

Axter Limited

West Road
Ransomes EuroPark
Ipswich
Suffolk IP3 9SX

Tel: 01473 724056 Fax: 01473 723263
e-mail: info@axtertd.co.uk
website: www.axter.co.uk



Agrément Certificate
15/5222
Product Sheet 1

AXTER WATERPROOFING SYSTEMS

FORCE DALLE SYSTEM

This Agrément Certificate Product Sheet⁽¹⁾ relates to the Force Dalle⁽²⁾ System, consisting of SBS modified bitumen membranes with polyester reinforcement, for use as single-layer roof waterproofing or as part of a built-up system in limited and pedestrian access protected warm roof or inverted roof specifications on flat roofs, terraces, balconies and podia, including zero-pitched applications.

(1) Hereinafter referred to as 'Certificate'.

(2) Force Dalle is a registered trademark.

CERTIFICATION INCLUDES:

- factors relating to compliance with Building Regulations where applicable
- factors relating to additional non-regulatory information where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.

KEY FACTORS ASSESSED

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

Properties in relation to fire — the system, when used in a suitable specification, will enable a roof to be unrestricted under Building Regulations (see section 7).

Resistance to wind uplift — resistance to wind uplift is dependent on the ballast layers of the roofing specification (see section 8).

Resistance to mechanical damage — the system will accept without damage the limited foot traffic and loads associated with installation and maintenance (see section 9).

Durability — under normal service conditions, the system will provide a durable waterproof covering with a service life of at least 30 years (see section 11).



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

Date of First issue: 24 June 2015

John Albon — Head of Approvals
Construction Products

Claire Curtis-Thomas
Chief Executive

Certificate amended on 22 September 2015 to reflect change to Certificate holder's contact details.

The BBA is a UKAS accredited certification body — Number 1113. 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

tel: 01923 665300
fax: 01923 665301
clientservices@bba.star.co.uk
www.bbacerts.co.uk

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Regulations

In the opinion of the BBA, the Force Dalle System, 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:	When used in suitably-protected specifications, the system will be unrestricted under this Requirement. See section 7 of this Certificate.
Requirement: C2(b)	Resistance to moisture
Comment:	The system will enable a roof to meet this Requirement. See section 6.1 of this Certificate.
Regulation: 7	Materials and workmanship
Comment:	The system is acceptable. See section 11 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 system can contribute to a construction meeting this Regulation. See sections 10 and 11 and the <i>Installation</i> part of this Certificate.
Regulation: 9	Building standards applicable to construction
Standard: 2.8	Spread from neighbouring buildings
Comment:	When used in suitably-protected specifications, the system can be regarded as having low vulnerability under clause 2.8.1 ⁽¹⁾⁽²⁾ of this Standard. See section 7 of this Certificate.
Standard: 3.10	Precipitation
Comment:	The use of the system 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)	Statement of sustainability
Comment:	The system can contribute to meeting the relevant requirements of Regulation 9, Standards 1 to 6 and therefore will contribute to a construction meeting a bronze level of sustainability as defined in this Standard.
Regulation: 12	Building standards applicable to conversions
Comment:	All comments given for the 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(a)(i)(iii)(b)(i)	Fitness of materials and workmanship
Comment:	The system is acceptable. See section 11 and the <i>Installation</i> part of this Certificate.
Regulation: 28(b)	Resistance to moisture and weather
Comment:	The system will enable a roof to satisfy the requirements of this Regulation. See section 6.1 of this Certificate.
Regulation: 36(b)	External fire spread
Comment:	When used in suitably protected specifications, the system will be unrestricted under the requirements of this Regulation. See section 7 of this Certificate.

Construction (Design and Management) Regulations 2015

Construction (Design and Management) Regulations (Northern Ireland) 2007

Information in this Certificate may assist the client, Principal Designer/CDM co-ordinator, designer and contractors 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 2014

NHBC accepts the use of the Force Dalle System, provided it is installed, used and maintained in accordance with this Certificate, 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 system in accordance with harmonised European Standard EN 13707 : 2013. 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 The Force Dalle System comprises SBS modified bitumen membranes with a polyester reinforcement (nominal $180 \text{ g}\cdot\text{m}^{-2}$) and a thermofusible film on upper and lower faces. The membranes are:

- Force 4000 Dalle — for use in fully-bonded, partially-bonded and loose-laid and ballasted applications
- Force 4000 Dalle JAD — for use in fully-bonded, partially-bonded and loose-laid and ballasted applications. The lap seldge is a heat activated self-adhesive strip to allow application over EPS insulation
- Force 4000 Dalle GL — for use in fully-bonded, partially-bonded and loose-laid and ballasted applications.

1.2 The membranes are manufactured to the nominal characteristics given in Table 1.

Table 1 Nominal characteristics

Characteristic (unit)	Force 4000 Dalle/Force 4000 Dalle JAD	Force 4000 Dalle GL
Thickness (mm)	4	4
Roll width (m)	1	2
Roll length (m)	8	10
Roll weight (kg)	37	95
Watertightness	pass	pass
Tensile strength* (N per 50 mm)		
longitudinal	700	700
transverse	600	600
Elongation at break* (%)		
longitudinal	35	35
transverse	35	35
Nail tear* (N)		
longitudinal	180	180
transverse	230	230
Low temperature flexibility* (°C)	≤ -16	≤ -16
Flow resistance* (°C)	100	100
Dimensional stability (%)	≤ 0.5	≤ 0.5
Impact* (mm)	2000	2000
Static loading* (kg) (soft substrate A)	20	20
Tensile strength of joint* (N per 50 mm)		
longitudinal	700	700
transverse	600	600

1.3 The following membranes, covered in other Product Sheets of this Certificate, can be used in conjunction with Force Dalle membranes:

Hyranger membranes

- Hyranger 25/25 RE
- Hyranger 25/25 TS
- Hyranger TS CPV
- Hyranger CPV RE
- Hyranger TS
- Hyranger TS PY
- Hyranger 30
- Hyranger 40
- Hyranger 35 PY
- Hyranger 40 AR
- Hyranger 40 PY FP

Matflex membranes

- Matflex VV
- Matflex CPV
- Matflex PY

Topfix membranes

- Topfix FMP (sanded)
- Topfix FMP PY (sanded)

Force membranes

- Force 4000 S
- Force 4000 Trafic NT
- Force 4000 Trafic Anti-Root membrane
- Force 4000 SA.

1.4 Primers for use with the system are:

- Vernis Antac — a solvent-based bitumen primer
- Vernis Antac ST — a solvent-based, quick-drying bitumen primer
- Vernis Antac GC — a solvent-based elastomeric bitumen primer
- Vernis Seal — a coloured quick-drying primer.

1.5 Ancillary items which can be used with the Force Dalle systems, but which are outside the scope of this Certificate, include:

- additional Axter roofing membranes which can be used in conjunction with the Force Dalle System — Excel (also known as Alpal Décor CPV), Arma CPV, Topaz 25, Armalu, Paxalpha PB 4000 Copper, Paxinox and Topflam FMP (sanded)
- Hyranger 35 PY Reinforcement Strip
- Thermecran — a perforated membrane for use in partially-bonded applications
- Planivent — a perforated membrane for use in partially-bonded applications
- Axter adjustable or fixed-height paving and timber decking support system
- Dalle Ceramic — a specialist range of ceramic pavers for use with the Axter support system
- MAT 100 — a glass protection or separation layer for use under heavy protection or paving slabs on supports
- Axter vapour control layers — VAP AL, VAP AL SK, Hyranger Spot ADH, Force SA, Vap IND, SK Vap, Stickflex VV 50, Armalu, Armalu CPV, Alphardoise, Alphardoise CPV, Antivap and Vap Foil
- Hytherm XPS and ECO XPS — extruded polystyrene inverted roof insulation
- Hytherm ADH/BF/EPS — thermal insulation
- Hyra-Stik — cold-applied liquid polyurethane adhesive for installing EPS, PUR and PIR insulation boards
- Mastic Hyrene — cold bitumen bonding compound
- Mastic Hyraflex — elastomeric compound for pitch pocket detailing and joint filling
- Starcoat liquid membranes — cold-applied liquid resins for complex detailing (covered by BBA Certificate 13/5031)
- Excel Joint and Excel Park — a polyamide-reinforced elastomeric membrane and jointing system for movement and expansion joints including prefabricated junction pieces (Inter-L and Inter-R)
- prefabricated accessories — rainwater outlets, leaf guards, SVP covers, cable penetration units, hot and cold pipe penetration units, Axtrims and termination bars.

2 Manufacture

2.1 The membranes are manufactured by saturating and coating the reinforcement with SBS (styrene-butadiene-styrene) modified bitumen and calendaring to the correct thickness.

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 Axter SAS has been assessed and registered as meeting the requirements of EN ISO 9001 : 2008 and EN ISO 14001 : 2004 by AFAQ (Certificate QUAL/1996/5190.10 and No 2011/40665 respectively).

3 Delivery and site handling

3.1 The membranes are delivered to site in rolls with labels bearing the product name, roll dimensions, production date, batch number, Certificate holder's name and the BBA logo incorporating the number of their corresponding Certificate.

3.2 Rolls should be stored upright on a clean, level surface and kept dry, away from excessive heat and under cover.

3.3 The primers are classified under the *Classification, Labelling and Packaging of Substances and Mixtures (CLP Regulation) 2009* and bear the appropriate hazard warning label. When storing, extremes of temperature must also be avoided. The flashpoints and hazard warning classifications are given in Table 2.

Table 2 Flashpoints and hazard classification

Material	Flashpoint (°C)	Classification
Vernis Antac	28	Harmful, Flammable
Vernis Antac ST	10	Harmful, Highly flammable
Vernis Antac GC	28	Harmful, Flammable
Vernis Seal	-4	Irritant, Highly flammable

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the Force Dalle System.

Design Considerations

4 General

4.1 The Force Dalle System is satisfactory for use as a single-layer waterproofing layer or as part of a built-up system in conjunction with other bitumen membranes in fully-bonded, partially-bonded or loose-laid and ballasted applications on flat, including zero-pitched, roofs with limited or pedestrian access in:

- inverted roof specifications
- protected roof specifications, eg covered by pavers or other suitable protection, including self-protected capsheets.

4.2 The use of Force 4000 Dalle systems is covered in Product Sheet 2 of this Certificate for the Cityflor Green Roof Systems.

4.3 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. Pedestrian access roofs are defined for the purposes of this Certificate as those roofs allowing unrestricted foot traffic but not subject to vehicular traffic. Where pedestrian access is envisaged additional protection to the system must be provided (see section 9).

4.4 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 such features as overall and local deflection and direction of falls. Pitched roofs are defined as those having a fall greater than 1:6. Zero-pitched roofs are defined for the purpose of this Certificate as those having a finished fall which can vary between 0° and 0.7°.

4.5 Decks to which the membranes are to be applied must comply with the relevant requirements of either BS 6229 : 2003 or BS 8217 : 2005 and, where appropriate, *NHBC Standards 2014*, 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 used in accordance with, and within the scope of that Certificate.

4.7 On zero-pitched roofs it is particularly important to identify the correct drainage points to ensure that the drainage provided is effective.

5 Practicability of installation

The system is designed to be installed by a competent roofing contractor, experienced with these types of system.

6 Weathertightness

 6.1 The system will resist minor structural movements and resist the passage of water and moisture to the inside of the building and so enable a roof to comply with the relevant requirements of the national Building Regulations.

6.2 The system is impervious to water and, when used in one of the build-ups described, will achieve a weathertight roof capable of accepting minor structural movement without damage.

7 Properties in relation to fire



7.1 The system, when protected by an inorganic covering (eg gravel or paving slabs) listed in the Annex of Commission Decision 2000/553/EC, can be considered to be unrestricted under the various national Building Regulations.

7.2 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

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

8 Resistance to wind uplift

8.1 The system, when used within a suitable specification, will adequately resist the effects of wind uplift likely to occur in practice.

8.2 In loose-laid and ballasted and inverted roof systems the precise ballast requirements should be calculated in accordance with the relevant parts of BS EN 1991-1-4 : 2005 and its UK National Annex.

9 Resistance to mechanical damage

9.1 The system can accept the limited foot traffic and light concentrated loads associated with installation and maintenance. Reasonable care should be taken to avoid puncture of the system by sharp objects or concentrated loads. Where traffic in excess of this is envisaged, such as for maintenance of lift equipment or in pedestrian areas, suitable protection, for example, using concrete slabs supported on the Axter support system, must be used.

9.2 When used over construction or expansion joints, the membranes can accommodate without damage the minor structural movement likely to occur under normal service conditions. If greater movement or expansion, Axter Excel Joint/Exel Park system should be applied in accordance with the Certificate holder's instructions.

10 Maintenance



Roofs covered with the system must be the subject of annual inspections to ensure continued performance.

11 Durability



The system will have a service life in excess of 30 years.

Installation

12 General

12.1 Installation must be carried out in accordance with the relevant clauses of BS 8000-4 : 1989 and BS 8217 : 2005, the Certificate holder's instructions and this Certificate.

12.2 Substrates to which the membranes are to be applied must be sound, dry and clean, and free from sharp projections such as nail heads and concrete nibs.

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

12.4 If the roof is likely to be subjected to uncontrolled pedestrian access, the substructure must meet the requirements of BS 8217 : 2005, and, to prevent damage to the roof covering, one of the appropriate surface finishes referred to in Clauses 8.19 and 9.2 of the Code must be used.

12.5 Force 4000 Dalle JAD is used in a warm roof application in conjunction with expanded polystyrene insulation in accordance with the Certificate holder's instructions.

13 Procedure

13.1 The system is installed with torch bonded joints with 100 mm side laps and 150 mm end laps. A minimum 2 mm bead of molten material must exude from all laps to indicate a satisfactory homogeneous seal.

13.2 The system must always be installed with end laps staggered by a minimum of 300 mm and in such a manner that no counter-seams are made in the direction of outlets.

13.3 Joints for Force 4000 Dalle JAD are formed by overlapping the membranes at the selvedge and heat activating the self-adhesive strip from above using a propane gas torch. A 160 mm cover strip of Hyranger 25/25 TS is torch applied along the lap to reinforce the joint.

Bonded applications — general

13.4 If required, the substrate is primed using the appropriate primer for the substrate prior to installation of the membrane.

Fully-bonded applications

13.5 Bonding is achieved by melting the lower surface by torching and pressing the membrane down. Care must be taken not to overheat the coating. Jointing is carried out as described in sections 13.1 to 13.3.

Partially-bonded applications

13.6 For partially-bonded applications, a layer of either Thermecran or Planivent is loose-laid over the substrate with minimum side laps of 50 mm prior to installation of the membrane.

13.7 Force 4000 Dalle is bonded to the surface of the perforated membrane as described in section 13.5 of this Certificate. Bonding should occur regularly through the perforations to ensure even bonding of the membrane to the substrate. Jointing is carried out as described in sections 13.1 to 13.3.

Loose-laid and ballasted applications

13.8 A separating layer of MAT 100 is loose-laid over the substructure, with 100 mm loose overlapping joints and terminating around the perimeter and upstands for a minimum distance of 500 mm.

13.9 Joints on slopes between 0° and 1° have an additional 160 mm strip of either Hyranger 25/25 RE or Hyranger 25/25 TS, or other membrane approved by the Certificate holder, applied over the side joints. The strips must run in the direction of the outlets to avoid trapping water on the roof. Jointing for roofs of 1° to 5° slope is carried out as described in sections 13.1 to 13.3.

Detailing

13.10 Upstands and other detailing are carried out in accordance with the Certificate holder's installation instructions. On exposed areas suitable protected cap sheets are used to protect the membranes.

14 Repair

In the event of damage, the membranes can be effectively repaired, after cleaning, by applying a patch of the same membrane, bonded to the damaged area with a suitable overlap.

Technical Investigations

15 Tests

15.1 Tests were conducted on Force Dalle waterproofing membranes and the results assessed to determine:
on the coating mass

- softening point (ring and ball)
- penetration at 25°C
- low temperature flexibility
- elastic recovery
- softening point (ring and ball), low temperature flexibility and elastic recover after heat ageing for 168 days at 70°C

on the membranes

- static indentation
- dynamic impact
- sliding resistance
- fatigue cycling.

15.2 Test results on Axter membranes using the same coating mass and/or reinforcement were assessed to determine:

- dimensional stability
- low temperature stability
- heat resistance
- tensile strength of joints.

16 Investigations

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

16.2 Data on CE marking for the roofing membranes to EN 13707 : 2013 were examined.

16.3 Visits were carried out to existing sites for exposed Axter membranes of similar product specification, to assess the performance in use and durability of the membranes.

Bibliography

- BS 6229 : 2003 *Flat roofs with continuously supported coverings — Code of practice*
- 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 1991-1-4 : 2005 *Eurocode 1 : Actions on structures — General actions — Wind actions*
- NA to BS EN 1991-1-4 : 2005 UK National Annex to *Eurocode 1 : Actions on structures — General actions — Wind actions*
- EN 13707 : 2013 *Flexible sheets for waterproofing — Reinforced bitumen sheets for roof waterproofing — Definitions and characteristics*
- EN ISO 9001 : 2008 *Quality management systems — Requirements*
- EN ISO 14001 : 2004 *Environmental management systems — Requirements with guidance for use*

Conditions of Certification

17 Conditions

17.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page — no other company, firm, organisation or person may hold or claim that this Certificate has been issued to them
- is valid only within the UK
- has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English Law.

17.2 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.

17.3 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.

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

17.5 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.

17.6 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.