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Agrément Certificate
15/5222
Product Sheet 2

AXTER WATERPROOFING SYSTEMS

CITYFLOR GREEN ROOF SYSTEMS

This Agrément Certificate Product Sheet⁽¹⁾ relates to Cityflor⁽²⁾ Green Roof Systems, SBS modified bitumen membranes for use in roof garden (intensive), green roof (extensive), brown roof, biodiverse roof and protected terrace/balcony specifications.

(1) Hereinafter referred to as 'Certificate'.

(2) Cityflor 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 systems will resist the passage of moisture into the building (see section 6).

Properties in relation to fire — the systems, 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 systems will accept without damage the limited foot traffic and loads associated with installation and maintenance (see section 9).

Resistance to penetration of roots — the systems will adequately resist plant root penetration (see section 10).

Durability — under normal service conditions, the systems will provide a durable waterproof covering with a service life of at least 30 years (see section 12).



The BBA has awarded this Certificate to the company named above for the systems described herein. These systems 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 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 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.

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Regulations

In the opinion of the BBA, Cityflor Green Roof Systems, 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 systems will be unrestricted under this Requirement. See section 7 of this Certificate.
Requirement: C2(b)	Resistance to moisture
Comment:	The systems will enable a roof to meet this Requirement. See section 6.1 of this Certificate.
Regulation: 7	Materials and workmanship
Comment:	The systems are acceptable. See section 12.1 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 systems can contribute to a construction meeting this Regulation. See sections 11.1 and 12.1 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 systems can be regarded as having low vulnerability under clause 2.8.1 ⁽¹⁾⁽²⁾ of this Standard. See sections 7.1 and 7.3 of this Certificate.
Standard: 3.10	Precipitation
Comment:	The use of the systems 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 systems 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 these systems 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 systems are acceptable. See section 12.1 and the <i>Installation</i> part of this Certificate.
Regulation: 28(b)	Resistance to moisture and weather
Comment:	The systems 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 systems 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 Cityflor Green Roof Systems, provided they are 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 systems 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.

1 Description

1.1 Cityflor Green Roof Systems consist of the following SBS modified bitumen membranes:

Hyranger membranes

- Hyranger 25/25 RE — an underlay with a 50 g·m⁻² glass reinforcement and a sand finish on both faces
- Hyranger 30 — a cap sheet for exposed areas of the system with a 50 g·m⁻² glass reinforcement, a mineral or ceramic finish on the upper face and a sand finish on the lower face
- Hyranger 35 PY — a torch-on underlay with a 150 g·m⁻² polyester reinforcement, a sand finish on the upper face and a thermofusible film on the lower face
- Hyranger 40 AR — a cap sheet for exposed areas of the system with a 50 g·m⁻² glass reinforcement, a mineral finish on the upper face and a sand finish on the lower face
- Hyranger 40 PY FP — a torch-on cap sheet for exposed areas of the system with a 180 g·m⁻² polyester reinforcement, a mineral finish on the upper face and a thermofusible film finish on the underside
- Hyranger CPV RE — an underlay with 120 g·m⁻² polyester reinforcement and a sand finish on both surfaces
- Hyranger 25 TS — a torch-on underlay with a 50 g·m⁻² glass reinforcement, a sand finish on the upper face and a thermofusible film on the lower face
- Hyranger 25/25 TS — a torch-on underlay with a 50 g·m⁻² glass reinforcement, a sanded finish on the upper face and thermofusible film finish on the lower face
- Hyranger TS — a torch-on underlay with a 50 g·m⁻² glass reinforcement, a macroperforated film and a sand finish on the upper face, and a thermofusible film on the lower face
- Hyranger TS (sanded) — a partial-bond underlay with a 50 g·m⁻² glass reinforcement, a sand finish on the upper face, and a macroperforated film and a sand finish on the lower face
- Hyranger TS CPV — a torch-on underlay with a 120 g·m⁻² polyester reinforcement, a sand finish on the upper face and a thermofusible film on the lower face
- Hyranger TS CPV (sanded) — a partial-bond underlay with a 120 g·m⁻² polyester reinforcement, a sand finish on the upper face, and a macroperforated film and a sand finish on the lower face
- Hyranger TS PY — a torch-on intermediate layer with a 180 g·m⁻² polyester reinforcement, a sand finish on the upper face and a thermofusible film on the lower face
- Hyranger TS PY (sanded) — a torch-on intermediate layer with a 180 g·m⁻² polyester reinforcement, a sand finish on the upper face, and a macroperforated film and a sand finish on the lower face
- Hyranger TS 180 PY — a torch-on intermediate layer with a 180 g·m⁻² polyester reinforcement, a macroperforated film on the upper face and a thermofusible film on the lower face
- Hyranger TS PY SPF — a torch-on intermediate layer with a 180 g·m⁻² polyester reinforcement, a sand finish on the upper face and a thermofusible film on the lower face, and a self-adhesive selvedge
- Hyranger Spot ADH — a self-adhesive underlay membrane with a 120 g·m⁻² polyester reinforcement, a macroperforated film and a sand finish on the upper face, and a silicone release film on the lower face
- Hyranger Spot SIA — a self-adhesive membrane underlay with a 120 g·m⁻² polyester reinforcement, a macroperforated film and a sand finish on the upper face, and a siliconised release paper on the lower face

Matflex membranes

- Matflex VV — a partial-bond underlay with a 50 g·m⁻² glass reinforcement, a sand finish on the upper face, and a macroperforated film and a sand finish on the lower face
- Matflex CPV — a partial-bond underlayer with a 120 g·m⁻² polyester reinforcement, a sand finish on the upper face, and a macroperforated film and a sand finish on the lower face
- Matflex PY — a partial-bond intermediate layer with a 180 g·m⁻² polyester reinforcement, a sand finish on the upper face, and a macroperforated film and a sand finish on the lower face

Topfix membranes

- Topfix FMP — a mechanically-fastened underlay with a 120 g·m⁻² polyester reinforcement, a macroperforated film and sand finish on the upper face, and a thermofusible film finish on the lower face
- Topfix FMP (sanded) — a mechanically-fastened underlay with a 120 g·m⁻² polyester reinforcement, a macroperforated film and a sand finish on the upper face, and a sand finish on the lower face
- Topfix PY FMP — a mechanically-fastened underlay with a 180 g·m⁻² polyester reinforcement, a macroperforated film and a sand finish on the upper face, and a thermofusible film finish on the lower face
- Topfix PY FMP (sanded) — a mechanically-fastened underlay with a 180 g·m⁻² polyester reinforcement, a macroperforated film and a sand finish on the upper face, and a sand finish on the lower face

Force membranes

- Force 3000 Trafic — a torch-on, root-resistant cap sheet with a 180 g·m⁻² polyester reinforcement, a mineral finish on the upper face and a thermofusible film on the lower face

- Force 4000 Trafic — a torch-on, root-resistant cap sheet with a 250 g·m⁻² polyester reinforcement, a mineral finish on the upper face and a thermofusible film on the lower face
- Force 4000 Trafic SP — a torch-on, root-resistant cap sheet with a 180 g·m⁻² polyester reinforcement, a mineral finish on the upper face and a thermofusible film on the lower face
- Force 4000 Dalle — a torch-on intermediate layer with a 180 g·m⁻² polyester reinforcement and a thermofusible film on both faces.

1.2 The membranes are manufactured to the nominal characteristics given in Tables 1 to 4.

<i>Table 1 Nominal characteristics — Hyranger membranes</i>			
Characteristic (unit)	Hyranger 25/25 RE	Hyranger 30	Hyranger 35 PY
Thickness (mm)	2.65	2.30	3.65
Roll width (m)	1	1	1
Roll length (m)	10	10	10
Roll weight (kg)	34	39	36
Watertightness	pass	pass	pass
Tensile strength* (N per 50 mm)			
longitudinal	250	250	700
transverse	150	150	550
Elongation at break* (%)			
longitudinal	3	3	40
transverse	3	3	50
Nail tear* (N)			
longitudinal	80	–	190
transverse	80	–	230
Low temperature flexibility* (°C)	≤ -16	≤ -16	≤ -16
Flow resistance (°C)	100*	100*	100
Dimensional stability (%)	≤ 0.1	≤ 0.1	≤ 0.3
Impact* (mm)	500	–	1000
Static loading* (kg)			
(soft substrate A)	–	–	20
(hard substrate B)	–	–	5
Characteristic (unit)	Hyranger 40 AR	Hyranger 40 PY FP	Hyranger CPV RE
Thickness (mm)	2.85	3.20	2.30
Roll width (m)	1	1	1
Roll length (m)	10	10	15
Roll weight (kg)	44	48	40
Watertightness	pass	pass	pass
Tensile strength* (N per 50 mm)			
longitudinal	250	750	400
transverse	150	750	275
Elongation at break* (%)			
longitudinal	3	35	15
transverse	3	35	15
Nail tear* (N)			
longitudinal	–	–	–
transverse	–	–	–
Low temperature flexibility* (°C)	≤ -16	≤ -16	≤ -16
Flow resistance (°C)	100*	100	100
Dimensional stability (%)	≤ 0.1	≤ 0.3	≤ 0.3
Impact* (mm)	–	–	700
Static loading* (kg)			
(soft substrate A)	–	–	10
(hard substrate B)	–	–	–
Characteristic (unit)	Hyranger 25 TS	Hyranger 25/25 TS	Hyranger TS/Hyranger TS (sanded)
Thickness (mm)	2.65	2.65	2.80
Roll width (m)	1	1	1
Roll length (m)	10	10	10
Roll weight (kg)	37	37	35/36
Watertightness	pass	pass	pass
Tensile strength* (N per 50 mm)			
longitudinal	250	250	250
transverse	150	150	150

Table 1 Nominal characteristics – Hyranger membranes (continued)

Characteristic (unit)	Hyranger 25 TS	Hyranger 25/25 TS	Hyranger TS/Hyranger TS (sanded)
Elongation at break* (%)			
longitudinal	3	3	3
transverse	3	3	3
Nail tear* (N)			
longitudinal	80	80	80
transverse	80	80	80
Low temperature flexibility* (°C)	≤ -16	≤ -16	≤ -16
Flow resistance (°C)	100	100	100*
Dimensional stability (%)	≤ 0.1	≤ 0.1	≤ 0.1
Impact* (mm)	500	500	500
Static loading* (kg)			
(soft substrate A)	-	-	-
(hard substrate B)	5	5	-
Characteristic (unit)	Hyranger TS CPV/ Hyranger TS CPV (sanded)	Hyranger TS PY/ Hyranger TS PY (sanded)	Hyranger TS 180 PY
Thickness (mm)	2.70	2.80	3.15
Roll width (m)	1	1	1
Roll length (m)	10	10	10
Roll weight (kg)	30	29	35
Watertightness	10	pass	pass
Tensile strength* (N per 50 mm)			
longitudinal	400	700	700
transverse	275	440	550
Elongation at break* (%)			
longitudinal	15	25	35
transverse	15	25	35
Nail tear* (N)			
longitudinal	-	-	-
transverse	-	-	-
Low temperature flexibility* (°C)	≤ -16	≤ -16	≤ -16
Flow resistance (°C)	-	-	-
Dimensional stability (%)	≤ 0.3	≤ 0.3	≤ 0.5
Impact* (mm)	700	1000	1000
Static loading* (kg)			
(soft substrate A)	10	20	20
(hard substrate B)	-	-	-
Characteristic (unit)	Hyranger TS PY SPF	Hyranger Spot ADH	Hyranger Spot SIA
Thickness (mm)	2.80	2.70	2.70
Roll width (m)	1	1	1
Roll length (m)	10	10	10
Roll weight (kg)	29	32	32
Watertightness	pass	pass	pass
Tensile strength* (N per 50 mm)			
longitudinal	700	450	450
transverse	550	275	275
Elongation at break* (%)			
longitudinal	35	15	15
transverse	35	15	15
Nail tear* (N)			
longitudinal	-	-	-
transverse	-	-	-
Low temperature flexibility* (°C)	≤ -16	≤ -16	≤ -16
Flow resistance (°C)	-	-	-
Dimensional stability (%)	-	≤ 0.3	≤ 0.3
Impact* (mm)	1000	700	700
Static loading* (kg)			
(soft substrate A)	20	10	10
(hard substrate B)	-	-	-

Table 2 Nominal characteristics — Matflex membranes

Characteristic (unit)	Matflex VV	Matflex CPV	Matflex PY
Thickness (mm)	2.70	2.70	2.70
Roll width (m)	1	1	1
Roll length (m)	10	8	10
Roll weight (kg)	31	30	30
Watertightness	pass	pass	pass
Tensile strength* (N per 50 mm)			
longitudinal	400	400	700
transverse	300	350	700
Elongation at break* (%)			
longitudinal	3	15	35
transverse	3	15	35
Nail tear* (N)			
longitudinal	150	–	350
transverse	120	–	350
Low temperature flexibility* (°C)	≤ -16	≤ -16	≤ -16
Flow resistance (°C)	100	100	100
Dimensional stability (%)	≤ 0.5	≤ 0.5	≤ 0.5
Impact* (mm)	500	500	1000
Static loading* (kg) (soft substrate A)	5	15	20

Table 3 Nominal characteristics — Topfix membranes

Characteristic (unit)	Topfix FMP/Topfix FMP (sanded)	Topfix PY FMP/Topfix PY FMP (sanded)
Thickness (mm)	2.65	2.60
Roll width (m)	1	1
Roll length (m)	10	10
Roll weight (kg)	31	30
Watertightness	pass	pass
Tensile strength* (N per 50 mm)		
longitudinal	450	750
transverse	275	750
Elongation at break* (%)		
longitudinal	15	35
transverse	15	35
Nail tear* (N)		
longitudinal	180	200
transverse	150	250
Low temperature flexibility* (°C)	≤ -16	≤ -16
Flow resistance (°C)	90	–
Dimensional stability (%)	≤ 0.3	≤ 0.3
Impact* (mm)	1250	–
Static loading* (kg) (soft substrate A)	20	–
Tensile strength of joint* (N per 50 mm)		
longitudinal	650	–
transverse	750	–

Table 4 Nominal characteristics — Force/Force Dalle membranes

Characteristic (unit)	Force 3000 Trafic	Force 4000 Trafic	Force 4000 Trafic SP	Force 4000 Dalle
Thickness (mm)	3.20	4.00	3.50	4.00
Roll width (m)	1	1	1	1
Roll length (m)	8	8	8	8
Roll weight (kg)	37	40	38	37
Watertightness	pass	pass	pass	pass
Tensile strength* (N per 50 mm)				
longitudinal	750	900	700	700
transverse	650	900	450	600
Elongation at break* (%)				
longitudinal	35	45	45	35
transverse	35	50	45	35
Nail tear* (N)				
longitudinal	–	250	–	180
transverse	–	300	–	230
Low temperature flexibility* (°C)	≤ –16	≤ –16	≤ –16	≤ –16
Flow resistance* (°C)	90	90	90	100
Dimensional stability (%)	≤ 0.3	≤ 0.5	–	≤ 0.5
Impact* (mm)	1250	1750	1500	2000
Static loading* (kg) (soft substrate A)	20	15	20	20
Tensile strength of joint* (N per 50 mm)				
selvedge	650	900	450	600
end joint	750	900	700	700
Root penetration*	pass	pass	pass	–

1.3 Primers for use with the systems 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.

1.4 Ancillary items which can be used with the membranes, but which are outside the scope of this Certificate, include:

- additional Axter roofing membranes which can be used in conjunction with the Cityflor Green Roof Systems — Alpaflor PY AR, Excel (also known as Alpal Décor CPV), Arma CPV, Topaz 25, Armalu
- Axtex Caminaxter — a polyester-reinforced, SBS modified bitumen membrane with ceramic granule finish, for use where a walkway across the exposed roofing membrane is required
- 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
- MAT 50 — a 50 g·m⁻² glassfibre protection or separation layer for optional use under heavy protection or paving slabs on supports
- MAT 100 — a 100 g·m⁻² glassfibre protection or separation layer for optional use under heavy protection or paving slabs on supports
- Axter adjustable or fixed height paving and timber decking support system
- Dalle Ceramic — a specialist range of ceramic pavers for use with Axter support system
- Axter Filter Layer 170 g·m⁻² — a non-woven polyester
- Axter drainage membranes and boards — Axter DRAIN, Hydrodrain/12/20/40, Hydrodrain D500 and Bac Canalis
- Axter vapour control layers — VAP AL, VAL AL SK, Hyranger Spot ADH, Force SA, Vap IND, SK Vap, Stickflex W 50, Armalu, Armalu CPV, Alphardoise, Alphardoise CPV, Antivap and Vap Foil
- Hytherm ADH/BF/EPS — thermal insulation
- Hyra-Stik — cold-applied liquid polyurethane adhesive for installing EPS, PUR and PIR insulation boards
- Mastic Hyrene — a bituminous adhesive for use in partially bonding membranes to concrete substrates
- 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 *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 5.

Table 5 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 Cityflor Green Roof Systems.

Design Considerations

4 General

4.1 Cityflor Green Roof Systems are satisfactory for use as built-up systems on roofs with limited access in:

- roof gardens (intensive) on flat roofs with limited or pedestrian access
- green roofs (extensive) on flat and pitched roofs with limited access
- biodiverse roofs with limited access or pedestrian access
- brown roofs with limited access or pedestrian access
- protected terrace/balconies with pedestrian 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. 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 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 such features as overall and local deflection and direction of falls. Pitched roofs are defined as those having a fall greater than 1:6.

4.4 The following terms are defined for the purpose of this Certificate as:

- roof garden (intensive) — a roof with a substantial layer of growing medium with planting that can include shrubs and trees, and generally accessible to pedestrians
- green roof (extensive) — a roof with a shallow layer of growing medium planted with low maintenance plants such as mosses, sedums, grasses and some wildflower species
- biodiverse roof — a roof planted with the aim either to recreate the habitat that was lost when the building was erected or to enhance it
- brown roof — a roof with a growing medium selected to allow indigenous plant species to inhabit the roof over time; no deliberate planting is undertaken.

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 systems or materials used in conjunction with the membranes must be either:

- as described in 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 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*.

4.8 The structural decks to which the systems are to be applied must be suitable to transmit the dead and imposed loads experienced in service.

4.9 Imposed loads, dead loading and wind loads specifications 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 respective UK National Annexes.

4.10 The drainage system for both green roofs and 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.

5 Practicability of installation

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

6 Weathertightness



6.1 The systems 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 membranes are impervious to water and, when used in one of the systems described, will achieve a weathertight roof capable of accepting minor structural movement without damage.

7 Properties in relation to fire



7.1 A roof incorporating the systems will be unrestricted under the national Building Regulations in the following circumstances:

- a roof garden covered with a drainage layer of gravel 100 mm thick and a soil layer 300 mm thick
- an irrigated roof garden or green roof
- when protected by an inorganic covering (eg gravel or paving slabs) listed in the Annex of Commission Decision 2000/553/EC.



7.2 Exposed areas of the capsheet, when used with one of the surface finishes detailed in Approved Document B, Appendix A, Table A5, part iii (England and Wales) and Technical Booklet E, Table 4.6, part iv (Northern Ireland) (listed below), would be deemed to be unrestricted:

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



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

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

8.2 The soil used in intensive plantings should not be of a type that will be removed, or become localised, owing to wind scour experienced on site.

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

9 Resistance to mechanical damage

9.1 The systems 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 systems 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 Once the planting specification is installed, it can be regarded as a suitable protection for the membrane in use.

9.3 When used over construction or expansion joints, the systems can accommodate without damage the minor structural movement likely to occur under normal service conditions.

10 Resistance to penetration of roots

Results of root penetration resistance tests on Force Traffic membranes, including joints, indicate that they are resistant to root penetration and can be used in a waterproofing system in roofs incorporating a planting specification.

11 Maintenance



11.1 Roofs should be inspected twice-yearly in autumn after leaf fall and in spring to ensure that vegetation and other debris are cleared from the roof, and drainage outlets cleared. Guidance is available within the latest edition of *The GRO Green Roof Code — Green Roof Code of Best Practice for the UK*.

11.2 It is imperative that the drainage system of the planted roof is designed correctly, and provision is made for access for maintenance purposes. Inspection of the drains should be carried out regularly to avoid waterlogging of the growing medium and the subsequent increase in dead weight load.

12 Durability



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

12.2 Exposed cap sheets may suffer some localised loss of mineral/ceramic surfacing in areas where complex detailing of the roof design is incorporated.

Installation

13 General

13.1 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.

13.2 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.

13.3 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.

13.4 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 if exposed, one of the appropriate surface finishes referred to in Clauses 8.19 and 9.2 of the Code, or alternatively Axter Caminaxter membrane, must be used.

13.5 The membranes 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.

13.6 A separation layer is used when the membranes are used in conjunction with expanded polystyrene insulation in accordance with the Certificate holder's instructions.

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

14 Procedure

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

14.2 The underlayers for the systems, dependent on the type, can be installed by the following methods:

- loose-laid
- partially-bonded
- fully-bonded
- mechanically fastened.

14.3 Underlayers and intermediate layers are installed using the appropriate application method and overlap sizes, in accordance with the Certificate holder's installation instructions.

14.4 Force Traffic membranes are used as cap sheets to the waterproofing system in planting specifications.

14.5 The cap sheet is fully torch-bonded to the membrane below, with joints staggered by 100 mm in relation to the layer below. Widths of the lap joints are in line with the recommendations of the Certificate holder.

14.6 The specification above the waterproofing system should be of a suitable design, including a filter layer and drainage layers where required. In cases of doubt the Certificate holder's advice should be sought.

14.7 Upstands and other detailing are carried out in accordance with the Certificate holder's installation instructions.

15 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

16 Tests

Tests were conducted on Cityflor Green Roof Systems and the results assessed to determine:

on the coating mass:

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

on the membranes

- static indentation
- dynamic impact
- sliding resistance
- fatigue cycling
- dimensional stability
- low temperature stability
- heat resistance
- tensile strength of joints
- root resistance.

17 Investigations

17.1 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.

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

17.3 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*

Conditions of Certification

18 Conditions

18.1 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.

18.2 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.

18.3 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.

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

18.5 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.

18.6 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.