

## Polypipe Civils

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Agrément Certificate  
**00/3678**  
Product Sheet 3

### RIDGIDRAIN ADVANCED DRAINAGE SYSTEM

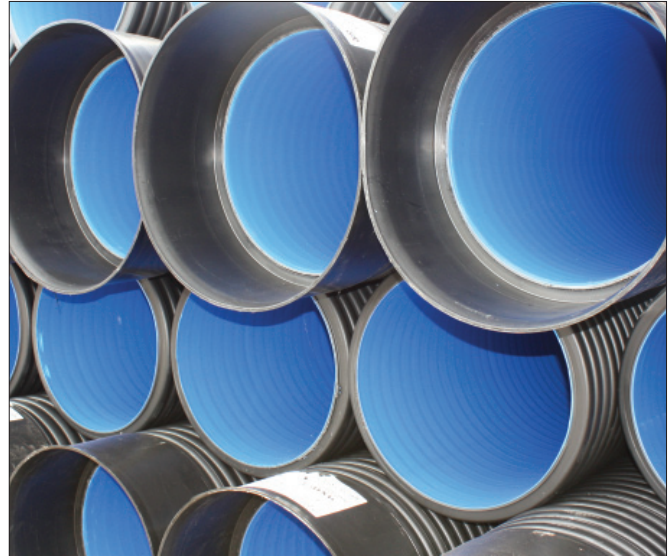
### RIDGIDRAIN (HDPE) 400 MM TO 600 MM PIPES AND COUPLERS

This Agrément Certificate Product Sheet<sup>(1)</sup> relates to Ridgidrain (HDPE) 400 mm to 600 mm Pipes and Couplers, a range of high density polyethylene pipes (perforated or unperforated) and couplers for use as filter and carrier pipes in surface water drainage systems.

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

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

**Maintenance** — the system may be cleaned using standard techniques (see section 10).

**Durability** — the system 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 system described herein. This system has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of First issue: 23 October 2012

A handwritten signature in black ink, appearing to read 'B Chamberlain'.

Brian Chamberlain

Head of Approvals — Engineering

A handwritten signature in black ink, appearing to read 'G Cooper'.

Greg Cooper

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](http://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, Ridgidrain (HDPE) 400 mm to 600 mm Pipes and Couplers, if installed, used and maintained in accordance with this Certificate, will meet or contribute to meeting 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)

Requirement:	H3(3)	Rainwater drainage
Comment:		The system will convey the flow of rainwater and minimise the risk of blockages or leakage. See sections 8.1 and 8.2 of this Certificate.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The system is acceptable. See section 11 and the <i>Installation</i> part of this Certificate.



## The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)(2)	Fitness and durability of materials and workmanship
Comment:		The system is acceptable. See sections 10, 11 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards – construction
Standard:	3.6(a)	Surface water drainage
Comment:		The system will meet the relevant requirements of this Standard, with reference to clauses 3.6.1 <sup>(1)(2)</sup> and 3.6.2 <sup>(1)(2)</sup> . See sections 8.1 and 8.2 of this Certificate.
Standard:	7.1(a)(b)	Statement of sustainability
Comment:		The product 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. (1) Technical Handbook (Domestic). (2) Technical Handbook (Non-Domestic).



## The Building Regulations (Northern Ireland) 2000 (as amended)

Regulation:	B2	Fitness of materials and workmanship
Comment:		The system is acceptable. See section 11 and the <i>Installation</i> part of this Certificate.
Regulation:	B3(2)	Suitability of certain materials
Comment:		The system is acceptable. See sections 10.1 to 10.4 of this Certificate.
Regulation:	N2	Drainage systems
Regulation:	N5	Rain-water drainage
Comment:		The system will meet the relevant requirements of this Regulation. See sections 8.1 and 8.2 of this Certificate.

## 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: 1 *Description*, 2 *Delivery and site handling* and *Installation* of this Certificate.

# Additional Information

## NHBC Standards 2011

NHBC accepts the use of Ridgidrain (HDPE) 400 mm to 600 mm Pipes and Couplers, when installed and used in accordance with this Certificate, in relation to *NHBC Standards*, Chapter 5.3 (D1 to D6) *Drainage below ground*.

## 1 Description

1.1 Ridgidrain (HDPE) 400 mm to 600 mm Pipes and Couplers are manufactured from high density polyethylene to the material specification given Table 1.

*Table 1 Material properties/specification*

Property	Test Method Reference	Proposed specification
Tensile properties	BS EN ISO 527	Sample 1B at 50 mm·m <sup>-1</sup> ≥ 18 MPa
Thermal stability (OIT)	BS EN 728	≥ 4 min
Melt mass-flow rate	BS EN ISO 1133	≤ 1.0 g (10 min) <sup>-1</sup> 2.16kg at 190°C
Reference density	BS EN ISO 1183	≥ 935 kg·m <sup>-3</sup>
Heat Reversion	ISO 12091	110C ±2°C (pass)

1.2 The pipes are of structured-wall construction and have a corrugated outer wall and smooth inner wall. The outer wall is coloured black and the inner wall blue, as standard, although other internal colours are available on request<sup>(1)</sup>.

(1) Further information can be obtained from the Certificate holder.

1.3 The pipes can be supplied either perforated or unperforated. Perforated pipes are available with the slots in the dwell between corrugations equally spaced around the circumference and offset symmetrically for alternate dwells along the pipe length (see Tables 2 and 3 and Figure 1). Alternatively, the slots are located on one half only of the pipe and thus the permeable area is approximately halved.

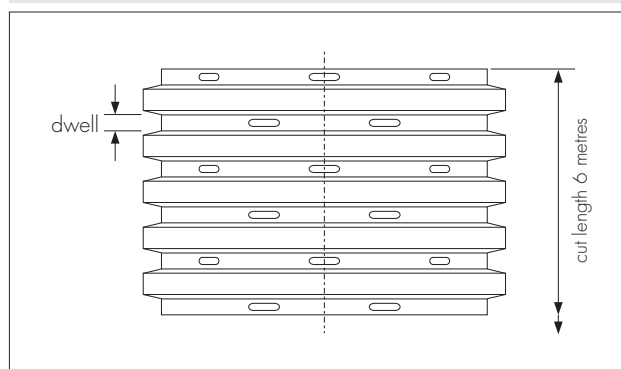
*Table 2 Perforated pipe details — fully perforated*

Nominal internal pipe diameter (mm)	No of slots per dwell	No of dwells per metre	Slot length (range) (mm)	Slot width (range) (mm)	Permeable area (minimum) (mm <sup>2</sup> ·m <sup>-1</sup> )
400	2	20	70–90	3–4	8400
450	2	13	70–90	3–4	5460
500	2	22	70–90	3–4	9240
600	2	10	80–100	3–4	4800

*Table 3 Perforated pipe details — halfperforated*

Nominal internal pipe diameter (mm)	No of slots per dwell	No of dwells per metre	Slot length (range) (mm)	Slot width (range) (mm)	Permeable area (minimum) (mm <sup>2</sup> ·m <sup>-1</sup> )
400	1	20	70–90	3–4	4200
450	1	13	70–90	3–4	2730
500	1	22	70–90	3–4	4620
600	1	10	80–100	3–4	2400

*Figure 1 Details of perforations*

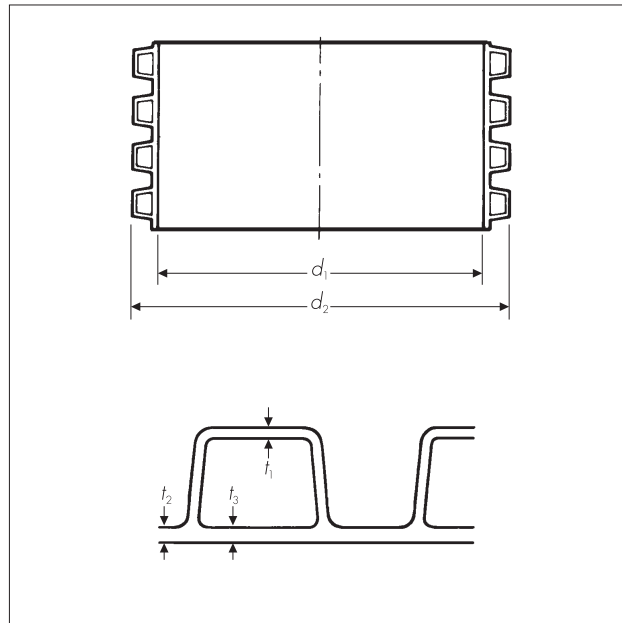


1.4 The pipes are manufactured in nominal internal diameters of 400, 450, 500 and 600 mm and to the dimensions shown in Table 4 and Figure 2.

Table 4 Ridgidraon (HDPE) 400 to 600 mm — Pipe dimensions

Nominal internal pipe diameter, $d_1$ (mm)	Minimum internal pipe diameter (mm)	Nominal external pipe diameter, $d_2$ (mm)	$t_1$ minimum (mm)	$t_2$ minimum (mm)	$t_3$ minimum (mm)	Nominal length (m)	Nominal weight ( $\text{kg}\cdot\text{m}^{-1}$ )
400	392	458	1.4	2.8	1.2	6	8
450	441	523	1.5	3.9	1.4	6	9
500	490	576	1.6	3.0	1.5	6	12
600	588	700	2.0	5.0	1.7	6	14

Figure 2 Ridgidrain (HDPE) pipe



1.5 The pipes are supplied with either two plain ends, or with one plain end and a welded integral socket. The integral socket is to the same profile as that of half a coupler (see Table 5 and Figure 3).

Table 5 Integral socket dimensions

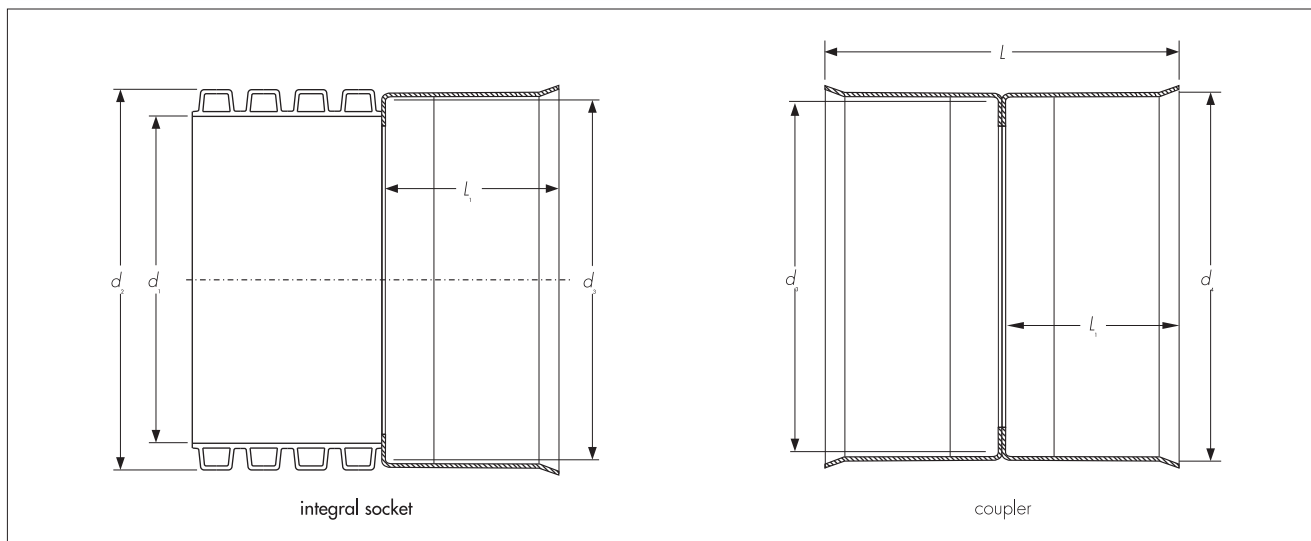
Nominal internal pipe diameter, $d_1$ (mm)	Nominal internal socket diameter, $d_3$ (mm)	Nominal socket depth, $L_1$ (mm)	Nominal seal height, $h$ (mm)
400	463	200	40
450	528	225	51
500	577	251	49
600	707	281	75

1.6 Black polyethylene couplers, manufactured by the Certificate holder, are used for jointing the plain ended Ridgidrain (HDPE) 400 to 600 mm pipes (see Table 6 and Figure 3).

Table 6 Coupler dimensions

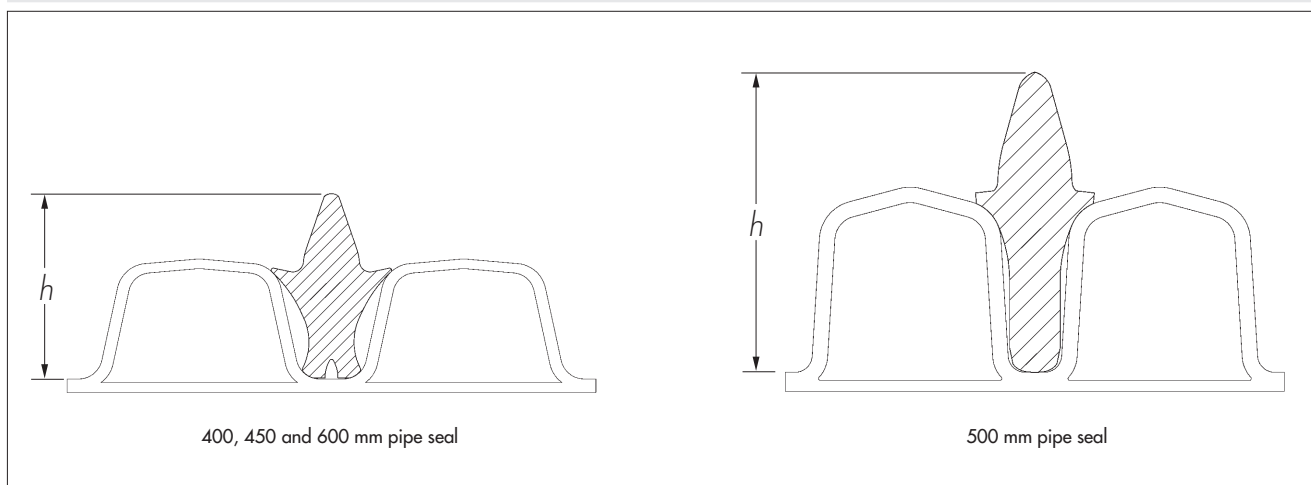
Nominal pipe size (mm)	Nominal internal diameter, $d_3$ (mm)	Nominal external diameter, $d_4$ (mm)	Nominal length, $L$ (mm)	Nominal seal height, $h$ (mm)
400	463	475	400	40
450	528	540	435	51
500	577	589	489	49
600	707	719	560	75

Figure 3 Welded integral socket and couplers



1.7 Sealing of the integral socket joints and joints formed using couplers requires rubber sealing rings supplied by the Certificate holder (See Figure 4). The rings are manufactured to BS EN 681-1 : 1996. The seals must be fitted in accordance with the Certificate holder's installation instructions to ensure a watertight joint.

Figure 4 Seals



## 2 Manufacture

2.1 The pipes are manufactured by a twin extrusion process, with the inner and outer skins extruded simultaneously, one inside the other, and heat-welded together in one continuous process. The moulded pipes are cooled, perforated if required and cut to length.

2.2 The couplers are made from two injection moulded half couplers, which are then welded together to form the completed coupler.

2.3 The integral sockets are made using one half coupler, which is spin welded on to the end of the pipe.

2.4 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 check that the specifications and quality control operated by the manufacturer are being maintained.

2.5 The management system of Polypipe Civils has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 by BSI Certificate Q06225.

## 3 Delivery and site handling

3.1 The 400 mm diameter pipes are delivered to site packaged in wooden support frames, with five pipe lengths to the pack. Pipes of 450 mm diameter and greater are supplied loose.

3.2 Each pipe bears a label showing the following information:

- Polypipe Civils
- Product code
- Ridgidrain unperforated, perforated, half perforated
- Job/pack number
- Operator
- Length
- The BBA logo, with this Certificate and product sheet number.

3.3 The Ridgidrain (HDPE) product range has '/1' at the end of the product code.

3.4 When long-term storage is envisaged, the perforated and unperforated pipes and couplers must be protected from direct sunlight. If protection cannot be provided, consideration must be given to the effects of daily exposure to direct sunlight:

- 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 provided.

3.5 The Certificate holder has the option of adding chemicals to provide enhanced UV stability on request.

3.6 Pipes should be stored on a flat surface. Where they delivered as loose lengths, they should not be stacked more than 4 m high. Care should be taken not to drop pipes or couplers on their ends, particularly during cold weather conditions.

## Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Ridgidrain (HDPE) 400 mm to 600 mm Pipes and Couplers.

## Design Considerations

### 4 General

4.1 Ridgidrain (HDPE) 400 mm to 600 mm Pipes and Couplers (perforated and unperforated), when installed in accordance with the recommendations given in this Certificate are suitable for the collection and disposal of surface and sub-surface water.

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

### 5 Practicability of installation

The products are designed to be installed by a competent contractor experienced with this type of product.

### 6 Strength

6.1 The pipes have a ring stiffness in excess of 6 kN·m<sup>-2</sup> and a creep ratio of less than 4 and may be assumed to have a standard dimension ratio (SDR) equivalent of not greater than 41.

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

6.3 The pipes are of stiffness class SN6 in accordance with BS EN ISO 9969 : 2007.

### 7 Performance of joints

The joints are satisfactory and will remain watertight under normal service conditions of pipe deformation, side or vertical displacement, pipeline deflection and thermal movement.

### 8 Flow characteristics



8.1 The pipes will have normal flow characteristics associated with polyethylene 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 design purposes a value of 0.6 mm is generally used.

### 9 Resistance to chemicals

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

## 10 Maintenance



10.1 The slots are designed to restrict the ingress of silt into the drains.

10.2 Access to the system for cleaning should be provided by conventional methods.

10.3 In common with other standard plastic drainage systems, toothed root cutters and rods with metal ferrules, as used with some mechanical clearing systems, could damage the pipes and couplers and should not be used.

10.4 Tests indicate that the pipes have adequate resistance to water cleansing using low pressure, high volume pressure jetting systems.

## 11 Durability



In the opinion of the BBA, when used in the context of this Certificate, the material from which the pipes and couplers 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 product is manufactured from polyethylene and can be recycled.

## Installation

### 13 General

13.1 Ridgidrain (HDPE) 400 mm to 600 mm Pipes and Couplers must be installed in accordance with BS EN 752 : 2008 and BS EN 1610 : 1998 as appropriate.

13.2 The pipes are installed using traditional drain-laying methods. The lengths in which the pipes are available and their lightness in weight are a significant advantage in handling and installation. Jointing of the pipes is achieved easily.

13.3 The perforated and unperforated pipes and couplers must be protected against damage from construction traffic.

13.4 Completed systems should be tested in accordance with BS EN 1610 : 1998 to ensure they are functioning correctly.

### 14 Procedure

14.1 Pipes are cut using conventional hand tools, and should be cut square between the corrugations.

14.2 For a watertight joint, the pipe ends and socket/coupler should be cleaned and a rubber seal fitted externally between the first and second corrugation in the pipe. The seal and inside of the socket/coupler should be lubricated and the pipe pushed fully home to the central register, either by hand or using a lever if necessary.

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

## Technical Investigations

Tests were carried out to determine:

- ring stiffness to BS EN ISO 9969 : 2007
- creep ratio to BS EN ISO 9967 : 2007
- impact strength at 0°C and 23°C to BS EN 14111 : 1996 with a d25 striker of 1.0 kg mass
- leaktightness of joints to BS EN 1277 : 2003 when subjected to diameter distortion and angular deflection from 0.5 bar to -0.3 bar
- dimensional accuracy

### 16 Investigations

16.1 An assessment was made of the effect of production tolerances on the performance of the products.

16.2 An assessment has been made of material properties, chemical resistance and durability.

16.3 Calculations were carried out to determine the slot area.

16.4 The following were assessed based on the performance of similar products manufactured by the Certificate Holder:

- practicability of installation
- ease of jointing
- flow characteristics.

16.5 The manufacturing process, including the quality and composition of the materials used and the methods adopted for quality control, have been assessed.

## 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 1411 : 1996 *Plastics piping and ducting systems — Thermoplastics pipes — Determination of resistance to external blows by the staircase method*
- BS EN 1610 : 1998 *Construction and testing of drains and sewers*
- BS EN ISO 527-1 : 1996 *Plastics — Determination of tensile properties — General principles*
- BS EN ISO 3451-1 : 2008 *Plastics — Determination of ash — General methods*
- BS EN ISO 9001 : 2008 *Quality management systems — Requirements*
- BS EN ISO 9967 : 2007 *Thermoplastics pipes — Determination of creep ratio*
- BS EN ISO 9969 : 2007 *Thermoplastics pipes — Determination of ring stiffness*
- ISO 1133 : 1997 *Plastics — Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics*
- ISO 1183 : 1970 *Methods for determining the density and relative density (specific gravity) of plastics excluding cellular plastics*
- 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 or claim that this Certificate has been issued to them
- is valid only within the UK
- has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English Law.

17.2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

17.3 This Certificate will remain valid for an unlimited period provided that the product/system and its manufacture and/or fabrication, including all related and relevant parts and processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

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

17.5 In issuing this Certificate, the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product/system
- actual installations of the product/system, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product/system is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product/system, including its manufacture, supply, installation, use, maintenance and removal
- any claims by the manufacturer relating to CE marking.

17.6 Any information relating to the manufacture, supply, installation, use, maintenance and removal of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care.