Polypipe Limited
t/a Polypipe Civils
Charnwood Business Park
North Road
Loughborough
Leicestershire LE11 1LE

Tel: 01509 615100 Fax: 01509 610215
e-mail: civilssales@polypipe.com
website: www.polypipe.com

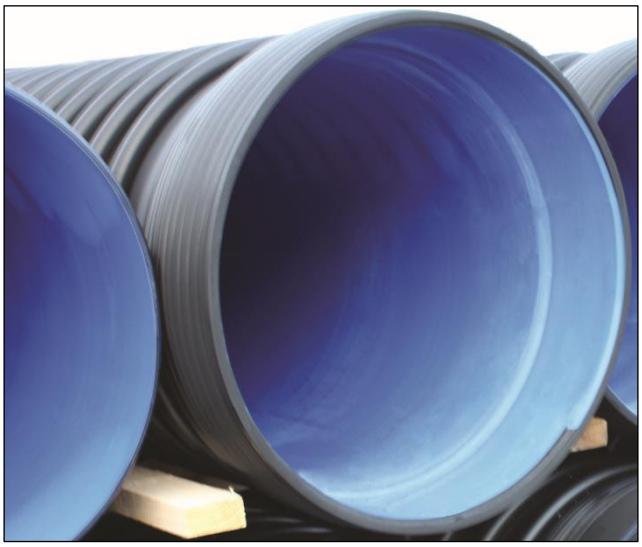
Agrément Certificate
11/4812
Product Sheet 1

RIDGISTORM XL DRAINAGE SYSTEM

RIDGISTORM XL 750 MM AND 900 MM FILTER AND CARRIER PIPES

This Agrément Certificate Product Sheet(1) relates to Ridgistorm XL 750 mm and 900 mm Filter and Carrier Pipes, perforated and unperforated HDPE pipes for use in surface water drainage applications.

(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 — the pipes have adequate strength to resist loads associated with installation and service (see section 6).

Performance of joints — the pipes will remain watertight under normal service conditions (see section 7).

Durability — the pipes will have a service life in excess of 50 years (see section 11).

The BBA has awarded this Certificate to the company named above for the products described herein. These products 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 Second issue: 4 October 2016

Originally certificated on 4 February 2011

Brian Chamberlain
Head of Technical Excellence

Claire Curtis-Thomas
Chief Executive

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.

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

Regulations

In the opinion of the BBA, Ridgistorm XL 750 mm and 900 mm Filter and Carrier Pipes, 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(3)**	**Rainwater drainage**
Comment:		The products will convey the flow of rainwater and minimise the risk of blockages or leakage. See section 8 of this Certificate.
Regulation:	**7**	**Materials and workmanship**
Comment:		The products are acceptable. See section 11 and the *Installation* part of this Certificate.

The Building (Scotland) Regulations 2004 (as amended)

Regulation:	**8(1)(2)**	**Durability, workmanship and fitness of materials**
Comment:		The use of the products satisfies the requirements of this Regulation. See sections 10.1 and 11 and the *Installation* part of this Certificate.
Regulation:	**9**	**Building standards applicable to construction**
Standard:	3.6(a)	Surface water drainage
Comment:		The products will meet the relevant requirements of this Standard, with reference to clauses 3.6.1[(1)(2)] and 3.6.2[(1)(2)]. See section 8 of this Certificate.
Standard:	7.1(a)	Statement of sustainability
Comment:		The products 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:		Comments in relation to the products 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)**	**Fitness of materials and workmanship**
Comment:		The products are acceptable. See section 11 and the *Installation* part of this Certificate.
Regulation:	**82(a)(b)**	**Rainwater drainage**
Comment:		The products will meet the relevant requirements of this Regulation. See section 8 of this Certificate.

Construction (Design and Management) Regulations 2015
Construction (Design and Management) Regulations (Northern Ireland) 2016

Information in this Certificate may assist the client, designer (including Principal Designer) and contractor (including Principal Contractor) to address their obligations under these Regulations.

See sections: 1 *Description* (1.2) and 3 *Delivery and site handling* (3.1 and 3.3) of this Certificate.

Additional Information

NHBC Standards 2016

NHBC accepts the use of Ridgistorm XL 750 mm and 900 mm Filter and Carrier Pipes, provided they are installed, used and maintained in accordance with this Certificate, in relation to *NHBC Standards*, Chapter 5.3 *Drainage below ground.*

Technical Specification

1 Description

1.1 Ridgistorm XL 750 mm and 900 mm Filter and Carrier Pipes are large diameter, high density polyethylene (HDPE) spigot and socket pipes, in both perforated and unperforated forms. The pipe has a profiled black outer layer and smooth blue inner layer(1).

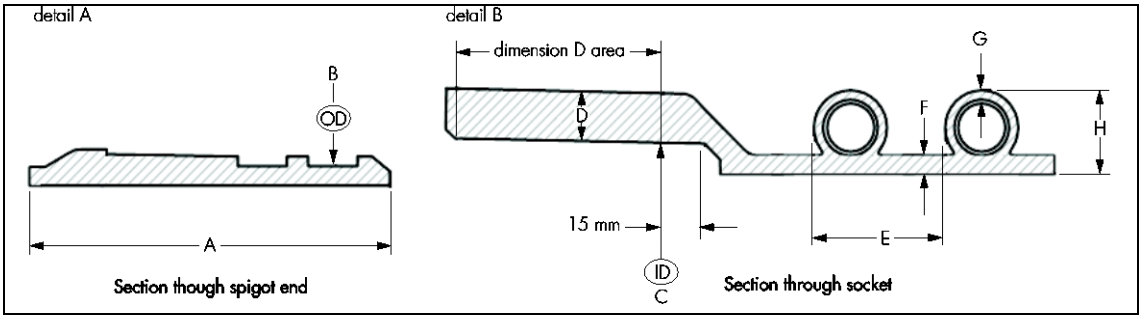
(1) Other colours are available, details of which can be obtained from the Certificate holder.

1.2 The products tested and covered by this Certificate have the properties and specifications given in Table 1. Pipe and socket details and dimensions are given in Table 2 and Figure 1.

Table 1 Material properties/specification

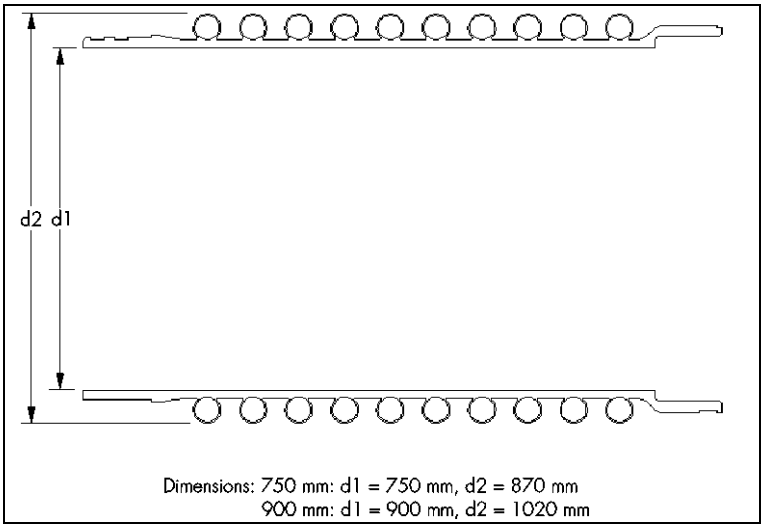
Property	Test method reference	Specification
Tensile strength at yield	BS EN ISO 527-1	Sample 1B at 50 mm min^{-1} ≥ 18 MPa
Oxidation induction time	BS EN 728	≥ 4 min
Melt flow indices	BS EN ISO 1133-1	≤ 1.0 g $(10\ min)^{-1}$ 2.16 kg at 190°C
Density	BS EN ISO 1183-1	≥ 935 $kg \cdot m^{-3}$
Heat reversion of parts	ISO 12091	110°C ± 2°C — Pass

Table 2 Pipe dimensions (in millimetres)



Dimension	750 mm pipe		900 mm pipe	
	Min	Max	Min	Max
A	195	—	195	—
B	770	780	920	930
C	792	800	943	952
D	20	40	20	40
E	115	125	95	105
F	5	8	5	8
G	4	N/A	4	N/A
H	60	N/A	60	N/A
Weight (kg) (per 6 m length)	210		270	

Figure 1 Ridgistorm XL 750 mm and 900 mm Pipe



1.3 The 750 mm and 900 mm pipes are supplied in standard 6 m lengths(1) with an external integral socket end and a formed spigot end. Each spigot requires two rubber seals (see Figure 2), manufactured(2) to BS EN 681-1 : 1996, which are obtainable from the Certificate holder and which must be fitted in accordance with the installation instructions to ensure a watertight joint. The integral socket end is designed to connect to the formed spigot end which has two grooves for the seals (see Figure 3).

(1) Other lengths from 1.25 m to 12 m can be supplied to special order.
(2) The Certificate holder has taken the responsibility of supplying the seals to comply with the requirements of BS EN 681-1 : 1996.

Figure 2 Ridgistorm XL 750 mm and 900 mm pipe — rubber seals (dimensions in mm)

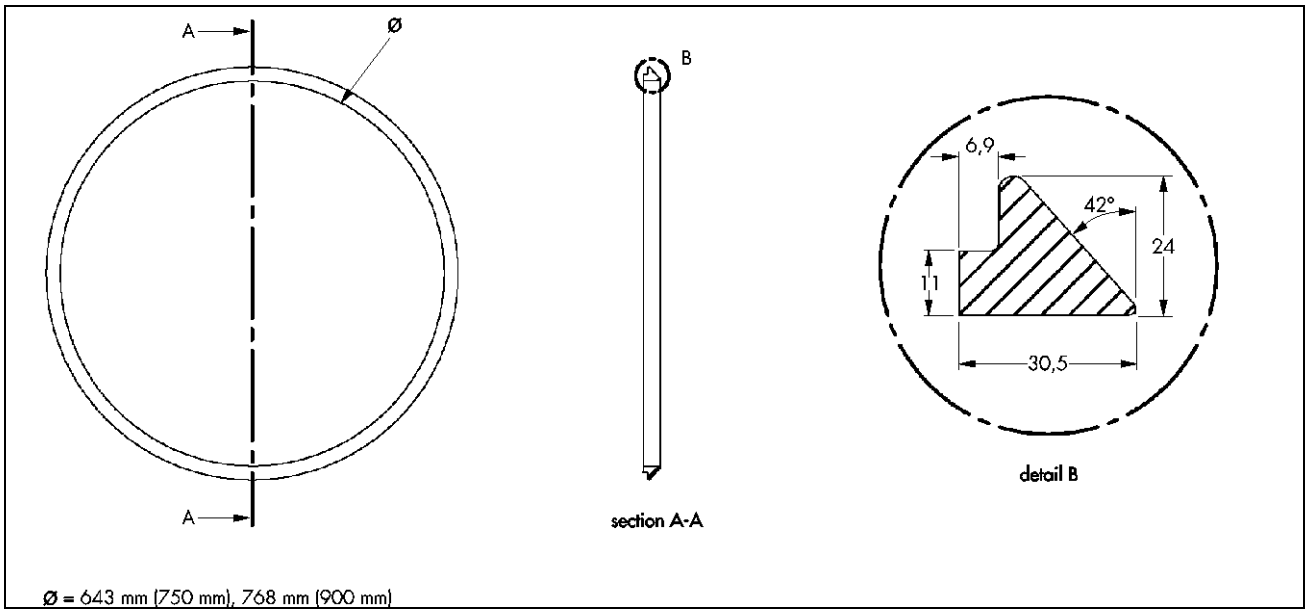
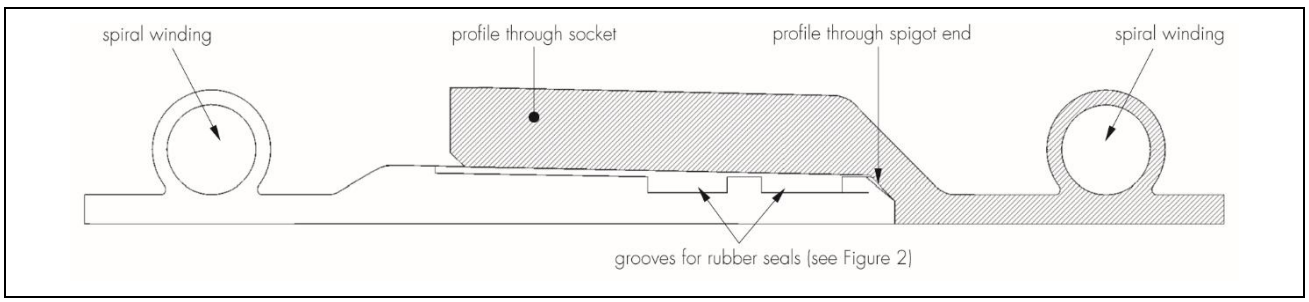


Figure 3 Ridgistorm 750 mm and 900 mm pipe — cross section through pipe joint

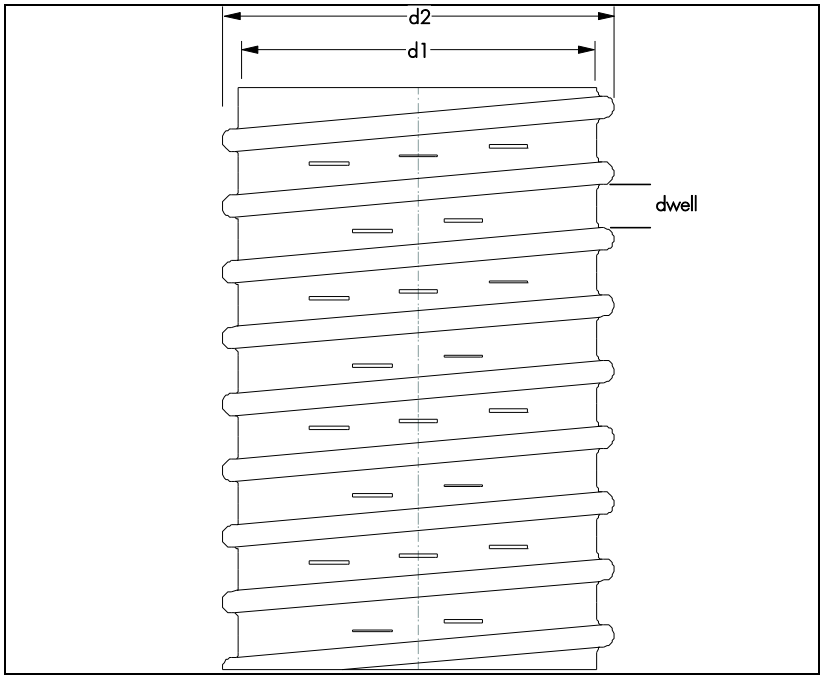


1.4 Perforated pipe is available with the slots in the dwell between corrugations equally spaced around the circumference (see Table 3 and Figure 4). Alternatively, the slots are located on only one half of the pipe and thus the number of slots per dwell and the permeable area are halved.

Table 3 Perforated pipe details

Nominal diameter	Internal pipe	Number of slots per dwell	Number of dwells per metre	Slot length (range) mm	Slot width (range) mm	Permeable area (min) $mm^2 \cdot m^{-1}$
750	Half perforated	3	8	120–170	2–4	5760
	Fully perforated	6	8	120–170	2–4	11520
900	Half perforated	3	10	120–170	2–4	7200
	Fully perforated	6	10	120–170	2–4	14400

Figure 4 Details of perforations (for dimensions d1 and d2, see Figure 1)



1.5 Continuous quality control is exercised during manufacture. Checks include impact resistance and short-term stiffness on the pipes, and dimensional accuracy on the pipes and couplers.

2 Manufacture

2.1 The pipes are manufactured from HDPE by a co-extrusion process: the outer reinforcement is extruded around a core tube and spirally wound around the outside of the pipe.

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 being operated by the manufacturer are being maintained.

2.3 The management system of Polypipe Civils has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 by BSI (Certificate Q 06225).

3 Delivery and site handling

3.1 Pipes are generally delivered as loose lengths and should not be stacked more than 4 m high. They should be stored on a flat surface. Care must be taken not to drop pipes on their ends, particularly during cold weather conditions.

3.2 Each pipe length and fitting, or each pack of pipes, bears the Certificate holder's product label.

3.3 Handling, storage and transportation should be in accordance with BS EN 1610 : 2015 and the Certificate holder's instructions.

3.4 When long-term storage is envisaged, the pipes must be protected from direct sunlight. If protection cannot be provided, consideration must be given to the effects of daily exposure to direct sunlight which are assessed as follows:

- up to 3 months — negligible UV degradation but possible extreme surface temperatures of up to 80°C may cause some localised distortion
- 3 months to 12 months — may have significant effect on the impact resistance and physical properties
- over 12 months — damage will occur unless protection is provided.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Ridgistorm XL 750 mm and 900 mm Filter and Carrier Pipes.

Design Considerations

4 General

4.1 Ridgistorm XL 750 mm and 900 mm Filter and Carrier Pipes are satisfactory for the collection and disposal of surface and sub-surface water, when installed in accordance with the recommendations given in this Certificate.

4.2 This Certificate does not cover use of the pipes for domestic sewage, combined sewerage systems or untreated trade effluent.

5 Practicability of installation

The products are designed to be installed by competent contractors experienced with this type of product, using traditional drain-laying methods in accordance with requirements of BS EN 1610 : 2015.

6 Strength

6.1 The pipes have a ring stiffness in excess of 6 $kN \cdot m^{-2}$ and a creep ratio of less than 4, and have adequate resistance to static loads.

6.2 The pipes have adequate resistance to impact loads to which they may be subjected during installation and in service.

6.3 For installation purposes the pipes must be designed according to BS EN 1295-1 : 1997.

7 Performance of joints

If correctly made, the joints constructed from pipe with rubber seals remain watertight when subjected to deflection and distortion, when tested in accordance with BS EN 1277 : 2003, method 4, conditions A, B and C.

8 Flow characteristics

8.1 The pipes will have normal flow characteristics associated with PVC-U pipes.

8.2 Full-bore velocities are available from the *Tables for the Hydraulic Design of Pipes, Sewers and Channels*, Volume 2, 8th Edition by H R Wallingford and D I H Barr. The values are based on the Colebrook-White equation. An appropriate value of roughness coefficient should be selected when designing the drainage system. For new pipes, a value of 0.006 mm is applicable, but for designs, a value of 0.6 mm is generally used.

9 Resistance to chemicals

The pipes will be unaffected by the types and quantities of chemicals likely to be found in surface water drainage systems.

10 Maintenance

10.1 Access to the products for cleaning should be provided by conventional methods.

10.2 Results of tests indicate that the pipes have adequate resistance to cleaning by water pressure jetting equipment (see section 15). However, it is recommended that low-pressure, high-volume systems are used in accordance with the WRC *Sewer Jetting Code of Practice.*

10.3 Slots in perforated pipes are designed to restrict the ingress of silt into the drains.

11 Durability

In the opinion of the BBA, when the pipes are used and installed in accordance with this Certificate, the material from which they are manufactured will not significantly deteriorate and the anticipated life of the system will be in excess of 50 years.

12 Reuse and recyclability

The products are manufactured from HDPE, which can be recycled.

Installation

13 General

13.1 Ridgistorm XL 750 mm and 900 mm Filter and Carrier Pipes must be installed in accordance with BS EN 752 : 2008, BS EN 1610 : 2015 and BS EN 1295-1 : 1997.

13.2 Where appropriate, pipes must be protected against damage from site construction traffic.

13.3 Completed systems should be tested in accordance with BS EN 1610 : 2015 to ensure that they are functioning correctly.

14 Procedure

14.1 Pipes cannot be cut and must only be used in their full lengths as they have integral spigot ends and sockets. Special lengths can be made to order as required.

14.2 For a watertight joint, the pipe spigot and socket should be cleaned and two rubber seals fitted into the grooves on the spigot end of the pipe. The seals and inside of the socket should be lubricated and the pipe pushed fully home. When using mechanical assistance to push pipes home, care must be taken to protect the pipe ends from damage.

14.3 Care must be taken during backfill to maintain the line and level of the pipeline. If necessary, the pipe should be restrained to prevent uplift.

Technical Investigations

15 Tests

Tests were conducted on the pipes, seals and joints and the results assessed to determine:

- ring stiffness of pipe
- creep ratio of pipe
- impact strength at 0°C and 23°C of pipe
- resistance to water jetting of pipe
- leaktightness of joints subjected to diametrical distortion and angular deflection from 0.5 bar to –0.3 bar
- insertion force (ease of jointing)
- dimensional accuracy of the pipe and ring seal.

16 Investigations

16.1 An assessment was made of data in relation to the effect of the production tolerances on the performance of the pipe and joints.

16.2 An evaluation was made of existing data to assess material properties, chemical resistance and durability.

16.3 Calculations were carried out to determine the slot area of perforated pipes.

16.4 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.

Bibliography

BS EN 681-1 : 1996 *Elastomeric seals — Material requirements for pipe joint seals used in water and drainage applications — Vulcanized rubber*

BS EN 728 : 1997 *Plastics piping and ducting systems — Polyolefin pipes and fittings — Determination of oxidation induction time*

BS EN 752 : 2008 *Drain and sewer systems outside buildings*

BS EN 1277 : 2003 *Plastics piping systems — Thermoplastics piping systems for buried non-pressure applications — Test methods for leaktightness of elastomeric sealing ring type joints*

BS EN 1295-1 : 1997 *Structural design of buried pipelines under various conditions of loading — General requirements*

BS EN 1610 : 2015 *Construction and testing of drains and sewers*

BS EN ISO 527-1 : 1996 *Plastics — Determination of tensile properties — General principles*

BS EN ISO 1133-1 : 2011 *Plastics — Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics — Standard method*

BS EN ISO 1183-1 : 2012 *Plastics — Methods for determining the density of non-cellular plastics — Immersion method, liquid pyknometer method and titration method*

BS EN ISO 9001 : 2008 *Quality management systems — Requirements*

ISO 12091 : 1995 *Structural-wall thermoplastics pipes — Oven test*

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 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.

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