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Agrément Certificate

97/3325

Product Sheet 10

GCP CONSTRUCTION STRUCTURAL WATERPROOFING MEMBRANES

PREPRUFE 160R PLUS

This Agrément Certificate Product Sheet⁽¹⁾ relates to Preprufe⁽²⁾ 160R PLUS, a pre-applied damp-proof and waterproof membrane for use on below ground structures. The product is also used to protect against radon, methane and carbon dioxide gases from the ground.

(1) Hereinafter referred to as 'Certificate'.

(2) Preprufe is a registered trademark.

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

Resistance to water and water vapour — the product, including joints, provides an effective barrier to the passage of water under hydrostatic pressure and water vapour from the ground (see section 6).

Resistance to underground gases — the product will contribute to restricting the ingress of methane, carbon dioxide and radon gases into the building (see section 7).

Resistance to mechanical damage — the product will accept, without damage, the loads associated with installation (see section 8).

Adhesion and stability — the adhesion of poured concrete to the product is satisfactory (see section 9).

Durability — under normal service conditions the product will provide an effective barrier to the transmission of liquid water, water vapour, radon, methane and carbon dioxide gases for the lifetime of the structure in which it is installed (see section 12).



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

Claire Curtis-Thomas

Date of Second issue: 19 November 2017

John Albon — Head of Approvals
Construction Products

Claire Curtis-Thomas
Chief Executive

Originally certificated on 10 December 2013

Certificate amended on 25 January 2018 to update test data.

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

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

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Regulations

In the opinion of the BBA, Preprufe 16OR PLUS, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):



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

Requirement:	C1(2)	Site Preparation and resistance to contaminants
Comment:		The product will contribute to a structure to satisfy this Requirement. See section 7 of this Certificate.
Requirement:	C2(a)	Resistance to moisture
Comment:		The product will enable a structure to satisfy this Requirement. See section 6.1 of this Certificate.
Regulation:	7	Materials and workmanship
Comment:		The product is acceptable. See section 12 and the <i>Installation</i> part of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)	Durability, workmanship and fitness of materials
Comment:		The use of the product satisfies the requirements of this Regulation. See section 12 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards applicable to construction
Standard:	3.1	Site preparation — harmful and dangerous substances
Standard:	3.2	Site preparation — protection from radon gas
Comment:		When properly installed in a correctly designed structure, the product will contribute to restricting the movement of radon, methane and carbon dioxide gases within the ground slab and will contribute to compliance with these Standards with reference to clauses 3.1.2 ⁽¹⁾⁽²⁾ , 3.1.6 ⁽¹⁾⁽²⁾ , 3.1.7 ⁽¹⁾⁽²⁾ , 3.1.8 ⁽¹⁾⁽²⁾ , 3.2.1 ⁽¹⁾⁽²⁾ and 3.2.2 ⁽¹⁾⁽²⁾ . See section 7 of this Certificate.
Standard:	3.4	Moisture from the ground
Comment:		The product will enable a structure to satisfy the requirements of this Standard, with reference to clauses 3.4.2 ⁽¹⁾⁽²⁾ , 3.4.4 ⁽¹⁾⁽²⁾ and 3.4.6 ⁽¹⁾⁽²⁾ . See section 6.1 of this Certificate.
Standard:	7.1(a)(b)	Statement of sustainability
Comment:		The product can contribute to meeting the relevant requirements of Regulation 9, Standards 1 to 6 and therefore will contribute to a construction meeting a bronze level of sustainability as defined in this Standard.
Regulation:	12	Building standards applicable to conversions
Comment:		All comments given for the product under Regulation 9, Standards 1 to 6 also apply to this Regulation, with reference to clause 0.12.1 ⁽¹⁾⁽²⁾ and Schedule 6 ⁽¹⁾⁽²⁾ . (1) Technical Handbook (Domestic). (2) Technical Handbook (Non-Domestic).



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

Regulation:	23(a)(i)(iii)(iv)(b)(i)	Fitness of materials and workmanship
Comment:		The product is acceptable. See section 12 and the <i>Installation</i> part of this Certificate.
Regulation:	26(a)	Preparation of site and resistance to dangerous and harmful substances
Comment:		The product will contribute to a structure to satisfy the requirements of this Regulation. See section 7 of this Certificate.
Regulation:	28(a)	Resistance to moisture and weather
Comment:		The product will enable a structure to satisfy the requirements of this Regulation. See section 6.1 of this Certificate.

Construction (Design and Management) Regulations 2015

Construction (Design and Management) Regulations (Northern Ireland) 2016

Information in this Certificate may assist the client, designer (including Principal Designer) and contractor (including Principal Contractor) to address their obligations under these Regulations.

See sections: 1 *Description* (1.3) and 3 *Delivery and site handling* (3.4) of this Certificate.

Additional Information

NHBC Standards 2017

In the opinion of the BBA, Preprufe 16OR PLUS, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements in relation to *NHBC Standards*, Technical Requirement R3 and Chapters 4.1 *Land quality – managing ground conditions*, 5.1 *Substructure and ground bearing floors* clause 5.1.20 *Damp-proofing concrete floors*, for use below the slab and in sandwich constructions, and 5.4 *Waterproofing of basements and other below ground structures*.

Where Grade 3 waterproofing protection is required and the below ground wall retains more than 600 mm measured from the top of the retained ground to the lowest finished floor level, the product must be used in combination with either Type B or Type C waterproofing protection, as defined in BS 8102 : 2009.

The Certificate holder should be consulted for approved Type B and Type C solutions.

CE marking

The Certificate holder has taken the responsibility of CE marking the product in accordance with harmonised European Standard EN 13967: 2012. An asterisk (*) appearing in this Certificate indicates that data shown are given in the manufacturer's Declaration of Performance.

Technical Specification

1 Description

1.1 Preprufe 160R PLUS is a composite waterproofing membrane comprising a high density polyethylene (HDPE) film, a pressure sensitive adhesive and a trafficable weather resistant coating with dual ziplaps for added security at overlaps.

1.2 The product is available in two versions, Preprufe 160R PLUS for application above +5°C and Preprufe 160R PLUS LT for application between -5°C and +30°C.

1.3 The nominal characteristics of the product are:

Thickness* (mm)	0.8
Width* (m)	1.18
Roll length* (m)	36.65
Roll weight (kg)	42
Mass per unit area* (kg·m ⁻²)	0.810
Watertightness* (60 kPa)	Pass
Tensile strength* (N per 6 mm)	60 (longitudinal) and 60 (transverse)
Elongation* (%)	4.5 (longitudinal) and 4 (transverse)
Nail tear strength* (N)	300
Compatibility with bitumen*	Pass.

1.4 Ancillary items available for use with the product and included in this assessment are:

- Preprufe Tape — a tape for use to overband end laps, cut edges and repairs. An LT grade is available for low temperature applications between -5°C and 30°C and an HC grade for use in hot climates above +10°C.
- Adcor 500S, Adcor SAS 500S and Adcor 550MI – hydro-expansive waterstops for use in construction joints (subject of BBA Certificate 13/5006).

1.5 The nominal characteristics of the Preprufe Tape are:

Thickness* (mm)	0.7
Width* (m)	0.1
Roll length* (m)	15
Roll weight* (kg)	2
Mass per unit area* (kg·m ⁻²)	1.33.

1.6 Ancillary items for use with the product but outside the scope of this Certificate are:

- Bituthene LM — liquid-applied compound for sealing around penetrations and irregular surfaces.

2 Manufacture

2.1 Preprufe 160R PLUS is manufactured by a compound mixing and coating process. The adhesive compound is blended, applied and laminated onto the HDPE film.

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

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

2.3 The management system of the manufacturer, GCP Applied Technologies Inc., has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 by Intertek (Certificate QMS-0816a-01).

3 Delivery and site handling

- 3.1 Rolls of the product are packed in cardboard boxes marked with the roll batch number, the Certificate holder's name and the BBA logo incorporating the number of this Certificate.
- 3.2 Rolls must be stored under cover in a cool, dry area to prevent damage.
- 3.3 Bituthene LM is delivered to site in 5.7 kg packs.
- 3.4 The Certificate holder has taken the responsibility of classifying and labelling the product under the *CLP Regulation (EC) No 1272/2008 on the classification, labelling and packaging of substances and mixtures*. Users must refer to the relevant Safety Data Sheet(s).

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Preprufe 160R PLUS.

Design Considerations


4 Use

- 4.1 Preprufe 160R PLUS is satisfactory for use as a Type A waterproofing protection as defined in BS 8102 : 2009 for the waterproofing of new-build underground structures, and as a damp-proofing membrane for solid floors in accordance with the relevant clauses of CP 102 : 1973, section 3.
- 4.2 The product can be used externally to provide an effective barrier to the transmission of liquid water where Grades 1 to 3 waterproofing protection is required, as defined in Table 2 of BS 8102 : 2009. The product must not be used for negative side pressure waterproofing applications.
- 4.3 Where Grade 3 waterproofing protection is required the environment must also be controlled by use of ventilation, dehumidification and/or air conditioning as appropriate to ensure dampness does not occur. See also the *Additional Information* section of this Certificate relating to the *NHBC Standards*.
- 4.4 The product is compatible with concrete and is resistant to those chemicals likely to occur in normal service conditions.
- 4.5 The product is satisfactory for use as a radon gas resistant membrane. It will also contribute to restricting the passage of methane and carbon dioxide gases (see section 7). Installations must be verified in accordance with BS 8485 : 2015.

5 Practicability of installation

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

6 Resistance to water and water vapour

-  6.1 The product, including joints, when completely sealed and consolidated, will adequately resist the passage of water under hydrostatic pressure and moisture from the ground and so meet the relevant requirements of the national Building Regulations.
- 6.2 The product is impervious to water and will provide a waterproof layer capable of accepting minor structural movement without damage.

7 Resistance to underground gases


-  7.1 Preprufe 160R PLUS and Preprufe 160R PLUS LT will contribute to restricting the ingress of methane, carbon dioxide and radon gases into buildings from landfill and naturally occurring sources.
- 7.2 When used as part of the structural barrier in basement floor and wall constructions conforming to BS 8102 : 2009, Grade 2 and 3 waterproofing, Preprufe 160R PLUS and Preprufe 160R PLUS LT will restrict the ingress of radon, methane and carbon dioxide gases into buildings from landfill and naturally occurring sources, with reference to BS 8485 : 2015, Table 5.
- 7.3 Measured gas permeabilities on the membrane are given in Table 1.

Table 1 Gas permeability

Gas	Method	Membrane	Result
Methane ⁽¹⁾	BS ISO 15105-1 : 2007	Preprufe 160R PLUS (jointed)	78.5 ml·m ⁻² ·day ⁻¹ ·atm ⁻¹
		Preprufe 160R PLUS LT (jointed)	77.8 ml·m ⁻² ·day ⁻¹ ·atm ⁻¹
Radon	K124/02/95 (Czech Technical University)	Preprufe 160R Plus (unjointed)	5.6 x 10 ⁻¹² m ² ·s ⁻¹

1) BS 8485 : 2015 requires that the methane gas transmission rate measured in accordance with ISO 15105-1 : 2007 for gas-resistant membranes is <40 ml·m⁻²·day⁻¹·atm⁻¹.

7.4 BRE Report BR 211 : 2015 recommends a 300 µm thick polyethylene sheet as the minimum required thickness for a radon gas resistant membrane. It is generally accepted that other materials with comparable or higher gas resistance are suitable, provided they can withstand the construction processes. In the opinion of the BBA, the product satisfies these criteria.

8 Resistance to mechanical damage

8.1 The membrane will not be damaged by normal foot or site traffic and is suitable for use without a protection layer. However, care must be taken to avoid point loading that could damage the product. Reinforcement should be placed on spreader type spacer blocks, or similar.

8.2 In horizontal applications the product should be placed onto suitably prepared surfaces, such as concrete blinding or any others advised by the Certificate holder.

9 Adhesion and stability

The adhesion of poured concrete to the product, and at joints between different sections of the product, is satisfactory. The properties are such as to accommodate minor movements likely to occur under normal service conditions in the structure in which the product is incorporated.

10 Effects of temperature

The product will remain flexible and capable of being formed at the minimum recommended temperatures (see section 13.5).

11 Maintenance

As the membrane is protected by the concrete placed against it and has suitable durability (see section 12), maintenance is not required. However, damage occurring prior to pouring of the concrete must be repaired (see section 15).

12 Durability



The membrane, when fully protected and subjected to normal service conditions, will provide an effective barrier to the transmission of water under hydrostatic pressure and water vapour and will restrict the ingress of radon, methane and carbon dioxide gases during the lifetime of the structure.

Installation

13 General

13.1 Preprufe 16OR PLUS must be installed in accordance with the relevant requirements of BS 8102 : 2009 and the Certificate holder's instructions. Additional guidance on the use of damp-proof membrane (dpm) materials is available in BS 8000-4 : 1989.

13.2 All surfaces to which the membrane is to be applied must be sound and solid to eliminate movement during the pouring of concrete. The substrate must have a smooth finish with no gaps or voids greater than 12 mm. Substrates do not require priming prior to installation of the product.

13.3 Horizontal substrates suitable for application are either of monolithic concrete construction or well compacted sand blinding on a granular fill. For use on other substrates, the advice of the Certificate holder should be sought. The substrate must be free from sharp protrusions and loose aggregate. The substrate does not need to be dry, but must be free from standing water to avoid contamination of the overlap areas.

13.4 Vertical substrates suitable for application are either of concrete or 19 mm plywood and provide support for the membrane. The plywood sheets must be closely butted and not more than 12 mm out of alignment. For use on other substrates, the advice of the Certificate holder should be sought.

13.5 The membrane must be installed at temperatures above -5°C . At temperatures below 0°C , the use of Preprufe Tape LT is required at all laps and detailing.

13.6 The membrane is supplied with coloured zip strips at the top and bottom of the seam area on the edge of the roll to enable fully-bonded laps between adjacent rolls.

14 Procedure

14.1 Edge and end laps for Preprufe 16OR PLUS and end laps for Preprufe Tape must be a minimum of 75 mm. Laps must be dry, clean and free from dust.

14.2 End laps and cut edges must be overbanded using Preprufe Tape. The overlap area is wiped with a damp cloth to ensure that the area is clean and free from dust, and allowed to dry prior to jointing. The tape is centred over the lap and rolled firmly to ensure a watertight seal. The plastic release liner must be removed.

Horizontal application

14.3 The membrane is placed with the green zip strip facing the concrete pour. The membrane is rolled out with the HDPE side facing the substrate.

14.4 End laps should be staggered to avoid build-up of layers.

14.5 Subsequent sheets are positioned to overlap the preceding sheet by 75 mm along the marked selvedge. The green and blue zip strip are left on the membrane until the overlap procedure is completed.

14.6 The green and blue zip strips are peeled back and removed from the overlap area to provide an adhesive-to-adhesive bond at the overlap.

14.7 A heavy roller is used to ensure that a continuous bond is achieved without creases.

14.8 On completion of the installation, it must be ensured that all plastic zip strips have been removed from overlaps and tape, prior to pouring the concrete.

Vertical application

14.9 The membrane is placed with the green strip facing the concrete pour.

14.10 The membrane is mechanically-fixed vertically using flat-headed fixings appropriate to the substrate.

14.11 The top of the membrane is secured using a batten or fixing positioned 50 mm below the top edge.

14.12 The membrane is secured flat to the substrate using fixings at 600 mm centres. Fixings can be made through the selvedge to allow firmly rolled overlaps, which are covered by subsequent strips of membrane. Any exposed fixings must be patched with Preprufe Tape.

14.13 The green and blue zip strips are peeled back and removed from the overlap area to provide an adhesive-to-adhesive bond at the overlap.

14.14 A heavy roller is used to ensure that a continuous bond is achieved without creases.

14.15 On completion of the installation, it must be ensured that all plastic zip strips have been removed from overlaps and tape, prior to pouring the concrete.

15 Repair

Damage to the membrane can be repaired by patching using Preprufe Tape prior to pouring the concrete.

Technical Investigations

16 Tests

An assessment was made of data to EN 13967 : 2004 in relation to:

- visible defects*
- dimensions and tolerances*
- mass per unit area
- resistance to impact*
- reaction to fire*
- tensile strength and elongation* on controls and following 24 weeks at 90°C
- tear resistance*
- watertightness on controls following:
 - 12 weeks ageing at 70°C
 - 4 weeks ageing at 70°C subsequent to a compatibility with bitumen test*
 - 1 and 16 weeks immersion in lime water
- resistance to static loading*
- joint strength*
- water vapour transmission*.

17 Investigations

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

17.2 An evaluation was made of the results of test data on the permeability of radon, methane and carbon dioxide gases in relation to the product.

17.3 An evaluation was made of independent test data relating to the product's ability to accommodate crack cycling, and resistance to water pressure up to 700 kPa.

Bibliography

BS 8000-4 : 1989 *Workmanship on building sites — Code of practice for waterproofing*

BS 8102 : 2009 *Code of practice for protection of below ground structures against water from the ground*

BS 8485 : 2015 *Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings*

BS EN ISO 9001 : 2008 *Quality management systems — Requirements*

EN 13967 : 2004 + A1 : 2006 *Flexible sheets for waterproofing — Plastic and rubber damp proof sheets including plastic and rubber basement tanking sheet — definitions and characteristics*

EN 13967 : 2012 *Flexible sheets for waterproofing — Plastic and rubber damp proof sheets including plastic and rubber basement tanking sheet — definitions and characteristics*

ISO 15105-1 : 2007 *Plastics — Film and sheeting — Determination of gas-transmission rate — Differential-pressure methods*

BRE Report BR 211 : 2015 — *Radon: guidance on protective measures for new buildings*

CP 102 : 1973 *Code of practice for protection of buildings against water from the ground*

Conditions of Certification

18 Conditions

18.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page — no other company, firm, organisation or person may hold or claim that this Certificate has been issued to them
- 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.

18.2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

18.3 This Certificate will remain valid for an unlimited period provided that the product/system and its manufacture and/or fabrication, including all related and relevant parts and 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.

18.4 The BBA has used due skill, care and diligence in preparing this Certificate, but no warranty is provided.

18.5 In issuing this Certificate, the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

- 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
- actual installations of the product/system, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product/system is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product/system, including its manufacture, supply, installation, use, maintenance and removal
- any claims by the manufacturer relating to CE marking.

18.6 Any information relating to the manufacture, supply, installation, use, maintenance and removal 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, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue 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.

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