Drainage (Keyline)

Contents

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Northampton
NN3 6TE
01604 643622

winvic
winvic.co.uk

Contents

Scope of Works

Drainage and Petrol Interceptors. Please refer to Data Sheets for materials installed

winvic

winvic.co.uk

Certificates/Warranties/Guarantees

winvic.co.uk

bsi.

By Royal Charter

Kitemark™ Certificate

This is to certify that:

Polypipe Limited
New Hythe Business Park
College Road
Aylesford
Maidstone
ME20 7PJ
United Kingdom

Holds Certificate Number: KM 57184

In respect of:

BS EN 1401-1
Plastics piping systems for non-pressure underground drainage and sewerage - Unplasticized poly(vinyl chloride)(PVC-U)

This issues the right and licence to use the Kitemark in accordance with the Kitemark Terms and Conditions governing the use of the Kitemark, as may be updated from time to time by BSI Assurance UK Ltd (the "Conditions"). All defined terms in this Certificate shall have the same meaning as in the Conditions.

The use of the Kitemark is authorized in respect of the Product(s) detailed on this Certificate provided at or from the above address.

For and on behalf of BSI: Chris Lewis - Certification Director, Product Certification

First Issued: 2017-07-19
Latest Issue: 2019-02-05

Effective Date: 2019-02-05
Expiry Date: 2022-02-04

...making excellence a habit.™

Kitemark® Licence

No. KM 582885

The licence is granted to:

Polypipe Building Products Ltd
Broomhouse Lane
Edlington
Doncaster
DA12 1ES
United Kingdom

In respect of:
Plastics piping systems for non-pressure underground drainage and sewerage. Structured-wall piping systems of unplasticized poly (vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE).

This issues the right and licence to use the Kitemark in accordance with the Kitemark Licence Conditions of Contract governing the use of the Kitemark, as may be updated from time to time by The British Standards Institution, and as approved by the Registrar under the Trade Marks Act 1994 (the "Conditions"). All defined terms in this Licence shall have the same meaning as in the Conditions.

The use of the Kitemark is authorized in respect of the Product(s) detailed on this Licence provided at or from the above address.

For and on behalf of BSI:

Gary Fenton, Global Assurance Director

First Issued: **16/03/2012** Latest Issue: **8/11/2012**

Kitemark® Licence

No. KM 582885

BS EN 13476-3:2007 - Specifications for pipes and fittings with smooth internal and profiled external surface and the system, Type B

WIS 4-35-01 : 2008 Thermoplastics structured wall pipes, joint and couplers with a smooth bore for gravity Sewers for the size range 150 – 900 mm inclusive

Products manufactured at:
Polypipe (Ulster) Limited, Dromore Road, Lurgan, Craigavon, BT66 7HL

PIPES

PS630	150mm x 3 m plain ended pipe
PS632	150mm x 3 m single socket pipe
PS660	150mm x 6 m plain ended pipe
PS662	150mm x 6 m single socket pipe
PS1030	225mm x 3 m plain ended pipe
PS1032	225mm x 3 m single socket pipe
PS1060	225mm x 6 m plain ended pipe
PS1062	225mm x 6 m single socket pipe
PS1230	315mm x 3 m plain ended pipe
PS1232	315mm x 3 m single socket pipe
PS1260	315mm x 6 m plain ended pipe
PS1262	315mm x 6 m single socket pipe

FITTINGS

Bends un-swept and swept angle:

PS603	150mm 45° Double Socket Short Radius Bend
PS609	150mm 15° Double Socket Short Radius Bend
PS611	150mm 90° Double Socket Short Radius Bend
PS667	150mm 30° Double Socket Short Radius Bend
PS1003	225mm 45° Double Socket Short Radius Bend
PS1009	225mm 15° Double Socket Short Radius Bend
PS1011	225mm 90° Double Socket Short Radius Bend
PS1067	225mm 30° Double Socket Short Radius Bend
PS1203	300mm 45° Double Socket Short Radius Bend
PS1209	300mm 15° Double Socket Short Radius Bend
PS1211	300mm 90° Double Socket Short Radius Bend
PS1267	300mm 30° Double Socket Short Radius Bend

Kitemark® Licence

No. KM 582885

Couplers and slip couplers:

PS600	150mm Slip Coupler
PS601	150mm Pipe Coupler
PS1000	225mm Slip Coupler
PS1001	225mm Pipe Coupler
PS1200	300mm Slip Coupler
PS1201	300mm Pipe Coupler

Reducers:

PS1021	225mm x 150mm Level Invert Reducer
PS1221	300mm x 225mm Level Invert Reducer

Branches and reducing branches un-swept and swept entry:

PS605	150mm 45° Triple Socket Equal Junction
PS623	150mm 90° Triple Socket Equal Junction
PS1005	225mm 45° Triple Socket Equal Junction
PS1205	300mm 45° Triple Socket Equal Junction
PS635RS	150mm x 110mm 45° Triple Socket Unequal Junction
PS643RS	150mm x 110mm 92½° Triple Socket Unequal Junction
PS1035RS	225mm x 110mm 45° Triple Socket Unequal Junction
PS1031	225mm x 150mm 45° Triple Socket Unequal Junction
PS1035RS	225mm x 160mm 45° Triple Socket Unequal Junction
PS1235RS	300mm x 110mm 45° Triple Socket Unequal Junction
PS1231	300mm x 150mm 45° Triple Socket Unequal Junction
PS1231RS	300mm x 160mm 45° Triple Socket Unequal Junction
PS12100	300mm x 225mm 45° Triple Socket Unequal Junction

Plugs:

PS620	150mm Socket Plug
PS1020	225mm Socket Plug
PS1220	300mm Socket Plug

HAPAS

Polypipe Civils
Charnwood Business Park
North Road
Loughborough
Leicestershire LE11 1LE
Tel: 01509 6151001 Fax: 01509 265945
e-mail: civilssales@polypipe.com
website: www.polypipe.com

BBA APPROVAL INSPECTION TESTING CERTIFICATION
TECHNICAL APPROVALS FOR CONSTRUCTION

HAPAS Certificate
13/H205
Product Sheet 1

POLYPIPE DUCTING SYSTEMS

RIDGIDUCT TWIN-WALLED HIGH DENSITY POLYETHYLENE DUCTING

This HAPAS Certificate Product Sheet(1) is issued by the British Board of Agrément (BBA), supported by the Highways Agency (HA) (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 replaces Certificate 90/R049 and relates to Ridgiduct Twin-walled High Density Polyethylene Ducting, for use in highways as underground ducting for electricity, gas and water supply services, and for street lighting cables and fibre-optic cabling for telecommunications.

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 likely to be encountered during service (see section 6).

Resistance to elevated temperatures — the products have adequate resistance to long-term deformation at an elevated temperature of 45°C (see section 7).

Resistance to chemicals — the products have an adequate resistance to attack from chemicals likely to occur in soils and groundwater (see section 8).

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: 14 November 2013

Brian Chamberlain
Head of Approvals — Engineering

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.

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Herts WD25 9BA

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website: www.bbacerts.co.uk

Requirements

In the opinion of the BBA, Ridgiduct Twin-walled High Density Polyethylene Ducting, when used in accordance with the provisions of this Certificate, will meet or contribute to meeting the following requirements of the Manual of Contract Documents for Highways Works (MCHW)[1], Specification for Highways Works (SHW), Volume 1 and Volume 3.

(1) The MCHW is operated by the Overseeing Organisations: The Highways Agency (HA), Transport Scotland, the Welsh Assembly Government and the Department for Regional Development (Northern Ireland).

Regulations

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 section: 3 *Delivery and site handling* (3.1) of this Certificate.

Technical Specification

1 Description

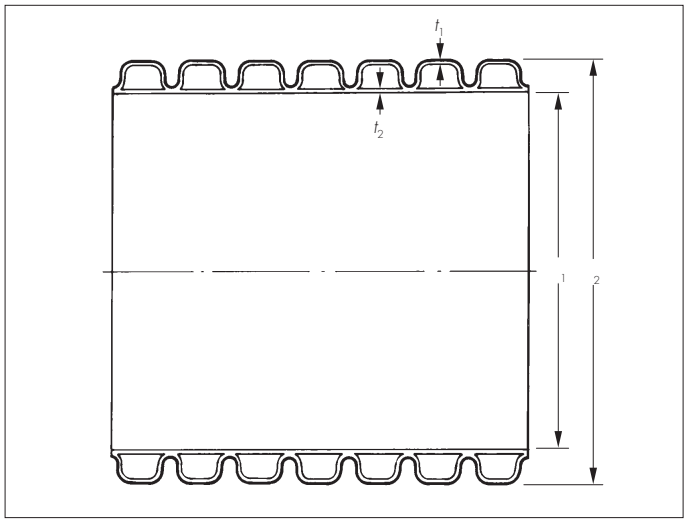
1.1 Ridgiduct Twin-Walled High Density Polyethylene Ducting comprises twin-walled high density polyethylene (HDPE) ducts and polypropylene (PP) couplers.

1.2 The outer wall of the ducts is corrugated and the inner wall is smooth finished. Details and dimensions are given in Table 1 and Figure 1.

Table 1 Duct dimensions

Manufacturer's Code No	Internal diameter (d_1) (mm)	External diameter (d_2) (mm)	t_1 (mm)	t_2 (mm)	Length (m)
RB 94	94	110	0.70	0.60	1, 2, 3 and 6
RB 100	100	118	1.00	0.80	1, 2, 3 and 6
RB 125	125	148	1.00	0.90	1, 2, 3 and 6
RB 150	150	177	0.90	0.95	1, 2, 3 and 6

Figure 1 Ridgiduct



1.3 The ducts are available in a colour range of black, purple, orange, green, blue and yellow. The ducts are marked appropriately in accordance with the customer's requirements.

1.4 A black PP coupler is used to join the ducts. Details of size are given in Table 2 and Figures 2 and 3.

Table 2 Coupler dimensions

Coupler type	Internal diameter (d_1) (mm)	Internal diameter (d_2) (mm)	External diameter (d_3) (mm)	L (mm)	t (mm)
94	111.60	111.25	114.50	100.00	2.0
100	117.5	119.4	125	97.25	2.5
125	147.5	148.25	155	101.60	2.5
150	177.0	178.5	185	123.00	2.5

Figure 2 94 mm coupler

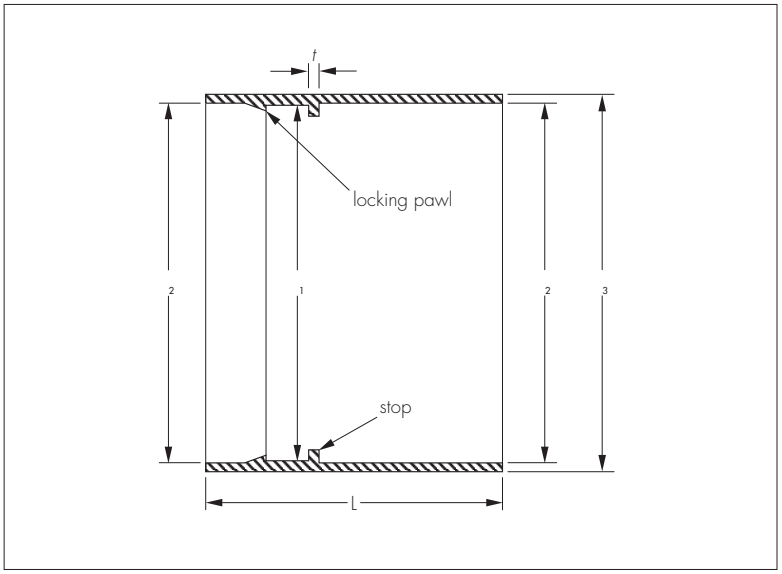
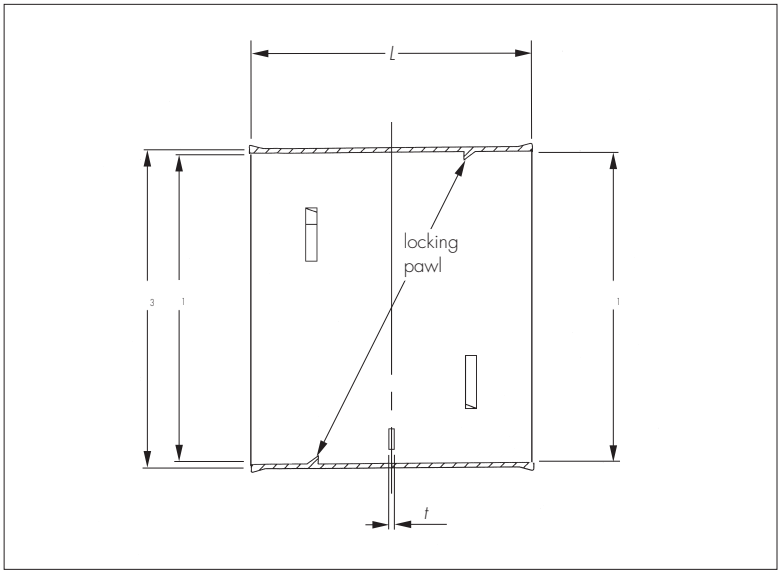


Figure 3 100 mm, 125 mm and 150 mm couplers



1.5 Jointing of the ducts with the couplers produces a system with protection against penetration by solid foreign objects of 2.5 mm diameter or greater, ie an IP rating of 3 (first characteristic numeral) to BS EN 60529 : 1992.

1.6 When used with an optional sealed coupling, available from the Certificate holder, and elastomeric seal, Ridgiduct RB 94, RB 100 and RB 150 are suitable for motorway communications applications as a sealed system to BS EN 61386-24 : 2010, IP67.

2 Manufacture

2.1 The ducts are manufactured from HDPE by a twin-extrusion process. Two pipes are extruded simultaneously, one inside the other, and heat-welded together in one continuous process.

2.2 The couplers are manufactured from PP using a conventional injection moulding technique.

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 operated by the manufacturer are being maintained.

2.4 The management system of Polypipe Civils Ltd 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 products are delivered to site strapped to pallets.

3.2 When used for electric cables, the ducts are marked with the legend 'electric cable duct'. The ducts are appropriately marked, in accordance with the customer's requirements.

3.3 The HDPE ducts and PP couplers have good resistance to UV degradation but, to avoid damage or deterioration in storage, it is recommended that the ducts be protected from direct sunlight. However, if this is unavoidable, the following mechanism of deterioration should be considered:

- up to three months' daily exposure to direct sunlight will cause negligible UV degradation but extreme surface temperatures of up to 80°C are possible on exposed surfaces and may cause some localised distortion
- three to 12 months' daily exposure to direct sunlight may have a significant effect on the impact resistance and physical properties of the duct
- over 12 months' daily exposure to direct sunlight will damage the duct and should be avoided.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on to Ridgiduct Twin-walled High Density Polyethylene Ducting.

Design Considerations

4 General

Ridgiduct Twin-Walled High Density Polyethylene Ducting, when installed in accordance with the recommendations given in this Certificate, is suitable for use in highways as underground ducting for electricity, gas and water supply services, and for street lighting cables and fibre optic cabling for cable television and telecommunications.

5 Practicability of installation

5.1 The products are designed to be installed by a competent general builder, or a contractor, experienced with these types of product.

5.2 The ducts have a smooth internal surface and a static coefficient of less than 0.22. The ducts and their joints do not present any internal projection or impedance to the installation or withdrawal of cables through the duct run.

6 Strength

6.1 The products have adequate strength to resist the loads likely to be encountered during service when used and installed in accordance with the recommendations given in this Certificate.

6.2 The ducts can be used as an alternative to the plastics pipes listed in the MCHW, Volume 1, Series 500, Table 5/2 *Pipes for Ducts*.

6.3 The ducts will have adequate resistance to the impact loads normally encountered during handling and installation. The ducts meet the resistance to impact requirements defined as 'normal duty' and the resistance to compression requirements defined in 'type 450' of BS EN 61386-24 : 2010.

6.4 The ducts have an adequate resistance to long-term deformation. When tested in accordance with BS 4962 : 1989, the ducts have an ultimate pipe stiffness (STES) value in excess of 1400 $N \cdot m^{-2}$.

7 Resistance to elevated temperatures

7.1 The maximum temperature to which the ducts and couplers will be subject in service as an electrical cable duct is dependent on the ground thermal conductivity, depth of burial, ground temperature and the heat load imposed by the electrical cable.

7.2 In general, cables with a surface temperature of up to 60°C will not affect the integrity of the ducts. For example, in a typical installation with a 300 mm^2 copper cable carrying a current of 600 amps imposing a heat load of 25 $W \cdot m^{-1}$, the cable would have a surface temperature of 60°C; this would result in a mean internal duct temperature of 45°C.

7.3 The ducts have adequate resistance to long-term deformation at an elevated temperature of 45°C.

8 Resistance to chemicals

The HDPE used to manufacture ducting and the PP used to manufacture couplers have an adequate resistance to attack from chemicals likely to occur in soils and groundwater. Details of chemical resistance of HDPE and PP are given in CP 312-1 : 1973.

9 Maintenance

As the products are buried and have suitable durability (see section 10), maintenance is not required.

10 Durability

When used in the context of this Certificate, the products will have adequate durability.

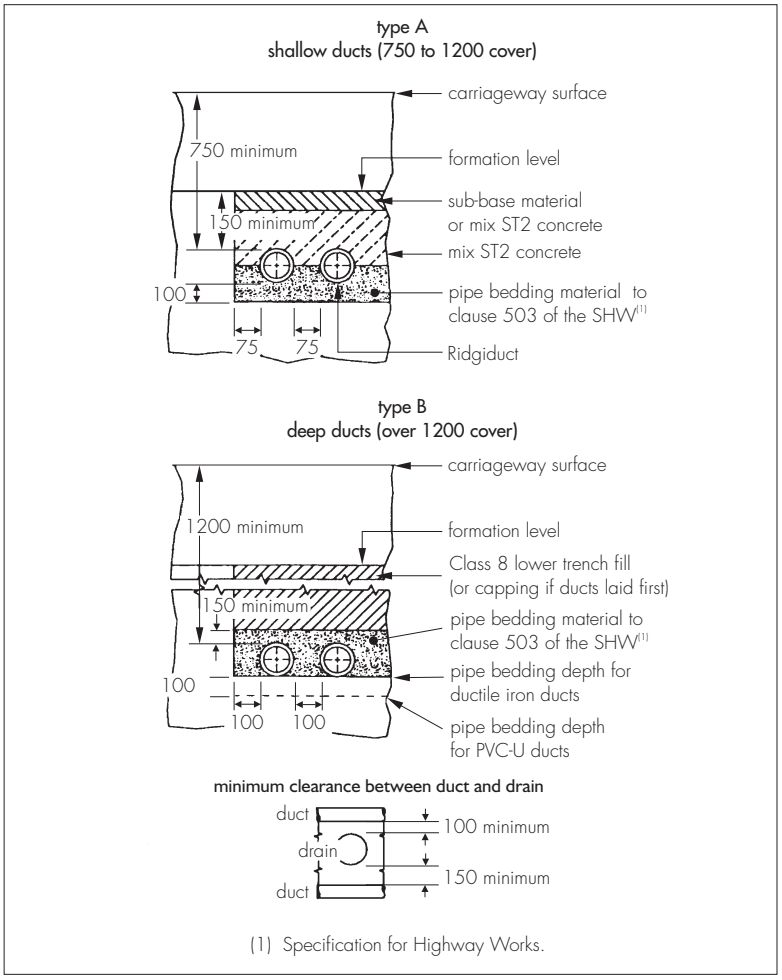
Installation

11 General

11.1 Ridgiduct Twin-Walled High Density Polyethylene Ducting must be installed in accordance with the general requirements and any additional site requirements (see section 1).

11.2 The general requirements are to be in accordance with the MCHW, Volume 3, as shown in Figure 4.

Figure 4 Highway construction detail



11.3 Ducting laid in depths of cover other than those specified in Figure 4 must be laid in accordance with the procedures described in the contract with the Highways Agency (HA).

11.4 The products must be adequately protected against damage from site construction traffic and from agricultural or similar operations.

11.5 When used as ducts for fibre optic cabling the recommendations in the MCHW, Volume 1, Series 1500, Clause 1531, should be followed.

12 Procedure

12.1 Joints are made by a simple push-fit of one duct length into the coupler attached to the adjacent length, ensuring that the connection is fully made.

12.2 Inspection points can be made in the conventional manner depending upon the type of services to be installed.

Technical Investigations

13 Tests

As part of the assessment leading to the issue of Certificate 90/R049, tests were carried out to determine:

- dimensional accuracy
- resistance to compression
- impact strength at –5°C
- Vicat softening temperature
- static friction coefficient
- visual examination
- adhesion of printing
- resistance to long-term deformation.
- ease of jointing
- resistance to penetration of simulated sharp aggregate
- resistance to sharp objects
- watertightness of joints
- degree of protection against foreign objects
- creep ratio
- degrees of protection by enclosure

14 Investigations

14.1 An examination was made of data relating to:

- chemical resistance
- heat dissipation
- effect of temperature
- practicability of installation
- material properties
- durability.

14.2 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 4962 : 1989 *Plastic pipes and fittings for use as subsoil field drains*

BS EN 60529 : 1992 *Specification for degrees of protection provided by enclosures (IP code)*

BS EN 61386-24 : 2010 *Conduit systems for cable management — Particular requirements — Conduit systems buried underground*

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

CP 312-1 : 1973F *Code of practice for plastics pipework (thermoplastics material) — General principles and choice of material*

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*

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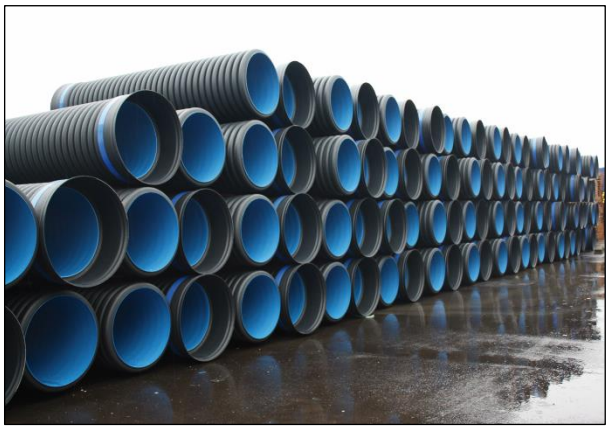
Agrément Certificate
00/3678
Product Sheet 3

RIDGIDRAIN ADVANCED DRAINAGE SYSTEM

RIDGIDRAIN (HDPE) 100 MM TO 900 MM PIPES AND COUPLERS

This Agrément Certificate Product Sheet(1) relates to Ridgidrain (HDPE) 100 mm to 900 mm Pipes and Couplers, a range of high density polyethylene (HDPE) pipes (perforated or unperforated) and couplers for use as filter and carrier drain 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 products have adequate strength to resist the loads associated with installation and service (see section 6).

Performance of joints — the products 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

Date of Fourth issue: 13 February 2019

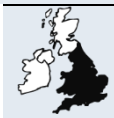
Originally certificated on 23 October 2012

Paul Valentine
Technical Excellence Director

Claire Curtis-Thomas
Chief Executive

Regulations

In the opinion of the BBA, Ridgidrain (HDPE) 100 mm to 900 mm Pipes and Couplers, 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 leaks. See section 8 of this Certificate.
Regulation:	**7**	**Materials and workmanship *(applicable in Wales only)***
Regulation:	**7(1)**	**Materials and workmanship *(applicable in England only)***
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:		Use of the products can contribute to a construction satisfying this Regulation. See sections 10 and 11 and the *Installation* part of this Certificate.
Regulation:	**9**	**Building standards applicable to construction**
Standard:	3.6(a)(b)	Surface water drainage
Comment:		The system will satisfy 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)(b)	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 Schedule6 [(1)(2)].

(1) Technical Handbook (Domestic).
(2) Technical Handbook (Non-Domestic).

The Building Regulations (Northern Ireland) 2012 (as amended)

Regulation:	**23(a)(i)**	**Fitness of materials and workmanship**
Comment:	**(iii)(b)(i)**	The products are acceptable. See section 11 and the *Installation* part of this Certificate.
Regulation:	**82(a)**	**Rainwater drainage**
Comment:		The products will convey the flow of rainwater and minimise the risk of blockages or leaks. 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* (1.3 to 1.6), 3 *Delivery and site handling* (3.5) and 14 *Procedure* (14.1) of this Certificate.

Additional Information

NHBC Standards 2019

In the opinion of the BBA, Ridgidrain (HDPE) 100 mm to 900 mm Pipes and Couplers, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements in relation to *NHBC Standards*, Chapter 5.3 *Drainage below ground*, Clause 5.3.4 *Foul and surface water disposal*.

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 The range of Ridgidrain (HDPE) 100 mm to 900 mm Pipes and Couplers comprises:

- Ridgidrain (HDPE) 100 mm to 900 mm filter and carrier Pipes (perforated and/or unperforated) and 400 to 600 mm Couplers — manufactured from HDPE to material specifications given in Tables 1 and 3 respectively
- Ridgidrain (PP) 100 to 375 mm couplers — manufactured from polypropylene with the specifications given in Table 2
- Ridgidrain 750 to 900 mm double couplers — manufactured from HDPE to the material specifications given in Table 4.

Table 1 Material properties/specification for pipes 100 mm – 900 mm diameter (polyethylene)

Property	Test method reference	Specification
Tensile properties	BS EN ISO 527-2	Sample 1B at 50 $mm \cdot m^{-1}$ ≥ 18 MPa
Thermal stability (OIT)	BS EN 728	≥ 4 min
Melt mass-flow rate	BS EN ISO 1133	≤ 1.0 g $(10\ min)^{-1}$ 2.16 kg at 190°C
Reference density	BS EN ISO 1183-1	≥ 935 $kg.m^{-3}$
Heat reversion	ISO 12091	110°C ± 2°C (pass)

Table 2 Material properties/specification for couplers 100 mm – 375 mm diameter (polypropylene)

Property	Test method reference	Specification
Tensile properties	BS EN ISO 527-2	Sample 1B at 50 $mm \cdot m^{-1}$ ≥ 18 MPa
Thermal stability (OIT)	BS EN 728	≥ 4 min
Melt mass-flow rate	BS EN ISO 1133	≤ 7 g $(10\ min)^{-1}$ 2.16 kg at 230°C
Reference density	BS EN ISO 1183-1	≥ 890 $kg.m^{-3}$
Effects of heating	BS EN ISO 580	150°C ± 2°C (pass)

Table 3 Material properties/specification for couplers 400 mm – 600 mm diameter (polyethylene)

Property	Test method reference	Specification
Tensile properties	BS EN ISO 527-2	Sample 1B at 50 $mm \cdot m^{-1}$ ≥ 18 MPa
Thermal stability (OIT)	BS EN 728	≥ 4 min
Melt mass-flow rate	BS EN ISO 1133	≤ 8 g $(10\ min)^{-1}$ 2.16 kg at 190 °C
Reference density	BS EN ISO 1183-1	≥ 935 $kg.m^{-3}$
Effects of heating	BS EN ISO 580	110°C ± 2°C (pass)

Table 4 Material properties/specification for rotationally moulded double couplers 750 mm – 900 mm diameter (polyethylene)

Property	Test method reference	Specification
Tensile properties	BS EN ISO 527-2	Sample 1B at 50 $mm \cdot m^{-1}$ ≥ 18 MPa
Thermal stability (OIT)	BS EN 728	≥ 1 min
Melt mass-flow rate	BS EN ISO 1133	≤ 20 g $(10\ min)^{-1}$ 5 kg at 190 °C
Reference density	BS EN ISO 1183-1	≥ 925 $kg.m^{-3}$

1.2 The pipes are structured-wall constructions 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 (1).

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

1.3 The 100 to 900 mm pipes can be manufactured 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 5 to 8 and Figure 1). Alternatively, the slots are located on one half of the pipe only, and thus the permeable areas are approximately halved.

Table 5 Perforated pipe details — fully perforated (production line A)

Nominal internal pipe diameter (mm)	Number of slots per dwell	Number of rows of slots	Number of dwells per metre	Slot length (range) (mm)	Slot width (range) (mm)	Permeable area (minimum) ($mm^2 \cdot m^{-1}$)
100	4	8	60	15 - 25	1.5 - 2.0	5400
150	3	6	45	15 - 25	1.5 - 3.0	3040
225	3	6	30	15 - 35	1.5 - 3.0	2025
300	6	6	25	15 - 35	1.5 - 3.0	3375
375	10	10	20	20 - 45	1.5 - 3.6	6000
400	2	4	20	70 - 90	3 - 4	8400
450	2	4	13	70 - 90	3 - 4	5460
500	2	4	22	70 - 90	3 - 4	9240
600	2	4	10	80 - 100	3 - 4	4800
750 (SN4 & SN6)	3	3	8	120 - 170	2 - 4	5760
900 (SN4 & SN6)	3	3	10	120 - 170	2 - 4	7200

Table 6 Perforated pipe details — fully perforated (production line B)

Nominal internal pipe diameter (mm)	Number of slots per dwell	Number of rows of slots	Number of dwells per metre	Slot length (range) (mm)	Slot width (range) (mm)	Permeable area (minimum) ($mm^2 \cdot m^{-1}$)
150	6	6	45	20 – 52	1.0 – 2.0	5400
225	3	6	30	25 – 60	1.0 – 2.0	2250
300	6	6	25	25 – 75	1.0 – 2.0	3750
375	10	10	20	20 – 45	1.5 – 3.6	6000

Table 7 Perforated pipe details — half perforated (production line A)

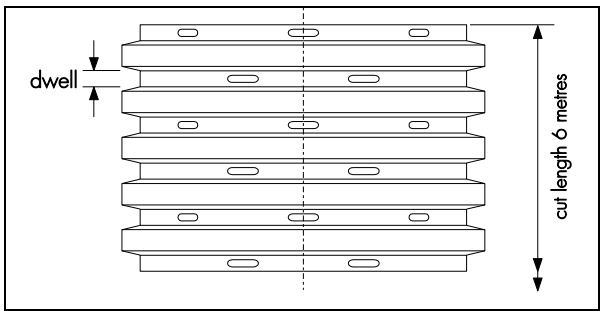
Nominal internal pipe diameter (mm)	Number of slots per dwell	Number of rows of slots	Number of dwells per metre	Slot length (range) (mm)	Slot width (range) (mm)	Permeable area (minimum) ($mm^2 \cdot m^{-1}$)
100	2	3	60	15 - 25	1.5 - 2.0	2700
150	2/1(1)	3	45	15 - 25	1.5 - 3.0	1520
225	2/1(1)	3	30	15 - 35	1.5 - 3.0	1015
300	3	3	25	15 - 35	1.5 - 3.0	1685
375	5	5	20	20 - 45	1.5 - 3.6	3000
400	1	2	20	70 - 90	3 - 4	4200
450	1	2	13	70 - 90	3 - 4	2730
500	1	2	33	70 - 90	3 - 4	4620
600	1	2	20	80 - 100	3 - 4	2400
750 (SN4 & SN6)	2	2	8	120 - 170	2 - 4	3840
900 (SN4 & SN6)	2	2	10	120 - 170	2 - 4	4800

(1) Two slots or one slot in alternating dwells.

Table 8 Perforated pipe details — half perforated (production line B)

Nominal internal pipe diameter (mm)	Number of slots per dwell	Number of rows of slots	Number of dwells per metre	Slot length (range) (mm)	Slot width (range) (mm)	Permeable area (minimum) ($mm^2 \cdot m^{-1}$)
150	4	4	45	20–52	1.0–2.0	3600
225	2	4	30	25–60	1.0–2.0	1500
300	4	4	25	25–75	1.0–2.0	2500
375	5	5	20	20–45	1.5–3.6	3000

Figure 1 Details of perforations

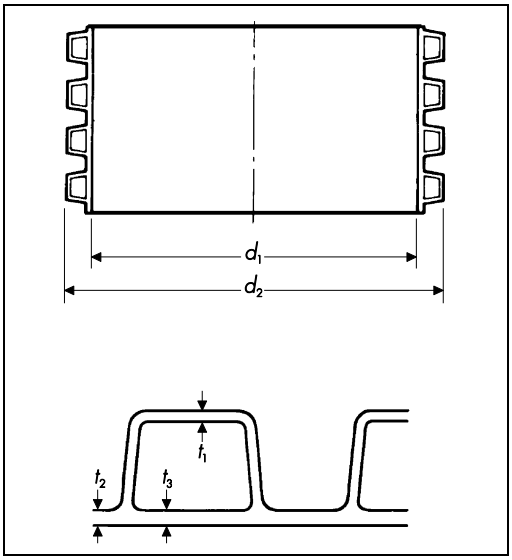


1.4 The pipes are manufactured in nominal internal diameters of 100 to 900 mm, and to the dimensions shown in Table 9 and Figure 2.

Table 9 Ridgidrain (HDPE) 100 mm to 900 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 ($kg \cdot m^{-1}$)
100	98	118.75	0.8	1.5	0.7	6	0.80
150	145	176.35	0.7	1.0	0.8	6	1.35
225	220	266.5	1.3	1.8	0.8	6	3.0
300	294	353.75	1.3	2.1	1.0	6	5.0
375	372	435.5	1.6	2.9	1.5	6	6.7
400	392	458	1.4	2.8	1.2	6	8.0
450	441	523	1.5	3.9	1.4	6	9.0
500	490	576	1.6	3.0	1.5	6	12.0
600	588	700	2.0	5.0	1.7	6	14.0
750 (SN4)	744	852	2.9	2.1	2.1	3	20
750 (SN6)	735.9	852	3.8	4.1	4.1	3	30
900 (SN4)	893.8	1022	3.6	2.6	2.6	3	29
900 (SN6)	884	1022	4.2	4.8	4.8	3	40

Figure 2 Ridgidrain (HDPE) pipe

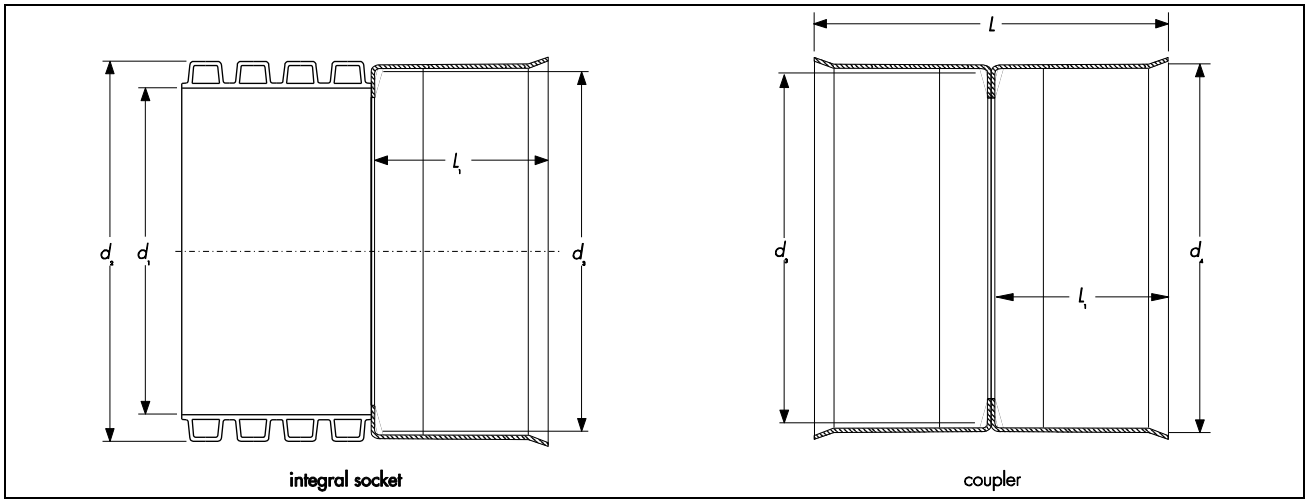


1.5 The pipes are supplied with either two plain ends, or with one plain end and a welded integral socket. The integral socket is to the same profile as that of half a coupler for integral sockets of 400 to 600 mm diameter. For the 750 to 900 mm diameters, the integral socket is formed as part of the corrugation process. Dimensions of integral sockets are given in Table 10 and details are shown in Figure 3.

Table 10 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 / 49.7
500	577	251	49
600	707	281	75
750 (SN4)	858	320	72.8
750 (SN6)	858	320	72.8
900 (SN4)	1030	405	86.7
900 (SN6)	1030	405	86.7

Figure 3 Welded integral socket and couplers



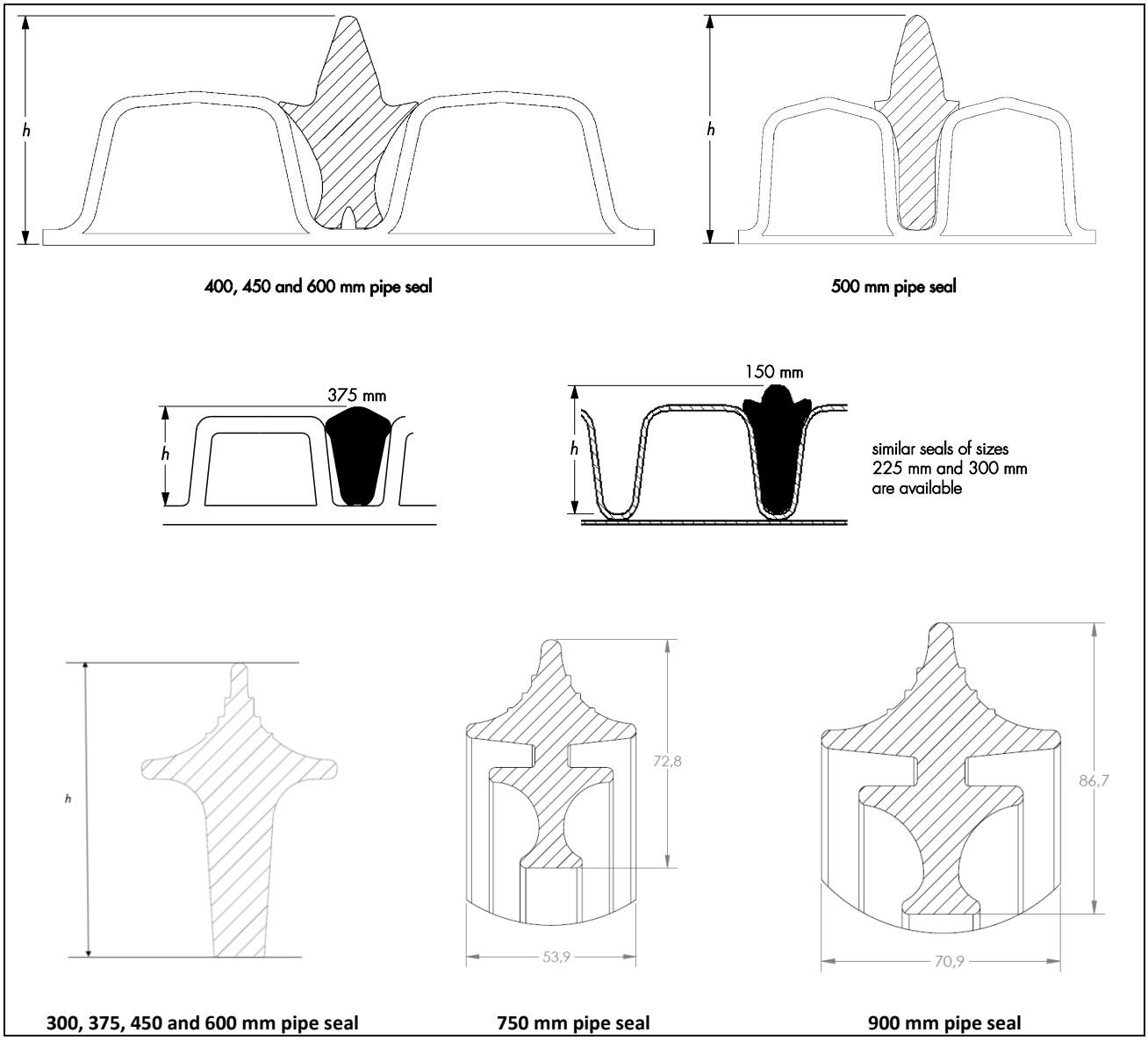
1.6 The black polyethylene couplers, manufactured by the Certificate holder, are used for jointing the plain ended Ridgidrain (HDPE) 100 to 600 mm pipes. The rotationally moulded HDPE double couplers are externally bought-in for 750 and 900 mm pipes (see Table 11 for coupler dimensions and Figure 3).

Table 11 Coupler dimensions

Nominal internal pipe diameter, d_1 (mm)	Nominal internal socket diameter, d_3 (mm)	Nominal external diameter, d_4 (mm)	Nominal length (L) (mm)	Nominal seal height, h (mm)
100	119	127	195	9.8
150	176	182	183	16.4
225	265	275	260	24
300	353	365	280	31.5/35.6
375	433	447	333	33/40.8
400	463	475	400	40
450	528	540	435	51/49.7
500	577	589	489	49
600	707	719	560	75
750	857.6	873.8	660	72.8
900	1029	1047	800	86.7

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. Two production lines, A and B, are used to manufacture the pipes.

2.2 The 100 to 375 mm double couplers are injection moulded. The 400 to 600 mm couplers are made from two injection moulded half couplers, which are then welded together to form the completed coupler. The 750 and 900 mm couplers are rotationally moulded.

2.3 The integral sockets are made using one half coupler, which is spin welded on to the end of the pipe for pipes of 400 to 600 mm diameter. For the 750 and 900 mm integral sockets, these are formed as part of the corrugation process.

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

2.5 The management system of Polypipe Ltd t/a Polypipe Civils has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015 and BS EN ISO 14001 : 2015 by BSI (Certificates Q06225 and EMS 535794 respectively).

3 Delivery and site handling

3.1 Pipes with diameters up to 400 mm are delivered to site packaged on wooden support frames, with five pipe lengths to the pack. Pipes with diameters of 450 mm and greater can be supplied loose or packed as required.

3.2 Each pipe bears a label showing the:

- name of the manufacturer
- company name
- product code(1)
- type of product — pipes unperforated, perforated, half perforated
- job/pack number
- operator
- length
- BBA logo incorporating the number of this Certificate.

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

3.3 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 is provided.

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

3.5 The pipes should be stored on a flat surface. Where they are 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) 100 mm to 900 mm Pipes and Couplers.

Design Considerations

4 Use

4.1 Ridgidrain (HDPE) 100 mm to 900 mm Pipes and Couplers, 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 the 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 a competent contractor experienced with these types of products, in accordance with BS EN 1610 : 2015.

6 Strength

6.1 The products have adequate robustness to resist the loads associated with installation, and with subsequent use in the situations defined in section 4.1.

6.2 For installation purposes, the pipes may be assumed to have a standard dimension ratio (SDR) equivalent of not greater than 26. The pipes have adequate resistance to the impact loads to which they may be subjected during installation and in service.

6.3 The pipes have a ring stiffness in excess of 6 $kN \cdot m^{-2}$ in accordance with BS EN ISO 9969 : 2016 and a creep ratio of less than 4 $kN \cdot m^{-2}$ in accordance with BS EN ISO 9967 : 2016, and have adequate resistance to static loads. Pipes of sizes 750 and 900 mm are also available in stiffness class SN4.

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 pipe will have the 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 designs, a value of 0.6 mm is generally used.

9 Resistance to chemicals

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

10 Maintenance

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

10.2 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 jetting systems. However, it is recommended that low pressure, high volume systems are used in accordance with BS EN 13476-1 : 2018, Annex D.

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 products will be in excess of 50 years.

12 Reuse and recyclability

The products are manufactured from polyethylene and polypropylene, which are recyclable.

Installation

13 General

13.1 Ridgidrain (HDPE) 100 mm to 900 mm Pipes and Couplers must be installed in accordance with BS EN 752 : 2017 and BS EN 1610 : 2015, 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 products must be protected against damage from construction traffic.

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

14 Procedure

14.1 The pipes are cut easily 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 backfill to maintain the line and level of the pipelines. If necessary, the pipe should be restrained to prevent uplift.

Technical Investigations

15 Tests

Tests were carried out and the results assessed to determine:

- dimensional accuracy
- ring stiffness to BS EN ISO 9969 : 2016
- creep ratio to BS EN ISO 9967 : 2016
- impact strength at 0 and 23°C to BS EN ISO 11173 : 2017 with a d25 striker of 1.0 kg mass
- leaktightness of joints to BS EN ISO 13259 : 2018, when subjected to diameter deflection and angular deflection
- resistance to longitudinal bending
- resistance to rodding
- insertion force (ease of jointing).

16 Investigations

16.1 An assessment was made of data relating to:

- chemical resistance
- flow capacity
- practicability of installation
- material properties
- resistance to rodding and jetting
- resistance to cyclic loading.

16.2 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 : 2017 *Drain and sewer systems outside buildings — Sewer system management*

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

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

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

BS EN 13476-1 : 2018 *Plastics piping systems for non-pressure underground drainage and sewerage — Structured-wall piping systems of unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE) — General requirements and performance characteristics*

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

BS EN ISO 580 : 2005 *Plastics piping and ducting systems — Injection-moulded thermoplastics fittings — Methods for visually assessing the effects of heating*

BS EN ISO 1133 : 2005 *Plastics — Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics*

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 : 2015 *Quality management systems — Requirements*

BS EN ISO 14001 : 2015 *Environmental management system — Requirements*

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

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

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.

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- 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.

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HAPAS Certificate

02/H068

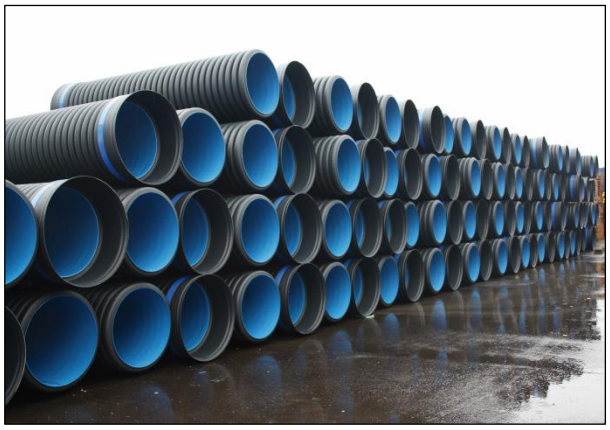
Product Sheet 6

RIDGIDRAIN ADVANCED DRAINAGE SYSTEM

RIDGIDRAIN (HDPE) 150 MM TO 900 MM PIPES AND COUPLERS

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 Certificate relates to Ridgidrain (HDPE) 150 mm to 900 mm Pipes and Couplers, a range of high density polyethylene (HDPE) pipes (perforated and unperforated) and couplers for use as filter and carrier pipes for highway drainage.



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 products have adequate strength for the intended application (see section 6).

Performance of joints — the products 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

Date of Fifth issue: 9 July 2020

Originally certificated on 23 October 2012

Hardy Giesler
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.

Requirements

In the opinion of the BBA, Ridgidrain (HDPE) 150 mm to 900 mm Pipes and Couplers, when used in accordance with the provisions of this Certificate, can satisfy or contribute to satisfying 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 structured wall pipes and fittings are contained in the MCHW, Volume 1 SHW, Clause 518. Further information and guidance is given in the MCHW, Volume 3, Section 1, F Series, 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 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 1.3 to 1.6) and 3 *Delivery and site handling* (3.6) 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.

Technical Specification

1 Description

1.1 The range of Rigidrain (HDPE) 150 mm to 900 mm Pipes and Couplers comprises:

- Ridgidrain (HDPE) 150 mm to 900 mm Filter and Carrier Pipes (perforated and/or unperforated) and 400 to 600 mm Couplers — manufactured from HDPE to material specifications given in Tables 1 and 3 respectively
- Ridgidrain (PP) 150 to 375 mm Couplers — manufactured from polypropylene with the specifications given in Table 2
- Ridgidrain 750 to 900 mm Double Couplers — manufactured from HDPE to the material specifications given in Table 4.

Table 1 Material properties/specification for pipes 150 mm – 900 mm diameter (polyethylene)

Property	Test method reference	Specification
Tensile properties	BS EN ISO 527-2	Sample 1B at 50 $mm \cdot min^{-1}$ ≥ 18 MPa
Oxygen induction time	BS EN 728	≥ 4 min
Melt mass-flow rate	BS EN ISO 1133-1	≤ 1.0 g $(10\ min)^{-1}$ 2.16 kg at 190 °C
Reference density	BS EN ISO 1183-1	≥ 935 $kg.m^{-3}$
Heat reversion	ISO 12091	110°C ± 2°C (pass)

Table 2 Material properties/specification for couplers 150 mm – 375 mm diameter (polypropylene)

Property	Test method reference	Specification
Tensile properties	BS EN ISO 527-2	Sample 1B at 50 mm·min^{-1} ≥ 18 MPa
Oxygen induction time	BS EN 728	≥ 4 min
Melt mass-flow rate	BS EN ISO 1133-1	≤ 7 g (10 min)$^{-1}$ 2.16 kg at 230°C
Reference density	BS EN ISO 1183-1	≥ 890 kg·m^{-3}
Heat reversion	ISO 12091	150°C ± 2°C (pass)

Table 3 Material properties/specification for couplers 400 mm – 600 mm diameter (polyethylene)

Property	Test method reference	Specification
Tensile properties	BS EN ISO 527-2	Sample 1B at 50 mm·min^{-1} ≥ 18 MPa
Thermal stability (OIT)	BS EN 728	≥ 4 min
Melt mass-flow rate	BS EN ISO 1133-1	≤ 8 g (10 min)$^{-1}$ 2.16 kg at 190°C
Reference density	BS EN ISO 1183-1	≥ 935 kg·m^{-3}
Heat reversion	ISO 12091	110°C ± 2°C (pass)

Table 4 Material properties/specification for rotationally moulded double couplers 750 mm – 900 mm diameter (polyethylene)

Property	Test method reference	Specification
Thermal stability (OIT)	BS EN 728	≥ 1 min
Melt mass-flow rate	BS EN ISO 1133-1	≤ 10 g (10 min)$^{-1}$ 2.16 kg at 190°C
Reference density	BS EN ISO 1183-1	≥ 925 kg·m^{-3}

1.2 The pipes are structured-wall constructions 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 (1).

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

1.3 The 150 to 900 mm pipes can be manufactured 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 5 to 8 and Figure 1). Alternatively, the slots are located on one half of the pipe only, and thus the permeable area is approximately halved.

Table 5 Perforated pipe details — fully perforated (production line A)

Nominal internal pipe diameter (mm)	Number of slots per dwell	Number of rows of slots	Number of dwells per metre	Slot length (range) (mm)	Slot width (range) (mm)	Permeable area (minimum) (mm^2·m^{-1})
150	3	6	45	15 - 25	1.5 - 3	3040
225	3	6	30	15 - 35	1.5 - 3	2025
300	6	6	25	15 - 35	1.5 - 3	3375
375	10	10	20	20 - 45	1.5 - 3.6	6000
400	2	4	20	70 - 90	3 - 4	8400
450	2	4	13	70 - 90	3 - 4	5460
500	2	4	22	70 - 90	3 - 4	9240
600	2	4	10	80 - 100	3 - 4	4800
750 (SN4 & SN6)	3	3	8	120 - 170	2 - 4	5760
900 (SN4 & SN6)	3	3	10	120 - 170	2 - 4	7200

Table 6 Perforated pipe details — fully perforated (production line B)

Nominal internal pipe diameter (mm)	Number of slots per dwell	Number of rows of slots	Number of dwells per metre	Slot length (range) (mm)	Slot width (range) (mm)	Permeable area (minimum) ($mm^2 \cdot m^{-1}$)
150	6	6	45	20 – 52	1.0 – 2	5400
225	3	6	30	25 – 60	1.0 – 2	2250
300	6	6	25	25 – 75	1.0 – 2	3750
375	10	10	20	20 –45	1.5 – 3.6	6000

Table 7 Perforated pipe details — half perforated (production line A)

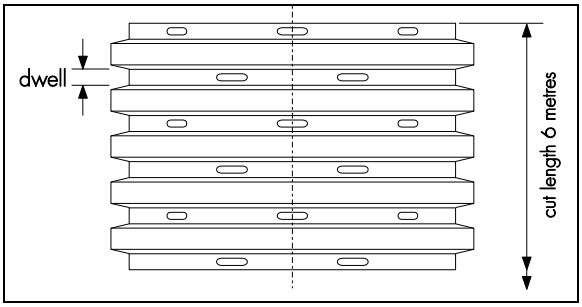
Nominal internal pipe diameter (mm)	Number of slots per dwell	Number of rows of slots	Number of dwells per metre	Slot length (range) (mm)	Slot width (range) (mm)	Permeable area (minimum) ($mm^2 \cdot m^{-1}$)
150	2/1(1)	3	45	15 - 25	1.5 - 3	1520
225	2/1(1)	3	30	15 - 35	1.5 - 3	1015
300	3	3	25	15 - 35	1.5 - 3	1685
375	5	5	20	20 - 45	1.5 - 3.6	3000
400	1	2	20	70 - 90	3 - 4	4200
450	1	2	13	70 - 90	3 - 4	2730
500	1	2	33	70 - 90	3 - 4	4620
600	1	2	20	80 - 100	3 - 4	2400
750 (SN4 & SN6)	2	2	8	120 - 170	2 - 4	3840
900 (SN4 & SN6)	2	2	10	120 - 170	2 - 4	4800

(1) Two slots or one slot in alternating dwells.

Table 8 Perforated pipe details — half perforated (production line B)

Nominal internal pipe diameter (mm)	Number of slots per dwell	Number of rows of slots	Number of dwells per metre	Slot length (range) (mm)	Slot width (range) (mm)	Permeable area (minimum) ($mm^2 \cdot m^{-1}$)
150	4	4	45	20 – 52	1 – 2	3600
225	2	4	30	25 – 60	1 – 2	1500
300	4	4	25	25 – 75	1 – 2	2500
375	5	5	20	20 – 45	1.5 – 3.6	3000

Figure 1 Details of perforations

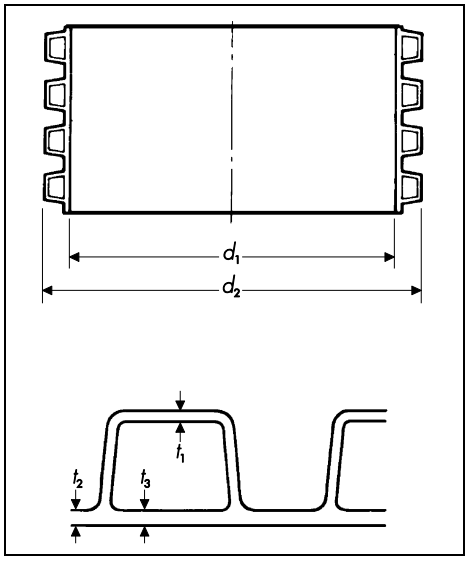


1.4 The pipes are manufactured in nominal internal diameters of 150 to 900 mm, and to the dimensions shown in Table 9 and Figure 2.

Table 9 Ridgidrain (HDPE) 150 mm to 900 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 mass ($kg \cdot m^{-1}$)
150	145	176.35	0.7	1	0.8	6	1.35
225	220	266.5	1.3	1.8	1	6	3
300	294	353.75	1.3	2.1	1	6	5
375	372	435.5	1.6	2.9	1.5	6	6.7
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	1.5	6	12
600	588	700	2	5	1.7	6	14
750 (SN4)	744	852	2.9	2.1	2.1	3	20
750 (SN6)	735.9	852	3.8	4.1	4.1	3	30
900 (SN4)	893.8	1022	3.6	2.6	2.6	3	29
900 (SN6)	884	1022	4.2	4.8	4.8	3	40

Figure 2 Ridgidrain (HDPE) pipe

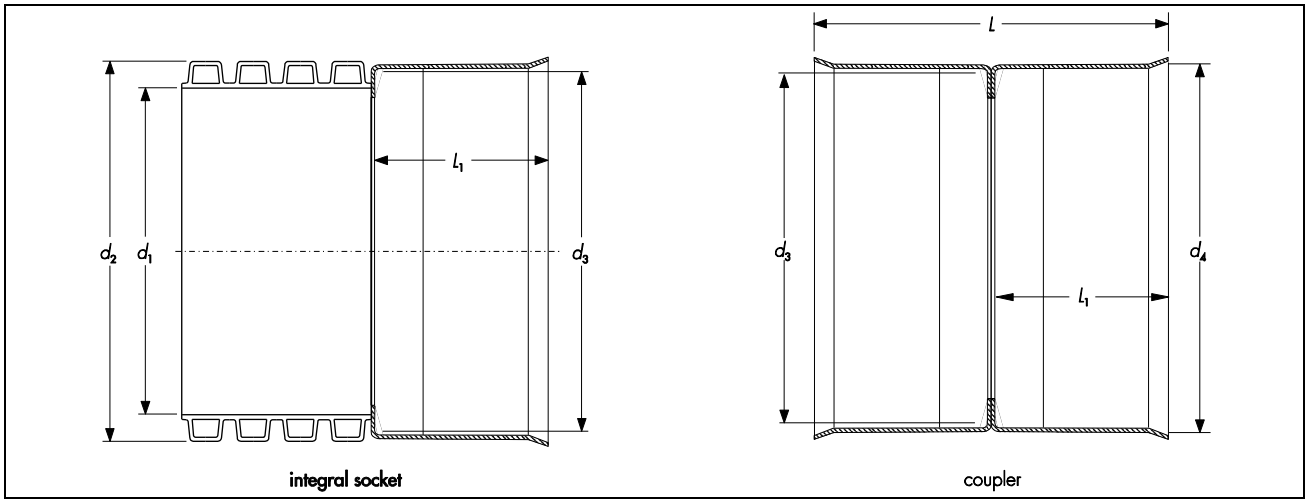


1.5 The pipes are supplied with either two plain ends, or with one plain end and a welded integral socket. The integral socket is to the same profile as that of half a coupler for integral sockets of 400 to 600 mm diameter. For the 750 to 900 mm diameters, the integral socket is formed as part of the corrugation process. Dimensions of integral sockets are given in Table 10 and details are shown in Figure 3.

Table 10 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	51/49.7
500	577	251	49
600	707	281	75
750 (SN4)	858	320	72.8
750 (SN6)	858	320	72.8
900 (SN4)	1030	405	86.7
900 (SN6)	1030	405	86.7

Figure 3 Welded integral socket and couplers



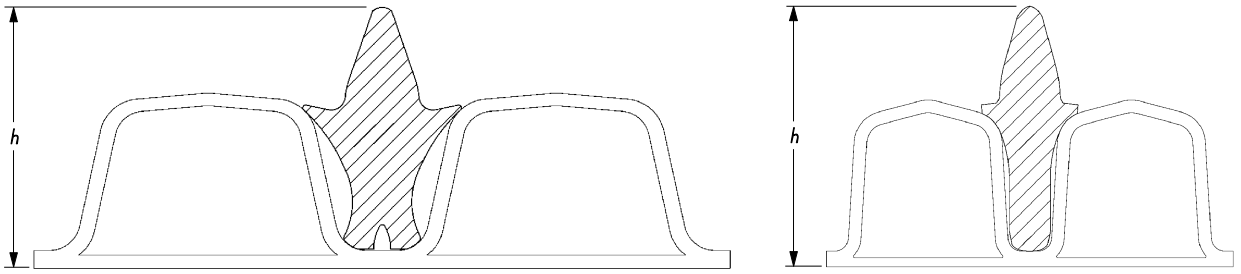
1.6 The black polyethylene couplers, manufactured by the Certificate holder, are used for jointing the plain ended Ridgidrain (HDPE) 150 to 600 mm pipes. The rotationally moulded HDPE double couplers are externally bought-in for 750 and 900 mm pipes (see Table 11 for coupler dimensions and Figure 3).

Table 11 Coupler dimensions

Nominal internal pipe diameter, d_1 (mm)	Nominal internal socket diameter, d_3 (mm)	Nominal external diameter, d_4 (mm)	Nominal length (L) (mm)	Nominal seal height, h (mm)
150	176	182	183	16.4
225	265	275	260	24
300	353	365	280	31.5/35.6
375	433	447	333	33/40.8
400	463	475	400	40
450	528	540	435	51/49.7
500	577	589	489	49
600	707	719	560	75
750	857.6	873.8	660	72.8
900	1029	1047	800	86.7

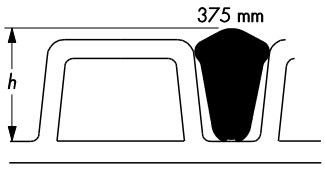
1.7 Sealing of the integral socket joints, and joints formed using couplers, requires rubber sealing rings supplied by the Certificate holder (see Figure 4). The rings are manufactured to BS EN 681-1 : 1996. The seals must be fitted in accordance with the Certificate holder's installation instructions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

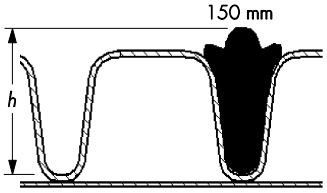
Figure 4 Seals



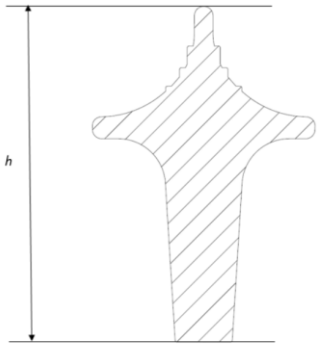
400, 450 and 600 mm pipe seal

500 mm pipe seal

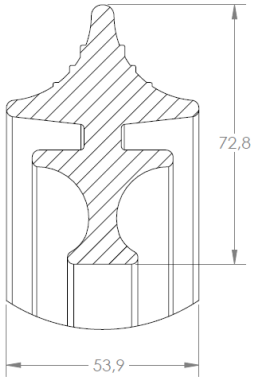




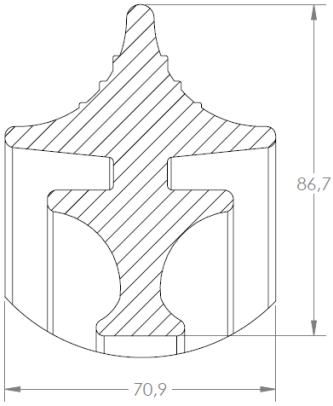
similar seals of sizes 225 mm and 300 mm are available



300, 375, 450 and 600 mm pipe seal



750 mm pipe seal



900 mm pipe seal

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. Two production lines, A and B, are used to manufacture the pipes.

2.2 The 150 to 375 mm double couplers are injection moulded. The 400 to 600 mm couplers are made from two injection moulded half couplers, which are then welded together to form the completed coupler. The 750 to 900 mm couplers are rotationally moulded.

2.3 The integral sockets are made using one half coupler, which is spin welded on to the end of the pipe for pipes of 400 to 600 mm diameter. For the 750 and 900 mm integral socket, these are formed as part of the corrugation process.

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

2.5 The management system of Polypipe Ltd t/a Polypipe Civils has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015 and BS EN ISO 14001 : 2015 by BSI (Certificates Q06225 and EMS 535794 respectively).

3 Delivery and site handling

3.1 Pipes with diameters up to 400 mm diameter are delivered to site packaged on wooden support frames, with five pipe lengths to the pack. Pipes with diameters of 450 mm and greater are supplied loose or packed as required.

3.2 Each pipe bears a label showing the:

- company name
- product code(1)
- product type — Ridgidrain unperforated, perforated, half perforated
- job/pack number
- operator
- length
- BBA logo incorporating the number of this Certificate.

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

3.3 Handling, storage and transportation should be in accordance with the requirements of the MCHW, Volume 1.

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.

3.5 The Certificate holder has the option of adding chemicals to provide enhanced UV stability on request, but this is outside the scope of this Certificate.

3.6 The pipes should be stored on a flat surface. Where they are 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) 150 mm to 900 mm Pipes and Couplers.

Design Considerations

4 Use

Ridgidrain (HDPE) 150 mm to 900 mm Pipes and Couplers (perforated or unperforated), comply with the requirements of the MCHW, Volume 1, Clause 518.5 for the pipes, Clause 518.6 for the couplers, and Clause 518.7 for the drainage system. When installed in accordance with the recommendations given in this Certificate, the products are suitable for the collection and disposal of surface and sub-surface water.

5 Practicability of installation

The products are designed to be installed by a competent contractor experienced with these types of products in highway works.

6 Strength

6.1 The pipes have a ring stiffness in excess of 6 $kN \cdot m^{-2}$ in accordance with BS EN ISO 9969 : 2016 and a creep ratio of less than 4 $kN \cdot m^{-2}$ in accordance with BS EN ISO 9967 : 2016, and have adequate resistance to static loads. Pipes of sizes 750 and 900 mm are also available in stiffness class SN4.

6.2 The pipes have adequate robustness to resist the loads associated with installation and subsequent use in the situations described in this Certificate.

6.3 The pipes can be used as an alternative to the plastic pipes for surface water drains listed in the MCHW, Volume 1, Table 5/1, and for safe bedding depth purposes may be assumed to have a standard dimension ratio (SDR) not greater than 26.

7 Performance of joints

7.1 Joints on filter pipes made from pipe and couplers without the rubber seals are not partially watertight, as defined in the MCHW, Volume 1, Clause 504.3.

7.2 When correctly made, 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 13).

8 Water infiltration

The slot area for the pipes exceeds the HE minimum requirement given in the MCHW, Volume 1, Clause 518.3 of 1000 mm^2 per metre length (see Tables 5 to 8 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 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 The slots are designed to restrict the ingress of silt into the drains.

10.2 Access to the products 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 products 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 and rodding.

11 Durability

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

12 Reuse and recyclability

The products are manufactured from polyethylene and polypropylene, which are recyclable.

Installation

13 General

13.1 Ridgidrain (HDPE) 150 mm to 900 mm Pipes and Couplers must be installed in accordance with HE requirements and the MCHW, Volume 1, Clauses 502, 503, 518.8, and 518.9.

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 products must be protected against damage from construction traffic.

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

14 Procedure

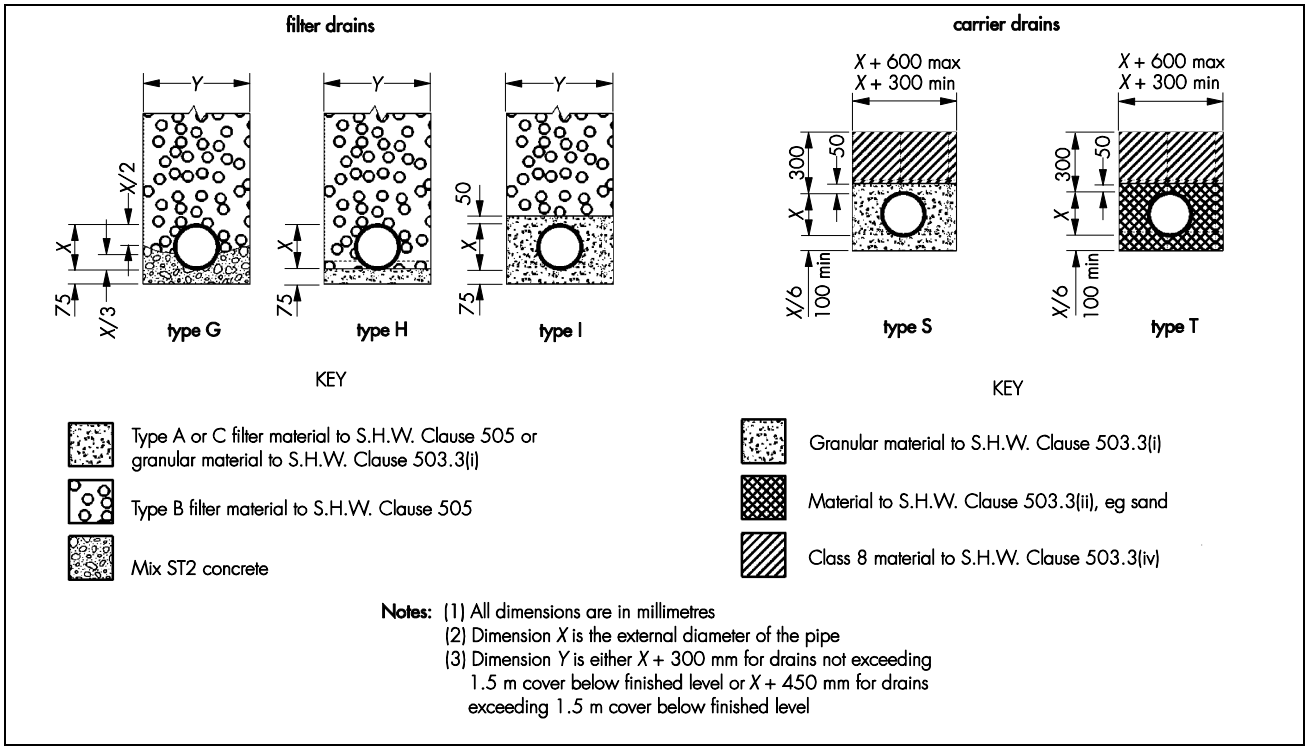
14.1 For typical laying, trench and backfilling specification details, reference should be made to Figure 5 of this Certificate and the MCHW, Volume 3, Drawing Nos F1 (Type T and S) and F2 (Type G, H and I).

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

14.3 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.

14.4 Care should be taken during backfill to maintain the line and level of the pipelines. 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:

- dimensional accuracy
- ring stiffness to BS EN ISO 9969 : 2016
- creep ratio to BS EN ISO 9967 : 2016
- impact strength at 0 and 23°C to BS EN ISO 11173 : 2017 with a d25 striker of 1.0 kg mass
- water jetting WRc method.

15.2 Tests were carried out on joined pipes to establish compliance with the MCHW, Volume 1, Clause 518.7, on leaktightness of joints to BS EN ISO 13259 : 2018, when subjected to diameter deflection and angular deflection from 0.5 to -0.3 bar.

16 Investigations

16.1 An assessment was made of data relating to:

- chemical resistance
- flow capacity
- practicability of installation
- material properties
- resistance to rodding and jetting
- resistance to cyclic loading.

16.2 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 1610 : 2015 *Construction and testing of drains and sewers*

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 the melt volume-flow rate (MVR) of thermoplastics*

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

BS EN ISO 9001 : 2015 *Quality management systems — Requirements*

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

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

BS EN ISO 14001 : 2015 *Environmental management system — Requirements*

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

BS EN ISO 9969 : 2016 *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*
Manual of Contract Documents for Highway Works, Volume 2 *Notes for Guidance on the Specification for Highway*
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.

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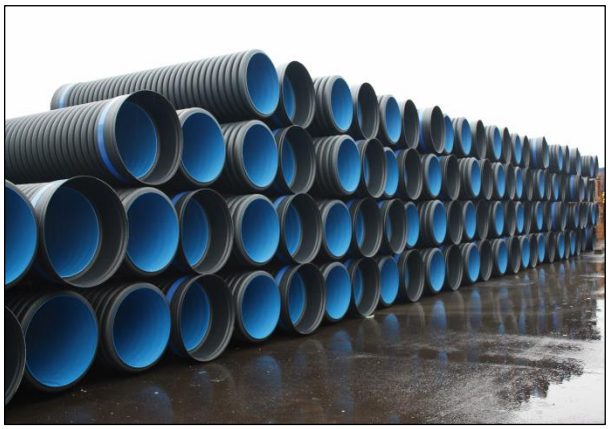
Agrément Certificate
00/3678
Product Sheet 3

RIDGIDRAIN ADVANCED DRAINAGE SYSTEM

RIDGIDRAIN (HDPE) 100 MM TO 900 MM PIPES AND COUPLERS

This Agrément Certificate Product Sheet(1) relates to Ridgidrain (HDPE) 100 mm to 900 mm Pipes and Couplers, a range of high density polyethylene (HDPE) pipes (perforated or unperforated) and couplers for use as filter and carrier drain 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 products have adequate strength to resist the loads associated with installation and service (see section 6).

Performance of joints — the products 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

Date of Fourth issue: 13 February 2019

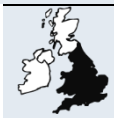
Originally certificated on 23 October 2012

Paul Valentine
Technical Excellence Director

Claire Curtis-Thomas
Chief Executive

Regulations

In the opinion of the BBA, Ridgidrain (HDPE) 100 mm to 900 mm Pipes and Couplers, 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 leaks. See section 8 of this Certificate.
Regulation:	**7**	**Materials and workmanship *(applicable in Wales only)***
Regulation:	**7(1)**	**Materials and workmanship *(applicable in England only)***
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:		Use of the products can contribute to a construction satisfying this Regulation. See sections 10 and 11 and the *Installation* part of this Certificate.
Regulation:	**9**	**Building standards applicable to construction**
Standard:	3.6(a)(b)	Surface water drainage
Comment:		The system will satisfy 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)(b)	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 Schedule6 [(1)(2)].

(1) Technical Handbook (Domestic).
(2) Technical Handbook (Non-Domestic).

The Building Regulations (Northern Ireland) 2012 (as amended)

Regulation:	**23(a)(i)**	**Fitness of materials and workmanship**
Comment:	**(iii)(b)(i)**	The products are acceptable. See section 11 and the *Installation* part of this Certificate.
Regulation:	**82(a)**	**Rainwater drainage**
Comment:		The products will convey the flow of rainwater and minimise the risk of blockages or leaks. 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* (1.3 to 1.6), 3 *Delivery and site handling* (3.5) and 14 *Procedure* (14.1) of this Certificate.

Additional Information

NHBC Standards 2019

In the opinion of the BBA, Ridgidrain (HDPE) 100 mm to 900 mm Pipes and Couplers, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements in relation to *NHBC Standards*, Chapter 5.3 *Drainage below ground*, Clause 5.3.4 *Foul and surface water disposal*.

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 The range of Ridgidrain (HDPE) 100 mm to 900 mm Pipes and Couplers comprises:

- Ridgidrain (HDPE) 100 mm to 900 mm filter and carrier Pipes (perforated and/or unperforated) and 400 to 600 mm Couplers — manufactured from HDPE to material specifications given in Tables 1 and 3 respectively
- Ridgidrain (PP) 100 to 375 mm couplers — manufactured from polypropylene with the specifications given in Table 2
- Ridgidrain 750 to 900 mm double couplers — manufactured from HDPE to the material specifications given in Table 4.

Table 1 Material properties/specification for pipes 100 mm – 900 mm diameter (polyethylene)

Property	Test method reference	Specification
Tensile properties	BS EN ISO 527-2	Sample 1B at 50 $mm \cdot m^{-1}$ ≥ 18 MPa
Thermal stability (OIT)	BS EN 728	≥ 4 min
Melt mass-flow rate	BS EN ISO 1133	≤ 1.0 g $(10\ min)^{-1}$ 2.16 kg at 190°C
Reference density	BS EN ISO 1183-1	≥ 935 $kg.m^{-3}$
Heat reversion	ISO 12091	110°C ± 2°C (pass)

Table 2 Material properties/specification for couplers 100 mm – 375 mm diameter (polypropylene)

Property	Test method reference	Specification
Tensile properties	BS EN ISO 527-2	Sample 1B at 50 $mm \cdot m^{-1}$ ≥ 18 MPa
Thermal stability (OIT)	BS EN 728	≥ 4 min
Melt mass-flow rate	BS EN ISO 1133	≤ 7 g $(10\ min)^{-1}$ 2.16 kg at 230°C
Reference density	BS EN ISO 1183-1	≥ 890 $kg.m^{-3}$
Effects of heating	BS EN ISO 580	150°C ± 2°C (pass)

Table 3 Material properties/specification for couplers 400 mm – 600 mm diameter (polyethylene)

Property	Test method reference	Specification
Tensile properties	BS EN ISO 527-2	Sample 1B at 50 $mm \cdot m^{-1}$ ≥ 18 MPa
Thermal stability (OIT)	BS EN 728	≥ 4 min
Melt mass-flow rate	BS EN ISO 1133	≤ 8 g $(10\ min)^{-1}$ 2.16 kg at 190 °C
Reference density	BS EN ISO 1183-1	≥ 935 $kg.m^{-3}$
Effects of heating	BS EN ISO 580	110°C ± 2°C (pass)

Table 4 Material properties/specification for rotationally moulded double couplers 750 mm – 900 mm diameter (polyethylene)

Property	Test method reference	Specification
Tensile properties	BS EN ISO 527-2	Sample 1B at 50 $mm \cdot m^{-1}$ ≥ 18 MPa
Thermal stability (OIT)	BS EN 728	≥ 1 min
Melt mass-flow rate	BS EN ISO 1133	≤ 20 g $(10\ min)^{-1}$ 5 kg at 190 °C
Reference density	BS EN ISO 1183-1	≥ 925 $kg.m^{-3}$

1.2 The pipes are structured-wall constructions 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 (1).

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

1.3 The 100 to 900 mm pipes can be manufactured 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 5 to 8 and Figure 1). Alternatively, the slots are located on one half of the pipe only, and thus the permeable areas are approximately halved.

Table 5 Perforated pipe details — fully perforated (production line A)

Nominal internal pipe diameter (mm)	Number of slots per dwell	Number of rows of slots	Number of dwells per metre	Slot length (range) (mm)	Slot width (range) (mm)	Permeable area (minimum) ($mm^2 \cdot m^{-1}$)
100	4	8	60	15 - 25	1.5 - 2.0	5400
150	3	6	45	15 - 25	1.5 - 3.0	3040
225	3	6	30	15 - 35	1.5 - 3.0	2025
300	6	6	25	15 - 35	1.5 - 3.0	3375
375	10	10	20	20 - 45	1.5 - 3.6	6000
400	2	4	20	70 - 90	3 - 4	8400
450	2	4	13	70 - 90	3 - 4	5460
500	2	4	22	70 - 90	3 - 4	9240
600	2	4	10	80 - 100	3 - 4	4800
750 (SN4 & SN6)	3	3	8	120 - 170	2 - 4	5760
900 (SN4 & SN6)	3	3	10	120 - 170	2 - 4	7200

Table 6 Perforated pipe details — fully perforated (production line B)

Nominal internal pipe diameter (mm)	Number of slots per dwell	Number of rows of slots	Number of dwells per metre	Slot length (range) (mm)	Slot width (range) (mm)	Permeable area (minimum) ($mm^2 \cdot m^{-1}$)
150	6	6	45	20 – 52	1.0 – 2.0	5400
225	3	6	30	25 – 60	1.0 – 2.0	2250
300	6	6	25	25 – 75	1.0 – 2.0	3750
375	10	10	20	20 – 45	1.5 – 3.6	6000

Table 7 Perforated pipe details — half perforated (production line A)

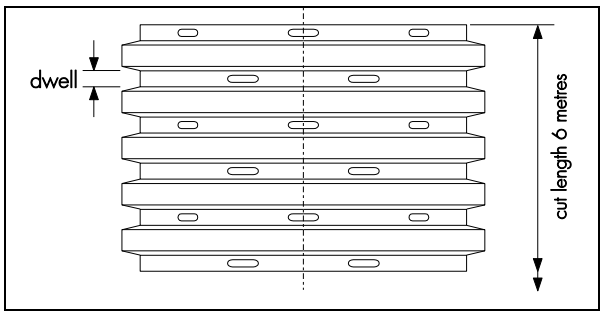
Nominal internal pipe diameter (mm)	Number of slots per dwell	Number of rows of slots	Number of dwells per metre	Slot length (range) (mm)	Slot width (range) (mm)	Permeable area (minimum) ($mm^2 \cdot m^{-1}$)
100	2	3	60	15 - 25	1.5 - 2.0	2700
150	2/1(1)	3	45	15 - 25	1.5 - 3.0	1520
225	2/1(1)	3	30	15 - 35	1.5 - 3.0	1015
300	3	3	25	15 - 35	1.5 - 3.0	1685
375	5	5	20	20 - 45	1.5 - 3.6	3000
400	1	2	20	70 - 90	3 - 4	4200
450	1	2	13	70 - 90	3 - 4	2730
500	1	2	33	70 - 90	3 - 4	4620
600	1	2	20	80 - 100	3 - 4	2400
750 (SN4 & SN6)	2	2	8	120 - 170	2 - 4	3840
900 (SN4 & SN6)	2	2	10	120 - 170	2 - 4	4800

(1) Two slots or one slot in alternating dwells.

Table 8 Perforated pipe details — half perforated (production line B)

Nominal internal pipe diameter (mm)	Number of slots per dwell	Number of rows of slots	Number of dwells per metre	Slot length (range) (mm)	Slot width (range) (mm)	Permeable area (minimum) ($mm^2 \cdot m^{-1}$)
150	4	4	45	20–52	1.0–2.0	3600
225	2	4	30	25–60	1.0–2.0	1500
300	4	4	25	25–75	1.0–2.0	2500
375	5	5	20	20–45	1.5–3.6	3000

Figure 1 Details of perforations

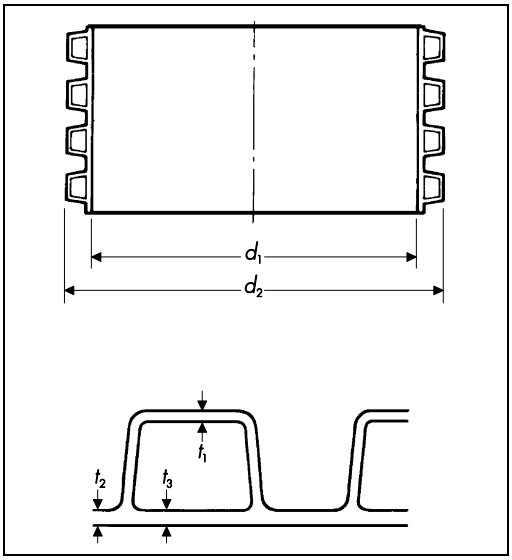


1.4 The pipes are manufactured in nominal internal diameters of 100 to 900 mm, and to the dimensions shown in Table 9 and Figure 2.

Table 9 Ridgidrain (HDPE) 100 mm to 900 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 ($kg \cdot m^{-1}$)
100	98	118.75	0.8	1.5	0.7	6	0.80
150	145	176.35	0.7	1.0	0.8	6	1.35
225	220	266.5	1.3	1.8	0.8	6	3.0
300	294	353.75	1.3	2.1	1.0	6	5.0
375	372	435.5	1.6	2.9	1.5	6	6.7
400	392	458	1.4	2.8	1.2	6	8.0
450	441	523	1.5	3.9	1.4	6	9.0
500	490	576	1.6	3.0	1.5	6	12.0
600	588	700	2.0	5.0	1.7	6	14.0
750 (SN4)	744	852	2.9	2.1	2.1	3	20
750 (SN6)	735.9	852	3.8	4.1	4.1	3	30
900 (SN4)	893.8	1022	3.6	2.6	2.6	3	29
900 (SN6)	884	1022	4.2	4.8	4.8	3	40

Figure 2 Ridgidrain (HDPE) pipe

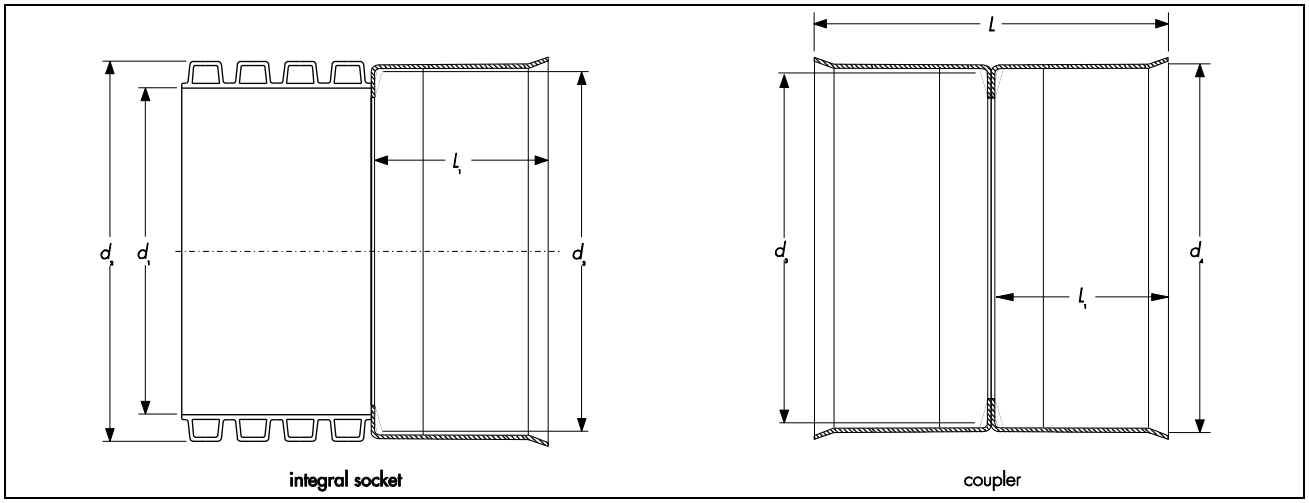


1.5 The pipes are supplied with either two plain ends, or with one plain end and a welded integral socket. The integral socket is to the same profile as that of half a coupler for integral sockets of 400 to 600 mm diameter. For the 750 to 900 mm diameters, the integral socket is formed as part of the corrugation process. Dimensions of integral sockets are given in Table 10 and details are shown in Figure 3.

Table 10 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 / 49.7
500	577	251	49
600	707	281	75
750 (SN4)	858	320	72.8
750 (SN6)	858	320	72.8
900 (SN4)	1030	405	86.7
900 (SN6)	1030	405	86.7

Figure 3 Welded integral socket and couplers



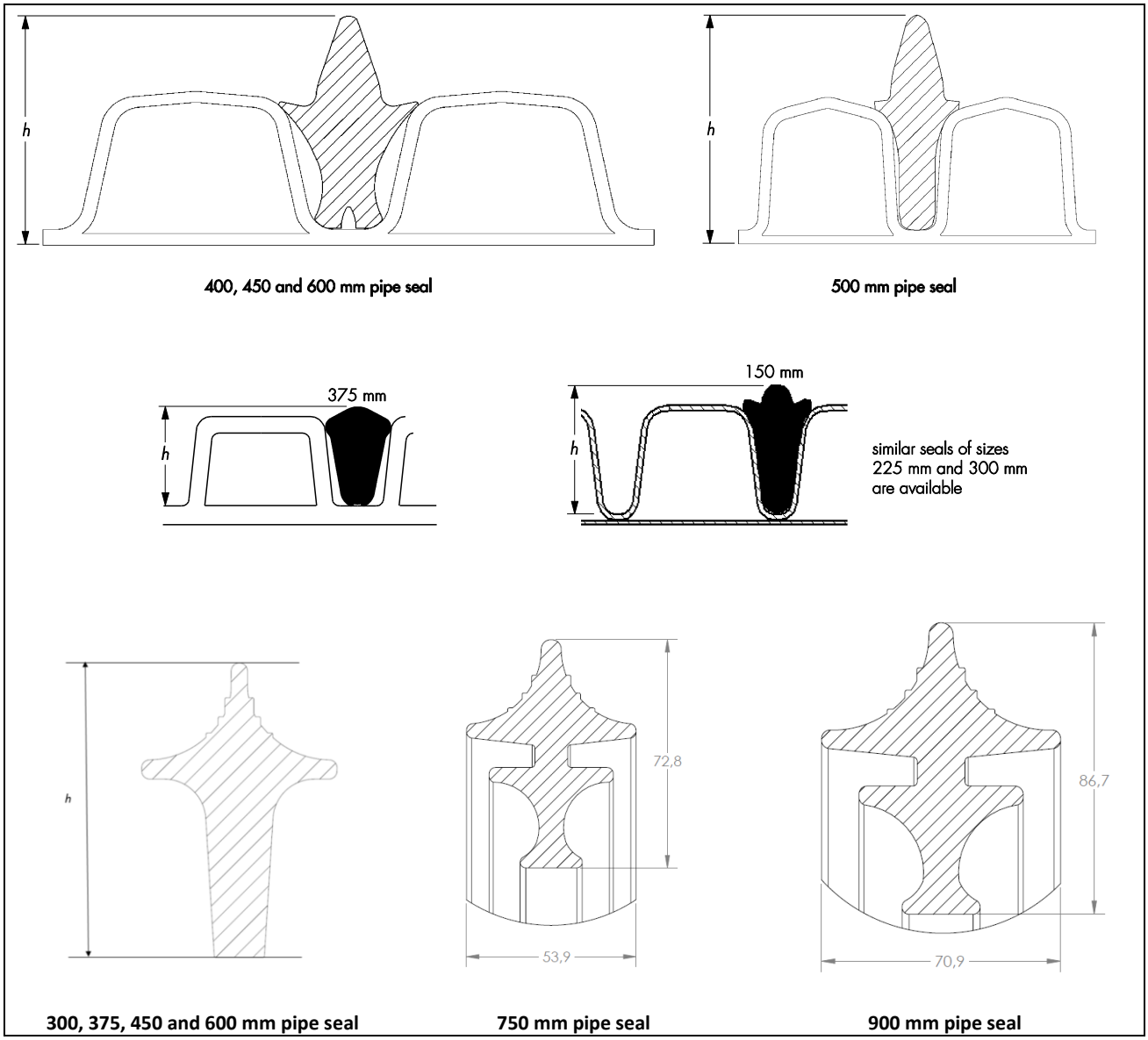
1.6 The black polyethylene couplers, manufactured by the Certificate holder, are used for jointing the plain ended Ridgidrain (HDPE) 100 to 600 mm pipes. The rotationally moulded HDPE double couplers are externally bought-in for 750 and 900 mm pipes (see Table 11 for coupler dimensions and Figure 3).

Table 11 Coupler dimensions

Nominal internal pipe diameter, d_1 (mm)	Nominal internal socket diameter, d_3 (mm)	Nominal external diameter, d_4 (mm)	Nominal length (L) (mm)	Nominal seal height, h (mm)
100	119	127	195	9.8
150	176	182	183	16.4
225	265	275	260	24
300	353	365	280	31.5/35.6
375	433	447	333	33/40.8
400	463	475	400	40
450	528	540	435	51/49.7
500	577	589	489	49
600	707	719	560	75
750	857.6	873.8	660	72.8
900	1029	1047	800	86.7

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. Two production lines, A and B, are used to manufacture the pipes.

2.2 The 100 to 375 mm double couplers are injection moulded. The 400 to 600 mm couplers are made from two injection moulded half couplers, which are then welded together to form the completed coupler. The 750 and 900 mm couplers are rotationally moulded.

2.3 The integral sockets are made using one half coupler, which is spin welded on to the end of the pipe for pipes of 400 to 600 mm diameter. For the 750 and 900 mm integral sockets, these are formed as part of the corrugation process.

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

2.5 The management system of Polypipe Ltd t/a Polypipe Civils has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015 and BS EN ISO 14001 : 2015 by BSI (Certificates Q06225 and EMS 535794 respectively).

3 Delivery and site handling

3.1 Pipes with diameters up to 400 mm are delivered to site packaged on wooden support frames, with five pipe lengths to the pack. Pipes with diameters of 450 mm and greater can be supplied loose or packed as required.

3.2 Each pipe bears a label showing the:

- name of the manufacturer
- company name
- product code(1)
- type of product — pipes unperforated, perforated, half perforated
- job/pack number
- operator
- length
- BBA logo incorporating the number of this Certificate.

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

3.3 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 is provided.

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

3.5 The pipes should be stored on a flat surface. Where they are 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) 100 mm to 900 mm Pipes and Couplers.

Design Considerations

4 Use

4.1 Ridgidrain (HDPE) 100 mm to 900 mm Pipes and Couplers, 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 the 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 a competent contractor experienced with these types of products, in accordance with BS EN 1610 : 2015.

6 Strength

6.1 The products have adequate robustness to resist the loads associated with installation, and with subsequent use in the situations defined in section 4.1.

6.2 For installation purposes, the pipes may be assumed to have a standard dimension ratio (SDR) equivalent of not greater than 26. The pipes have adequate resistance to the impact loads to which they may be subjected during installation and in service.

6.3 The pipes have a ring stiffness in excess of 6 $kN \cdot m^{-2}$ in accordance with BS EN ISO 9969 : 2016 and a creep ratio of less than 4 $kN \cdot m^{-2}$ in accordance with BS EN ISO 9967 : 2016, and have adequate resistance to static loads. Pipes of sizes 750 and 900 mm are also available in stiffness class SN4.

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 pipe will have the 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 designs, a value of 0.6 mm is generally used.

9 Resistance to chemicals

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

10 Maintenance

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

10.2 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 jetting systems. However, it is recommended that low pressure, high volume systems are used in accordance with BS EN 13476-1 : 2018, Annex D.

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 products will be in excess of 50 years.

12 Reuse and recyclability

The products are manufactured from polyethylene and polypropylene, which are recyclable.

Installation

13 General

13.1 Ridgidrain (HDPE) 100 mm to 900 mm Pipes and Couplers must be installed in accordance with BS EN 752 : 2017 and BS EN 1610 : 2015, 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 products must be protected against damage from construction traffic.

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

14 Procedure

14.1 The pipes are cut easily 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 backfill to maintain the line and level of the pipelines. If necessary, the pipe should be restrained to prevent uplift.

Technical Investigations

15 Tests

Tests were carried out and the results assessed to determine:

- dimensional accuracy
- ring stiffness to BS EN ISO 9969 : 2016
- creep ratio to BS EN ISO 9967 : 2016
- impact strength at 0 and 23°C to BS EN ISO 11173 : 2017 with a d25 striker of 1.0 kg mass
- leaktightness of joints to BS EN ISO 13259 : 2018, when subjected to diameter deflection and angular deflection
- resistance to longitudinal bending
- resistance to rodding
- insertion force (ease of jointing).

16 Investigations

16.1 An assessment was made of data relating to:

- chemical resistance
- flow capacity
- practicability of installation
- material properties
- resistance to rodding and jetting
- resistance to cyclic loading.

16.2 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 : 2017 *Drain and sewer systems outside buildings — Sewer system management*

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

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

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

BS EN 13476-1 : 2018 *Plastics piping systems for non-pressure underground drainage and sewerage — Structured-wall piping systems of unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE) — General requirements and performance characteristics*

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

BS EN ISO 580 : 2005 *Plastics piping and ducting systems — Injection-moulded thermoplastics fittings — Methods for visually assessing the effects of heating*

BS EN ISO 1133 : 2005 *Plastics — Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics*

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 : 2015 *Quality management systems — Requirements*

BS EN ISO 14001 : 2015 *Environmental management system — Requirements*

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

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

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.

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BBA APPROVAL INSPECTION TESTING CERTIFICATION
TECHNICAL APPROVALS FOR CONSTRUCTION

Agrément Certificate
89/2175
Product Sheet 1

RIDGIDUCT DUCTING SYSTEM

RIDGIDUCT TWIN-WALLED HIGH DENSITY POLYETHYLENE DUCTING

This Agrément Certificate Product Sheet[1] relates to Ridgiduct Twin-Walled High Density Polyethylene Ducting, for use as underground utility ducting for electricity, gas and water supply services, and for street lighting cables and fibre optic cabling for telecommunications.

(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 product has adequate strength to resist the loads likely to be encountered during service (see section 6).

Performance of joints — the joints in the product have an adequate degree of resistance to solid foreign objects and the ingress of water (see section 7).

Resistance to elevated temperatures — the product has adequate resistance to long-term deformation at elevated temperatures (see section 8).

Resistance to chemicals — the product has an adequate resistance to attack from chemicals likely to occur in soils and groundwater (see section 9).

Durability — when used in the context of this Certificate, the product will have adequate durability (see section 11).

The BBA has awarded this Certificate to the company named above for the product described herein. The product 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

B C Chamberlain

Claire

Date of First issue: 9 June 2016

Originally certificated on 28 February 1989

Brian Chamberlain
Head of Technical Excellence

Claire Curtis-Thomas
Chief Executive

Certificate amended on 10 August 2016 to update technical details.

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.

Regulations

In the opinion of the BBA, the use of Ridgiduct Twin-Walled High Density Polyethylene Ducting is not subject to the national Building 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 section: 3 *Delivery and site handling* (3.2) of this Certificate.

Technical Specification

1 Description

1.1 Ridgiduct Twin-Walled High Density Polyethylene Ducting comprises twin-walled high-density polyethylene (HDPE) ducting and polypropylene (PP) couplers.

1.2 The outer wall of the duct is corrugated and the inner wall is smooth-finished. Details and dimensions are given in Table 1 and Figure 1 of this Certificate.

Figure 1 Ridgiduct pipe

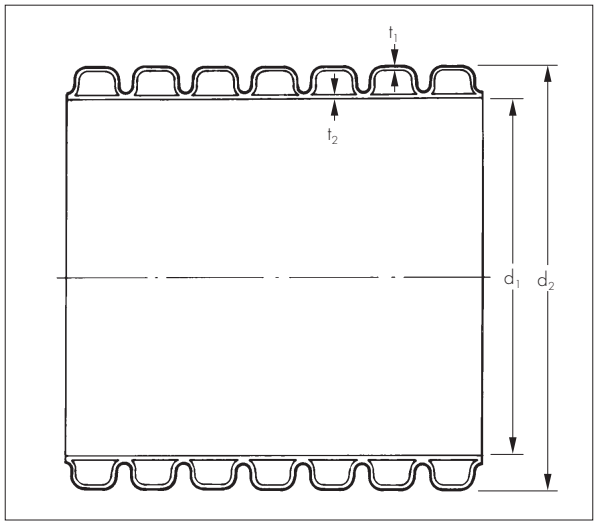


Table 1 Pipe dimensions

Manufacturer's code number	Internal diameter (d_1) (mm)	External diameter (d_2) (mm)	Thickness (t_1) (mm)	Thickness (t_2) (mm)	Length (L) (m)
RB 94	94	110	0.70	0.60	1, 2, 3 and 6
RB 100	100	118	1.00	0.80	1, 2, 3 and 6
RB 125	125	148	1.00	0.90	1, 2, 3 and 6
RB 150	150	177	0.90	0.95	1, 2, 3 and 6

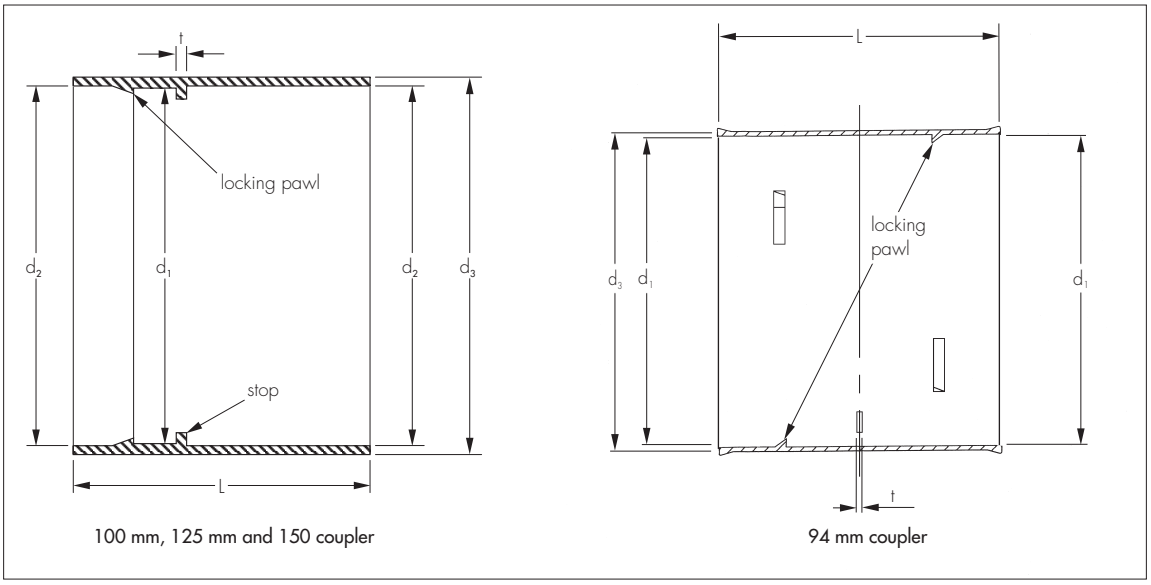
1.3 The ducts are available in black, purple, orange, green, blue, grey and yellow.

1.4 The couplers, which join the ducts, are supplied in black only. Details of coupler sizes are given in Table 2 and Figure 2. An optional sealed coupling is available from the Certificate holder.

Table 2 Coupler dimensions

Coupler (mm)	Internal diameter (d_1) (mm)	Internal diameter (d_2) tapered end (mm)	External diameter (d_3) (mm)	Length (L) (mm)	Thickness (t) (mm)
94	111.6	111.25	114.5	100.00	2.0
100	117.5	119.40	125.0	97.25	2.5
125	147.5	148.25	155.0	101.60	2.5
150	177.0	178.50	185.0	123.00	2.5

Figure 2 Couplers



2 Manufacture

2.1 The ducts are manufactured from HDPE by a twin-extrusion process. Two tubes are extruded simultaneously, one inside the other and heat-welded together in one continuous process.

2.2 The couplers are manufactured from PP using a conventional injection-moulding technique.

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 operated by the manufacturer are being maintained.

2.4 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 ducts are delivered to site strapped to pallets.

3.2 When used for electric cables, the ducts are marked with the legend 'electric cable duct'. The ducts are appropriately marked, in accordance with the customer's requirements.

3.3 The HDPE ducts and PP couplers have good resistance to UV degradation, but to avoid damage or deterioration in storage it is recommended that the ducts and couplers are protected from direct sunlight. If direct sunlight exposure is unavoidable, the following points should be considered:

- up to three months' daily exposure to direct sunlight will cause negligible UV degradation, but extreme surface temperatures of up to 80°C are possible on exposed surfaces and may cause some localised distortion
- three to 12 months' daily exposure to direct sunlight may have a significant effect on the impact resistance and physical properties of the duct
- over 12 months' daily exposure to direct sunlight will damage the ducts and couplers and must be avoided.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Ridgiduct Twin-Walled High Density Polyethylene Ducting.

Design Considerations

4 General

4.1 Ridgiduct Twin-Walled High Density Polyethylene Ducting, when installed in accordance with the recommendations given in this Certificate, is satisfactory for use as underground utility ducting for electricity, gas and water supply services, and for street lighting cables and fibre optic cabling for cable television and telecommunications.

4.2 The product has a smooth internal surface and a static coefficient of less than 0.22. The ducts and their joints do not present any internal projection or impedance to the installation or withdrawal of cables through the duct run.

4.3 When used with the optional sealed coupling and an elastomeric seal, Ridgiduct RB 94, RB 100 and RB 150 are suitable for applications as a sealed system with a rating of IP67 as given in BS EN 60529 : 1992.

5 Practicability of installation

The product is designed to be installed by utility contractors experienced with this type of product.

6 Strength

6.1 The product has adequate strength to resist the loads likely to be encountered during service, when used and installed in accordance with the recommendations given in this Certificate.

6.2 The product will have adequate resistance to the impact loads normally encountered during handling and installation. The product meets the resistance to impact requirements defined as 'normal duty' and the resistance to compression requirements defined as 'type 450' of BS EN 61386-24 : 2010.

6.3 The product has adequate resistance to long-term deformation. When tested in accordance with BS 4962 : 1989, the product has an ultimate pipe stiffness (STES) value in excess of 1400 $N \cdot m^{-2}$.

7 Performance of joints

Jointing of the ducts with the couplers produces a system with protection against penetration by solid foreign objects of 2.5 mm diameter or greater, ie an IP rating of 3 (first characteristic numeral) to BS EN 60529 : 1992 (see also section 4.3 of this Certificate).

8 Resistance to elevated temperatures

8.1 The maximum temperature which the ducts and couplers will be subject to in service as an electrical cable duct is dependent on the ground thermal conductivity, depth of burial, ground temperature and the heat load imposed by the electrical cable.

8.2 In general, cables with a surface temperature of up to 60°C will not affect the integrity of the product. For example, in a typical installation with a 300 mm^2 copper cable carrying a current of 600 amps imposing a heat load of 25 $W \cdot m^{-1}$, the cable would have a surface temperature of 60°C; this would result in a mean internal duct temperature of 45°C.

8.3 The product has adequate resistance to long-term deformation at an elevated temperature of 45°C.

9 Resistance to chemicals

The HDPE used to manufacture the duct and the PP used to manufacture couplers have an adequate resistance to attack from chemicals likely to occur in soils and groundwater. Details of the chemical resistance of HDPE and PP are given in D64/14117 DC.

10 Maintenance

As the product is buried and has suitable durability (see section 11), maintenance is not required.

11 Durability

When used in the context of this Certificate, the product will have adequate durability.

12 Reuse and recyclability

The components of the ducting system are manufactured from polyethylene and polypropylene, which can be recycled.

Installation

13 General

13.1 Ridgiduct Twin-Walled High Density Polyethylene Ducting must be installed as for the equivalent size of PVC-U pipes to ENV 1401-3 : 2001.

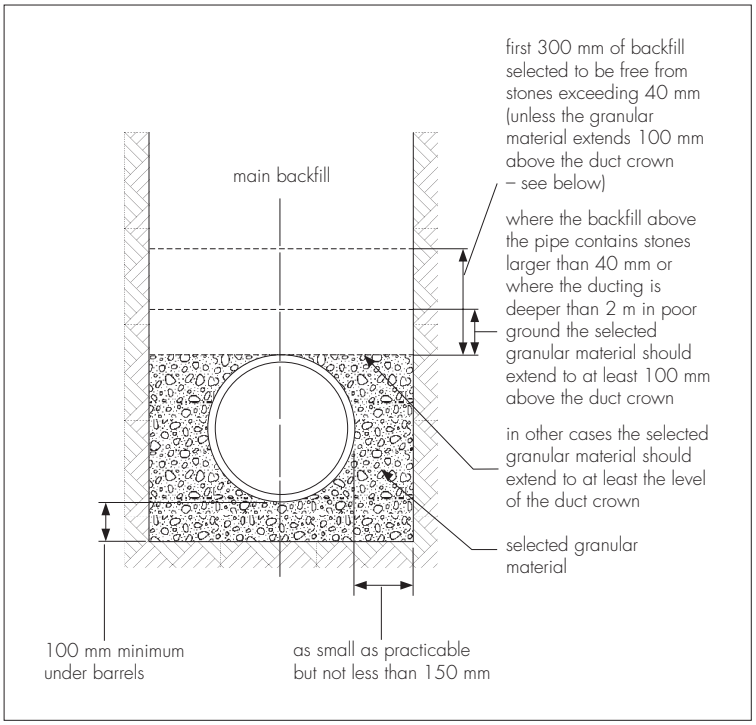
13.2 The duct must be adequately protected against damage from site construction traffic and from agricultural or similar operations.

14 Procedure

14.1 The trench is excavated to a depth of 100 mm below the invert level of the ducting, where a bedding of granular material is laid to a minimum depth of 100 mm.

14.2 After the duct has been laid, selected granular material should be placed evenly on both sides of duct up to the level of the duct crown. The backfill should be compacted in 300 mm layers (see Figure 4). Heavy compactors should not be used until the ducts have at least 300 mm cover. To aid compaction, suitable light vibration tampers may be used with discretion at any stage of the work.

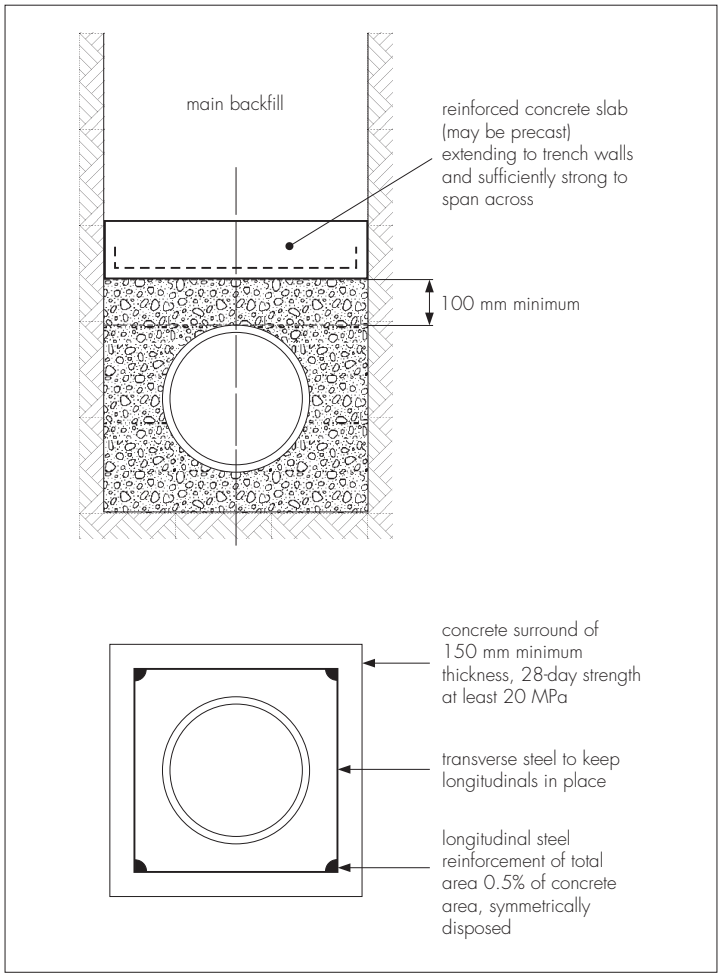
Figure 4 Bedding details for ducting in a narrow trench



14.3 When laid at depths of less than 0.6 m, the duct should be protected against risk of damage where necessary. This can be achieved by placing a layer of granular material not less than 75 mm, covered by a concrete paving slab.

14.4 When laid at depths of less than 0.9 m below a finished road surface, the duct should be suitably protected where necessary (an example is shown in Figure 5).

Figure 5 Bedding details for ducting laid at a depth less than 0.9 m below a finished road surface



14.5 Joints in the ducting are made by a simple push-fit of one duct length into the coupler attached to the adjacent length, ensuring that the connection is fully made.

14.6 Inspection joints can be made in the conventional manner, depending on the type of services to be installed.

Technical Investigations

15 Tests

Tests were carried out to determine:

- dimensional accuracy
- resistance to compression
- impact strength at –5°C
- Vicat softening temperature
- static friction coefficient
- visual examination
- adhesion of printing
- resistance to long-term deformation
- ease of jointing
- resistance to penetration of simulated sharp aggregate
- resistance to sharp objects
- watertightness of joints
- degree of protection against foreign objects
- creep ratio
- degrees of protection by enclosure.

16 Investigations

16.1 An examination was made of data relating to:

- chemical resistance
- heat dissipation
- effect of temperature
- practicability of installation
- material properties
- durability.

16.2 The manufacturing process was evaluated, including the methods adopted for quality control, and details were obtained of the quality and composition of materials used.

Bibliography

BS 4962 : 1989 *Specification for plastics pipes and fittings for use as subsoil field drains*

ENV 1401-3 : 2001 *Plastic piping systems for non-pressure underground drainage and sewerage — Unplasticized poly(vinylchloride) (PVC-U) — Guidance for installation*

BS EN 60529 : 1992 + A2 :2013 *Degrees of protection provided by enclosures (IP code)*

BS EN 61386-24 : 2010 *Conduit systems for cable management — Particular requirements — Conduit systems buried underground*

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

D64/14117 DC : *Pipework systems, Pipes, Pipe fittings, Thermoplastic polymers, Plastics, Polymers, Installation, Bending, Underground, Soils, Soil compaction tests, Chemical-resistance tests, Polyvinyl chloride, Unplasticized polyvinyl chloride, Polyethylene, Particle size distribution, Acrylonitrile butadiene styrene, Polyamides, Polypropylene, Pipe laying*

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.

British Board of Agrément
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Herts WD25 9BA

tel: 01923 665300
fax: 01923 665301
clientservices@bba.star.co.uk
www.bbacerts.co.uk

Certification

Job Reference Number:	**LM 264921**
Client:	**Travis Perkins/Keyline Ltd - Panattoni Park**

This certificate guarantees that the equipment detailed below has been installed and tested in accordance with the manufacturer's instructions and in line with the Environment Agency's Pollution Prevention Guidelines. The equipment has been demonstrated to be fully operational to the satisfaction of the customer/user.

Equipment Overview:	14320 Darcy Mains
Serial Number/s:	14320-2100424
Works Completed:	INSTALL/COMMISSION - IM ALARM
Site Address:	Unit 3 Panattoni Park Great Bank Road Wingates industrial Estate, Bolton BL5 3XU
Date of Attendance:	26/06/2024

Important Note: It is extremely important that any automatic alarm/ monitoring equipment is maintained every six months in order that it can reliably carry out its intended function. This is required within the Oil Storage Bill which covers bunded oil storage and Standard BS EN 858-1/2 for light Liquid Separators

If your equipment needs attention at any point please contact us directly on 01732 762338

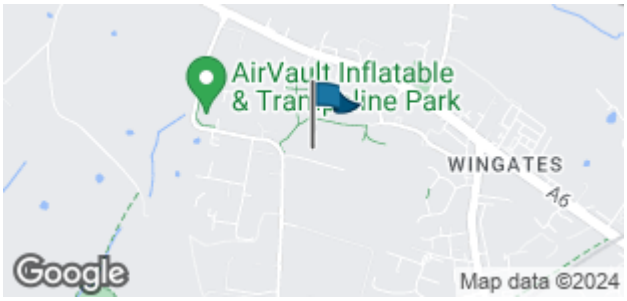
Darcy Group
Brook House Larkfield Trading Estate, New Hythe Ln,
Aylesford
ME20 6GN

INSTALL/COMMISSION - IM ALARM

Customer	TRAVIS PERKINS/KEYLINE LTD - PANATTONI PARK
Contact	Hugh Watkins
Address	Unit 3 Panattoni Park Great Bank Road Wingates industrial Estate Bolton BL5 3XU

Resource	ER07 Peter Ward
Job type	INSTALL/COMMISSION - IM ALARM
Reference	LM 264921
Order number	647406428
Date	26/06/2024 08:00 - 17:00
Job duration	09:00:00
Driving duration	03:14:08
Distance travelled	35.7 mi

Hugh Watkins



A Sheet Engineer Point of Work Risk Assessment		
	Answer	**Notes**
IS IT SAFE TO BEGIN WORK?	Yes	

A Tech IM Install Sheet		
	Answer	**Notes**
Are you able to begin the job?	Yes	
Do you need to carry out a pre works risk assesment?	Yes	

Darcy Group
Brook House Larkfield Trading Estate, New Hythe Ln,
Aylesford
ME20 6GN

Overview of works undertaken	Pre installed control panel inspected All wired correctly with the correct probe enabled Made terminations at the control panel for the probe Energised the panel and set service code Installed the probe at the interceptor chamber Made required terminations for the probe at the chamber Set probe to correct height within the chamber (this was outside the delivery tube as the bottom is not deep enough within the interceptor water level to ensure the probe stays in liquid) Panel and probe functions tested System operational
Unit locations What 3 Words	Panel located in warehouse Sticky.goals.fetch Chamber in yard Swung.bind.dirt
Product details and serial numbers	14320-2100424
confirm types of unit installed	14320 Darcy Mains
Is this a Solar GSM?	No
Have you entered a 12 month service code?	Yes
Have you marked manhole lids?	Yes
Have you used any additional parts?	Yes
Please ask your site contact to sign to accept the additional parts charges	Ben Childs

Darcy Group
Brook House Larkfield Trading Estate, New Hythe Ln,
Aylesford
ME20 6GN

Comments	This unit has a GSM white box fitted this has not been set up as the clients tenants for this unit have not yet moved in and will require a contract SIM card installing and the unit programming with the appropriate numbers once the sim is in place
Do you need to make a recommendation?	No
Do you need to return any parts to Birkenhead?	No
Are all works complete?	Yes

E Sheet Parts Used

	Answer	Notes
Parts Used From Van Stock List	PP/GCT_4700 Inline Joint	
Parts used other	0	

Darcy Group
Brook House Larkfield Trading Estate, New Hythe Ln,
Aylesford
ME20 6GN

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Brook House Larkfield Trading Estate, New Hythe Ln,
Aylesford
ME20 6GN

LM 264921_1

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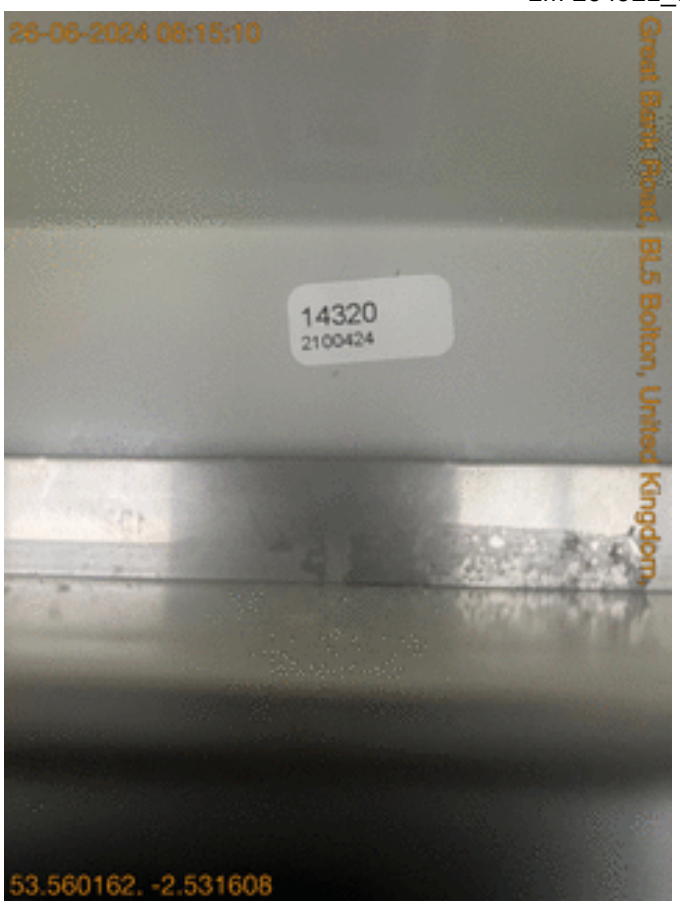
Aylesford
ME20 6GN

LM 264921_2

Darcy Group
Brook House Larkfield Trading Estate, New Hythe Ln,
Aylesford
ME20 6GN

LM 264921_3



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LM 264921_7

Darcy Group
Brook House Larkfield Trading Estate, New Hythe Ln,
Aylesford
ME20 6GN

LM 264921_8

Cleaning and Maintenance Regimes

N/A

Data Sheets

winvic

winvic.co.uk

NEXUS™
Structural Chamber

Sections

Assembled

Assembled with Cover

NEXUS™ is a unique patented twin wall access chamber system which comprises of high quality polypropylene modules that are assembled into ring sections prior to delivery. The system offers raising ring and duct entry ring sections as detailed. Each ring comprises male and female 'quick-click' connections enabling each to be quickly stacked in an array of arrangements thus allowing the positioning of duct entry sections to accommodate varying depths of ducting. For ducts exceeding the standard 64 mm and 114 mm diameter entry points, the raising ring can simply be core-drilled on site to accommodate all sizes of duct. On larger ducts it is recommended that raising ring sections are drilled for all duct entries in order to maintain structural rigidity.

Standard Sizes

Code	Clear Opening (mm)	O/all Dim (mm)	Raiser Ref	Duct Entry Ref	Bracing	Entry Points
NX3030	300 x 300	400 x 400	RP	DE		8
NX4530	450 x 300	550 x 400	RP	DE		10
NX4545	450 x 450	550 x 550	RP	DE		12
NX6045	600 x 450	700 x 550	RP	DE		14
NX6060	600 x 600	700 x 700	RP	DE	*	16
NX6767	675 x 675	775 x 775	RP	DE	*	16
NX7560	750 x 600	850 x 700	RP	DE	*	18
NX7575	750 x 750	850 x 850	RP	DE	*	20
NX9045	900 x 450	1000 x 550	RP	DE	*	18
NX9060	900 x 600	1000 x 700	RP	DE	*	20
NX9075	900 x 750	1000 x 850	RP	DE	*	22
NX9090	900 x 900	1000 x 1000	RP	DE	*	24
NX100100	1000 x 1000	1100 x 1100	RP	DE	*	24
NX12060	1200 x 600	1300 x 700	RP	DE	*	24
NX12067	1200 x 675	1300 x 775	RP	DE	*	24
NX12075	1200 x 750	1300 x 850	RP	DE	*	26
NX12090	1200 x 900	1300 x 1000	RP	DE	*	28
NX120120	1200 x 1200	1300 x 1300	RP	DE	*	32

Further sizes available in 25 & 150 mm increments

CHARCON
HARD LANDSCAPING

BRITISH STANDARD KERB AND EDGING

OHS 61759 FM 96927 EMS 96928

A range of kerbs, channels and edging as specified in the current version of BS EN 1340.

FEATURES

- Designed to provide edge restraint in pedestrian and vehicular applications
- Complies with British Standards
- British Standard kerb is a cost effective kerb for all applications.

MANUFACTURING STANDARD

British Standard kerb is manufactured using a wet pressed process and is manufactured in accordance with and complies with all relevant sections of BS EN 1340: Concrete Kerb Units – requirements and test methods.

Charcon Hard Landscaping fully operates an accredited Quality Assurance scheme, certified to BS EN 9001:2008 which is independently and regularly assessed by BSI (British Standards Institution). All Charcon manufacturing sites are also certified to BS EN 14001 Environmental Management Systems.

PERFORMANCE

UNPOLISHED: Unpolished slip resistance values, when tested in accordance with BS EN 1340, are available on request. All Charcon kerb units are classified as having a low potential for slip.

POLISHED: Polished slip resistance values can be provided on request.

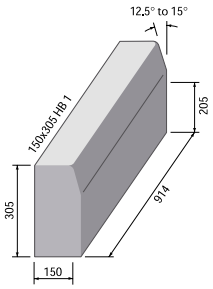
COMPLIMENTARY PRODUCTS

Designed for use with Charcon flag and block paving ranges.

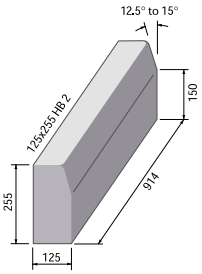
British Standard Kerb Product Data												
Unit Type	**HB1**	**HB2**	**HB2**	**HB3**	**BN1**	**BN2**	**BN2**	**BN3**	**BN3**	**SP2**	**SP2**	**SP3**
Length (mm)	914	914	609	914	914	914	609	914	609	914	609	914
Height (mm)	305	255	255	150	305	255	255	150	150	255	255	150
Width (mm)	150	125	125	125	150	125	125	125	125	125	125	125
Weight (Kg) approx.	100	70	46	40	100	70	46	40	30	60	40	30
Unit/m² (approx)	1.09	1.09	1.64	1.09	1.09	1.09	1.64	1.09	1.64	1.09	1.64	1.09
No. Per pack	14	18	18	18	14	18	18	18	24	18	18	24
m²/pack (approx)	12.84	16.51	10.98	16.91	12.84	16.51	10.98	16.91	14.63	16.51	10.98	21.9
Pack weight (T)	1.4	1.26	0.72	0.72	1.4	1.26	0.72	0.72	0.72	1.26	0.72	0.72
Colours	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey

HB - Half batter / BN - Bullnose / SP - Splay.

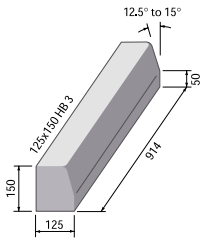
British Standard Edging Product Data									
Unit Type	**Flat Top**	**Flat Top**	**Flat Top**	**Bullnose**	**Bullnose**	**Bullnose**	**Round Top**	**Round Top**	**Round Top**
Length (mm)	914	914	914	914	914	914	914	914	914
Height (mm)	150	200	255	150	200	255	150	200	255
Width (mm)	50	50	50	50	50	50	50	50	75
Weight (Kg) approx.	15	20	30	15	20	30	15	20	40
Unit/m² (approx)	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
No. Per pack	40	20/40	20	40	20/40	20	60	20	12
m²/pack (approx)	36.56	18.28/35.56	18.28	36.56	18.28/35.56	18.28	55.05	18.28	11.01
Pack weight (T)	0.62	0.45/0.90	0.55	0.62	0.45/0.90	0.55	0.9	0.45	0.54
Colours	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey



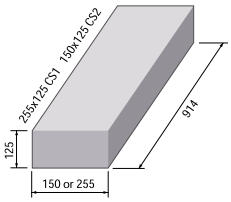
HB1 (98kg)



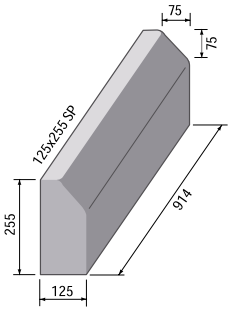
HB2 (64kg)



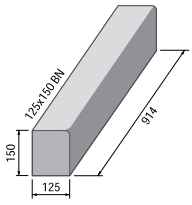
HB3 (38kg)



CS1 (71kg)
CS2 (41kg)



SP (63kg)



BN (40kg)

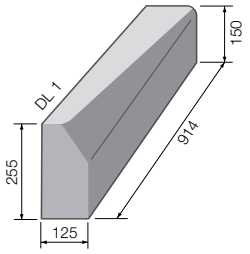
PRODUCT DATA

125x255mm HB – 125x150mm BN (LH) DL1
125x255mm HB – 125x150mm BN (RH) DR1
125x255mm SP – 125x150mm BN (LH) DL2
125x255mm SP – 125x150mm BN (RH) DR2
125x150mm BN As Crossing Kerb
125x255mm BN – 125x150 BN (LH) non BS
125x255mm BN – 125x150 BN (RH) non BS

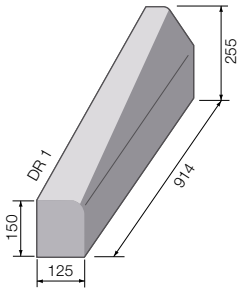
RADIUS DROPPERS BS:EN1340

125x255mm HB – 125x150mm BN (LH)
125x255mm HB – 125x150mm BN (RH)

Available in 4, 5, 6, 8 and 10 m.



DL1 (52kg)



DR1 (52kg)

RADIUS KERBS AND CHANNELS BS:EN1340

The table shown is an approximate guide only.

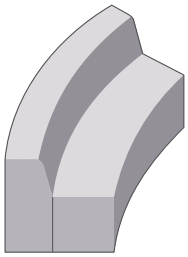
All radii over 15 m (40 ft) can be achieved by using standard 914mm (3 ft) or 609mm (2 ft) kerbs.

Before ordering, check availability of size and profile.

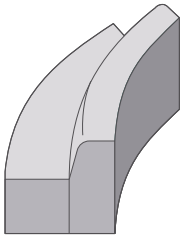
Also when ordering, please state the dimensions first, then the profile, then the radii followed by Internal or External, eg 125x150 BN 4 m ext.

APPROX NO. UNITS PER 1/4 CIRCLE

Size of radius (m)	Units per 1/4 circle
0.5	1
1	2
2	4
3	6
4	8
5	10
6	12
8	16
10	20
15	30



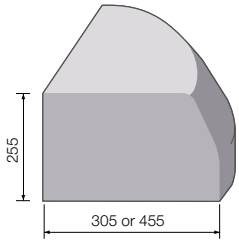
Internal Kerb External Channel



External Kerb Internal Channel

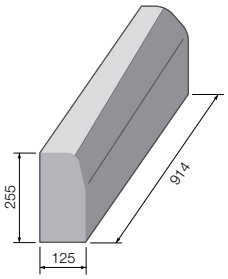
QUADRANTS BS:EN1340

305x255mm QHB
455x255mm QHB
305x255mm QSP
305x255mm QBN



TRANSITION KERBS BS:EN1340

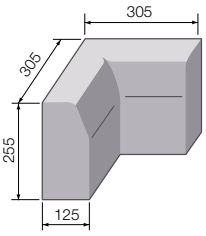
125x255mm HB RH –
125x255mm SP LH TR
125x255mm HB LH –
125x255mm SP RH TL



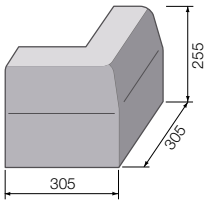
ANGLES BS:EN1340

125x255mm HB Ext Angle HBXA
125x255mm SP Ext Angle SPXA
125x255mm HB Int Angle HBIA
125x255mm SP Int Angle SPIA

IA (33kg)



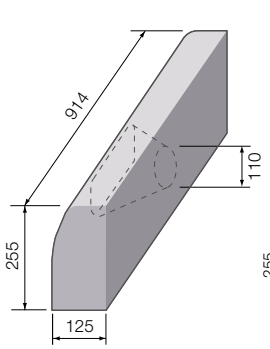
XA (33kg)



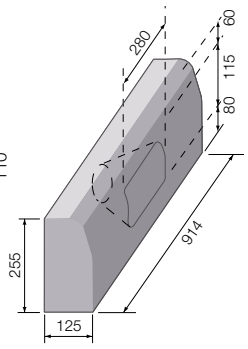
OFFLETS (WEIR KERBS)

Designed to allow surface water to be discharged through the opening in the face of the kerb to a 100mm pipe.

Available in Half Batter and Splay.



(56kg)



(56kg)

NON-STANDARD KERBS & CHANNELS

Subject to availability and minimum order quantity.

Kerbs
150x305mm BN
125x255mm BN
150x125mm HB

Scotland
150x175mm SP
150x175mm HB
125x175mm HB works order
125x205mm HB works order

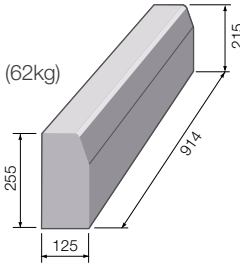
Channels
150x150mm CS
150x100mm CS

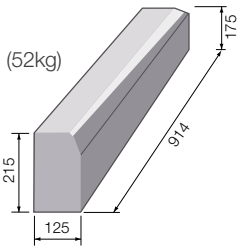
NON-STANDARD DROPPERS AND CROSSING KERB

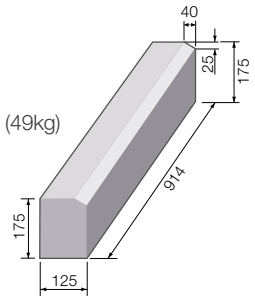
125x255mm HB – 125x175 SP* (LH) DL
125x255mm HB – 125x175 SP* (RH) DR
125x175mm SP* As Crossing Kerb

Double Pattern
125x255mm HB – 125x215 WRCC (LH)
Order Code WR1
125x215mm HB – 125x175 WRCC (LH)
Order Code WR2
125x215mm HB – 125x175 WRCC (RH)
Order Code WR3
125x255mm HB – 125x215 WRCC (RH)
Order Code WR4

* NB 25mm splay





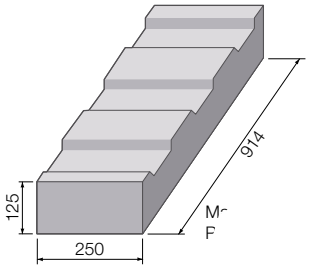


MARGINAL STRIPS AND MARKER CHANNELS

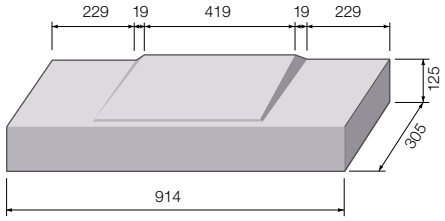
Marginal strips and marker channels, hydraulically pressed, are designed for motorways and other roads where raised kerbs are not used. They provide a visible marking and act as a rumble strip.

Available in straight lengths only.

Manufactured to order only.



Marker channel (68kg)
Patent No 853557



(84kg)

SUSTAINABILITY AND LOCAL SOURCING

ENERGY USE AND GREENHOUSE GAS EMISSIONS: Aggregate Industries is at the forefront of sustainability and has committed to reducing both energy and greenhouse gas intensity 5% year-on-year (18.5% total improvement by 2020).

RECYCLABLE: 100% of the product can be recycled thus reducing the amount of material that is sent to landfill.

MANUFACTURING LOCATION: Produced in the UK, with locally sourced materials under strict environmental and social legislation, for local supply.

RESPONSIBLE SOURCING: Aggregate Industries is the first company in the world to achieve accreditation to the BES 6001 Framework Standard for the Responsible Sourcing of Construction Products.

Aggregate Industries has achieved a 'Very Good' rating for major product groups. The BES 6001 standard assesses:

- Quality management
- Environmental management
- Health and safety management
- Greenhouse gas emissions
- Minimising raw material usage
- Labour practice
- Biodiversity
- Community engagement

KEY AGGREGATE AND RECYCLED CONTENT

British Standard kerb is manufactured using high quality, hard wearing locally sourced aggregates.

GENERIC GREEN GUIDE RATING*

Not applicable.

POLICIES

Aggregate Industries' policies on the environment and community, health and safety and sustainable solutions for different product applications can be viewed on our website www.aggregate.com.

DESIGN AND INSTALLATION STANDARD

For successful installation refer to BS 7533 Part 6. For specific design, installation and maintenance guidance, please contact our technical department on 01335 372222.

MAINTENANCE AND CLEANING

Aggregate Industries can supply on request advice on specific stain removal and general maintenance, suitable cleaning products and referrals to specialist cleaning companies.

COSHH DATA

Full COSHH data is available on request. Please call technical services on 01335 372222.

TECHNICAL SUPPORT

Detailed guidance and assistance with the preparation of specification of the Charcon range of hard landscaping products, including model clauses, is available through the sales office. A free technical design service is also available.

For further information, please refer to our technical services On 01335 372222.

*Ratings based upon generic green guide values (2009) supplied by BRE Global Ltd, www.thegreenguide.co.uk

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Aggregate Industries, Hulland Ward,
Ashbourne, Derbyshire DE6 3ET

Tel: +44 (0) 1335 372 222
Fax: +44 (0) 1335 370 074
Email: landscaping@aggregate.com
Web: www.charcon.com

A member of LafargeHolcim

BES 6001 Responsible Sourcing www.greenbooklive.com

AGGREGATE INDUSTRIES

cpm Drainage

CPM Perfect Manhole

Concrete for Life

Welcome to CPM Group

CPM is a market-leading manufacturer of precast concrete products with extensive production facilities across the UK. This combined with a network of specialist distributors, enables us to provide our customers with complete UK coverage.

The CPM business is built on a solid reputation for delivering quality products and providing a first class service. We supply a vast range of sustainable precast concrete products to every sector of the construction industry.

The construction industry's demand for fast, efficient, sustainable modular systems has led CPM to introduce a diverse range of precast off-site solutions which are designed, engineered and manufactured off-site, under factory conditions. There off-site solutions offer a real alternative to traditional on-site construction and include modular retaining walls, stormwater attenuation and control, water treatment and manhole innovation.

CPM – Innovation and diversification is the key to our success

As a leading innovator in the precast concrete arena, CPM has an ongoing and intensive research and development programme, headed by our experienced and dedicated product development team, who are at the heart of our precast operation. This ensures that our product range constantly evolves and provides imaginative solutions to our customers' requirements.

CPM – Concrete for Life

The CPM Perfect Manhole team is centrally based in the Midlands and is committed to offering excellent customer service throughout the lifecycle of a project – from beginning to end and work closely with CPM's Technical team who are made up of qualified engineers and are on hand to give advice on every aspect relating to our products and services and offer a complete design, engineering and technical support service.

BIM (Building Information Modeling), AutoCAD drawings, designs, calculations and installation advice are just some of the benefits we provide and all our design work is fully supported by professional indemnity insurance for peace of mind.

Please note that all weights and dimensions are correct at the time of publication and are subject to change. A copy of CPM's terms and conditions is available at www.cpm-group.com

+ Product Index

The Perfect Manhole System

After an extensive research programme, CPM introduced the 1200mm Perfect Manhole system in October 2009 to meet the challenges of modern day construction. Today it is available in 1200mm, 1500mm and 1800mm diameters and comprises of a monolithic precast concrete base (available pre-benched in any configuration within just days of requisition), a sealed chamber ring (with a thicker wall than a traditional ring), a rubber joint (so no tokstrip or similar product is required) and a sealed cover slab (supplied with your required access).

For other sizes please Telephone: 01538 380500 / Email perfect@cpm-group.com

This unique system of products combine to form the CPM Perfect Manhole system; designed and manufactured to last a minimum of 120 years that provides a sealed manhole system that gives up to 40% savings on green house emissions compared to traditional manhole construction and eliminates the need of ready mixed concrete to form the traditional base, chamber benching and further concrete to surround the manhole. A complete manhole can be installed in as little as 25 minutes, and making safe site practice a real winner when using the Perfect Manhole as it reduces the need to work in confined spaces and eliminates the need for wet trades resulting in rapid construction compared to traditional methods as well as a reduction in time for the excavation space to be open.

The Perfect Installation / Time Line

Attributes of the Perfect Manhole System

✓ Build Greener	Up to 40% lower greenhouse gas emissions
✓ Build Leaner	Saves material and labour / No waste
✓ Build Faster	Speedy installation
✓ Build Safer	No confined space working, excavation closed quicker
✓ Build Quality	CPM's Perfect Manhole is produced in a quality controlled factory environment

Quality of the Perfect Manhole System

- ✓ Perfect Manhole complies with BSEN1917:2002 and BS5911-3.
- ✓ CPM's Perfect Manhole is accepted for use by all major UK companies and is included in Sewers for Adoption 7th edition.

The long term benefits

- ✓ CPM's Perfect Manhole is made from high quality durable concrete with a minimum of 120 year design life.
- ✓ Easy access for inspection - reduces maintenance and running costs.
- ✓ Watertight Manhole – prevents water infiltration into the manhole system and ex-filtration of raw sewage or dirty water from the manhole into the surrounding area.

The Perfect Manhole take off tool / Configurator

Available from CPM's website www.cpm-group.com is the Perfect Manhole take off tool and configurator. Just input your 1200mm or 1500mm manhole details and email to perfect@cpm-group.com and CPM will send you back a complete schedule and costs for your project.

Advantages / Perfect Manhole System

- **Safer construction**
  No requirement to form a concrete surround. Reduction of open excavation.
- **GHG savings**
  Up to 40% savings on GHG emissions compared with traditional construction.
- **Fast installation**
  The modular solution eliminates the need for wet trades resulting in rapid construction compared to conventional methods.
- **No need to surround in concrete unless specifically required**
  130mm wall thickness.
- **Available at short notice**
  Our modern methods of production enables just in time delivery of all components including bases at short notice.
- **Watertight**
  The combination of a thicker wall and rubber joints ensures a watertight structure.*
- **No water ingress into sewerage network reduces treatment costs**
  The combination of a 130mm wall and sealed rubber joint withstand 5m head of pressure.*
- **Combined seal includes load distributor**
  Load distribution ensures even distribution of vertical loads.
- **Allows joint inspection**
  Correct installation can be visually confirmed.
- **Fully tested under factory conditions**
  The whole system from base to cover slab is subject to testing.
- **Kitemarked solution manufactured under factory conditions**
  Complies with the requirements of BSEN 1917 and BS5911-3
- **Concrete for life – built to last.**
  High quality durable concrete with a minimum 120 year design life.
- **Flexible connections**
  The Perfect Manhole can be connected to plastic, clay, cast iron or concrete - giving you a larger choice.

*Watertightness is defined in BS EN 1917 as resisting a 5m head for 15 minutes. This is to simulate a temporary surcharge condition not a permanent head of water.
*Shafts in high water tables are subject to buoyancy effects. For further information please contact the CPM Group Technical team.

Ticking all the boxes

- **Efficient construction**
  Available in varying depths for efficient construction.
- **Base options**
  Available pre-benched or plain bottom with or without inlet / outlets.
- **Pre-fit options**
  Hydro-Brake®, penstocks, non-return valves, and filters can be pre-fitted in the factory.
- **Customer choice**
  The perfect manhole is available with or without double steps. Sealed chamber rings can be used without the perfect base.
- **Cover choice.**
  Each perfect manhole is available with a cover slab opening of 600 x 600mm, 675 x 675mm, 750 x 600mm or 1200 x 675mm

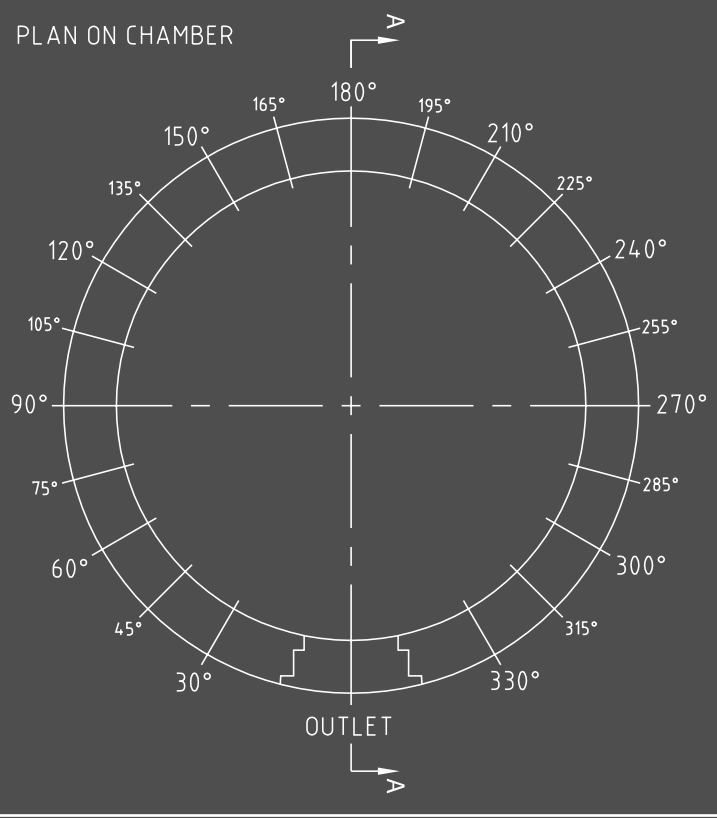
Extra Services

- **Full take-off service available.**
- **Lifting apparatus available for fast, effective and safe handling.**
- **Full installation guide available.**
- **Hydro-Brake® / Penstocks and valves can be pre-fitted.**

Available in 1200mm, 1500mm and 1800mm diameter
For other sizes please call 01538 380500 or Email perfect@cpm-group.com

Perfect Manhole / Diagrams

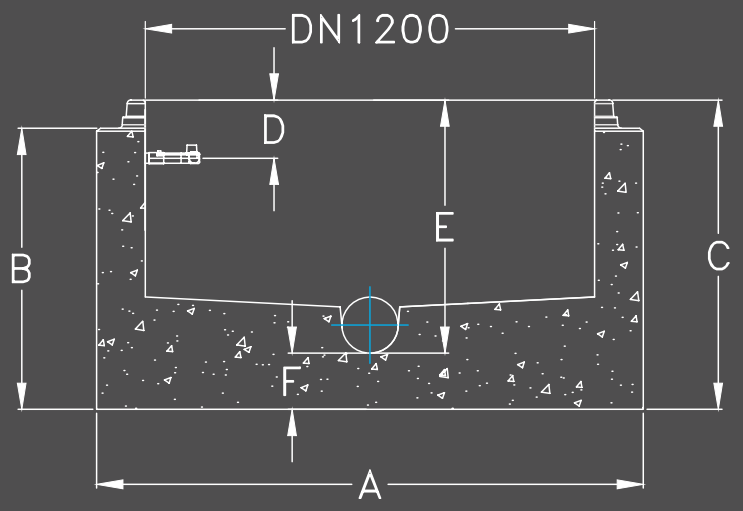
Customer		**Product Reference**	
Site		**Originator**	
Customers MH Ref			
Required fall across main channel (E1 To A0)			
Double steps position if Required (DEG)			
Outlet / Inlet Postions (DEG)	**Pipe Size**	**Gradient**	**Pipe Type**
Outlet - A0			
Inlet - E1			
Inlet - E2			
Inlet - E3			
Inlet - E4			



Please use this diagram to scan/photocopy and forward your requirements to perfect@cpm-group.com

Please note that there is a 1 in 9 gradient for the 1200mm perfect manhole and a 1 in 18 gradient for pipes 450mm upwards for the 1500mm perfect manhole and the angles between adjacent connection cannot be less than 24 degrees.

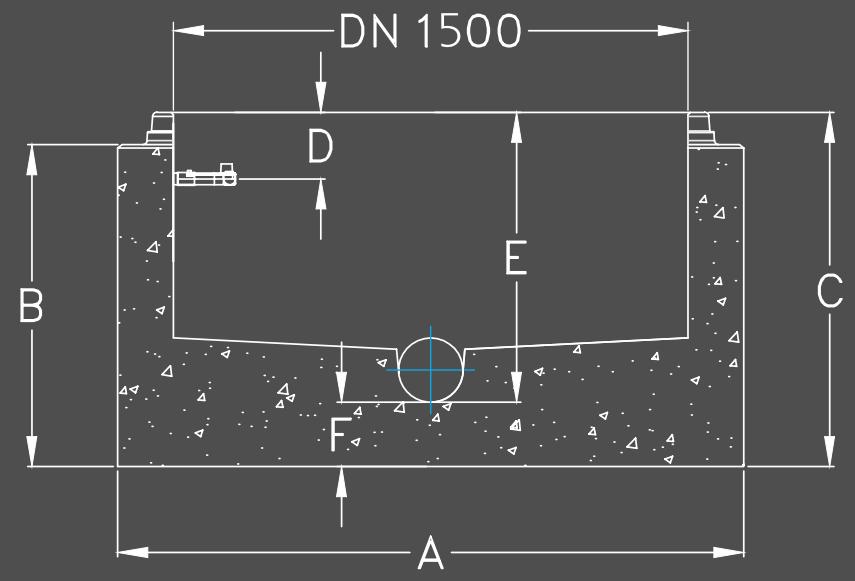
Perfect Manhole Dimensions / 1200mm



1200mm Standard Base Unit								
Dimensions	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**Weight/kg**
100 Diameter Outlet	1460	600	675	155	400	275	130	1820
100 Diameter Outlet	1460	675	750	155	475	275	130	1918
100 Diameter Outlet	1460	750	825	155	550	275	130	2016
150 Diameter Outlet	1460	600	675	155	450	225	130	1806
150 Diameter Outlet	1460	675	750	155	525	225	130	1984
150 Diameter Outlet	1460	750	825	155	600	225	130	2002
225 Diameter Outlet	1460	600	675	155	525	150	130	1753
225 Diameter Outlet	1460	675	750	155	675	150	130	1853
225 Diameter Outlet	1460	750	825	155	985	150	130	1951
300 Diameter Outlet	1460	675	750	155	600	150	130	1998
300 Diameter Outlet	1460	750	825	155	675	150	130	2096

1200mm chambers have a nominal fall of 20mm +/- 10mm north to south across the major incoming to outgoing inlets.
G=Wall Thickness. Please note that all weights and measures are approximate.

Perfect Manhole Dimensions / 1500mm



Typical Perfect Manhole Images

1500mm Standard Base Unit

Dimensions	A	B	C	D	E	F	Wall	Weight/kg
100 Diameter Outlet	1820	750	835	155	580	255	160	2900
100 Diameter Outlet	1820	825	910	155	655	255	160	3100
150 Diameter Outlet	1820	750	835	155	630	205	160	2900
150 Diameter Outlet	1820	825	910	155	705	205	160	3100
225 Diameter Outlet	1820	750	835	155	630	205	160	2900
225 Diameter Outlet	1820	825	910	155	705	205	160	3100
300 Diameter Outlet	1820	825	910	155	705	205	160	3100
100 Diameter Outlet	1820	900	985	155	730	255	160	3224
150 Diameter Outlet	1820	900	985	155	780	205	160	3195
255 Diameter Outlet	1820	900	985	155	780	205	160	3363
255 Diameter Outlet	1820	900	985	155	855	205	160	3514
300 Diameter Outlet	1820	900	985	155	780	205	160	3566
300 Diameter Outlet	1820	975	1060	155	855	205	160	3716
300 Diameter Outlet	1820	900	985	155	930	205	160	3867
375 Diameter Outlet	1780	975	1060	155	855	205	160	3772
375 Diameter Outlet	1820	1050	1135	155	930	205	160	3992
375 Diameter Outlet	1820	1125	1210	155	1005	205	160	4072
450 Diameter Outlet	1820	975	1060	155	855	205	160	3835
450 Diameter Outlet	1820	1050	1135	155	930	205	160	3985
450 Diameter Outlet	1820	1125	1210	155	1005	205	160	4135
450 Diameter Outlet	1820	1200	1285	155	1080	205	160	4522
525 Diameter Outlet	1960	1050	1135	155	930	205	230	5039
525 Diameter Outlet	1960	1125	1210	155	1005	205	230	5264
525 Diameter Outlet	1960	1200	1285	155	1080	205	230	5489
600 Diameter Outlet	1960	1125	1210	155	1005	205	230	4950
600 Diameter Outlet	1960	1200	1285	155	1080	205	230	5362
600 Diameter Outlet	1960	1275	1360	155	1155	205	230	5587
675 Diameter Outlet	1960	1125	1210	155	1005	205	230	5035
675 Diameter Outlet	1960	1200	1285	155	1080	205	230	5260
675 Diameter Outlet	1960	1275	1360	155	1155	205	230	5485
675 Diameter Outlet	1960	1350	1435	155	1230	205	230	5710

1500mm chambers have a nominal fall of 25mm +10mm/-13mm north to south across the major incoming to outgoing inlets. G=Wall Thickness. Please note that all weights and measures are approximate.

Perfect Manhole System / 1800mm

After the successful introduction of the 1200mm and 1500mm perfect manhole system, CPM has developed an 1800mm sealed manhole that can be used for precast concrete pipes up to 900mm diameter.

The system includes a cast-in base and incorporates the concrete butt pipes into the chamber base and pipe channel; this only leaves the benching to be completed on site.
By leaving the benching out of the base element, the weight of the unit is reduced to between 5.0 and 5.5 tonnes depending upon the configuration.

Deeper manholes are accommodated by using a reducing slab to a 1200mm sealed manhole.

The 1800mm Perfect Manhole system can be supplied with either double steps or with an integrated ladder system which is available from CPM.

As the 1800mm sealed manhole system is a bespoke precast product, standard measurements cannot be given as each is individual.

For further information please call 01538 380500 or email perfect@cpm-group.com

Typical Perfect Manhole Images

Perfect Manhole / Rings

Perfect Manhole Ring / Typical Weights	
1200 Dimensions / mm	**Weight / kg**
1200 x 1000	1180
1200 x 750	890
1200 x 500	590
1200 x 250	300
1500 Dimensions / mm	**Weight / kg**
1500 x 1000	1730
1500 x 750	1330
1500 x 500	860

Perfect Manhole / Cover Slabs

Perfect Manhole Cover Slab / Typical Weights / kg				
Dimensions	**600 X 600**	**675 X 675**	**750 X 600**	**1200 X 675**
1200	675	600	600	470
1500	1170	1120	1120	960

Please note that all weights and measures are approximate.

CPM Perfect Installation Guide

Introduction

This guide offers advice on how to install the CPM Perfect Manhole system incorporating a load bearing elastomeric seal known as a ‘sealed manhole’ system.

The system provides a manhole whereby all joints and connections have elastomeric seals enabling a watertight manhole to be constructed quickly and easily with the minimum of site work.

Manholes are consequently installed in a similar manner to pipes requiring a different technique to traditional manhole construction.

The wall thickness being over 125mm means that the installed manhole does not require a concrete surround unless specified by the client.

The system is Kitemarked to BS EN 1917 and BS 5911-3 and the 1200mm diameter Perfect Manhole is CE Marked.

For further information on this please visit: www.cpm-group.com/quality

Components

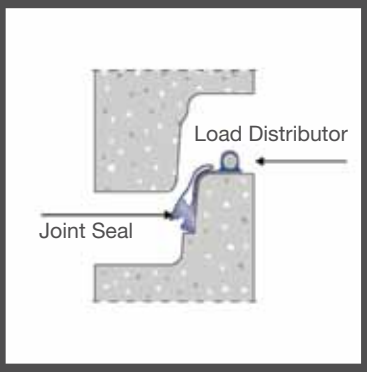
A perfect manhole system will typically comprise of a combination of the following standard elements.

Base units - Base units shall comprise of the following:

- Chamber unit depth dependant on manhole diameter and channel diameter
- The base depth varies to obtain the correct overall height
- Joint on chamber unit designed to utilise a load bearing elastomeric seal
- Integral base to give a watertight unit
- Channel and benching formed by CPM or on site subject to customers requirements
- Double steps fitted if required
- Formed or cored holes for jointing to inlet/outlet pipes with seals

Shaft Units

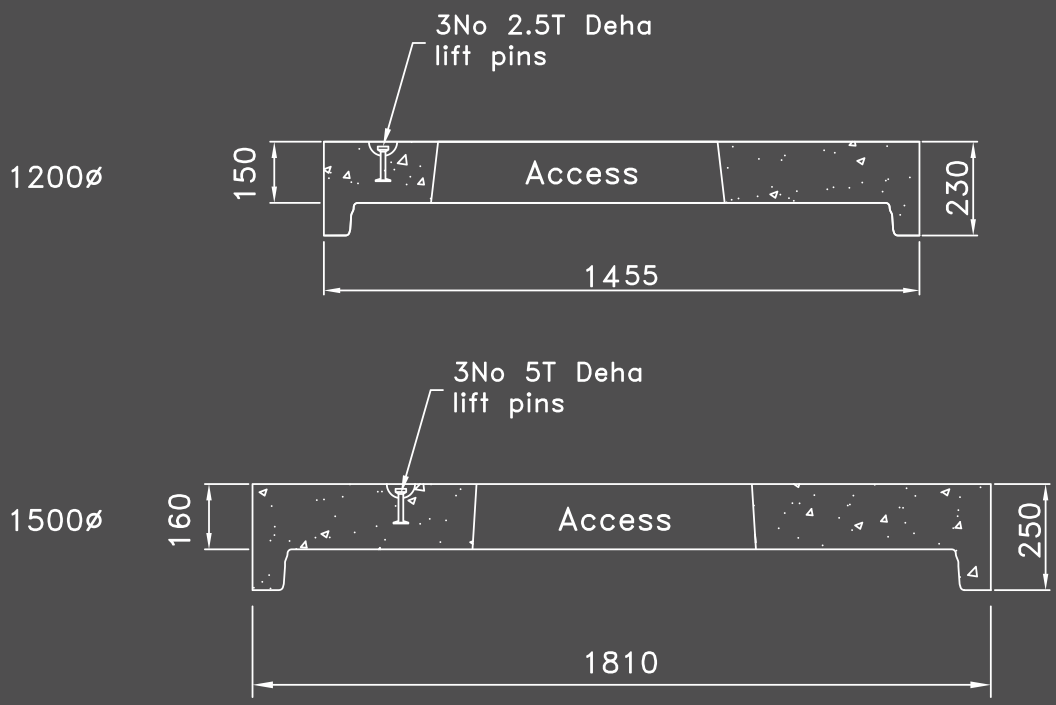
- Shaft unit with spigot and socket joint with the seal fitted
- Units can be supplied with or without double steps
- The Integrated ladder system is also available with the sealed manhole system.



Seal references are Forsheda F-171 or DS SDVSEAL, manufactured to BS EN 681-1 type WC. Actual size is dependent on manhole diameter.

Elastomeric Seal

Cover Slab Drawings



In a 1500mm diameter, the cover slab maybe supplied with an integral 250mm shaft to obtain the correct overall height

Offloading and Lifting

CPM is able to offer advice and recommendations for offloading products on site and assist in the preparation of a safe delivery plan in accordance with the HSE document ‘Delivering safety: co-operating to prevent workplace vehicle accidents’.

Weights will be given on the General Arrangement drawing.

CPM recommends that ALL lifting operations should comply with the Lifting Operations and Lifting Equipment Regulations (LOLER) 1998, and the Provision and Use of Work Equipment Regulations 1998 (PUWER).

The lift system is of a ‘Deha’ style incorporating a cast-in lift pin on to which a lifting clutch is attached for lifting. CPM can provide a set of three way lifting straps into which the lifting clutches are fixed. The lifting straps are supplied for sale and are fully certified.

More information is available at www.cpm-group.com

1) The lift clutch is attached to the lift pin by lowering the clutch slot over the lift pin and rotating the tab until it rests on the concrete surface, with the tab facing the direction of the lift

2) Correctly attached lift clutch

3) Three way straps with protective sleeves

Assembly

Normal considerations should be taken into account when assessing the suitability of the formation. The manhole can be built off either:

- Minimum 150mm pipe granular bedding material being 5-20 graded, 14, 20, 40mm single size suitably compacted to provide a level base.
- 150mm GEN 1(C8/10) concrete. Base unit should be placed whilst concrete is wet so it can be set level otherwise a levelling screed of 15- 20mm sand cement will be required to prevent point loading on the base unit.

Note: In poor or wet ground conditions a concrete pad is advised.
Normally a granular bedding is recommended where the safe ground bearing pressure >200kN/m^2.

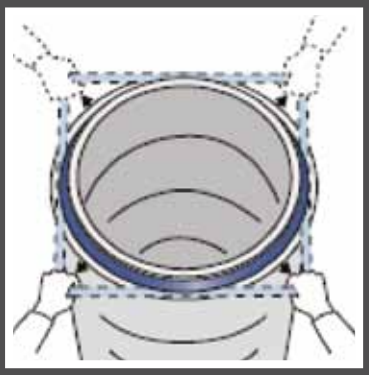
Seal Installation

The seal is ideally positioned on the base unit before it is in the excavation in the following manner

Stretch the seal onto the spigot of the manhole and position it against the shoulder. Make sure the load distributor (the circular part) is located on the upper surface of the spigot.

Load distributor

Check that the internally lubricated skin is correctly positioned and sitting against the rest shoulder.



Equalise the stretch in the seal by lifting at several points.

Note: External lubrication is not required

Shaft Construction

Once the bedding has been prepared, the base unit can be positioned. It is advisable to lay the pipeline up to and including the rocker pipe on the downstream side. A butt pipe should then be inserted in to the outlet pipe seal on the base unit.

The unit can then be jointed with the rocker pipe as it is finally positioned in the excavation. A final level check should be carried out. The base unit can then be backfilled with granular pipe bedding around the pipes and suitable material around the shaft.

The remainder of the shaft can then be constructed by centring the upper manhole section, and lowering into place. The design of the joint encourages 'self centring'. For ease of installing it is advisable to backfill the shaft as it is built. This provides ease of access to unhook the lift clutches and to guide the units into position.

A joint gap of between 10-20mm should be obtained after jointing. This gap may reduce as the shaft is constructed dependant on the depth to the minimum 5mm. 250mm deep rings may require slight downward pressure to joint. The cover slab can also be laid using the same lifting system.

The slab may need slight vertical downward pressure to seal the unit as the self-weight may not always be sufficient.

Pipe Jointing to Perfect Manhole bases

Perfect Manhole bases are supplied with inlet/outlet seals specifically for the pipe being used. The bases will be delivered with the seals set in the base wall. The connection is dependant on the pipe type as per pages 20 and 21.

'Sewers for Adoption' requires a flexible joint as close as possible to the manhole face for movement. The base joint can be considered as this joint however it is still advisable to provide a short length butt pipe acting as the rocker pipe and of the same length as would normally be provided. This arrangement then provides two flexible joints for all connecting pipes as required by Sewers for Adoption.

General

- All pipes to be jointed into the perfect manhole should be cut square with all sharp edges removed and where necessary chamfered.
- All pipes and F-910 seals fitted to the perfect base, should be lubricated with CPM Pipe Jointing Lubricant.
- All pipes should be centred and pushed squarely in to the F-910 seal until an even joint gap is achieved.
- It may be necessary to utilise mechanical means such as an excavator bucket. In which case a timber should be placed against the pipe to prevent damage to the pipe.
- If for any reason the F-910 seal has to be removed, when it is replaced, locate the seal back in to the hole without lubricant.
- Care should always be taken to prevent soil and stones from entering the joint.
- A joint gap of between 5-15mm should be obtained between the end of the pipe and the concrete channel.
- An even joint gap should be achieved.
- The permitted deflection on the pipe / base joint is 2 degrees.
- The provision of a short length 'butt' pipe is advised particularly with flexible pipelines.

Concrete Pipelines

- A CPM socket butt at the upstream and a spigot butt at the downstream end are required. Note: The joints are designed primarily for CPM concrete pipe diameters and to ensure a correct joint, CPM pipes must be used. Other manufacturer's pipes can still be used for the rest of the pipeline as the joints are compatible.
- Using CPM pipe lubricant, thoroughly grease the seal and butt end of the pipe.
- The pipe can now be jointed into the base. A 5-20mm joint gap should be achieved between the end of the pipe and the benching face.

Clay/Solid Wall PVC Pipelines

- Cut and chamfer the pipe prior to jointing.
- Clean and lubricate the pipe end to be jointed.
- Care should be taken to ensure the pipe is not damaged during mechanical jointing.
- The pipe can then be jointed directly into the F-910 seal.

Twinwall up to and including 300mm diameter Pipelines

- Cut and remove all sharp edges prior to jointing. Ensure the pipe is clean.
- Locate the twinwall seal into the pipe groove as per the manufacturer's instructions. Note: This may vary between manufacturers.
- Lubricate the F-910 seal, the twinwall seal and the rib of the twinwall pipe prior to jointing.
- Care should be taken to ensure the pipe is not damaged during mechanical jointing.

Ultra-Rib / Ultra Fortis Pipelines

- Ultra-rib and Ultra Fortis are jointed using an adaptor coupler.
  The pipe end is prepared in accordance with manufacturers recommendations
- Place the ring seal between the 2nd and 3rd ribs from the spigot end.
- Make sure the ring is correctly seated and is not twisted.
- Apply lubricant to the ring seal and adaptor.
- Push the spigot into the adaptor until it is fully engaged.
- Apply lubricant to the seal set in the Perfect Manhole base unit and push home the pipe and adaptor. Alternatively the adaptor can be pushed into the base first.

Twinwall 375 to 600mm diameter Pipelines

- This range of pipe joins into a 1500mm Perfect Manhole and utilises a twinwall double socket coupling.
- The coupling has to be split into two separate socket ends each with a butt end.
- A sealing ring is placed on the end of the pipe in accordance with manufacturers instructions.
- The pipe is firstly jointed into the split double socket coupling.
- The split double socket coupling and base seal are greased.
- The pipe together with the spilt coupling can be jointed into the base seal.

Backdrop Manholes

Provide B12 dowels at 150 centres vertically either side of the vertical pipe, set into the shaft wall with epoxy resin. The dowels are to be set into the wall a maximum of 75mm to ensure sufficient cover to the dowel on the internal face. The vertical pipe can then have a concrete surround as detailed in B.15 of Sewers for Adoption 7th Edition and a monolithic structure will be achieved.

Note:

The Installer is to ensure that the connecting pipe is within the manufacturers specifications. The Perfect Manhole base seals have been specifically designed to ensure a watertight seal and operate within the tolerance of the pipe. Should the outside diameter of the pipe be out of the specified tolerances, CPM Group cannot accept responsibility for the performance of the joint.

Jointing in extreme cold weather

When jointing lateral connections into the Perfect Manhole bases in extreme cold conditions, the F-910 seals should be brought back to temperature by placing the seals either in the excavator cabin or in on-site canteen etc.

Then follow below

- Ensure that the hole for the seal is clean, dry and frost free.
- The F-910 connector seal should be installed into the hole without lubricant.
- Lubricate the connecting pipe and the sealing lips of the F-910 seal with CPM lubricant for concrete pipes and suitable lubricant for other materials.
- Centre the end of the pipe and push it into the seal until fully home.


IN

Concrete for Life

Complete UK Coverage

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NORTHERN WORKS
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East Riding of Yorkshire, DN14 0DU
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Wishaw, Lanarkshire, ML2 9BG
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BGTIG1.5.3 | MAR 2022

Below Ground Drainage



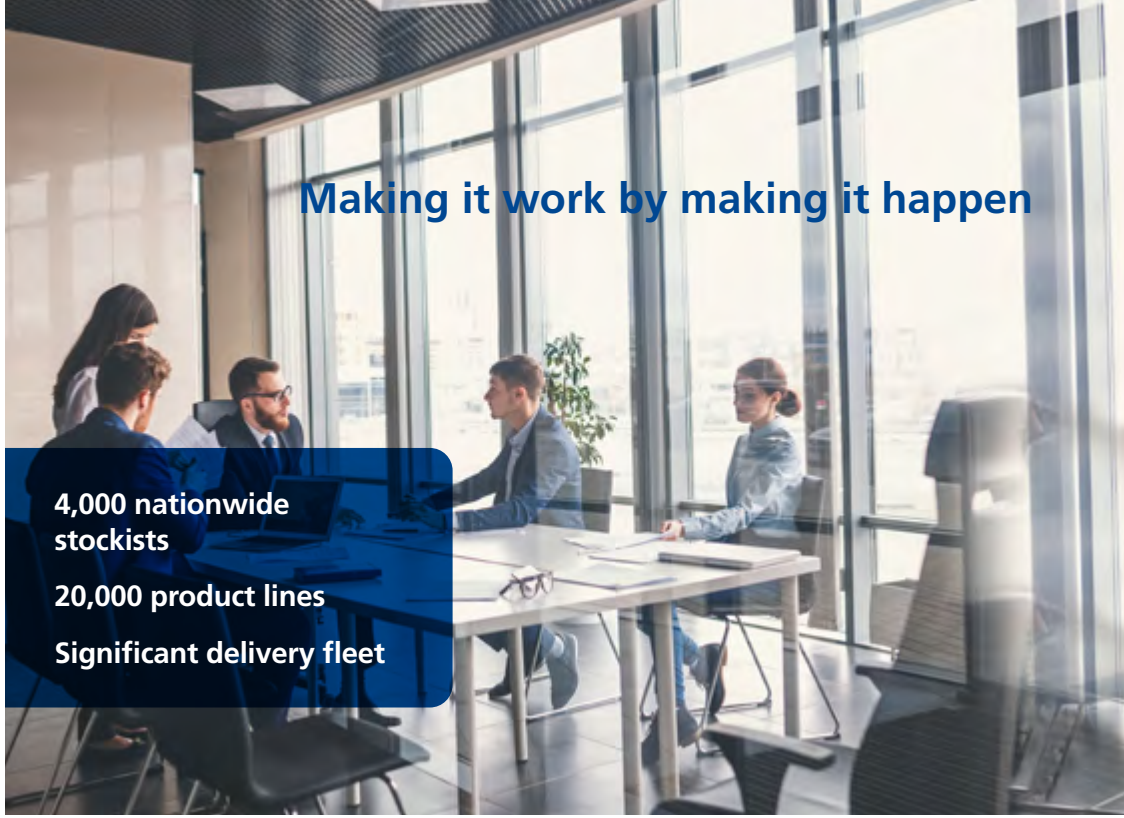



Technical Installation Guide

Part of the GENUIT GROUP

Polypipe Building Products

Contents



Making it work by making it happen

4,000 nationwide stockists

20,000 product lines

Significant delivery fleet

Since creating our very first plastic pipe back in 1980, there's been a passion within us to support the industry at every stage of its growth. We are invested in its future and look forward to facing the challenges together, both from an economic and sustainability point of view. This is why we invest heavily in innovation and manufacturing techniques – to enable us to establish more inventive solutions, such as our new soil, waste and traps systems and processes.

Our customer service centres also benefit from significant investment, to provide you with the best possible service. You can be sure we have got a team on hand to help; from research and development to technical and design support. The expert knowledge of our Sales and Business Development support teams can help get you on the right track from day one.

With manufacturing facilities across Doncaster, together with the stock levels we hold, we have the capability to deliver the solutions you need to complete your projects on time and in full.

Investing to stay ahead

Without investing in new technology, new ideas and fresh talent, we'd never be able to deliver the products and systems to help you move forward and help overcome construction challenges.

By making this investment in new construction methods and technology, we can make advancements within our product ranges, helping to make installation easier, quicker and safer. Advancements that provide the end-user with peace of mind and that allow you to simply fit and forget.

The scale to deliver

Whether for new build or refurbishment projects, Polypipe specifically recognises the demands of modern construction environments, and works across all disciplines to help you get the job done.

Over 20
Research & Development Technicians

Over 2,200
Manufacturing and Support Services

Over 70
Design, Heating and Ventilation Engineers

Over 120
Dedicated Technical Support Engineers

Over 200
Sales and Business Development Managers

The number and size of our manufacturing facilities, together with recent investment in our own delivery fleet allows us to deliver the confidence you need to ensure your projects are completed on time, in full and to the highest quality.

We have over 20,000 product lines, giving you a choice of materials and installation methods to complete your system, from plot drainage through to plastic plumbing. We are stocked in over 4,000 merchant branches nationwide, so you're sure to find the product you need close at hand.

Not just bigger… better

We also have teams of specialists who work together with you to help design a system that fits your scheme exactly, ensure your project runs smoothly and everything meets the necessary regulations.

As we're well networked with all the necessary trade associations and regulatory bodies, working with us means you'll have access to regular important updates on legislation and new industry developments.

To ensure you get the right service, the most relevant product and the most cost-effective system for your project, we've over 1,200 experienced individuals supporting you from start to finish, whatever the size of the job. As technology and innovation become a bigger part of our lives and indeed our working environments, our experts work together with you to design a system to ensure projects run smoothly and meet all the necessary regulations.

Our Customer Experience teams, Business Development Managers and Area Sales Managers are available at every stage of your project, support is always there for whenever you need it.

National sales team with local knowledge

Multisite manufacturing

2,500 tonnes of products delivered each week

On average 50,000 order lines per day

One of the UK's largest privately-owned delivery fleet

4,000 stockists nationwide

	Product	Certificate No	Kitemark Licence
Drainage	Plastic Piping Systems for non-pressure UG Drainage & Sewer	KM 583143	BS EN 13476-2
	110mm-160mm UG Gravity Drainage & Sewer	KM 59284	BS 4660:2000
	PVCu Plastic Piping Systems for non-pressure UG Drainage & Sewer	KM 06383	EN 1401-1
	Ductile Iron Covers and Frames	KM 583718	BS 124-2
	Plastic Inspection Chambers for Drains and Sewers	KM 061546	BS 7158
	Plastic Pipe Fittings and Shallow Inspection Chambers	KM 585205	BS EN 13598-2
	150mm - 300mm Structured Wall Pipe	KM 583143	BS EN 13476-3
	Structured Wall Pipe and Couplers	KM 582885	WIS 4-35-01
	Shear Band Couplings	KM 506831	EN 295-4
	EPDM Rubber	KM 506832	WIS 4-41-01
	EPDM Rubber	KM 37955	EN 681-1

Product	BBA Certificate No
Underground Drainage Couplings & Adaptors	89/2206
Underground Drainage Gullies	89/2206
Polyrib Drainage Fittings	89/2206
460x610mm Rectangular, 320mm and 460mm Inspection Chambers	89/2206
150mm - 300mm Polysewer Fittings	02/3923

	Product	Certificate No	Kitemark Licence
Water Supply	Water Supply under-pressure Water Pipes	KM 85017	EN 12201-2
	Polyfast Polyethylene Compression Fittings	KM 85017	WIS 4-32-11
	Polyguard Barrier Pipe & Fittings	KM 692343	BS 8588

Product	WRAS
Water Supply	1704501 & 1706501

	Product	Certificate No	Kitemark Licence
Utilities	Polyethylene pipe and fittings for natural and manufactured gas	KM 611619	GIS/PL 2-2:2008

BS EN 13476-2 KM583143 · BS 4660:2000 KM59284 · EN 1401-1 KM06383 · BS 124-2 KM583718 · BS 7158 KM061546 · BS EN 13598-2 KM585205 · WIS 4-35-01 KM582885

EN 295-4 KM506831 · WIS 4-41-01 KM506832 · EN 681-1 KM37955 · EN 12201-2 KM85017 · WIS 4-32-11 KM85017 · BS 8588 KM692343

Promoting recycling

We produce pipes and fittings using recycled materials where appropriate, and all products are 100% recyclable at the end of their useful life. Following a major investment programme and the commissioning of a polymer reprocessing plant at Horncastle, we are now one of the UK's largest processors of post-consumer waste. The plant has increased our ability to make use of reprocessed materials, recycling pre-sorted bales of household plastic polyethylene waste to produce high quality materials for our products.

In 2018, Polypipe recycled 44,700 tonnes of plastic, of which 17,500 tonnes came from recyclable plastic bottles and containers. As such, recycled plastic accounted for 75% of the raw material consumed by our Civils and Green Infrastructure Division in 2017, to produce pipes that were destined to be buried in the ground in applications that will manage and treat rainwater and stormwater.

Sustainable Multi-layer pipe

Polypipe Building Products MLRC pipe incorporates a number of industry leading improvements which includes certification to stiffness class SN8 to meet the requirements for adoption. It also carries the BS EN 13476-2 kitemark, so you can be assured that it meets the highest quality standards. Our sustainable Multi-layer pipes have identical dimensions, chemical resistance and life expectancy to pipes manufactured to BS EN 1401.

Plot Drainage Systems

Developed and manufactured with quality, innovation and longevity in mind, Polypipe Building Products' plot drainage systems is the most comprehensive range in the UK residential drainage market. Manufactured to meet market specification, Polypipe's 110mm - 160mm smooth wall systems are BSI Kitemarked™ or BBA approved, ensuring you are using high quality products.

Our plot drainage is available in 110mm and 160mm, complemented with a vast range of fittings and accessories all designed to enhance your experience with our products, ensuring you have the right products for the job.

However, none of these advancements are at the expense of the environment. Polypipe has invested heavily in technology which allows us to use more recycled materials in our products and systems, while still ensuring compliance with stringent Kitemark™ standards. This is evidenced by our recycled core drainage pipe, which has at least 50% recycled material at its core.

Underground Drain - PVCu

Polypipe Underground Drain - PVCu system is designed and manufactured with strength and durability in mind. Featuring a wide range of bends, junctions, gullies and other ancillaries, the range covers all project needs.

- Manufactured out of a durable PVCu offering durability and longevity.
- Kitemarked to BS EN 13476-2, BS 4660:2000 and BS EN 1401-1.
- Available in sizes 3"/82mm, 4"/110mm and 6"/160mm.

Pipe Riser Inspection Chambers

The Polypipe 450mm Pipe Riser Inspection Chamber gives complete flexibility, providing easy access for inspection, cleaning and maintenance in sewer and drainage systems in traffic and non-traffic areas.

- Suitable for both adoptable and non-adoptable applications.
- Versatile and available with inlets for 150mm Polysewer or 110-160mm Underground Drainpipe.
- High strength single piece 450mm Ridgisewer SN8 riser.
- Kitemarked to BS EN 13598-2.

Inspection Chambers, Covers & Frames

- Manufactured from Polypropylene.
- Kitemarked to BS EN 13598-2 and/or BS EN 124-2.
- Covers and frames available for intensity of traffic in either Class A15 or B125 applications.
- Range of frame depths up to 70mm (UG520).
- Ductile Iron Covers and Frames are kitemarked to BS EN 124:2015.

Channel and Slot Drain

- Discreet, flush-fitting design.
- Engineered polypropylene for strength and durability.
- Simple slot construction for fast installation.
- Fits to standard 110mm underground plastic pipe.

Polysewer Gravity Sewer System

- Kitemarked to WIS 4-35-01, BS EN 13476-3 and BBA Approved.
- Compliant to Sewerage Sector Guidance for England, Sewers for Scotland, and the Welsh Minister Standards for Sewers.
- Manufactured to stiffness class SN8 and adoptable by sewerage companies.

Underground Drainage Adaptors

- Choice of three adaptors and drain stopper for 4"/110mm pipe.
- Ideal for floor level connections to PVCu, clay or cast-iron nominal 110mm pipe.
- Seal to inside of pipe, so they can be used even if cut-pipe end is at finished floor level.

Access Fittings

- Manufactured to BS 4660:2000.
- Available in plastic or aluminium giving the fittings their strength and durability.
- Sizes available to connect to 110mm or 160mm pipe.

Anti-Splash Concrete Surrounds

- A range of PVCu products bonded to concrete surround.
- Kitemarked to BS 4660:2000.
- Available in Gullies and Hoppers.

Channel Components

- Manufactured from PVCu providing strength and durability.
- Easy to install.
- Manufactured to BS 4660:2000.

Settlement Fittings

- Designed for situations where differential settlement may be an issue.
- Manufactured from PVCu providing strength and durability.
- Easy to install.

Ring Lock Seal

The ring lock seal won't distort once installed. The innovative design of the reinforcing ring means the shape of the seal stays uniformed through the entire circumference regardless of how it's installed. The seal will not dislodge from the fitting during installation. When combined with single-piece moulding technology, Polypipe Underground Drain - PVCu range is the UK's most advanced drainage system.

Look for blue so you know its Polypipe.

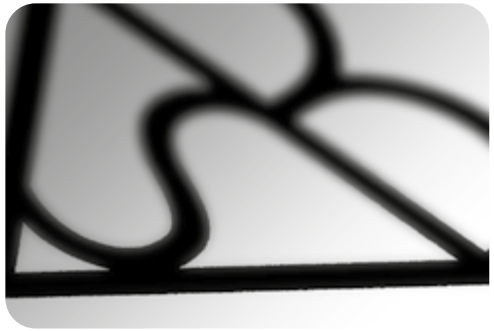
Single-piece Moulding Technology

At Polypipe, we're constantly looking at how we can improve and enhance our below ground drainage systems to improve their ease of installation and durability once installed. That's why we're working hard and investing in bringing the latest single-piece moulding technology to our below ground drainage fittings.

Polypipe's single-piece moulding technology means the entire body of the fitting is manufactured as one complete unit. This, together with Blue Ring-Lock Seal Technology gives robust fittings with secure joints. Over the lifetime of the drainage system, expansion and contraction from temperature changes causes pipe movement at the fitting joint. Single-piece moulded fittings have a seal fixed within the fitting body, which allows this expansion and contraction without compromising the integrity of the system.

Approvals

Polypipe's below ground drainage systems hold a comprehensive range of BSI and BBA certifications and approvals.
As a company, Polypipe take pride knowing that our products are manufactured to and beyond industry standards. Giving us and you the reassurance of a quality product that will stand up to and beyond industry standards.



Roads and Sewers Drainage Systems

Developed and manufactured with quality, innovation and longevity in mind, Polypipe Building Products' roads and sewers drainage systems is the most comprehensive range in the UK residential drainage market. Manufactured to meet market specification, Polypipe's 150mm - 315mm smooth wall and ribbed systems carry a range of BSI Kitemarked™ and BBA approved, ensuring you are using high quality products.

Our roads and sewers drainage is also available in a range of fittings and accessories all designed to enhance your experience with our products, ensuring you have the right products for the job.

However, none of these advancements are at the expense of the environment. Polypipe has invested heavily in technology which allows us to use more recycled materials in our products and systems, while still ensuring compliance with stringent Kitemark™ standards. This is evidenced by our recycled core drainage pipe, which is designed with at least 50% recycled material at its core.

IC600 Pipe Riser Inspection Chambers

The Polypipe IC600 range of inspection chambers is a safe and cost-effective solution for all foul and surface water applications. Designed for adoptable and non-adoptable domestic and commercial drainage systems, the range is manufactured from high quality polypropylene and is engineered to last whilst being light in weight for ease of handling and installation.

- Choice of IC600 bases with straight through or cross tee flow configurations.
- Certified to EN 13598-2
- High strength single piece 600mm diameter Ridgisewer SN8 riser.
- Light in weight and strong for improved health and safety and easy handling

Polysewer Gravity Sewer System

Polysewer is a range of PVCu structured wall pipes and fittings available in diameters 150-300mm. The complete system includes a range of couplings, seals, bends, junctions and accessories. Polysewer provides robust, sewer gas-resistant pipes for new and replacement gravity sewer systems.

- Kitemarked™ to WIS 4-35-01 and BS EN 13476-3.
- Compliant with Sewerage Sector Guidance for England, Sewers for Scotland, and The Welsh Minister Standards for Sewers.
- Manufactured to stiffness classification SN8.

Sewerdrain Gravity Sewer System

- Available in 200mm, 250mm and 315mm diameters with a full range of pipe and fittings.
- Kitemarked to BS EN 1401-1.
- Compliant with Sewerage Sector Guidance for England, Sewers for Scotland, and The Welsh Minister Standards for Sewers.

Flexicon Rubber Couplers & Adaptors

- Comprehensive range for adapting different sized plain ended pipes, including clay, PVCu, and cast iron.
- Quick and easy installation giving an air-tight and water-tight installation.
- Kitemarked to BS EN 295-4 and WIS 4-41-01.

Flexicon Reducing Bushes

- Compatible with pipes made from other material.

Installation Guidance

With Polypipe Building Products' ethos of 'fit and forget'. Installation and design calculations are an important part of having a watertight system. Working to the advice in this section will inform you of Polypipe's recommended installation method.

Note: Illustrations are for visual representation only.

Best practice and guidance of jointing methods, flow rate calculations, pipework installation and drainage/chamber requirements are all featured in the guide. Should you require any further details please email:

Drainage@Polypipe.com

Or contact your local Area Sales Manager by visiting:

www.polypipe.com/your-local-asm

Product	Size	Outside Diameter (mm) Min	Wall Thickness (mm) Min	Weight Per Metre (kg) Min
Underground Drain - PVCu (BS EN 1401-1 & BS EN 13476-2)	82mm/3"	82.40	3.20	1.18
	110mm/4"	110.00	3.20	1.59
	160mm/6"	160.00	4.10	2.97
Polysewer Gravity Sewer System (WIS 4-35-01 & BS EN 13476-3)	150mm	160.00	7.00	1.90
	225mm	250.00	10.50	3.70
	300mm	330.00	14.50	5.50
Sewerdrain Gravity Sewer System (BS EN 1401-1)	200mm	200.00	4.90	4.44
	250mm	250.00	6.10	6.92
	315mm	315.00	7.70	11.00

TABLE 1: PRODUCT DIMENSIONS & WEIGHTS

Pipe Handling and Storage

Handling and loading of pipes

PVCu pipes and fittings are very easily handled as they are strong and lightweight, however, incorrect handling can result in damage and care should be exercised. Loose pipes should be loaded onto transport and unloaded by hand, however for mechanical unloading, webbing or rope slings should be used. Metal chains, hooks or chains must not come into contact with pipes.

Pipes in larger quantities may be delivered in full bundles within timber frames and the pipes should remain within this packaging until required for installation.

Pipe bundles should be unloaded by using webbing or rope slings or by forklift. If unloading by forklift, care should be taken to align forks correctly underneath the bundles to avoid damage to the pipes.

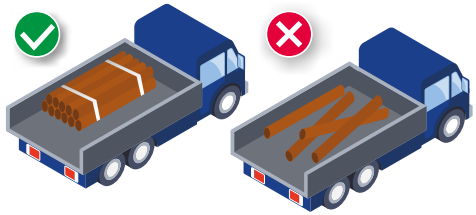


DIAGRAM 1: Correct and Incorrect way to load pipes

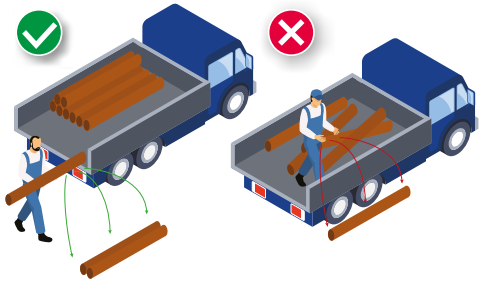


DIAGRAM 2: Correct and Incorrect way to off load pipes

Truck Graphic Originaly Designed by upklyak / Freepik

Storage of loose pipes

Pipe bundles may be stacked up to three high on firm level ground ensuring that the frames are placed 'wood to wood' to avoid damaging the pipes. Pipes should not be removed from any position within stacked bundles. Before removing pipes, the bundles should be placed at ground level and provision made to retain the frames in an upright position as pipes are removed.

Loose pipes should be laid on a reasonably flat surface free from large stones or sharp projections, if this is not possible, place the pipes on transverse bearers of at least 75mm width and spaced at centres not exceeding 1m. Side support should have a minimum bearing width of at least 75mm and placed at intervals of 1.5m or less.

Different sizes are best stacked separately, if this is not practical, then stack with the largest pipes at the base (see diagram 3), stacks should not exceed seven layers or 2m in height.

DIAGRAM 3: Correct and Incorrect way to store pipes

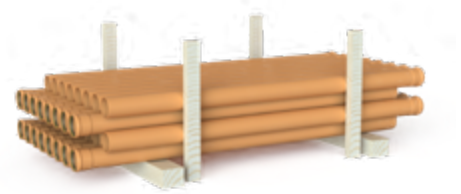


DIAGRAM 4: Correct way to store socketed pipes

When socketed pipes are stacked, the bottom layer of sockets should be prevented from being in direct contact with the ground, either by excavating under the socket, or by use of transverse supports (see diagram 4).

Alternate layers should have the sockets protruding from and opposite to the previous layer.

Methods of Jointing

Push-fit (Ring Seal) Jointing

1. Where plain end pipe is being used, ensure that the pipe is cut square to the axis and that all burrs are removed.
2. Chamfer the end of the pipe to prevent the ring seal being damaged or displaced when the pipe is inserted into the socket. Fittings with spigot ends are moulded with a chamfer during manufacture.
3. Lubricate the spigot or ring seal with Polypipe joint lubricant (SG500, LUBX1 or LUBX2.5)
4. Insert the pipe or fitting into the socket and then withdraw it by approx. 10mm to allow for thermal expansion and contraction of the pipework.

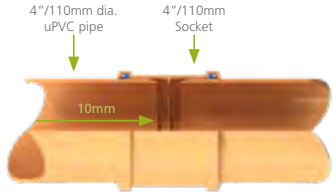


DIAGRAM 5:Push-Fit Jointing Installation

Solvent Weld Jointing

1. Ensure that the pipe is cut square and that all burrs are removed.
2. Ensure that both surfaces to be jointed are dry and free from dust or other debris.
3. Use Polypipe cleaning fluid CF250 to remove any surface grease from the spigot and socket to be jointed.
4. Apply a coat of Polypipe solvent cement to both surfaces to be jointed using the brush applicator provided in the lid. The cement should be applied along the length of the spigot and not around it's diameter.
5. The spigot should be inserted into the socket immediately, with a slight twisting action.
6. Any surplus solvent cement should be removed with a clean cloth.
7. The joint will be strong enough to handle after approx. 5 minutes and can be tested after 12 hours.

Table 2 indicates the approximate number of joints that can be made for each pipe diameter with solvent cement, cleaning fluid and silicone grease.

Approximate Number of Joints for Pipe Diameters

	Pipe Dimensions		
	82mm	110mm	160mm
Solvent Cement 125ml Code SC125	9	5	3
Solvent Cement 250ml Code SC250	18	10	6
Solvent Cement 500ml Code SC500	35	20	12
Cleaning Fluid 250ml Code CF250	30	20	15
Silicone Grease 100g Code SG100	35	20	10
Joint Lubricant 500ml Bottle SG500		100	45
LUBX Joint Lubricant 1kg Tub LUBX1		200	90
LUBX Joint Lubricant 2.5kg Tub LUBX2.5		250	110

TABLE 2: NUMBER OF SOLVENT CEMENT JOINTS FOR PIPE DIAMETERS

Ancillaries

Solvent Weld

Solvent cement available in 125ml, 250ml & 500ml.

Gap filling cement available as a 140ml tube

When working with solvent cement it is essential to observe normal safety rules:

- Do not allow solvents or cleaners to come into contact with skin or eyes
- Only use when in a well-ventilated area
- Do not smoke or use naked flames near the area of work
- Once finished, close the container and store in a cool area

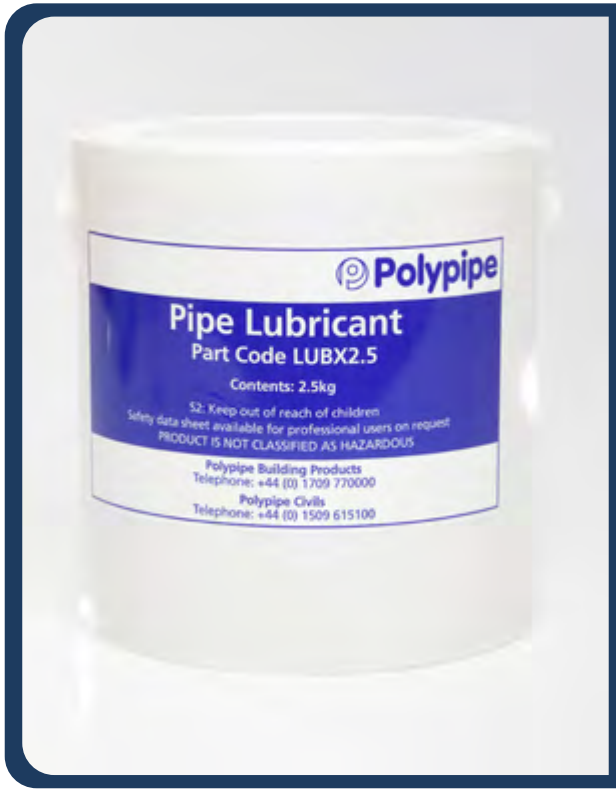
Cleaning Fluid

- Available as a 250ml tin

Lubricant

- Silicone grease available in 100g & 500g
- Aerosol Lubricant in 400ml can
- Joint Lubricant 500ml bottle
- Joint Lubricant 1kg and 2.5kg tub

Note: Only Polypipe solvent cement, cleaning fluid, silicone grease and pipe/joint lubricant are recommended for use with Polypipe products. Other suppliers products may not be compatible.



Scan the QR code below for our COSHH data sheets

All COSHH data sheets are hosted on www.poolypipe.com

Installation Guidance: Methods of Jointing

Cutting and Jointing Polysewer Pipes

Polysewer pipes should be to length using a fine tooth saw. The cut should be made square to the pipe in the valley midway between the corrugations, chamfering is not necessary.

The procedure for jointing is as follows:

1. Ensure Polysewer pipe ends and sockets are free from dirt, swarf, grit, etc., particularly the first corrugation of any pipe ends.
2. Check the seal is clean and fits over the pipe end into the valley of the **first corrugation**. Ensure the seal is not twisted.
3. Apply Polypipe pipe/joint lubricant (SG500, LUBX1 or LUBX2.5) to both the pipe seal and the socket.
4. Push the pipe fully into the socket. If necessary, use a timber block and lever to ensure the pipe is fully inserted.

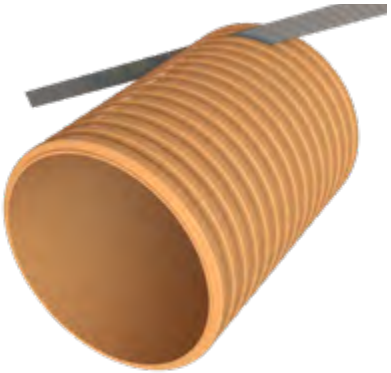


DIAGRAM 6: Cutting Polysewer pipes

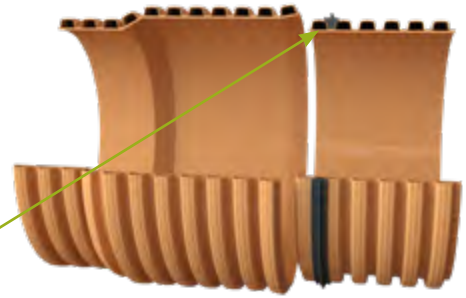


DIAGRAM 7: Adding seal and Joining Polysewer Pipes and Sockets

Seal must be seated in the valley of the first corrugation

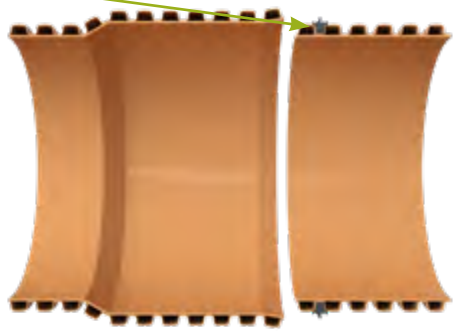


DIAGRAM 8: Adding seal and Joining Polysewer Pipes and Sockets

Calculation of Flow Rates

Foul Drains

Individual sanitary appliances, e.g., a WC or washbasin have a Discharge Unit value to enable flow rates to be established.

BS EN 12056-2: 2000 details the Discharge Unit values, which may vary slightly, depending on the soil system configuration to which they are connected. However, the following figures are suitable for general calculation purposes.

Appliance	Discharge Unit Value
Wash basin	0.5
Bidet	0.5
Shower	0.6
Single urinal with cistern	0.8
Bath	0.8
Sink	0.8
Dishwasher	0.8
Washing machine	0.8
WC with 7.5 litre cistern	2.0

TABLE 3: DISCHARGE UNIT VALUES

Formula for calculation of flow rate: $Q=k\sqrt{\Sigma DU}$

Where: Q = *Flow Rate in litres/sec*
K = *Frequency factor*
ΣDU = *Sum of discharge units*

K= *0.5 for dwellings, guest houses, offices etc.*
0.7 for hospitals, schools, restaurants, hotels etc.
1.0 for toilets/showers open to the public

Surface Water Drains

It is generally accepted that a suitable rainfall design intensity for sizing surface water drains is 0.014 litres/second/m² (50mm/hour).

For high-risk areas, where ponding would lead to flooding of buildings, the drainage scheme should be designed in accordance with BS EN 752, where a higher rainfall intensity would be appropriate.

Minimum Velocities

Flow velocities in drainage systems should be a minimum of 0.75metres/sec at 1/3 of the design flow to avoid the possibility of grit and other solid waste being deposited along the invert of the drain.

From / To	Junction	Inspection Chamber	Manhole
Start of external drain (stack or ground floor appliance)	-	22m	45mm
Rodding Eye	22m	45m	45m
Shallow Inspection Chamber (up to 1m deep)	22m	45m	45m
Deep Inspection Chamber and Manhole (deeper than 1m)	-	45m	90m

TABLE 4: MAXIMUM SPACINGS OF ACCESS POINTS

Installation Guidance: Calculation of Flow Rates

Capacity of Drains

The capacity of a drainage system will be determined by the diameter and gradient of the pipework. The table shows capacities of 110mm and 160mm diameter drains for each of the roughness coefficient factors usually applied to pipework for calculation purposes as follows:

k = 0.06 for new surface water drains

k = 0.60 for new foul water drains

k = 1.50 for mature foul drains

The figures are also based on the recommended proportional depth of flow of 0.75. Foul drains are normally designed to carry peak discharges at less than full depth to allow for a safety factor and to aid ventilation.

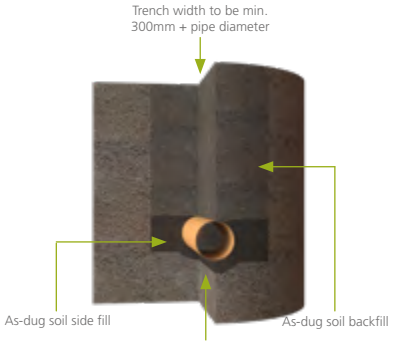
Gradient (1 in...)	110mm k= 0.06	110mm k= 0.60	110mm k= 1.50	160mm k= 0.06	160mm k= 0.60	160mm k=1.50
	Capacity in Litres/Second					
5	33.3	25.1	21.6	96.2	73.4	63.5
10	23.3	17.7	15.3	67.4	51.8	44.9
15	18.9	14.5	12.4	54.7	42.2	36.6
20	16.3	12.5	10.8	47.2	36.5	31.6
25	14.5	11.2	9.7	42.0	32.6	28.4
30	13.0	10.2	8.8	38.2	29.8	25.9
35	12.2	9.5	8.2	35.3	27.5	23.9
40	11.3	8.8	7.6	33.0	25.9	22.0
45	10.5	8.3	7.2	31.0	24.1	21.0
50	10.0	7.8	6.7	29.2	23.0	20.0
55	9.5	7.5	6.5	28.0	22.0	19.0
60	9.2	7.2	6.2	26.7	21.0	18.0
65	8.6	6.8	5.8	25.4	20.1	17.5
70	8.5	6.6	5.6	24.6	19.4	16.8
75	8.0	6.4	5.5	24.6	19.4	16.3
80	7.8	6.2	5.3	23.0	18.0	15.7
85	7.5	6.0	5.2	22.2	17.5	15.1
90	7.3	5.8	5.0	21.7	17.0	15.4
95	7.1	5.7	4.9	21.0	16.6	14.2
100	6.9	5.5	4.8	20.5	16.2	14.0

TABLE 5: DRAIN CAPACITIES

Bedding & Backfilling

The following information is based on the recommendations in BS EN 1610 'Construction and testing of drains and sewers' and is intended as a general guide to good practice in the selection of bedding and backfill materials for Polypipe Building Products underground drainage systems.

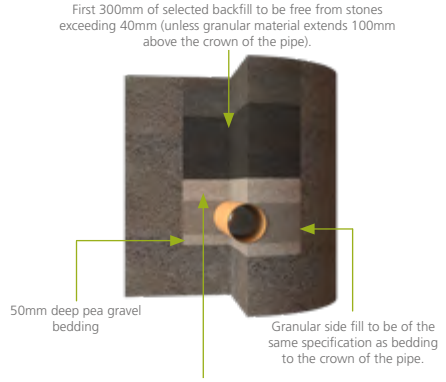
1. *Pipe laid on trench bottom*



Trench bottom hand trimmed and loosened to form pipe bed. Small depressions should be made to accommodate pipe sockets.

As-dug material is suitable if conforming to BS EN 1610 i.e. material should have particles not exceeding 10mm for 110mm pipe and 15mm for 160mm pipe.

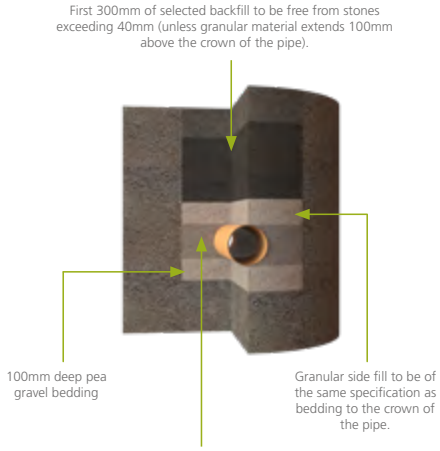
2. *Pipes laid on 50mm granular bedding*



Where the backfill above the pipe contains stones larger than 40mm or where pipes are laid deeper than 2.0m in poor ground, the granular material should extend to a minimum of 100mm above the crown of the pipe.

Where the as-dug material can be hand trimmed by shovel and is not puddled when walked upon, a 50mm depth of 10mm single sized granular bedding material may be used.

3. *Pipes laid on 100mm granular bedding*



Where the backfill above the pipe contains stones larger than 40mm or where pipes are laid deeper than 2.0m in poor ground, the granular material should extend to a minimum of 100mm above the crown of the pipe.

When pipes are laid in rock, compacted sand and gravel requiring mechanical means of trimming and in very soft or wet ground, the bedding should be a minimum of 100mm.

Pipe Diameter	Nominal maximum Particle size	Material Detail
100mm	10mm	10mm single size with no sharp edges
Over 100mm to 150mm	15mm	10mm or 14mm single size or 14mm to 5mm graded
Over 150mm to 300mm	20mm	10mm, 14mm or 20mm single size or 14mm to 5mm graded or 20mm to 5mm graded

TABLE 6: GRANULAR BEDDING AND SIDEFILL MATERIALS FOR PVCu DRAINAGE PIPES

Note: Installation should be carried out in accordance with BS EN 1610 and BS EN 752.

Where the 'as dug' material is suitable as bedding, the bottom of the trench may be trimmed to form the pipe bed. Suitable material is defined as granular material in accordance with the recommendations of BS EN 1610.

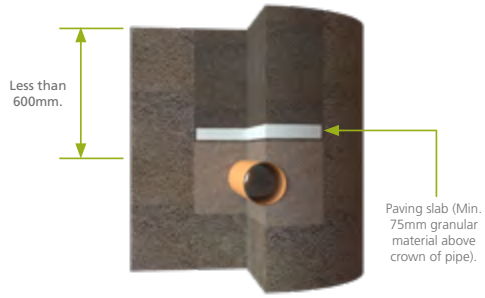
Recycled bedding of suitable size may also be used.

Installation Guidance: Pipework Installation

Protection for Pipes

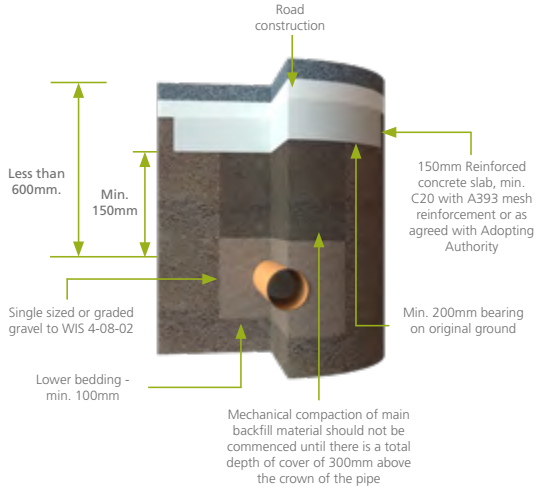
1. *Pipes laid at shallow depths in non-trafficked areas*

Pipes laid in non-trafficked areas, e.g., in gardens with less than 600mm of cover, should be protected against damage by placing paving slabs or similar over them across the whole width of the trench. A layer of granular material of 75mm min. thickness must be laid between pipes and slabs.

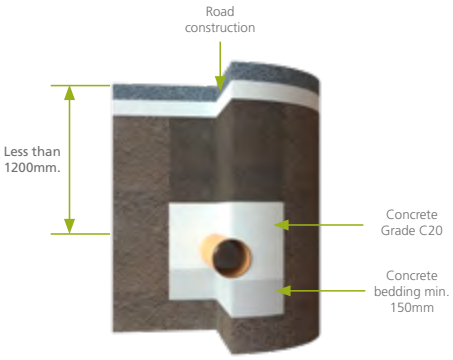


2. *Pipes laid at shallow depths in adoptable trafficked areas*

(a) Side fill material to be placed evenly on both sides of pipe, taking care to work the material under the lower quadrant of the pipe, ensuring the pipe is not lifted. Both sides of the trench should be filled simultaneously to avoid horizontal movement of the pipe.

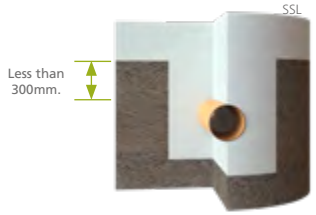


(b) Flexible joints to be provided in concrete at each pipe joint. It is recommended that 3.0m pipe lengths are used where concrete encasement is required.



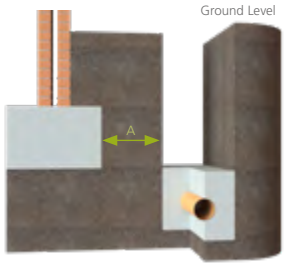
Pipes Laid at Shallow Depths Under Buildings

Where the crown of the pipe is within 300mm of the underside of the slab, the pipework should be surrounded with 150mm concrete as an integral part of the floor slab.

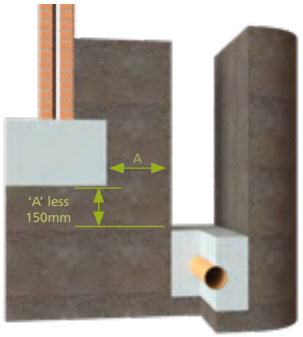


Pipes Near Buildings

Where the crown of the pipe is within 300mm of the underside of the slab, the pipework should be surrounded with 150mm concrete as an integral part of the floor slab.



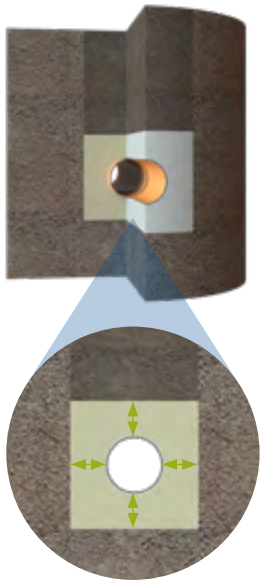
Where dimension A is less than 1.0m, concrete fill trench to level of underside of foundations.

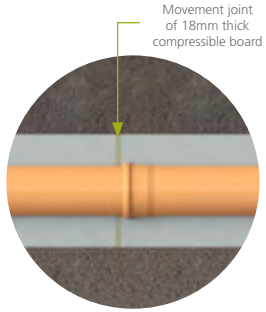


Where dimension A is greater than 1.0m, concrete fill trench to this level.

Joint for Concrete Encased Pipe

Where pipes are surrounded in concrete to protect nearby foundations, an 18mm compressible board, e.g. fibreboard or polystyrene should be placed around the pipe at each joint.

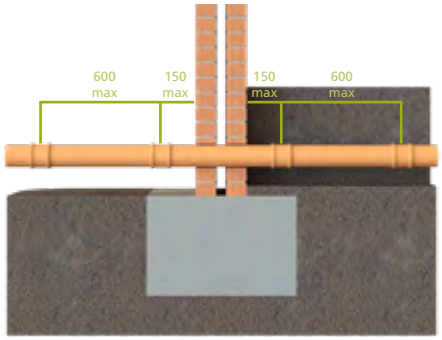




Installation Guidance: Pipework Installation

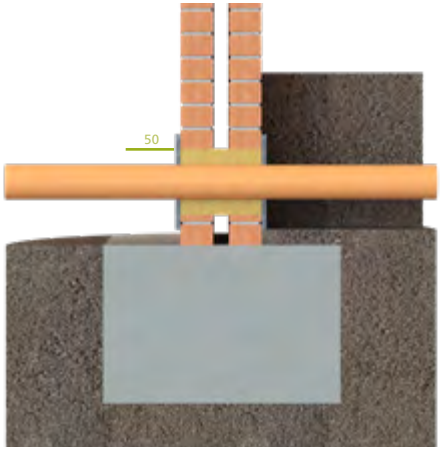
Pipes Through Walls

(a) Short length of pipe bedded in wall with joints formed within 150mm of each wall face.
Adjacent rocker pipes of 600mm max. length with flexible joints.



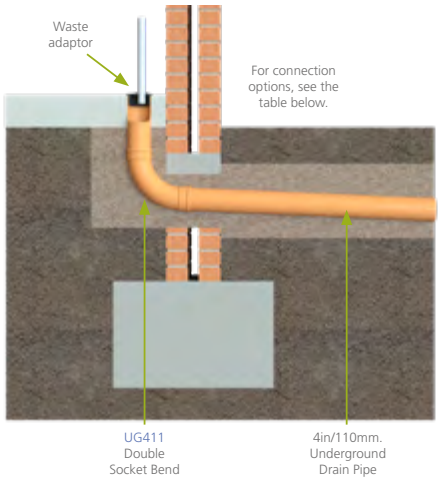
(b) Arch or lintelled opening to give min. 50mm space all round the pipe. Mask opening on both side of the wall with rigid sheet material to prevent entry of fill or vermin.

Important Fill void with compressible material to prevent entry of gas.

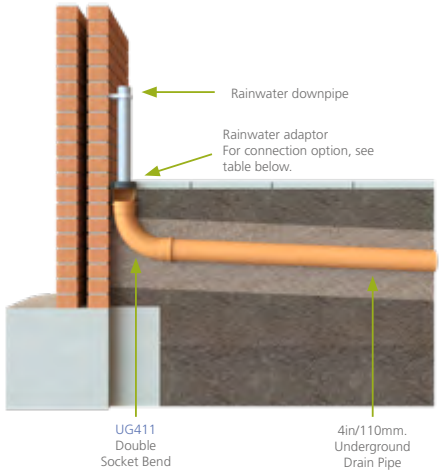


Waste and Rainwater Connections

Waste Pipe



Rainwater Pipe



						Round		Square
		21.5mm	32mm	40mm	50mm	50mm	68mm	65mm
WASTE	UG255 (4in/110mm.)	✓						
	UG256 (4in/110mm.)		✓	✓				
	UG257 (4in/110mm.)				✓			
	UG435 (4in/110mm.)			✓	✓			
	UG456 (4in/110mm.)		✓	✓				
	UG457 (4in/110mm.)				✓			
	UG461 (4in/110mm.)		✓	✓				
	UG492 (4in/110mm.)			✓				
RAINWATER	UG485 (4in/110mm.)		✓	✓	✓	✓	✓	✓
	UG493 (4in/110mm.)		✓	✓	✓	✓	✓	✓
	UG253 (3in/82mm.)						✓	✓
	UG254 (4in/110mm.)						✓	✓

TABLE 7: RAINWATER AND WASTE PIPE CONNECTION OPTIONS

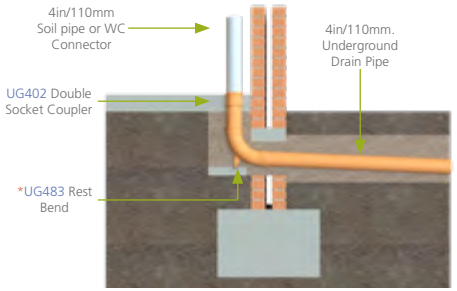
Installation Guidance: Drainage Connections Installation

Drainage Adaptors

	SKU Code	Description	No. of connections
	UG255	4in/110mm. Adaptor to 21.5mm overflow	1
	UG256	4in/110mm. Adaptor to 32/40mm waste pipe	1
	UG257	4in/110mm. Adaptor to 50mm waste pipe	1
	UG435	4in/110mm. Single to Pipe or Spigot (Requires Waste Boss Adaptor)	1
	UG456	4in/110mm. Socket to 40mm waste pipe	1
	UG457	4in/110mm. Socket to 50mm waste pipe	1
	UG461	4in/110mm. 32mm and 40mm double mixed to Socket	2
	UG492	4in/110mm. 40mm and 40mm double equal to Socket.	2
	UG485	4in/110mm. Universal Drain Adaptors (Black EPDM) Locates on Socket	1
	UG493	4in/110mm. Universal Drain Adaptors (Black EPDM) Locates on Spigot	1
	UG253	3in/82mm. Spigot/Socket to 68mm Round Downpipe Socket	1
	UG254	4in/110mm. Spigot/Socket to 68mm Round Downpipe Socket	1

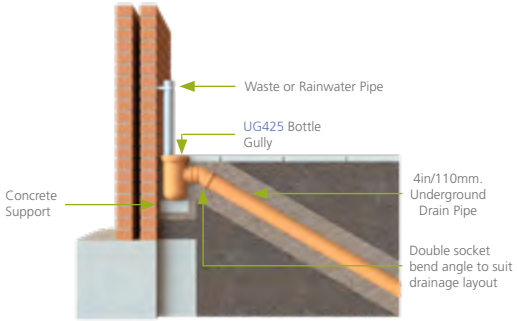
TABLE 8: DRAINAGE ADAPTOR OVERVIEW

Soil Pipe / WC

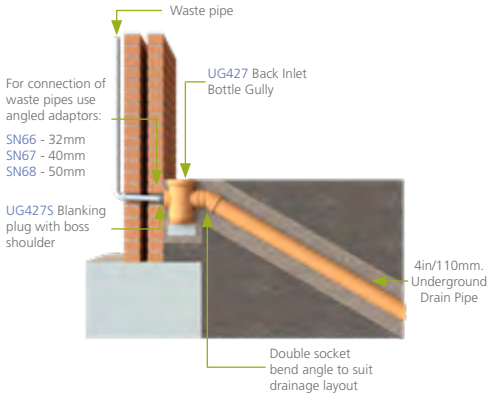


*Alternatively two UG403 45° radius bends connected together with a short length of pipe may be used

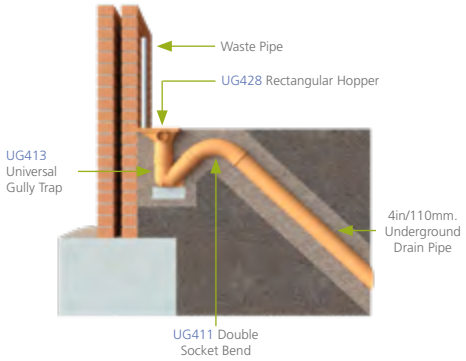
Bottle Gully



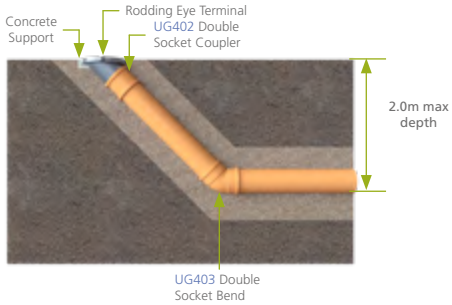
Back Inlet Bottle Gully



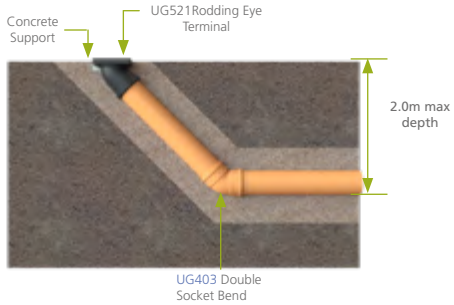
Rectangular Hopper/Universal Gully Trap



Rodding Eye - Spigot Tail



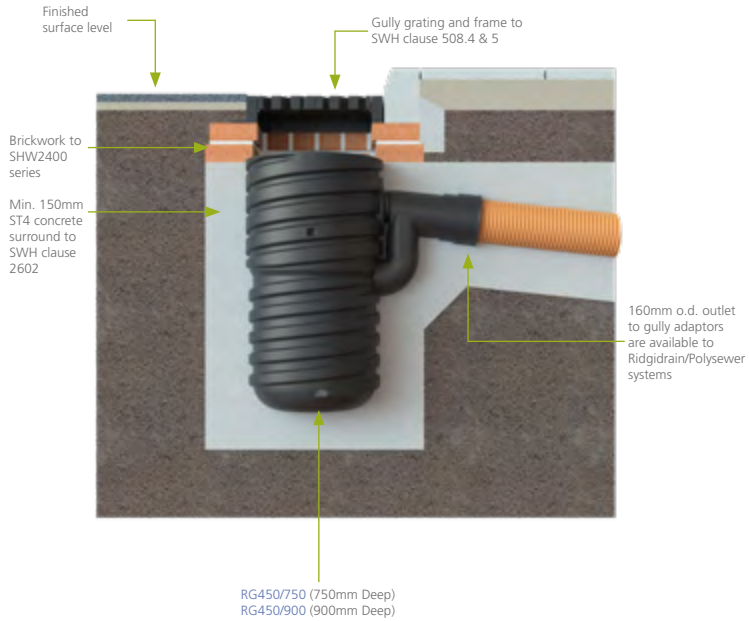
Rodding Eye - Socket Tail



Installation Guidance: Drainage Connections Installation

Gully Installation

Road Gully Installation



Inspection Chambers

Design Requirements

The layout of the underground drainage system should be kept as simple as possible with the minimum number of changes in direction and gradient. Access points should be provided only if blockages could not be cleared without them.

Connections of drains to other drains should be made obliquely in the direction of flow.

Sewers, i.e. drain serving more than one property, should be kept as far as is practicable away from the point on a building where future extension is likely, e.g. the rear side of a dwelling where there is room for an extension.

The system should be ventilated by a flow of air, normally provided by a ventilating pipe situated at or near the head of each main drain.

Drains should be laid to even gradients and any change of gradient should be combined with an access point.

** Min. 5 WC's*

Peak Flow (Litres/Sec)	Pipe Size	Minimum Gradient	Max. Capacity (Litres/Sec)
< 1	82mm	1:40	4.10
< 1	110mm	1:40	9.20
> 1	82mm	1:80	2.80
> 1	110mm	1:80	6.30
> 1	160mm	1:150*	15.00

TABLE 9: FOUL DRAINS

Pipe Size	Minimum Gradient	Max. Capacity (Litres/Sec)
82mm	1:100	3.50
110mm	1:100	6.90
160mm	1:150	18.20

** Min. 5 WC's*

TABLE 10: SURFACE WATER DRAINS

Chamber Depths

Where the required chamber depth falls between that available with standard risers, the top riser can be cut back using a fine tooth saw to the finished level and slope of surrounding ground.

	Dim 'A'
+ 1 Riser	314mm
+ 2 Risers	457mm
+ 3 Risers	600mm

TABLE 11: 320mm SHALLOW INSPECTION CHAMBER BASE DEPTH

	Dim 'A'
+ 2 Risers	605mm
+ 3 Risers	803mm
+ 4 Risers	1000mm

TABLE 12: 460mm INSPECTION CHAMBER BASE DEPTH

Where the depth of the inspection chamber exceeds 1.20m, a 450 and 460mm diameter Non-man Entry chamber is available, which can be used up to depths of 4.00m where permitted.

Installation Guidance: Inspection Chamber Installation

Jointing Side Risers

Section through base of 320mm diameter riser

Section through base of 460mm diameter riser

For Jointing 460mm diameter risers, use sealing ring code UG488 in the groove around the bottom edge of the riser.

When assembling side riser and bases or side riser to side riser, the seal should be lubricated with Polypipe pipe/joint lubricant (SG500, LUBX1, LUBX2.5) silicone grease or aerosol lubricant prior to jointing to ensure a watertight seal for first time site testing. Other suppliers lubricants may not be compatible.

Note: Building sealant conforming to BS EN ISO 11600 may also be used to seal joints between risers or between the bottom riser and the base of pre-formed inspection chambers

Riser to Riser and Frame to Riser Fixing Kits

A selection of fixing kits are available to secure risers together and for securing frames to risers.

FRK500

460mm Plastic Frame to Riser Fixing Kit (for use with UG497, UG510& UG511).

FRK501

Spare Black Ties (30) (for FRK 500) - Not suitable for Ductile Iron Frames.

FRK502

460mm Ductile Iron Frame to Riser Fixing Kit (for use with UG419, UG513, UG520, UDC700, UDC702 & UDC750).

FRK503

460mm Riser to Riser Fixing Kit - use 1 kit per riser.

FRK504

Plastic Frame to Riser & Riser to Riser Fixing Kit

SFARB Inspection Chambers

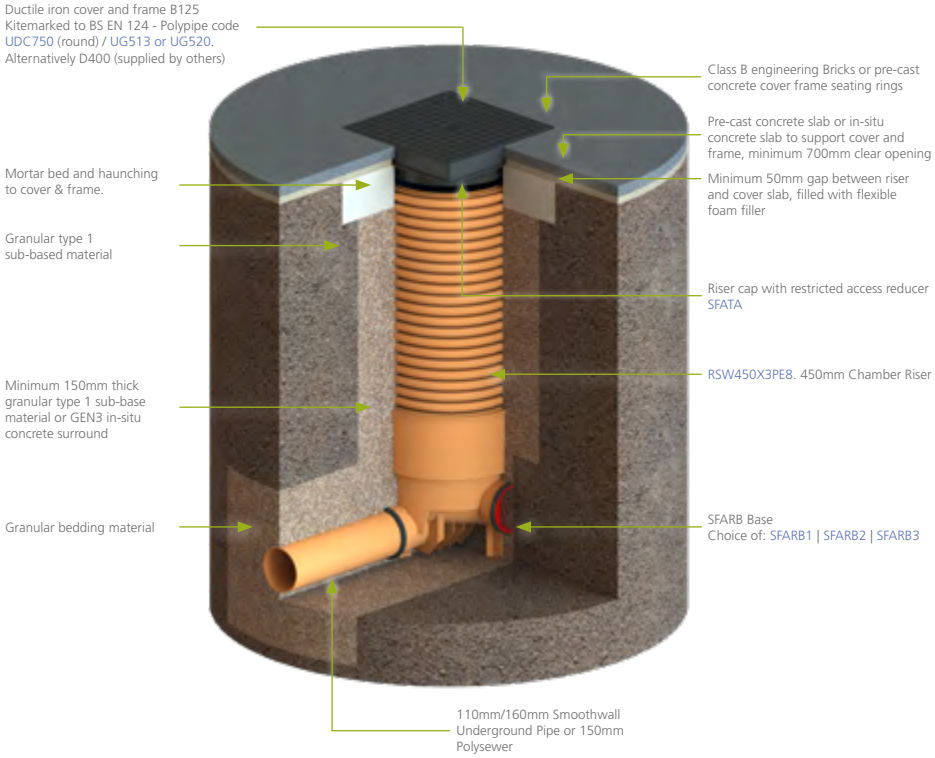
The Polypipe 450mm Pipe Riser Inspection Chamber gives complete flexibility, providing easy access for inspection, cleaning and maintenance in sewer and drainage systems in traffic and non-traffic areas.

Suitable for both adoptable and non-adoptable applications, the range is manufactured from high quality polypropylene and is engineered to last.

The bases are pre-benched and the 450mm Ridgisewer riser is easy to cut to length without the need for special tools or equipment, making the whole installation quicker and easier.

Key Benefits

- Fully sealed for a watertight, tamper proof and low maintenance installation
- Light in weight and strong for improved health and safety and easier handling
- Chemical & corrosion resistant
- Kitemarked to BS EN 13598-2
- High strength single piece 450mm Ridgisewer SN8 riser
- Versatile and available with inlets for 150mm Polysewer and 160mm/110mm BS EN 1401, BS EN 13476-2 & BS EN 13476-3.



Installation Guidance: Inspection Chamber Installation

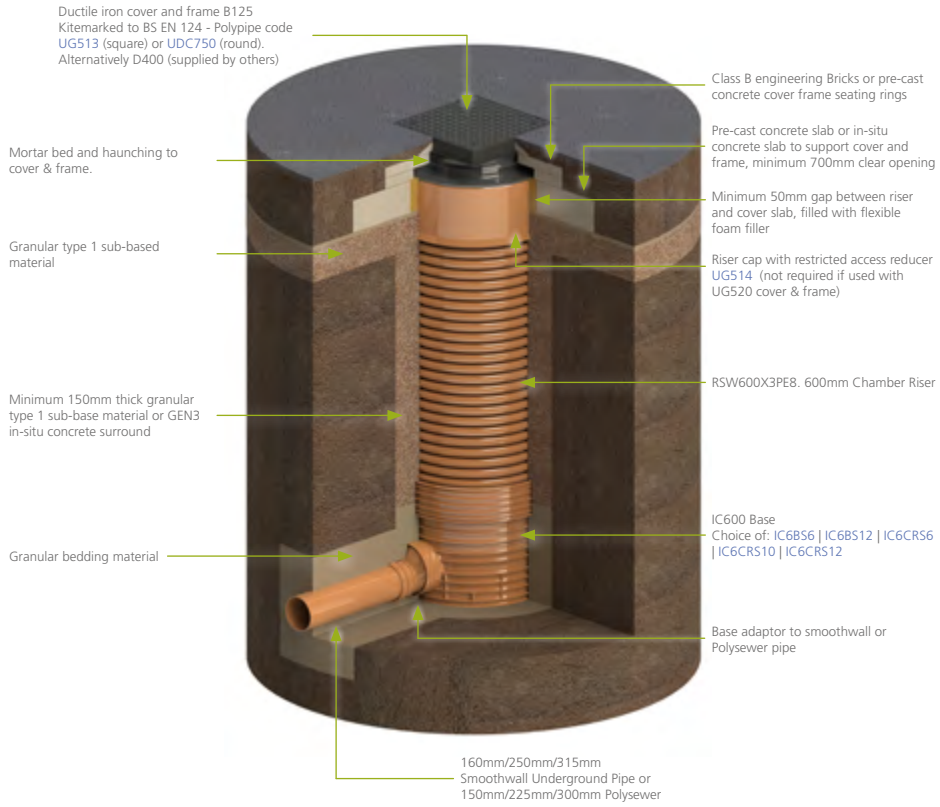
IC600 Inspection Chambers

The Polypipe IC600 range of 600mm diameter inspection chambers is designed for adoptable and non-adoptable domestic and commercial drainage systems, the range is manufactured from high quality polypropylene and is engineered to last.

The unique adaptor range simplifies choice allowing multiple configuration options for connection to Polysewer, Smoothwall PVCu and 150mm Vitrified Clay pipe.

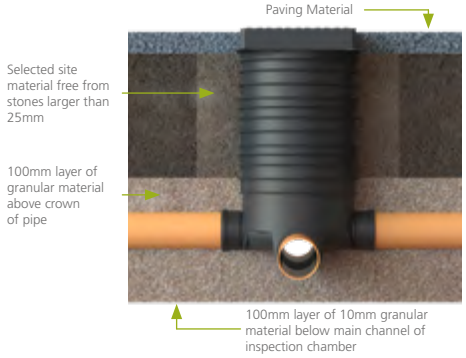
Key Benefits

- For use with 150/160mm, 225/250mm or 300/315mm pipe with a choice of adaptors for pipe connection to Polysewer, Smoothwall PVCu and Vitrified Clay pipe
- Certified to EN 13598-2 and compliant to Sewerage Sector Guidance for England, Sewers for Scotland, and the Welsh Minister Standards for Sewers.
- Light weight & strong for improved health and safety and easy handling, corrosion resistant with high strength single piece 600mm diameter Ridgisewer SN8 riser
- Riser cap which can be adapted for reduced access for chamber depths of greater than 1.2m by using the UG514 restricted access reducer with Polypipe ductile iron covers & frames



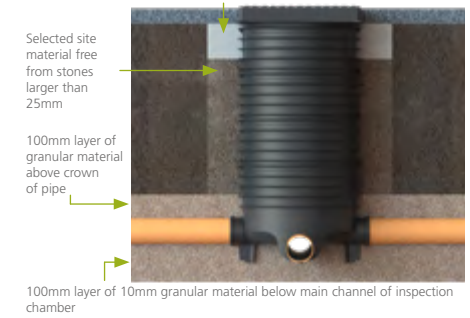
Inspection Chamber Detail

320mm Shallow Inspection Chamber Detail



460mm Diameter Inspection Chamber Detail

150mm x 150mm concrete surround required for support of cover and frame. Where the inspection chamber is being installed on a driveway subject to light vehicular traffic, or where B125 covers are being used, the concrete support should be 300mm wide x 225mm deep



1. In all installations, the main channel of the inspection chamber should always be used. Where the chamber is being used as a change or direction for the drainage system, short radius bends of 11 1/4°, 15°, 30° and 45° can be used in the inlet and outlet to achieve the required angle.
2. Side inlet branch connections enter the inspection chamber approx. 55mm above the invert of the main channel.
3. 320mm diameter chambers are supplied with 2 no. blanking plugs for the side inlets and 460mm diameter chambers are supplied with 3 no. blanking plugs.

TESTING OF BELOW GROUND DRAINAGE SYSTEMS

Following initial installation, all sections of the underground drainage system should be inspected for obstructions, straightness, and water infiltration, and tested accordingly.

BS EN 1610:2015 Construction & Testing of Drains and Sewers; Clause 10 - Testing During Construction states:

'…Where initial leak tightness testing is required it should be applied before any sidefill is placed around the joints…'

The Design and Construction Guidance for foul and surface water sewers clause E7.3 - Testing of Gravity Sewers states: 'Sewers shall be tested regularly throughout the installation (typically every three jointed segments) before any concreting or backfilling is commenced, other than such as may be necessary for structural stability whilst under test.

'Testing before sidefilling and backfilling will help to minimise disruption and the need for removal of sidefill or backfill should remediation be required.'

The current Building Regulations require that drains should be tested for water tightness by means of an air test or water test as detailed below:-

Air Test

For pipes up to 300mm diameter, the pipe should be pressurised to a pressure of 110mm water gauge and held for approx. 5 minutes prior to testing.

Following this, the pipe should be able to hold an initial 100mm pressure with a maximum loss of head on a manometer of 25mm in a period of 7 minutes.

Water Test

For pipes up to 300mm diameter, the system should be filled with water up to a depth of 500mm above the lowest invert in the test section and a minimum depth of 100mm measured at the highest invert in the test section.

This may then be left for a period (one hour is generally sufficient) to condition the pipe. The test pressure should then be maintained for a period of 30 minutes, by topping up the water level as necessary so that it is within 10mm of the required level throughout the test.

The losses per square metre of surface area should not exceed 0.15 litres for test lengths with only pipelines or 0.20 litres for test lengths including pipelines and manholes, or 0.4 litres for tests with only manholes and inspection chambers alone (i.e. no pipelines).

Covers and Frames

It is important to select a cover and frame with a suitable load classification for the location of the chamber. Load classifications are as follows:

(A15) Group 1 - Class A15 of BS EN 124:2015

Cover and frame capable of withstanding a 15kN/1.5 tonne test load. For use in areas to which only pedestrians and cyclists have access. A 150mm x 150mm concrete surround is required for support of cover and frame.

Note: A15 covers may not be acceptable for adoption by some water and sewerage companies

(A35 & A50) Group 1 - Class A15 of BS EN 124:2015 and Class A35 of BS ISO 15398:2012

Cover and frame tested to withstanding a 35kN/3.5 tonne test load (A35) or 50kN/5.0 tonne test load (A50). For use in areas to which pedestrians and cyclists have access, may also be used for private single household driveways not part of the Public Highway, provided always that they are on a concrete surround at least 300mm wide x 225mm deep. On slopes, or where vehicles may turn causing tarmac around the frame to scuff or crack, a 300mm wide x 225mm deep concrete surround should extend upwards to surround the frame and no tarmac should be put on top of the concrete. **If the frame is not supported correctly on concrete, then the cover and frame will not perform as required.**

Note: A35 and A50 covers may not be acceptable for adoption by some water and sewerage companies

(B125) Group 2 - Class B125 of BS EN 124:2015

Covers and frame capable of withstanding a 125kN/12.5 tonne test load. For use in footways, pedestrian areas and comparable areas such as car parks or car decks.

Note: B125 is the minimum class of cover accepted by some water and sewerage companies for adoptable areas.

UDC750

Product	Classification
UG439 Circular Concrete Cover & PP Frame	A15
UG499 Square Concrete Cover & PP Frame	A15
UG436 Aluminium Sealed Cover & Frame	A15
UG501 Circular PP Sealed Cover & Frame	A15
UG502 Square PP Sealed Cover & Frame	A15
UDC700 Circular Ductile Iron Cover & Frame	B125
UDC702 Square Ductile Iron Cover & Frame	B125

TABLE 13: 320mm DIAMETER COVERS & FRAMES

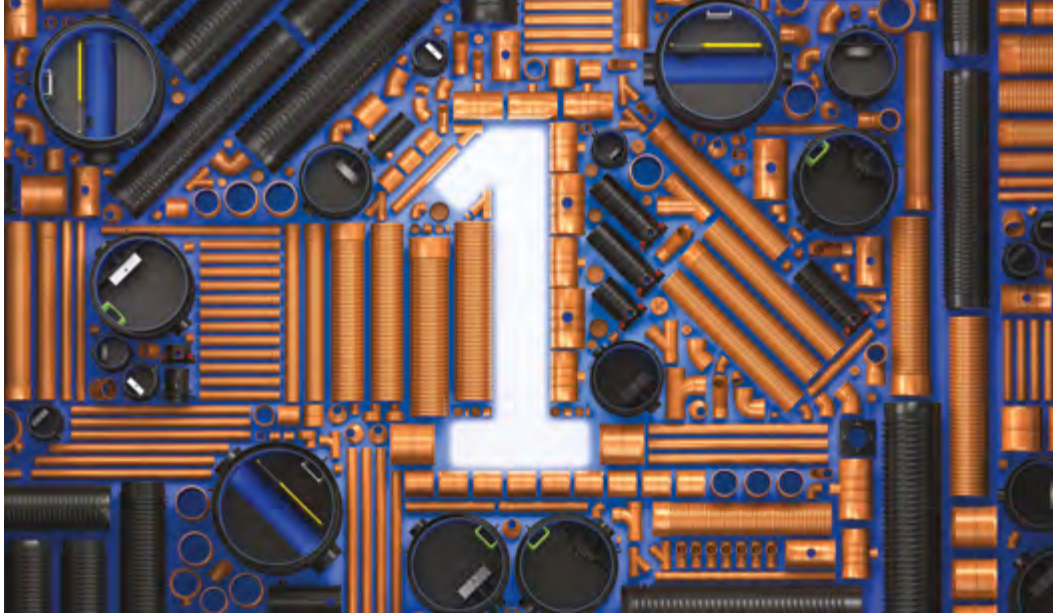
Product	Classification
UG497 Circular Concrete Cover & PP Frame	A15
UG419 Cast Iron Cover & Cast Iron Frame	A50
UG510 Square PP Sealed Cover & Frame with 350mm non-man entry restriction	A35
UG511 Circular PP Cover & Frame	A35
UG513 Square Cast Iron Cover & Cast Iron Frame	B125
UG520 Square Ductile Iron Cover & Frame with 350mm non-man entry	B125
UDC600 Square Ductile Iron Cover & Frame B125	B125

TABLE 14: 450mm/460mm DIAMETER COVERS & FRAMES

Where a heavier duty cover is required, UDC700 (320mm circular), UDC702 (320mm square) and UDC750 (450mm/460mm) circular ductile iron cover and frames are available to BS EN 124 Class B125 tested to withstand 125kN/12.5 tonne test loads. The UG513 and UG520 square cover and frame for the 460mm diameter chamber also meets this requirement.

URP720 (320mm) and URP760 (460mm) recessed paviour covers are available which will withstand a 100kN/10 tonne test load.

NOTE: Where specified, frame to riser fixing kits should be used, see the current Trade Price List for details.



New Sewers Code for Adoption

New approved guidance from Water UK for use by developers focusing on the planning, design and construction of foul and surface water drainage systems.

The Sewers Code for Adoption provides merchants, developers, and contractors with an updated and standardised set of delivery procedures.

The Sewers Code for Adoption guidance includes a Design and Construction Guidance document that replaces the existing manual outlining significant changes which will affect the adoption of sustainable drainage systems (SuDS) and below ground drainage systems on all development sites in England.

Visit the link below to find out more:

www.polypipe.com/new-sewers-code-for-adoption

Sewer Pipes, Fittings & Chambers

Our product portfolio includes the UK's largest range of sewer pipe, fittings and chambers for all commercial and residential projects. Whatever the size or scale of your project, we'll help you find the systems you want that deliver the solutions you need.

Our Underground MLRC Pipe is a fully adoptable solution, whilst our Polysewer PVCu structured wall pipe and fittings, provide robust, sewer gas-resistance within new and replacement gravity sewer systems.

Visit: **www.polypipe.com/belowground**

www.polypipe.com/channeldrainage

Notes

Notes

Below Ground Installation Guide

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Pre-cast Solutions
2009/2010


Containment Kerbs


Bus Stop Kerbs


Railway


Service Protection

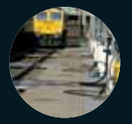

Bespoke Services

Camels new production facility

Welcome

Since 1997 Camel has been manufacturing high strength concrete components for the construction industry. Supplying projects of all sizes from pedestrian refuges to container terminals. Camel has enjoyed supplying high quality products and exceptional service to its customers. By specialising, Camel can offer support and solutions throughout a contract, from the initial take-off to rapidly responding to client design changes.





Contents

REGISTERED SUPPLIER LINK-UP

TÜV NORD ISO 9001 UKAS QUALITY MANAGEMENT 005

Containment Kerbs

The concept of containment kerbs is to safely redirect vehicles away from danger returning them to their intended route. Unlike crash barriers, containment kerbs remain undamaged and cause no damage to vehicles. Camel Kerbs have a 2 stage system for redirecting vehicles, initially the lower inclined face of the kerb compresses the vehicles suspension and the axle guides the vehicle back onto the highway. Ultimately if needed the round upper profile of the kerb exerts a lateral force on the vehicles tyre walls positively directing the vehicle back onto its intended path.

HIGHWAYS AGENCY

Camel Kerb

The Camel Kerb is made from very high strength concrete, 70% stronger than conventional pressed kerbs (BS7364) necessary to resist the impact of a 40 tonne HGV. Using 55N/mm² concrete with quartzite aggregate, Camel Kerbs are wet cast in stainless steel moulds and have an extremely fine finish ensuring vehicle tyres slide away leaving kerbs undamaged. The concrete used provides excellent resistance to road salt and diesel. Camel Kerb quadrants are thicker and more reinforced than conventional units giving greater strength where it is needed most. Camel Kerbs are available in standard (415mm), extra deep (565mm) and shallow (370mm) profiles. All are available with dowel holes and/or high tensile re-bar hoops in either the base or rear face. The full range consists of differing lengths, quadrants, transmissions, internal and external radius kerbs and are available in small quantities that can be delivered by our paletting service to avoid part load charges.

Design

By having a very smooth finish Camel Kerbs are more effective at redirecting traffic by returning more energy laterally into the sidewall of the vehicles tyre minimising the possibility of the vehicle climbing over. Furthermore the smooth lower inclined face encourages the tyre to slip back onto its intended path. To ensure the long term stability of the installation, Camel Kerbs uniquely have 2 stability features: Keyways in the base and a 3 degree slope on the back face. Combining these features ensures the best possible impact absorption.

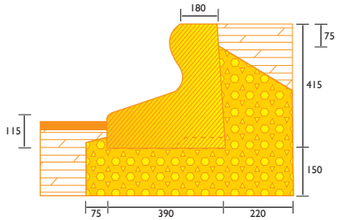
Applications

By blending OPC and selected fine aggregates giving a high white finish, Camel Kerbs are highly visible and act as a strong deterrent to all drivers. Each kerb weighs a quarter of a tonne and are ideally suited to protecting areas where vehicles are moving in close proximity to buildings, pedestrians, vulnerable installations, fuel pumps, walls and drops. Also on highways around bends, roundabouts, traffic calming chicanes, and over bridges. Camel Kerbs offer a permanent solution to misdirected traffic and are a very cost effective means of protecting bridge parapets.

Profile options

Standard Profile **Shallow Profile** **Extra Deep**

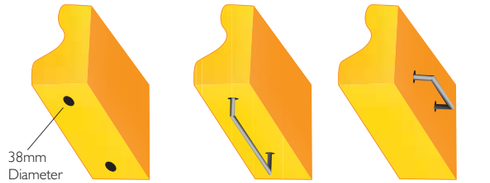
We also offer a complimentary design service with FREE on site support and a rapid response service. Lifting clamps are also available should you require.



BS7263 (1994) Complies with all the relevant specifications Transverse strength specification exceeded by 70%

Services

Camel can offer a unique service of producing one off kerbs of any length radius or angle to suit any design. Camel even produce extra deep kerbs where drainage falls have to be accommodated, shallow profile where foundation depth is limited and all kerbs are available with dowel holes and or re-bar if required.

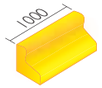


Dowel Holes **Re bar in base** **Re bar in backface**

Product Range

Camel Kerbs are available in a comprehensive range of lengths, radii, drop and quadrant kerbs. The range is so comprehensive that gaps need never exceed 5mm. The Camel radius kerbs range from 1m radius to 76 m radius. Standard units are 1000mm long providing better value and more coverage per unit.

Straight Kerbs



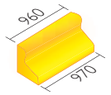
1000ST (250kg)

600ST (150kg)

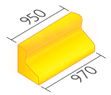
400ST (100kg)

Specials can be produced to any length up to 1000mm

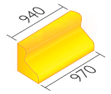
External Radius



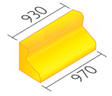
ER76-25 (242kg)
No. per 1/4 circle: 122-40



ER25-15 (241kg)
No. per 1/4 circle: 40-24

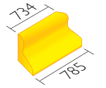


ER15-11 (239kg)
No. per 1/4 circle: 24-18

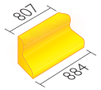


ER11-8.5 (238kg)
No. per 1/4 circle: 18-14

ER7.5 (210kg)
No. per 1/4 circle: 14



ER6 (194kg)
No. per 1/4 circle: 12



ER4.5 (223kg)
No. per 1/4 circle: 8

ER3 (135kg)
No. per 1/4 circle: 8

ER2 (90kg)
No. per 1/4 circle: 8

ER1.5 (80kg)
No. per 1/4 circle: 6

ER1.2 (70kg)
No. per 1/4 circle: 5

ER1 (60kg)
No. per 1/4 circle: 4

Containment Kerbs

Quadrants

135° Quad (165kg)

120° Quad (150kg)

90° Quad (135kg)

60° Quad (108kg)

45° Quad (90kg)

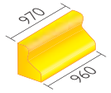
Int. Quadrants

400 INT90°

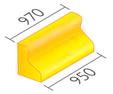
INT45°

Specials can be produced to any angle or any length up to 1000mm

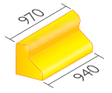
Internal Radius



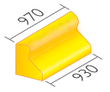
IR76-25 (242kg)
No. per 1/4 circle: 122-40



IR25-15 (241kg)
No. per 1/4 circle: 40-24

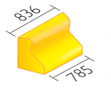


IR15-11 (239kg)
No. per 1/4 circle: 24-18

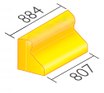


IR11-8.5 (238kg)
No. per 1/4 circle: 18-14

IR7.5 (210kg)
No. per 1/4 circle: 14



ER6 (180kg)
No. per 1/4 circle: 12



IR4.5 (223kg)
No. per 1/4 circle: 8

IR3 (135kg)
No. per 1/4 circle: 8

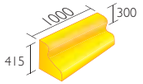
IR2 (90kg)
No. per 1/4 circle: 8

IR1.5 (80kg)
No. per 1/4 circle: 6

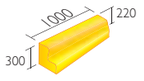
IR1.2 (70kg)
No. per 1/4 circle: 5

IR1 (60kg)
No. per 1/4 circle: 4

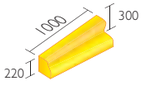
Drop Kerbs



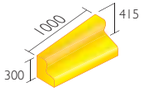
LARGE LHD (220kg)



SMALL LHD (135kg)



SMALL RHD (135kg)



LARGE RHD (220kg)

To match HB2

Camellet Kerbs

Built to the same very high standard as its parent the Camel Kerb, Camellet Kerbs are ideally suited to areas where a low kerb height is required, normally in lighter traffic areas. They offer the same solid reliability on the roadway, but in a more compact form. They provide a multi-purpose traffic management solution while creating stylish hard landscaping schemes ranging from protective barriers to directional measures.

Design

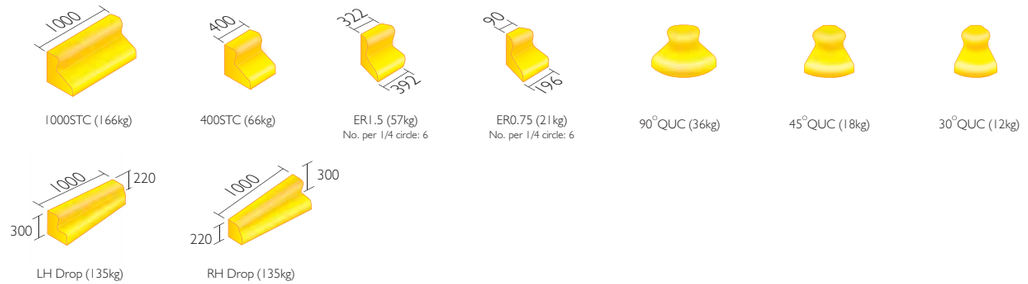
The Camellet Kerb is designed to protect verges and landscaped areas where a high degree of visual and physical traffic direction is needed, but in more residential areas where the Camel Kerb would look out of place. Its unique features include a ramped 'toe' and a concave recess profile. Its main objective is to redirect smaller vehicles to their correct path and protect vulnerable pedestrian areas.

Applications

Using the same blend as the Camel Kerb, the Camellet Kerb is designed to be used to prevent illegal parking, protect landscaped areas, separate carriageways at junctures, offer protection to pedestrians on pavements and at refuges and act as a visual deterrent to motorists.

Product Range

Our product range comes complete with a new radius range, quads and short lengths.



1000STC (166kg)

400STC (66kg)

ER1.5 (57kg)
No. per 1/4 circle: 6

ER0.75 (21kg)
No. per 1/4 circle: 6

90°QUC (36kg)

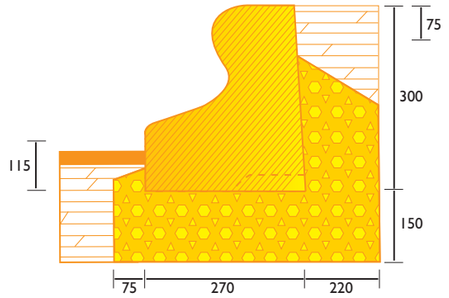
45°QUC (18kg)

30°QUC (12kg)

LH Drop (135kg)

RH Drop (135kg)

Profile



BS7263 (1994) Complies with all the relevant specifications Transverse strength specification exceeded by 70%

Dimensions
All dimensions in mm Haunching C7.5

COSHH
The inhalation of dust from cutting should be avoided

Manual handling
Lifting clamps should be used in conjunction with suitable lifting machinery

Manufacture
Wet cast compacted with pneumatic vibrating poker

Bus Stop Kerbs

Camel's Easilift bus stop kerb is the only guided bus kerb with a truly vertical face. Manufactured with Camel's renowned durable high strength 55kN/mm^2 concrete the Easilift kerb is the only kerb to offer superior edge strength combined with a tyre friendly intermediate face and graduated redirecting force as used on barriers complying with EN 1317-2 1998.





Health & Safety Laboratory

Easilift 160/180

Camel's Easilift Bus Stop Kerbs are available in special lengths and with radius and in 2 different profiles, 180 and 160, which are ideal for guided and non-guided busses. The kerbs are manufactured with a 200mm upper service to avoid the need for additional flags and maximises the high grip passenger landing area.

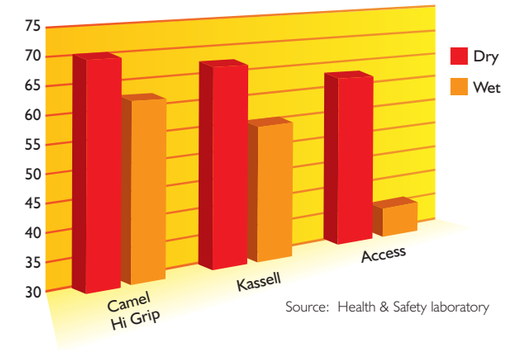
Design

Wet cast in precision stainless steel moulds using bright white aggregates, the kerbs are highly visible and encourage the busses approach.

Each unit is manufactured with a special non-slip surface that has been risk assessed and tested by the Health and Safety Executive for 'The assessment of pedestrian slip risk' in both dry and wet conditions. The kerbs achieved the highest reading in its class, showing a pendulum value in excess of 65 making it the safest bus stop kerb available. Drop kerbs can be painted yellow to aid driver awareness.


Safe Handling

Easilift Kerbs are specifically engineered for safe handling with a Halfen-Deha designed recessed lifting anchor that can be attached to any lifting machinery. There is no need for costly vacuum lifting apparatus which may not work on transition units. The anchor mechanism complies with the manual handling regulations, even on drop kerbs.

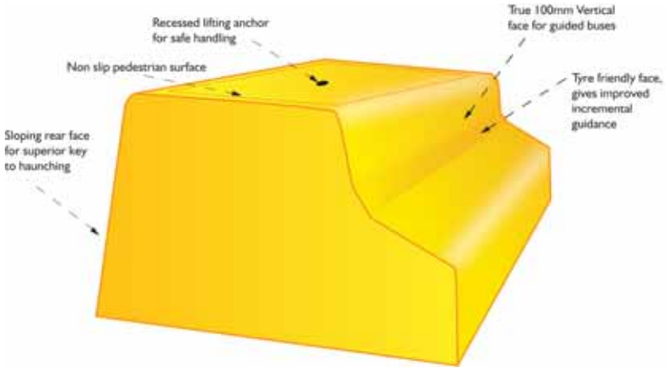


Source: Health & Safety laboratory

Health & Safety Laboratory

Manufacture

By having a very smooth finish Camel Kerbs are more effective at redirecting traffic by returning more energy laterally into the sidewall of the vehicles tyre minimising the possibility of the vehicle climbing over. Furthermore the smooth lower inclined faces encourage the tyre to slip back onto its intended path. A 3 degree slope on the back face ensures long term stability. Combining these features ensures the best possible impact absorption.



200mm non slip upper surface avoids the need for additional flags

200mm Hi grip pedestrian surface as recommended by Health & Safety Executive

Rapidlift by HALFEN-DEHA

Complies with manual handling regulations even on drop kerbs

Installation made safe & Easi

Easi Lift Anchor incorporated into kerb

Lifting clamp for safe and Easi use

Product Range

All products are available in 160/180 sizes. Please specify on order.

Right Hand Drop 1000mm 160kg

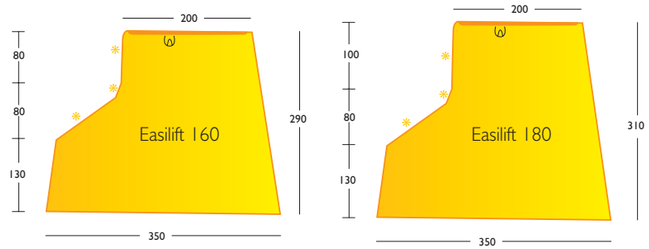
Left Hand Drop 1000mm 160kg

Standard Unit 1000mm 190kg

45º Quadrant

90º Quadrant

Easilift 160/180



* 3 combined faces providing incremental guidance to guided and non guided buses

Drop kerbs can be painted yellow to aid driver awareness

Internal/External

30° Internal Radius

30° External Radius

60° Internal Radius

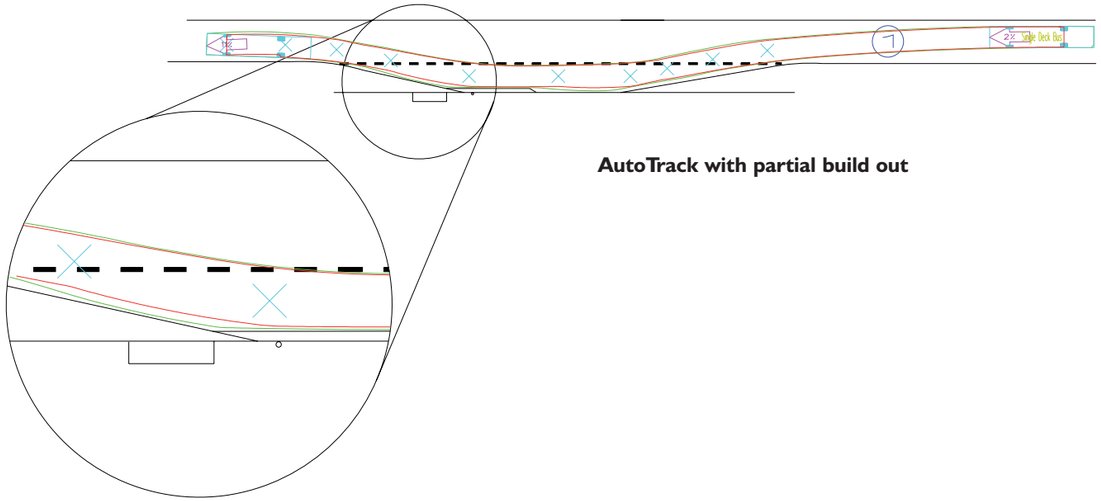
60° External Radius

90° Internal Quadrant

45° Internal Quadrant

Bus Lay-by Design

With consulting partners Camel can assist in bus lay-by design. Ensuring ease of docking for drivers, convenience for passengers and improved productivity for operators.



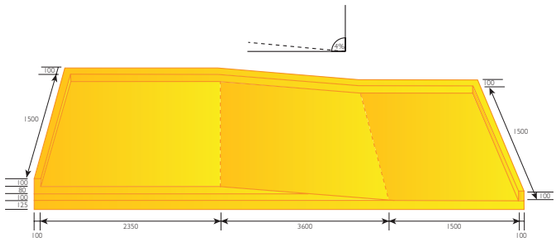
AutoTrack with partial build out

Rural

Camel's unique 'Rural Bus Stop' system has been designed with both the passenger and the contractor in mind. The system is ideal for situations where there is no existing infrastructure. The system has been designed to provide a cost effective Bus Stop that complies with the Disability Discrimination Act. Separate, modular sections combined with Camel's easi lift system, allow for fast, efficient, safe installation.

The anchor mechanism on the easi lift system complies with manual handling regulations and provides a more cost and time effective solution. High tensile steel bars cast into the base of each unit ensures a robust fixing into the concrete bed. Unit is complete with a hole for flag fixing and all units have a perimeter wall for passenger safety.

Design



Railway

Camel are a registered Link Up supplier allowing our Railway Products to be used throughout Network Rail and the London Underground. Our platform copings can be supplied in various standard sizes and we can also offer a bespoke manufacturing option. Our range of products includes offset tactile and oversail blocks.

Platform Copings

Design

Camel's rail products are manufactured using our renowned durable high strength 55kN/mm^2 in accordance with BS8110 and to Network Rails individual specification. All platform copings and tactile products adhere to BS7976 regarding pendulum accredited slip resistance.

Handling and Installation

Camel would recommend the use of a vacuum lifter in accordance with HSE guidelines to position products when on site. The base should be a standard sand/cement mortar base and a dowel rod should be used where necessary when laying platform copings.

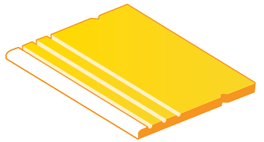
Colour

Alternative sizes, colours and finishes are available on request as specified by customer.

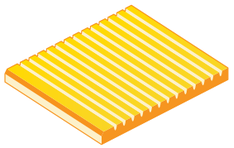
Product data

Size (mm)	930x760	1160x760	1219x914
Thickness (mm)	100	100	100
Weight per unit (approx kg)	170	215	270

Light rail platform copings



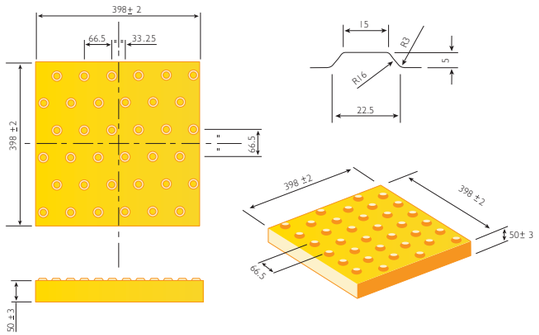
London Underground copings



Offset Tactile Paving

Design

The profile of the platform edge warning paving surface consists of offset rows of flat topped domes.
Manufactured in accordance with BS EN 1339.



Oversail Blocks

Design

Oversail blocks are manufactured using a wet cast process.
These are made to order to each individual customer requirements.

Retaining Walls

Bridge Parapets

Service Protection

Case Study

Contractor: Galliford Try
Camel Concrete Products has successfully supplied concrete troughs1250x750x1000 class 4 and 1250x750x500 class 4 lids to Galliford Try at New Liverpool Museum, Mann Island, Liverpool. Camel worked very closely with Galliford Try regarding the unit specification and to ensure the product was delivered to the sites exact requirements.

> “Camel supplied an excellent product which offered Galliford Try a cost effective solution. This was supported with a professional service and on time deliveries.”
>
> - Steve Begley, Galliford Try

Camel Barriers

Camel offer a wide range of standard and bespoke concrete barriers these can be used as an easy solution to preventing unauthorised vehicular access to unoccupied sites or vacant land. Also our research shows how effective these specially designed units can be in the prevention against terrorist attacks by protecting gatehouses, entrances to military, political and major public areas also as a deterrent on the perimeters of airports.

Design

Camel products were chosen to supply bespoke crash barriers for Manchester Airport following the terrorist attacks in Glasgow.
We are also developing specialist concrete barriers which will disable any vehicle's wheel base should it be driven directly at the barriers. It has been proven that standard containment kerb would not stop certain 4 x 4 vehicles if driven with the purpose to breach the containment kerb.

Applications

- Airports
- Military Facilities
- Political Establishment
- Nuclear Power Plants
- Major Public Buildings
- Sporting Venues

"We are delighted with the professional service and quality product supplied by Camel."

- Mark Henry, R&M Developments, Manchester Airport

Troughs and Lids

Camel products produce a wide range of concrete troughs and lids varying from light duty cable protection to Class 4 heavy duty specification.
Our trough and lid system offers complete protection to services and utilities compared to alternative methods of overheard suspension or direct bury solutions and can be made to any size or dimensions to meet customer's demands. For further information, please contact us.

Design

Camel troughs and lids are manufactured using a wet cast process using a 55kn/mm2 standard of concrete to BS 8110. All lifting equipment required for the relative trough or lid are supplied and tested by DEHA/Halfen. All standard sizes are listed but bespoke sizes can be manufactured. We can also offer a range of accessories including 45 and 90 degree corners along with T junction units.

Applications

- Water Treatment Works
- Electrical Installations
- Military Installations
- Gas, Oil and Chemical Plants
- Industrial and Commercial Developments
- Motorways and Roads
- Railway Developments
- Prisons
- Docks and Harbours
- Educational, Sport and Leisure Developments
- Supermarkets / Petrol Stations

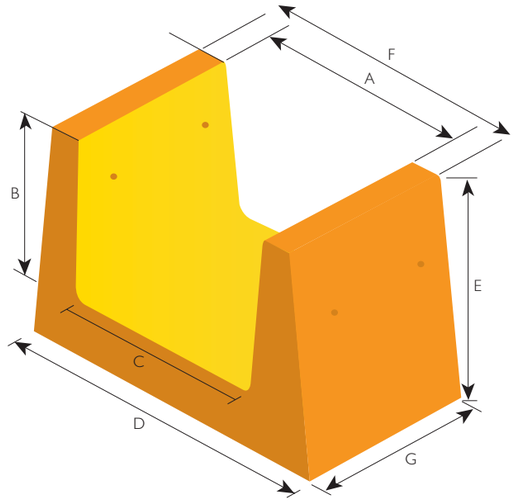
Rapidlift by HALFEN-DEHA
Complies with manual handling regulations even on drop kerbs

Troughs and Lids

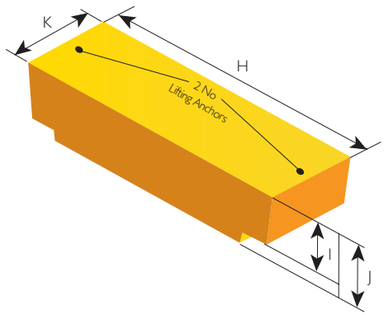
Product Selection

When selecting the required trough and lid combination you should firstly consider the internal dimension to ensure the required access to the services is available.

You should then consider the trafficking requirements and location. Also will the lids require lifting eyes.



Camel Troughs can be made to any size and loading



Camel Lids can be made to any size and loading

Notes:

1. Nominal cover to reinforcement to be 30mm
2. Units to be manufactured in accordance with BS8110
3. **Concrete mix design**
   Lids: Min grade C55/10
   Min Cement content 475kg/cu.M (OPC)
   Exposure condition: Moderate
   Troughs: min grade C55/10
   Min cement content 475kg/cu.M (OPC)
   Exposure condition: Moderate
4. **Concrete finishes**
   Lids: Ex steel mould finish
   To soffit and sides. Top face brushed finish
5. 2 no Halfen universal stainless steel anchors in lids.

Product List

All products available in Classes 1-4

	Troughs (mm)							Lids (mm)			
	A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**
1250 Series											
1250 x 750	1307	770	1203	1600	910	1487	1000	1527	250	270	500
1250 x 500	1277	520	1203	1600	660	1517	1000	1557	250	270	500
1250 x 250	1247	270	1203	1600	410	1547	1000	1587	250	270	500
1000 Series											
1000 x 1000	1000	1000	880	1360	1130	1200	1000	1240	250	270	500
1000 x 750	970	750	880	1360	880	1230	1000	1270	250	270	500
1000 x 500	940	500	880	1360	630	1260	1000	1300	250	270	500
1000 x 250	910	250	880	1360	380	1290	1000	1330	250	270	500
750 Series											
750 x 750	750	770	660	1140	900	930	1000	970	250	270	500
750 x 500	720	520	660	1140	650	960	1000	1000	250	270	500
750 x 250	690	270	660	1140	400	990	1000	1030	250	270	500
500 Series											
500 x 500	500	520	440	900	650	680	1000	720	250	270	500
500 x 250	470	270	440	900	400	710	1000	750	250	270	500
350 Series											
350 x 300	350	320	320	740	450	530	1000	570	250	270	500

Trafficking application classes

Indicates that a product is suitable for a particular application.

Class 1: Pedestrian areas e.g. footways, walkways and cycle tracks.

Class 2: Private driveways and grassed areas e.g. parkland maintained with mowing equipment.

Class 3: Car parks and access roads subject to occasional commercial vehicle traffic.

Class 4: Lorry parks and kerbside (non-public highways) i.e. All road going vehicles at 15 mph max.

Bespoke Services

Camel has a wealth of experience in the pre-cast market and can manufacture bespoke concrete products to almost any shape or size using precision steel moulds that ensure complete accuracy. Our state of the art facility in Wakefield has the capabilities to manufacture concrete strengths of up to 85N/mm^2 and can handle weights of up to 15 tonnes with our overhead craneage system. With our robust quality control system, only the finest aggregates are used in the production process.





Our Services

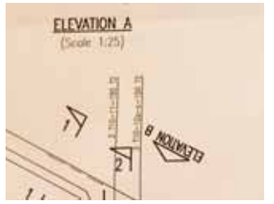
Our long standing partnerships with stainless steel, mild steel, fibreglass and timber mould manufacturers combined with our in-house design and planning service ensures each new project benefits from the ideal mould solution.
Camel has been involved from design to fitting of many bridge installations across the UK and has a wealth of experience in this field. Using bespoke moulding and high tensile reinforcing. The capabilities are endless.

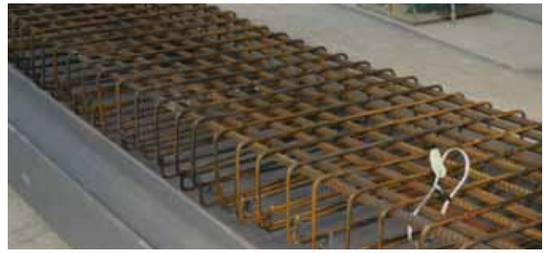
Further Solutions

- State of the Art Mould Production Facilities
- Precision Steel Moulds
- Overhead Craneage System
- Welding
- Manufacture
- Lifting Solutions
- Precision
- Reinforcing
- Assembly

> “Camel provided a high quality, cost effective solution and delivered two weeks ahead of schedule.”
>
> - Jim Mercer, Hewlett Civil Engineering.





Case Studies

New River Wharf Bridge
A1(M) Wetherby

HIGHWAYS AGENCY

"The parapet units had one of the best finishes I have ever seen."
- John Atkinson, Balfour Beatty.

Pre-cast concrete angled column bases of new apartment block in Stalybridge

"Everytime the client modified the design, Camel accommodated the changes and still delivered on time. To achieve the desired finish and shape an offsite solution was required." - Chris Joynes, Urban Splash.

Retaining Walls

Design

Camel manufacture Retaining Wall Systems to meet client requirements. Using latest reinforcing technology fast turnaround of orders can be achieved. Under our ISO 9001 accredited process quality and customer satisfaction can be assured.

HIGHWAYS AGENCY

Network Rail

REGISTERED SUPPLIER LINK-UP

British Waterways

Brico

Brico is a new 'lego' like product that makes building temporary or permanent structures easier and more time efficient. It is available in a number of formats and with varying finishes. The units are available for either purchase or we offer a rental option.

Design

Manufactured with Camel's renowned durable high strength 55kN/mm^2 concrete incorporating a peg design for simple application, Brico has a positive mechanical interlock between components. Vertical dowel holes align to allow high tensile steel re-bars to pass down the entire wall and be grouted into place. Components are also available with reinforcing cast into rear and /or end faces, drainage holes or built in gate hinges. Taper units provide a slanting solution while coping units make for a more aesthetically pleasing look. A built in anchor system allows for safe handling and easy installation.

Applications

Brico is manufactured in units ranging from half 4 peg to standard 8 peg with both taper and coping units acting as finishes. Although the length and depth vary, the width remains at a constant 600mm. The system can be used in applications such as vertical retaining walls, battered retaining walls, aggregate bays, salt bays, perimeter security walling or bridge abutments and can be bought or rented.

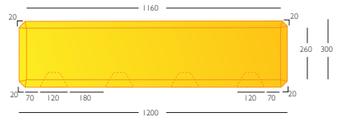
Options

Each unit is available with rebar inserted on the back face and/or vertical dowel holes (40mm) cast from top to bottom. These can be used to reinforce more permanent structures with high tensile reinforcing which would be grouted into place.

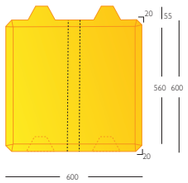
Product Range

Rapidlift by HALFEN-DEHA
Complies with manual handling regulations even on drop kerbs

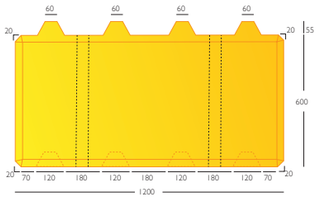
Coping Unit Mass 500kg



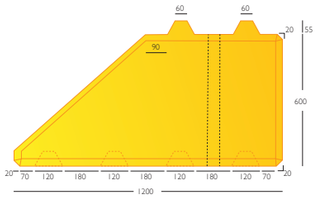
Half Unit Mass 500kg



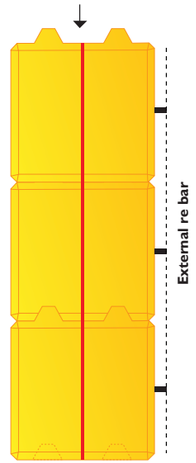
Standard Unit Mass 1000kg



Taper Unit Mass 750kg



Internal re bar



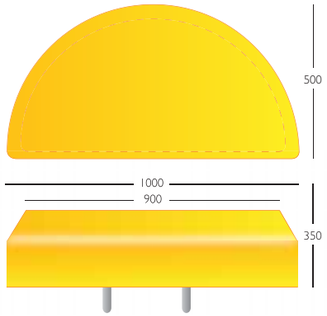
Stack using internal or external re bar

Specialist Products

Fuel Island

Design

- Protects Fuel pump installations
- Visual deterrent
- Safe handling is built in
- Manufactured with Camel's renowned durable high strength 55kN/mm^2 concrete
- Superior edge strength
- Wet cast in precision steel moulds
- Bright white aggregates make Camel's Kerbs highly visible
- Available with high tensile re-bar in the base



Fuel Islands Kerb 350kg

Passenger Refuge

Design

Bespoke off-site solution which provides maximum protection for pedestrians while reducing traffic management and labour during installation.

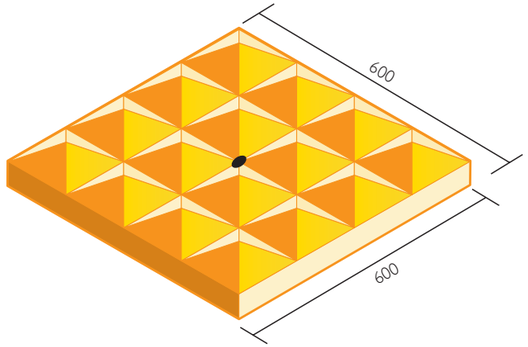
With ducting and lifting inserts cast in, a uniform, durable and efficient refuge is quickly installed.

Deterant Paving

Camel's Deterent paving is designed to be used to discourage pedestrian and vehicular over run to particular areas of a site. In particular allowing the distinct demarcation between a pedestrian walkway and trafficked area.

Design

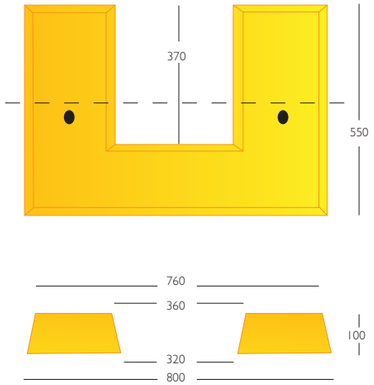
Deterrent paving is manufactured with a 600x600 plan size and 75mm thickness with a surface pyramid pattern.
Camel includes a counter-sunk lifting anchor for safe handling.



Gully Reducer

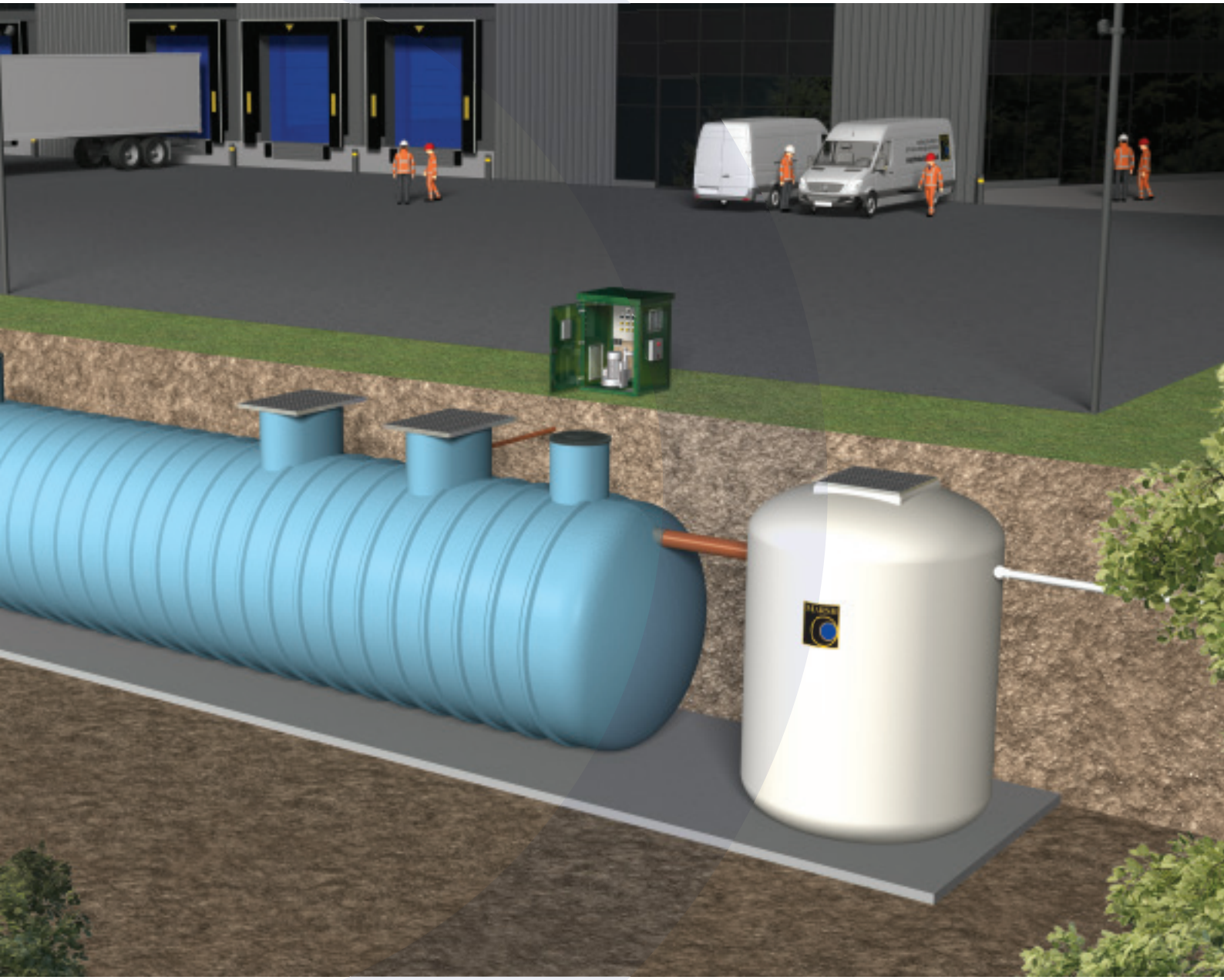
Design

- More cost effective than engineering bricks
- Gully need not be buried so deeply
- Reduce traffic management costs
- Far quicker to install
- Steel reinforced
- Made from 55N/mm sq concrete
- Immediately traffic ready
- No need to disturb kerb or footpath
- Superior resistance to HGV loadings
- Safe handling is built in with Camel's easilift system
- Other Sizes available on request



MARSH CIVILS

WATER AND WASTEWATER TREATMENT SOLUTIONS



Achilles UVDB SILVER PLUS

NBS Source PARTNER

SpecifiedBy

MADE IN BRITAIN®

MARSH CIVILS

DELIVERING CONFIDENCE

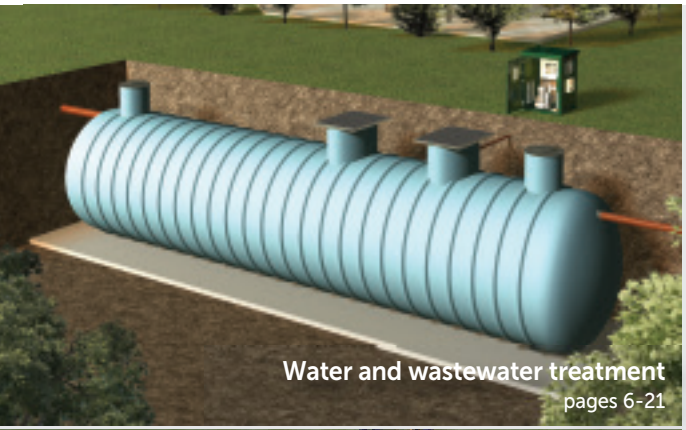
As a trusted UK water and wastewater solution provider and a support team with extensive civils experience, we can help you and your team deliver project confidence.

- Fully accredited and certified water and wastewater treatment solutions
- High quality British manufacturing
- Flexible production capacity
- BIM/CAD materials support
- Wide-ranging civils project experience
- End-to-end customer service

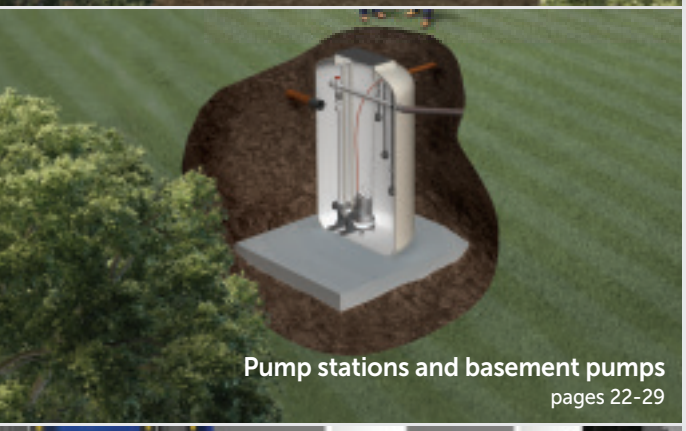
www.marshcivils.co.uk

Achilles UVDB SILVER PLUS · NBS Source PARTNER · SpecifiedBy · BRITISH WATER MEMBER · Member of Future Water Association · Future Water Association · Informing, Innovating, Influencing · MADE IN BRITAIN

> Marsh's experienced and knowledgeable team promptly and accurately interpret our requirements. We put full confidence in Marsh from pricing to completion for all our project requirements.
>
> *– Client testimonial*



Water and wastewater treatment
pages 6-21



Pump stations and basement pumps
pages 22-29

Oil separators
pages 30-39

Water and **wastewater** treatment products

“

Very happy with the team’s service and I feel confident in the product that has been specified.

– Client testimonial

> Early engagement with the Marsh Civils team can bring product optimisation and cost savings. We recommend getting in touch as soon as possible.

Project management

With extensive experience of managing the design, manufacture and despatch of pump stations, sewage treatment plants, attenuation tanks, rainwater harvesting systems and associated products, the Marsh Civils team works closely with clients to ensure projects are delivered on time and on budget.

The company trains its team to recognised competency standards to address the growing management requirements, from order placement through to delivery and installation.

All products are backed by Marsh Industries' commercial and technical support.

Post-installation and commissioning visits are available, together with service and maintenance contracts if required.

Gaia Sege© Process design software

Developed by Marsh Industries, the unique Gaia Sege process design software uses core information to accurately calculate and tailor key variables, ensuring total optimisation for individual applications.

These precise calculations provide assurance to consultants, engineers, specifiers and contractors that the system is specifically designed to meet the appropriate standards of regulatory bodies.

Sewage treatment plants

For sewage treatment plants, the programme employs core process equations to precisely calculate and modify critical variables, ensuring total processing optimisation for Biological Oxygen Demand (BOD), Total Suspended Solids (TSS) and Ammonia (NH_4) reduction and removal.

Gaia Sege software also uses 'British Water Flows & Loads' data to calculate initial flows and loadings whilst also calculating peak flows and levels.

The programme can also calculate accurate sludge generation and storage on a daily basis, dependent upon final effluent standards required, ensuring the optimisation of primary chambers, individual clarifiers, diffused oxygen feed and final settlement chamber.

Pump chambers

Gaia Sege utilises current building regulations to calculate precise storage chamber sizes. Pump systems are determined by using friction head loss calculations based on minimum self-cleansing velocities in order to specify the best possible pump(s) for the application.

Grease traps

Appropriate grease trap sizes are generated by accounting for the amount of grease and flow generated from the grease producing facility whilst providing adequate retention time befitting of these variables.

Water attenuation tanks

Marsh Industries' rainfall storage sizing programme, Gaia Storm Dammer, can simulate the calculated flood storage required for any prolonged period within a set geographic area (ie, 1 in 5 year or 1 in 100 year rainfall).

BIM/CAD library

We host a wide range of product downloads for architects, engineers, consultants and specifiers, including BIM files (RFA files), DWG CAD files and other supporting documentation. All files are available to download at www.marshcivils.co.uk.

We also host a full technical library featuring all product information, specifications and certification.

Structural integrity testing

Structural integrity tests, performed in accordance with EN ISO 179-1/1eA: 2010-11, were undertaken to evaluate the strength of Marsh Industries' GRP materials against similar GRP materials used by other manufacturers.

Three separate material samples were submitted for impact testing; Marsh GRP material (virgin unfilled resin), a GRP material containing calcium fillers and a GRP material containing sand filler.

The tests involved 12 samples of each material at a size of 80x10x5mm. The nominal pendulum energy was 15J at an impact velocity of 3.8m/s.

Results proved Marsh GRP material to be 40% stronger than the other materials tested.

Tank sizing and specification

For precise sizing and product specification, please contact the Marsh Civils team on 01933 829470 or email contracts@marshindustries.co.uk

Fire resistance testing

Fire resistance testing was performed to assess ignitability of products subjected to direct impingement of flame. Marsh Industries' GRP material passed all practical testing to achieve EN ISO 11925-2:2010 standard.

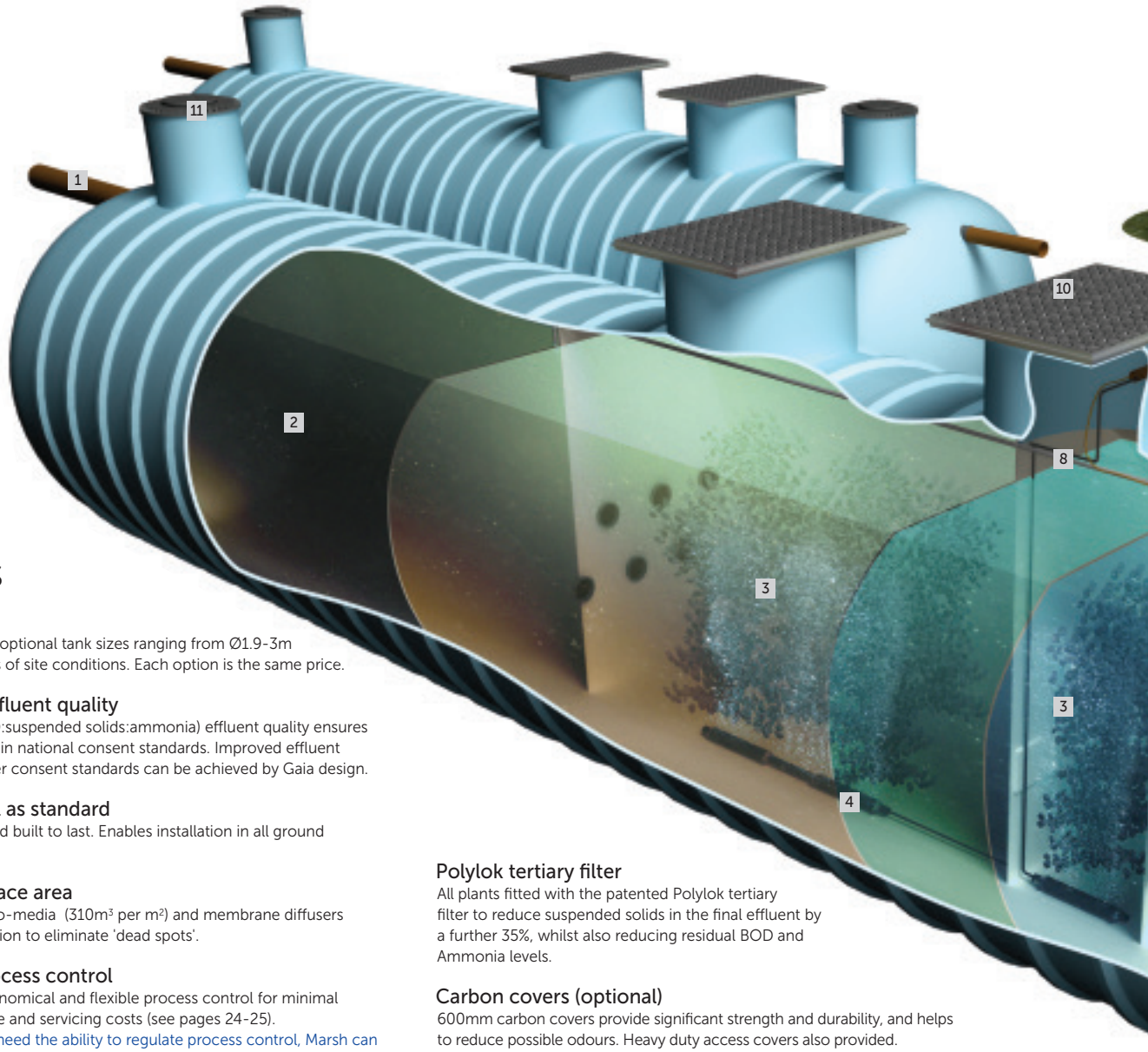
Ultra:Polylok™
Sewage treatment plants
Advanced biological processing for off-mains wastewater

Overview

Marsh Ultra Polylok sewage treatment systems provide advanced biological treatment to off-mains wastewater on sites ranging from 50-500PE.

The units are ideally suited for large residential, commercial, industrial and leisure sites - particularly where onerous consent standards preclude the use of standard 'off the shelf' units.

Proven reliability of the simple but effective Submerged Aeration Filtration (SAF-MBBR) system offers both operating and financial benefits when compared to more complex alternatives that require frequent servicing and maintenance to sustain performance.



Benefits

Plant sizing
Bespoke design with optional tank sizes ranging from Ø1.9-3m satisfies the demands of site conditions. Each option is the same price.

Class-leading effluent quality
20:30:20mg/ltr (BOD:suspended solids:ammonia) effluent quality ensures discharge is well within national consent standards. Improved effluent quality to meet tighter consent standards can be achieved by Gaia design.

Heavy duty shell as standard
Structurally sound and built to last. Enables installation in all ground conditions.

High media surface area
High specification bio-media (310m^3 per m^2) and membrane diffusers provide even circulation to eliminate 'dead spots'.

Eco-friendly process control
Energy-efficient, economical and flexible process control for minimal running, maintenance and servicing costs (see pages 24-25).
For sites that do not need the ability to regulate process control, Marsh can offer diaphragm compressors for sewage treatment plants up to 150PE

Internal recirculation
Continues the treatment process to provide higher effluent quality whilst balancing flow over 24 hour period or periods of intermittent use.

Polylok tertiary filter
All plants fitted with the patented Polylok tertiary filter to reduce suspended solids in the final effluent by a further 35%, whilst also reducing residual BOD and Ammonia levels.

Carbon covers (optional)
600mm carbon covers provide significant strength and durability, and helps to reduce possible odours. Heavy duty access covers also provided.

Optional extras
Optional extras include extensions for deep installations, pumped outlets for sites with adverse levels, sample chambers, Degrilleur trash barriers, phosphate reduction and UV treatment chambers.

Key

1 Inlet
2 Primary chamber
3 Aeration chambers
4 Air diffusers
5 Final (or 'humus') chamber
6 Polylok filter
7 Outlet
8 Recirculation to primary chamber
9 Turret guard
10 Heavy duty access covers
11 Carbon covers (optional)
12 High level alarm
13 Eco-friendly process contol
14 Control kiosk

This is not a typical tank installation. Configuration and components are shown for illustration purposes only

Tank sizing

Developed by Marsh Industries, the unique Gaia Sege process design software uses core information to accurately calculate and tailor key variables, ensuring total system optimisation for individual applications.

These precise calculations provide assurance to consultants, engineers, specifiers and contractors that the system is specifically designed to meet the appropriate standards of regulatory bodies.

For Ultra:Polylok sewage treatment plants, the programme employs core process equations to precisely calculate and modify critical variables, ensuring total processing optimisation for Biological Oxygen Demand (BOD), Total Suspended Solids (TSS) and Ammonia (NH_4) reduction and removal.

Gaia Sege software also uses 'British Water Flows & Loads' data to calculate initial flows and loadings whilst also calculating peak flows and levels.

The programme can also calculate accurate sludge generation and storage on a daily basis, dependent upon final effluent standards required, ensuring the optimisation of primary chambers, individual clarifiers, diffused oxygen feed and final settlement chamber.

GRP kiosks

Marsh GRP kiosks provide safe and secure storage of electrical control panels and other tank monitoring equipment.

The kiosks are typically fitted with one or two doors, depending on kiosk size, with stainless steel vents and yale locks.

Energy-efficient, **economical** and **flexible** process control for Ultra:Polylok™ sewage treatment plants

Efficiency

Air blower speed/output is controlled using a variable speed 'drive' which supplies the precise amount of air required to enable the sewage treatment plant to function efficiently.

Optimisation of the air blower output results in improved running costs, meaning the end user can be assured they have the most economical solution for their wastewater system. This is a unique feature when it comes to overall energy-efficiency as most process control kiosks currently available within the industry have a one size fits all approach.

Flexibility

These next generation process control kiosks are built with flexibility in mind. Additional control options can be programmed into the 'drive' to regulate the volume of air delivered to the sewage treatment plant for different periods. This can be particularly beneficial for seasonal applications such as campsites, caravan parks, lodges or hotels where they may operate at peak capacity for short periods of the year. This functionality permits the volume of air to be increased or reduced, depending on the amount of people to be accommodated, thereby offering the end-user the ability to further reduce energy and running costs.

In addition, the process control kiosk allows for system expansion in the case of business/site growth (subject to design), thus eliminating the need to install extra tanks, pipework, air blowers, etc.

Noise reduction

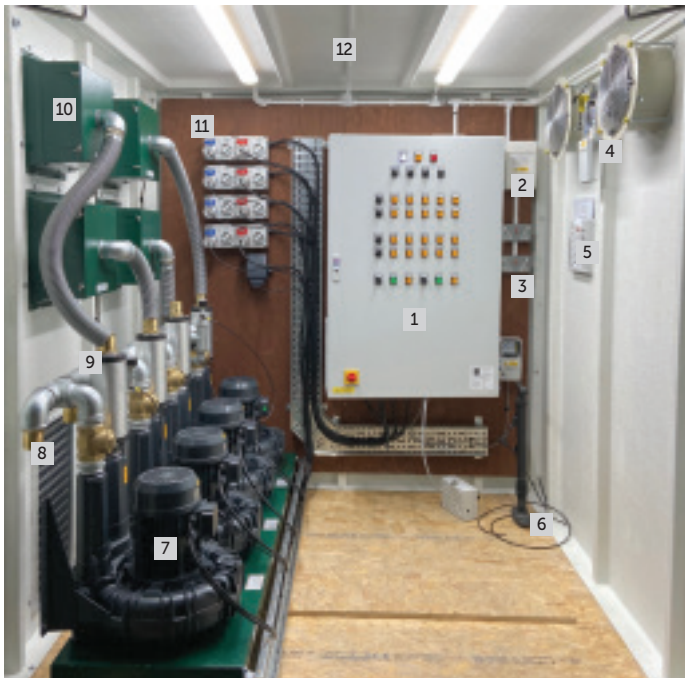
We believe these kiosks to be the quietest on the market. They are fitted with a number of noise reduction measures as standard, making them ideal for caravan parks, campsites, etc, subject to kiosk placement/location. This may reduce the need for creating barriers or planting to restrict noise.

Further noise reduction measures can be added through the use of acoustic PUNF foam linings and various acoustic noise absorbing baffles. This not only reduces noise, but also enables the kiosk to be placed in a more convenient location, on sites where space is at a premium (the recommended distance from the sewage treatment plant should be 10m).

Specification/costs of noise reduction options, including measured decibel levels at a given distance from the kiosk, can be supplied on request.

Features

- **Powder coated, mild steel or GRP kiosk (Green - RAL6005)**
  The kiosk protects the motor and controls from the elements
- **Forced ventilation, including ambient temperature control**
  A ventilation fan/thermostat maintains the optimal ambient temperature in accordance with the air blower manufacturer's specifications
- **Thermal protection on motors**
  Protects the motor windings from overheating, increasing the reliability and lifespan of the motor
- **Electrical overload and short circuit protection**
  As required by electrical regulations
- **Air intake filter maintenance alarm**
  Alerts the end-user when the intake filter needs cleaning/replacing
- **High pressure alarm**
  Alerts the end user if the system design pressure has been exceeded, typically suggesting a blockage or restriction in the pipework
- **Low pressure alarm**
  Alerts the end user if the system design pressure is low, typically suggesting a leakage in the pipework
- **Standard acoustic attenuation including air intake silencer and external acoustic hood**
  Reduces noise from the blower motor and air intake



Key

1 Electrical control panel
2 Kiosk lighting and power DB
3 230v RCD sockets
4 Kiosk ventilation fans/thermostat control box
5 Electrical panel drawings and documents
6 Test equipment (for use when commissioning)
7 Aeration blowers
8 Pipe manifold including 50mm outlets and return valves
9 Air intake silencer
10 Aeration blower intake filter
11 Blower power and control outlets
12 Kiosk lighting

Specifications

Ultra:Polylok		Kiosk					
Model	People served	Height	Width	Depth	Power rating Kw	Recommended electrical supply 230v	Recommended electrical supply 400v
UP55	55	1350	850	500	0.8	230v SP&N 16A type C/D MCB	400v TP&N 10A type C/D MCB
UP75	75	1350	850	500	0.8	230v SP&N 16A type C/D MCB	400v TP&N 10A type C/D MCB
UP100	100	1350	850	500	1.1	230v SP&N 20A type C/D MCB	400v TP&N 16A type C/D MCB
UP125	125	1350	850	500	1.1	230v SP&N 20A type C/D MCB	400v TP&N 16A type C/D MCB
UP150	150	1350	850	500	1.1	230v SP&N 20A type C/D MCB	400v TP&N 16A type C/D MCB
UP175	175	1350	850	500	1.1	230v SP&N 16A type C/D MCB	400v TP&N 16A type C/D MCB
UP200	200	1350	850	500	1.5	230v SP&N 25A type C/D MCB	400v TP&N 20A type C/D MCB
UP225	225	1350	850	500	1.5	230v SP&N 25A type C/D MCB	400v TP&N 20A type C/D MCB
UP250	250	1350	850	500	2.2	230v SP&N 40A type C/D MCB	400v TP&N 32A type C/D MCB
UP275	275	1350	850	500	2.2	230v SP&N 40A type C/D MCB	400v TP&N 32A type C/D MCB
UP300	300	1350	850	500	3.0	230v SP&N 50A type C/D MCB	400v TP&N 40A type C/D MCB
UP325	325	1450	950	500	3.0	230v SP&N 50A type C/D MCB	400v TP&N 40A type C/D MCB
UP350	350	1450	950	500	3.0	230v SP&N 50A type C/D MCB	400v TP&N 40A type C/D MCB
UP375	375	1450	950	500	3.0	230v SP&N 50A type C/D MCB	400v TP&N 40A type C/D MCB

Notes:
> *The dimensions given on this page are for guidance only*
> *For precise kiosk and Ultra:Polylok sewage treatment plant sizes and configurations, please contact Marsh Civils*
> *All dimensions in mm*

Maintenance

Our engineers will advise on the appropriate maintenance plan once the site installation has been completed, however the process controls installed within the kiosk are designed to alert you to any imminent maintenance required on the system.

Installation

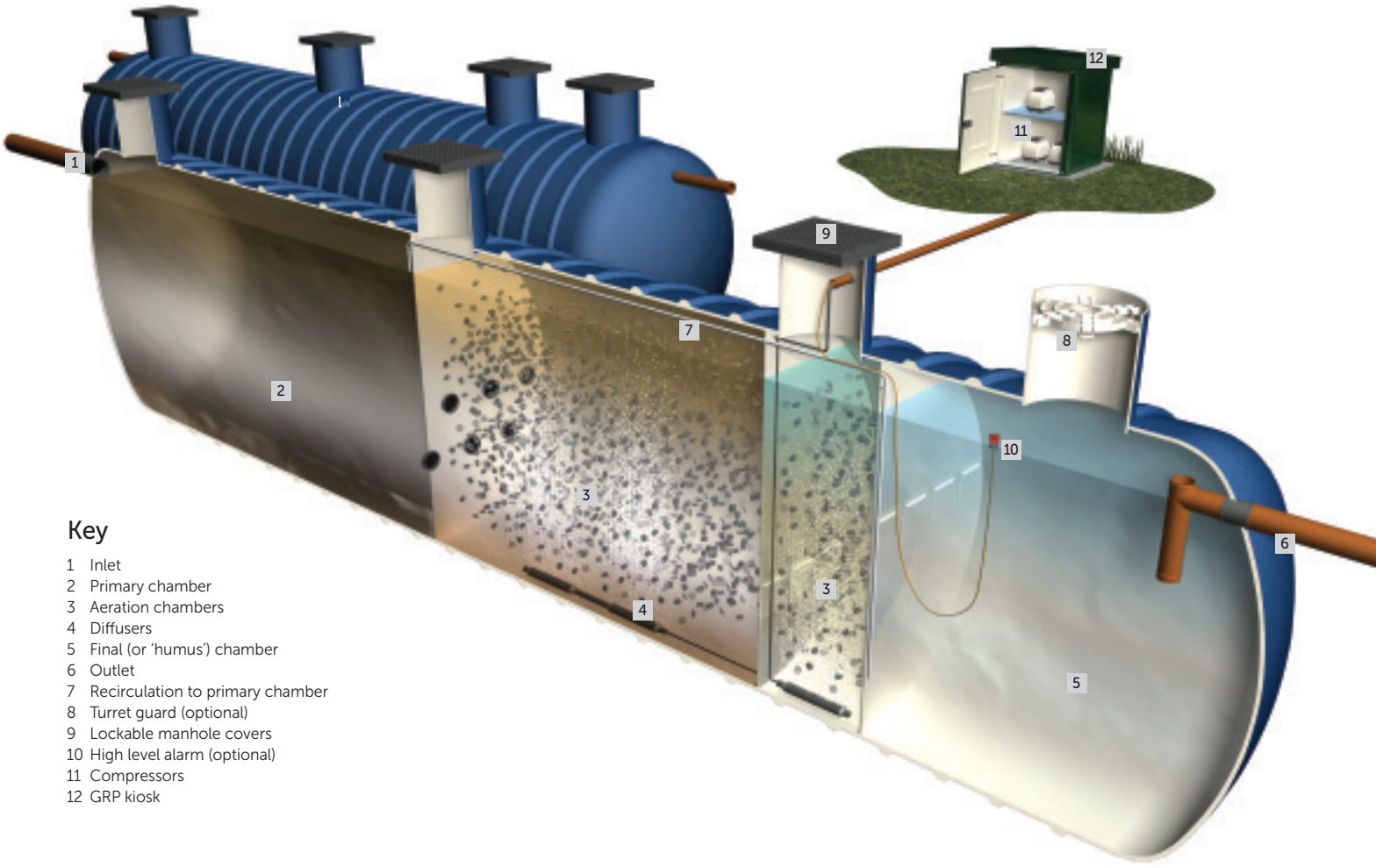
All kiosks are supplied fully assembled, tested and ready for installation. An electrical supply/connection to the kiosk should be all that is required on site (electrical supply requirements will be supplied upon kiosk specification).

Marsh:Standard
Cost-effective sewage treatment
Biological processing for off-mains wastewater

Overview

Marsh:Standard cost-effective sewage treatment systems provide biological treatment to off-mains wastewater on large residential, commercial, industrial and leisure sites ranging from 50-300+PE.

Proven reliability of the simple but effective Submerged Aeration Filtration (SAF-MBBR) system offers both operating and financial benefits when compared to more complex and expensive alternatives that require frequent servicing and maintenance to sustain performance.



Key

1 Inlet
2 Primary chamber
3 Aeration chambers
4 Diffusers
5 Final (or 'humus') chamber
6 Outlet
7 Recirculation to primary chamber
8 Turret guard (optional)
9 Lockable manhole covers
10 High level alarm (optional)
11 Compressors
12 GRP kiosk

This is not a typical tank installation. Configuration and components are shown for illustration purposes only

Benefits

Plant sizing
Designed to BS12255, systems are available from 50-300+ PE in sizes ranging from Ø2.5-3m satisfying the demands of virtually all site conditions.

Class-leading effluent quality
Designed to British Water loadings (150litres per person, 60mg BOD litre and 8mg/litre Ammonia) ensures effluent discharge is well within national consent standards.

Cost-effective operation and maintenance
Systems have no internal moving parts and require minimal ongoing maintenance.

Heavy duty shell as standard
Structurally sound and built to last. Enables easy installation in all ground conditions.

High media surface area
High specification bio-media (310m^3 per m^2) and membrane diffusers provide even circulation to eliminate 'dead spots'.

Low energy compressor(s)
Easily accessible low energy compressor for minimal running, maintenance and servicing costs. Integral alarm detects low pressure in air line.

Internal recirculation
Continues the treatment process to provide higher effluent quality whilst balancing flow over 24 hour period or periods of intermittent use.

Lockable manhole covers
600mm lockable manhole covers provide significant strength and durability, and helps to reduce possible odours.

Health and Safety considerations
The Marsh:Standard can be fitted with many safety features including turret guards, failure alarms for compressor components and high level alarms.

Optional extras
Optional extras include carbon covers for odour control, turret guards for additional safety, polylok filters to further reduce suspended solids, high level alarms and telemetry for monitoring, and risers/pumped outlets for deeper installations.

Manufactured in the UK
All units are manufactured in our twin manufacturing plants at Kettering and Bridgwater. The tanks are constructed using GRP (virgin unfilled resin – no 'fillers' such as chalk) providing consistent wall thickness ensuring superior structural strength and durability.

Specifications

Model	Population served	Width +/-50mm	Length +/-50mm	Height +/-50mm	Inlet		Outlet		Turrets x 4	Desludge
					Invert	Ø	Invert	Ø	Ø	Days
MS55	50-55	2500	4160	2950	600	160	800	160	600	90
MS60	60	2500	4470	2950	600	160	800	160	600	90
MS70	70	2500	5350	2950	600	160	800	160	600	90
MS85	85	2500	6000	2950	600	160	800	160	600	90
MS100	100	2500	6950	2950	600	160	800	160	600	90
MS125	125	2500	8550	2950	600	160	800	160	600	90
MS150	150	2500	10200	2950	600	160	800	160	600	90
MS200	200	2500	13400	2950	600	160	800	160	600	90
MS250	250	3000	9650	3450	600	160	800	160	600	60
MS300	300	3000	9650	3450	600	160	800	160	600	45

> *Pumped outlets are available*
> *The dimensions given on this page are for guidance only*
> *For precise tank sizes and configurations, please contact Marsh Civils*
> *All dimensions in mm*

GEM-APS
Aerated Precipitation System
Eco-friendly, economical phosphate and ammonia reduction

Air blower and control panel housing
Chemical dosing process is pre-configured based upon the expected flows and loads of the sewage treatment plant

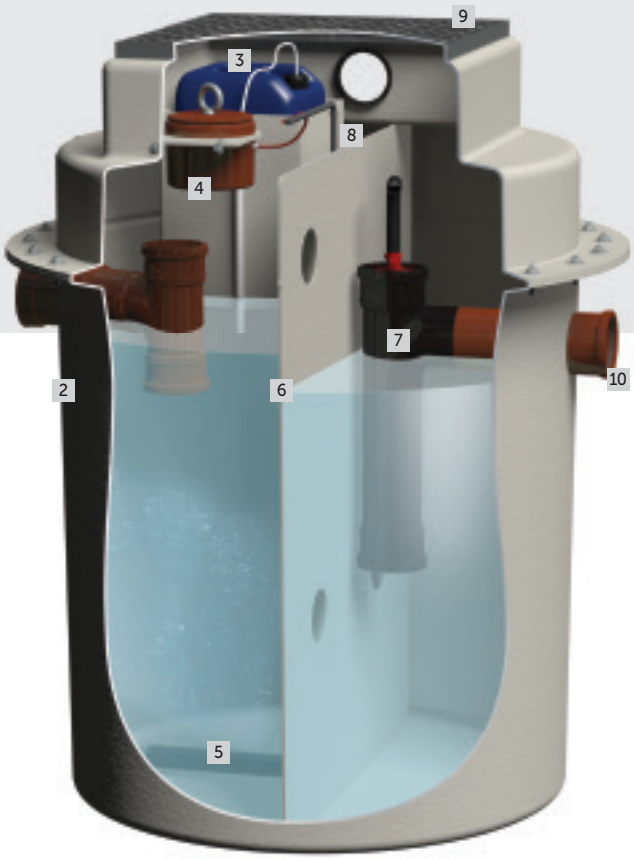
Chemical dosing components
Controlled process involving chemical dosing and aeration

Gem-APS
Economical, efficient, and cost-effective phosphate, ammonia and BOD reduction unit

Package sewage treatment plant
The Gem-APS can be positioned at the outlet end of any existing sewage treatment plant (dependent on sizing)

Tank configuration and components shown for illustration purposes only

> The Gem-APS is a unique innovation for use on sites where phosphate discharge is a problem or where ammonia and BOD requirements are strict for planning consent.



Overview

The Gem-APS is designed to further reduce phosphates, ammonia and BOD from wastewater that has been previously treated in a domestic sewage treatment plant.

Positioned at the outlet end of any existing sewage treatment plant, the Gem-APS treats the discharged wastewater in a controlled process, involving small volumes of chemical dosing and aeration, in compliance with British Water and local environmental regulations, allowing the remaining effluent to be safely discharged to a river, ditch or drainage field.

Chemical dosing amounts are pre-configured based upon the expected flows and loads of the sewage treatment plant (Full scaleable detail available). The Gem-APS can also be regulated to reduce phosphate levels further.

For precise sizing and product specification, please contact the Marsh Civils team on 01933 829470 or email contracts@marshindustries.co.uk

Marsh offers commissioning and servicing of the Gem-APS, it is strongly advised to use this service when setting up the unit.

Benefits

- Tested in accordance with BS EN 12566-7 Annex A at PIA GmbH test facility in Aachen, Germany
- Small footprint and shallow dig for easy installation provides enhanced health and safety benefits
- Heavy duty shell as standard enables installation in all ground conditions. Unique 'keying-in' lip assists anchoring into granular or concrete surrounds
- Near silent, energy efficient compressor (located externally) with integral alarm
- Unique Polylok tertiary filter reduces suspended solids helping to extend drainage field life
- Lockable lid for safety and security
- Low level chemical alarm/indicator

Features

1 Inlet
2 GRP tank appropriately sized for the sewage treatment plant
3 Dosing chemical container
4 Dosing chemical pump in watertight housing
5 Aeration diffuser(s)
6 Separating baffle with grate to stop media migration
7 Polylok filter for solids and flocculent capture
8 Pipework and sludge return
9 Lockable lid for safety and security
10 Outlet

Guidance notes

- *The Marsh Gem-APS phosphate and ammonia reduction unit should discharge effluent into a drainage field.*
- *Environment Agency guidance states the following in relation to aluminium discharge limits to surface water:*

"Aluminium is acutely toxic to fish. For discharges to receiving waters with a lower 95-percentile pH value greater than or equal to 6, the EQS is a maximum allowable concentration (MAC) of 1mg/l (total).

However, we will also apply an emission standard of 10mg/l (dissolved) as a maximum concentration in the effluent if dilution is greater than 1:10. These standards reduce the possibility of active aluminium occurring downstream of the discharge. They also minimise deposition of particulate aluminium on the bed of a watercourse. At dilutions of less than 10:1 the total aluminium standard also limits dissolved aluminium in the discharge.

Aluminium limits for receiving waters with low pH
Aluminium in receiving waters with a low pH may remain in solution or re-dissolve. These waters are likely to already contain some dissolved aluminium, so the capacity to accept more will be limited.

We therefore apply different limits for aluminium in discharges to receiving waters that have a lower 95-percentile pH value of less than 6.

For soft waters, where the calcium carbonate concentration is less than 20mg/l annual average, the EQS is a 95-percentile limit of 75µg/l (dissolved).

MAC of 100µg/l (dissolved) we will apply an emission standard of 500µg/l (total) as a maximum concentration in the effluent. For hard waters, where the calcium carbonate concentration is greater than or equal to 20mg/l annual average, the EQS is a: 95-percentile limit of 500µg/l (dissolved).

MAC of 1mg/l (dissolved) we will apply an emission standard of 1mg/l (total) as a maximum concentration in the effluent. For receiving waters that already contain aluminium, we consider discharge limits on a detailed, site-specific basis".

Phosphate: 0.9mg/L
Ammonia: 0.4mg/L
BOD: 2mg/L

Cesspools

For firewater, Elsan waste, silage and aviation fuel storage

Overview

Designed and manufactured in accordance with BS4994/ BSEN976, the Marsh range of cesspools provides environmentally safe storage of firewater, Elsan waste, silage and aviation fuel.

Available in capacities up to 100,000 litres in Ø2.5m and Ø3m diameters, the tanks are manufactured using GRP (virgin unfilled resin - no 'fillers' such as chalk) providing consistent wall thickness ensuring superior structural strength and durability. This also enables the tank to be significantly lighter for on-site handling/positioning and better suited to withstand greater hydrostatic pressures when in use.

The tanks are supplied with a chemically resistant gel-coat that protects the fibres in the laminates and provides excellent water and chemical resistance. This inherent integrity allows Marsh to offer an unrivalled 50 year design life, backed by a 25 year structural guarantee.

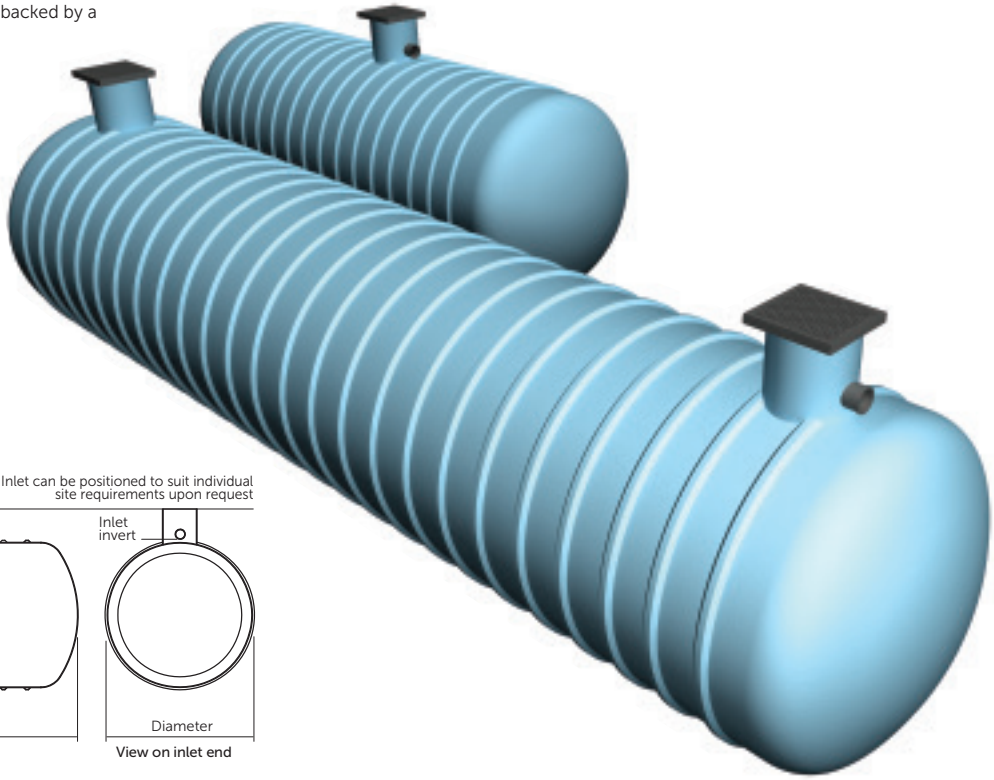
Benefits

- Available in capacities from 20,000 to 100,000 litres in Ø2.5 and Ø3m diameters
- Designed to meet latest UK and European standards
- Heavy duty shells enable installation in all ground conditions
- Variable invert depths and orientations to suit individual site conditions
- Optional high-level alarm available
- Guaranteed for 25 years with a design life of 50 years

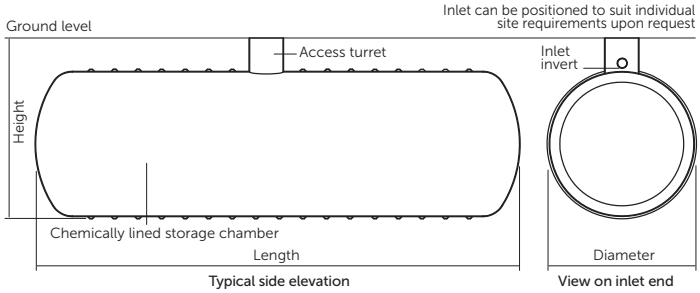
Guidance notes

- *Reference should be made to DEFRA guidance notes 'The Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations - UK' and gov.uk guidance 'Storing silage, slurry and agricultural fuel oil'*

Optional Bauer fittings are available



Specifications



Ø2.5m tanks

Capacity Litres	Dia Ø	Length	Height	Inlet Invert	Turret size	No. of Turrets
20,000	2500	4500	3100	500	Ø600x600	1
25,000	2500	5550	3100	500	Ø600x600	1
30,000	2500	6500	3100	500	Ø600x600	1
35,000	2500	7550	3100	500	Ø600x600	1
40,000	2500	8600	3100	500	Ø600x600	2
45,000	2500	9600	3100	500	Ø600x600	2
50,000	2500	10600	3100	500	Ø600x600	2
55,000	2500	11600	3100	500	Ø600x600	2
60,000	2500	12600	3100	500	Ø600x600	2
65,000	2500	13600	3100	500	Ø600x600	2
70,000	2500	14700	3100	500	Ø600x600	2

Ø3m tanks

Capacity Litres	Dia Ø	Length	Height	Inlet Invert	Turret size	No. of Turrets
40,000	3000	6200	3600	500	Ø600x600	1
45,000	3000	6900	3600	500	Ø600x600	1
50,000	3000	7600	3600	500	Ø600x600	1
55,000	3000	8300	3600	500	Ø600x600	1
60,000	3000	9000	3600	500	Ø600x600	2
65,000	3000	9800	3600	500	Ø600x600	2
70,000	3000	10500	3600	500	Ø600x600	2
75,000	3000	11200	3600	500	Ø600x600	2
80,000	3000	11900	3600	500	Ø600x600	2
85,000	3000	12600	3600	500	Ø600x600	2
90,000	3000	13300	3600	500	Ø600x600	2
95,000	3000	14000	3600	500	Ø600x600	2
100,000	3000	14700	3600	500	Ø600x600	2

Notes:
> *The dimensions given on this page are for guidance only*
> *For precise tank sizes and turret configurations, please contact Marsh Civils*
> *All dimensions in mm*

Degrilleur™

Trash barrier for sewage treatment plants and pump chambers

Overview

When non dissolvable objects are flushed into the sewer and then into a sewage treatment plant or pump station downstream, it can lead to blockages or worse - possible plant failure.

To combat this Marsh Industries has developed the 'Degrilleur' – a bar screen which prevents any unsuitable materials from entering the system.

The unit has no moving parts and requires no electrics and is suitable for domestic, commercial and industrial installations.

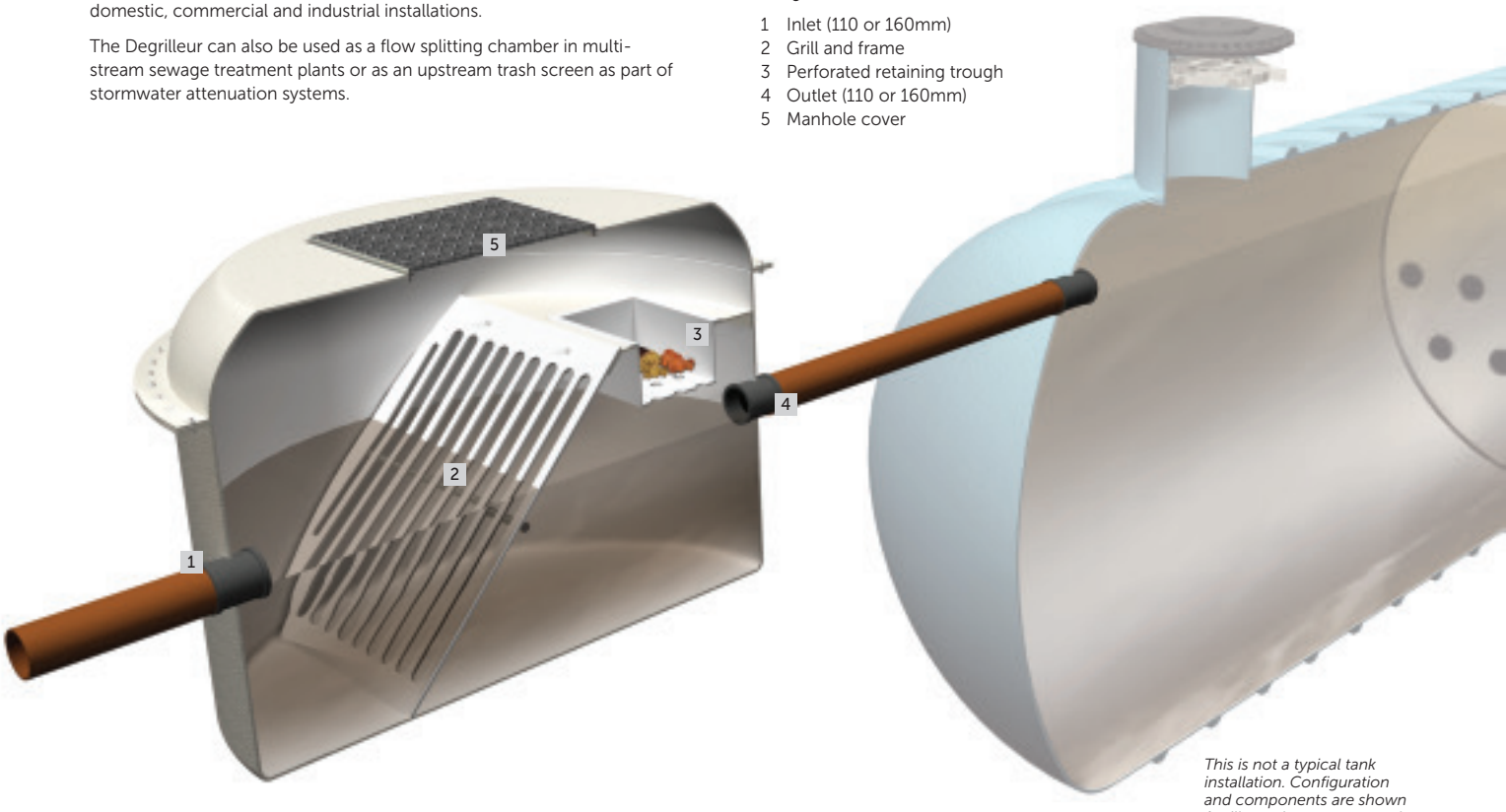
The Degrilleur can also be used as a flow splitting chamber in multi-stream sewage treatment plants or as an upstream trash screen as part of stormwater attenuation systems.

Operating principle

The Marsh Degrilleur, positioned ahead of the system inlet, blocks the debris and forces it to rise to the top of the chamber where it is collected in a retaining trough for disposal.

Key

1 Inlet (110 or 160mm)
2 Grill and frame
3 Perforated retaining trough
4 Outlet (110 or 160mm)
5 Manhole cover



This is not a typical tank installation. Configuration and components are shown for illustration purposes only

Specifications

Cylindrical Degrilleur

Model	Diameter over flanges +/-50mm	Height +/-50mm
MID-1	1950	1283

Horizontal Degrilleur

Model	Diameter over flanges +/-50mm	Height +/-50mm	Length over flanges +/-50mm
MID-2	1950	2284	2860
MID-3	1950	2284	5200

Notes:
> *The dimensions given on this page are for guidance only*
> *For precise tank sizes and turret configurations, please contact Marsh Civils*
> *All dimensions in mm*

Marsh GMS★
Grease traps
Innovative and reliable grease management systems

Overview

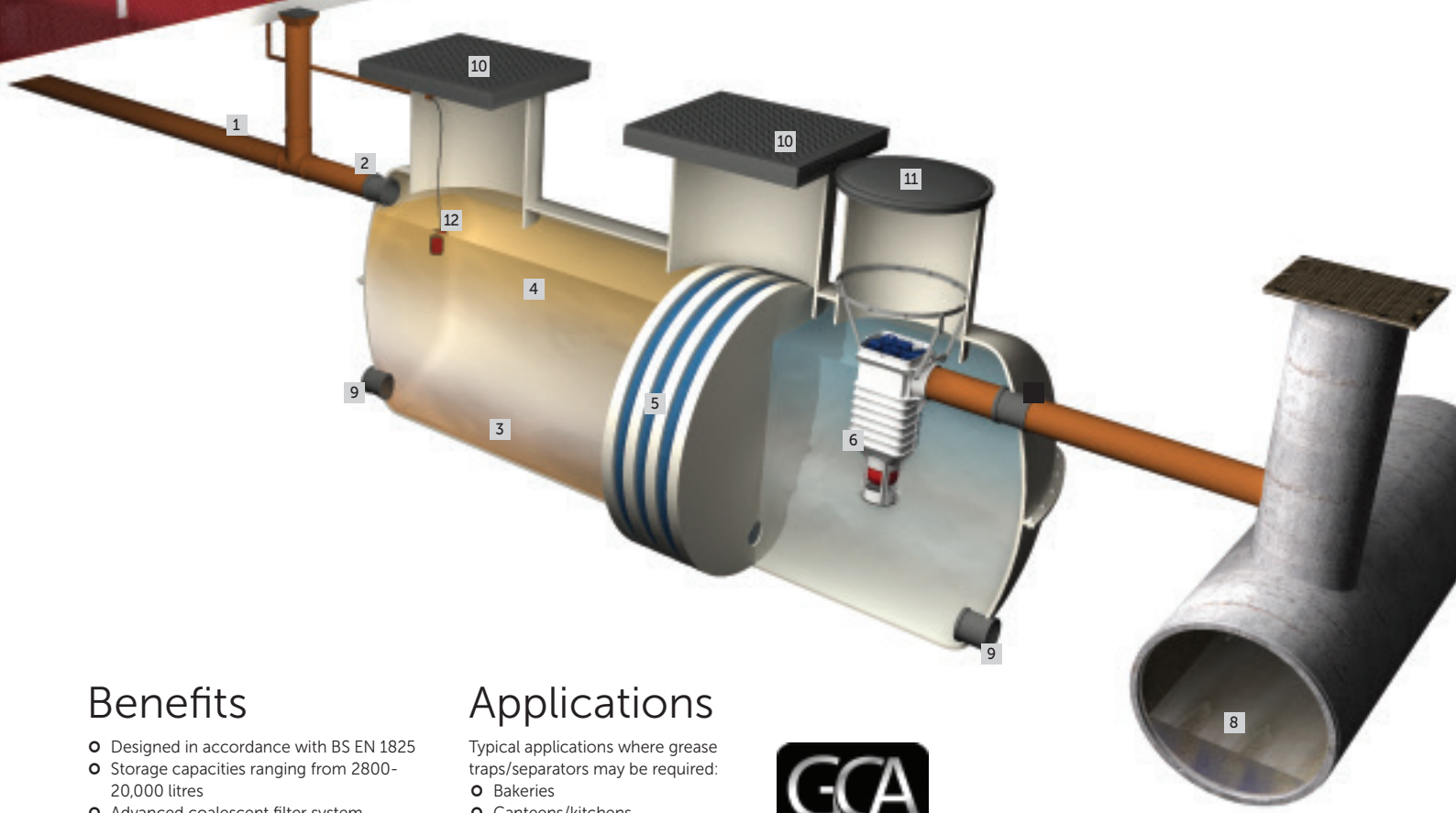
Available in capacities from 2800 to 20,000 litres, Marsh Industries' Grease Management System (GMS★) range of grease traps effectively prevents Fats, Oils and Grease (FOG) from entering the drainage network or sewage treatment plants.

Testing and verification

Marsh Industries has reassessed the currently prescribed testing methods for grease traps and devised its own unique test rig and analysis at Loughborough University.

The rig, put to test for 12 months, addressed calls from the industry for clarity in testing procedures of grease trap technology. After completing trials, the new range of grease traps are the only products of their type that have been successfully tested using materials that match the FOG used in the food industry, as opposed to the traditional test method of using heating oils.

A white paper, published by Marsh, titled "A New way forward for Meaningful Testing of Grease Traps", reports on analysis from the tests carried out at Loughborough University and can be downloaded from www.marshcivils.co.uk



Benefits

- Designed in accordance with BS EN 1825
- Storage capacities ranging from 2800-20,000 litres
- Advanced coalescent filter system
- Bespoke design tailored to individual project specifications
- Adjustable turret and invert height
- Optional Polylok filter for further wastewater treatment
- Optional high level alarm

Applications

Typical applications where grease traps/separators may be required:

- Bakeries
- Canteens/kitchens
- Fast food restaurants
- Food processing factories
- Hotels
- Public houses
- Restaurants
- Social clubs

Marsh Industries is proud to support the Grease Contractors Association (GCA). The GCA is a non-profit organisation of specifiers, installers and maintainers of grease management systems www.britishwater.co.uk/page/GCA

This is not a typical tank installation. Configuration and components are shown for illustration purposes only

Operating principle

The Marsh GMS★ grease trap provides sufficient storage in its primary chamber allowing for adequate solidification of FOG molecule structures before passing through an advanced coalescing filtration system.

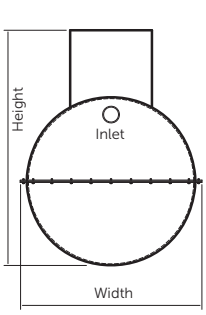
The coalescing filtration system contains different grades of filter to prevent solids and waste passing into the final settlement chamber.

In larger units, an optional Ultra Polylok UV Filter is available which can provide further treatment to residual solids and can also destroy viruses, parasites and other pathogenic bacteria.

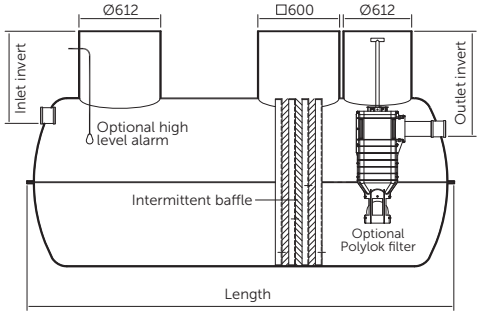
Key

1 Wastewater pipe
2 Tank inlet
3 Solids retention
4 Fats, oils and grease (FOG) retention
5 Advanced coalescing filter
6 Polylok filter (optional)
7 Tank outlet
8 Mains sewer system
9 Additional desludge points (optional)
10 Heavy duty manhole cover
11 Outlet access
12 High level alarm (optional)

Specifications



View on inlet end

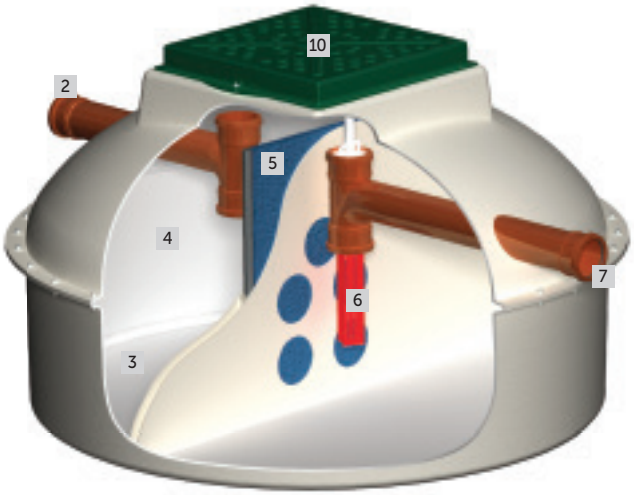


Cross section through elevation

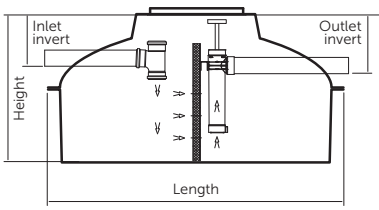
Model	Size	Width	Length	Height	Inlet		Outlet	
	Litres	+/-50mm	+/-50mm	+/-50mm	Invert	Ø	Invert	Ø
MG2800	2800	1352	3040	1732	685	110	800	110
MG3800	3800	1352	4040	1732	685	110	800	110
MG4500	4500	1572	2960	2092	685	110	800	110
MG6000	6000	1952	3090	2332	685	110	800	110
MG8000	8000	1952	3780	2332	685	160	800	160
MG10000	10000	1952	4340	2332	685	160	800	160
MG12000	12000	1952	5640	2332	685	160	800	160
MG14000	14000	1952	5980	2332	685	160	800	160
MG16000	16000	1952	6840	2332	685	160	800	160
MG18000	18000	1952	7640	2332	685	160	800	160
MG20000	20000	1952	8240	2332	685	160	800	160

Marsh GMS★ Roundel

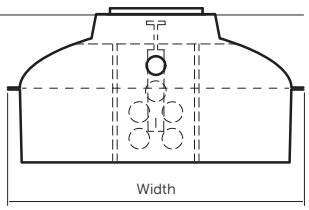
Compact grease management system



Marsh Industries' GMS 'Roundel – Ø1812 x 1m high – is shallow, compact and provides easy installation, particularly in urban areas or sites with arduous ground conditions and reduces the risk of undermining existing structures, pipelines or cable ducts.



Cross section through elevation



View on outlet end

Model	Size	Width	Length	Height	Inlet		Outlet	
	Litres	+/-50mm	+/-50mm	+/-50mm	Invert	Ø	Invert	Ø
Roundel	2000	Ø1980	Ø1980	1000	350	110	400	110

Notes:
> *The dimensions given on this page are for guidance only*
> *For precise tank sizes and configurations, please contact Marsh Civils*
> *All dimensions in mm*

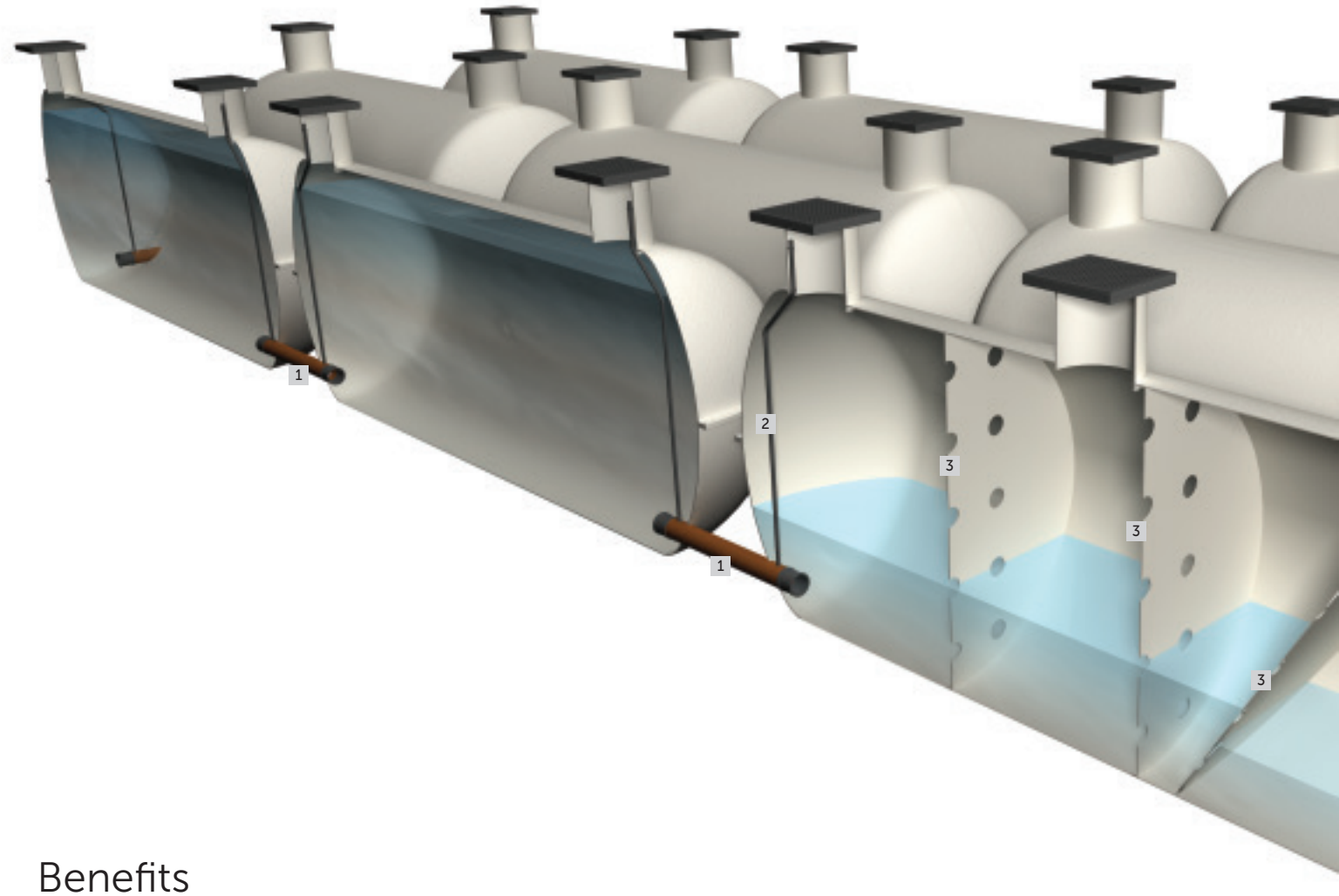
Storm Dammer®

Stormwater flow attenuation

Overview

Available in capacities from 2800-110000 litres in multiple configurations with tank sizes ranging from Ø1.2m to Ø3m diameters, the Storm Dammer alleviates the risk of flooding and reduces pressure on drains/sewers by storing the excess flow of stormwater before controlled discharge downstream.

Greater capacity, ease of inspection and maintenance makes Storm Dammer the industry choice for developers, municipal planners and civil engineers.

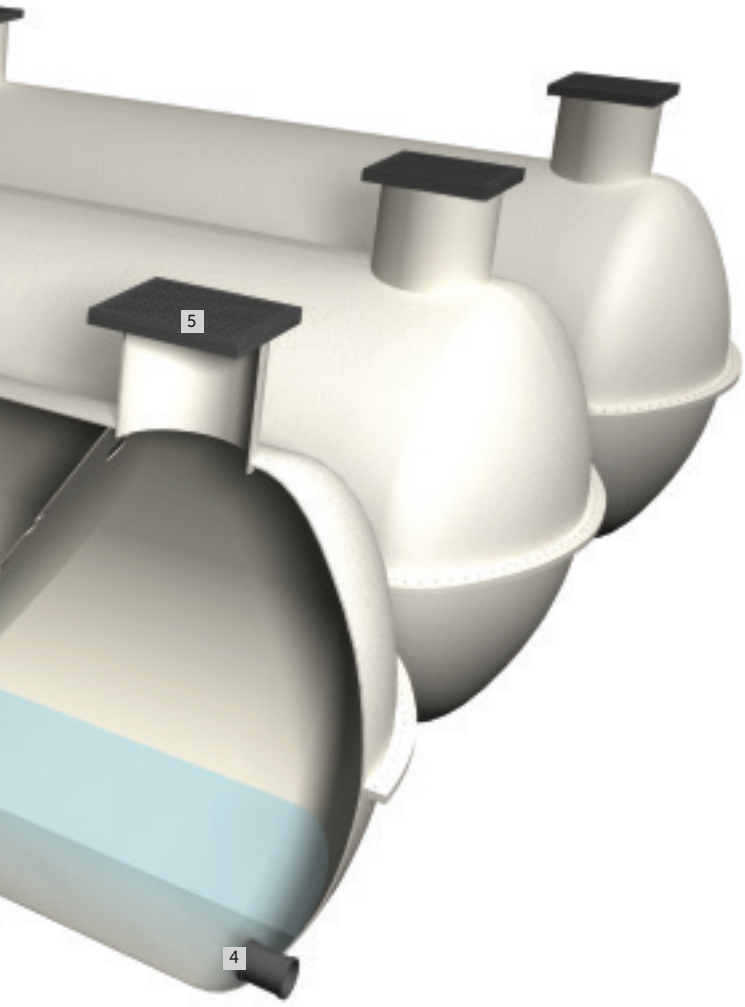


Benefits

- Designed to meet latest UK and European standards
- Multiple tank configurations and inlet orientations to suit storage and site layout requirements
- Tank diameters range from Ø1.2 to Ø3m with length up to 20 metres
- Heavy duty shells manufactured from virgin unfilled resin provides superior structural strength and durability. This also enables the tank to be significantly lighter for on-site handling/positioning and better suited to withstand greater hydrostatic pressures when in use
- Tank design offers easy access for inspection, maintenance and cleaning when compared to inaccessible crate systems
- Systems can be fitted with flow control devices and orifice plates to regulate storage and discharge
- Easily accessible, low energy submersible pumps ensure minimal running, maintenance and servicing costs
- Guaranteed for 25 years with a design life of 50 years

Key

1 Connecting pipework
2 Internal vent pipes
3 Flow control devices
4 Outlet
5 Access manways



This is not a typical tank installation. Configuration and components are shown for illustration purposes only

Fittings and accessories

Orifice baffles

Utilising Marsh Industries' unique Gaia Storm Dammer program, in conjunction with the Micro Drainage Design program, the standard range of Storm Dammer tanks are designed using orifice baffles as the primary flow attenuation system.

Precise calculations from the Gaia Storm Dammer program ensures that the correct type of orifice baffles are distributed throughout the system to deliver the optimum outflow required.

Flood and storm control valves

Storm Dammer systems can be designed to include Vortex Storm Control units which can reduce out-flow on varying scales.

Pumps can also be fitted to upline chambers allowing stored water to be distributed to other chambers that may not be in the immediate area.

Pumps

Marsh Industries works in partnership with major UK pump manufacturers to develop attenuation tanks and pump chambers that are designed to distribute water to the mains drainage network or to other off-site storage tanks. Pumps can be supplied as single, twin or multi-line installations in both single and three phase.

AUTOadapt™ sump pump

Designed for a range of water and wastewater applications, the AUTOadapt pump removes the complexity of standard submersible pumps by combining all external sensors switches and cables from the pit within the pump itself. This simplifies installation and operation, vastly increasing reliability.

Marsh:UV

Effluent disinfection for off-mains drainage

Overview

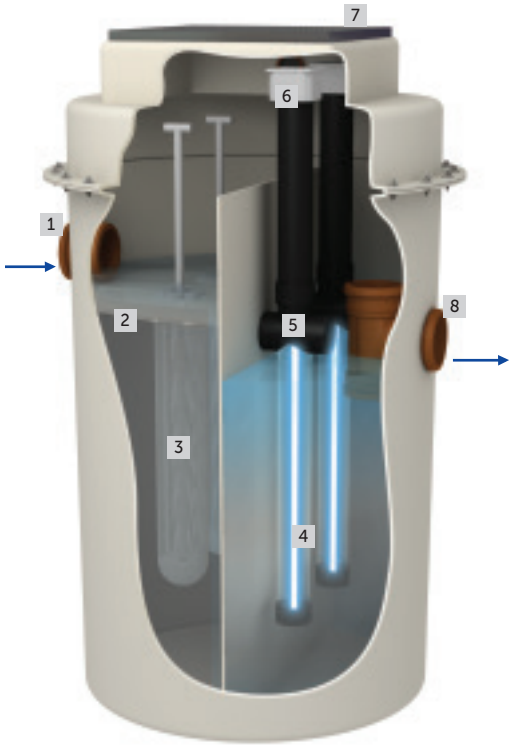
Marsh Industries has developed an innovative UV disinfection system which removes 99% faecal coliform bacteria levels from sewage treatment plant effluent.

The Marsh:UV Disinfection Unit can be supplied as an integral part within the Marsh Ultra:Polylok range of sewage treatment plants (50-500+PE) or as a stand-alone unit which can be installed at the outlet end of any existing sewage treatment plant.

The UV light(s) are mounted in a sub-assembly which can be easily removed for periodic servicing and bulb replacement. In stand-alone units, the light assembly is mounted in a primary chamber by an anodized aluminium frame. The frame seals against the inner surface of the primary chamber to prevent flow bypass.

When the disinfection unit is filled with waste water, the ultraviolet light source operates continuously with a lamp surface temperature range of 105-120ºF providing optimum UV light output and long lamp lifetime (Power supply is via 230v Single Phase with consumption of a single UV lamp being 45 watts).

In addition to the UV disinfection assembly, microfibre tertiary filters are attached at the inlet pipe to reduce any remaining suspended solids, residual BOD and ammonia levels.



Key

1 Inlet
2 Filter shelf
3 Quick-release microfibre tertiary filters
4 UV lamps
5 Disinfection chamber
6 Control box
7 Maintenance access cover
8 Outlet

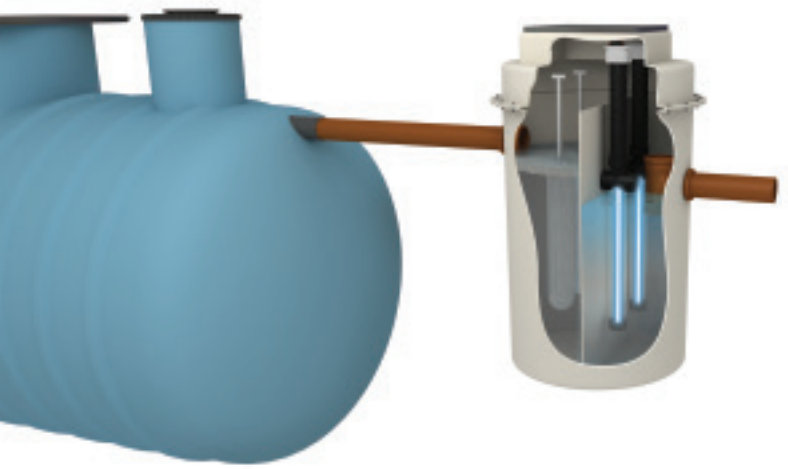
UV treatment performance

A single UV maximum flow through the unit is rated at 16m^3 per day or a peak flow rate .056 litres per second under the following conditions:

- UV dosage is greater than 5mJ/cm^2
- Suspended Solids – less than 30 mg/litre
- BOD (5 days) – less than 30 mg/litre
- If the effluent is cleaner than the above figures the level of treatment is greater

From the above conditions, the faecal coliform reduction by the Marsh:UV Disinfection Unit exceeds 99.9% or 3-logs, at the end of UV lamp life, which is two years of continuous operation.

Figure 2 below provides an indication of the UV dosage requirements in order to provide a 90-99% reduction in different strains of coronavirus.



Benefits

- Removes 99% faecal coliform bacteria levels from sewage treatment plant effluent
- Optimum UV light distribution assembly for maximum disinfection (UV dosage requirements to provide a 90-99% reduction in different strains of coronavirus)
- Can be supplied as an integral part within the Marsh Ultra:Polylok range of sewage treatment plants (50-500+PE) or as a stand-alone unit
- Unique microfibre tertiary filters further reduce remaining suspended solids, residual biological oxygen demands and ammonia levels
- Optimised for minimal running costs
- Heavy duty shell as standard to enable installation in all ground conditions
- Integral eye bolts for improved on-site handling
- 'Keying-in flange' assists anchoring into granular or concrete surround
- Pedestrian cover included as standard

Modern sewage treatment plants are efficient systems used to process waste water from domestic or commercial premises to a standard that allows outflowing effluent to be discharged into natural bodies of water, such as drainage fields, streams, rivers or lakes.

The sewage treatment plant removes toxic constituents, such as suspended solids, nitrogen and ammonia, etc, however microscopic pathogens can remain undetected within the outflowing effluent. These pathogens are typically harmless, but the risk remains that some hazardous pathogens, such as coronaviruses, could survive and prosper in the natural environment.

As Covid-19 marches across the globe, public health, personal hygiene and sanitation is at the forefront of everyone's mind. Biologists, public health experts and researchers are exploring all possible routes of virus transmission, including the possibility of contamination from water and sewage.

In principle - The effects of UV light on bacteria

Bacteria, which causes some of our most common illnesses, are single cell organisms.

When looking inside a bacterium, the simplicity of the cell is evident; the cell contains DNA, ribosome and other basic proteins – this simplicity increases its susceptibility to UV light.

UV-induced DNA damage can affect how proteins and enzymes are produced. UV can also increase reactive oxygen species production, which can react with the cell wall. The cell wall and other components of the cell can become severely damaged, thus halting cell growth.

Covid-19

Although it is not yet proven that Covid-19 can survive or spread through contact with water and sewage, environmental biologists at the University of Stirling have warned that the potential spread of Covid-19 via sewage "must not be neglected" in the battle to protect human health1.

Richard Quilliam, Professor of Biological and Environmental Sciences at the University of Stirling, who is currently leading a £1.85m study into the transport of pathogens and viruses in marine environments, said "We know that Covid-19 is spread through droplets from coughs and sneezes, or via objects or materials that carry infection. However, it has recently been confirmed that the virus can also be found in human faeces up to 33 days after the patient has tested negative for symptoms of Covid-19."

"It is not yet known whether the virus can be transmitted via the faecal-oral route, however, we know that viral shedding from the digestive system can last longer than shedding from the respiratory tract. Therefore, this could be an important, but as yet unquantified, pathway for increased exposure."

The authors of the peer-reviewed paper presented the example of the severe acute respiratory syndrome (SARS) outbreak in 2002-2003 when SARS, closely linked to the Covid-19 virus strain, was detected in sewage discharged by two hospitals in China.

Professor Quilliam highlights that, as most Covid-19 patients are asymptomatic or experience just mild symptoms and remain at home (not in hospital), there is significant risk of "widespread" distribution through sewers.

UV dosage requirements to provide a 90-99% reduction in different strains of coronavirus (where historical data exists)

Organism	90% (1 log reduction) mJ/cm²	99% (2 log reduction) mJ/cm²	Source
Coronavirus	0.7	2.1	Walker 2007
Berne virus (Coronaviridae)	0.7	2.1	Weiss 1986
Murine Coronavirus (MHV)	1.5	4.5	Hirano 1978
Canine Coronavirus (CCV)	2.9	8.7	Saknimit 1988
Murine Coronavirus (MHV)	2.9	8.7	Saknimit 1988
SARS Coronavirus CoV-P9	4.0	12.0	Duan 2003
Murine Coronavirus (MHV)	10.3	30.9	Liu 2003
SARS Coronavirus (Hanoi)	13.4	40.2	Kariwa 2004
SARS Coronavirus (Urbani)	24.1	72.3	Walker 2007
Average	**6.7**	**20.1**	

Effluent disinfection

For over a century scientists have known about the ability of ultraviolet light (UV) to disinfect and, for many years, UV-C2 lamps have been used for disinfection in medical settings, food production and a number of other places.

Effluent disinfection using UV light is the decontamination of outflowing water from sewage treatment plants, sewer pipes or industrial outfall into natural bodies of water.

Without UV disinfection, effluent can retain a mass of hazardous pathogens that could infect the natural water, causing potentially serious environmental health issues.

UV light deactivates pathogens so that they cannot survive in clean water, meaning they cannot replicate and infect future waterways.

UV light is one of the safest disinfectants available due to the lack of chemicals used and produced by the device.

The most common method of effluent disinfection used in off-mains sewage treatment plants is to install and connect a separate UV disinfection unit to the outlet of the sewage treatment plant.

The UV disinfection unit contains the necessary UV light system to match the volume of outflow from the sewage treatment plant.

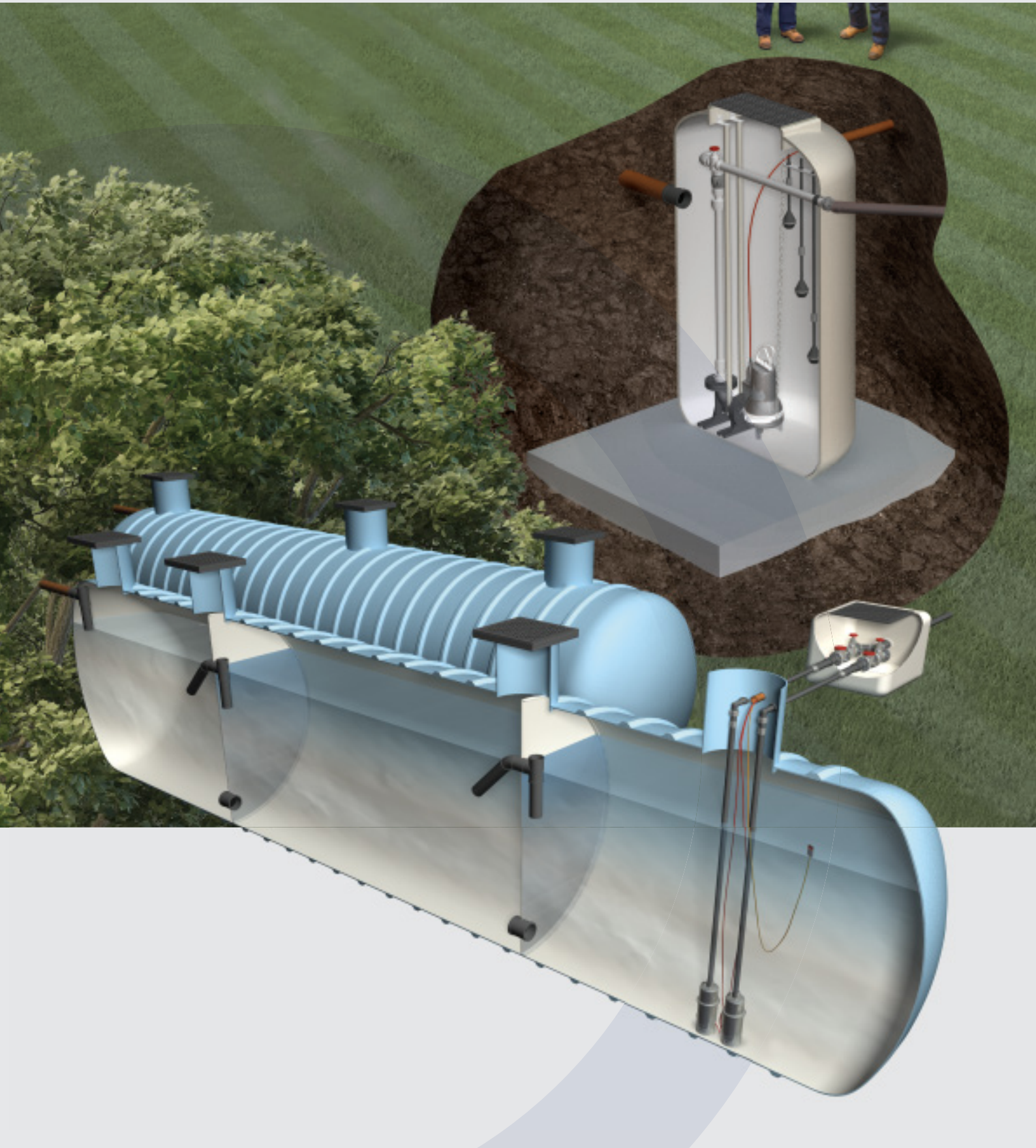
It should be noted that when introducing a UV disinfection unit to a sewage treatment plant, it is necessary to ensure that the flow of water does not exceed the depth the UV light can travel. UV light can only pass through a certain amount of water before it becomes ineffective. Making sure that the water flow is uniform with the UV light means that the effluent will receive the best disinfection possible.

Notes:

[1] https://www.stir.ac.uk/news/2020/05/sewage-poses-potential-covid-19-transmission-risk-experts-warn

[2] UV-C refers to ultraviolet light with wavelengths between 200–280 nanometers (nm). Light in the UV-C wavelength can be used for disinfecting water, sterilizing surfaces, destroying harmful micro-organisms in food products and in air.

PUMP STATIONS



Marsh WellWater™

The most comprehensive range of pump stations available in the UK

Pump stations available in capacities ranging from 141 to 100,000 litres

When discharge to mains is required, but to do so by gravity is impractical, a WellWater™ pump station will be needed.

All Marsh pump station systems are bespoke, however there are several factors that play a role in identifying precisely the right tank sizes and type that are required for your project.

Marsh Civils' system designers can work closely with you to identify all key requirements in accompaniment with Marsh Industries' unique process design software, Gaia Sege.

Pump station systems are available as vertical or horizontal units in various sizes.

Why specify a Marsh pump station?

- Designed to British Standard European Norms:
  BSEN12050 for structural strength and water-tightness
  BSEN752 to comply with hydrostatic and electrical requirements
  BSEN752-6 for drain and sewer systems in outside buildings
- Smooth internal walls and integral pump well improve pump efficiency and eliminates 'dead spots' which can lead to odours and septicity
- Variable invert depths and orientations to suit individual site conditions
- Pre-assembled pipework for fully automatic operation
- Unique 'keying-in' lip on WellWater:Seine range assists anchoring into concrete surround

Applications

The WellWater range of pump stations are suitable for sewage, final effluent, grinders and surface water (twin/single) applications in all domestic, commercial and industrial sites:

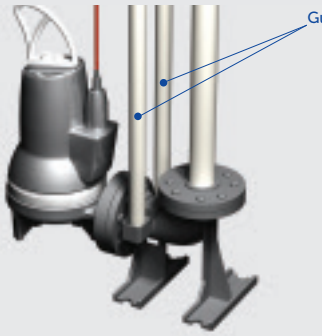
- Agricultural water and wastewater
- Biofuel systems
- Commercial buildings
- Domestic buildings
- Food processing
- Industrial boilers
- Industrial wastewater
- Industrial water treatment
- Marine
- Mining
- Pharmaceuticals
- Wastewater transport
- Wastewater treatment
- Water distribution
- Water intake
- Water treatment

Pump options

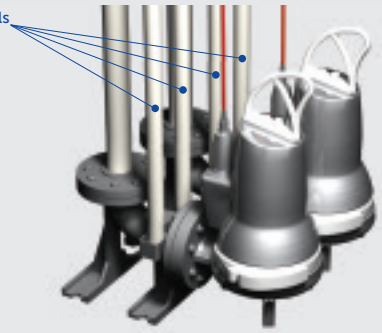
Marsh uses market-leading submersible pumps throughout its WellWater range of pump stations to ensure maximum reliability and efficiency with minimal clogging or wear. Pump stations can be specified with a single free-standing pump or single and twin pumps with guide rails as illustrated below.

Note: Floats can be fitted directly to specific pump systems. please contact Marsh Civils to discuss your project requirements.

Single free-standing pump



Single pump with guide rails



Twin pumps with guide rails

Pump station maintenance packages

Pump station maintenance packages provide peace of mind that your pump and associated equipment will continue to work reliably and effectively, whilst at the same time considerably extending their working-life expectancy.

Pump stations covered by Marsh maintenance packages suffer far fewer intermediate breakdowns, making scheduled maintenance an extremely cost-effective safeguard against potential failure.

For details on Marsh pump station maintenance packages contact 01933 829470 or email service@marshindustries.co.uk.

Guidance notes

- *Where foul water drainage from a domestic property is to be pumped to mains the effluent receiving chamber should be sized to contain 24-hour inflow to allow for disruption in service, the minimum daily discharge being taken as 150 litres per person per day*
- *For other building types the capacity of the receiving chamber should be based on the calculated daily demand of the water intake for the building, or when only a proportion of the foul sewage is to be pumped then the capacity should be based pro-rata*
- *If the sewer is to be 'adopted' by a local water authority, please contact Marsh Civils as Sewers for Adoption (SFA) specification and additional local authority related criteria may apply*

WellWater:Seine

Standard pump stations

Marsh WellWater:Seine pump stations are available in storage capacities ranging from 141 to 5675 litres.

Each system is supplied as a complete unit with either single or twin free-standing submersible pumps and high quality internal pipework/fittings as standard.

These pump stations are typically used in smaller domestic or commercial applications for pumping foul water or sewage to mains sewer.

Key

1 Inlet
2 Submersible pump(s)
Single or twin free-standing options
3 Pump retrieval chain
4 Non-return valve(s)
5 Gate valve
6 Outlet connection
7 Ducting and cable entry points
8 Vent
9 Manway access
10 Float bracket

Float configuration options

A Pump 'OFF' float switch
B Pump 1 'ON' float switch
C Pump 2 'ON' float switch
On twin pump configurations
D High water float switch

WellWater:Seine range

Model	Single/Twin pump	Pump duty See table below	Application mm	Diameter mm	Depth mm	Total storage Litres	Invert mm	Pipework dia
SE0610	Single	A	Effluent	600	1000	141	500	32
SE0615	Single	A	Effluent	600	1500	282	500	32
SE0620	Single	A	Effluent	600	2000	424	500	32
SE1111	Single	A	Effluent	1100	1100	570	500	32
TE1111	Twin	A	Effluent	1100	1100	570	500	32
SE1115	Single	A	Effluent	1100	1500	950	500	32
TE1115	Twin	A	Effluent	1100	1500	950	500	32
SE1122	Single	A	Effluent	1100	2200	1616	500	32
TE1122	Twin	A	Effluent	1100	2200	1616	500	32
SE1126	Single	A	Effluent	1100	2600	1996	500	32
TE1126	Twin	A	Effluent	1100	2600	1996	500	32
SS0610	Single	B	Sewage	600	1000	141	500	63
SS0615	Single	B	Sewage	600	1500	282	500	63
SS0620	Single	B	Sewage	600	2000	424	500	63
SS1111	Single	B	Sewage	1100	1100	570	500	63
TS1111	Twin	B	Sewage	1100	1100	570	500	63
SS1115	Single	B	Sewage	1100	1500	950	500	63
TS1115	Twin	B	Sewage	1100	1500	950	500	63
SS1122	Single	B	Sewage	1100	2200	1616	500	63
TS1122	Twin	B	Sewage	1100	2200	1616	500	63
SS1126	Single	B	Sewage	1100	2600	1996	500	63
TS1126	Twin	B	Sewage	1100	2600	1996	500	63
TS1721	Twin	C	Sewage	1700	2100	2724	500	63/90
TS1734	Twin	D	Sewage	1700	3400	5675	500	90

Pump duties	**Total lift** m	1	2	3	4	5	6	7	8
A Effluent pumping stations	**Distance** m	54	43	30	20	8	-	-	-
B Up to TS1126 - 6m total head	**Distance** m	160	120	90	40	10	-	-	-
C TS1721 - 10m Total Head	**Distance** m	-	700	620	530	430	340	250	160
D TS1734 - 7.4m Total Head	**Distance** m	-	-	180	120	90	50	5	-

Notes:
> *Floats can be fitted directly to specific pump systems. please contact Marsh Civils to discuss your project requirements*
> *All pump stations are available for dirty water (DW) or sewage (SW), in single pump (SP) and twin pump (TP) configurations*
> *The dimensions given on this page are for guidance only*
> *For precise tank sizes and configurations, please contact Marsh Civils*
> *All dimensions in mm*

Tank configurations and components are shown for illustration purposes only

WellWater:Hudson

Ø1.2-1.5m pump stations

Marsh WellWater:Hudson pump stations are Ø1.2m or Ø1.5m vertical units, available from 2000mm to 3500mm heights with storage capacities ranging from 2170 litres to 5979 litres.

Each system is supplied as a complete unit with either single or twin submersible pumps with guide rails and high quality internal pipework/fittings as standard.

These pump stations are typically used in medium to large domestic or commercial applications for pumping foul water or sewage to mains sewer.

Key

1 Inlet
2 Submersible pump(s)
Single or twin pumps with guide rails
3 Guide rails
4 Pump retrieval chain
5 Non-return valve(s)
6 Gate valve
7 Outlet connection
8 Ducting and cable entry points
9 Vent
10 Manway access
11 Float bracket

Float configuration options

A Pump 'OFF' float switch
B Pump 1 'ON' float switch
C Pump 2 'ON' float switch
On twin pump configurations
D High water float switch

Note: Floats can be fitted directly to specific pump systems. Please contact Marsh Civils to discuss your project requirements.

WellWater:Hudson Ø1.2m range

Model	Single/Twin pump	Application	Diameter mm	Depth mm	Total storage Litres	Invert mm	Pipework dia mm
SS1220	Single	Sewage	1200	2000	2170	minimum 500	110 or 160
TS1220	Twin	Sewage	1200	2000	2170	minimum 500	110 or 160
SS1230	Single	Sewage	1200	3000	3300	minimum 500	110 or 160
TS1230	Twin	Sewage	1200	3000	3300	minimum 500	110 or 160
SS1235	Single	Sewage	1200	3500	3860	minimum 500	110 or 160
TS1235	Twin	Sewage	1200	3500	3860	minimum 500	110 or 160
SG1220	Single	Grinders	1200	2000	2170	minimum 500	110 or 160
TG1220	Twin	Grinders	1200	2000	2170	minimum 500	110 or 160
SG1230	Single	Grinders	1200	3000	3300	minimum 500	110 or 160
TG1230	Twin	Grinders	1200	3000	3300	minimum 500	110 or 160
SG1235	Single	Grinders	1200	3500	3860	minimum 500	110 or 160
TG1235	Twin	Grinders	1200	3500	3860	minimum 500	110 or 160

WellWater:Hudson Ø1.5m range

Model	Single/Twin pump	Application	Diameter mm	Depth mm	Total storage Litres	Invert mm	Pipework dia mm
SS1520	Single	Sewage	1500	2000	3328	minimum 500	110 or 160
TS1520	Twin	Sewage	1500	2000	3328	minimum 500	110 or 160
SS1530	Single	Sewage	1500	3000	5095	minimum 500	110 or 160
TS1530	Twin	Sewage	1500	3000	5095	minimum 500	110 or 160
SS1535	Single	Sewage	1500	3500	5979	minimum 500	110 or 160
TS1535	Twin	Sewage	1500	3500	5979	minimum 500	110 or 160
SG1520	Single	Grinders	1500	2000	3328	minimum 500	110 or 160
TG1520	Twin	Grinders	1500	2000	3328	minimum 500	110 or 160
SG1530	Single	Grinders	1500	3000	5095	minimum 500	110 or 160
TG1530	Twin	Grinders	1500	3000	5095	minimum 500	110 or 160
SG1535	Single	Grinders	1500	3500	5979	minimum 500	110 or 160
TG1535	Twin	Grinders	1500	3500	5979	minimum 500	110 or 160

More tank depths available upon request

WellWater:Nile

Ø1.8m pump stations

Marsh WellWater:Nile pump stations are Ø1.8m vertical units, available in 3000mm and 4000mm heights with storage capacities of 7250 litres and 9800 litres respectively.

Each system is supplied as a complete unit with either single or twin submersible pumps with guide rails and high quality internal pipework/fittings as standard.

These pump stations are typically used in large domestic or commercial applications for pumping foul water or sewage to mains sewer.

Key

1 Inlet
2 Submersible pump(s)
Single or twin pumps with guide rails
3 Guide rails
4 Pump retrieval chain
5 Non-return valve(s)
6 Gate valve
7 Outlet connection
8 Ducting and cable entry points
9 Vent
10 Manway access
11 Float bracket

Float configuration options

A Pump 'OFF' float switch
B Pump 1 'ON' float switch
C Pump 2 'ON' float switch
On twin pump config's
D High water float switch

Note: Floats can be fitted directly to specific pump systems. please contact Marsh Civils to discuss your project requirements.

WellWater:Nile range

Model	Single/Twin pump	Application	Diameter mm	Depth mm	Total storage Litres	Invert mm	Pipework dia mm
SS1830	Single	Sewage	1800	3000	7250	minimum 500	110 or 160
TS1830	Twin	Sewage	1800	3000	7250	minimum 500	110 or 160
SS1840	Single	Sewage	1800	4000	9800	minimum 500	110 or 160
TS1840	Twin	Sewage	1800	4000	9800	minimum 500	110 or 160
SG1830	Single	Grinders	1800	3000	7250	minimum 500	110 or 160
TG1830	Twin	Grinders	1800	3000	7250	minimum 500	110 or 160
SG1840	Single	Grinders	1800	4000	9800	minimum 500	110 or 160
TG1840	Twin	Grinders	1800	4000	9800	minimum 500	110 or 160

Notes:
> *All pump stations are available for dirty water (DW) or sewage (SW), in single pump (SP) and twin pump (TP) configurations*
> *The dimensions given on this page are for guidance only*
> *For precise tank sizes and configurations, please contact Marsh Civils*
> *All dimensions in mm*

Tank configurations and components are shown for illustration purposes only

WellWater:Amazon

Ø2.5m pump stations

Marsh WellWaterAmazon pump stations are Ø2.5m horizontal units, available in storage capacities ranging from 7710 litres to 100,000 litres.

Each system is supplied as a complete unit with either twin submersible pumps with guide rails and high quality internal pipework/fittings as standard.

These pump stations are typically used in extra large domestic or commercial applications for pumping foul water or sewage to mains sewer.

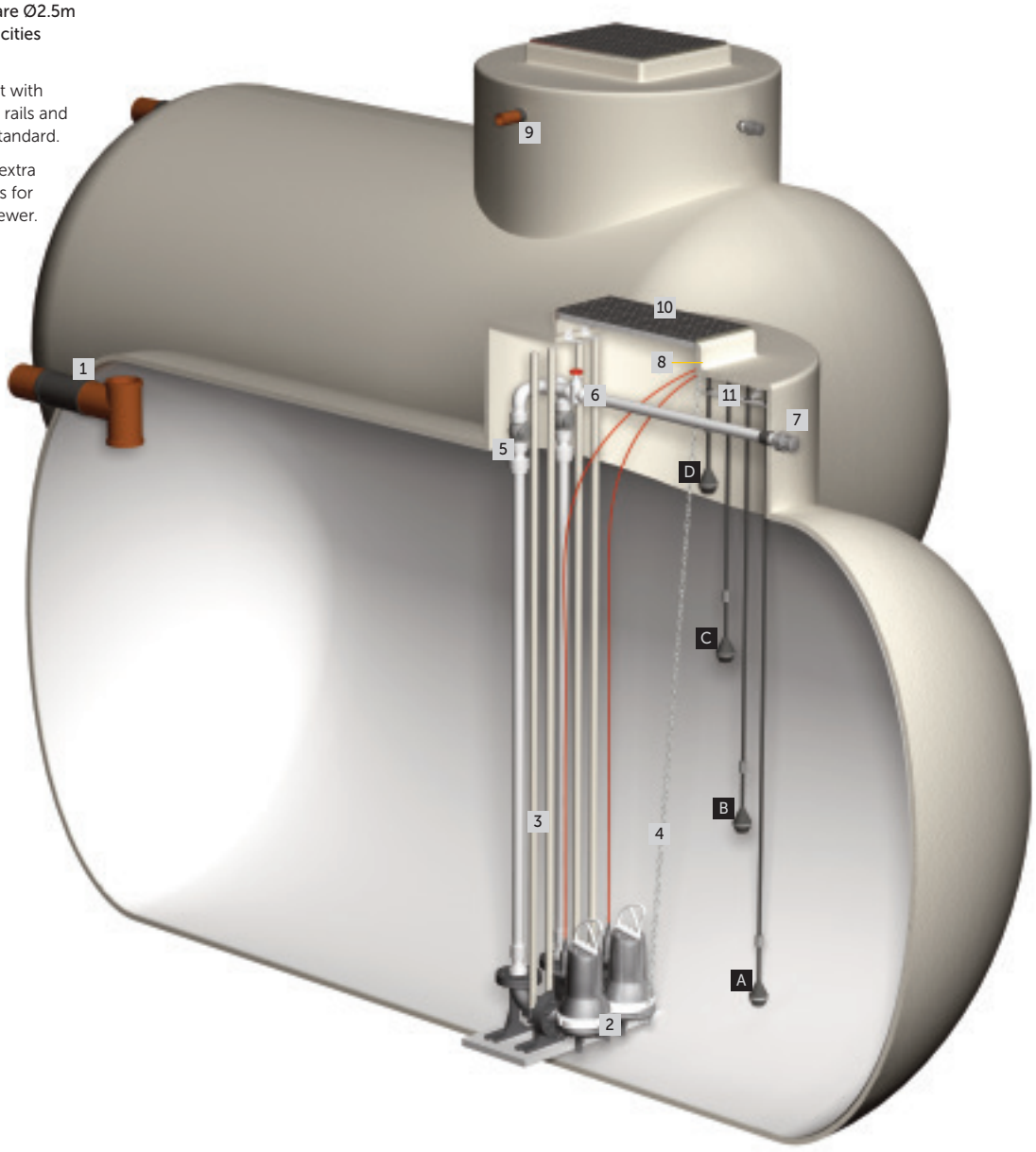
Key

1 Inlet
2 Twin pumps with guide rails
3 Guide rails
4 Pump retrieval chain
5 Non-return valve(s)
6 Gate valve
7 Outlet connection
8 Ducting and cable entry points
9 Vent
10 Manway access
11 Float bracket

Float configuration options

A Pump 'OFF' float switch
B Pump 1 'ON' float switch
C Pump 2 'ON' float switch
On twin pump configurations
D High water float switch

Note: Floats can be fitted directly to specific pump systems. please contact Marsh Civils to discuss your project requirements.



WellWater:Amazon range examples (Tanks with capacities up to 100,000 litres are available on request)

Model	Pump	Application	Diameter mm	Length mm	Total storage Litres	Invert mm	Pipework dia mm
TS2520	Twin	Sewage	2500	2000	7710	minimum 500	110 or 160
TS2535	Twin	Sewage	2500	3500	15050	minimum 500	110 or 160
TS2540	Twin	Sewage	2500	4000	17500	minimum 500	110 or 160

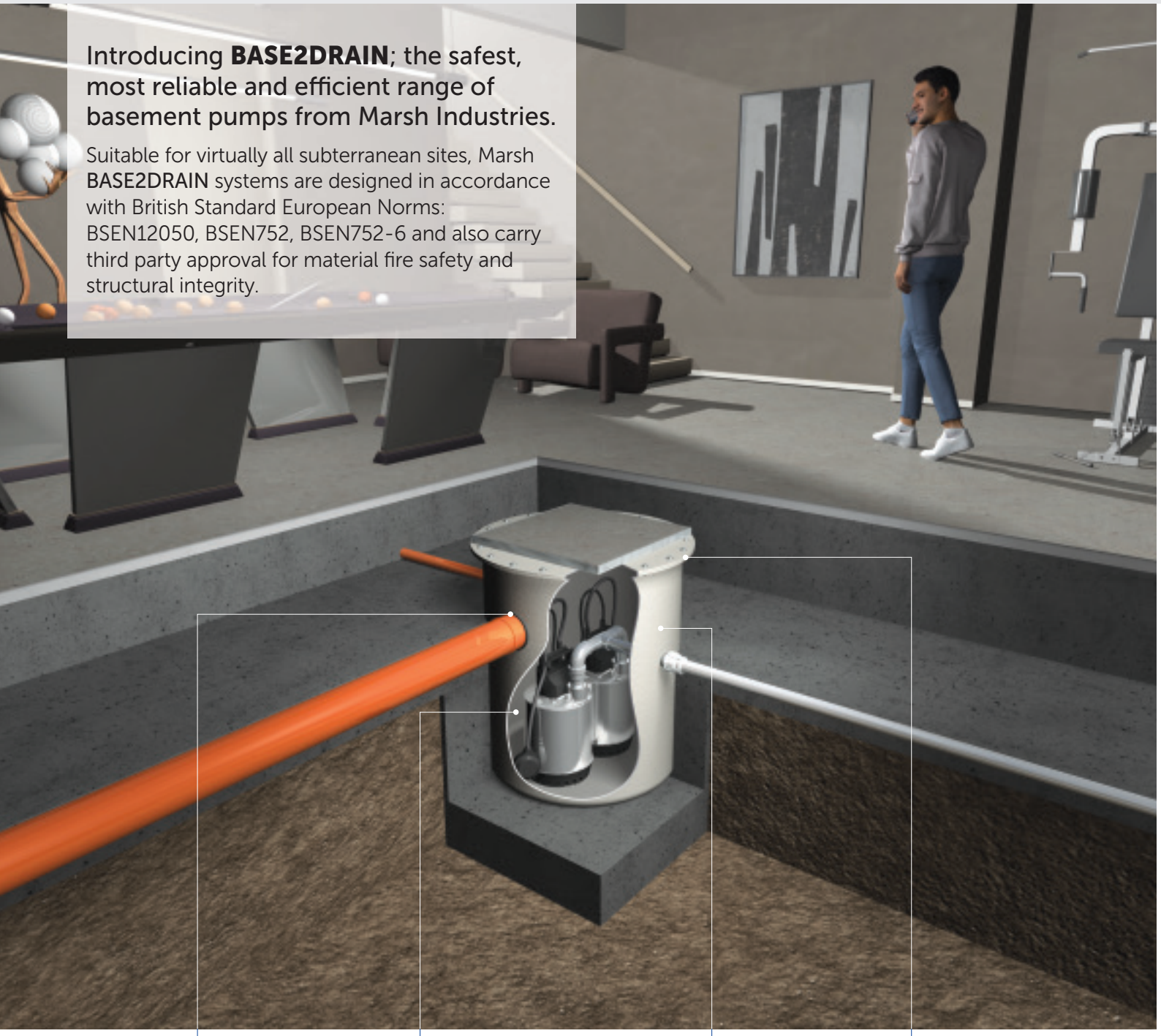
Notes:
> *All pump stations are available for dirty water (DW) or sewage (SW), in single pump (SP) and twin pump (TP) configurations*
> *The dimensions given on this page are for guidance only*
> *For precise tank sizes and configurations, please contact Marsh Civils*
> *All dimensions in mm*

Tank configurations and components are shown for illustration purposes only

BASE2DRAIN

Basement pumps

Quality, efficiency, reliability



Introducing **BASE2DRAIN**; the safest, most reliable and efficient range of basement pumps from Marsh Industries.

Suitable for virtually all subterranean sites, Marsh **BASE2DRAIN** systems are designed in accordance with British Standard European Norms: BSEN12050, BSEN752, BSEN752-6 and also carry third party approval for material fire safety and structural integrity.

Variable invert depths and orientations to suit individual site conditions

Smooth internal walls improve pump efficiency and eliminates 'dead spots' which can lead to odours and septicity

Structurally robust, fire tested GRP shell

Unique 'keying-in' lip assists anchoring into concrete surround

> Reliable product, prompt response on after sales issues, and flexible delivery schedules when required.
>
> *– Client testimonial*

Overview

A Marsh BASE2DRAIN basement pump is necessary when discharge from a subterranean site, such as an underground car park or a home basement, is required but gravity discharge is impractical.

Available in a wide range of sizes and capacities, all BASE2DRAIN systems are supplied as a complete unit with either twin or triple submersible pumps and high quality internal pipework/fittings as standard.

Marsh Civils' technical team can work closely with you to identify all key requirements in specifying the right system for your project.

Pump options

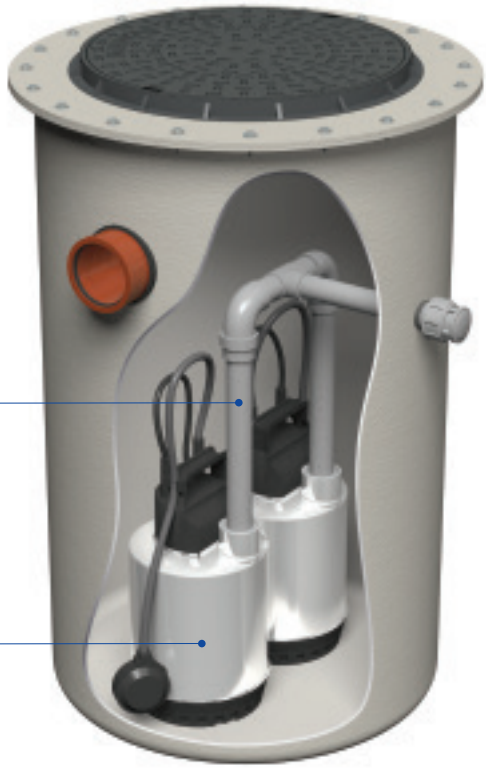
Marsh uses market-leading submersible pumps throughout its BASE2DRAIN range to ensure maximum reliability and efficiency with minimal clogging or wear.

Notes:
- *In triple submersible pump applications, one pump is typically used as a backup.*
- *Floats can be fitted directly to specific pump systems*

Specifications

Model	Pump options	Diameter +/-50mm	Depth +/-50mm	Total storage Litres	Outlet diameter	Outlet invert	Power
B2D-TP675	Twin pump	600mm	750mm	141 Litres	32mm MDPE	250mm	0.25kw/0.55kw
B2D-TP610	Twin pump	600mm	1000mm	169 Litres	32mm MDPE	400mm	0.25kw/0.55kw
B2D-TP615	Twin pump	600mm	1500mm	212 Litres	32mm MDPE	750mm	0.55kw
B2D-TP620	Twin pump	600mm	2000mm	226 Litres	32mm MDPE	1200mm	0.55kw
B2D-TRP7575/BB	Twin pump / Triple pump / UPS battery-back up options	750mm	750mm	220 Litres	32mm MDPE	250mm	0.25kw/0.55kw
B2D-TRP7510	Twin pump / Triple pump options	750mm	1000mm	265 Litres	32mm MDPE	400mm	0.25kw/0.55kw
B2D-TRP7515	Twin pump / Triple pump options	750mm	1500mm	331 Litres	32mm MDPE	750mm	0.55kw
B2D-TRP7520	Twin pump / Triple pump options	750mm	2000mm	353 Litres	32mm MDPE	1200mm	0.55kw

Notes:
- *The dimensions given on this page are for guidance only*
- *For precise tank sizes and configurations, please contact Marsh*
- *All dimensions in mm*

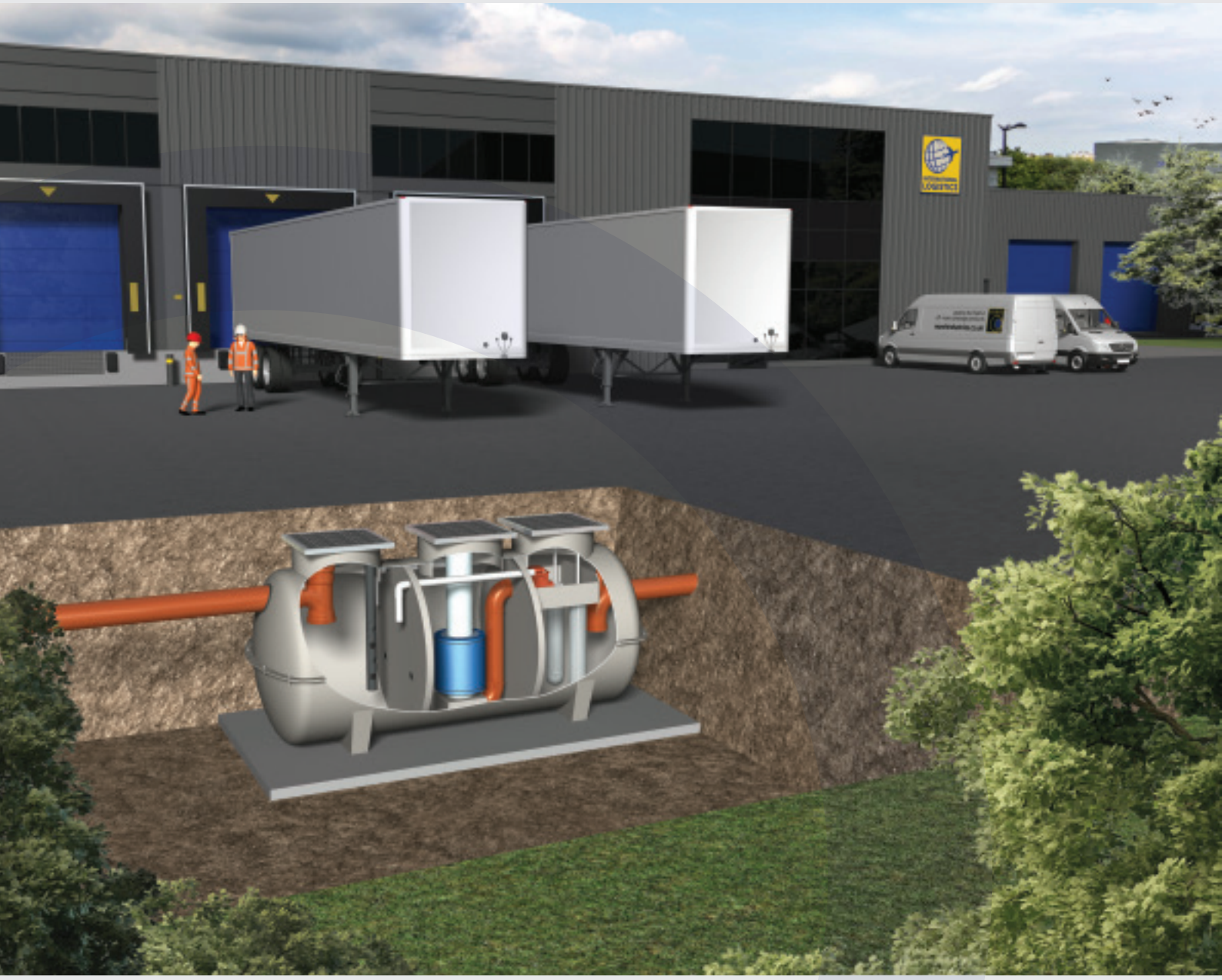


Why specify Marsh?

- Designed to British Standard European Norms:
  BSEN12050 for structural strength and water-tightness
  BSEN752 to comply with hydrostatic and electrical requirements
  BSEN752-6 for drain and sewer systems in outside buildings
- Smooth internal walls and integral pump well improve pump efficiency and eliminates 'dead spots' which can lead to odours and septicity
- Variable invert depths and orientations to suit individual site conditions
- Pre-assembled pipework for fully automatic operation
- Unique 'keying-in' lip assists anchoring into concrete surround
- GRP tank material passed all practical fire testing to achieve EN ISO 11925-2:2010 standard (see back page)
- Structural integrity tests performed in accordance with EN ISO 179-1/1eA: 2010-11 (see back page)

Note: Tank products and configurations shown for illustrative purposes only

OIL SEPARATORS



MARSH SuDS SAFE SEPARATORS

Separation by flotation and settlement

> Speaking to experts in their field, such as those at Marsh Industries, provides us with confidence that the correctly sized tank is supplied and installed. Their systems are innovative and generally on quick lead times.
>
> *– Client testimonial*

Oil separators are designed to prevent oil and other hydrocarbons from entering the drainage system. They separate oil from water, and safely retain the oil until it is removed.

Oil cannot be treated easily and will therefore cause severe pollution if allowed to enter mains sewers or drainage fields. Statutory controls enforce strict regulations on the discharge of such pollutants.

Separators should be used in such applications as petrol stations, industrial yards and garages; or virtually anywhere that a risk of oil contamination exists.

Discharge requirements for oil separators may vary in different areas of the country and it is therefore essential to consult the appropriate environmental controlling authority prior to specifying an oil separator. If the discharge is to a public sewer then local Building Control, the Water Authorities and water companies should also be contacted.

Note: For larger sites, more than one type of oil separator may be required.

Separator types and principles of operation

Classes

Separators are classed in two categories based on performance under standard test conditions.

Class 1 separators are designed to achieve a discharge concentration of less than 5mg/litre of oil. These separators are required for discharges to surface water drains and the water environment.

Class 2 separators are designed to achieve a discharge concentration of less than 100mg/litre of oil under standard test conditions. They are suitable for dealing with discharges where there is a lower quality requirement, such as discharges to the foul sewer.

Both classes can be produced as 'full retention', 'bypass' or 'forecourt' separators as explained below.

Bypass separators

Bypass separators treat all flows from rainfall events of up to 6.5mm/hr. This covers over 99% of all rainfall events. Flows higher than 6.5mm/hr are designed to bypass the separator.

These separators are used in a 'low risk' environment where there is no requirement to provide full treatment for the flow; for example a car park where the risk of a significant spillage is small.

Full retention separators

Full retention separators treat the full flow that is delivered by the drainage system, which is normally equivalent to the flow generated by a rainfall intensity of 65mm/hr.

These separators are used where there may be a 'high risk' of a significant fuel spillage, such as vehicle workshops

Forecourt separators

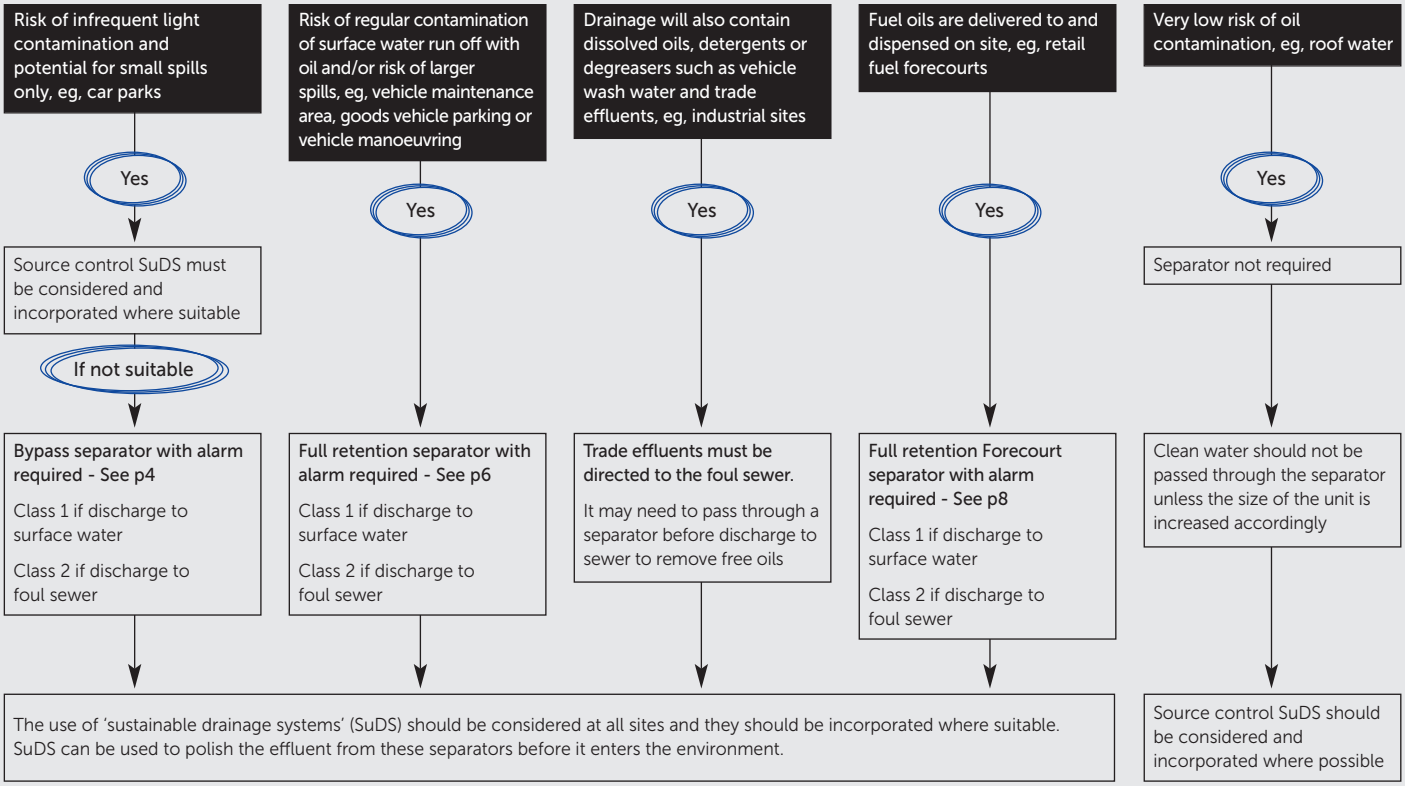
Forecourt separators are a type of full retention separator, however they are specifically designed to store the maximum spillage likely to occur on a petrol station forecourt.

These separators are manufactured to a specific size in order to retain the potential spillage from a single compartment of a road tanker – currently up to 7,600 litres in the UK.

Wash-down separators and silt traps

It is a legal requirement to install a silt trap or wash-down separator on commercial sites, such as vehicle wash bays, where there is an environmental risk of contamination from dirt, brake dust, traffic film residue, cleaning agents, oil, etc.

Choosing the right separator



Marsh:Marator™

High performance full retention oil separators for sites where the “industry standard” is just not good enough

Overview

Marsh Industries has developed an innovative separator system that breaks the constraints of the current standards; the ‘Marsh:Marator’.

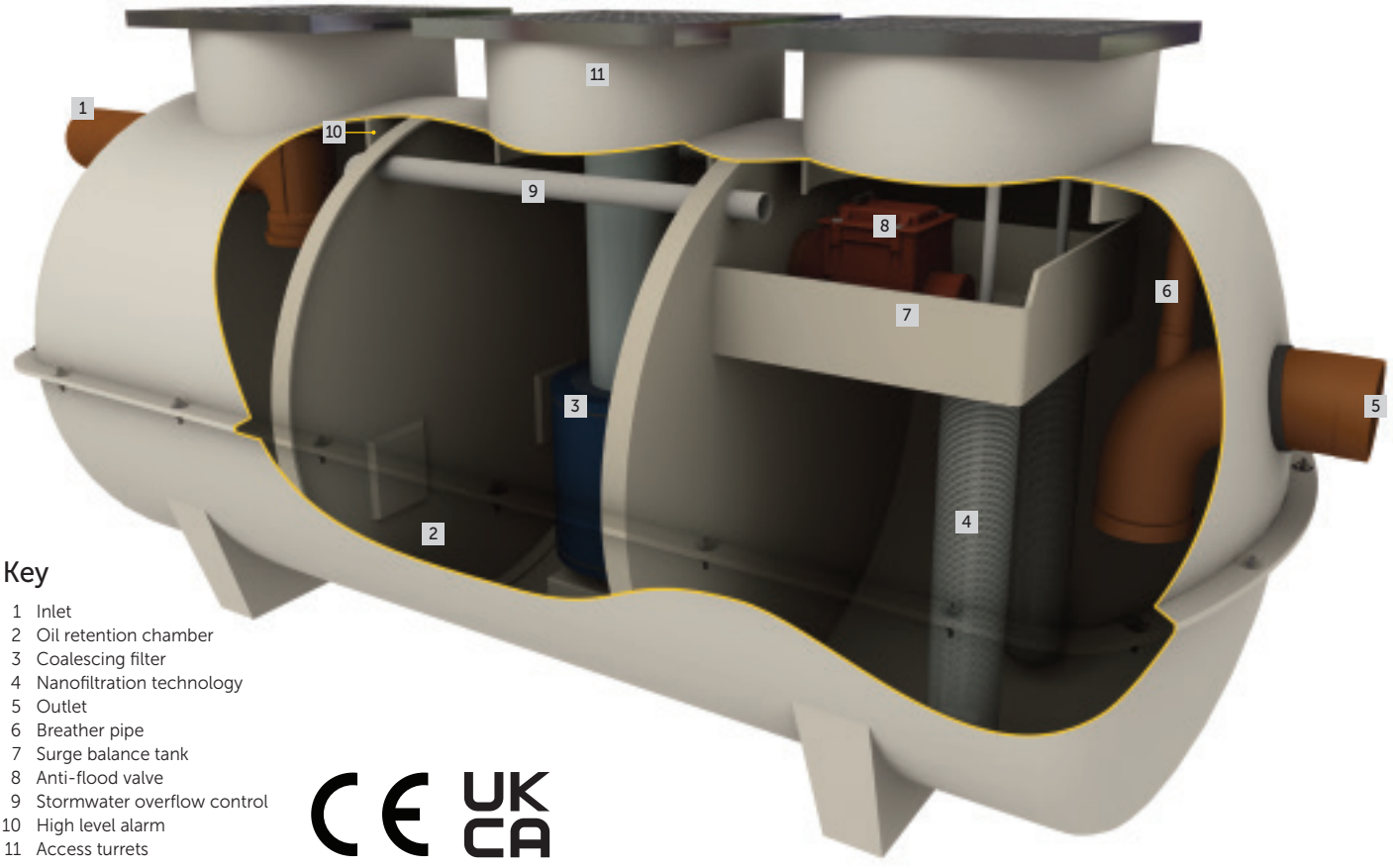
The Marator takes advantage of nanofiltration technology to produce discharge that is 50 times better than any current separator available on the market today; that is less than 0.1mg/ltr – the standard only requires less than 5mg/ltr for a ‘class 1 discharge’.

Testing was analysed for hydrocarbon content using infrared spectroscopy at GEOTAIX UMWELTTECHNOLOGIE GmbHA.

During the sampling period, five samples of 500ml were taken via the sampling point. The quality of discharge from the Marator exceeded the measureable level of the test equipment not to mention the current EN standard:

Test results (NS6 model)

Sample	Result GC in mg/litre (Industry standard <5mg/litre)
NS 6-1	< 0.1
NS 6-2	< 0.1
NS 6-3	< 0.1
NS 6-4	< 0.1
NS 6-5	< 0.1
NS 6-6	< 0.1
NS 6-7	< 0.1
Average	< 0.1



Key

1 Inlet
2 Oil retention chamber
3 Coalescing filter
4 Nanofiltration technology
5 Outlet
6 Breather pipe
7 Surge balance tank
8 Anti-flood valve
9 Stormwater overflow control
10 High level alarm
11 Access turrets

CE UKCA

Benefits

- Designed and tested to meet latest UK and European standards
- Corrosion resistant
- Tank shells guaranteed for 25 years with a design life of 50 years
- Heavy duty shells enable installation in all ground conditions
- Easy access turrets for maintenance and servicing (Turret guards optional)
- Various alarm types available (Required by EN858-1)
- Variable invert depths and inlet/outlet configurations to suit individual site conditions
- Vented turrets can dissipate excessive fumes and vapours

Typical applications

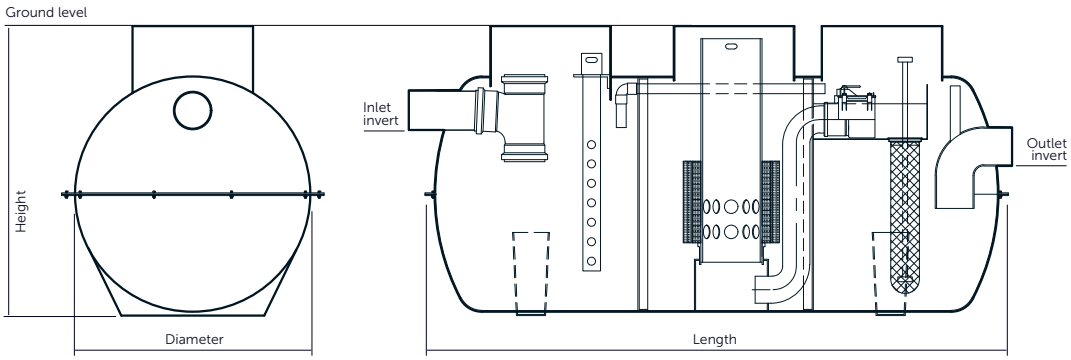
- *Car parks*
- *Roadways*
- *Industrial estates*
- *Vehicle workshops*
- *Refuel facilities*
- *Fuel storage sites*

Illustration shown for visual reference only



SuDS SAFE SEPARATORS

Specifications



View on inlet end

Section through tank centre

Model	Max flow litre/sec	Drainage area m²	Silt storage litres	Oil storage litres	Diameter +/-50mm	Length +/-50mm	Height +/-50mm	Connection size	Inlet invert	Outlet invert
Marator 6	6	340	600	60	1250	3040	1862	200	900	1100
Marator 10	10	566	1000	100	1250	4040	1862	200	900	1100
Marator 15	15	851	1500	150	1812	4240	2360	315	900	1100
Marator 20	20	1137	2000	200	1812	4240	2360	315	900	1100

Notes:
> *Larger systems are available, please contact Marsh Civils*
> *The dimensions given on this page are for guidance only*
> *For precise tank sizes and configurations, please contact Marsh Civils*
> *Number of access shafts will be built to suit site specifications and to maintain safe access for emptying*
> *All dimensions in mm*

Are outmoded EN standards an environmental concern?

Current EN standard
The European Standard, BS EN 858 parts 1&2, was introduced in 2002 to normalise design and regulate testing of products across Europe. This standard settled on a two-tier quality level – class 1 and class 2.

Class 1 – designed to achieve a discharge concentration of less than 5mg/ltr of oil in the discharge
Class 2 – designed to achieve a discharge concentration of less than 100mg/ltr of oil in the discharge

Once testing is complete and approval achieved, manufacturers are free to bring their products to market.

The effects of current standards
A good starting point for any product is to set out relevant standards and levels of quality, both in product build and product performance. However, since the introduction of BS EN 858 in 2002, product development in gravity oil/liquid separation has remained static.

Manufacturers are only required to meet the testing standards to sell product. There has been no natural drive to improve product performance.

The current class 1 standard of less than 5mg/ltr of light liquid is only determined by test conditions. Our experience in this field tells us that this standard is rarely met once a product is installed.

The reality of current standards
With the current level of 5mg/ltr for a Class 1 discharge – we ask "Are Class 1 separators the very best that manufacturers can offer?"

Studies have shown that the majority of hydrocarbon pollutants entering the water system stems from urban developments. Figure 2 shows the toxic effects of particular contaminants on humans and aquatic life.

Leaving aside the toxic effects of contaminants on human and aquatic life, when a hydrocarbon molecule spreads to one molecule thick and given enough surface area to spread, five litres of oil would be more than enough to contaminate five football pitches.

In addition, most hydrocarbon molecules are attached to silt particles; where Stokes' law proves that these particles will sink rather than float as conventional separators require.

When mixed with other elements in real life scenarios, such as glycol, standard gravity separators become less efficient at contaminate removal.

In our view, the current testing standards covering products within the gravity separator market are outmoded and failing to protect the environment as they should. They do not reflect or address any 'real-life' scenario where hydrocarbon pollution is prevalent.

The solution = the Marsh:Marator

Marsh:Hydroil™
Full retention separators
For areas at 'high risk' of oil contamination

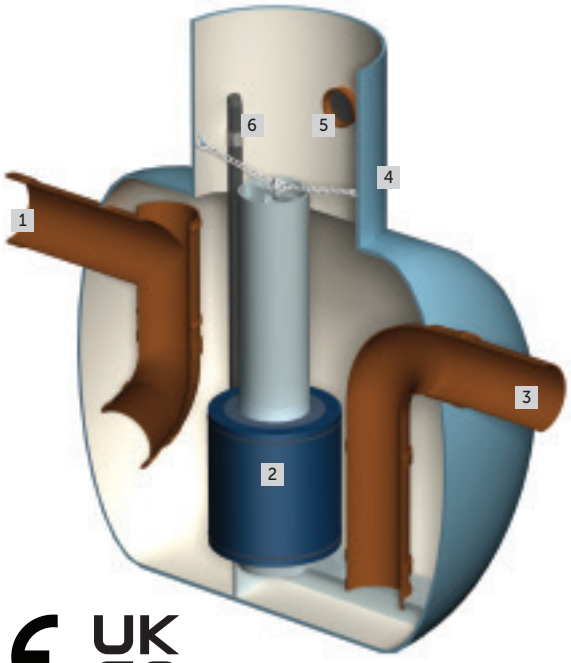
Overview

Full retention separators are used where there may be a 'high risk' of a significant fuel spillage, such as vehicle workshops

Designed and tested to BS EN858 parts 1&2, Marsh Hydroil full retention separators are manufactured from virgin unfilled resin offering exceptional durability, impact resistance and are guaranteed to be watertight and of uniform thickness. These combined properties ensure that the full range of separators stand up to the most rigorous conditions during their service life.

Internal working components, such as coalescing filters, automatic closure devices, weirs, oil skimmer plates, and their configurations offer the most modern and efficient oil/water separation capability available to the market today.

A wide choice of inlet and outlet positions are available on the units - detailed requirements should be provided at time of order (standard inlet and outlet positions will otherwise be fitted).



Operating principle

Marsh Hydroil full-retention separators treat the full flow that is delivered by the drainage system, which is normally equivalent to the flow generated by a rainfall intensity of 65mm/hr.

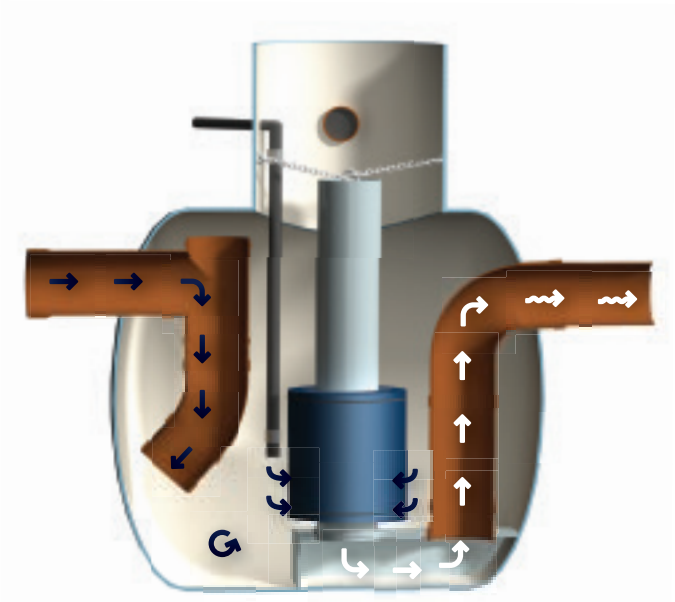
Key

1 Inlet
2 Coalescer
3 Outlet
4 Access turret
5 Air vent
6 Level alarm dip pipe

Flowpath

Oil/water mixture

Water



Benefits

- Designed and tested to meet latest UK and European standards
- Corrosion resistant
- Tank shells guaranteed for 25 years with a design life of 50 years
- Heavy duty shells enable installation in all ground conditions
- Easy access turrets for maintenance and servicing (Turret guards optional)
- Various alarm types available (Required by EN858-1)
- Variable invert depths and inlet/outlet configurations to suit individual site conditions
- Vented turrets dissipate excessive fumes and vapours

Typical applications

- *Vehicle workshops*
- *Refuel facilities*
- *Fuel storage sites*

Mitigation indices

As the world focuses on more green and environmentally friendly solutions, Marsh Industries has examined how effective their separators are when incorporating them into sustainable drainage schemes.

The company tested their full retention Hydroil separator range for total suspended solids and metal mitigation indices in line with industry-approved procedures at PIA, the notified test house in Aachen, Germany. This is in addition to an existing test procedure, whereby the Hydroil has already achieved EN858-1 certification for light liquid separators.

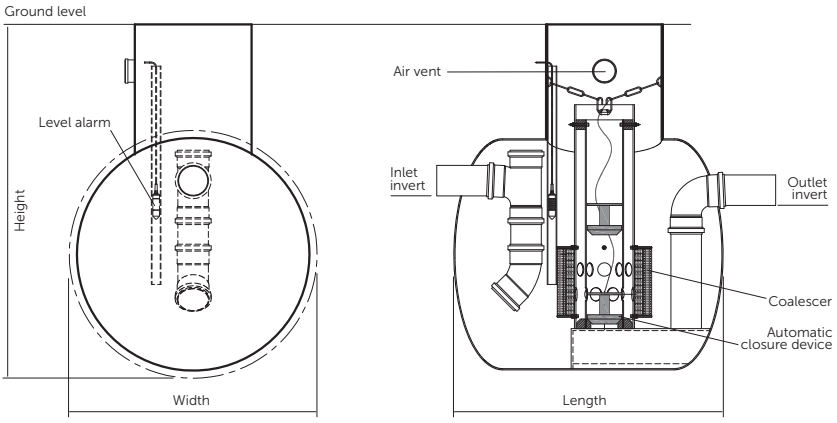
Combining these two test sets together and applying the simple index approach to proprietary/manufactured EN858 devices, the Hydroil separator range is able to achieve the following mitigation indices:

Hydrocarbons: 97.5%
Total Suspended Solids: 84.35%
Total Metal Reduction: 63.26%

The results will provide user confidence that the testing of this range is beyond reproach and cements these products as the complete surface water treatment solution for SuDS schemes.

SuDS SAFE SEPARATORS

Specifications



View on inlet end

Section through tank centre

Full retention separator range

Model	Flow litre/sec	Drainage area m²	Silt storage litres	Oil storage litres	Width +/-50mm	Length +/-50mm	Height +/-50mm	Connection size	Inlet invert	Outlet invert
NSFR 3	3	170	300	30	1200	1400	1840	160	900	950
NSFR 4	4.5	255	450	40	1200	1700	1840	160	900	950
NSFR 6	6	340	600	60	1200	2400	1840	160	900	950
NSFR 8	8	453	800	80	1200	3200	1840	160	900	950
NSFR 10	10	566	1000	100	1200	3500	1840	160	900	950
NSFR 15	15	851	1500	150	1800	3600	2440	200	900	1000
NSFR 20	20	1137	2000	200	1800	4000	2440	200	900	1000
NSFR 30	30	1700	3000	300	1800	4800	2440	250	900	1000
NSFR 40	40	2265	4000	400	1800	6200	2440	315	900	1000
NSFR 50	50	2800	5000	500	1800	7500	2440	315	900	1000
NSFR 60	60	3233	6000	600	2622	5200	3172	315	900	1000
NSFR 65	65	3670	6500	650	2622	5600	3172	315	900	1000
NSFR 70	70	4318	7000	700	2622	6000	3172	315	900	1000
NSFR 80	80	4533	8000	800	2622	6600	3172	315	900	1000
NSFR 100	100	5666	10000	1000	2622	8600	3172	315	900	1000
NSFR 125	125	7082	12500	1250	3128	7200	3678	400	900	1100
NSFR 150	150	8500	15000	1500	3128	8400	3678	400	900	1100
NSFR 165	165	9166	16500	1650	3128	9300	3678	400	900	1100
NSFR 175	175	9800	17500	1750	3128	10000	3678	400	900	1100
NSFR 200	200	11110	20000	2000	3128	11300	3678	400	900	1100
NSFR 210	210	11898	21000	2100	3128	11500	3678	400	900	1100
NSFR 250	250	13888	25000	2500	3128	13800	3678	400	900	1100
NSFR 275	275	15582	27500	2750	3128	14500	3678	400	900	1100

Notes:
> *The dimensions given on this page are for guidance only*
> *For precise tank sizes and configurations, please contact Marsh Civils*
> *Number of access shafts will be built to suit site specifications and to maintain safe access for emptying*
> *All dimensions in mm*

Illustrations shown for visual reference only

Marsh:Hydroil™ Bypass separators

For areas at 'low risk' of oil contamination

Overview

Bypass separators are used in a 'low risk' environment where there is no requirement to provide full treatment for the flow: for example a car park where the risk of a significant spillage is small.

Designed and tested to BS EN858 parts 1&2, Marsh Hydroil bypass separators are manufactured from virgin unfilled resin offering exceptional durability, impact resistance and are guaranteed to be watertight and of uniform thickness. These combined properties ensure that the full range of separators stand up to the most rigorous conditions during their service life.

Internal working components, such as coalescing filters, weirs, oil skimmer plates, and their configurations offer the most modern and efficient oil/water separation capability available to the market today.

A wide choice of inlet and outlet positions are available on the units - detailed requirements should be provided at time of order (standard inlet and outlet positions will otherwise be fitted).

Operating principle

Marsh Hydroil bypass separators are designed to treat 10% of peak flow.

The drainage areas served by each separator are determined in accordance with both BS EN858 parts 1&2, but also with reference to a formula provided by the Environment Agency, where NSB=0.0018xA (catchment area in m^2). Flows from higher rainfall rates are allowed to bypass the main separation chamber.

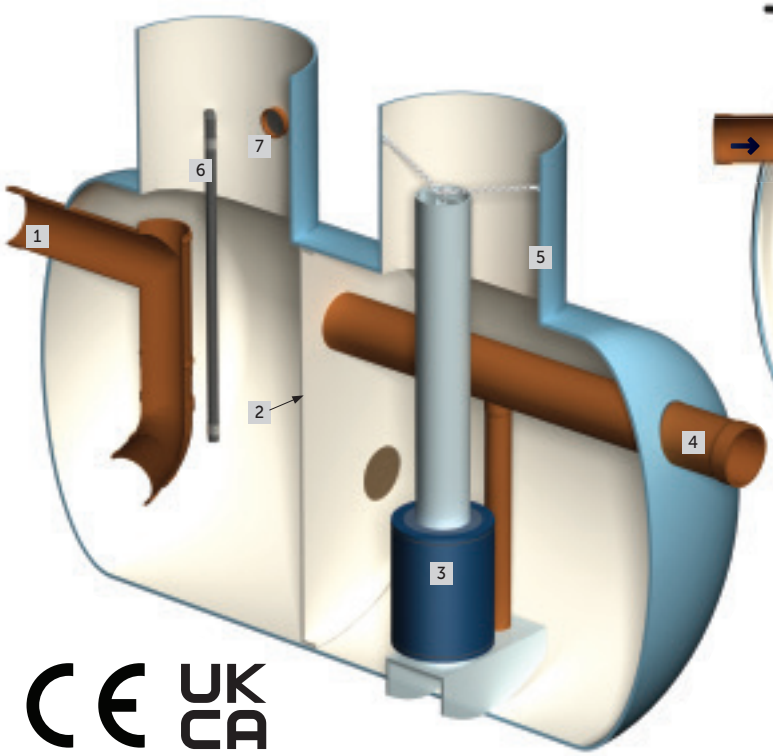
Key

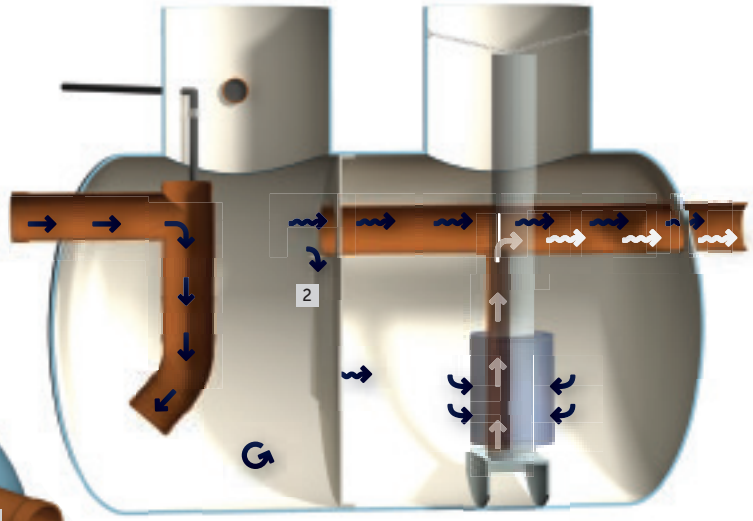
1 Inlet
2 Oil skimmer plate
3 Coalescer
4 Outlet
5 Access turret
6 Level alarm dip pipe
7 Air vent

Flowpath

Oil/water mixture

Water





CE UKCA

Benefits

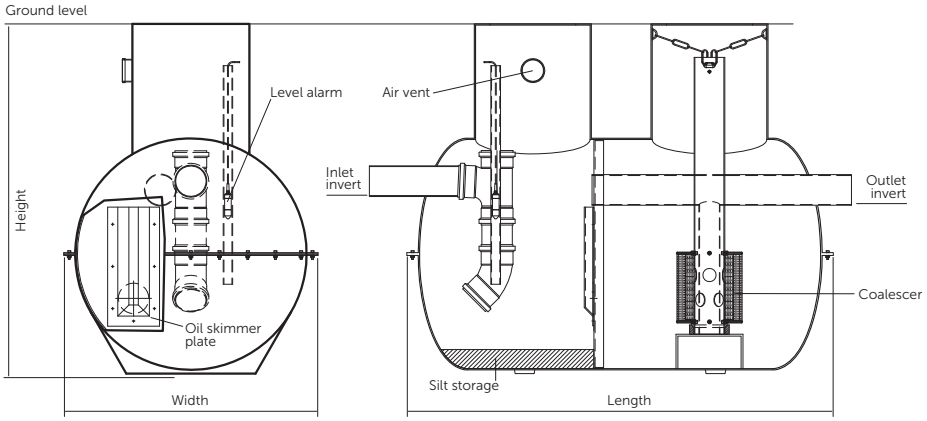
- Designed and tested to meet latest UK and European standards
- Corrosion resistant
- Tank shells guaranteed for 25 years with a design life of 50 years
- Heavy duty shells enable installation in all ground conditions
- Easy access turrets for maintenance and servicing (Turret guards optional)
- Various alarm types available (Required by EN858-1)
- Variable invert depths and inlet/outlet configurations to suit individual site conditions
- Vented turrets dissipate excessive fumes and vapours

Typical applications

- *Car parks*
- *Roadways*
- *Industrial estates*
- *SuDS*

SuDS SAFE SEPARATORS

Specifications



View on inlet end

Section through tank centre

Bypass separator range

00 Model	Flow litre/sec	Drainage area m²	Silt storage litres	Oil storage litres	Width +/-50mm	Length +/-50mm	Height +/-50mm	Connection size Ø	Inlet invert	Outlet invert
NSBP 3	30	1700	300	45	1354	2254	1834	160 O/D	900	950
NSBP 4	45	2550	450	67.5	1354	2254	1834	160 O/D	900	950
NSBP 6	60	3400	600	90	1354	2254	1784	200 O/D	900	950
NSBP 8	80	4530	800	120	1354	2254	1784	200 O/D	900	950
NSBP 10	100	5660	1000	150	1354	2914	1784	315 O/D	900	950
NSBP 15	150	8510	1500	225	1354	4184	1784	315 O/D	900	1000
NSBP 18	180	10198	1800	270	1818	2398	2418	400 O/D	1050	1150
NSBP 20	200	11370	2000	300	1818	2398	2418	400 O/D	1050	1150
NSBP 25	250	14185	2500	375	1818	3198	2418	400 O/D	1050	1150
NSBP 30	300	17000	3000	450	1818	3758	2418	500 O/D	1185	1285
NSBP 40	400	22650	4000	600	1818	4878	2418	500 O/D	1185	1285
NSBP 45	450	25325	4500	675	1818	5438	2418	500 O/D	1185	1285
NSBP 50	500	28330	5000	750	1818	5998	2418	500 O/D	1185	1285
NSBP 60	600	33996	6000	900	2622	4028	3172	600 I/D Twin wall	1350	1450
NSBP 65	650	36829	6500	975	2622	4303	3172	600 I/D Twin wall	1350	1450
NSBP 70	700	39620	7000	1050	2622	4578	3172	600 I/D Twin wall	1350	1450
NSBP 75	750	42495	7500	1125	2622	4908	3172	600 I/D Twin wall	1350	1450
NSBP 80	800	45330	8000	1200	2622	5415	3172	600 I/D Twin wall	1350	1450
NSBP 100	1000	56660	10000	1500	3128	4702	3678	750 I/D Twin wall	1525	1625
NSBP 125	1250	70820	12500	1875	3128	5741	3678	TBC*	TBC*	TBC*
NSBP 130	1300	73658	13000	1950	3128	6028	3678	TBC*	TBC*	TBC*
NSBP 150	1500	84990	15000	2255	3128	6780	3678	TBC*	TBC*	TBC*

Notes:

**Pipework and inverts sized on application*

> *The dimensions given on this page are for guidance only*
> *For precise tank sizes and configurations, please contact Marsh Civils*
> *Number of access shafts will be built to suit site specifications and to maintain safe access for emptying*
> *All dimensions in mm*

Illustrations shown for visual reference only

Marsh:Hydroil™ Forecourt separators

For areas at 'significant risk' of oil contamination

Overview

Designed and tested to BS EN858 parts 1&2, Marsh Hydroil forecourt separators are manufactured from virgin unfilled resin offering exceptional durability, impact resistance and are guaranteed to be watertight and of uniform thickness. These combined properties ensure that the full range of separators stand up to the most rigorous conditions during their service life.

Internal working components, such as coalescing filters, weirs, oil skimmer plates, and their configurations offer the most modern and efficient oil/water separation capability available to the market today.

A wide choice of inlet and outlet positions are available on the units - detailed requirements should be provided at time of order (standard inlet and outlet positions will otherwise be fitted.

Operating principle

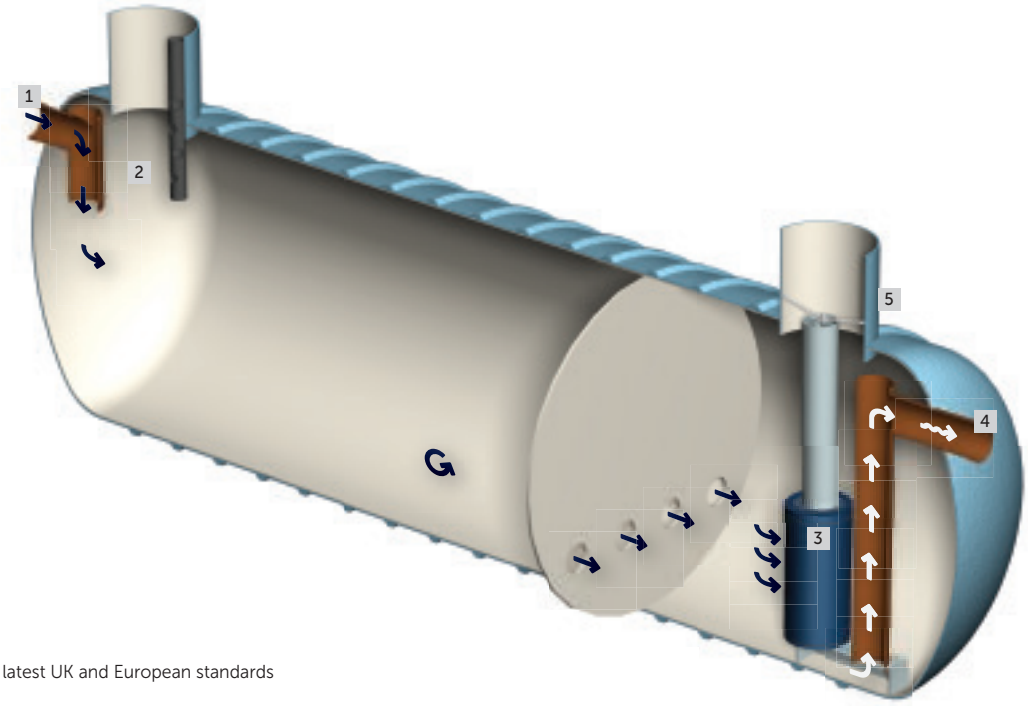
Marsh Hydroil forecourt separators are manufactured to a specific size in order to retain the potential spillage from a single compartment of a road tanker – currently up to 7,600 litres in the UK.

Key

1 Inlet
2 Oil level alarm (in 3" pipe)
3 Coalescer
4 Outlet
5 Access turrets

Flowpath

Oil/water mixture
Water



Benefits

- Designed and tested to meet latest UK and European standards
- Corrosion resistant
- Tank shells guaranteed for 25 years with a design life of 50 years
- Heavy duty shells enable installation in all ground conditions
- Easy access turrets for maintenance and servicing (Turret guards optional)
- Various alarm types available (Required by EN858-1)
- Variable invert depths and inlet/outlet configurations to suit individual site conditions
- Vented turrets dissipate excessive fumes and vapours

Typical applications

- *Petrol stations*
- *Refuel facilities*
- *Fuel storage sites*

Forecourt separator range

Model	Capacity litres	Width +/-50mm	Length +/-50mm	Height +/-50mm	Connection size	Inlet invert	Outlet invert
Class 1	10000	1800	4200	2200	160	700	800
Class 2	10000	1800	4200	2200	160	700	800

Notes:
> *The dimensions given on this page are for guidance only*
> *For precise tank sizes and configurations, please contact Marsh Civils*
> *Number of access shafts will be built to suit site specifications and to maintain safe access for emptying*
> *All dimensions in mm*

Illustrations shown for visual reference only

Wash-down separators and silt traps

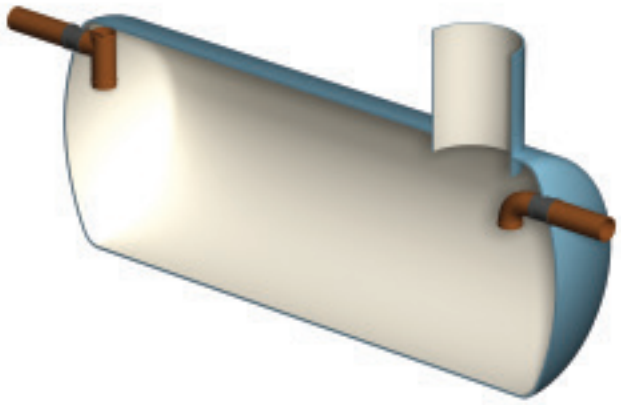
Pollution prevention

Wash-down separators

Available in capacities from 2800-20,000 litres, Marsh wash-down separators safely remove silt and debris from vehicle wash-down facilities.

These units are primarily used on car wash bays, pressure wash facilities or other cleaning facilities where the effluent must be discharged to the foul water drainage system.

It is a legal requirement to install a silt trap or wash-down separator on commercial sites, such as vehicle wash bays, where there is an environmental risk of contamination from dirt, brake dust, traffic film residue, cleaning agents, oil, etc. In all cases, you should contact your local building control or environmental agency for specific site requirements.



Benefits

- Heavy duty shells enable installation in all ground conditions
- Tank shells guaranteed for 25 years with a design life of 50 years
- Variable invert depths and inlet/outlet configurations to suit individual site conditions
- Easy access turrets for maintenance and servicing (Turret guards optional)
- Optional Polylok filter can further reduce pollutants from entering the drainage system
- Various alarm types available (Required by EN858-1)
- Corrosion resistant

Wash-down separator range

Model	Capacity litres	Width +/-50mm	Length +/-50mm	Height +/-50mm	Connection size	Inlet invert	Outlet invert
WD2800	2800	1200	3000	1715	110	700	750
WD3800	3800	1200	4000	1715	110	700	750
WD4500	4500	1500	2650	2015	110	700	750
WD6000	6000	1800	2950	2300	110	700	750
WD8000	8000	1800	3600	2300	160	700	750
WD10000	10000	1800	4200	2300	160	700	750
WD12000	12000	1800	5200	2300	160	700	750
WD15000	15000	2500	3100	3000	160	700	750
WD18000	18000	2500	4100	3000	160	700	750
WD20000	20000	2500	4500	3000	160	700	750

Notes:

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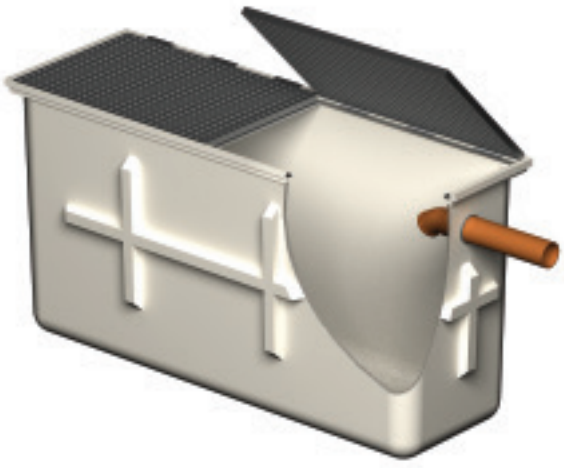
> *For precise tank sizes and configurations, please contact Marsh Civils*
> *Number of access shafts will be built to suit site specifications and to maintain safe access for emptying*
> *All dimensions in mm*



Silt traps

With a capacity from 830-3400 litres, Marsh silt traps provide effective storage of silt and debris from vehicle wash-down facilities.

Positioned ahead of an oil separator, the silt trap gathers and stores silt and sediment, and prevents it from entering the oil separator system.

Benefits

- Heavy duty body enables installation in all ground conditions
- Hinged, galvanised steel grating provides structural integrity and easy emptying
- Tank body guaranteed for 25 years with a design life of 50 years

Silt trap

Model	Capacity litres	Length +/-50mm	Width +/-50mm	Height +/-50mm	Connection size	Outlet invert
CST1	830	1165	680	1060	110mm	240
CST2	1570	2180	680	1060	110mm	240
CST3	2300	3205	680	1060	110mm	240
CST4	3400	4230	680	1060	110mm	240

Marsh Industries

Providing world-class water and wastewater treatment solutions to the domestic, commercial and agricultural sectors from our UK manufacturing plants in Kettering, Raunds and Bridgwater.

Working smarter

Efficiently meeting the needs of our customers

We strive to be recognised as a collaborative and trusted partner for our customers, aligned to their business, and with a reputation for providing quality products that really do add value.

Innovative thinking

Enabling technologies that deliver tangible benefits

Working across many areas of the UK construction sectors our specialist innovation team combines 100+ years' experience of designing, manufacturing and testing wastewater treatment products that are proven to be economic, efficient and environmentally sensitive.

Compliant products

In line with building and environmental regulations

Our products are fully type-tested and certified to ensure compliance with relevant environmental permitting programmes and Building Regulations. Our extensive portfolio of product approvals and certification is available for viewing.

Delivering confidence

Extensive civils knowledge and experience

Customers specify Marsh products and services because they know we deliver from a solid foundation of knowledge, experience, product quality and proven performance.

Supporting your business

Specialist services to further enhance customer requirements

There are times when our customers need a little extra support. Whether this is on-site advice, backup support, specialist testing or bespoke project solutions, we offer a range of services when and where required.

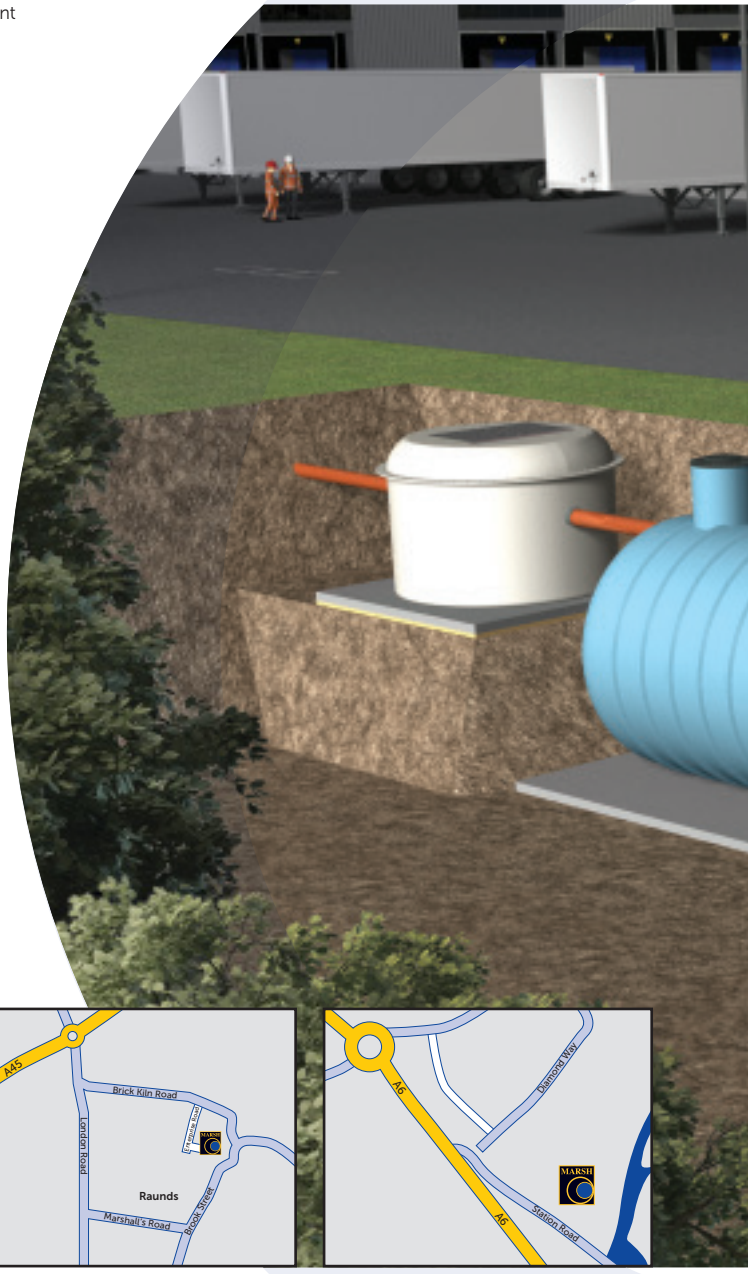
Together we are a strategic partnership

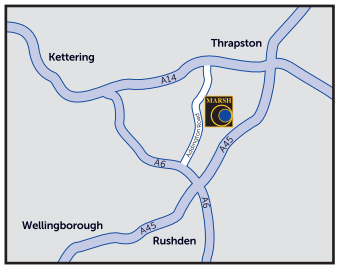
Our core strength lies in the knowledge, experience and enthusiasm of our staff and our customers combined.

Achilles UVDB SILVER PLUS

NBS Source PARTNER

SpecifiedBy





MARSH HQ AND FACTORIES
Units 2-20, Addington Business Park
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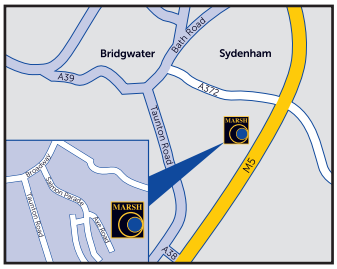
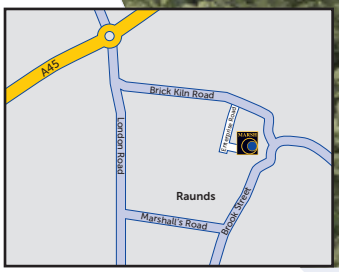


BRIDGWATER FACTORY
Axe Road, Colley Lane Industrial Est.
Bridgwater, Somerset TA6 5LN



RAUNDS FACTORY
Enterprise Rd, Raunds,
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MARSH CIVILS OFFICE
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Northamptonshire NN9 5QF

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MI-CIVILS-0322-A

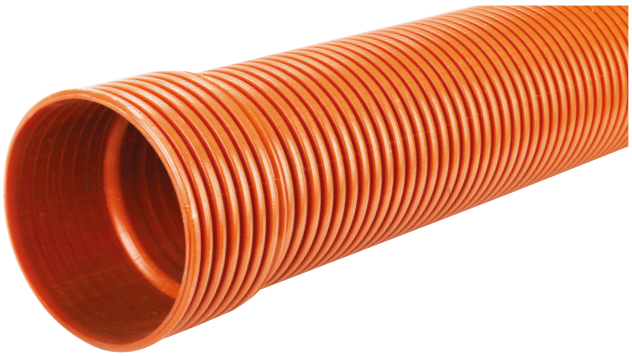
Polysewer

Data Sheet

PRODUCT INFORMATION **P1** **ISSUE 2 - APRIL 2018**

Polysewer is a range of PVCu structured wall gravity sewer pipes and fittings available in diameters from 150-300mm. The complete system includes a range of couplings, seals, bends, junctions and accessories.

The system is manufactured in accordance to BS EN 13476-1, BS EN 13476-3 and WIS 4-35-01 v2, and has adequate resistance to the type and quantities of chemicals likely to be found in domestic sewerage.



Applications

Polysewer provides robust, chemical and sewer gas resistant sewer pipes for new and replacement gravity sewer systems.

Performance

Polysewer has a design life in excess of 100 years.

Key benefits

- Fully compliant with BS EN 13476-1, BS EN 13476-3 and WIS 4-35-01 v2
- BSI Kitemarked and BBA approved
- Adoptable by water companies
- Manufactured to stiffness classification 8
- Lighter in weight for increased Health and Safety benefits
- Durable, long life PVCu
- Structured wall pipe for high ring stiffness and strength
- Integral sockets for quicker installation and greater leak tightness
- Strong, flexible pipe wall withstands ground movement and differential settlement
- Chemical, impact and abrasion resistant
- Resistant to sulphate attack and corrosion by sewer gas
- Saddle connectors are available
- Meets WRc Code of Practice for high pressure water jetting tolerance

KM55698 KM582885

BBA BRITISH BOARD OF AGREMENT CERTIFICATE No. 02/3923

POLYSEWER INTEGRALLY SOCKETED PIPE

NOMINAL SIZE (mm)	ID (mm)	OD (mm)	CODE	LENGTH (m)	PACK QTY
150	146	160	PS632	3	46
225	229	250	PS1032	3	23
300	301	330	PS1232	3	8

6m lengths available, subject to minimum order quantity and lead times.

JOINTING

NOMINAL SIZE (mm)	COUPLING CODE	SEAL CODE
150	PS601	PSSP1
225	PS1001	PSSP2
300	PS1201	PSSP3

Polypipe Civils
Charnwood Business Park, Loughborough, Leicestershire LE11 1LE
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www.polypipe.com/civils

Polypipe

POLYPIPE BUILDING PRODUCTS LTD
MATERIAL SAFETY DATA SHEET

1: IDENTIFICATION OF THE SUBSTANCE / MIXTURE

1.1 Product Identity

Product Name: Polypipe Building Products PVC-u Below Ground Products – Underground Drainage, Polysewer, Sewer drain, Ducting, Land Drain and Civils

1.2 Relevant Identified Uses:

Recommended use: Below Ground Systems

1.3 Details of Supplier

POLYPIPE BUILDING PRODUCTS
BROOMHOUSE LANE
EDLINGTON
DONCASTER
DN12 1ES

TELEPHONE: 01709 770000
EMERGENCY: 01709 770000
EMAIL: bp.datasheets@polypipe.com

The following information is based upon our current knowledge and experience of our products and is not exhaustive. It applies to the product range outlined above. The potential hazards identified, together with the recommended precautions for storage, handling and use, give the basic information for conducting workplace risk assessments and adequate control measures under the Control of Substances Hazardous to Health Regulations 2002, Control of Substances Hazardous to Health (Amendment) Regulations 2004, The CLP Regulations and the Approved Code of Practice

2: HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

Non-Hazardous under normal conditions and use

2.2 Label elements

Not applicable

2.3 Other hazards

Non-Hazardous under normal conditions and use. Fine particles released during cutting may cause irritation to the eyes and respiratory tract.

3: COMPOSITION / INFORMATION ON INGREDIENTS

3.1 Substances

PVC-u

Calcium hydroxide - Stabilizer

Natural Calcium Carbonate - Filler

Chemical Name	EC No	CAS No.	Weight %	Classification according to Regulation (EC) No. 1272/2008 [CLP]	REACH Registration Number

Poly (vinyl chloride)	-	009002-86-2	>99		-
Natural Calcium Carbonate	215-279-6	1317-65-3	>=85-<100		
Calcium hydroxide	215-137-3	1305-62-0	<20	STOT SE 3; H335 Skin Irrit. 2; H315 Eye Dam. 1; H318	01-2119475151-45-xxxx

4: FIRST AID MEASURES

4.1. Description of first aid measures

General Advice

Inhalation: Not applicable in normal use. If thermal decomposition occurs and vapours have been inhaled, affected person is to be moved to fresh air and seek medical attention.

Skin Contact: Not applicable under normal use. Fine particles released during cutting - wash with soap and water

Eye contact: Not applicable under normal use. Fine particles released during cutting – rinse with clean water for up to 10 minutes holding eyelids apart. Seek medical advice.

Ingestion: Not applicable in normal use. If ingestion of dust occurs during cutting, rinse mouth out with water and seek medical advice. Do not induce vomiting.

5: FIRE FIGHTING MEASURES

5.1. Extinguishing media

Suitable Extinguishing Media Water, Foam, CO2, Sand or Earth

Unsuitable Extinguishing Media Do NOT use water

5.2. Special hazards arising from the substance or mixture

Combustible but not readily ignited under normal conditions.

Combustion or thermal decomposition will evolve toxic and irritant vapours – Hydrogen Chloride, Carbon Monoxide & Carbon Dioxide, Smoke & Fire Soot

5.3. Advice for firefighters

With large fires self-contained breathing apparatus and protective clothing must be worn. Combustion will cease on flame removal.

6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Personal Precautions: Not applicable under normal conditions. Avoid build of dust during any cutting process

6.2. Environmental precautions

Not applicable under normal conditions.

6.3. Methods and material for containment and cleaning up

Methods for cleaning up: Material should be collected in clean containers and recycled where practicable.

6.4. Reference to other sections

Reference to other sections: Sections 8 & 13

7: HANDLING AND STORAGE

7.1. Precautions for safe handling

Advice on safe handling

Ensure safe lifting techniques are applied when handling the product.
The use of Personal Protective Equipment (PPE) is recommended when working with this product.

7.2. Conditions for safe storage, including any incompatibilities

Storage Conditions

Store under cover away from sources of heat and ignition and strong acids
Store in a dry location

8: EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Control parameters

Chemical Name	CAS No.	LTEL 8 hr TWA ppm	LTEL 8 hr TWA mg/m3	STEL ppm	STEL mg/m3	Note:
PVC Dust (Respirable)	009002-86-2	-	1.5	-	COM	01-2119457290-43-XXXX
Natural Calcium Carbonate (Inhalable) (Respirable)	1317-65-3		10 4			
Calcium hydroxide (Inhalable)	1305-62-0		5			

8.2. Exposure controls

Engineering Controls Not applicable in normal use.

Personal Protective Equipment

General & hygienic measures Wash hands before breaks and at the end of work
Avoid contact with the eyes

Eye/Face Protection Suitable safety goggles should be worn to reduce the potential risk due to cutting swarf and dust

Respiratory Protection Wear suitable dust mask if cutting operation creates dust

Protection of Hands Abrasive resistant gloves should be worn to reduce the potential risk of small cuts and abrasions, which may occur during the installation process

9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Physical State:	Solid PVC-u product
Odour:	Slight
Auto ignition Temperature:	450 ℃
Explosive properties	Deposited dust is weakly flammable and has no self-sustained flame. This product is not classified as a dust explosive
Solubility (Water):	Insoluble
Solubility (Other):	Soluble in: cyclohexanone, tetrahydrofuran, 1,2 Dicloroethane
Specific Gravity:	1, 4 at 20 Deg C

10: STABILITY AND REACTIVITY

10.1. Reactivity
Stable under normal handling and storage conditions

10.2. Chemical stability
Stable under normal conditions

10.3. Possibility of hazardous reactions
PVC-u
With the exception of sulphuric acid (> 90%) and nitric acid (>50%), PVC is resistant to acids and alkalis up to 60 Deg C. However, above this temperature the polymer is attacked by the stronger acids.

Calcium Carbonate (filler)
Reacts with acids to form carbon dioxide.

10.4. Conditions to avoid
Dust accumulation

10.5 Incompatible materials
PVC-u see 10.3
Calcium Hydroxide – Stabiliser – Strong oxidising agents

10.6. Hazardous decomposition products
PVC-u
Thermal decomposition will evolve toxic vapours. (hydrogen chloride, carbon monoxide, carbon dioxide and fire soot).

11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

PVC-u

Inhalation	PVC products may contain traces of vinyl chloride monomer
Ingestion	High concentrations of dust may be irritant to the respiratory system
Skin	May cause abrasion in contact with skin
Eyes	May cause abrasion on contact with eyes

12: ECOLOGICAL INFORMATION

General information:

There is no risk to the environment from the use of this product. The product in insoluble in water. The product has no mobility in soil. There is no evidence for biodegradability in water or soil. The product is not harmful to organisms.

13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Recover and recycle if possible. Dispose of waste material in accordance with national and local regulations

14. TRANSPORT INFORMATION

These products are not classified as dangerous goods for carriage

15: REGULATORY INFORMATION

Not classified as hazardous for supply

16: OTHER INFORMATION

Training Advice Provide adequate information, instruction, and training for operator

This product should be used in accordance with the manufacturer's instructions

It is the user's responsibility to adhere to both National and Local Safety Regulations.

This safety data sheet complies with the requirements of: Regulation (EC) No. 1907/2006
Disclaimer

The information provided in this Safety Data Sheet was compiled using current safety information supplied by distributors of the component materials. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

This safety data sheet. Recipients of the product must take responsibility for observing existing laws and regulations. This Safety Data Sheet is in REACH Annex II format and supersedes all previous issues, and users are cautioned to ensure it is the current version.

Destroy all previous revisions and refer to the supplier on +44 1709 770000 for queries regarding this data sheet.

Ridgiduct Power - Class 2

Data Sheet

PRODUCT INFORMATION **P1** **ISSUE 5 - NOV 2018**

Manufactured from high density polyethylene (HDPE) , Ridgiduct Power offers a stiff yet flexible twinwall system that is light in weight and robust to easily outperform alternative products. Ridgiduct Power comes in sizes 100, 125 and 150mm and fully complies with ENATS 12-24 Class 2 specification.

Key benefits

- Complies with ENATS 12-24 Class 2 specification, 450N compressive strength at 50°C Complies with BS EN 61386-24:2010, Type 750N, normal duty impact resistance
- A preferred choice for Distribution Network Operators (DNOs)
- Network Rail PADS approved
- Supplied with an integral coupler
- IP4X system (dust protection)
- Low weight, flexible, durable and high strength
- Good impact resistance, even at low temperatures
- Available in an alternative twinwall split duct form for easy installation around existing cables with minimal change in strength

BBA BRITISH BOARD OF AGREMENT CERTIFICATE No. 13/H205

Network Rail PA05/05875

ENATS (12-24)

RIDGIDUCT POWER DUCT & COUPLINGS						
ID (mm)	OD (mm)	LENGTH (mm)	PRODUCT CODE	DUCT QTY	COUPLING CODE	COUPLING QTY
100	118	2	RB100X2*	85	RBC100	10
100	118	3	RB100X3*	85	RBC100	10
100	118	6	RB100X6*	85	RBC100	10
125	148	2	RB125X2	46	RBC125	10
125	148	3	RB125X3	46	RBC125	10
125	148	6	RB125X6	46	RBC125	10
150	178	2	RB150X2	36	RBC1500	10
150	178	3	RB150X3	36	RBC150	10
150	178	6	RB150X6	36	RBC150	10
225	267	6	RB225X6PE**	14	CRD225	7
300	354	6	RB300X6PE**	9	CRD300	3

*A sealed system can be achieved using Ridgidrain sealing rings and couplers.
**Made to order and subject to lead times. Supplied plain ended, please order couplers and seals separately.

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Polypipe

Ridgiduct Power - Class 2

Data Sheet

RIDGIDUCT POWER BENDS				
DESCRIPTION	PRODUCT CODE	RADIUS (m)	ANGLE	PACK QTY
PVCu Double Socket Bend 100mm	RBB100X11X2.4*	2.4	11.25	1
	RBB100X22X2.4*	2.4	22.5	1
	RBB100X45X0.45	0.45	45	1
	RBB100X90X0.45	0.45	90	1
PVCu Double Socket Bend 125mm	RBB125X11X2.4*	2.4	11.25	1
	RBB125X22X2.4*	2.4	22.5	1
	RBB125X45X0.61	0.61	45	1
	RBB125X90X0.61	0.61	90	1
PVCu Double Socket Bend 150mm	RBB150X11X2.4*	2.4	11.25	1
	RBB150X22X2.4*	2.4	22.5	1
	RBB150X45X0.61	0.61	45	1
	RBB150X90X0.61	0.61	90	1

* Made to order and are subject to lead times. Compliant with ENATS 12-24.

RIDGIDUCT POWER DRAWN BENDS				
DESCRIPTION	PRODUCT CODE	RADIUS (m)	ANGLE	PACK QTY
HDPE Twinwall Bend 100mm	RBDB100X11X0.42	0.42	11.25	10
	RBDB100X22X0.42	0.42	22.5	10
	RBDB100X45X0.42	0.42	45	7
	RBDB100X90X0.42	0.42	90	7
HDPE Twinwall Bend 125mm	RBDB125X11X0.6	0.6	11.25	7
	RBDB125X22X0.6	0.6	22.5	7
	RBDB125X45X0.6	0.6	45	4
	RBDB125X90X0.6	0.6	90	3
HDPE Twinwall Bend 150mm	RBDB150X11X0.61	0.61	11.25	5
	RBDB150X22X0.61	0.61	22.5	5
	RBDB150X45X0.61	0.61	45	4
	RBDB150X90X0.61	0.61	90	3

Please note that all Ridgiduct Power Drawn Bends are not ENATS compliant.

Technical Support

Detailed guidance and assistance is available.
For further information, please contact our Technical Team
on **+44 (0)1509 615 100** or email: **civils@polypipe.com**
or visit **www.polypipe.com/civils-technical-hub**

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Ridgidrain

Data Sheet

PRODUCT INFORMATION P1 ISSUE 7 - FEB 2019

The very first twinwall surface drainage system in the UK with Highways Authority Product Approval Scheme (HAPAS) status, Ridgidrain has a high strength to weight ratio and flexibility to resist high traffic loads. Available in sizes 100-900mm it has a low friction inner wall for improved hydraulics and comes in 6m lengths (3m lengths as standard for 750-900mm) to significantly reduce the number of joints and risk of leakage. Made from up to 100% recycled, high strength HDPE using a structured wall design to produce a robust, yet flexible pipe, Ridgidrain has a high resistance to the most common chemicals. It offers excellent performance, meaning you get all the benefits of sustainability, strength and lower weight without compromising on long term effectiveness.

Applications

Ridgidrain is a versatile non-pressure surface water and subsurface water drainage system that can be used as a carrier drain or used for attenuation or infiltration. Ridgidrain is used in many applications including:

- Residential
- Commercial
- Highways
- Rail
- Retail
- Leisure
- Education
- Airports
- Industrial
- Agricultural

Performance

Ridgidrain is manufactured to SN6 with a predicted design life in excess of 50 years. The system is resistant to most common chemicals and is ideal for stormwater applications. Where applications permit for the use of lower stiffness classes, Ridgidrain in sizes 750mm and 900mm can be manufactured to SN4.

Technical Support

Detailed guidance and assistance is available.
For further information, please contact our Technical Team on +44 (0) 1509 615 100 or email civils@polypipe.com or visit www.polypipe.com/civils-technical-hub

Key benefits

- Full range of SN6 pipes and fittings from 100mm to 900mm
- BBA and BBA HAPAS approved
- Network Rail Parts and Drawing Systems (PADS) approved*
- Structured wall design for high ring stiffness and strength
- Smooth bore giving excellent hydraulic properties
- Longer lengths so fewer joints for improved resilience to leakage
- 100-600mm Ridgidrain comes in 6m lengths as standard, sizes 750-900mm comes in 3m lengths as standard
- Light in weight for reduced transport /installation costs and improved Health & Safety benefits
- Unperforated, half perforated and full perforated options available
- Ridgitrack is available for higher loading applications
- Up to 94% lighter than concrete means fewer deliveries to site
- Reduces CO_2 consumed in production, transportation and on-site handling
- Incorporates recycled plastic, manufactured from up to 100% recycled material
- Resistant to ground movement and differential settlement
- Integrally socketed in diameters 400mm to 900mm for ease of installation

BBA BRITISH BOARD OF AGREMENT CERTIFICATE No. 02/H068

BBA BRITISH BOARD OF AGREMENT CERTIFICATE No. 00/3678

Network Rail

(Network Rail Parts and Drawing Systems (PADS) Approved)
Certificate Number: PA05/05460

* For sizes 100-600mm.
Pending for sizes 750-900mm.

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RIDGIDRAIN PLAIN ENDED PIPES

NOMINAL SIZE MM	CODE	ID MM	OD MM	LENGTH M	OPTION	WEIGHT KGM^{-1}	PACK QTY
100	RD100X6PE *	100	118	6	U	0.75	85
100	RD100X6PEHP *	100	118	6	HP	0.75	85
100	RD100X6PEP *	100	118	6	P	0.75	85
150	RD150X6PE/1	150	178	6	U	1.2	36
150	RD150X6PEHP/1	150	178	6	HP	1.2	36
150	RD150X6PEP/1	150	178	6	P	1.2	36
225	RD225X6PE/1	225	267	6	U	2.45	14
225	RD225X6PEHP/1	225	267	6	HP	2.45	14
225	RD225X6PEP/1	225	267	6	P	2.45	14
300	RD300X6PE/1	300	355	6	U	4.18	9
300	RD300X6PEHP/1	300	355	6	HP	4.18	9
300	RD300X6PEP/1	300	355	6	P	4.18	9
375	RD375X6PE/1	375	435	6	U	7.5	5
375	RD375X6PEHP/1	375	435	6	HP	7.5	5
375	RD375X6PEP/1	375	435	6	P	7.5	5
400	RD400X6PE/1▲	400	458	6	U	8.13	5
400	RD400X6PEHP/1▲	400	458	6	HP	8.13	5
400	RD400X6PEP/1▲	400	458	6	P	8.13	5
450	RD450X6PE/1▲	450	523	6	U	9.3	4
450	RD450X6PEHP/1▲	450	523	6	HP	9.3	4
450	RD450X6PEP/1▲	450	523	6	P	9.3	4
500	RD500X6PE/1▲	500	576	6	U	12.25	4
500	RD500X6PEHP/1▲	500	576	6	HP	12.25	4
500	RD500X6PEP/1▲	500	576	6	P	12.25	4
600	RD600X6PE/1▲	600	700	6	U	17.5	2
600	RD600X6PEHP/1▲	600	700	6	HP	17.5	2
600	RD600X6PEP/1▲	600	700	6	P	17.5	2

RIDGIDRAIN INTEGRALLY SOCKETED PIPES

NOMINAL SIZE MM	CODE	ID MM	OD MM	LENGTH M	OPTION	WEIGHT KGM^{-1}	PACK QTY
400	RD400X6/1**	400	458	6	U	8.0	5
400	RD400X6HP/1**▲	400	458	6	HP	8.0	5
400	RD400X6P/1**▲	400	458	6	P	8.0	5
450	RD450X6/1**	450	523	6	U	9.0	4
450	RD450X6HP/1**	450	523	6	HP	9.0	4
450	RD450X6P/1**	450	523	6	P	9.0	4
500	RD500X6/1**	500	576	6	U	12.0	4
500	RD500X6HP/1**	500	576	6	HP	12.0	4
500	RD500X6P/1**	500	576	6	P	12.0	4
600	RD600X6/1**	600	700	6	U	14.0	2
600	RD600X6HP/1**	600	700	6	HP	14.0	2
600	RD600X6P/1**	600	700	6	P	14.0	2
750	RD7506X3/1 **	750	852	3	U	30	2
750	RD7506X3HP/1**	750	852	3	HP	30	2
750	RD7506X3P/1**	750	852	3	P	30	2
900	RD9006X3/1**	900	1022	3	U	40	2
900	RD9006X3HP/1**	900	1022	3	HP	40	2
900	RD9006X3P/1**	900	1022	3	P	40	2

Sizes 1050 – 3000mm are available as Ridgistorm-XL. * Black inner wall. ▲ Made to order and subject to lead times. U = Unperforated, HP = Half perforated, P = Fully perforated Weights are nominal. ** Integral sockets are manufactured from non recycled material. Sizes 750 – 900mm are also available in SN4 (amend 6X part of code to 4X) and lengths of 1.5m and 6m. 750mm SN4 pipe = 20 KGM-1, 900mm SN4 pipe = 29 KGM-1

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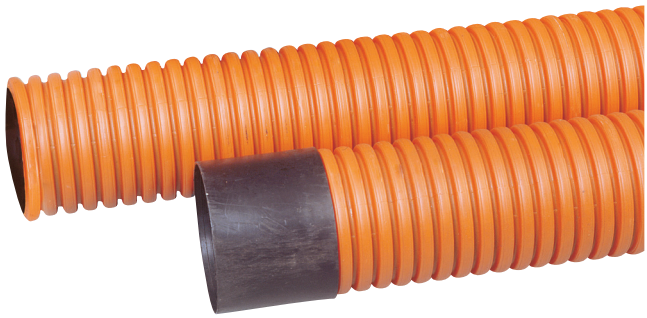
Ridgiduct Lighting

Data Sheet

PRODUCT INFORMATION **P1** **ISSUE 1 - FEB 2017**

Ridgiduct Lighting is a twinwall, low weight, flexible cable protection system, specially manufactured from HDPE in orange for use in street lighting and traffic signal applications.

A full range of bends, access and pole boxes are also available.



Applications

For street lighting or traffic signalling cable protection applications.

Performance

Ridgiduct is manufactured from high density polyethylene (HDPE) and is supplied with a black polypropylene (PP) coupler. The internal wall has a static coefficient of less than 0.22. Ridgiduct also has durable resistance to attack from chemicals likely to occur in soils and ground water.

Key benefits

- Complies with BS EN 61386-24:2010, Type 450N,normal duty impact resistance
- BBA and BBA HAPAS approved
- Network Rail PADS approved
- Good impact resistance, even at low temperatures
- Flexible in application, with a minimal requirement for special bends
- Available with print options for street lighting and traffic signals
- Supplied with an integral coupler
- Low weight, flexible, durable and high strength

Network Rail PA05/05875

Note: 100mm and 150mm only.

BBA BRITISH BOARD OF AGREMENT CERTIFICATE No. 13/H205

BBA BRITISH BOARD OF AGREMENT CERTIFICATE No. 89/2175

RIDGIDUCT LIGHTING DUCT

ID mm	OD mm	LENGTH m	CODE	PACK QTY
94	110	6	RB94X6O(SL or TS)	95
100	118	6	RB100X6O(SL or TS) ▲	85
150	178	6	RB150X6O(SL or TS)	36

▲ Made to order and subject to lead times.
Available with street lighting (SL) or traffic signal (TS) print. Please specify with order.

JOINTING

NOMINAL SIZE	COUPLING CODE	SEALED SYSTEM*
94	RBC94	CRD94 & SRD94/1
100	RBC100	CRD100 & SRD100
150	RBC150	CRD150 & SRD150

* For a Sealed system 1 CRD coupler and 2 SRD seals required per joint.

RIDGIDUCT LONG RADIUS DRAWN BENDS

ID mm	BEND RADIUS mm	ANGLE	COUPLER CODES	PACK QTY
94mm	420	11.25°	RBDB94X11X0.42	10
	420	22.5°	RBDB94X22X0.42	10
	420	45°	RBDB94X45X0.42	7
	420	90°	RBDB94X90X0.42	7
100mm	420	11.25°	RBDB100X11X0.42	10
	420	22.5°	RBDB100X22X0.42	10
	420	45°	RBDB100X45X0.42	7
	420	90°	RBDB100X90X0.42	7
150mm	610	11.25°	RBDB150X11X0.61	5
	610	22.5°	RBDB150X22X0.61	5
	610	45°	RBDB150X45X0.61	4
	610	90°	RBDB150X90X0.61	3

Note: Bends are supplied in the colour black only.

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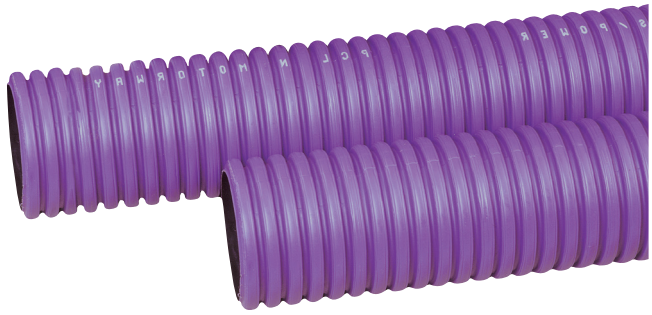
Ridgiduct Motorway Communications

Data Sheet

PRODUCT INFORMATION **P1** **ISSUE 1 - FEB 2017**

Ridgiduct Motorway Communications come in sizes 94, 100 and 150mm as a sealed system specifically designed for motorway communications applications.



Applications

For motorway communications. For Scotland, print is available for motorway comms/power.

Performance

Ridgiduct is manufactured from high density Polyethylene (HDPE) and is supplied with a black Polypropylene (PP) coupler. The internal wall has a static coefficient of less than 0.22. Ridgiduct also has adequate resistance to attack from chemicals likely to occur in soils and ground water.

Key benefits

- IP67 Rated Sealed System when installed with CRD Coupling and SRD Sealing Ring
- BBA HAPAS certified as a fully sealed system
- Complies with BS EN 61386-24:2010, Type 450N, normal duty impact resistance
- Network Rail PADS approved
- Print options available
- Can be used for trenchless applications
- Low weight, flexible, durable and high strength
- Good impact resistance even at lower temperatures
- Comtite™ Ducting Plug available to ensure full compliance with Series 1500 specification for Highway Works (MCHW)

Network Rail PA05/05875

BBA BRITISH BOARD OF AGREMENT CERTIFICATE No. 13/H205

RIDGIDUCT MOTORWAY COMMUNICATIONS DUCT

ID (mm)	OD (mm)	LENGTH (m)	CODE	PACK QTY
94	110	6	RB94X6PMCPPE/1	95
100	118	6	RB100X6PMCPPE	85
150	178	6	RB150X6PMCPPE ▲	36

▲ Made to order and subject to lead times.
Conforms to Highways Agency Specification for sealed systems.
For Scottish market printed Motorway Comms/Power.
Other print options available.

JOINTING

ID (mm)	COUPLING CODE	SEAL CODE
94	CRD94	SRD94/1
100	CRD100	SRD100
150	CRD150	SRD150

1 coupler and 2 seals per joint.

RIDGIDUCT LONG RADIUS DRAWN BENDS

ID mm	BEND RADIUS mm	ANGLE	COUPLER CODES	PACK QTY
94mm	420	11.25°	RBDB94X11X0.42	10
	420	22.5°	RBDB94X22X0.42	10
	420	45°	RBDB94X45X0.42	7
	420	90°	RBDB94X90X0.42	7
100mm	420	11.25°	RBDB100X11X0.42	10
	420	22.5°	RBDB100X22X0.42	10
	420	45°	RBDB100X45X0.42	7
	420	90°	RBDB100X90X0.42	7
150mm	610	11.25°	RBDB150X11X0.61	5
	610	22.5°	RBDB150X22X0.61	5
	610	45°	RBDB150X45X0.61	4
	610	90°	RBDB150X90X0.61	3

Note: Bends are supplied in the colour black only.

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Ridgiduct Utilities

Data Sheet

PRODUCT INFORMATION **P1** **ISSUE 1 - FEB 2017**

Ridgiduct is a light in weight, twinwall cable protection system that can be manufactured in a range of NJUG classification colours, from HDPE, to meet the cable protection needs of all utilities applications.

Applications

KEY - Typical NJUG colour coding

Black (B) - Electricity	Yellow (Y) - Gas
Orange (O) - Street Lighting	Blue (BL) - Water
Purple (P) - Street Lighting (Scotland)	Green (G) - Cable Television
Purple (P) - Motorway Communications	Grey (GR) - Telecommunications

Performance

Ridgiduct is manufactured from high density polyethylene (HDPE) and is supplied with a black polypropylene (PP) coupler in 94 - 150mm sizes. 225 & 300mm are supplied plain ended and require a CRD coupling. The internal wall has static coefficient of the less than 0.22. Ridgiduct also has durable resistance to attack from chemicals likely to occur in soils and ground water.

Key benefits

- Complies with BS EN 61386-24:2010, Type 450N, normal duty impact resistance
- BBA HAPAS approved
- Network Rail PADS approved
- Low weight, flexible, durable and high strength
- Good impact resistance at low temperatures
- Available from stock
- Available in a range of colours which comply with NJUG classifications
- Supplied with an integral coupler (94-150mm only)
- Print options available

Network Rail

PA05/05875

(All sizes except 125mm are PADS approved)

BBA BRITISH BOARD OF AGREMENT CERTIFICATE No. 13/H205

BBA BRITISH BOARD OF AGREMENT CERTIFICATE No. 89/2175

RIDGIDUCT UTILITIES

ID (mm)	OD (mm)	LENGTH (m)	CODE	COLOURS	PACK QTY
94	110	6	RB94X6	B Y* BL O G P	95
100	118	6	RB100X6	B Y* BL O G P	85
125	148	6	RB125X6	B ***	46
150	178	6	RB150X6	B Y* BL O G P	36
225	266	6	RB225X6**	B Y* BL	14
300	354	6	RB300X6**	B Y* BL	9

*Please check the requirements of the utility company, who may stipulate a requirement for perforated duct. For Perforated duct please refer to our Gas Ducting.
**Not BBA approved. ***Not Network Rail Pads approved.

JOINTING

NOMINAL SIZE	COUPLING CODE	SEALED SYSTEM*
94	RBC94	CRD94 & SRD94/1
100	RBC100	CRD100 & SRD100
125	RBC125	N/A
150	RBC150	CRD150 & SRD150
225	CRD225	CRD225 & SRD225
300	CRD300	CRD300 & SRD300

* For a Sealed system 1 CRD coupler and 2 SRD seals required per joint.

RIDGIDUCT LONG RADIUS DRAWN BENDS

ID (mm)	BEND RADIUS (mm)	ANGLE	CODE	PACK QTY
94	420	11.25°	RBDB94X11X0.42	10
	420	22.5°	RBDB94X22X0.42	10
	420	45°	RBDB94X45X0.42	7
	420	90°	RBDB94X90X0.42	7
100	420	11.25°	RBDB100X11X0.42	10
	420	22.5°	RBDB100X22X0.42	10
	420	45°	RBDB100X45X0.42	7
	420	90°	RBDB100X90X0.42	7
125	600	11.25°	RBDB125X11X0.6	7
	600	22.5°	RBDB125X22X0.6	7
	600	45°	RBDB125X45X0.6	4
	600	90°	RBDB125X90X0.6	3
150	610	11.25°	RBDB150X11X0.61	5
	610	22.5°	RBDB150X22X0.61	5
	610	45°	RBDB150X45X0.61	4
	610	90°	RBDB150X90X0.61	3

Note: Bends are supplied in the colour black only.

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