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Agrément Certificate
20/5743
Product Sheet 1 Issue 2

DANOSA LIQUID ROOF WATERPROOFING SYSTEMS

DANOFORCE FLEX HP

This Agrément Certificate Product Sheet(1) relates to DANOFORCE FLEX HP, a liquid-applied roof waterproofing system for use on limited access and, where appropriate, pedestrian access roofs, on warm and cold exposed roofs (flat and pitched), green roofs (flat, zero fall and pitched), protected warm and cold roofs (flat and zero fall), inverted roofs (flat and zero fall), blue roofs in combination with a storm water attenuation system(2), terraces, balconies and walkways across roof areas.

(1) Hereinafter referred to as 'Certificate'.
(2) The storm water attenuation system is outside the scope of this Certificate.

The assessment includes

Product factors:

- compliance with Building Regulations
- compliance with additional regulatory or non-regulatory information where applicable
- evaluation against technical specifications
- assessment criteria and technical investigations
- uses and design considerations

Process factors:

- compliance with Scheme requirements
- installation, delivery, handling and storage
- production and quality controls
- maintenance and repair

Ongoing contractual Scheme elements†:

- regular assessment of production
- formal 3-yearly review

KEY FACTORS ASSESSED

Section 1. Mechanical resistance and stability
Section 2. Safety in case of fire
Section 3. Hygiene, health and the environment
Section 4. Safety and accessibility in use
Section 5. Protection against noise
Section 6. Energy economy and heat retention
Section 7. Sustainable use of natural resources
Section 8. Durability

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

Hardy Giesler
Chief Executive Officer

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Originally certified on 20 April 2020

Certificate amended on 5 March 2026 to update company name and add NHBC statement.

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SUMMARY OF ASSESSMENT AND COMPLIANCE

This section provides a summary of the assessment conclusions; readers should refer to the later sections of this Certificate for information about the assessments carried out.

Compliance with Regulations

Having assessed the key factors, the opinion of the BBA is that DANOFORCE FLEX HP, 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 Building Regulations 2010 (England and Wales) (as amended)

Requirement:	**B4(1)**	**External fire spread**
Comment:		The system is restricted by this Requirement in some circumstances. See section 2 of this Certificate.
Requirement:	**B4(2)**	**External fire spread**
Comment:		On suitable substructures, the system may enable a roof to be unrestricted under this Requirement. See section 2 of this Certificate.
Requirement:	**C2(b)**	**Resistance to moisture**
Comment:		The system will enable a roof to satisfy this Requirement. See section 3 of this Certificate.
Regulation:	**7(1)**	**Materials and workmanship**
Comment:		The system is acceptable. See sections 8 and 9 of this Certificate.

The Building (Scotland) Regulations 2004 (as amended)

Regulation:	**8(1)(2)**	**Fitness and durability of materials and workmanship**
Comment:		The system can satisfy the requirements of this Regulation. See sections 8 and 9 of this Certificate.
Regulation:	**8(3)**	**Fitness and durability of materials and workmanship**
Comment:		The system on balconies is restricted by this Regulation in some circumstances. See section 2 of this Certificate.
Regulation:	**9**	**Building standards - construction**
Standard:	2.2	Separation
Standard:	2.7	Spread on external walls Use of the system on balconies is restricted under clauses 2.2.7(1) and 2.7.2(1)(2) of these Standards. See section 2 of this Certificate Standards. See section 2 of this Certificate.
Standard:	2.8	Spread from neighbouring buildings
Comment:		When applied to a suitable substructure, the system contributes to satisfying this Standard, with reference to clause 2.8.1(1)(2). See section 2 of this Certificate.
Standard:	3.10	Precipitation
Comment:		The use of the system will enable a roof to satisfy this Standard, with reference to clauses 3.10.1(1)(2) and 3.10.7(1)(2). See section 3 of this Certificate.
Regulation:	**12**	**Building standards - conversion**
Comment:		Comments in relation to the system 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(1)(a)(i)(ii) (iii)(iv)(b)(i)**	**Fitness of materials and workmanship**
Comment:		The system is acceptable. See sections 8 and 9 of this Certificate.
Regulation:	**28(b)**	**Resistance to moisture and weather**
Comment:		The system will enable a roof to satisfy this Regulation. See section 3 of this Certificate.
Regulation:	**36(a)**	**External fire spread**
Comment:		Use of the system is restricted under this Regulation. See section 2 of this Certificate.
Regulation:	**36(b)**	**External fire spread**
Comment:		On suitable substructures, the use of the system may enable a roof to be unrestricted by this Regulation. See section 2 of this Certificate.

Additional Information

NHBC Standards 2024

In the opinion of the BBA, DANOFORCE FLEX HP, 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, terraces and balconies*.

In addition, in the opinion of the BBA, the system, when installed and used in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements in relation to *NHBC Standards for Conversions and Renovations*, taking account other relevant guidance within the chapter and the suitability of the substrate to receive the system.

The NHBC Standards do not cover the refurbishment of existing roofs.

The opinion of the BBA does not amount to any endorsement or approval by NHBC and does not in any way guarantee that NHBC will approve such product / system as compliant with the NHBC Technical Requirements and Standards.

Fulfilment of Requirements

The BBA has judged DANOFORCE FLEX HP to be satisfactory for use as described in this Certificate. The system has been assessed as a liquid-applied roof waterproofing system for use on limited access and, where appropriate, pedestrian access roofs, on warm and cold exposed roofs (flat and pitched), green roofs (flat, zero fall and pitched), protected warm and cold roofs (flat and zero fall), inverted roofs (flat and zero fall), blue roofs in combination with a storm water attenuation system(1), terraces, balconies and walkways across roof area.

(1) The storm water attenuation system is outside the scope of this Certificate.

ASSESSMENT

Product description and intended use

The Certificate holder provided the following description for the system under assessment. DANOFORCE FLEX HP consists of:

- DANOFORCE FLEX HP — a flexible, modified polyester resin
- DANOFORCE FLEX HP PIGMENT — a pigment dispersed in polyester resin, available in two standard colours, anthracite grey and light grey; other non-standard colours are available on request
- DANOFORCE CATALYST — 50% dibenzoyl peroxide powder
- GLASSFLEX REINFORCEMENT — a 450 g·m–2 glass fibre mat for reinforcing the system
- QUARTZ SAND AGGREGATE — an optional surface finish to provide an anti-slip surface if required.

Ancillary Items

The following ancillary items are essential to use with the system and have been assessed with the system:

- DANOFORCE PRIMER+ LT — an alternative primer for preparing bituminous, wood, concrete, and other substrates, as approved by the Certificate holder
- DANOFORCE METAL PRIMER — a two-part primer for preparing metal substrates
- M-WASH TREATMENT — a pre-treatment for new galvanized steel or zinc substrates
- ANTIFUNGICIDAL SOLUTION — a fungicide for the removal of algae and moss prior to application
- DANOFORCE TAPING JOINT — a reinforcing tape for use at points of weakness such as detailing, protrusions and over cracks
- DANOFORCE MMA RESIN — a liquid-applied methyl methacrylate resin that may be used over excessive movement joints and other special case applications
- DANOFORCE FLEX HP ACCELERATOR — an additive to allow application at lower temperatures
- DANOFORCE PRIMER+ LT ACCELERATOR — an additive to allow application at lower temperatures
- preformed trims — a range of factory-manufactured GRP trims, including upstand fixing trim, drip trim, fillet trim and flat trim
- ACETONE CLEANER — for use in cleaning tools.

The Certificate holder recommends the following ancillary items for use with the system, but these materials have not been assessed by the BBA and are outside the scope of this Certificate:

- quartz sand — an alternative grit for walkways and balconies
- mineral slate — an alternative grit for walkways and balconies
- DANOFORCE SEALER — a hard finishing wear coat for walkways and balconies.

Applications

The system is intended for use on the following substrates:

- concrete
- asphalt
- plywood(1)
- OSB 3(2)
- reinforced bitumen membranes (including sanded and mineral surfaced felts)
- insulation(1)
- GRP
- single-ply membranes(1)
- previously coated surfaces(1)
- small areas of metal incidental to the roof, eg pipe upstands
- small areas of plastic-coated metal incidental to the roof(1).

(1) The advice of the Certificate holder must be sought on compatibility with the system, but such advice is outside the scope of this Certificate.

The system is intended for use in the following situations:

- as a liquid-applied roof waterproofing system on new or existing roofs with limited or pedestrian access in the following specifications:
  - exposed warm and cold flat and pitched roofs(1)
  - protected warm and cold flat and zero fall roofs (ie covered by pavers or other suitable protection)(1)(2)
  - green (extensive) flat, zero fall and pitched roofs(1)(2)
  - inverted flat and zero fall roofs(1)(2).
  - blue roofs(1)(2)
  - terraces with anti-slip layer(2)
  - walkways across roof areas with anti-slip layer(2)
  - balconies(2).

(1) Limited access.
(2) Pedestrian access.

Definitions for system and applications inspected

The following terms have been defined for the purpose of this Certificate as:

- limited access roof — a roof subjected only to pedestrian traffic for maintenance of the roof covering, cleaning of gutters, etc
- pedestrian access roof — a roof subject only to foot traffic and gathering of people greater than required for maintenance
- flat roof — a roof having a minimum finished fall of 1:80(1)
- zero fall roof — a roof having a minimum finished fall between 0 and 1:80(1)
- pitched roof — a roof having a fall in excess of 1:6
- green roof — a roof with a shallow layer of growing medium planted with low-maintenance plants such as mosses, sedums, grasses and some wild flower species
- invasive plant species — vegetation species having vigorous and/or invasive root systems likely to cause damage to components of the inverted roof insulation system and roof waterproofing
- blue roof — a flat roof designed to allow controlled attenuation of rain fall during storm events as part of a SUDS good practice policy(2).

(1) *NHBC Standards* 2024 require a minimum fall of 1:60 for green roofs.
(2) The storm water attenuation system is outside the scope of this Certificate.

Product assessment – key factors

The system was assessed for the following key factors, and the outcome of the assessment is shown below. Conclusions relating to the Building Regulations apply to the whole of the UK unless otherwise stated.

1 Mechanical resistance and stability

Not applicable

2 Safety in case of fire

Data were assessed for the following characteristics.

2.1 External fire spread

2.1.1 When tested to DD CEN/TS 1187 : 2012, Test 4, the constructions given in Table 1 of this Certificate achieved a classification under BS EN 13501-5 : 2016 of B_{ROOF}(t4).

Table 1 External fire exposure classifications

Layer	System 1	System 2	System 3
Roof pitch	between 0 and 10°	between 0 and 10°	between 0 and 10°
Substrate	An 18 mm orientated strand board(1)		
Primer	A polymeric adhesive primer(1) applied at a rate of 0.15 l·m^{-2}		
AVCL	a 0.6 mm thick aluminium faced, bitumen, self-adhesive vapour control layer(1)		
Adhesive	Polyurethane adhesive(1)		
Insulation	A 120 mm thick, foil-faced polyisocyanurate insulation board (PIR)(1)	a 150 mm thick tissue-faced PIR board(1)	A 123 mm PIR insulation board with a 3 mm bituminous, puncture resistant faced board(1)
Deck	—	—	—
Primer	—	A polymeric adhesive primer(1) applied at a rate of 0.15 l·m^{-2}	DANOFORCE PRIMER+ LT at 0.25 l·m^{-2}
Carrier membrane	—	a 2.0 mm thick self-adhesive, bitumen carrier membrane(1)	—
First coat	DANOFORCE FLEX HP at 1.25 l·m^{-2}	DANOFORCE FLEX HP at 1.50 l·m^{-2}	DANOFORCE FLEX HP at 1.50 l·m^{-2}
Reinforcement	GLASSFLEX REINFORCEMENT		
Second coat	DANOFORCE FLEX HP at 0.50 l·m^{-2}		
Third coat	—	—	DANOFORCE FLEX HP at 0.50 l·m^{-2}
Anti-slip	—	—	0.7 – 1.2 mm quartz sand broadcast at 2.5 kg·m^{-2}
Sealer coat	—	—	DANOFORCE SEALER at 0.60 l·m^{-2}

(1) These components are outside the scope of this Certificate.

Table 1 External fire exposure classifications (continued)

Layer	System 4	System 5
Roof pitch	between 0 and 10°	between 10 and 70°
Substrate	An 18 mm orientated strand board(1)	An 18 mm orientated strand board(1)
Primer	A polymeric adhesive primer(1) applied at a rate of 0.15 l·m^{-2}	—
AVCL	a 0.6 mm thick aluminium faced, bitumen, self-adhesive vapour control layer(1)	300 µm thick polyethylene AVCL(1)
Adhesive	Polyurethane adhesive(1)	—
Insulation	A 210 mm thick rockwool insulation board(1)	a 130 mm thick tissue-faced PIR board(1) mechanically fastened
Deck	—	An 18 mm orientated strand board(1) mechanically fastened
Primer	DANOFORCE PRIMER+ LT at 0.25 l·m^{-2}	DANOFORCE PRIMER+ LT at 0.25 l·m^{-2}
Carrier membrane	—	—
First coat	DANOFORCE FLEX HPat 1.50 l·m^{-2}	DANOFORCE FLEX HP at 1.50 l·m^{-2}
Reinforcement	GLASSFLEX REINFORCEMENT	GLASSFLEX REINFORCEMENT
Second coat	DANOFORCE FLEX HP at 0.50 l·m^{-2}	DANOFORCE FLEX HP at 0.50 l·m^{-2}
Third coat	—	—
Anti-slip	—	—
Sealer coat	—	—

(1) These components are outside the scope of this Certificate.

2.1.2 When tested to BS 476-3 : 2004 at 0° pitch, the construction given in Table 2 of this Certificate achieved a fire rating of EXT.F.AB.

Table 2 External fire exposure classifications

Layer	System
Substrate	A 6 mm calcium silicate board(1)
Primer	DANOFORCE PRIMER+ LT at 0.25 l·m^{-2}
First coat	DANOFORCE FLEX HP at 1.25 l·m^{-2}
Reinforcement	GLASSFLEX REINFORCEMENT
Second coat	DANOFORCE FLEX HP at 0.50 l·m^{-2}

(1) This component is outside the scope of this Certificate.

2.1.3 On the basis of data assessed, the constructions listed in Tables 1 and 2 will be unrestricted by the documents supporting the national Building Regulations with respect to proximity to a relevant boundary. Restrictions may apply at junctions with compartment walls.

2.1.4 A roof incorporating the system will also be unrestricted under the national Building Regulations with respect to proximity from a relevant boundary in the following circumstances:

- when used in protected or inverted roof specifications including an inorganic covering listed in the Annex of Commission Decision 2000/553/EC
- irrigated green roofs.

2.1.5 The classification and permissible areas of use of other specifications must be confirmed by reference to the requirements of the documents supporting the national Building Regulations.

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

2.2 Reaction to fire

2.2.1 The Certificate holder has not declared a reaction to fire classification for DANOFORCE FLEX HP.

2.2.2 The system will be restricted in use under the documents supporting the national Building Regulations.

2.2.3 In England, the system, when used in pitches greater than 70°, excluding upstands, must not be used less than 1 m from a relevant boundary, on residential buildings more than 11 m in height or on other buildings more than 18 m in height. Restrictions apply on assembly and recreation buildings. These constructions must also be included in calculations of unprotected area.

2.2.4 In Wales, the system, when used in roof pitches greater than 70°, excluding upstands, must not be used less than 1 m from a relevant boundary, on other buildings more than 18 m in height or, in some cases, on assembly and recreation buildings. These constructions must also be included in calculations of unprotected area.

2.2.5 In Northern Ireland, for roofs incorporating the system in pitches greater than 70°, excluding upstands, that do not achieve the minimum Class E reaction to fire classification to BS EN 13501-1 : 2018, designers must seek guidance on the proposed use of the system from the relevant Building Control Body.

2.2.6 In Scotland, the use of the system is unrestricted with respect to building height and proximity to a relevant boundary. However, restrictions on the overall construction may apply, depending on the reaction to fire classification achieved by the build-up, which must be established on a case-by-case basis.

2.2.7 In England, unless covered with a protection with a reaction to fire of class A1 or A2-s1, d0, for example 40 mm thick cast stone slabs, the system must not be used on balconies of residential buildings with a storey 11 m or more in height or balconies of buildings that have a storey at least 18 m above ground level and contain one or more dwellings, an institution, a room for residential purposes, student accommodation, care homes, sheltered housing, hospitals, dormitories in boarding schools, hotels, hostels or boarding houses.

2.2.8 In Wales, unless covered with a protection with a reaction to fire of class A1 or A2-s1, d0, for example 40 mm thick cast stone slabs, the system must not be used on balconies of buildings that have a storey at least 18 m above ground level and contain one or more dwellings, an institution, a room for residential purposes, student accommodation, care homes, sheltered housing, hospitals, dormitories or boarding schools.

2.2.9 In Northern Ireland, unless covered with a protection with a reaction to fire of class A1 or A2-s1, d0, for example 40 mm thick cast stone slabs, the system must not be used on balconies of buildings that have a storey at least 18 m above ground level and contain one or more dwellings, an institution, a room for residential purposes (excluding any room in a hostel, hotel or boarding house), student accommodation, care homes, sheltered housing, hospitals, dormitories in boarding schools, nursing homes and places of lawful detention.

2.2.10 In Scotland, the system must not be used on balconies of buildings with a storey at a height of 11 m or more above the ground.

3 Hygiene, health and the environment

Data were assessed for the following characteristics.

3.1 Weathertightness

3.1.1 Results of weathertightness tests are given in Table 3.

Table 3 Weathertightness results

Product assessed	Assessment method	Requirement	Result
DANOFORCE FLEX HP	Watertightness to BS EN 1928 : 2000 60 kPa	No leakage	Pass
DANOFORCE FLEX HP on concrete	Delamination strength to EOTA TR-004 : 2004	50 kPa	Pass
DANOFORCE FLEX HP on steel primed using DANOFORCE METAL PRIMER			Pass
DANOFORCE FLEX HP on DANOFORCE FLEX HP (day joint)			Pass

3.1.2 On the basis of data assessed, the system will adequately resist the passage of moisture to the inside of a building and so satisfy the requirements of the national Building Regulations.

3.1.3 The adhesion of the bonded system is sufficient to resist the effects of wind suction, elevated temperature and thermal shock conditions likely to occur in practice and remain weathertight.

3.2 Resistance to mechanical damage

3.2.1 Results of resistance to mechanical damage tests are given in Table 4.

Table 4 Resistance to mechanical damage results

Product assessed	Assessment method	Requirement	Result
DANOFORCE FLEX HP on steel	Dynamic indentation to EOTA TR-006 : 2004 tested at 23°C tested at -20°C	Value achieved	 I_4 I_4
DANOFORCE FLEX HP on polyurethane insulation board			I_2
DANOFORCE FLEX HP on steel	Static indentation to EOTA TR-007 : 2004 tested at 23°C	Value achieved	L_4
DANOFORCE FLEX HP on polyurethane insulation board			L_4
DANOFORCE FLEX HP	Fatigue to EOTA TR-008 : 2004 tested at -10°C for 1000 cycles	Watertight and less than 75 mm delamination from substrate	Pass
DANOFORCE FLEX HP	Tensile strength to BS EN ISO 527-3 : 2003 control cured at 3°C cured at 40°C	Value achieved	 2591 N·(50 mm)$^{-1}$ 2303 N·(50 mm)$^{-1}$ 2568 N·(50 mm)$^{-1}$
DANOFORCE FLEX HP	Elongation at maximum load to BS EN ISO 527-3 : 2003 control cured at 3°C cured at 40°C		 3.3% 3.4% 3.4%

3.2.2 On the basis of data assessed, the system can accept, without damage, the foot traffic and light concentrated loads associated with installation, maintenance and the effects of minor movement likely to occur in practice while remaining weathertight.

3.2.3 Where traffic in excess of the examples given in section 3.2.2 is envisaged, such as pedestrian access roofs or for maintenance of lift equipment, either the pedestrian access specification must be used or other suitable protection must be provided (for example, using concrete slabs supported on bearing pads). Reasonable care must be taken to avoid puncture by sharp objects or concentrated loads.

3.2.4 The system is capable of accepting minor structural movement while remaining weathertight.

3.3 Resistance to root penetration

In green roofs using plants with non-invasive roots, the roof waterproofing layer will adequately resist root penetration, subject to routine maintenance being carried out in accordance with this Certificate and as recommended by the Green Roof Organisation (GRO) *Code of Best Practice*.

4 Safety and accessibility in use

Not applicable

5 Protection against noise

Not applicable

6 Energy economy and heat retention

Not applicable

7 Sustainable use of natural resources

Not applicable

8 Durability

8.1 The potential mechanisms for degradation and the known performance characteristics of the materials in the product were assessed.

8.2 Specific test data were assessed as given in Table 5.

Table 5 Results of durability tests

Product assessed	Assessment method	Requirement	Result
DANOFORCE FLEX HP on concrete	Delamination strength to EOTA TR-004 : 2004 after 180 days at 60°C water exposure to EOTA TR-012 : 2004	50 kPa	Pass
DANOFORCE FLEX HP on steel	Dynamic indentation to EOTA TR-006 : 2004 after heat ageing 240 days at 70°C to EOTA TR-011 : 2004 tested at -20°C	Value achieved	I_4
	after UV ageing 1200 MJ·m^2 at 50°C to EOTA TR-010 : 2004 tested at -10°C		I_4
DANOFORCE FLEX HP on steel	Static indentation to EOTA TR-007 : 2004 after 216 days at 60°C water exposure to EOTA TR-012 : 2004 tested at 80°C	Value achieved	L_4
DANOFORCE FLEX HP	Fatigue to EOTA TR-008 : 2004 after heat ageing 200 days at 70°C to EOTA TR-011 : 2004 tested at -10°C for 50 cycles	Watertight and less than 75 mm delamination from substrate	Pass
DANOFORCE FLEX HP	Tensile strength to BS EN ISO 527-3 : 2003 after heat ageing 240 days at 70°C to EOTA TR-011 : 2004	Value achieved	3850 N·(50 mm)$^{-1}$
	after UV ageing 1200 MJ·m^2 at 50°C to EOTA TR-010 : 2004		4742 N·(50 mm)$^{-1}$
DANOFORCE FLEX HP	Elongation at maximum load to BS EN ISO 527-3 : 2003 after heat ageing 240 days at 70°C to EOTA TR-011 : 2004		0.9%
	after UV ageing 1200 MJ·m^2 at 50°C to EOTA TR-010 : 2004		1.8%

8.3 Service life

8.3.1 Under normal service conditions, the system will have a life of at least 30 Years, provided it is designed, installed and maintained in accordance with this Certificate and the Certificate holder's instructions.

8.3.2 When fully protected, under normal service conditions, the system will have a life of at least equivalent to the roof in which it is incorporated, provided it is designed, installed and maintained in accordance with this Certificate and the Certificate holder's instructions.

8.3.3 In situations where maintenance or repair of any of the components in the roof structure are necessary (eg protection layer or insulation), the durability of the membrane may be reduced. In these circumstances the Certificate holder must be consulted, but such advice is outside the scope of this Certificate.

8.3.4 An estimation cannot be given for the life of green roof specifications owing to the nature of use; however, under normal circumstances, it should be significantly greater than for exposed waterproof coverings.

PROCESS ASSESSMENT

Information provided by the Certificate holder was assessed for the following factors:

9 Design, installation, workmanship and maintenance

9.1 Design

9.1.1 The design process was assessed by the BBA, and the following requirements apply in order to satisfy the performance assessed in this Certificate.

9.1.2 Decks to which the system is to be applied must comply with the relevant requirements of BS 6229 : 2018 and, where appropriate, *NHBC Standards* 2024, Chapter 7.1.

9.1.3 For design purposes of flat roofs, twice the minimum finished fall must be assumed, unless a detailed structural analysis of the roof is available, including overall and local deflection, direction of falls etc.

9.1.4 Terraces and balconies, to which the system is to be applied, must be designed in accordance with BS 8579 : 2020.

9.1.5 Where regular pedestrian traffic is envisaged, special precautions such as additional protection to the membrane must be taken; for example, QUARTZ SAND AGGREGATE or similar incorporated into the final coat.

9.1.6 Structural decks to which the system is to be applied must be suitable to transmit the dead and imposed loads experienced in service. Allowance needs to be made for loading deflections to ensure that the free drainage of water is maintained.

9.1.7 Imposed loads, dead loads and wind loads must be calculated by a suitably experienced and competent individual in accordance with BS EN 1991-1-1 : 2002, BS EN 1991-1-3 : 2003 and BS EN 1991-1-4 : 2005, and their UK National Annexes.

9.1.8 The ballast requirements for inverted specifications must be calculated by a suitably experienced and competent individual in accordance with the principles of BS EN 1991-1-4 : 2005 and its UK National Annex. The system must be ballasted with a minimum depth of 50 mm of aggregate. In areas of high wind exposure, the Certificate holder's advice must be sought, but this is outside the scope of this Certificate. Alternatively, concrete slabs on suitable supports can be used.

9.1.9 The growing medium used in green roofs 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.

9.1.10 For green roofs, invasive non-native alien plant species as defined by UK Government guidance must not be used.

9.1.11 For green roof finishes, in order to protect the roof waterproofing and any system components above the waterproofing, such as insulation or water flow reducing layer, invasive plant species must not be used. In particular, the following species must be excluded:

- invasive weeds including Buddleia
- plants and grasses with aggressive rhizomes such as Bamboo
- self-setting woody weeds such as Sycamore and Ash seedlings should be removed at early germination stage
- other woody plants which spread aggressively including Rhododendron.

9.1.12 The Green Roof Organisation (GRO) can provide guidance on species not included in section 9.1.11 but such advice is outside the scope of this Certificate.

9.1.13 The drainage systems for inverted roofs, zero fall roofs or green roofs must be correctly designed, and the following points must be addressed:

- provision made for access for maintenance purposes

- for zero fall roofs, it is particularly important to identify the correct drainage points, to ensure that drainage is sufficient and effective
- dead loads for green roofs can increase if the drains become partially or completely blocked causing waterlogging of the drainage layer
- additional guidance for inverted roof specifications is given in BBA Information Bulletin No *4 Inverted roofs – Drainage and U value corrections*.

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

- as described in the relevant clauses of BS 6229 : 2018, or
- the subject of a current BBA Certificate and used in accordance with the scope of that Certificate.

9.1.15 The NHBC requires that the roof membranes, once installed, are inspected in accordance with *NHBC Standards* 2024, Chapter 7.1, Clause 7.1.11, and undergo an appropriate integrity test, where required. Any damage to the membrane is repaired in accordance with section 9.4 of this Certificate and reinspected.

9.2 Installation

9.2.1 Installation instructions provided by the Certificate holder were assessed and judged to be appropriate and adequate.

9.2.2 Installation must be carried out in accordance with this Certificate and the Certificate holder's instructions. A summary of instructions and guidance are provided in Annex A of this Certificate.

9.2.3 Installation of DANOFORCE FLEX HP must be carried out in accordance with the Certificate holder's instructions and this Certificate.

9.2.4 Application of the system is carried out at a minimum substrate temperature and air temperature of 3°C stable (1°C with the use of DANOFORCE FLEX HP ACCELERATOR and DANOFORCE PRIMER+ LT ACCELERATOR), rising to a maximum air temperature of 30°C and substrate temperature of 40°C. The system must not be installed in rain, snow, fog or misty conditions, or when the relative humidity is above 95%.

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

9.2.6 Substrates on which the system is applied must be properly prepared in accordance with the Certificate holder's instructions.

9.2.7 Adhesion to substrates depends on the condition and cleanliness of the substrate. Substrates must be visibly dry, sound and free from loose materials or contamination (eg moss or algae). In cases of doubt the advice of the Certificate holder's Technical Department must be sought, but such advice is outside the scope of this Certificate.

9.2.8 Any areas of fungal growth or moss must be treated with an approved, proprietary anti-fungal solution to ensure that all spores are destroyed.

9.2.9 High pressure sand-blasting or water-jetting must be used to remove loose or flaking materials and residues following treatment with the anti-fungal wash, but the substrate must be visibly dry before application of the system.

9.2.10 Damaged areas of the substrate, for example, blistered reinforced bitumen membranes, must be removed, replaced or repaired.

9.2.11 Deck surfaces must be free from sharp projections, such as protruding fixing bolts or concrete nibs.

9.2.12 Gutters and outlets must be checked to ensure that they are, and remain, clear of all debris.

9.2.13 New galvanized steel and zinc substrates must be treated with M-WASH TREATMENT at a coverage rate of 15 $m^2 \cdot l^{-1}$. The wash is allowed to react and the surface conversion is indicated by a black deposit. The surface residue is washed off with water and dried prior to the application of the primer.

9.2.14 Metal substrates are primed using DANOFORCE METAL PRIMER at a coverage rate of 5 to 10 m^2 per litre; rough or porous surfaces will significantly reduce coverage rate. The primer should be left to dry for a minimum of 2 hours and ideally between 8 and 24 hours to maximize adhesion. The maximum overcoating period is 14 days; after this period, it may be necessary to rub down and/or re-prime the surface.

9.2.15 Other substrates are primed, using catalysed DANOFORCE PRIMER + LT at a coverage rate of 4 to 6 m^2 per litre. Porous surfaces should be visually checked to ensure an adequate seal and any suspect areas re-primed as necessary. The primer is allowed to dry for at least one hour before overcoating. If the primed surface is left for longer than seven days before application of the system, it is necessary to solvent wipe the surface with ACETONE CLEANER prior to the installation of the waterproofing. The catalyst proportion for DANOFORCE PRIMER+ LT is given in Table 6 in respect of the surface/air temperature.

Table 6 Catalyst proportion for DANOFORCE PRIMER+ LT

Temperature (°C)	Catalyst addition (%)
3 – 10	3 – 4
10 – 20	2 – 3
20 – 35	2

9.2.16 DANOFORCE FLEX HP is mixed on site by adding the pigment (if required) and then the catalyst to the resin in the correct proportions. The catalyst is added in the proportions given in Table 7, depending on the surface/air temperature, and stirred in accordance with the mixing instructions.

Table 7 Catalyst proportion for DANOFORCE FLEX HP

Temperature (°C)	Catalyst addition (%)
3 – 10	4
10 – 15	3
15 – 20	2 – 3
20 – 30	2

9.2.17 One coat of DANOFORCE FLEX HP is applied to all upstands, detailing, protrusions, cracks, joints, and stepped joints with adjoining dissimilar substrates, and reinforced with DANOFORCE TAPING JOINT or pre-cut strips of GLASSFLEX REINFORCEMENT prior to the application of the main waterproofing. DANOFORCE FLEX HP is allowed to dry before overcoating with the main waterproofing.

9.2.18 The application is normally in two coats. Depending on the substrate, the first coat of resin is applied at the rates given in Table 8, and GLASSFLEX REINFORCEMENT rolled out and laid with 50 mm side and end laps. Extra resin is immediately applied to achieve a closed, pinhole-free surface.

Table 8 First coat coverage rate(1)

Substrate	Coverage rate ($l \cdot m^{-2}$)
Smooth concrete	1.25 – 1.50(2)
Plywood	1.25 – 1.50
Asphalt	1.25 – 1.50
Sanded felt	1.25 – 1.50
Mineral felt	1.50 – 2.00(2)
De-chipped felt/asphalt	1.50 – 2.00(2)
Single ply	1.25 – 1.50
GRP	1.25 – 1.50
Metal	1.25 – 1.50
Insulation	1.25 – 1.50

(1) The rates given in this Table are indicative only and it is the contractor's responsibility to ascertain the rate used on the specific site.

(2) When applying to very rough, uneven or heavily mineralised surfaces, the coverage rate may be significantly reduced. This must be taken into account when estimating material usage.

9.2.19 The second coat of resin can be applied as soon as it is practical to do so. However, the maximum period between coats is seven days, after which it is necessary to clean the surface with ACETONE CLEANER allowing a further seven days, application time. The coverage rate for the second coat is 0.5 litres per m^2.

9.2.20 Joints subjected to excessive movement may require the use of DANOFORCE MMA RESIN as an alternative bridging material; the Certificate holder should be consulted for advice.

9.3 Workmanship

Practicability of installation was assessed by the BBA on the basis of the Certificate holder's information. To achieve the performance described in this Certificate, the system must only be installed by contractors who have been trained and approved by the Certificate holder.

9.4 Maintenance and repair

9.4.1 Ongoing satisfactory performance of the system in use requires that it is suitably maintained. The guidance provided by the Certificate holder was assessed by the BBA and found to be appropriate and adequate.

9.4.2 The following requirements apply in order to satisfy the performance assessed in this Certificate:

9.4.2.1 The system must be the subject of visual six-monthly inspections and maintenance in accordance with the recommendations in BS 6229 : 2018, Chapter 7, and the Certificate holder's own maintenance requirements. For green roof and drainage systems, these six-monthly inspections must be carried out by a suitably experienced and competent individual (with horticultural knowledge) to ensure continued satisfactory performance. This must include an examination of the overall condition of the roof, ensure that drain outlets and gutters are kept clear and unblocked and, for green roofs and roof gardens, the removal of any self-propagated plants and invasive plant species found. See section 9.1.12.

9.4.2.2 Green roofs must be the subject of regular inspections, particularly in autumn after leaf fall and in spring, to ensure unwanted vegetation and other debris is cleared from the roof and drainage outlets. Guidance is available within the latest edition of *The GRO Green Roof Code of Best Practice*.

9.4.2.3 For green roofs, to protect the waterproofing, invasive plant species (see sections 9.1.11 and 9.1.12) must be eliminated through maintenance.

9.4.2.4 The control and removal of invasive plant species is carried out by hand. Where this is not possible, any chemicals used must be checked for compatibility with the roof waterproofing layer and any system components above the waterproofing, such as insulation or water flow reducing layer. The Certificate holder can advise on the suitability of a particular product, but such advice is outside the scope of this Certificate.

Note: If using chemicals, green roof rainwater outlets may need to be disconnected from the main drainage system to prevent contamination of the local water system and/or harm to flora and fauna.

9.4.2.5 The chemical fertiliser used on green roofs must be checked for compatibility with the roof waterproofing layer and any system components above the waterproofing, such as insulation or water flow reducing layer. The Certificate holder can advise on the suitability of a particular product, but such advice is outside the scope of this Certificate.

9.4.2.6 If a leak occurs in the roof waterproof membrane in a protected specification, it must be repaired following removal of any system components above the waterproofing.

9.4.2.7 If minor damage occurs, it can be rectified by cleaning back to unweathered material, reactivating the surface and applying the system to the damaged area at the total application rate stated in section 9.2.18.

10 Manufacture

10.1 The production processes for the product have been assessed, and provide assurance that the quality controls are satisfactory according to the following factors:

10.1.1 The manufacturer has provided documented information on the materials, processes, testing and control factors.

10.1.2 The quality control operated over batches of incoming materials has been assessed and deemed appropriate and adequate.

10.1.3 The quality control procedures and product testing to be undertaken have been assessed and deemed appropriate and adequate.

10.1.4 The process for management of non-conformities has been assessed and deemed appropriate and adequate.

10.1.5 An audit of each production location was undertaken, and it was confirmed that the production process was in accordance with the documented process, and that equipment has been properly tested and calibrated.

†10.2 The BBA has undertaken to review 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.

11 Delivery and site handling

11.1 The Certificate holder stated that the system components are delivered to site in packaging bearing the Certificate holder's name, logo, product name, batch number and health and safety data.

11.2 Delivery and site handing must be performed in accordance with the Certificate holder's instructions and this Certificate, including:

11.2.1 The liquid components must be stored unopened.

11.2.2 All components must be stored undercover and in the dry, at the recommended storage temperatures.

11.3 The system components and ancillary items packaging type and size are given in Table 10.

Table 10 Packaging

Component/item	Package type	Size
DANOFORCE FLEX HP	Tins	15 litres
DANOFORCE FLEX HP PIGMENT(1)	Packs	0.6 and 0.9 kg
GLASSFLEX REINFORCEMENT	Rolls	17, 30 and 100 m^2
DANOFORCE CATALYST	Packs	0.5 or 1 kg
QUARTZ SAND AGGREGATE	Packs	2.25 or 25 kg
DANOFORCE PRIMER+ LT	Tins	5 litres
DANOFORCE METAL PRIMER	Tins	4 litres
DANOFORCE MMA RESIN	Tins	10 litres
M-WASH TREATMENT	Tins	5 litres
DANOFORCE FLEX HP Accelerator	Tins	1 litres
DANOFORCE PRIMER+ LT Accelerator	Tins	0.5 litres

ANNEX A – SUPPLEMENTARY INFORMATION †

Supporting information in this Annex is relevant to the product but has not formed part of the material assessed for the 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.

CLP Regulations

The Certificate holder has taken the responsibility of classifying and labelling the system and/or components under the *GB CLP Regulation* and *CLP Regulation (EC) No 1272/2008 - classification, labelling and packaging of substances and mixtures*. Users must refer to the relevant Safety Data Sheets.

UKCA marking

The Certificate holder has taken the responsibility of UKCA marking the system in accordance with UKAD 030350-00-0402.

CE marking

The Certificate holder has taken the responsibility of CE marking the system, in accordance with EAD 030350-00-0402.

Additional information on installation

Design

A.1 When designing a zero fall roof Reference should also be made to the appropriate clauses in Liquid Roofing and Waterproofing Association (LRWA) Note 7 — *Specifier Guidance for Flat Roof Falls*.

A.2 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.*

Installation

A.3 Installation of DANOFORCE FLEX HP must be carried out in accordance with the relevant clauses of Liquid Roofing and Waterproofing Association (LRWA) Note 7 – *Specifier Guidance for Flat Roof Falls*.

Maintenance

A.4 Additional guidance on maintenance for green roofs is available within the latest edition of the GRO *Green Roof code – Green Roof Code of Best Practice for the UK*.

Bibliography

BS 476-3 : 2004 *Fire tests on building materials and structures — Classification and method of test for external fire exposure to roofs*

BS 6229 : 2018 *Flat roofs with continuously supported flexible waterproof coverings — Code of practice*

BS 8579 : 2020 *Guide to the design of balconies and terraces*

BS EN 1991-1-1 : 2002 *Eurocode 1 : Actions on structures — General actions*
NA to BS EN 1991-1-1 : 2002 UK National Annex to *Eurocode 1 : Actions on structures — General actions*
BS EN 1991-1-3 : 2003 + A1 : 2015 *Eurocode 1 : Actions on structures — General actions*
NA to BS EN 1991-1-3 : 2003 + A1 : 2015 UK National Annex to *Eurocode 1 : Actions on structures — General actions*
BS EN 1991-1-4 : 2005 + A1 : 2015 *Eurocode 1 : Actions on structures — General actions*
NA to BS EN 1991-1-4 : 2005 + A1 : 2015 UK National Annex to *Eurocode 1 : Actions on structures — General actions*

BS EN 13501-1 : 2018 *Fire classification of construction products and building elements — Classification using data from reaction to fire tests*

BS EN 13501-5 : 2016 *Fire classification of construction products and building elements — Classification using data from external fire exposure to roofs test*

BS EN 1928 : 2000 *Flexible sheets for waterproofing — Bitumen, plastic and rubber sheets for roof waterproofing — Determination of watertightness*

BS EN ISO 527-3 : 2003 *Plastics — Determination of tensile properties - Part 3: Test conditions for films and sheets*

DD CEN/TS 1187 : 2012 *Test methods for external fire exposure to roofs*

EAD/UKAD 030350-00-0402 *Liquid applied roof waterproofing kits*

EOTA TR-004 : May 2004 *Determination of the resistance to delamination*
EOTA TR-006 : May 2004 *Determination of the resistance to dynamic indentation*
EOTA TR-007: May 2004 *Determination of the resistance to static indentation*
EOTA TR-008 : May 2004 *Determination of the resistance to fatigue movement*
EOTA TR-010 : May 2004 *Exposure procedure for artificial weathering*
EOTA TR-011 : May 2004 *Exposure procedure for accelerated ageing by heat*
EOTA TR-012 : May 2004 *Exposure procedure for accelerated ageing by hot water*

Conditions of Certificate

Conditions

1 This Certificate:

- relates only to the product 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
- and any matter arising out of or in connection with it or its subject matter (including non-contractual disputes or claims) is governed by and construed in accordance with the law of England and Wales
- the courts of England and Wales shall have exclusive jurisdiction to settle any matter arising out of or in connection with this Certificate or its subject matter (including non-contractual disputes or claims).

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.

3 This Certificate will be displayed on the BBA website, and the Certificate Holder is entitled to use the Certificate and Certificate logo, provided that the product 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.

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

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

6 Any information relating to the manufacture, supply, installation, use, maintenance and removal of this product which is contained or referred to in this Certificate is the minimum required to be met when the product 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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