

## RIDGISTORM XL DRAINAGE SYSTEM

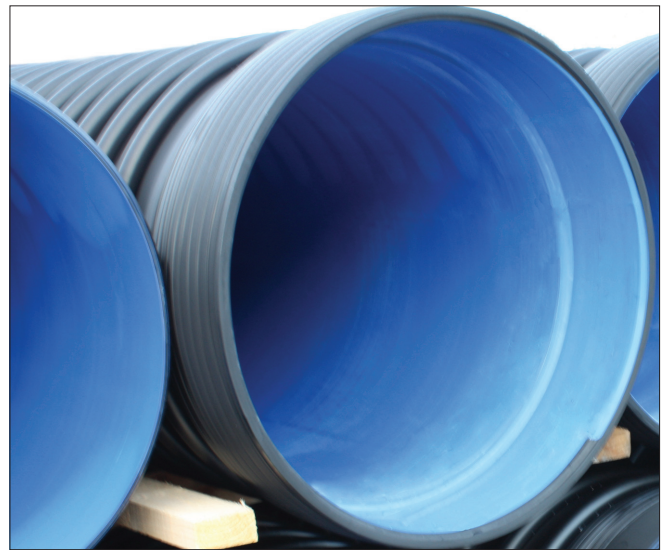
### RIDGISTORM XL 750 MM AND 900 MM FILTER AND CARRIER PIPES

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 Assembly Government and the Department for Regional Development, 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 relates to Ridgistorm XL 750 mm and 900 mm Filter and Carrier Pipes, for use in highway drainage applications.

#### 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 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

Brian Chamberlain  
Head of Approvals — Engineering

Claire Curtis-Thomas  
Chief Executive

Date of Second issue: 15 April 2016

Originally certificated on 18 June 2010

Certificate amended on 8 September 2016 to update Table 2.

*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.*

# Requirements

In the opinion of the BBA, Ridgistorm XL 750 mm and 900 mm Filter and Carrier Pipes when assessed in accordance with the provisions of this Certificate, can satisfy or contribute to satisfying the following requirements of the Manual of Contract Documents for Highways Works (MCHW)<sup>(1)</sup>, Specification for Highways Works (SHW), Volume 1 and 2.

The general requirements for structured wall pipes and fittings are contained in the MCHW Volume 1, Clause 518. Further information and guidance is given in MCHW, Volume 3, Drawing Numbers 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 Assembly Government and the Department for Regional Development (Northern Ireland).

# Regulations

## Construction (Design and Management) Regulations 2015

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

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

See sections: 3 *Delivery and site handling* (3.1, 3.2 and 3.4) and 13 *Installation* of this Certificate.

# Technical Specification

## 1 Description

1.1 Ridgistorm XL 750 mm and 900 mm Filter and Carrier Pipes are available in both perforated and unperforated forms and comprise a profiled black outer layer and smooth blue inner layer<sup>(1)</sup>.

(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 are manufactured from material with the specification given in Table 1. Pipe and socket details and dimensions are given in Table 2 and Figure 1.

Table 1 Material properties/specification<sup>(1)</sup>

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

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

Figure 1 Ridgistorm XL 750 mm and 900 mm Pipe

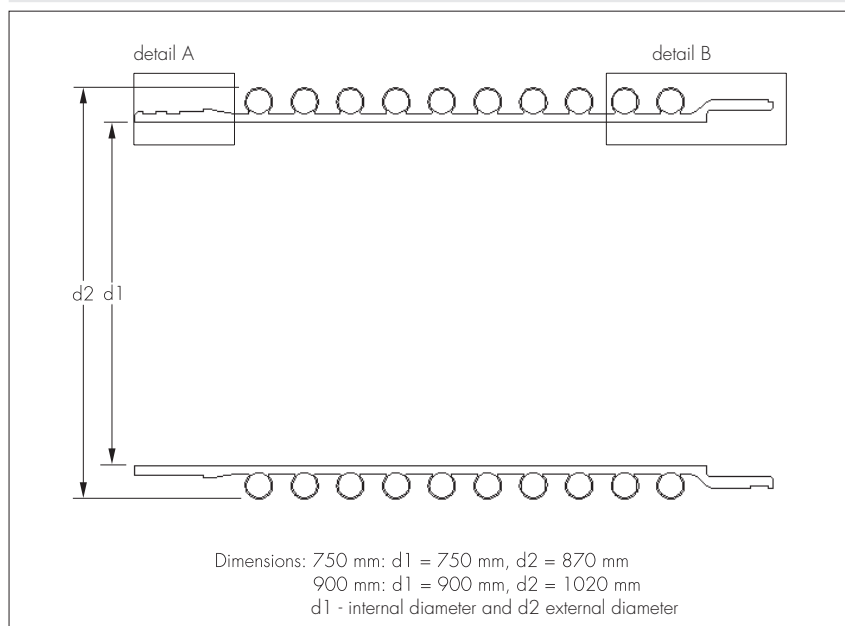


Table 2 Pipe dimensions (in millimetres)

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 (per 6 m length)	210 kg		270 kg	

1.3 The 750 mm and 900 mm pipes are supplied in standard 6 m lengths<sup>(1)</sup> with an external integral socket end and a formed spigot end. Each spigot requires two rubber seals (see Figure 2), manufactured 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 between 1.25 m and 6 m can be supplied to special order.

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

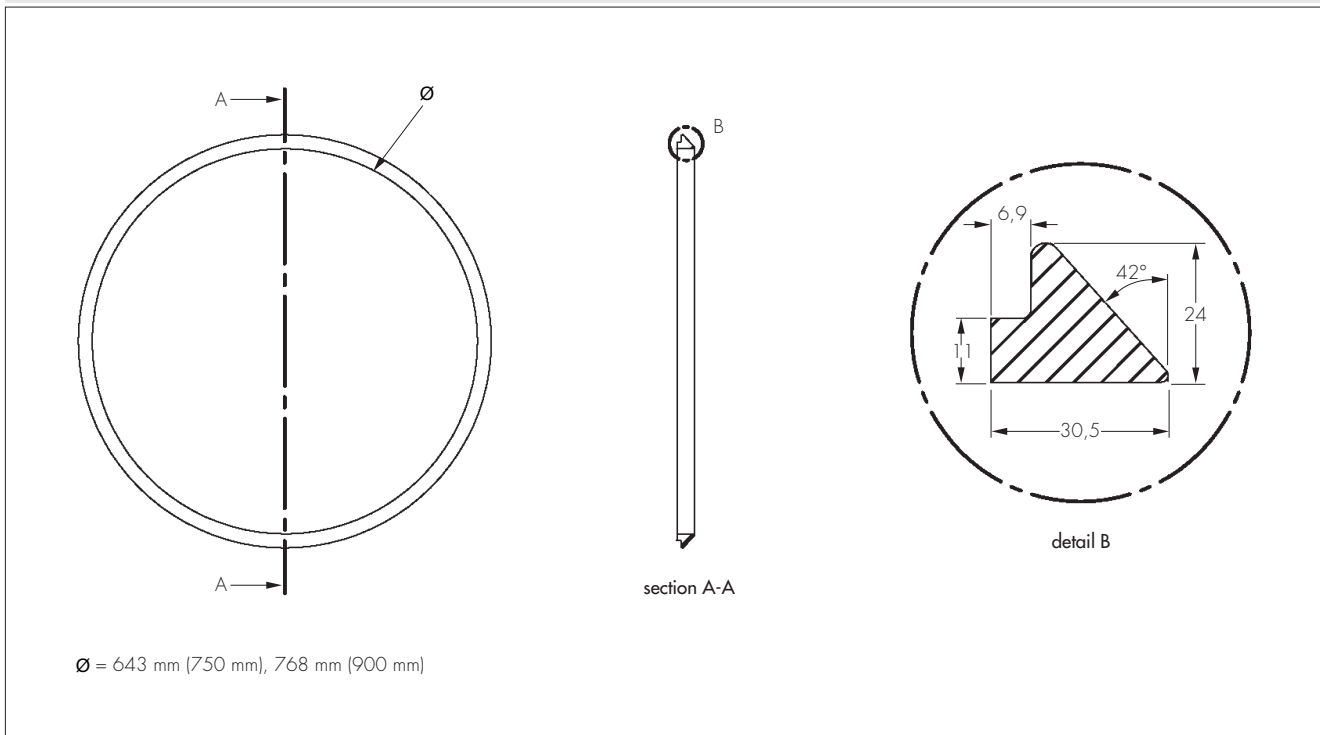
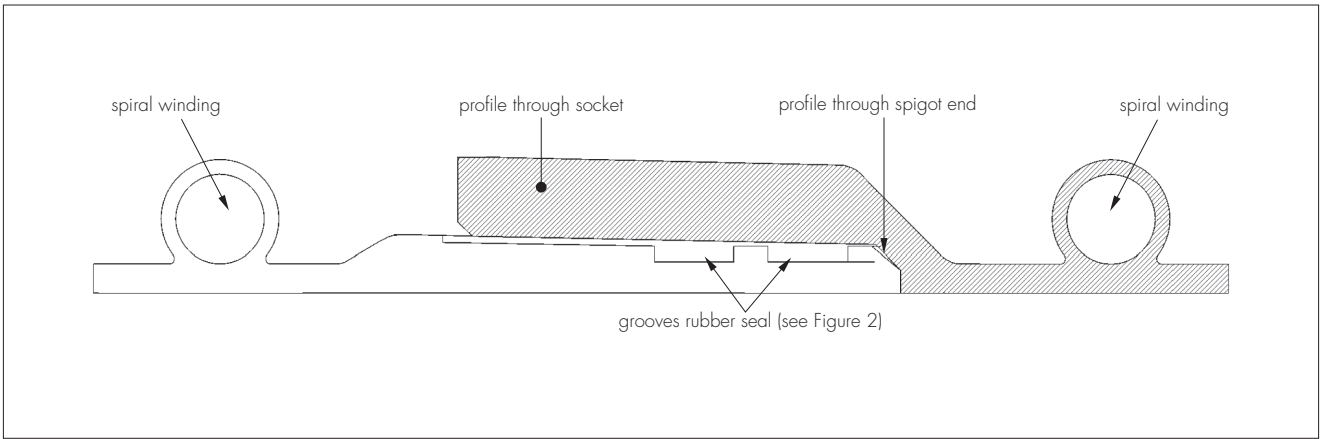


Figure 3 Ridgistor 750 mm and 900 mm pipe — cross section through pipe joint

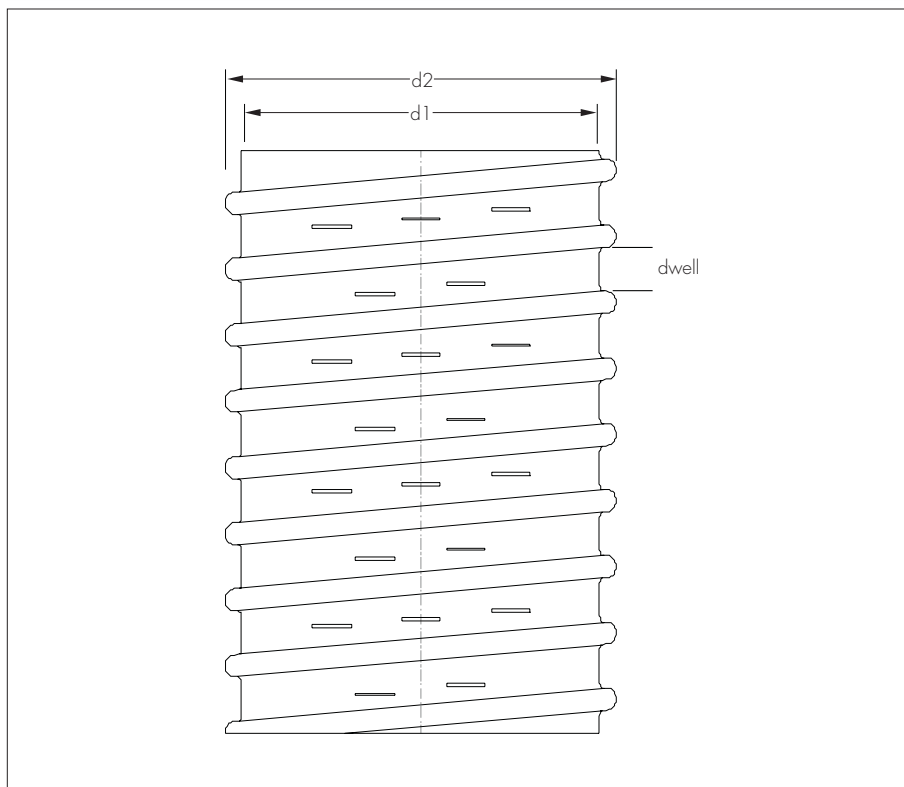


1.4 Perforated pipe is available with the slots in the dwell between corrugations equally spaced around the circumference (see Table 3 and Figure 4). Alternatively, the slots are located on only one half of the pipe and thus the number of slots per dwell and the permeable area is halved.

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 <sup>2</sup> /m
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 please see Figure 1)



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

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

## 2 Manufacture

2.1 The pipes are manufactured from extruded polyethylene by co-extrusion. 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 operated by the manufacturer are being maintained.

2.3 The management system of Polypipe Ltd 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 Handling, storage and transportation should be in accordance with MCHW and the Certificate holder's instructions.

3.2 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.

3.3 The manufacturer has the option of adding chemicals to provide enhanced UV stability on request.

3.4 Pipes should be stored on a flat surface. They are generally delivered as loose lengths and should not be stacked more than 4 m high. Care should be taken not to drop pipes 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 Ridgistorm XL 750 mm and 900 mm Filter and Carrier Pipes.

## Design Considerations

### 4 General

Ridgistorm XL 750 mm and 900 mm Filter and Carrier Pipes comply with the requirements of the MCHW, Volume 1, Clause 518.5 for pipe, Clause 518.6 for couplers and Clause 518.7 for the system. 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 are designed to be installed by a contractor experienced with these types 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 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 The pipes can be used as an alternative to the plastic pipes for surface water drains listed in Table 5/1 of the MCHW, Volume 1, and for safe bedding depth purposes may be assumed to have a standard dimension ratio (SDR) equivalent of less than 41.

### 7 Performance of joints

7.1 Pipe joints made without the rubber seals are not partially watertight as defined in the MCHW, Volume 1, Clause 504.3.

7.2 Correctly made, the joints constructed from pipe 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 1.3).

## 8 Water infiltration

The perforated area for perforated pipes exceeds the minimum requirement given in the MCHW, Volume 1, Clause 518.3, of 1000 mm<sup>2</sup> per metre length (see Table 4).

## 9 Flow characteristics

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

9.2 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.

## 10 Maintenance

10.1 Slots in perforated pipes 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 The system 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.

10.4 Tests indicate that the pipes have adequate resistance to water cleansing using pressure jetting equipment (see section 13.1). 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 used in the context of this Product Sheet, 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

Ridgiform XL 750 mm and 900 mm Filter and Carrier Pipes must be installed in accordance with the MCHW, Volume 1, Clauses 503, 505, 518.7 and 518.8.

## 14 Procedures

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

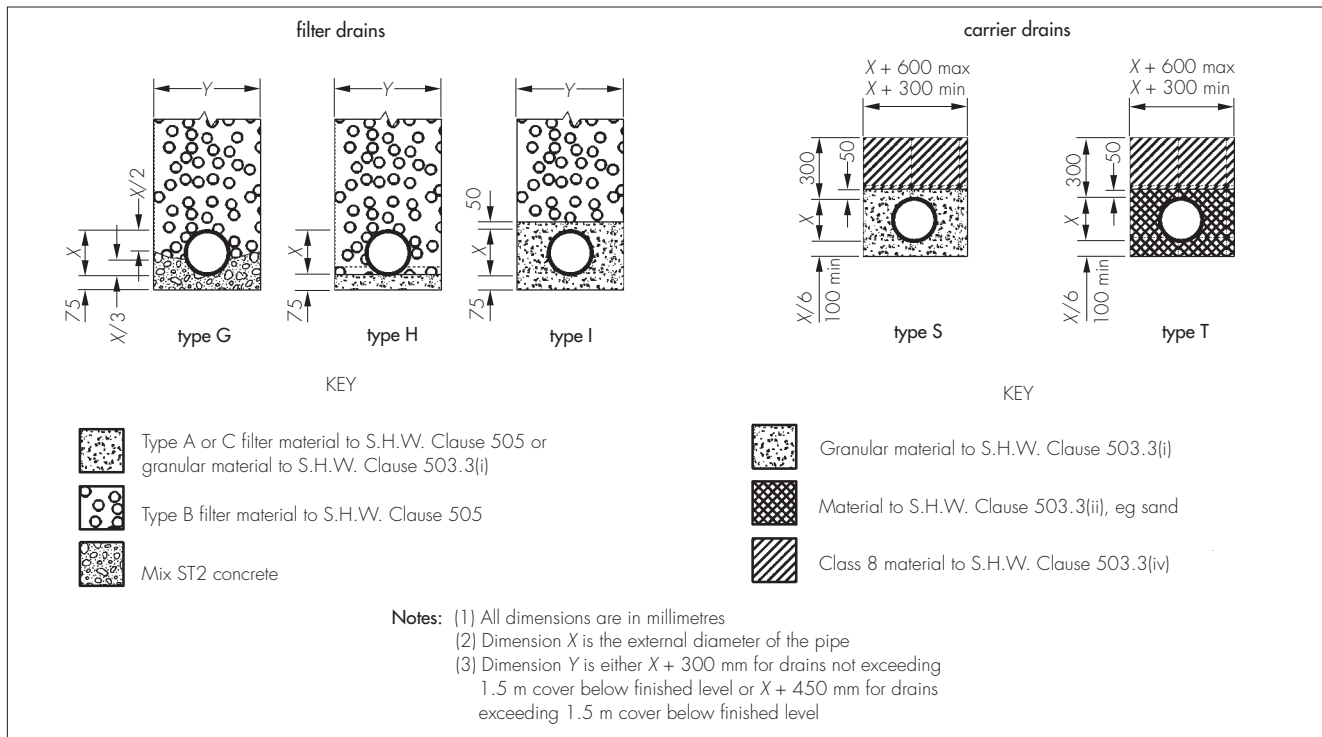
14.2 Pipes cannot be cut and can only be used in their full lengths as they have integral spigot ends and sockets. Special lengths can be made to order as required.

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

14.4 Pipes 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.

Figure 5 Trench and bedding details



## Technical Investigations

### 15 Tests

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

- determination of 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 1411 : 1996 with a d25 striker of 1.0 kg mass
- water jetting WRc method.

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

- leaktightness of joints to BS EN 1277 : 2003 when subjected to diameter distortion and angular deflection from 0.5 bar to -0.3 bar
- insertion force (ease of jointing).

15.3 Tests were carried out to establish the dimensional accuracy of the pipe, coupler and ring seal.

### 16 Investigations

16.1 An examination 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, chemical resistance and durability.

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

16.4 The manufacturing process was examined, 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 1277 : 1996 *Methods of testing plastics — Thermoplastics pipes, fittings and valves — 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 ISO 527-1 : 2012 — *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*

BS EN ISO 1183-3 : 1999 *Plastics — Methods for determining the density of non-cellular plastics. Gas pycnometer method*

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

Manual of Contract Documents for Highway Works, Volume 1 *Specification for Highway Works*, August 1998 (as amended)

Manual of Contract Documents for Highway Works, Volume 2 *Notes for Guidance on the Specification for Highway Works*, August 1998 (as amended)

Manual of Contract Documents for Highway Works, Volume 3 *Highway Construction Details*, March 1998 (as amended)

## Conditions of Certification

### 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.