

CONDRON CONCRETE TWINWALL DRAINAGE SYSTEM

CONDRON CONCRETE 150 mm, 225mm and 300mm FITTINGS

This HAPAS Certificate Product Sheet⁽¹⁾ 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 Product Sheet relates to Condron Concrete Twinwall Drainage System 150 mm, 225 mm and 300 mm Fittings, for use in conjunction with Condron Concrete 150 mm, 225 mm and 300 mm Pipes and Couplers, as covered by Product Sheet 1 of this Certificate, 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 will remain watertight under normal service conditions (see section 7).

Maintenance — the products may be cleaned using standard techniques (see section 9).

Durability — the products will have a service life in excess of 50 years (see section 10).

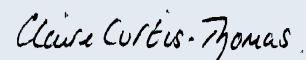
The BBA has awarded this Certificate to the company named above for the products described herein. These products have been assessed by the BBA as being fit for their intended use provided they are installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of First issue: 22 July 2019



Paul Valentine
Technical Excellence Director



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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.
Any photographs are for illustrative purposes only, do not constitute advice and should not be relied upon.*



Requirements

In the opinion of the BBA, Condron Concrete 150 mm, 225 mm and 300 mm Fittings, 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)⁽¹⁾, Volume 1 *Specification for Highways 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 Condron Concrete 150 mm, 225 mm and 300 mm Fittings comprise of a range of injection moulded fittings manufactured from black recycled high-density polyethylene (HDPE). The material specifications of the fittings are given in Table 1.

1.2 The fittings (bends, T and Y junctions, and reducers) covered by this Certificate are given in Figure 1 and Table 2. The fittings are for use in conjunction with Condron Concrete 150 mm to 37 5mm Pipes and Couplers covered by Product Sheet 1 of this Certificate.

1.3 Rubber seals to BS EN 681-1: 1996* are available for each size of fitting for connection to the pipes.

Table 1 Material properties and specifications⁽¹⁾

Property	Test method reference	Specification
Melt mass-flow rate	BS EN ISO 1133-1	$\leq 0.75 \text{ g (10 min)}^{-1}$ 2.16 kg at 190°C
Reference density	BS EN ISO 1183-1	$\geq 935 \text{ kg}\cdot\text{m}^{-3}$
Thermal stability (OIT)	BS EN 728	$\geq 4 \text{ min (200}^\circ\text{C)}$
Tensile properties	BS EN ISO 527-2	Sample 1B at 50 mm min^{-1} $\geq 18 \text{ MPa}$
Heat reversion	ISO 12091	150°C $\pm 2^\circ\text{C}$ (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.

Figure 1 Condron Concrete Twinwall Fittings










Bends (150 mm, 225 mm, 300 mm)		
150 mm x 15° degrees 	150 mm x 22.5° degrees 	150 mm x 30° degrees 
150 mm x 45° degrees 	150 mm x 90° degrees 	
225 mm x 45° degrees 	225 mm x 90° degrees 	
300 mm x 45° degrees 	300 mm x 90° degrees 	

Figure 1 Condron Concrete Twinwall Fittings (continued)







T junctions (150 mm, 225 mm, 300 mm)	
<p>150 x 150 x 150 mm T</p> 	<p>225 x 225 x 150 mm T</p> 
<p>300 x 300 x 150 mm T</p> 	<p>225 x 225 x 225 mm T</p> 
Y junctions (150 mm, 225 mm, 300 mm)	
<p>150 x 150 x 150 mm Y</p> 	<p>225 x 225 x 150 mm Y</p> 

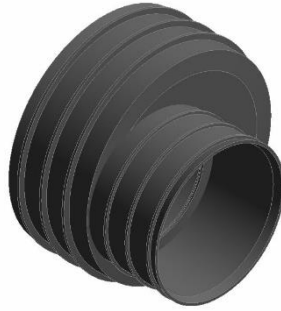
Figure 1 Condron Concrete Twinwall Fittings (continued)

300 x 300 x 150 mm Y



Reducer

225 x 150 mm reducer



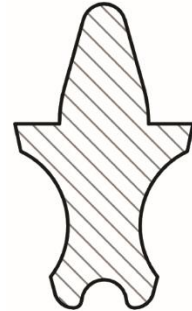
Seals



150 mm seal



225 mm seal



300 mm seal

Table 2 Condron Concrete Twinwall Fittings

	Fitting Description	Nominal size (mm)	Internal socket diameter (mm)	Socket length (mm)	Fitting body Length (mm)	Wall thickness Socket (mm)	Wall thickness Fitting body (mm)
1	150 mm Bend 15°	150	178.5 ± 2.0	88.5	—	3.26	3.02
2	150 mm Bend 22.5°	150	178.5 ± 2.0	88.5	—	3.26	3.02
3	150 mm Bend 30°	150	178.5 ± 2.0	88.5	—	3.26	3.02
4	150 mm Bend 45°	150	178.5 ± 2.0	88.5	—	3.26	3.02
5	150 mm Bend 90°	150	178.5 ± 2.0	88.5	—	3.26	3.02
6	225 mm Bend 45°	225	264.5 ± 2.5	108.0	—	3.25	2.90
7	225 mm Bend 90°	225	264.5 ± 2.5	108.0	—	3.25	2.90
8	300 mm Bend 45°	300	346.5 ± 3.0	120.5	—	3.70	3.00
9	300 mm Bend 90°	300	346.5 ± 3.0	120.5	—	3.70	3.00
10	150 x 150 x 150 mm T junction	150	178.5 ± 2.0	88.5	380.0	3.20	3.05
11	225 x 225 x 150 mm T junction	225	264.5 ± 2.5	108.0	445.0	3.15	2.95
		150	178.5 ± 2.0	88.5		3.20	2.95
12	300 x 300 x 150 mm T junction	300	346.5 ± 3.0	120.5	480.9	3.70	3.00
		150	178.5 ± 2.0	88.5		3.20	3.00
13	225 x 225 x 225 mm T junction	225	264.5 ± 2.5	108.0	555.0	3.25	2.95
14	150 x 150 x 150 mm Y junction	150	178.5 ± 2.0	88.5	460.0	3.45	3.20
15	225 x 225 x 150 mm Y junction	225	264.5 ± 2.5	108.0	520.0	3.35	3.15
		150	178.5 ± 2.0	88.5		3.45	3.20
16	300 x 300 x 150 mm Y junction	300	346.5 ± 3.0	120.5	556.9	3.70	3.00
		150	178.5 ± 2.0	88.5		3.45	3.20
17	225 x 150 mm Reducer	225	264.5 ± 2.5	108.0	211.7	3.30	—
		150	178.5 ± 2.0	88.5		3.40	—

2 Manufacture

2.1 The fittings are produced from the same raw material (recycled HDPE) and heating process as the pipes and couplers covered in the Product Sheet 1 of this Certificate, except the material is injected into moulds where it cools and hardens to the configuration of the mould.

2.2 The rubber seals are manufactured to BS EN 681-1 : 1996* and are available for each size of fitting for connection to the pipes. The seals must be fitted in accordance with the installation instructions to ensure a watertight joint.

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 Each fitting carries a label stating the Certificate holder's name and the fitting type, diameter, SN rating (stiffness) and traceability code of the fitting. Fittings and rubber seals are delivered in boxes along with the pipe bales.

3.2 Handling, storage and transportation of the fittings 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 fittings 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 Condron Concrete 150 mm, 225 mm and 300 mm Fittings.

Design Considerations

4 General

Condron Concrete 150 mm, 225 mm and 300 mm Fittings, when used in conjunction with the pipes and couplers subject of Product Sheet 1 of this Certificate and installed in accordance with the recommendations given in this Certificate, are suitable for use in highways for the collection and disposal of surface and sub-surface water.

5 Practicability of installation

The fittings 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, 518.8 and 518.9.

6 Strength

6.1 The fittings have a ring stiffness in excess of $6 \text{ kN}\cdot\text{m}^{-2}$ in accordance with BS EN ISO 13967 : 2009.

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

7 Performance of joints

When correctly made, joints constructed from connectors with rubber seals remain watertight when subjected to deflection and distortion, and comply with the MCHW, Volume 1, Clauses 504.3 and 518.7.

8 Flow characteristics

When used with suitable pipes, the fittings will increase the hydraulic resistance of a system. For loss coefficients (K values), advice must be sought from the Certificate holder.

9 Maintenance

9.1 Access to a system comprising the fittings should be provided by conventional methods.

9.2 Drains incorporating the fittings can be rodded easily using flexible drain rods.

9.3 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 fittings and should not be used.

10 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.

11 Reuse and recyclability

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

Installation

12 General

Drains utilising Condron Concrete 150 mm, 225 mm and 300 mm Fittings must be installed in accordance with the MCHW, Volume 1, Clauses 503, 505, 518.7 and 518.8.

13 Procedure

13.1 Typical laying, trench and backfilling specification details are given in Product Sheet 1 of this Certificate, section 14.

13.2 To make a joint, the pipe end and fitting socket 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 of the fitting should be lubricated, and the pipe pushed fully home to the register, either by hand or using a lever if necessary.

13.3 Fittings must be protected against damage from site construction traffic.

Technical Investigations

14 Tests

Tests were carried out and the results assessed to determine:

- dimensional accuracy
- ring stiffness of the fittings to BS EN ISO 13967 : 2009
- impact resistance (drop test) to BS EN ISO 13263 : 2017
- leaktightness of joint to BS EN ISO 13259 : 2018, Conditions B and C when subjected to diameter deflection and angular deflection
- rodding resistance to the MCHW, Volume 1, Clause 518.12.

15 Investigations

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 13259 : 2018 — *Plastics piping systems — Thermoplastics piping systems for underground non-pressure applications — Test method for leaktightness of elastomeric sealing ring type joints*
- BS EN ISO 13263 : 2017 — *Thermoplastics piping systems for non-pressure underground drainage and sewerage — Thermoplastics fittings — Test method for impact strength*
- BS EN ISO 13967 : 2009 — *Thermoplastics fittings — Determination of ring stiffness*
- 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*

16 Conditions

16.1 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.

16.2 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.

16.3 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.

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

16.5 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.

16.6 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.