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Agrément Certificate
16/5288
Product Sheet 2

ADDAGRIP RESIN BOUND DECORATIVE SURFACING

TERRABOUND

This Agrément Certificate Product Sheet⁽¹⁾ relates to Terrabound, a resin bound aggregate surfacing system for use as a surface course in domestic driveways, patios, pedestrian areas, lightly trafficked car-parks, low speed access roads and lightly trafficked areas.

(1) Hereinafter referred to as 'Certificate'.

CERTIFICATION INCLUDES:

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



KEY FACTORS ASSESSED

Strength and stability — the system has satisfactory resistance to the loads associated with vehicle and pedestrian traffic conditions for which it is designed (see section 6).

Surface characteristics — the system has satisfactory slip and skid resistance and is resistant to wear (see section 7).

Rainwater drainage — the system can be designed to have sufficient rainwater drainage properties to eliminate surface ponding (see section 8).

Durability — when used in applications as described in this Certificate, the system will retain its integrity and have a service life in excess of that of a traditional asphalt surface course. Rainwater drainage can be maintained provided that a maintenance schedule, including regular suction cleaning and sweeping, is implemented (see section 10).

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

Simon Wroe
Head of Approvals — Engineering

Claire Curtis-Thomas
Chief Executive

Date of First issue: 20 January 2016

Certificate amended on 12 December 2017 to update section 16 Tests.

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, Terrabound, 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:	H3(2)	Drainage of paved areas
Comment:		The system can contribute to the dissipation of rainwater from pavement areas and minimise the risk of ponding. See section 8 of this Certificate.
Requirement:	M1	Access to and use of buildings other than dwellings (Volume 2)
Requirement:	M2	Access to extensions to buildings other than dwellings
Requirement:	M4(1)(2)(3)	Access to and use of buildings Volume 1: Dwellings
Comment:		The system is suitable for use as a surfacing course in car parks and on approach routes, providing external access to dwellings and buildings other than dwellings. See section 4.1 of this Certificate.
Regulation:	7	Materials and workmanship
Comment:		The system is acceptable. See section 10 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 satisfying this Regulation. See sections 9 and 10 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards applicable to construction
Standard:	2.12	Fire and rescue service access
Comment:		The system will contribute to meeting the relevant requirements of this Standard, with reference to clauses 2.12.0 ⁽¹⁾⁽²⁾ , 2.12.2 ⁽¹⁾⁽²⁾ and 2.12.3 ⁽¹⁾⁽²⁾ . See section 4.1 of this Certificate.
Standard:	3.6	Surface water drainage
Comment:		The system will contribute to meeting the relevant requirements for rainwater drainage in this Standard, with reference to clauses 3.6.2 ⁽¹⁾⁽²⁾ , 3.6.3 ⁽¹⁾⁽²⁾ , 3.6.4 ⁽¹⁾⁽²⁾ and 3.6.6 ⁽¹⁾⁽²⁾ . See section 8 of this Certificate.
Standard:	4.1	Access to Buildings
Comment:		Use of the system will contribute towards compliance with this Standard, with reference to clause 4.1.4 ⁽¹⁾⁽²⁾ . See section 4.1 of this Certificate.
Standard:	7.1(a)(b)	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-iv)(b)(i)	Fitness of materials and workmanship
Comment:		The system is acceptable. See section 10 and the <i>Installation</i> part of this Certificate.
Regulation:	82(a)(b)	Rainwater drainage
Comment:		The system will contribute to the dissipation of rainwater from pavement areas, and minimise the risk of ponding. See section 8 of this Certificate.
Regulation:	37	Facilities and access for the Fire and Rescue Service
Regulation:	91	Access and use
Regulation:	92	Access to extensions
Comment:		The system will contribute to meeting the relevant requirements for vehicular and non-vehicular access routes and hardstanding areas in these Regulations. See section 4.1 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 section: 3 *Delivery and site handling* of this Certificate.

Additional Information

NHBC Standards 2016

In the opinion of the BBA, Addaset and Addabound, 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 10.2 *Drives, paths and landscaping*.

Technical Specification

1 Description

1.1 Terrabound is a resin bound surface course comprising a two-component, cold-applied polyurethane binder, and fine and coarse 3 mm, 6 mm or 10 mm sized aggregates.

1.2 Also for use with the system, but outside the scope of this Certificate, is glass grit 0.3 mm to 0.6 mm or aluminium oxide FEPA 46, 36 or 30, broadcast onto surfaces where additional skid/slip resistance may be required.

2 Manufacture

2.1 The binder components are manufactured using a batch-blending process.

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.

3 Delivery and site handling

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

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Terrabound.

Design Considerations

4 Use



4.1 Terrabound is satisfactory for use as a surface course system for domestic driveways, patios, pedestrian areas, lightly trafficked car-parks, low speed access roads and lightly trafficked areas.

4.2 Terrabound is designed incorporating a blend of either a 3 mm, 6 mm or 10 mm aggregate. The choice of aggregate type will depend on site-specific details, including location and contractual requirements for polished stone value (PSV), texture depth, colour, porosity and any other properties.

4.3 The system can be applied to a bituminous or concrete substrate provided the underlying layers of the pavement are stable and have sufficient load-spreading capabilities to support the imposed loading of the surfacing during installation and the expected service life.

4.4 The system can be used as part of new or maintenance pavement construction.

5 Practicability of installation

The system is to be installed only by contractors approved by the Certificate holder, using conventional equipment for the mixing and application of the system (see the *Installation* section of this Certificate).

6 Strength and stability

Resistance to permanent deformation

6.1 The 3 mm, 6 mm and 10 mm aggregate based system has a resistance to rut rate and rut depth classified as Type 2 in accordance with PD 6691 : 2015, Appendix D, Table D.2, as suitable for heavily stressed sites requiring very high rut resistance.

Tensile bond strength

6.2 A visual inspection of existing sites confirmed no significant defects that could be relative to de-bonding. In addition, laboratory testing to TRL Report 176, Appendix J, on a control set and after heat ageing and water soak, confirmed satisfactory tensile bond strength to both asphalt and concrete when installed in accordance with the provisions of this Certificate.

Erosion index

6.3 A visual inspection of sites confirmed no significant defects that could be related to wear such as fretting and ravelling of aggregates from the surface. In addition, laboratory testing in accordance with the BBA HAPAS *Guidelines for Assessment and Certification of High Friction Surfacing* for scuffing at 45°C resulted in an erosion index of less than 3.0.

Chemical resistance

6.4 When tested in accordance with BS 903-A26 : 1995, ISO 48 : 1994, the system has a good resistance to chemicals likely to be spilt on road surfaces or parking areas, such as oil or petrol. However, it is recommended that any spillages are removed as soon as possible to avoid staining or potential contamination due to porous nature of surface.

7 Surface characteristics

Skid and slip resistance

7.1 The initial skid resistance (prior to trafficking) measured in accordance with TRL Report 176, Appendix E (pendulum test using sliders applicable to both vehicular and foot traffic), indicates that initial measurements of greater than 50 can be achieved. The system is considered suitable in applications where this is required.

7.2 Retained skid resistance is affected by the aggregate type and expected trafficking. Appropriate aggregate selection must therefore be considered in areas where risk of slipping by foot, or skidding by vehicles, is high.

Surface texture

7.3 The initial texture depth measured in accordance with BS EN 13036-1 : 2010 indicates that texture depth is dependent on the aggregate size of the mix. The texture depth for 3 mm aggregate is ≥ 0.7 mm, for 6 mm is ≥ 1.2 mm, and for 10 mm is ≥ 1.5 mm. The system is considered suitable for use in applications where these texture depths are required.

7.4 Retained texture depth is affected by the aggregate type and expected trafficking levels. Therefore appropriate aggregate selection must be considered in areas where retained texture depths are required.

8 Rainwater drainage



8.1 Results of vertical and horizontal permeability tests conducted in accordance with BS EN 12697-19 : 2004, indicate that the water will drain through the surface course and into the pavement substrate thereby reducing or eliminating surface ponding (see Table 1).

8.2 Vertical and horizontal flow rate is affected by the aggregate size used in the mix. The 3 mm aggregate design shows the lowest flow rates when compared to the 6 mm and 10 mm.

Table 1 Vertical and horizontal permeability

Test	Method	Parameter measured	Results		
			3 mm	6 mm	10 mm
Permeability	BS EN 12697-19 : 2004	Permeability ⁽¹⁾ ($10^{-3} \cdot \text{m} \cdot \text{s}$)			
		Vertical	0.09	0.12	0.23
		Horizontal	0.09	0.15	0.24

(1) Mean of two results. Test were carried out on 100 mm diameter cores.

9 Maintenance



In order to maintain the permeability of the surface it must be cleaned periodically using a pressure washer or a sweeper fitted with water jetting and vacuuming equipment.

10 Durability



The system has been in use since 2010 and, when used in domestic driveways, patios, pedestrian areas, lightly trafficked car-parks, low speed access roads and lightly trafficked areas, will have a service life in excess of conventional asphalt surfacing.

11 General

11.1 Ambient and pavement surface temperatures, along with relative humidity, should be recorded at the start and if, the weather is variable, during the installation process. Installation should not proceed if:

- the relative humidity is greater than 80%
- the surface temperature is less than 3°C above the dew point of the measured air temperature and relative humidity
- the operating temperature and road surface temperature and/or air temperature is outside the range 7°C to 30°C.

11.2 The Certificate holder is responsible for training and monitoring their approved Installers to ensure the system is installed in accordance with the BBA Agreed Method Statement and this Certificate.

11.3 The Certificate holder must be consulted on the structural design and suitability of the pavement structure. The base and binder course layers must take into account the anticipated rainfall, traffic loading, ground conditions and the key factors assessed and identified in this Certificate.

11.4 Rates of spread will be dictated by the required installed depths and the aggregate size. The minimum nominal installation depth for the 3 mm aggregate is 12 mm, for the 6 mm aggregate is 16 mm, and the 10 mm aggregate is 22 mm.

12 Preparation

12.1 All imperfections in the substrate not acceptable to the Installer should be reinstated with a material approved by the Purchaser in consultation with the Installer.

12.2 The substrate must be clean, dry and free from ice, frost, loose aggregate, oil, grease, road salt and other loose matter which may impair the adhesion of the system.

13 Application

13.1 The binder components are supplied in pre-weighed packs. Parts A and B are mixed together using a slow-speed, high-torque drill and paddle for a minimum of 45 seconds, until a homogeneous mix is achieved.

13.2 The mixed resin must then be added immediately to the pre-mixed aggregate and placed in a mechanical mixer and mixed for 1 to 2 minutes, or until homogeneous.

13.3 The mixed material is immediately spread evenly across the surface at the required depth using a spazzle and screed box.

13.4 The surface is finished with a hand trowel or lightweight finishing tool.

13.5 Glass grit or aluminium oxide may be applied to the surface at this stage at a spread rate of 50 to 80 g.m².

14 Aftercare

The system must be allowed to cure. During the curing period no disturbance or trafficking is permitted.

15 Repair

Any damaged areas must be cut back to firmly-bound material and replaced with material mixed and installed in accordance with this Certificate.

Technical Investigations

16 Tests

Tests were conducted on samples of Terrabound, including the resin, and results were assessed to determine:

- tensile characteristics
 - control
 - UV exposure (400 mj·m⁻² at 50°C, 10 years equivalence)
 - heat aged at 70°C for 28 days
 - water soak at 23°C for 7 days (including chlorinated water)
- scuffing resistance
- skid and slip resistance
- texture depth
- erosion index
- resistance to permanent deformation at 60°C

- tensile adhesion
 - control
 - heat aged 70°C for 28 days
 - water soak 23°C 7 Days
- colour stability after UV exposure (400 mj-m⁻² at 50°C, 10 years equivalence)
- hardness test
 - 1 and 7 day exposure to:
 - petrol
 - diesel
 - hydraulic fluid
 - antifreeze
 - engine oil
 - battery acid
- permeability.

17 Investigations

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

17.2 An installation trial was carried out to assess the practicability of the installation and on-site quality control procedures. A visual inspection of the site concluded that it was free from significant abnormalities.

17.3 A user/specifier survey relating to existing sites up to and including five years in service was carried out to confirm the system's performance in use. The visual condition survey carried out by the BBA inspection marked all sites as moderate to excellent condition with no significant defects.

17.4 A review of existing test data relating to an extensive study of hydraulic conductivity was carried out to support the Certificate holder's claims relative to permeability.

Bibliography

BBA HAPAS *Guidelines for Assessment and Certification of High Friction Surfacing*

BS 903-A26 : 1995, ISO 48 : 1994 *Physical testing of rubber — Method for determination of hardness (hardness between 10 IRHD and 100 IRHD)*

BS EN 12697-19 : 2004 *Bituminous mixtures — Test methods for hot mix asphalt — Permeability of specimen*

BS EN 12697-22 : 2003 *Bituminous mixtures — Test methods for hot mix asphalt — Wheel tracking*

BS EN 13036-1 : 2010 *Road and airfield surface characteristics — Test methods — Measurement of pavement surface macrotexture depth using a volumetric patch technique*

PD 6691 : 2015 *Guidance on the use of BS EN 13108, Bituminous mixtures — Material specifications*

TRL Report 176 *Laboratory tests on high friction surfaces for highways*

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.