of dirt, dust, shale deposits and grease should be removed from the underside of the roof. Any underlay or loose torching must also be removed prior to the application of Renotherm.

16 Application

16.1 Renotherm should be applied by spray to the underside of the slates or tiles between rafters, starting at the eaves and working up towards the ridge.

16.2 Renotherm should be applied in a series of coats to a total thickness of between 25 mm and 35 mm. No coat should be applied at a thickness of more than 20 mm. Subsequent coats are applied once the foam reaction has occurred, and within 10 minutes of the previous coat.

16.3 If the roof to be treated is cold, and/or if there is a risk of tiles or slates lifting due to the pressure created by the foaming process, it is recommended that the first coat should not exceed a thickness of 5 mm.

16.4 Care must be taken not to apply Renotherm to the face of the rafters, flue pipes, main roof trusses, electrical cables or below the lowest tiling batten.

16.5 After completion a survey should be performed to check that ventilation arrangements, electrical cables and flues are not obstructed. Corrective measures must be taken to clear such obstruction.

Technical Investigations

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

17 Tests

17.1 A series of tests was carried out on the Renotherm HFC blown foam to establish physical characteristics. The results of the tests are given in Table 1.

Table 1 General physical properties

| Test (units) | Method ⁽¹⁾ | Mean result |
|---|-------------------------------|-------------|
| Density (kgm ⁻³) | BS 4370-1(2) | 42.0 |
| Water vapour permeability (gm ⁻² day ⁻¹) | BS 4370-2(8) (88% RH/38°C) | 143.4 |
| Dimensional stability (%) (thickness) | BS 4370-1(5B) | |
| 24 hours at -15°C | | -0.53 |
| 24 hours at 80°C | | 0.75 |
| 24 hours at 100°C | | 0.93 |
| Compressive strength (kPa) unaged | BS 4370-1(3) | 220 |

(1) The test document is detailed in the *Bibliography*. Numbers in the table refer to sections/parts of the document.

17.2 Existing test data held by the BBA on Renotherm was examined. The test data related to:

- wind uplift
- thermal shock
- tensile adhesion
- shear strength.

17.3 Supplementary test data were supplied by the manufacturer relative to:

- closed-cell content to BS EN ISO 4590 : 1995 — 88%
- thermal conductivity to BS EN 12667 : 2001 — 0.022 Wm⁻¹K⁻¹ (aged sample)
- burning characteristics to BS 4735 : 1974 — extent of burn 3.6 mm.

18 Investigations

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

18.2 A site survey was performed to establish the material's performance in use.

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

Bibliography

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 4370-1 : 1988 *Methods of test for rigid cellular materials — Methods 1 to 5*

BS 4370-2 : 1973 *Methods of test for rigid cellular materials — Methods 6 to 10*

BS 4735 : 1974 *Laboratory method of test for assessment of the horizontal burning characteristics of specimens no larger than 150 mm x 50 mm x 13 mm (nominal) of cellular plastics and cellular rubber materials when subjected to a small flame*

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

BS EN 12667 : 2001 *Thermal performance of building materials and products — Determination of thermal resistance by means of guarded hot plate and heat flow meter methods — Products of high and medium thermal resistance*

BS EN ISO 4590 : 1995 *Rigid cellular plastics — Determination of the volume percentage of open cells and of closed cells*

Conditions of Certification

19 Conditions

19.1 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.

19.2 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.

19.3 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.

19.4 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.

19.5 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.



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 93/2939 is accordingly awarded to Renotherm Ltd.

On behalf of the British Board of Agrément

Date of Fourth issue: 31st January 2005

A handwritten signature in black ink, appearing to read 'P. C. Newson', is written over a light grey background.

Chief Executive

**The original Certificate was issued on 13th September 1993. This amended version includes a change of blowing agent from HCFC to HFC, revision of test results, deletion of service and performance data, references to revised Building Regulations, CDM Regulations and Standards and revised Conditions of Certification.*

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