

## CONDRON CONCRETE TWINWALL DRAINAGE SYSTEM

## CONDRON CONCRETE 150 mm to 375 mm PIPES AND COUPLERS

This HAPAS Certificate Product Sheet<sup>(1)</sup> is issued by the British Board of Agrément (BBA), supported by Highways England (HE) (acting on behalf of the Overseeing Organisations of the Department for Transport; Transport Scotland; the Welsh Government and the Department for Infrastructure, Northern Ireland), the Association of Directors of Environment, Economy, Planning and Transport (ADEPT), the Local Government Technical Advisers Group and industry bodies. HAPAS Certificates are normally each subject to a review every three years.

(1) Hereinafter referred to as 'Certificate'.

This Certificate Product Sheet<sup>(1)</sup> relates to Condron Concrete 150 mm to 375 mm Pipes and Couplers, a range of recycled high-density polyethylene (HDPE) pipes (perforated with slots and unperforated) and couplers for use as filter and carrier pipes in highway drainage.

(1) Hereinafter referred to as 'Certificate'.

### CERTIFICATION INCLUDES:

- factors relating to compliance with HAPAS requirements
- factors relating to compliance with Regulations 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 products have adequate strength to resist the loads associated with installation and service (see section 6).

**Performance of joints** — the products' joints, when connected with elastomeric sealing rings, will remain watertight under normal service conditions (see section 7).

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

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

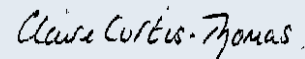


The BBA has awarded this Certificate to the company named above for the products described herein. These products have been assessed by the BBA as being fit for their intended use provided they are installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément



Paul Valentine  
Technical Excellence Director



Claire Curtis-Thomas  
Chief Executive

Date of Third issue: 22 July 2019

Originally certificated on 26 August 2015

*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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## Requirements

In the opinion of the BBA, Condon Concrete 150 mm to 375 mm Pipes and Couplers, when used in accordance with the provisions of this Certificate, will meet or contribute to meeting the requirements of the *Manual of Contract Documents for Highway Works (MCHW)*<sup>(1)</sup>, Volume 1 *Specification for Highway Works (SHW)*, and Volume 2 *Notes for Guidance on the Specification for Highway Works*.

The general requirements for thermoplastic structured wall pipes and fittings are contained in the MCHW, Volume 1, Clause 518. Further requirements are detailed in the MCHW, Volume 3, Section 1, F series, Drawing Nos F1 and F2.

Additional site requirements may be included on particular contracts.

(1) The MCHW is operated by the Overseeing Organisations: Highways England (HE), Transport Scotland, the Welsh Government and the Department for Infrastructure (Northern Ireland).

## Regulations

### 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* (1.1) and 3 *Delivery and site handling* (3.1) of this Certificate.

## Additional Information

### CE marking

The Certificate holder has taken the responsibility of CE marking the elastomeric sealing rings, in accordance with harmonised European Standard BS EN 681-1 : 1996. An asterisk (\*) appearing in this Certificate indicates that data shown are given in the manufacturer's Declaration of Performance.

## Technical Specification

### 1 Description

1.1 Condon Concrete 150 mm to 375 mm Pipes and Couplers comprise a range of black recycled HDPE pipes and couplers, available in both perforated with slots and unperforated forms, with a profiled outer layer and smooth inner layer. The material specification of the pipes is given in Table 1.

Table 1 *Material properties and specifications*<sup>(1)</sup>

Property	Test method reference	Specification
Melt mass-flow rate	BS EN ISO 1133-1	≤0.75g (10 min) <sup>-1</sup> 2.16 kg at 190°C
Reference density	BS EN ISO 1183-1	≥935 kg·m <sup>-3</sup>
Thermal stability (OIT)	BS EN 728	≥ 4 min (200°C)
Tensile properties	BS EN ISO 527-2	Sample 1B at 50 mm min <sup>-1</sup> ≥18 MPa
Heat reversion	ISO 12091	150°C ±2°C (Pass)

(1) This Table is the format of the MCHW, Volume 2, Appendix 5/7. It is used to satisfy the MCHW, Volume 1, Clause 518.2.

1.2 The pipes are available with two plain ends or one socketed end. The outer wall is corrugated and the inner wall is smooth-finished. Details and dimensions are given in Figure 1 and Table 2.

Figure 1 Cross-section

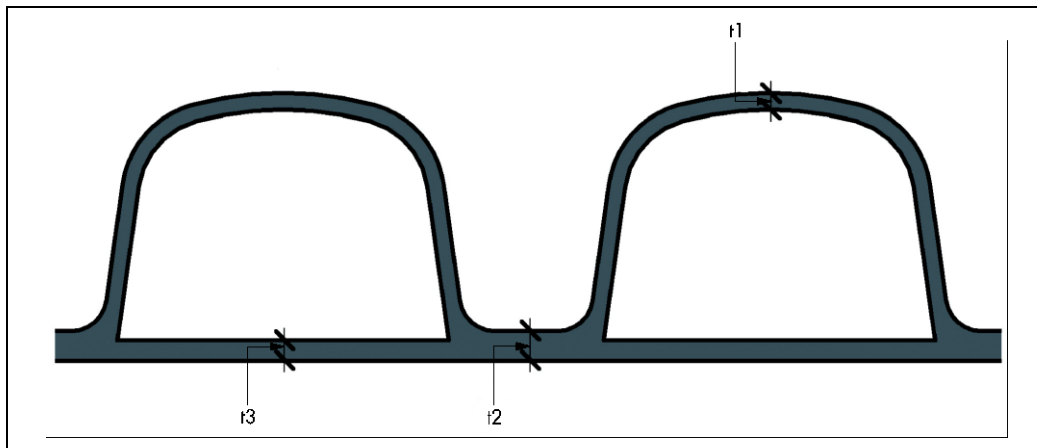


Table 2 Pipe dimensions

Nominal internal pipe diameter (mm)	Minimum internal pipe diameter (mm)	Nominal external pipe diameter (mm)	t1 minimum (mm)	t2 minimum (mm)	t3 minimum (mm)	Nominal length (m)	Nominal weight (kg·m <sup>-1</sup> ) <sup>(1)</sup>
150	148	175	0.68	1.4	1.3	6	1.2
225	223	260	1.28	1.55	1.19	6	2.38
300	298	345	1.26	2.25	1.53	6	4.10
375	373	435	1.42	2.7	2.1	6	6.8

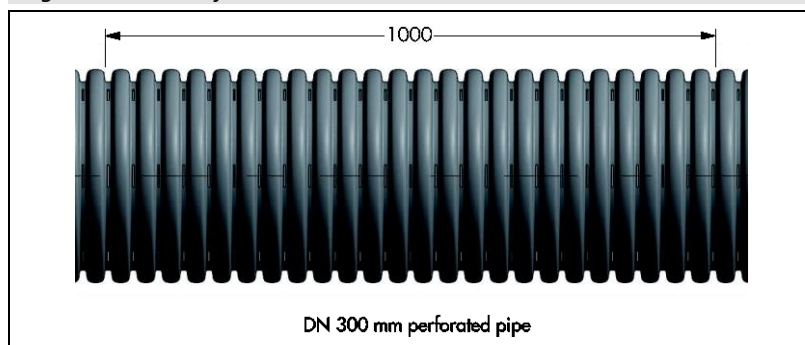
(1) A tolerance of +/- 5% is applied to the nominal weight.

1.3 Pipes can be supplied either perforated with slots or unperforated. Slotted pipes are available with the slots in the dwell between corrugations equally spaced around the circumference (see Table 3 and Figure 2).

Table 3 Slotted pipe details

Nominal internal pipe diameter (mm)	No. of slots per dwell	No. of dwells per metre	Slot length (mm)	Slot width (mm)	Permeable area minimum (mm <sup>2</sup> ·m <sup>-1</sup> )
150	6	39	15–32	1.0 – 1.5	3510
225	6	29	10–30	3.0 – 3.5	5220
300	6	25	15–31	3.0 – 3.5	6750
375	6	20	20–42	2.7 – 3.5	6480

Figure 2 Details of slots



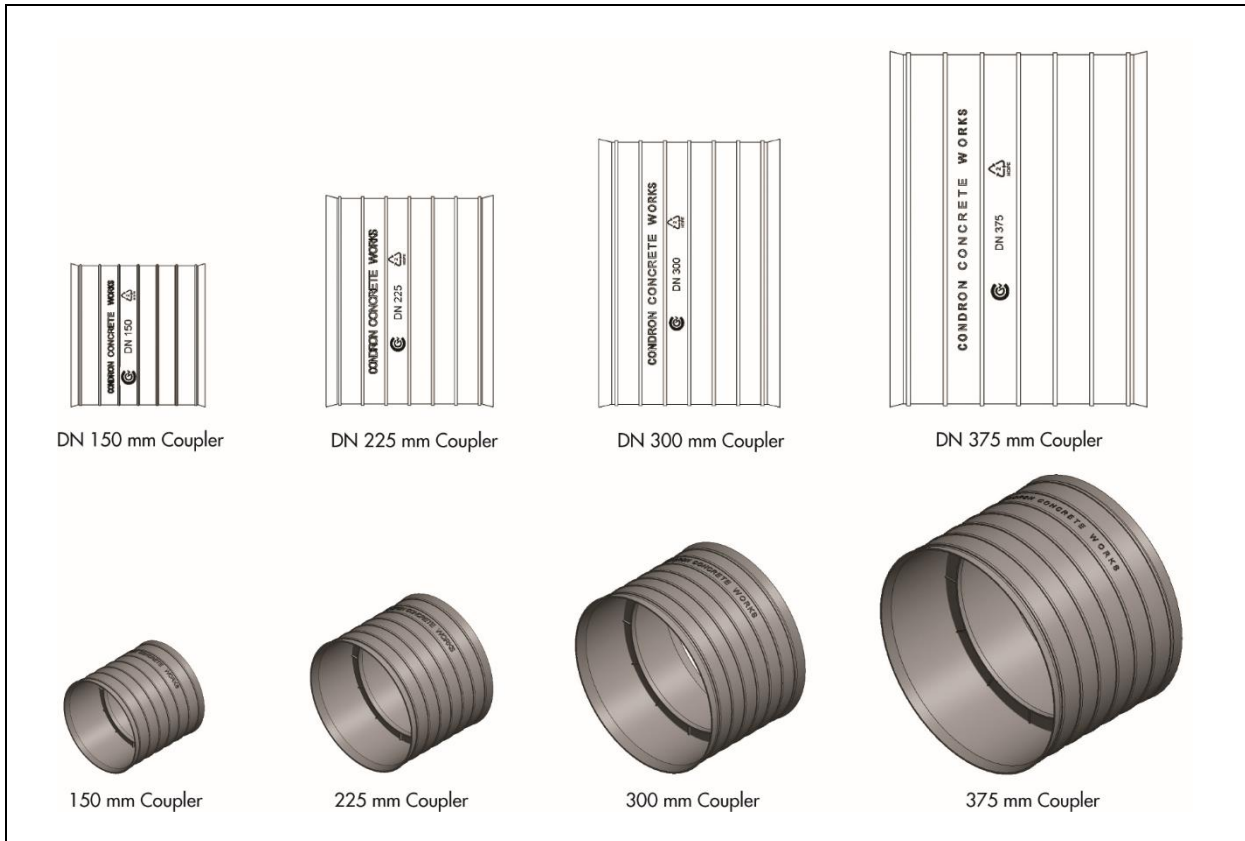
## Couplers

1.4 Black recycled HDPE couplers are available for the 150 to 375 mm sizes of pipe (see Table 4 and Figure 3).

**Table 4 Coupling dimensions**

Nominal internal pipe diameter (mm)	Internal diameter (mm)	Nominal external diameter (mm)	Nominal length (mm)	Nominal seal height (mm)
150	178.5	185.1	180	17.2
225	264.5	278.5	220	27
300	346.5	364.5	245	31
375	439.5	458.5	330	38.7

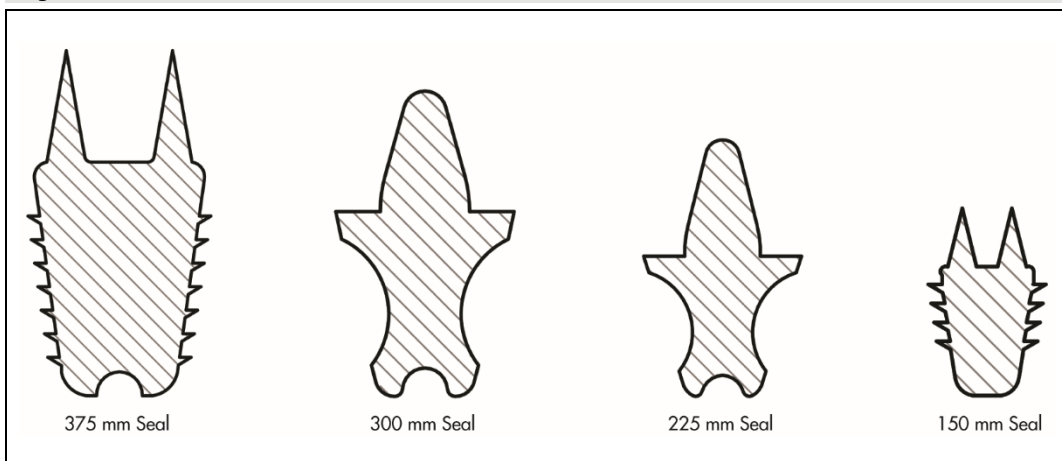
**Figure 3 Couplings**



**Seals**

1.5 Each coupling requires two rubber seals which are manufactured and CE marked in accordance with BS EN 681-1 : 1996\* (see Figure 4). The seals must be fitted in accordance with the installation instructions to ensure a watertight joint.

**Figure 4 Seals**



## 2 Manufacture

2.1 The pipes are manufactured by the Certificate holder from recycled HDPE in a twin extrusion process in which two pipes are extruded simultaneously, one inside the other, and heat-welded together in one continuous process.

2.2 The couplers and rubber seals are bought in to the Certificate holder's purchasing specification.

2.3 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.

## 3 Delivery and site handling

3.1 The pipes are delivered to site packaged in wooden support frames and secured by straps. Each bale of pipes bears a label stating the Certificate holder's name and the perforation type, diameter, SN rating (stiffness) and traceability code of the pipe. Couplers and rubber seals are delivered in boxes along with the pipe bales.

3.2 Handling, storage and transportation of the pipes and couplers must be in accordance with the Certificate holder's instructions, with care taken to avoid damage by dropping or dragging. They should be adequately supported at all times, and contact with sharp projections, protuberances and abrasive surfaces should be avoided.

3.3 The pipes and couplers should be retained in their packaging until installation.

3.4 When long-term storage is envisaged, the products 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 to 12 months — may have significant effect on the impact resistance and physical properties
- over 12 months — damage will occur unless protection provided.

## Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Condron Concrete 150 mm to 375 mm Pipes and Couplers.

## Design Considerations

### 4 General

Condron Concrete 150 mm to 375 mm Pipes and Couplers comply with the MCHW, Volume 1, Clauses 518.5 (for pipes) and 518.6 (for couplers). When installed in accordance with the recommendations given in this Certificate, they are suitable for use in highways for the collection and disposal of surface and sub-surface water.

### 5 Practicability of installation

The products must be installed by competent contractors experienced with these types of products, using traditional drain-laying methods in accordance with HE requirements and the MCHW, Volume 1, Clauses 503, 505, 518.7 and 518.8.

## 6 Strength

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

6.2 The pipes have adequate robustness to resist loads associated with installation and service.

## 7 Performance of joints

When correctly made, joints constructed from integrally socketed pipes and couplers with rubber seals remain watertight when subjected to deflection and distortion, and comply with the MCHW, Volume 1, Clauses 504.3 and 518.7 (see section 14 of this Certificate).

## 8 Water infiltration

The slot area for the pipes exceeds the minimum requirement given in the MCHW, Volume 1, Clause 518.3, of  $1000 \text{ mm}^2$  per metre length (see Table 2 of this Certificate).

## 9 Flow characteristics

9.1 The pipes will have the normal flow characteristics associated with polyethylene pipes.

9.2 Full-bore velocities are available from *Tables of 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  $0.006 \text{ mm}$  is applicable, but for designs, a value of  $0.6 \text{ mm}$  is generally used.

## 10 Maintenance

10.1 Access to a system comprising the pipes and couplers should be provided using conventional methods.

10.2 A system made up of the pipes and couplers can be rodded easily using flexible drain rods. 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.

10.3 Results of tests indicate that the pipes have adequate resistance to water cleansing using pressure jetting equipment. It is recommended that low-pressure, high-volume systems are used in accordance with the MCHW, Volume 1, Clause 520.

## 11 Durability

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

## 12 Reuse and recyclability

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

## Installation

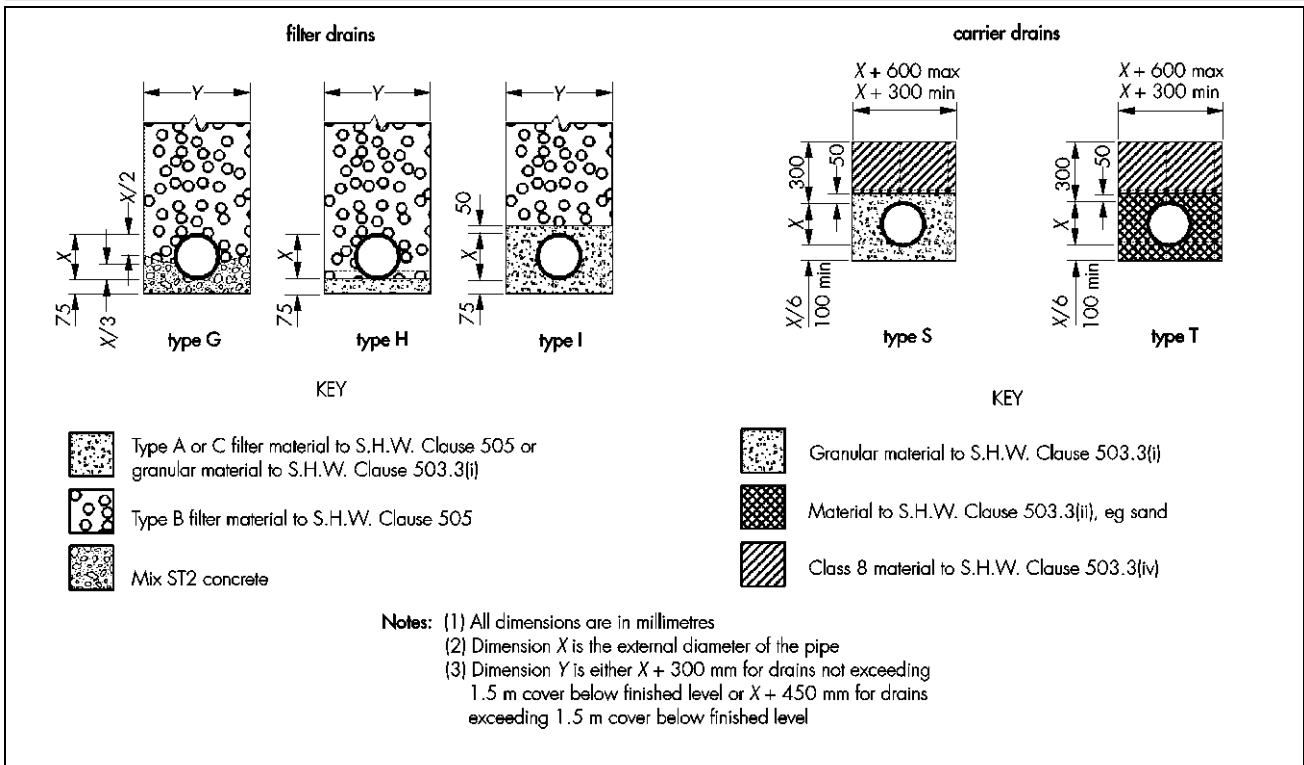
### 13 General

Condron Concrete 150 mm to 375 mm Pipes and Couplers must be installed in accordance with HE requirements and the MCHW, Volume 1, Clauses 503, 505, 518.7 and 518.8.

## 14 Procedure

14.1 For typical laying, trench and backfilling specification details, reference should be made to Figure 5 and the MCHW, Volume 3, Drawing Numbers F1 (Types T and S) and F2 (Types G, H and I).

Figure 5 Installation details



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

14.3 For a watertight joint, the pipe ends and coupler are cleaned and a rubber seal is fitted externally between the first and second corrugation on the pipe. The seal and the inside of the coupler are lubricated and the pipe is pushed fully home to the central register, either by hand or using a lever if necessary.

14.4 The pipes (perforated with slots and unperforated) and couplers must be protected against damage from site construction traffic.

14.5 Care should 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

15.1 Tests were carried out on the pipes to determine compliance with the MCHW, Volume 1, Clause 518.5, including:

- determination of ring stiffness to BS EN ISO 9969 : 2016
- creep ratio to BS EN ISO 9967 : 2016
- resistance to longitudinal bending to the MCHW, Volume 1, Clause 518.11
- impact strength at 0 and 23°C to BS EN ISO 11173 : 2017 with a d25 striker of 1.0 kg mass
- rodding resistance to the MCHW, Volume 1, Clause 518.12
- water jetting (WRc method).

15.2 Tests were carried out on joined pipe to establish compliance with the MCHW, Volume 1, Clause 518.7, of:

- leaktightness of joints to BS EN ISO 13259 : 2018 when subjected to diameter and angular deflection

15.3 Tests were carried out to establish the dimensional accuracy of the pipes, couplers and sealing rings.

## 16 Investigations

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

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

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 — Vulcanised rubber*

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

BS EN ISO 527-2 : 2012 *Plastics — Determination of tensile properties — Test conditions for moulding and extrusion plastics*

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

BS EN ISO 1183-1 : 2019 *Plastics — Methods for determining the density of non-cellular plastics — Immersion method, liquid pycnometer method and titration method*

BS EN ISO 9967 : 2016 *Thermoplastic pipes — Determination of creep ratio*

BS EN ISO 9969 : 2016 *Thermoplastic pipes — Determination of ring stiffness*

BS EN ISO 11173 : 2017 *Thermoplastics pipes — Determination of resistance to external blows — Staircase method*

BS EN ISO 13259 : 2018 *Plastics piping systems — Thermoplastics piping systems for underground non-pressure applications — Test method for leaktightness of elastomeric sealing ring type joints*

ISO 12091 : 1995 *Structures-wall thermoplastic pipes — Oven test*

Manual of Contract Documents for Highway Works, Volume 1 *Specification for Highway Works*

Manual of Contract Documents for Highway Works, Volume 2 *Notes for Guidance on the Specification for Highway Works*

Manual of Contract Documents for Highway Works, Volume 3 *Highway Construction Details*



### 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.