

Derivados Normalizados Asfálticos S.A (DANOSA)

Polígono Industrial Sector 9
19290 Fontanar
Guadalajara
Spain

Tel: 00 34 949 888 210

e-mail: info@danosa.com

website: www.danosa.com



Agrément Certificate

14/5118

Product Sheet 2

DANOSA SINGLE-PLY ROOF WATERPROOFING MEMBRANES

DANOPOL AND DANOPOL+ FV PVC MEMBRANES

This Agrément Certificate Product Sheet⁽¹⁾ relates to DANOPOL and DANOPOL+ FV PVC Membranes, for use in loose-laid and ballasted systems on flat and zero fall roofs, inverted systems on flat and zero fall roofs, roof gardens on flat and zero fall roofs, and green roofs on flat, zero fall and pitched roofs.

(1) Hereinafter referred to as 'Certificate'.

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

Weathertightness — the products will resist the passage of moisture into the building (see section 6).

Properties in relation to fire — the products can enable a roof to be unrestricted under the Building Regulations (see section 7).

Resistance to wind uplift — the products will resist the effects of any likely wind suction acting on the roof (see section 8).

Resistance to mechanical damage — the products will accept the limited foot traffic and loads associated with installation and maintenance (see section 9).

Resistance to penetration by roots — the DANOPOL FV 1.5 membrane will adequately resist plant root penetration (see section 10).

Durability — under normal service conditions, the products will provide a durable roof waterproofing with a service life in excess of 25 years (see section 12).

The BBA has awarded this Certificate to the company named above for the products described herein. These products have been assessed by the BBA as being fit for their intended use provided they are installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of Second issue: 23 January 2018

John Albon – Head of Approvals
Construction Products

Originally certificated on 14 April 2014

Claire Curtis-Thomas
Chief Executive

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.*



British Board of Agrément

Bucknalls Lane
Watford
Herts WD25 9BA

©2018

tel: 01923 665300
clientservices@bbacerts.co.uk
www.bbacerts.co.uk

Regulations

In the opinion of the BBA, DANOPOL and DANOPOL+ FV PVC Membranes, 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:	B4(2)	External fire spread
Comment:		On suitable substructures, the use of the membranes can enable a roof to be unrestricted under the requirements of this Regulation. See sections 7.1 to 7.3 of this Certificate.
Requirement:	C2(b)	Resistance to moisture
Comment:		The membranes, including joints, will enable a roof to satisfy this Requirement. See section 6.1 of this Certificate.
Regulation:	7	Materials and workmanship
Comment:		The products are acceptable. See section 12 and the <i>Installation</i> part of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)(2)	Durability, workmanship and fitness of materials
Comment:		The use of the products satisfies the requirements of this Regulation. See sections 11.1 and 12 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards applicable to construction
Standard:	2.8	Spread from neighbouring buildings
Comment:		The membranes, when applied to a suitable substructure, are regarded as having low vulnerability under clause 2.8.1 ⁽¹⁾⁽²⁾ of this Standard. See sections 7.1 to 7.3 of this Certificate.
Standard:	3.10	Precipitation
Comment:		The membranes, including joints, will enable a roof to satisfy the requirements of this Standard, with reference to clauses 3.10.1 ⁽¹⁾⁽²⁾ and 3.10.7 ⁽¹⁾⁽²⁾ . See section 6.1 of this Certificate.
Standard:	7.1(a)(b)	Statement of sustainability
Comment:		The products 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:		Comments in relation to the products 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)	Fitness of materials and workmanship
Comment:	(iii)(b)(i)	The products are acceptable. See section 12 and the <i>Installation</i> part of this Certificate.

Regulation:	28(b)	Resistance to moisture and weather
Comment:		The membranes, including joints, can enable a roof to satisfy the requirements of this Regulation. See section 6.1 of this Certificate.
Regulation:	36(b)	External fire spread
Comment:		On suitable substructures, the use of the membranes can be unrestricted by the requirements of this Regulation. See sections 7.1 to 7.3 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* (1.2) and 3 *Delivery and site handling* (3.3) of this Certificate.

Additional Information

NHBC Standards 2018

In the opinion of the BBA, DANOPOL and DANOPOL+ FV PVC Membranes, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements in relation to *NHBC Standards*, Chapter 7.1 *Flat roofs and balconies*.

CE marking

The Certificate holder has taken the responsibility of CE marking the products in accordance with harmonised European Standard EN 13956 : 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 DANOPOL and DANOPOL+ FV PVC Membranes are a range of glassfibre reinforced PVC membranes.
- 1.2 The membranes are manufactured to the nominal characteristics given in Table 1.

Table 1 Nominal characteristics

Characteristic (unit)	DANOPOL FV 1.2	DANOPOL FV 1.5 DANOPOL+ FV 1.5	DANOPOL FV 1.8
Thickness (mm)	1.2	1.5	1.8
Width (m)	1.80	1.80	1.80
Length (m)	20	15	13
Mass per unit area (kg·m ⁻²)	1.5	1.9	2.3
Watertightness*	pass	pass	pass
Tensile strength* (N·50 mm ⁻¹)			
longitudinal	> 600	> 750	> 900
transverse	> 600	> 750	> 900
Elongation at maximum force* (%)			
longitudinal	> 200	> 220	> 250
transverse	> 200	> 220	> 250
Tear resistance* (N)			
longitudinal	> 120	> 150	> 180
transverse	> 120	> 150	> 180
Peel strength of joints* (N·50 mm ⁻¹)	> 250	> 250	> 250
Shear strength of joints* (N·50 mm ⁻¹)	> 500	> 600	> 800
Low temperature foldability (°C)	< -30	< -30	< -30
Static load* (kg) (method B)	> 50	> 55	> 60
Impact resistance* (mm)	> 500	> 700	> 900
Resistance to roots	pass	pass	pass
Reaction to fire*	E	E	E
Colour			
DANOPOL FV	light grey	light grey	light grey
DANOPOL+ FV	—	dark grey	—

1.3 Ancillary items for use with the products, but outside the scope of this Certificate, include:

- DANOPOL Colaminated Metal — 0.6 mm galvanized steel sheet coated with 0.6 mm PVC compound for use in forming details
- DANOPOL H — non-reinforced PVC membrane for use in detailing
- Embossed Surfacing Membrane — a low profile embossed PVC membrane for use in demarcation of maintenance walkways, plant zones and working areas
- 150G Fleece — a needle-punched and calendered polypropylene fleece for use as a separation layer
- DANOFELT PY 300 — a polyester geotextile for use as separation or filter layer
- PVC Primer — a polyurethane primer for preparing the surface of existing PVC membranes prior to the application of a polyurethane adhesive
- PVC Contact Adhesive — adhesive for bonding the PVC membrane to substrates
- DANOBOND Adhesive — a solvent free adhesive
- DANOSEAL — a styrene acrylate sealant
- Pre-formed accessories — a range of corners and pipe collars
- Alpha Profile — a PVC extruded profile for use as a decorative standing seam
- PVC Lightning Clip — a lightning conductor clip to hold a lightning conductor strip, incorporating a PVC membrane flange to allow welding to the waterproofing membrane
- DANODREN JARDIN — a composite board comprising a high density polyethylene, dimple-profiled sheet and non-woven geotextile for use as a drainage layer in roof gardens and green roofs
- DANODREN R-20 — a high density polyethylene, dimple-profiled sheet for use as a water retaining layer in roof gardens and green roofs
- DANOLOSA — a paving slab incorporating an extruded polystyrene insulation.

2 Manufacture

2.1 The membranes are manufactured by extruding the PVC compound into sheets and laminating two sheets together with glassfibre reinforcement.

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 Derivados Normalizados Asfálticos S.A (DANOSA) has been assessed and registered as meeting the requirements of EN ISO 9001 : 2015 and EN ISO 14001 : 2004 by Bureau Veritas Certification (Certificates ES044036-1 and ES069274-1 respectively).

3 Delivery and site handling

3.1 The membranes are delivered to site in rolls wrapped in polythene on pallets. Roll labels bear the Certificate holder's name and address, product identification, batch number, CE marking and the BBA logo incorporating the number of this Certificate.

3.2 Rolls should be stored on end on a clean, level surface, and kept under cover.

3.3 The Certificate holder has taken the responsibility of classifying and labelling the products 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 DANOPOL and DANOPOL+ FV PVC Membranes.

Design Considerations

4 Use

4.1 DANOPOL and DANOPOL+ FV PVC Membranes are satisfactory for use as a roof waterproofing system, as follows:

- loose-laid and ballasted on flat and zero fall roofs with limited access,
- on flat and zero fall inverted roofs with limited or pedestrian access,
- on roof gardens on flat and zero fall roofs, or
- on flat, pitched and zero fall green roofs with limited access.

4.2 Limited access roofs are defined for the purpose of this Certificate as those subjected only to pedestrian traffic for maintenance of the roof covering, cleaning of gutters, etc. Where traffic in excess of this is envisaged, additional protection to the membrane must be provided (see section 9).

4.3 Flat roofs are defined for the purpose of this Certificate as those having a minimum finished fall of 1:80. 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 and direction of falls, etc. Pitched roofs are defined for the purpose of this Certificate as those having a fall in excess of 1:6.

4.4 Zero fall roofs are defined for the purpose of this Certificate as those having a finished fall which can vary between 0° and 0.7°. Reference should also be made to the appropriate clauses in Liquid Roofing and Waterproofing Association (LRWA) Note 7 – *Specifier Guidance for Flat Roof Falls*.

4.5 Decks to which the products are to be applied must comply with the relevant requirements of BS 6229 : 2003, BS 8217 : 2005 and, where appropriate, *NHBC Standards 2018*, Chapter 7.1.

4.6 Insulation materials to be used in conjunction with the membranes must be in accordance with the Certificate holder's instructions and be either:

- as described in the relevant clauses of BS 8217 : 2005, or
- the subject of a current BBA Certificate and be used in accordance with that Certificate.

4.7 Contact with bituminous, coal tar and oil-based products must be avoided as the membranes are not compatible with lower grades of bitumen. If contact with such products is likely, a separating layer must be interposed before installing the waterproofing sheet. Where doubt arises, the advice of the Certificate holder must be sought.

4.8 Dead loads, wind loading and imposed loads are calculated in accordance with BS EN 1991-1-1 : 2002, BS EN 1991-1-3 : 2003, BS EN 1991-1-4 : 2005 and their UK National Annexes.

4.9 Recommendations for the design of green roofs and roof garden specifications are available within the latest edition of *The GRO Green Roof Code - Green Roof Code of Best Practice for the UK*.

4.10 Structural decks for green roofs or roof gardens to which the system is to be applied must be suitable to transmit the dead and imposed loads experienced in service.

4.11 The drainage system for completely flat green roofs or roof gardens must be correctly designed, and provision made for access for maintenance purposes. Dead loads for green roofs and roof gardens can increase if the drains become partially or completely blocked causing waterlogging of the drainage layer.

4.12 In inverted roof specifications the ballast requirements should be calculated in accordance with the relevant parts of BS EN 1991-1-4 : 2005 and its UK National Annex. Additional guidance for inverted roof specifications is given in BBA Information Bulletin No 4 *Inverted roofs — Drainage and U value corrections*.

5 Practicability of installation

Installation of the products must be only carried out by installers trained and registered by the Certificate holder.

6 Weathertightness



6.1 The membranes, including joints, when completely sealed and consolidated, will adequately resist the passage of moisture into the building and enable a roof to comply with the requirements of the national Building Regulations.

6.2 The membranes are impervious to water and will provide a weathertight roof capable of accepting minor structural movement.

7 Properties in relation to fire



7.1 The membranes, when used in protected or inverted roof specifications including an inorganic covering listed in the Annex of Commission Decision 2000/553/EC, can be considered to be unrestricted under the national Building Regulations.

7.2 In the opinion of the BBA, when used in irrigated roof gardens, brown roofs or green roofs, the use of the membranes will also be unrestricted.

7.3 The designation of other specifications should be confirmed by:

England and Wales — test or assessment in accordance with Approved Document B, Appendix A, clause 1
Scotland — test to conform to Mandatory Standard 2.8, clause 2.8.1⁽¹⁾⁽²⁾

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

Northern Ireland — test or assessment by a UKAS-accredited laboratory, or an independent consultant with appropriate experience.

7.4 If allowed to dry, the plants used may allow flame spread across the roof. This should be taken into consideration when selecting suitable plants for the roof. Appropriate planting irrigation and/or protection should be applied to ensure the overall fire-rating of the roof is not compromised.

8 Resistance to wind uplift

8.1 The ballast requirements for roof systems must be calculated in accordance with the relevant parts of BS EN 1991-1-4 : 2005 and its National Annex. When using gravel ballast, the system must always be loaded with a minimum depth of 50 mm of aggregate. In areas of high-wind exposure, the Certificate holder's advice should be sought. Alternatively, concrete slabs on suitable supports can be used.

8.2 The soil used in roof gardens and ballast on inverted/protected roofs must not be of a type that will be removed or become delocalised owing to wind scour experienced on the roof.

8.3 It should be recognised that the type of plants used in roof gardens could significantly affect the expected wind loads experienced in service.

9 Resistance to mechanical damage

Results of tests indicate that the products can accept the limited foot traffic and light concentrated loads associated with installation and maintenance. Where traffic in excess of this is envisaged, such as for maintenance of lift equipment, a walkway such as DANOLOSA or concrete slabs on bearing pads should be used. In all circumstances, reasonable care should be taken to avoid puncture by sharp objects or concentrated loads.

10 Resistance to penetration of roots

Results of tests on the DANOPOL FV 1.2 membrane indicate that the membranes are resistant to root penetration and can be used in a roof waterproofing system for roof gardens and green roofs.

11 Maintenance



11.1 Maintenance must include checks and operations, where applicable, to ensure that:

- adequate ballast is in place and is evenly distributed over the membrane
- protection layers are in good condition
- exposed membrane is free from the build-up of silt and other debris, and unwanted vegetation is cleared.

11.2 Green roofs and roof gardens must be the subject of regular inspections, particularly in autumn after leaf fall and in spring, to ensure unwanted vegetation and other debris are cleared from the roof and drainage outlets (see section 4.9). Guidance is available within the latest edition of *The GRO Green Roof Code -Green Roof Code of Best Practice for the UK*.

11.3 Where damage has occurred it should be repaired in accordance with section 16 and the Certificate holder's instructions.

12 Durability



12.1 Accelerated weathering tests confirm that satisfactory retention of physical properties is achieved. Under normal conditions, the membranes will have a service life in excess of 25 years.

12.2 In environments where the membranes are in contact with organic solvents, the life expectancy of the membranes may be reduced. In cases of doubt the advice of the Certificate holder should be sought.

13 Reuse and recyclability

The products contain PVC and polyester, which can be recycled.

Installation

14 General

14.1 Installation of DANOPOL and DANOPOL+ FV PVC Membranes must be carried out by installers trained and registered by the Certificate holder in accordance with the relevant clauses of BS 8000-0 : 2014, BS 8000-4 : 1989, BS 8217 : 2005, the Certificate holder's instructions and this Certificate.

14.2 Substrates to which the membranes are to be applied must be sound, dry, clean and free from sharp projections such as nail heads and concrete nibs. Rough substrates must first be overlaid with a suitable protection layer.

14.3 Installation should not be carried out during inclement weather (eg rain, fog or snow). When the temperature is below 5°C suitable precautions against surface condensation must be taken.

14.4 The need for a vapour control layer (VCL) should be judged on a case by case basis, taking into account the internal hygrothermal values and the external vapour resistance of the different elements of the system. A VCL must be used when the water absorption by diffusion of the insulation is greater than 3% by volume.

14.5 All flashings must be formed in accordance with the Certificate holder's instructions.

14.6 Soil or other bulk material must not be stored on one area of the roof prior to installation, to ensure localised overloading does not occur.

15 Procedure

15.1 The membrane is laid flat onto the substrate without folds or ripples, with 50 mm minimum side laps and 50 mm minimum end laps.

15.2 Joints are produced either by hot-air welding or by solvent welding using Tetrahydrofuran (THF) in accordance with the Certificate holder's instructions. The weld must be a minimum width of 40 mm.

15.3 The membrane must be covered by at least a 50 mm depth of well-rounded gravel or other suitable ballast depending on the specification being installed. In areas of high wind exposure, paving slabs set on a suitable support may be considered.

16 Repair

Any damage must be repaired by cleaning around the affected area and welding a patch of the membrane over it, as described in section 15.2.

Technical Investigations

17 Tests

17.1 Tests were carried out on DANOPOL and DANOPOL+ FV PVC Membranes and the results assessed to determine:

- thickness
- mass per unit area
- plasticiser content
- water vapour transmission
- tensile strength and elongation
- tear resistance (trapezoidal)
- static loading

- dynamic indentation
- shear strength of joint
- peel of joints
- root resistance
- water exposure for 180 days at 60°C.

17.2 Tests were carried out on DANOPOL HS PVC Membranes (the subject of Product Sheet 1 of this Certificate) and the results assessed to determine for DANOPOL FV Membranes:

- watertightness
- low temperature foldability
- heat ageing
- UV ageing.

18 Investigations

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

Bibliography

BS 6229 : 2003 *Flat roofs with continuously supported coverings — Code of practice*

BS 8000-0 : 2014 *Workmanship on construction sites — Introduction and general principles*

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

BS 8217 : 2005 *Reinforced bitumen membranes for roofing — Code of practice*

BS EN 1991-1-1 : 2002 *Eurocode 1 : Actions on structures — General actions— Densities, self-weight, imposed loads for buildings*

NA to BS EN 1991-1-1 : 2002 UK National Annex to *Eurocode 1 : Actions on structures — General actions — Densities, self-weight, imposed loads for buildings*

BS EN 1991-1-3 : 2003 + A1 : 2010 *Eurocode 1 : Actions on structures — General actions — Snow loads*

NA + A1 : 15 to BS EN 1991-1-3 : 2003 + A1 : 2015 UK National Annex to *Eurocode 1 : Actions on structures — General actions — Snow loads*

BS EN 1991-1-4 : 2005 + A1 : 2010 *Eurocode 1 : Actions on structures — General actions — Wind actions*

NA to BS EN 1991-1-4 : 2005 + A1 : 2010 UK National Annex to *Eurocode 1 : Actions on structures — General actions — Wind actions*

EN 13956 : 2012 *Flexible sheet for waterproofing — Plastic and rubber sheets for roof waterproofing — Definitions and characteristics*

EN ISO 9001 : 2015 *Quality management systems — Requirements*

EN ISO 14001 : 2004 *Environmental management systems. Requirements with guidance for use*

19 Conditions

19.1 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 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.

19.2 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.

19.3 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.

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

19.5 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.

19.6 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.