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Agrément Certificate

93/2888

Product Sheet 1

CEMENTAID CONCRETE WATERPROOFING SYSTEMS

EVERDURE CALTITE

This Agrément Certificate Product Sheet⁽¹⁾ relates to Everdure Caltite, an aqueous hydrophobic liquid incorporating pore-blocking components, for use in concrete mixes to provide watertight concrete for basements, roofs, swimming pools, tunnels, and culverts, without the requirement for additional applied protection.

(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

Water penetration and absorption — Everdure Caltite concrete has reduced capillary absorption when compared with an equivalent plain concrete (see section 6).

Reinforcement protection — Everdure Caltite concrete has enhanced resistance to reinforcement corrosion when compared with an equivalent plain concrete (see section 8).

Mechanical properties — the flexural and compressive strengths of concrete are not adversely affected by the incorporation of the product (see section 9).

Durability — Everdure Caltite concrete is more durable than an equivalent plain concrete mix, owing to its reduced capillary absorption (see section 18).

The BBA has awarded this Certificate to the company named above for the product described herein. This 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 Third issue: 16 December 2014

John Albon — Head of Approvals

Claire Curtis-Thomas

Originally certificated on 9 March 1993

Construction Products

Chief Executive

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, Everdure Caltite is not subject to these Regulations:



The Building Regulations 2010 (England and Wales) (as amended)



The Building (Scotland) Regulations 2004 (as amended)



The Building Regulations (Northern Ireland) 2012

Construction (Design and Management) Regulations 2007

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

Information in this Certificate may assist the client, CDM co-ordinator, designer and contractors to address their obligations under these Regulations.

See sections: *3 Delivery and site handling (3.1, 3.3 and 3.4) and 22 Placing (22.1) of this Certificate.*

Additional Information

NHBC Standards 2014

In the opinion of the BBA, the use of Everdure Caltite, in relation to this Certificate, is not subject to the requirements of these Standards.

CE marking

The Certificate holder has taken the responsibility of CE marking the product in accordance with harmonised European Standard BS EN 934-2 : 2009, Table 9. An asterisk (*) appearing in this Certificate indicates that data shown are given in the manufacturer's Declaration of Performance.

Technical Specification

1 Description

Everdure Caltite is an aqueous, hydrophobic liquid that provides waterproofing, pore-blocking and enhanced durability properties to concrete in which it is incorporated. A superplasticising liquid admixture, complying with BS EN 934-2 : 2009, Tables 3.1 and 3.2, is added to reduce the water/cement ratio of the mix while enhancing the workability of the concrete.

2 Manufacture

2.1 The product is manufactured by a 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.

2.3 The management system of Cementaid (UK) Limited has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 by BSI (Certificate FM/72342).

3 Delivery and site handling

3.1 The product is supplied in 210 litre drums, in IBCs or by bulk tanker. Drums and IBCs are stencilled with the relevant product details and the batch number. A label bearing the BBA logo incorporating the number of this Certificate is attached to the drum. A copy of each material's Safety Data Sheet accompanies the delivery.

3.2 The product should be stored protected from frost.

3.3 The product is classified as 'non-hazardous', but is alkaline with a pH value of 10 to 11, and may evolve ammonia. Overalls and gloves must be worn when handling the product and contact with the eyes must be avoided.

3.4 When handling, the normal health and safety procedures associated with cementitious materials should be observed.

Assessment and Technical Investigations

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

Design Considerations

4 Use

4.1 Everdure Caltite is satisfactory for use in concrete mixes at an addition rate of 30 litres per cubic metre of concrete. The concrete mix should incorporate a high-range water reducing superplasticiser conforming to BS EN 934-2 : 2009, Tables 3.1 and 3.2. The product is suitable for use in basements, roofs, swimming pools, tunnels and culverts without the requirement for additional applied protection.

4.2 Concrete containing the product should be designed in accordance with BS EN 206 : 2013 and BS 8500-2 : 2006 for use as all normal types, including precast, pre-stressed, post tensioned, ready-mixed, reinforced, slip formed, sprayed and pumped concretes.

4.3 The product is compatible with cement blends containing pulverized fuel ash, ground granulated blastfurnace slag and silica fume as defined in BS EN 197-1 : 2011.

4.4 The use of the product with an air-entraining agent is outside the scope of the Certificate.

4.5 The product is suitable for use in contact with potable water and has been approved by the Water Regulations Advisory Scheme for this purpose.

5 Practicability of installation

Everdure Caltite concrete can be placed, compacted and cured by operatives with experience of conventional concreting methods and equipment.

6 Water penetration and absorption

Everdure Caltite concrete has greater resistance to water penetration and water absorption than an equivalent plain concrete.

Table 1 Effect of the product on water penetration and absorption (typical laboratory results)

Property	Control concrete	Everdure Caltite concrete	Test reference
Water absorption (%) ⁽¹⁾	3.1	0.8	BS 1881-5
Water permeability (m·s ⁻¹) ⁽¹⁾			Taywood/Valenta
0–50 mm	2.23 x 10 ⁻¹²	1.14 x 10 ⁻¹²	
50–100 mm	1.43 x 10 ⁻¹²	0.15 x 10 ⁻¹²	
Initial surface absorption test (ISAT) (ml·m ⁻² ·s ⁻¹)			BS 1881-5
10 mins	0.50	0.11	
30 mins	0.25	0.08	
60 mins	0.16	0.04	
120 mins	0.10	0.02	

(1) The specific effect of the product on these properties for a particular mix and site conditions should be evaluated through site trials prior to use.

7 Water vapour permeability

7.1 Everdure Caltite concrete has a lower permeability by water vapour than an equivalent plain concrete.

7.2 Concrete made with a high water/cement ratio can have a water vapour permeability above 3000 x 10⁻¹² g·m(N·s)⁻¹. The permeability of the concrete is highly dependent on the exact mix design.

7.3 The appropriate thickness for concrete with a specific permeability to achieve a water vapour resistance of 200 MN·s·g⁻¹ or 550 MN·s·g⁻¹ (suitable for grade 3 of BS 8102 : 2009) is given by:

$$\text{For } 200 \text{ MN}\cdot\text{s}\cdot\text{g}^{-1}, \quad t = 0.20 \times 10^{12} \times p$$

$$\text{For } 550 \text{ MN}\cdot\text{s}\cdot\text{g}^{-1}, \quad t = 0.55 \times 10^{12} \times p$$

where: t = concrete thickness in mm

$$p = \text{water vapour permeability in } \text{g}\cdot\text{m}(\text{N}\cdot\text{s})^{-1} \text{ (from BS 3177 : 1959 test).}$$

(1) This figure may be used where a high resistance to water vapour is required.

8 Reinforcement protection

8.1 The high alkalinity required to prevent corrosion of the reinforcement ($\text{pH} > 13$) will not be adversely affected by the incorporation of the product into the concrete.

8.2 Corrosion of reinforcement is normally caused by the ingress of chloride to the steel and/or by the reduction in alkalinity of the concrete by the diffusion of carbon dioxide. The reduced permeability of concrete containing the product will slow down diffusion of aggressive agents into the concrete and so confer improved protection against reinforcement corrosion.

8.3 The Certificate holder has declared the chloride ion content of the product as $< 0.1\%*$.

8.4 The Certificate holder has declared that the product complies with the corrosion behaviour requirements given in BS EN 934-1 : 2008, Clause 5.1, by testing to BS EN 480-14 : 2006.

9 Mechanical properties

9.1 The compressive strength of Everdure Caltite concrete will be similar to the equivalent plain concrete with the same slump.

9.2 The flexural strength of Everdure Caltite concrete is higher than that of equivalent plain concrete with the same slump.

9.3 The static modulus of elasticity of Everdure Caltite concrete is similar to an equivalent plain concrete.

10 Drying shrinkage and wetting expansion

The drying shrinkage and wetting expansion of Everdure Caltite concrete is reduced compared with that of an equivalent plain concrete (see Table 2).

*Table 2 Effect of the product on the shrinkage and expansion properties of hardened concrete⁽¹⁾
(typical laboratory results)*

Property	Control concrete	Everdure Caltite concrete	Test reference
Drying shrinkage (%)	0.036	0.024	BS 1881-5
Wetting expansion (%)	0.020	0.007	BS 1881-5

(1) The specific effect of the product on these properties for a particular mix and site conditions should be evaluated through site trials prior to use.

11 Setting and hardening characteristics

11.1 The effect of the product for a specific mix and site conditions should be evaluated through site trials prior to use.

11.2 The setting time of Everdure Caltite concrete is similar to that of an equivalent plain concrete.

11.3 The setting time will depend on the concrete mix design used and ambient temperature during placing and curing.

12 Carbonation resistance

Everdure Caltite concrete has a greater resistance to carbon dioxide diffusion than an equivalent plain concrete.

13 Frost resistance

Everdure Caltite concrete has a greater resistance to frost than an equivalent plain hardened concrete (see Table 3).

*Table 3 Effect of the product on the frost resistance properties of hardened concrete⁽¹⁾
(typical laboratory results)*

Property	Control concrete	Everdure Caltite concrete	Test reference
Freeze/thaw expansion (%)	0.031	0.010	BS 5075-2

(1) The specific effect of the product on these properties for a particular mix and site conditions should be evaluated through site trials prior to use.

14 Sulfate resistance

The lower permeability of Everdure Caltite concrete reduces the ingress of sulfates. However, if sulfate-resistant concrete is required, the advice of the Certificate holder should be sought.

15 Alkali/silica reaction (ASR)

15.1 Concrete containing the product should be designed according to BS EN 206 : 2013, Section 5.2.3.5, and BS 8500-2 : 2006, Section 5.2.

15.2 The Certificate holder's declared value of $< 0.2\%*$ for the sodium oxide equivalent of the system should be used when calculating its contribution to the total alkali content of a given concrete mix. This in turn can be used to assess the susceptibility of that concrete to alkali-silica reaction.

16 Resistance to leaching

16.1 Use of the product reduces the leaching of the lime from the hydrated cement in the concrete.

16.2 Inspected sites and investigation of Everdure Caltite concrete up to 30 years old show no evidence of leaching out of the active ingredients of the product within the concrete.

17 Maintenance

For a specific installation, the maintenance regime should be considered to ensure that the required design life of the concrete is achieved.

18 Durability

18.1 Under normal conditions of service, Everdure Caltite concrete is more durable than an equivalent plain concrete owing to its reduced permeability.

18.2 Where exposure to aggressive soil conditions or chemicals is anticipated, a full assessment of the site should be made. In these situations the Certificate holder should be consulted on the suitability of the product.

Installation

19 General

19.1 When used in concrete, Everdure Caltite enhances durability and improves protection against reinforcement corrosion, by providing a concrete with reduced permeability that protects it against water ingress via hydrostatic pressure.

19.2 Use of the product will produce a concrete with properties relative to a control of:

- reduced porosity
- reduced capillary absorption
- increased water resistance
- increased corrosion resistance

19.3 Structures built incorporating the product should be designed to the relevant sections of BS 8102 : 2009, BS EN 1992-1-1 : 2004, BS EN 1992-1-2 : 2004 and BS EN 1992-3 : 2006.

19.4 Everdure Caltite concrete is suitable for Type B protection as described in BS 8102 : 2009, Table 1, and can meet the requirements for all grades defined in Table 2 of that Standard. For Grade 3 (where control of water vapour is required), it will be necessary to provide a mix with a sufficiently low vapour permeability in combination with an adequate section thickness (see sections 7.2 and 7.3). The use of suitable ventilation, dehumidification or air-conditioning, appropriate to the intended use, must also be considered.

19.5 Basements for dwellings should be designed in accordance with the guidance given in *Approved document — basement for dwellings (revised edition)*⁽¹⁾.

(1) Published by the British Cement Association, Product code: 48.062.

20 Mix design

20.1 Everdure Caltite concrete is normally supplied as ready-mixed concrete but may be prepared on sites where there is adequate mix control. Concrete preparation on site should be carried out in accordance with BS 8000-2-1 : 1990, the Certificate holder's instructions and this Certificate.

20.2 The concrete must have a minimum cement content of 335 kg·m⁻³, and be batched with a maximum water/cement ratio of 0.45 and to a consistence class S2 or S3. Further details of suitable mixes can be obtained from the Certificate holder.

20.3 Once the fresh concrete is mixed, further materials must not be added.

20.4 The consistency of the concrete can be adjusted using a suitable⁽¹⁾ water reducing or superplasticising admixture complying with BS EN 934-2 : 2009 to ensure that the maximum water/cement ratio given in section 20.2 is not exceeded. Specific admixtures have not been considered and are outside the scope of this Certificate.

(1) The Certificate holder's advice should be sought regarding the suitability and compatibility of water reducing or superplasticising admixtures. Admixtures should be evaluated before use and site trials carried out to establish the appropriate dose required.

21 Mixing

21.1 The product is added to the concrete mix at the correct doses (see section 4.1) in accordance with the Certificate holder's instructions.

21.2 The resulting concrete is mixed in accordance with the Certificate holder's instructions to ensure even distribution of the product throughout the concrete.

21.3 Where the product is to be added to concrete on site, care must be taken to ensure that adequate mix control is available.

22 Placing

22.1 Everdure Caltite concrete is placed in the same way as normal concrete, in accordance with BS 8000-2-2 : 1990, BS EN 13670 : 2009, the Certificate holder's health and safety guidance, and the normal routine precautions for handling concrete.

22.2 Concrete mixes containing the product should not be placed at temperatures lower than 5°C or above 30°C.

22.3 Concrete containing the product should be fully compacted.

23 Curing

The concrete should be cured strictly in accordance with BS EN 13670 : 2009, BS EN 1992-1-1 : 2004, its UK National Annex and the Certificate holder's recommendations (where site-specific information exists).

24 Joints

24.1 Joints must be designed with waterstops as recommended in BS 8102 : 2009, to maintain the watertightness of the whole structure. The advice of the Certificate holder should be sought on particular applications.

24.2 Penetrations of the concrete, such as pipe entries or formwork ties, must also be securely sealed to maintain watertightness. The Certificate holder can advise on suitable systems.

25 Finishes

When water-based products are used to coat the hardened concrete, a bonding agent may be needed. For specific cases, advice should be sought from the Certificate holder.

Technical Investigations

26 Tests

26.1 The results of tests on the effect of Everdure Caltite on the typical properties of concrete were assessed to determine:

- water absorption
- water permeability
- drying shrinkage
- wetting expansion
- freeze/thaw expansion
- initial surface absorption.

26.2 Tests were carried out and the results assessed to determine:

- characterisation tests on the product including specific gravity, differential thermal analysis and gas chromatography
- comparative workability of fresh concrete
- compressive strength of cured concrete
- slip resistance of cured concrete.

27 Investigations

27.1 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.

27.2 A user survey was conducted to investigate the performance of the product in service.

27.3 Data relating to the following aspects of Everdure Caltite concrete were assessed:

- mix designs
- curing regime
- toxicity
- setting and hardening concrete characteristics, including:
 - setting time
 - bleeding
 - heat of reaction
 - curing
 - plastic shrinkage
- hardened concrete characteristics, including:
 - density
 - colour
 - compressive strength
 - modulus of elasticity

- drying shrinkage/wetting expansion
- thermal shock resistance
- tensile strength
- porosity
- pore distribution
- bond strength to steel
- permeability
- resistance to carbonation
- sulfate attack
- chlorides
- acid
- freeze/thaw
- water penetration and leaching
- water vapour permeability
- requirements for surface finishes
- maintenance and repair requirements.

27.4 Visits were made to sites where installation of the product was taking place.

27.5 Visits were made to established sites where the product has been in service.

27.6 Cementaid (UK) Limited's method of technical support to clients was observed and assessed.

Bibliography

- BS 1881-5 : 1970 *Testing concrete — Methods of testing hardened concrete for other than strength*
- BS 3177 : 1959 *Method for determining the permeability to water vapour of flexible sheet materials used for packaging*
- BS 5075-2 : 1982 *Concrete admixtures — Specification for air-entraining admixtures*
- BS 8000-2-1 : 1990 *Workmanship on building sites — Code of practice for concrete work — Mixing and transporting concrete*
- BS 8000-2-2 : 1990 *Workmanship on building sites — Code of practice for concrete work — Sitework with in-situ and precast concrete*
- BS 8102 : 2009 *Code of practice for protection of below ground structures against water from the ground*
- BS 8500-2 : 2006 *Concrete — Complementary British Standard to BS EN 206 — Concrete — Specification, performance, production and conformity*
- BS EN 197-1 : 2011 *Cement — Composition, specifications and conformity criteria for common cements*
- BS EN 206 : 2013 *Concrete — Specification, performance, production and conformity*
- BS EN 480-14 : 2006 *Admixtures for concrete, mortar and grout — Test methods — Determination of the effect on corrosion susceptibility of reinforcing steel by potentiostatic electro-chemical test*
- BS EN 934-1 : 2008 *Admixtures for concrete, mortar and grout — Common requirements*
- BS EN 934-2 : 2009 *Admixtures for concrete, mortar and grout — Concrete admixtures — Definitions, requirements, conformity, marking and labelling*
- BS EN 1992-1-1 : 2004 *Eurocode 2 : Design of concrete structures — General rules and rules for buildings*
- NA to BS EN 1992-1-1 : 2004 *UK National Annex to Eurocode 2 : Design of concrete structures — General rules and rules for buildings*
- BS EN 1992-1-2 : 2004 *Eurocode 2 : Design of concrete structures — General rules — Structural fire design*
- NA to BS EN 1992-1-2 : 2004 *UK National Annex to Eurocode 2 : Design of concrete structures — General rules — Structural fire design*
- BS EN 1992-3 : 2006 *Eurocode 2 : Design of concrete structures — Liquid retaining and containing structures*
- NA to BS EN 1992-3 : 2006 *UK National Annex to Eurocode 2 : Design of concrete structures — Liquid retaining and containment structures*
- BS EN 13670 : 2009 *Execution of concrete structures*
- BS EN ISO 9001 : 2008 *Quality management systems — Requirements*

28 Conditions

28.1 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.

28.2 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.

28.3 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.

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

28.5 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.

28.6 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.