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**Agrément
Certificate
No 88/1983/C**
Third issue*

Designated by Government
to issue
European Technical
Approvals

PARALON NT4 PLUS AND ARD/HS PLUS ROOF WATERPROOFING SYSTEMS

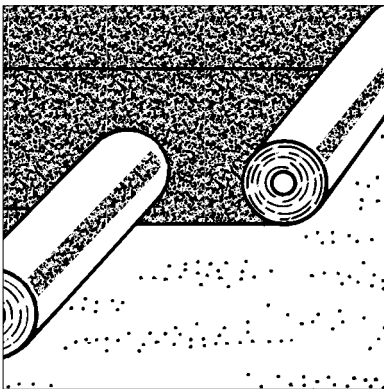
Système d'étanchéité pour toitures
Dachabdichtungen

Product

• THIS CERTIFICATE OF CONFIRMATION REPLACES AND EXTENDS CERTIFICATE No 86/1759/C AND RELATES TO PARALON NT4 PLUS AND ARD/HS PLUS, NON-WOVEN POLYESTER REINFORCED POLYMER MODIFIED BITUMEN ROOF WATERPROOFING SYSTEMS.

• Installation is carried out only by installers trained and approved by the United Kingdom marketing company.

• The products are imported and marketed in the UK by Integrated Polymer Systems UK Ltd, Swinton Meadows, Mexborough, South Yorkshire S64 8AB, Tel: 01709 581000, Fax: 01709 578001 for Midlands and Southern England, and Imper Roof Ltd, St Andrews House, 385 Hillington Road, Glasgow G52 4BL, Tel: 0141-810 5188, Fax: 0141-810 5114 for Scotland and Northern England.



Confirmation of Italian Agréments issued by the Istituto Centrale per l'Industrializzazione e la Tecnologia Edilizia (ICITE) to Imper Italia SpA, Via Lanzo 131, 10148 Torino, Italy.

Regulations

1 The Building Regulations 1991 (as amended 1994) (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 with the Building Regulations. In the opinion of the BBA, Paralon NT4 Plus and ARD/HS Plus Roof Waterproofing Systems, 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:

On flat roofs and with one of the surface finishes prescribed in Part iii of Table A5 of the Approved Document or when loose laid and ballasted the roof shall be deemed to be of designation AA.

For other situations see sections 11 to 11.4 of this Certificate.

Requirement: C4

Resistance to weather and ground moisture

Comment:

Data obtained from tests for water resistance on the membranes, including joints, indicate that the materials will meet this Requirement. See section 8.1 of this Certificate.

Requirement: Regulation 7

Materials and workmanship

Comment:

The membranes are acceptable materials. See section 13.1 of this Certificate.

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



In the opinion of the BBA, Paralon NT4 Plus and ARD/HS Plus Roof Waterproofing Systems, if used in accordance with the provisions of this Certificate, will satisfy or contribute to satisfying the various Regulations and Technical Standards as listed below.

Regulation: 10

Fitness of materials

Standard: B2.1

Selection and use of materials and components

Comment:

The membranes comply with the Standard.

Regulation: 12

Structural fire precautions

Standard: D2.5

Separation of roofs and rooflights from boundaries

Standard: D3.6

Roofs and rooflights of buildings ancillary to dwellings

Comment:

Test data to BS 476 : Part 3 : 1958 indicate that on suitable substructures the use of the membranes will be unrestricted by the requirements of these Standards. See sections 11.1, 11.2 and 11.4.

Regulation: 17

Preparation of sites and resistance to moisture

Standard: G3.1

Resistance to precipitation

Comment:

Test data examined for water resistance indicate that the use of the membranes can enable a roof to satisfy the requirements of this Standard. See section 8.1 of this Certificate.

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3 The Building Regulations (Northern Ireland) 1994 (as amended 1995)



In the opinion of the BBA, Paralon NT4 Plus and ARD/HS Plus Roof Waterproofing Systems, 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 13.1 of this Certificate.
Regulation:	C5	Resistance to ground moisture and weather
Comment:		Data obtained from tests for water resistance of the membranes, including joints, indicate that the use of the membranes can enable a roof to satisfy the requirements of this Regulation. See section 8.1 of this Certificate.
Regulation:	E8	External fire spread
Comment:		Data obtained from tests to BS 476 : Part 3 : 1958 indicate that on suitable substructures, the use of the membranes will enable a roof to be unrestricted under the requirements of this Regulation. See sections 11.1 to 11.4 of this Certificate.

4 Construction (Design and Management) Regulations 1994

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 to site (6.3).

Technical Specification

5 Description

5.1 Paralon NT4 Plus is manufactured by saturating and coating a non-woven polyester base of weight 180 gm^{-2} with a mixture of bitumen, polypropylene, ethylene-propylene copolymer and small amounts of inert fillers. The underface is a heat activated adhesive layer.

5.2 Paralon ARD/HS Plus is manufactured in the same way as Paralon NT4 Plus except that the upper face is finished with slate chippings.

5.3 The membranes are supplied in rolls in the nominal dimensions given in Table 1.

Table 1 Dimensions

Parameters (units)	Paralon NT4 Plus	Paralon ARD/HS Plus
thickness (mm)	4	4*
length (m)	10	5 and 10
width (m)	1	1
weight (kgm^{-2})	4.0	5.1
weight per roll (kg)	40	25.5 and 51

*excluding slate chippings

5.4 Ancillary materials used with this product are: Impertene Primer or approved alternative.

Elastomul paint — a water-based resin emulsion.

Triplene 2100/3/4 — a glass reinforced modified bitumen felt, for use as an underlay where appropriate.

5.5 Quality control checks include tests of the characteristics of the polyester, coating compound and the finished product.

6 Delivery to site

6.1 The membranes are delivered to site in wrapped rolls bearing the manufacturer's name and the BBA identification mark incorporating the number of this Certificate.

6.2 Rolls must be stored upright under cover on a clean, level surface.

6.3 Impertene is supplied in 20 litre, 50 litre and 200 litre containers. Impertene is highly flammable with a flashpoint of 10°C and should be stored in accordance with the Highly Flammable Liquids and Liquefied Petroleum Gases Regulations 1972.

Design Data

7 General

7.1 Paralon NT4 Plus and ARD/HS Plus are suitable for use on timber, metal, concrete or insulated decks as:

(a) a fully bonded single- or double-layer waterproof covering on flat roofs with limited access

(b) a fully bonded double-layer waterproof covering on pitched roofs with limited access.

7.2 Paralon NT4 Plus is also suitable for use as a loose-laid single- or double-layer waterproof covering, ballasted with aggregate to prevent wind uplift, on flat roofs with limited access.

7.3 Paralon ARD/HS Plus is also suitable for use, where appropriate, as an exposed cap sheet or in detail work.

7.4 Limited access roofs are defined for the purpose of this Certificate as those roofs that are

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.

7.5 When designing flat roofs, 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. 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 as those having falls in excess of 1:6.

7.6 Decks to which the membranes are to be applied must comply with the relevant requirements of BS 8217 : 1994 and BS 6229 : 1982 and, where appropriate, NHBC Standards, Chapter 7.1 or the Zurich Municipal Technical Manual, Section 5, Clause 5.9.3.19.

7.7 Insulation materials used in conjunction with the product must be:

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

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 C4, Section 5.1

Scotland

Standard G3.1, Regulation 17

Northern Ireland

Regulation C5.

8.2 The membranes are impervious to water and, when used in the systems described, will give a weathertight roof covering capable of accepting minor structural movements without damage.

9 Resistance to wind uplift

9.1 Data confirm that the adhesion of the bonded systems to the decking, or to bituminous felt, is sufficient to resist the effects of wind suction, elevated temperature and thermal shock conditions likely to occur in practice.

9.2 The precise ballast requirements for loose-laid systems should be calculated in accordance with the relevant parts of CP 3 : Chapter V : Part 2 : 1972 or BS 6399 : Part 2 : 1995, but should not be below a minimum thickness of 50 mm. The use of concrete slabs, etc on suitable protective supports

should be considered in areas of high design wind loads.

10 Resistance to foot traffic

The systems can accept, without damage, the limited foot traffic and light concentrated loads associated with installation and maintenance operations. Where traffic in excess of this is envisaged, additional protection to the membrane in accordance with the manufacturer's instructions must be provided. Reasonable care is required, however, to avoid puncture by sharp objects or concentrated loads.

11 Properties in relation to fire



11.1 When tested in accordance with BS 476 : Part 3 : 1958:

- (a) a system comprising 19 mm thick tongue-and-groove timber deck, one layer BS 747 : 1977(1986), type 3B felt and one layer of torch-applied Paralon NT4 Plus was designated EXT.F.AA
- (b) a system comprising 19 mm thick tongue-and-groove timber deck, one layer of BS 747 : 1977(1986), type 3B felt and one layer of Paralon NT4 Plus bitumen bonded was designated EXT S.AC.

11.2 Paralon NT4 Plus, when used in a loose-laid and ballasted specification including a minimum surface finish of 50 mm of aggregate, shall be deemed to satisfy BS 476 : Part 3 : 1958 designation EXT.F.AA.



11.3 When used for flat roofs with one of the surface finishes (listed below) defined in Part iii of Table 5 of Appendix A of Approved Document B of the Building Regulations England and Wales, or Technical Booklet E, Table 4.6 of Part IV of the Building Regulations Northern Ireland, the roof is deemed to be of designation AA.

Surface finishes:

- (a) bitumen bedded stone chippings covering the whole surface to a depth of not less than 12.5 mm
- (b) bitumen bedded tiles of a non-combustible material
- (c) sand and cement screed, or
- (d) macadam.



11.4 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 A1

Scotland

test to conform with Standards D2.5 and D3.6

Northern Ireland

test or assessment by a UKAS accredited laboratory, BRE or an independent consultant with appropriate experience.

12 Maintenance

In the event of damage, the sheet can be effectively repaired, after cleaning, with pieces of the membranes torch welded to the damaged area.

13 Durability



13.1 Accelerated weathering tests confirm that satisfactory retention of physical properties is achieved. All available evidence indicates that Paralon NT4 Plus and ARD/HS Plus should have a life of at least 20 years.

13.2 With Paralon ARD/HS Plus, it is possible that some localised loss of mineral surfacing may occur after some years in areas where complex detailing of the roof design is incorporated.

Installation

14 General

14.1 Installation of the roof coverings must be in accordance with the manufacturer's instructions, the relevant clauses of BS 8000 : Part 4 : 1989 and BS 8217 : 1994.

14.2 Substrates to which the roof covering is applied must be firm, dry and clean, and free from sharp projections such as nail heads, concrete nibs, etc.

14.3 The product should not be laid in rain, snow or heavy fog, nor if the temperature falls below 5°C.

14.4 If the roof is likely to be subjected to uncontrolled pedestrian access, the substructure must meet the requirements of clause 8.3 of BS 8217 : 1994, and to prevent damage to the roof covering one of the appropriate surface finishes referred to in clauses 8.11 and 8.13 of the code must be used.

14.5 At falls in excess of 5° (1:11), the nominal precautions against slippage and the provision for mechanical fixings as required by BS 8217 : 1994 should be observed.

14.6 On completion of the roof, Paralon NT4 Plus, when used as a top layer, may have a surface finish applied in accordance with BS 8217 : 1994, clauses 8.11 and 9.17. Surface finishes in the Code of Practice include:

- stone aggregate in dressing compound
- pre-cast concrete paving slabs
- proprietary tiles on bonding compound.

14.7 Paralon ARD/HS Plus having a mineral surface finish, when used on roofs with limited access, requires no further surface protection.

14.8 When used for remedial work, existing waterproofing layers must be made sound and

existing surface finishes (eg surface dressing) must be removed and then primed.

14.9 Concrete substrates where partial or full applications are to be made should be primed with Impertene Primer at an application rate between 150 gm⁻² and 400 gm⁻² depending on the porosity of the concrete.

14.10 A list of approved installers is available from the marketing company.

15 Procedure

Fully bonded applications

15.1 Bonding is achieved by melting the lower surface by torching and pressing the membrane down. Care must be taken not to overheat the coating.

15.2 Side laps should be a minimum of 100 mm and end laps should be a minimum of 150 mm. Where used partially bonded, the membrane must be fully bonded to the substrate for at least 1 m immediately before and after the end lap. A bead of molten material must exude from all laps to indicate a satisfactory seal and which should be levelled out using a heated, rounded-tip trowel.

Partially bonded applications

15.3 A layer of type 3G felt to BS 747 : 1994 should be loose laid edge to edge, over the substrate.

15.4 The membrane is then fully torch welded onto the perforated layer ensuring that the bitumen seeps regularly into the perforations.

Loose-laid applications

15.5 Side laps should be a minimum of 100 mm and end laps should be a minimum of 150 mm. The laps should be welded by torching the lower surface and pressing the membrane down.

15.6 With loose-laid systems the membranes should be ballasted to combat the effects of wind uplift. This can be achieved by:

- 0.2 mm thick polyethylene protective sheet covered by at least 50 mm of well-rounded gravel (gravel size 15/30 mm)
- 0.2 mm thick polyethylene or a non-woven (polyester) sheet (minimum mass 300 gm⁻²) covered by a 20 mm thick layer of sand overlaid with a layer of concrete paving slabs⁽¹⁾.

(1) If paving on plastic pads the sand is not required.

16 Surface finish

Where additional protection against wind uplift is not required, the surface of the membranes can be finished with a solar protective coating of Elastomul. Such paints should be the subject of regular checks to ensure their effectiveness.

Technical Investigations

The following is a summary of the technical investigations carried out on Paralon NT4 Plus and ARD/HS Plus Roof Waterproofing Systems.

17 Tests

17.1 Technical data from tests carried out by ICITE leading to the issue of Agréments 273/84, 294/86, 375/92 and 466/96 were evaluated in the context of UK roofing practice and building regulations and are summarised in Tables 2 to 7.

17.2 Test data on the resistance to ultraviolet light ageing were examined.

Table 2 Characteristics of the polyester reinforcements

Test (units)	Method*	Mean result
Mass (gm ⁻²)	MOAT 30 : 6.B	183
Load at break (N per 50 mm)	MOAT 30 : 6.C	
longitudinal		683
transverse		453
Elongation (%)	MOAT 30 : 6.C	
longitudinal		33
transverse		39

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

Table 3 Physical properties of coating mass (as used in both Paralon membranes)

Test (units)	Method*	Mean result
Softening point (ring and ball) (°C)	MOAT 30 : 6.G	
unaged		148
heat aged ⁽¹⁾		152
Penetration (60°C)	DIN : 52010	
unaged		159.2
Fines content (%)	MOAT 30 : 6.F	2.36
Low temperature flexibility (°C)	MOAT 30 : 6.D	
unaged		-25
heat aged ⁽¹⁾		-15

(1) Heat aged 180 days at 70°C.

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

Table 4 Physical properties of sheets — directional

Test (units)	Method*	Mean results			
		Paralon NT4 Plus		Paralon ARD/HS Plus	
		long ⁽¹⁾	trans ⁽²⁾	long ⁽¹⁾	trans ⁽²⁾
Tensile strength (N per 50 mm)	MOAT 30 : 6C	993	640	749	702
Elongation (%)	MOAT 30 : 6C	43.0	53.6	41.9	49.8
Tear strength (N)	MOAT 27 : 5.4.1	197	195	270	282
Dimensional stability — free (%)	UNI 8202/17	-0.38	+0.24	-0.50	+0.19

(1) Longitudinal direction.

(2) Transverse direction.

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

Table 5 Physical properties — general

Test (units)	Method*	Mean result
Water absorption (%)	50 × 50 mm samples immersed 7 days at 23 ± 2°C	0.3
Water pressure (60 kPa)	MOAT 27 : 5.1.4	pass
Low temperature flexibility (°C)	MOAT 29 : 6D	
unaged		-20
heat aged ⁽¹⁾		-15
water soak ⁽²⁾		-15
Heat resistance (°C)	MOAT 29 : 6E	
unaged		150
heat aged ⁽¹⁾		140

(1) Heat aged 180 days at 70°C.

(2) Water soak 7 days at 60°C.

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

Table 6 Tests on joints

Test (units)	Method*	Mean results	
		Paralon NT4 Plus	Paralon ARD/HS Plus
Air pressure 10 kPa	MOAT 27 : 5.2.1		
unaged		pass	pass
Resistance to peeling (N per 50 mm)	MOAT 56 : P		
unaged		45.1	—
aged ⁽¹⁾		28.1	—
Tensile strength (N per 50 mm)	MOAT 27 : 5.2.2/4		
end laps			
unaged		850	880
heat aged ⁽¹⁾		850	840
water soak ⁽²⁾		1000	950
side laps			
unaged		770	760
heat aged ⁽¹⁾		770	760
water soak ⁽²⁾		980	800

(1) Heat aged 28 days at 80°C.

(2) Water soak 7 days at 60°C.

— not tested

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

Table 7 Service performance

Test (units)	Method*	Mean results	
		Paralon NT4 Plus	Paralon ARD/HS Plus
Static indentation concrete substrate	MOAT 27 : 5.1.9	L ₄	L ₄
		L ₄	L ₄
Dynamic indentation perlite substrate	UNI 8202/12a	PD4	PD4
		PD4	PD4
Slip resistance	MOAT 27 : 5.1.7	pass	pass
Unrolling at low temperature (0°C)	MOAT 27 : 5.4.3	pass	—
Peel resistance (N per 50 mm) substrate — ⁽¹⁾ asbestos concrete (primed) unaged heat aged ⁽¹⁾	MOAT 27 : 5.1.3	284	280
		205	260
Polyurethane insulation board unaged heat aged ⁽¹⁾	MOAT 27 : 5.1.3	214	210
		185	150
Wind uplift: — ⁽²⁾ fully bonded to concrete fully bonded to perlite insulation boards	MOAT 27 : 5.1.3	—	onset of failure 3 kPa 60% at 8 kPa failure at 4 kPa
		—	
		—	
Thermal shock	MOAT 27 : 5.1.5	—	pass
Fatigue cycle	MOAT 27 : 5.1.8	pass	pass

(1) Heat aged.

(2) Other substrates also examined.

— not tested.

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

18 Other investigations

18.1 The manufacturing process in Italy, including the methods adopted for quality control, have been inspected by ICITE and assessed as satisfactory.

18.2 A survey of known users of the membranes was carried out to assess the performance in UK situations.

18.3 Visits were made to existing sites in Italy to assess the performance in use.

18.4 Data relating to the performance of Paralon NT4 Plus when tested to BS 476 : Part 3 : 1958 were examined.

Bibliography

BS 476 *Fire tests on building materials and structures*

Part 3 : *External fire exposure roof test*

BS 747 : 1977(1986) *Specification for roofing felts*

BS 747 : 1994 *Specification for roofing felts*

BS 6229 : 1982 *Code of practice for flat roofs with continuously supported coverings*

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

BS 8217 : 1994 *Code of practice for built-up felt roofing (supersedes CP 144 : Part 3)*

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

MOAT No 29 : 1984 *Directives for the Assessment of Roofing Systems using PVC sheets without reinforcement, loose laid under heavy protection and not compatible with bitumen*

MOAT No 30 : 1984 *Special Directives for the Assessment of Reinforced Waterproof Coatings in Atactic Polypropylene (APP) Polymer Bitumen*

MOAT No 56 : 1991 *UEAtc special Technical Guide for the assessment of single layer roof waterproofings*

DIN 52010 : 1983 *Testing of bitumen — Determination of needle penetration*

UNI 8202

12a : 1984 *Determination of dynamic punching resistance*

17 : 1988 *Determination of stability of heat*

Conditions of Certification

19 Conditions

19.1 Where reference is made in this Certificate to any Act of Parliament, Regulation made thereunder, Statutory Instrument, Code of Practice, British Standard, manufacturer's instruction or similar publication, it shall be construed as reference to such publication in the form in which it is in force at the date of this Certificate.

19.2 The quality of materials and the method of manufacture have been examined and found satisfactory by the BBA and must be maintained to this standard during the period of validity of this Certificate. This Certificate will remain valid for an unlimited period provided:

- (a) the specification of the product is unchanged; and
- (b) the product remains the subject of Italian Agréments.

19.3 This Certificate will apply only to the product that is installed, used and maintained as set out in this Certificate.

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

- (a) the presence or absence of patent or similar rights subsisting in the product; and
- (b) the legal right of the Certificate holder to market, install or maintain the product; and
- (c) the nature of individual installations of the product, including methods and workmanship.

19.5 It should be noted that any recommendations relating to the safe use 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 or Common Law duties of care, or of any duty of care which 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 or Common Law duties 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 use of this product.



In the opinion of the British Board of Agrément, Paralon NT4 Plus and ARD/HS Plus are fit for their intended use provided they are installed, used and maintained as set out in this Certificate. Certificate No 88/1983/C is accordingly awarded to Imper Italia SpA.

On behalf of the British Board of Agrément

Date of Third issue: 28th November 1997

Director

**Original Certificate issued 29th January 1988, with a Second issue on 8th June 1993. This revised version issued to include change of product name, change of marketing companies, reference to revised Building Regulations and associated text, increase in reinforcement weight and updated ICITE results, revised general text and Conditions of Certification.*

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