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**Agrément
Certificate
No 04/4075**

Designated by Government
to issue
European Technical
Approvals

XENITH SINGLE PLY PVC ROOF WATERPROOFING MEMBRANES

Membrane d'étanchéité
Wasserdichtungsmittel

Product




Typical installation

• THIS CERTIFICATE RELATES TO XENITH SINGLE PLY PVC ROOF WATERPROOFING MEMBRANES.

- The membranes are for use in mechanically fastened systems on flat and pitched roofs with limited access and loose-laid and ballasted on flat roofs with limited access.
- The membranes are manufactured in Israel by Haogenplast Ltd, and marketed in the United Kingdom by the Certificate holder.
- Installation must be carried out only by trained and approved contractors.

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 waterproofing systems with the Building Regulations. In the opinion of the BBA, Xenith Single Ply PVC Waterproofing Membranes if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements.

Requirement: B4(2)

External fire spread

Comment:

Data obtained from tests to BS 476-3 : 1958 indicate that on suitable non-combustible substructures the use of the membranes will enable a roof to be unrestricted under this Requirement. See sections 11.1 to 11.3 of this Certificate.

Requirement: C4

Resistance to weather and ground moisture

Comment:

Data for water resistance on the membranes, including joints, indicate that the systems meet this Requirement. See section 8.1 of this Certificate.

Requirement: Regulation 7

Materials and workmanship

Comment:

The membranes are acceptable materials. See section 13 of this Certificate.

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



In the opinion of the BBA, Xenith Single Ply PVC Waterproofing Membranes, 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 <i>Installation</i> part of this Certificate.
Standard:	B2.2	Selection and use of materials, fittings, and components, and workmanship
Comment:		The membranes comply with this Standard. See section 13 of this Certificate.
Regulation:	12	Structural fire precautions
Standard:	D9.1	Fire spread from an adjoining building
Comment:		Test data to BS 476-3 : 1958 indicate that on suitable non-combustible substructures the use of the membranes will be unrestricted by the requirements of this Standard. See sections 11.1 to 11.3 of this Certificate.
Regulation:	17	Resistance to moisture
Standard:	G3.1	Resistance to precipitation — Resistance to precipitation
Comment:		Data examined for water resistance on the membranes, including joints, indicate that the use of the systems can enable a roof to satisfy the requirements of this Standard. See section 8.1 of this Certificate.

3 The Building Regulations (Northern Ireland) 2000



In the opinion of the BBA, Xenith Single Ply PVC Waterproofing Membranes, 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 membranes are acceptable materials. See section 13 of this Certificate.
Regulation:	C4	Resistance to ground moisture and weather
Comment:		Data for water resistance on the membranes, including joints, indicate that the use of the systems can enable a roof to satisfy the requirements of this Regulation. See section 8.1 of this Certificate.
Regulation:	E5	External fire spread
Comment:		Test data to BS 476-3 : 1958 indicate that on suitable non-combustible substructures the use of the membranes will be unrestricted by the requirements of this Regulation. See sections 11.1 to 11.3 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* (5.2) and 6 *Delivery and site handling* (6.3).

Technical Specification

5 Description

5.1 Xenith Single Ply membranes are polyester reinforced PVC membranes, manufactured by calendering.

5.2 The membranes are grey in colour and manufactured to the nominal characteristics given in Table 1.

Table 1 Nominal characteristics

Parameter (units)	Xenith 1.2	Xenith 1.5
Thickness (mm)	1.2	1.5
Width (m)	1.1	1.1
Length (m)	20	20
Roll weight (kg)	33.0	39.6
Weight per unit area (kgm ⁻²)	1.50	1.80

5.3 Ancillary items for use with the membranes include:

- Xenithmetal — galvanized steels laminated with Xenith PVC compound for use in forming edge and other details
- paving support pads — for use in loose-laid and ballasted specification
- THF welding fluid — Tetrahydrofuran (THF) for use in solvent welding of joints in membranes
- fasteners and fixing plates — fasteners and fixing plates used with the mechanically fastened systems are supplied by Buildex, SFS or Olympic
- separation layers — non-woven polyester scrim or glass fibre mat, for use when the membranes come into contact with incompatible materials
- vapour control layer — a polyethylene membrane for use as a vapour control layer where required.

5.4 Quality control checks are carried out during production and on the final product. Checks on the final product include:

- dimensions
- weight
- tensile strength
- elongation at break
- tear strength
- dimensional stability.

6 Delivery and site handling

6.1 The membranes are delivered to site in rolls, individually wrapped in a PVC sleeve, on pallets. Labels on the rolls bear the marketing company's name, product name, dimensions, product code, batch number, date of manufacture and the BBA identification mark incorporating the number of this Certificate.

6.2 Rolls should be stored horizontally on a clean, dry, level surface and kept under cover.

6.3 THF welding fluid has a flashpoint of -17°C and is classified as 'Highly Flammable' and 'Irritant' under the Chemicals (Hazard Information and Packaging for Supply) Regulations 2002 (CHIP3) and should be stored in accordance with the Highly Flammable Liquids and Petroleum Gases Regulations 1997.

Design Data

7 General

7.1 Xenith membranes, are satisfactory for use as mechanically-fixed waterproofing on flat and pitched roofs with limited access and loose-laid and ballasted on flat roofs with limited access.

7.2 Limited access roofs are defined for the purpose of this Certificate as those roofs subjected only to pedestrian traffic for maintenance of the roof covering and cleaning of gutters, etc. Where traffic in excess of this is envisaged, special precautions, such as additional protection to the membrane, must be taken.

7.3 Flat roofs are defined for the purpose of this Certificate as those roofs having a minimum finished fall of 1:80. Pitched roofs are defined for the purpose of this Certificate as those having a fall in excess of 1:6. For design purposes, twice the minimum finished fall should be assumed, unless a detailed analysis of the roof is available, including overall and local deflection, direction of falls, etc.

7.4 Decks to which the membranes are to be applied must comply with the relevant requirements of BS 6229 : 2003, BS 8217 : 1994 and, where appropriate, NHBC Standards, Chapter 7.1 or the Zurich Building Guarantees Technical Manual, page 234.

7.5 Insulation materials used in conjunction with the systems must be either:

- as described in BS 8217 : 1994, or
- the subject of a current BBA Certificate and be used in accordance with, and within the limitations of, that Certificate.

7.6 The membranes can be adversely affected by contact with bituminous or coal tar products, or polystyrene insulation boards, and a suitable separating layer must be used. When doubt arises, the advice of the Certificate holder should be sought.

7.7 Installation must be carried out only by installers trained and approved by the marketing company.

8 Weathertightness

8.1 Test data confirm that the membranes, and joints in the membranes, when completely sealed and consolidated, will

adequately resist the passage of moisture to the inside of the building and so meet the requirements of the national Building Regulations:

England and Wales

Approved Document C, Requirement C4, Section 5.1

Scotland

Regulation 17, Standard G3.1

Northern Ireland

Regulation C4.

8.2 The systems are impervious to water and, when used as described will give a weathertight roof capable of accepting minor structural movement without damage.

9 Resistance to wind uplift

9.1 The resistance to wind uplift of a mechanically-fixed waterproofing layer is provided by the washer secured to the deck by approved fasteners passing through the membrane. The number and position of fixings will depend on many factors, including:

- wind uplift forces to be resisted
- pull-out strength of fasteners
- elastic limit of the membrane
- appropriate safety factors.

9.2 The number of fixings used should be established by reference to the wind uplift forces calculated in accordance with BS 6399-2 : 1997 on the basis of maximum permissible loads of 0.4 kN per fixing.

9.3 The precise ballast requirements for loose-laid systems should be calculated in accordance with the relevant parts of BS 6399-2 : 1997, but should be a minimum thickness of 50 mm. In areas of high-wind exposure the gravel may be bonded at the edges for a distance of one metre. Alternatively, concrete slabs on suitable supports can be used.

10 Resistance to foot traffic

Data indicate that the systems can accept, without damage, the limited foot traffic and light concentrated loads associated with the installation and maintenance operations. Reasonable care should be taken, however, to avoid sharp objects or concentrated loads. Anywhere regular traffic is envisaged, ie maintenance of lift equipment, a walkway should be provided using concrete slabs supported on bearing pads.

11 Properties in relation to fire



11.1 When tested in accordance with BS 476-3 : 1958, a system comprising a 19 mm plywood deck, a layer of a 250 µm polyethylene vapour control layer loose-laid, a 50 mm thick foil faced polyurethane insulation board mechanically fixed to deck, and a layer of Xenith 1.2 PVC membrane achieved a rating of EXT.F.AC.

11.2 The membrane used in the loose-laid and ballasted specification, including a minimum depth of 50 mm of aggregate, shall be deemed to satisfy BS 476-3 : 1958.

11.3 The designation of other specifications (eg on combustible substrates) should be confirmed by:

England and Wales

Test or assessment in accordance with Approved Document B, Appendix A, Clause 1

Scotland

Test to confirm compliance with Standard D9.1

Northern Ireland

Test or assessment by a UKAS accredited laboratory or an independent consultant with appropriate experience.

12 Maintenance

12.1 Roofs covered with the systems should be the subject of annual inspections, as is good practice with single-layer waterproofing systems, to ensure continued security and performance, especially those roofs without ballast.

12.2 In the event of accidental damage, repairs can be carried out by cleaning the area around the damage and applying a patch as described in the Certificate holder's instructions.

13 Durability



Accelerated weathering tests and evidence from long-term existing sites confirm that satisfactory retention of physical properties is achieved. Available evidence indicates that the system should have a life in excess of 25 years.

14 General

14.1 Installation of Xenith Single Ply PVC Waterproofing Membranes must be carried out by trained and approved installers working in accordance with the relevant clauses of the Certificate holder's instructions and BS 8000-4 : 1989.

14.2 Conditions on site should be those for normal roof waterproofing work. Deck surfaces must be dry, clean and free from sharp projections such as nail heads, concrete nibs. When used over a rough substrate, a suitable protection layer should be placed over the substrate.

14.3 Installation should not be carried out during wet weather (eg rain, fog, snow) nor when the temperature is below 5°C unless suitable precautions against surface condensation are taken.

14.4 All flashings should be formed in accordance with the Certificate holder's instructions.

14.5 When used over bitumen, bitumen-bound insulation products, coal tar, pitch or oil-based products a separation layer must be interposed between the substrate and the membrane. In cases of doubt the advice of the Certificate holder should be sought.

15 Procedure

Mechanically fastened

15.1 The membrane should be laid out flat onto the substrate without folds or ripples, with 100 mm overlaps, and secured against wind uplift prior to installation of fasteners by sandbags or other suitable means.

15.2 The membrane is fixed to the deck (through insulation boards, where appropriate) in the joint overlaps prior to welding of the joint. The fastener screw should be positioned 30 mm from edge of the membrane (10 mm from edge of plate). The fixings should be installed at centres calculated from the average wind force in that area.

Loose-laid and ballasted

15.3 The membrane should be laid out flat onto the substrate without folds or ripples, with 100 mm overlaps.

15.4 The membrane is mechanically fixed at perimeters and the laps welded together. Finally, the detailing work is carried out.

15.5 The membrane should be covered with a 50 mm protective sheet prior to the application of a 50 mm minimum thick layer of washed, well-rounded gravel. In areas of high wind exposure, a heavier gravel may be used and/or the gravel may be bonded at the edges for a distance of one metre. Alternatively, concrete slabs on suitable supports can be used.

16 Jointing

Hot-air welding

16.1 The welding area should be dry and clean. If the membrane in the weld area has become contaminated, it must be cleaned in accordance with the Certificate holder's instructions.

16.2 Welding is carried out either by hand or automatic welding machine.

16.3 The welded width of the joint must be a minimum of 50 mm. Care should be taken that overheating of the membrane does not occur, possible impairment of the membrane may result.

16.4 For hot-air welding a firm substrate is required to achieve consistent welding. Some insulation materials may not have an adequate resistance to this pressure. In such cases solvent welding may be a necessary alternative.

16.5 The seam should be tested with a suitable metal probe and any weakness repaired immediately.

Solvent welding

16.6 Solvent welding using THF is carried out by inserting a brush connected to a solvent dispenser between the sheets of roof covering to be welded.

16.7 Pressure is applied by means of a roller, five seconds after solvent application in summer, or 10 seconds to 15 seconds after solvent application in winter.

16.8 The welded width of the joint should be a minimum of 50 mm.

16.9 The seam should be tested with a suitable metal probe, and any weakness repaired immediately.

Technical Investigations

The following is a summary of technical investigations carried out on Xenith Single Ply PVC Waterproofing Membranes.

17 Tests

17.1 Data from tests conducted by BBA and BDA are summarised in Tables 2 and 3.

Table 2 Physical properties — directional

Test (units)	Method ⁽¹⁾	Mean results		
		1.2 mm		
		long ⁽²⁾	trans ⁽³⁾	
Tensile strength [N (50 mm) ⁻¹]	MOAT 60 : 4.8.1 (200 mm min ⁻¹)	1240	1185	
Elongation at break	MOAT 60 : 4.8.1 (200 mm min ⁻¹)	16	18	
Dimensional stability (%)	MOAT 27 : 5.1.6.1	-0.05	+0.10	
Nail tear (N)	MOAT 27 : 5.4.1 (200 mm min ⁻¹)	-10°C	530	805
		18°C	515	615
		40°C	550	586

(1) The test documents are detailed in the *Bibliography*. Numbers in the table refer to the sections of the various documents.

(2) Longitudinal direction.

(3) Transverse direction.

Table 3 Membranes — general

Test (units)	Method ⁽¹⁾	Mean results		
		1.2 mm	1.5 mm	
Water vapour permeability (gm ⁻² day ⁻¹)	BS 3177 (25°C/75% RH)	—	1.79	
Vapour resistance (MNs ^g ⁻¹)	BS 3177 (25°C/75% RH)	—	114.6	
Low temperature flexibility (°C)	MOAT 27 : 5.4.2	control	≤-40 ⁽³⁾	—
		heat aged ⁽²⁾	≤-40 ⁽³⁾	—
Static indentation	MOAT 27 : 5.1.9	rigid	—	L ₄
		compressive	—	L ₄
Dynamic indentation	MOAT 27 : 5.1.10	Perlite	—	I ₄
		EPS	—	I ₄
'T' peel [N (50 mm) ⁻¹]	MOAT 60 : 4.18.2	180	—	
Peel resistance (N)	MOAT 27 : 5.1.3	control	—	243
		heat aged ⁽⁴⁾	—	120
Wind uplift load per fixing (N)	MOAT 55 : 4.2.2	700	—	
Corrected load per fixing (N)	MOAT 55 : 5.1	418	—	

(1) The test documents are detailed in the *Bibliography*. Numbers in the table refer to sections/parts of the various documents.

(2) Heat aged 168 days at 80°C.

(3) -40°C lowest temperature tested.

(4) Heat aged 28 days at 80°C.

— not tested.

17.2 Testing was also carried out on the 1.2 mm membrane to determine:

- thickness
- length
- width
- trueness
- weight per unit area
- plasticiser content
- weldability (using THF)
- dehydrochlorination.

17.3 The effects of 56-day water soak at 23°C and 28-day sulphur dioxide immersion were assessed on the basis of a membrane using the same PVC compound.

18 Investigations

18.1 Existing data on fire performance to BS 476-3 : 1958 of the reinforced and fleece backed membranes were examined.

18.2 The manufacturing processes were examined, including methods of quality control. Details were also obtained of the quality and composition of the materials used.

18.3 A visit to a site in progress was carried out to assess the practicability of installation.

18.4 A visit to an existing site installed during 1987 in Israel was carried out to assess the durability of the product under extreme environment exposure conditions.

Bibliography

BS 476-3 : 1958 *Fire tests on building materials and structures — External fire exposure roof test*

BS 3177 : 1959 *Method for determining the permeability to water vapour of flexible sheet materials used for packaging*

BS 6229 : 2003 *Code of practice for flat roofs with continuously supported coverings*

BS 6399-2 : 1997 *Loading for buildings — Code of practice for wind loads*

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

BS 8217 : 1994 *Code of practice for built-up felt roofing*

MOAT No 27 : 1983 *General Directive for the Assessment of Roof Waterproofing Systems*

MOAT No 55 : 1991 *UEAtc Supplementary guide for the assessment of mechanically fastened roof waterproofing*

MOAT No 60 : 1997 *UEAtc Technical Guide for the approval of reinforced and/or backed roof waterproofing systems made of plasticised PVC Sheeting incompatible with bitumen*

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) 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 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 or standard of individual installations of the product or any maintenance thereto, 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.



In the opinion of the British Board of Agrément, Xenith Single Ply PVC Waterproofing Membranes are fit for their intended use provided they are installed, used and maintained as set out in this Certificate. Certificate No 04/4075 is accordingly awarded to Ruberoid Building Products Limited.

On behalf of the British Board of Agrément

Date of issue: 26th March 2004

A handwritten signature in black ink, appearing to read 'P. Q. Newson'.

Chief Executive