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Agrément Certificate No 97/3337
*Second issue**

BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

Designated by Government to issue European Technical Approvals

RAWMAT HDB WATERPROOFING SYSTEM

Système d'étanchéité
Bauwerksabdichtungen

Product

- *THIS CERTIFICATE RELATES TO THE RAWMAT[1] HDB WATERPROOFING SYSTEM, A WATERPROOFING MEMBRANE CONSISTING OF A 4.6 mm THICK PRE-HYDRATED HIGH DENSITY BENTONITE LAYER, SURFACED ON BOTH SIDES BY GEOTEXTILE FABRIC.*
- *The system is used to protect underground structures against water from the ground, generally in accordance with BS 8102 : 1990.*
- *The system does not require priming or protection boards.*
- *The system is satisfactory for Type A basement construction as defined in Table 1 of BS 8102 : 1990.*

continued

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 waterproofing systems with the Building Regulations. In the opinion of the BBA, the Rawmat HDB Membrane Waterproofing System, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements.

Requirement:	A1	Loading
Comment:		When adequately confined, the system satisfies this Requirement. See section 13 of this Certificate.
Requirement:	C4	Resistance to weather and ground moisture
Comment:		The system is an effective barrier to liquid water and water vapour. See section 9 of this Certificate.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The system is acceptable. See section 14 of this Certificate.

continued

• *The system includes other bentonite products which are used to seal construction joints, form details and to ensure the membrane is continuous.*

• *The system must never remain permanently exposed.*

(1) Rawmat is a registered trademark of Rawell Environmental Ltd.

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

In the opinion of the BBA, the Rawmat HDB Membrane Waterproofing System, if used in accordance with the provisions of this Certificate, will satisfy or contribute to satisfying the various Regulations and related Technical Standards as 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 can contribute to a construction meeting this Standard. See the *Installation* 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 section 14 of this Certificate.
Regulation:	11	Structure
Standard:	C2.1	Stability
Comment:		The system is acceptable when installed in accordance with section 13 of this Certificate.
Regulation:	17	Resistance to moisture
Standard:	G2.6	Preparation of a site and resistance to moisture from the ground — Resistance to moisture from the ground
Comment:		The system is an effective barrier to liquid water and water vapour. See sections 9 of this Certificate.

3 The Building Regulations (Northern Ireland) 2000

In the opinion of the BBA, the Rawmat HDB Membrane Waterproofing System, if used in accordance with this Certificate, will satisfy or contribute to satisfying the various Building Regulations as listed below.

Regulation:	B2	Fitness of materials and workmanship
Comment:		The system is acceptable. See section 14 of this Certificate.
Regulation:	C4	Resistance to ground moisture and weather
Comment:		The system is an effective barrier to liquid water and water vapour. See section 9 of this Certificate.
Regulation:	D1	Stability
Comment:		When adequately confined, the product satisfies this Regulation. See section 13 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:	*5 Description* (5.3) and 6 *Delivery and site handling* (6.1 and 6.4).

Technical Specification

5 Description

5.1 Rawmat HDB membrane consists of a 4.6 mm layer of non-granular, pre-hydrated bentonite. The face side is a polypropylene fabric woven with air textured multi-filament yarns weighing 112 gm^{-2}. The reverse side is a polyester scrim weighing 30 gm^{-2}.

5.2 The product is available in rolls 1 m by 5 m and 2 m by 50 m, which achieve an applied bentonite weight of approximately 8 kgm^{-2}.

5.3 Components used in the system are:

- Rawseal[(1)] waterstop — a range consists of flexible pre-hydrated bentonite in square (SQ25), rectangular (RC50), triangular (TR35) and strip cross-sections, used to provide a seal at construction joints, form details and to ensure the membrane is continuous.
- Rawpaste Mastic — a trowelling grade mastic, based on hydrated bentonite, designed for use with the membrane and waterstops. It is used to provide a waterproof seal at surface irregularities and at gaps around service entries. It can also be used to temporarily hold the membrane against vertical concrete surfaces.
- Rawtite Rapid Bond Adhesive— a cyanoacrylate adhesive used during installation to provide a temporary bond between waterstops and substrate. It is also used as an alternative to nailing, to fix the membrane to vertical surfaces. Safety precautions are provided on each container of adhesive.

- Rawtite PR Primer — an accelerating agent for use with Rawtite Rapid Bond Adhesive. It contains linear aliphatic alcohols and safety precautions are provided on each container of primer.

(1) Rawseal is a registered trademark of Rawell Environmental Ltd.

5.4 Rawmat HDB is manufactured in a controlled continuous process, in which sodium bentonite is hydrated, and extruded between the facing sheets. The resulting laminate is then cut to length and reeled.

5.5 Quality control tests are carried out on Rawmat HDB membrane and Rawseal waterstops for:

- dimensions
- weight
- swelling characteristics
- density
- moisture content
- water permeability.

6 Delivery and site handling

6.1 The 1 m rolls are supplied on pallets containing 30 rolls, with a total weight of approximately 1330 kg. The 2 m rolls are supplied singly and weigh approximately 900 kg.

6.2 Rawseal waterstops are supplied in cardboard boxes on pallets. Rawpaste Mastic is supplied in plastic buckets.

6.3 Rolls of membrane and waterstop are supplied wrapped in polythene sheet to protect them from drying out. They should be stored in the original packaging, protected from liquid water and direct sunlight and away from the possibility of mechanical damage.

6.4 Heavier rolls should be moved using lifting bar and chains, incorporating a spreader bar to prevent damage to the ends of the rolls.

Design Data

7 General

7.1 The Rawmat HDB Waterproofing System is satisfactory for use in Type A structures, in grades 2, 3 and 4, as defined in Table 1 of BS 8102 : 1990, to waterproof basements by external tanking, and to waterproof the roofs of underground structures.

7.2 Installed correctly, Rawmat HDB will not permit the passage (tracking) of water between the membrane and the concrete structure to which it is fixed.

7.3 Rawmat HDB must be contained properly to ensure that a watertight seal is achieved in service. The quality of the backfilling operation is therefore important in order to achieve the required compaction, and should be adequately supervised on site (see section 16.3).

8 Practicability of installation

8.1 The membrane is cut to shape and subsequent rolls are overlapped. Rawseal waterstops and Rawpaste Mastic can be used to assist continuity of the seal.

8.2 The Rawmat HDB membrane may be installed under most normal site conditions, including sub-zero temperatures.

8.3 The membrane is pre-hydrated and can be formed and cut easily. These properties will be impaired and the membrane may curl at the edges if subject to prolonged exposure to drying conditions. It is recommended that the installation is conducted systematically, and that backfilling or concrete is applied promptly, shortly after installation. Temporary protection from rain or drying conditions can be provided by covering with thin plastic sheeting.

9 Resistance to water vapour and liquid water

The system provides an effective barrier to the transmission of water vapour and water under pressure.

10 Chemical resistance

10.1 The membrane is pre-hydrated, and is relatively unaffected by electrolytes.

10.2 Rawmat is not affected by organic contaminants and can tolerate highly acidic or alkaline conditions.

11 Resistance to puncturing

The membrane is relatively tolerant to damage; any such areas are able to self-heal when they are further hydrated.

12 Resistance to substrate movement

The membrane is not bonded to the substrate and can thus accommodate any likely structural movement in service, eg differential settlement or movement at joints.

13 Resistance to loading

Provided the membrane is not subject to point loading, a Rawmat HDB installation beneath a foundation slab will transmit dead and imposed loads to the ground safely and without excessive deformation.

14 Durability

When fully protected and subject to normal service conditions, the system will provide an effective barrier to the transmission of liquid water and water vapour for the life of the building in which it is incorporated.

Installation

15 General

15.1 Installation of the Rawmat HDB Waterproofing System is conducted by competent operatives after instruction or training from the Certificate holder's representative or distributor.

15.2 Rawmat HDB membrane is applied with the scrim geotextile (white) side in contact with the walls and roof of the structure. However, under a floor slab the woven fabric (black) side must be uppermost.

15.3 Cutting and trimming of the membrane is performed using a kraft knife. Cuts should be reinforced by application of patches and additional mastic. Minor repairs may be carried out by the application of mastic. Seriously damaged sections of membrane must be cut away and replaced.

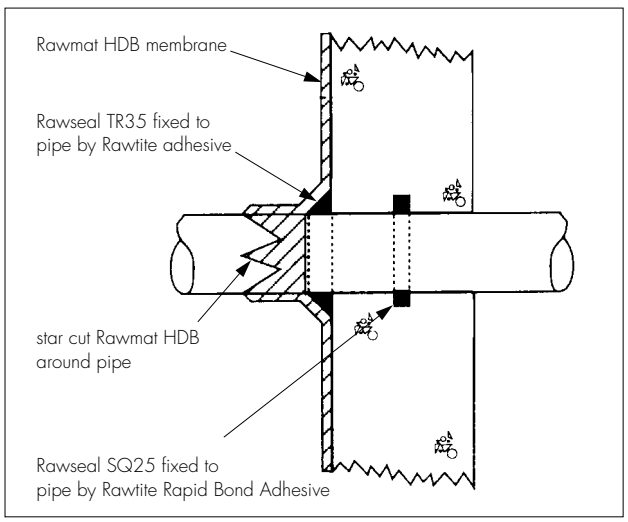
15.4 A continuous waterproof barrier is achieved using lap joints of minimum width 100 mm. These joints may be temporarily secured by Rawtite Rapid Bond Adhesive, or caulked with Rawpaste Mastic. Wherever possible, sheets should be staggered to prevent a concentration of laps at any particular point.

15.5 Surfaces to be waterproofed may be damp, but should be reasonably smooth and compacted (any cracks or voids should be filled and levelled using Rawpaste Mastic) and free from standing water.

15.6 Before the placing of reinforcement on studs, the membrane is usually protected by covering with a 50 mm screed of lean concrete. If a protective screed is not applied, small pads or cushions of concrete should be placed underneath the studs to spread the load.

15.7 Sealing around protrusions through the membrane, such as pile caps and service pipes, is accomplished by cutting out a star-shaped hole in the membrane, and fitting over the protrusion, bedding the membrane onto a combination of Rawseal TR35 and Rawpaste Mastic (see Figure 1).

Figure 1 Detailing at service entry



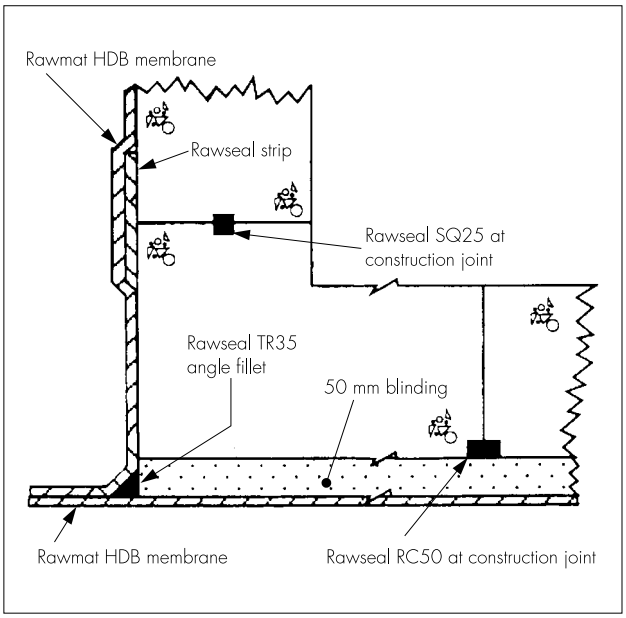
15.8 The applied membrane is covered with poured concrete or backfilled as soon as possible after placing.

16 Procedure

Vertical surfaces

16.1 Connection with any horizontal Rawmat HDB membrane protruding from the bottom of the slab should be made using Rawseal TR35 fillet working from the base up the wall as shown in Figure 2. The horizontal membrane should be cleaned prior to any overlapping.

Figure 2 Corner detail on hydrostatic structure



16.2 The membrane can be fixed to the vertical surface using proprietary fasteners incorporating large washers to spread the load. Alternatively, the wall is first spot primed with Rawtite PR primer, then Rawtite Rapid Bond Adhesive is applied in spots or beads onto the membrane surface and pressed against the primed concrete to form an instant seal.

16.3 Backfilling should be carried out as soon as possible after placing the Rawmat HDB sheets. Backfill material should be free from building debris and angular aggregate, and should be compacted to a minimum 85% Modified Proctor.

Horizontal surfaces

16.4 The membrane should extend a minimum of 150 mm outside the perimeter of the shuttering to enable a good lap joint to be made with the vertical sheets (see Figure 2).

Technical Investigations

The following is a summary of the technical investigations carried out on the Rawmat HDB Waterproofing System.

17 Tests

17.1 A trial installation was built using the Rawmat HDB Waterproofing System and observations were made of the ease of installation at corners, laps and around obstructions, and the rate and pattern of water penetration.

17.2 Tests were conducted to determine the resistance to electrolytes.

18 Investigations

18.1 The manufacturing process was examined, and the raw material specifications and quality control procedures established.

18.2 An assessment was made of independent reports relating to:

- resistance to hydrostatic pressure(1)
- effect of wet/dry cycling(1)
- freeze/thaw resistance(1)
- effect of electrolytes
- resistance to loading
- chemical resistance.

(1) In tests using a tri-axial permeability cell and at pressures up to 45 metres of water, Rawmat HDB was observed to provide an effective barrier to the transmission of water. This water resistance was maintained with samples which had been exposed to both freeze/thaw and wet/dry cycling.

18.3 Visits were made to sites in progress to assess the application properties of the system.

18.4 A survey of contractors was conducted to assess the product's application properties and performance in use.

Bibliography

BS 8102 : 1990 *Code of practice for protection of structures against water from the ground*

Conditions of Certification

19 Conditions

19.1 This Certificate:

(a) relates only to the product that is 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) has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective;

(d) is copyright of the BBA.

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, shall be construed as 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 fabricating process(es) 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 by the BBA or its agents; and

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

19.4 In granting this Certificate, the BBA makes no representation as to:

(a) the presence or absence of any patent 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 nature of individual installations of the product, including methods and workmanship.

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.

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TECHNICAL APPROVALS FOR CONSTRUCTION

In the opinion of the British Board of Agrément, the Rawmat HDB Membrane Waterproofing System is fit for its intended use provided it is installed, used and maintained as set out in this Certificate. Certificate No 97/3337 is accordingly awarded to Rawell Environmental Ltd.

On behalf of the British Board of Agrément

Date of Second issue: 27th June 2003

Chief Executive

**Original Certificate issued 26th February 1997. This amended version includes a change to the name and address of the Certificate holder, revised national Building Regulations, inclusion of the CDM Regulations, and new* Conditions of Certification.

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