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**t/a Alumasc Water Management Solutions**

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**Agrément Certificate**  
**05/4191**  
Product Sheet 1

**HARMER SML CAST IRON DRAINAGE SYSTEM**

**HARMER SML CAST IRON DRAINAGE SYSTEM PIPES, COUPLINGS AND FITTINGS  
FOR ABOVE-GROUND AND BELOW-GROUND APPLICATIONS**

This Agrément Certificate Product Sheet<sup>(1)</sup> relates to Harmer SML Cast Iron Drainage System Pipes, Couplings and Fittings For Above-Ground and Below-Ground Applications, cast iron products for use in the conveyance of foul and surface water in domestic, commercial and public buildings.

(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 in service when installed in accordance with this Certificate (see section 6).

**Performance of joints** — joints within the pipeline remain watertight under conditions where pipeline movement is in excess of that expected to occur in normal good drainage practice, and will not be adversely affected by thermal expansion or contraction (see section 7).

**Flow characteristics** — a cast-iron soil system using the pipes, couplings and fittings have satisfactory flow characteristics (see section 8).

**Resistance to chemicals** — the products will be unaffected by those types and quantities of chemicals likely to be found in domestic waste water (see section 9).

**Resistance to elevated temperatures** — the products have adequate resistance to the temperatures likely to occur in service (see section 10).

**Durability** — the products have service lives equivalent to those found in conventional cast-iron sanitary pipework systems (see section 14).



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

On behalf of the British Board of Agrément

*Brian Chamberlain*

Brian Chamberlain  
Head of Technical Excellence

*Claire*

Claire Curtis-Thomas  
Chief Executive

Date of Second issue: 3 February 2017

Originally certificated on 13 January 2005

The BBA is a UKAS accredited certification body – Number 113.

The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at [www.bbacerts.co.uk](http://www.bbacerts.co.uk)  
Readers are advised to check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct.

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## Regulations

In the opinion of the BBA, Harmer SML Cast Iron Drainage System Pipes, Couplings and Fittings For Above-Ground and Below-Ground Applications, 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)

<b>Requirement:</b>	<b>B3(4)</b>	<b>Internal fire spread (structure)</b>
Comment:	The products, when designed in accordance with this Certificate, can satisfy the necessary requirements, provided the installation stipulations are met. See section 11 of this Certificate.	
<b>Requirement:</b>	<b>E1</b>	<b>Protection against sound from other parts of the building and adjoining buildings</b>
Comment:	The products, when used in accordance with this Certificate, can satisfy this Requirement. See section 12 of this Certificate.	
<b>Requirement:</b>	<b>H1(1)</b>	<b>Foul water drainage</b>
Comment:	The products will convey the flow of foul or surface water and minimise the risk of blockages or leakage. See sections 4, 6, 7 and 8 of this Certificate.	
<b>Requirement:</b>	<b>H3(1)</b>	<b>Rainwater drainage</b>
Comment:	The products can satisfy the relevant requirements of this Requirement. See sections 4, 7 and 8 of this Certificate.	
<b>Regulation:</b>	<b>7</b>	<b>Materials and workmanship</b>
Comment:	The products are acceptable. See section 14 and the <i>Installation</i> part of this Certificate.	



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

<b>Regulation:</b>	<b>8(1)(2)</b>	<b>Durability, workmanship and fitness of materials</b>
Comment:	The use of the products will satisfy the requirements of this Regulation. See sections 13 and 14 and the <i>Installation</i> part of this Certificate.	
<b>Regulation:</b>	<b>9</b>	<b>Building standards applicable to construction</b>
Standard:	<b>2.1</b>	Compartmentation
Comment:	The products can satisfy the necessary requirements, provided the installation stipulations are met, with reference to clause 2.1.14 <sup>(2)</sup> . See section 11 of this Certificate.	
Standard:	<b>2.2</b>	Separation
Comment:	The products can satisfy the necessary requirements, provided the installation stipulations are met, with reference to clauses 2.2.6 <sup>(2)</sup> and 2.2.9 <sup>(1)</sup> . See section 11 of this Certificate.	
Standard:	<b>3.6</b>	Surface water drainage
Standard:	<b>3.7</b>	Wastewater drainage
Comment:	The products will contribute to satisfying the relevant requirements of these Standards, with reference to clauses 3.6.1 <sup>(1)(2)</sup> and 3.7.1 <sup>(1)(2)</sup> respectively. See sections 4, 6, 7 and 8 of this Certificate.	
Standard:	<b>5.1</b>	Noise separation
Comment:	A system comprising the products, when designed in accordance with this Certificate, can satisfy this Standard, with reference to clauses 5.1.1 <sup>(1)(2)</sup> , 5.1.6 <sup>(2)</sup> and 5.1.7 <sup>(1)</sup> . See section 12 of this Certificate.	

**Standard:** 7.1(a) **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<sup>(1)(2)</sup> and Schedule 6<sup>(1)(2)</sup>.

(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 14 and the *Installation* part of this Certificate.

**Regulation:** 35(4) **Internal fire spread — Structure**  
**Comment:** The products can satisfy the necessary requirements, provided the installation stipulations are met. See section 11 of this Certificate.

**Regulation:** 49 **Protection against sound from other parts of the building and from adjoining buildings**  
**Regulation:** 51 **Reverberation in the common internal parts of a building containing flats or rooms for residential purposes**  
**Comment:** The products can satisfy these Regulations. See section 12 of this Certificate.

**Regulation:** 79 **Drainage systems**  
**Comment:** The products are acceptable. See sections 4, 6, 7 and 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 section: 1 *Description* (1.1 and 1.2) of this Certificate.

## Additional Information

### NHBC Standards 2017

NHBC accepts the use of Harmer SML Cast Iron Drainage System Pipes, Couplings and Fittings For Above-Ground and Below-Ground Applications, provided they are installed, used and maintained in accordance with this Certificate, in relation to *NHBC Standards*, Chapters 5.3 *Drainage below ground* and 8.1 *Internal services*.

### CE marking

The Certificate holder has taken the responsibility of CE marking the products in accordance with harmonised European Standard BS EN 877 : 1999 and BS EN 681-1 : 1996. An asterisk (\*) appearing in this Certificate indicates that data shown are given in the manufacturer's Declaration of Performance.

## 1 Description

1.1 Harmer SML Cast Iron Drainage System Pipes, Couplings and Fittings For Above-Ground and Below-Ground Applications comprise a range of cast-iron drainage products coated with primer and/or epoxy layers. The products are available in a range of sizes, depending on design and type of use and are listed in Table 1 and Figure 1; where appropriate, the components comply with the requirements of BS EN 877 : 1999.

1.2 There are three types of couplings (see Figure 2):

- Harmer Duo — a collar manufactured from AISI type 304 stainless steel, with an EPDM seal, and available in sizes up to 300 mm, for both above- and below-ground applications. The collar is tightened by two galvanized or stainless steel nuts and bolts, and has an integral clip to ensure electrical continuity through the joint
- Harmer Grip — as Harmer Duo, but for use with higher pressures. Available in sizes up to 200 mm
- Ductile — manufactured from ductile cast iron to EN-GJS-400-15(GGG40), available in sizes up to 200 mm. The coupling incorporates an EPDM sealing collar and is available in two versions:
  - red-coloured, for above-ground applications, incorporating two screws to ensure electrical continuity through the joint
  - brown-coloured, for below-ground applications, with no electrical continuity screws required.

*Table 1 General dimensions of pipes*

Nominal diameter (mm)	Above ground <sup>(1)</sup>	Below ground <sup>(1)</sup>	Pipe Length (m)	Exterior diameter (mm)	Nominal wall thickness (mm)	Minimum wall thickness (mm)	Mean pipe weight (kg)
50	660004	—	3.0	58	3.5	3.0	13.5
70	660094	—	3.0	78	3.5	3.0	18.3
100	660184	232055	3.0	110	3.5	3.0	26.5
125	660274	—	3.0	135	4.0	3.5	37.0
150	660364	232057	3.0	160	4.0	3.5	43.5
200	660454	232058	3.0	210	5.0	4.0	78.0
250	660654	232095	3.0	274	5.5	4.5	113.0
300	660664	232097	3.0	326	6.0	5.0	144.0

(1) Product codes.

1.3 Harmer SML Cast Iron Drainage System Pipes, Couplings and Fittings For Above-Ground and Below-Ground Applications are certified to BS EN 877 : 1999 under BSI Kitemark licence no. KM 613802 issued to Alumasc Exterior Building Products Ltd t/a Alumasc Water Management Solutions, Station Road, Burton Latimer, Kettering NN15 5JP.

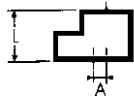
1.4 The pipe and fittings are coated internally and externally with epoxy or a primer as given in Table 2.

*Table 2 Coating thickness<sup>(1)</sup>*

Product		Coating type		Average thickness (µm)
		Above ground	Below ground	
Pipe	external	red primer coating	two-part brown and zinc base coating	40
	internal	two-part ochre epoxy	two-part ochre epoxy	120
Fittings	external	two-part red epoxy	two-part brown epoxy	60
	internal	two-part red epoxy	two-part brown epoxy	60

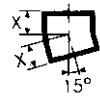
Figure 1 Fittings and dimensions (mm)<sup>(1)(2)</sup>

Reducers



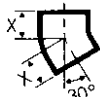
Size	Above ground	Below ground	A	L	Weight (kg)
70 x 50	662504	—	10	75	0.5
100 x 50	662514	—	25	80	0.9
100 x 70	662524	—	16	85	0.9
125 x 50	662534	—	38.5	85	1.4
125 x 70	662544	—	28.5	90	1.5
125 x 100	662554	—	12.5	95	1.5
150 x 50	662564	—	51	95	2.0
150 x 70	662574	—	41	100	2.0
150 x 100	662584	232072	25	105	2.2
150 x 125	662594	—	12.5	110	2.2
200 x 100	662604	232074	50	115	4.1
200 x 125	662614	—	37.5	120	4.1
200 x 150	662624	232076	25	125	4.3
250 x 150	662634	232120	57	140	6.8
250 x 200	662644	232121	32	145	7.0
300 x 150	662494	232122	83	150	10.7
300 x 200	662714	232123	58	160	11.4
300 x 250	662724	232124	26	170	12.4

Single bend 15°




Size	Above ground	Below ground	X	Weight (kg)
DN50	661004	—	40	0.4
DN70	661064	—	45	0.6
DN100	661124	232059	50	1.0
DN125	661184	—	60	1.7
DN150	661244	232065	65	2.5
DN200	661304	—	80	4.6

Single bend 30°



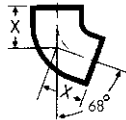
Size	Above ground	Below ground	X	Weight (kg)
DN50	661014	—	45	0.5
DN70	661074	—	50	0.7
DN100	661134	232060	60	1.3
DN125	661194	—	70	2.0
DN150	661254	232066	80	3.0
DN200	661314	—	95	5.4
DN250	661364	—	110	9.7
DN300	661384	—	130	15.5

Single bend 45°



Size	Above ground	Below ground	X	Weight (kg)
DN50	661024	—	50	0.5
DN70	661084	—	60	0.9
DN100	661144	232061	70	1.6
DN125	661204	—	80	2.3
DN150	661264	232067	90	3.5
DN200	661324	232070	110	6.5
DN250	661374	232103	130	10.3
DN300	661394	232104	155	17.3

Single bend 68°

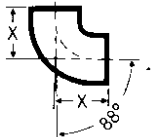
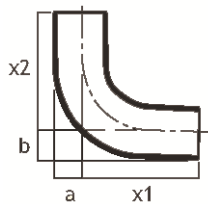
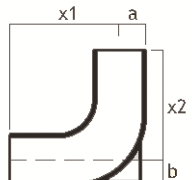
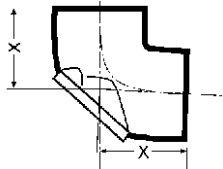
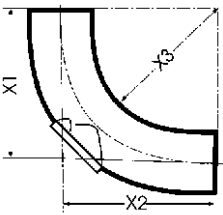
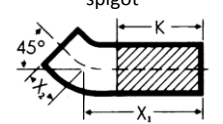
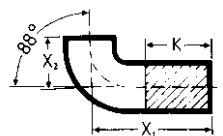


Size	Above ground	X	Weight (kg)
DN50	661034	65	0.7
DN70	661094	75	1.1
DN100	661154	90	1.9
DN125	661214	105	2.9
DN150	661274	120	4.9
DN200	661334	145	7.7

(1) Product codes listed in 'Above ground' and 'Below ground' columns.

(2) DN = nominal diameter.

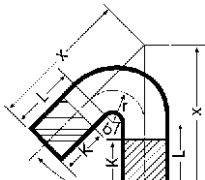
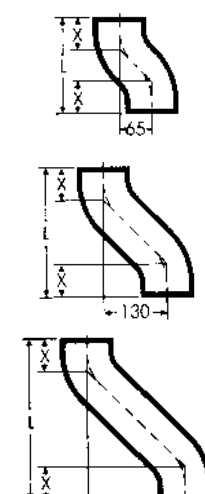
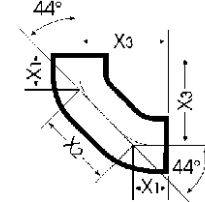
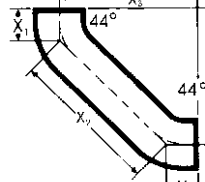
Figure 1 Fittings and dimensions (mm) (continued)<sup>(1)(2)</sup>

<p>Single bend 88°</p> 	<table><tr><th>Size</th><th>Above ground</th><th>X</th><th>Weight (kg)</th></tr><tr><td>DN50</td><td>661054</td><td>75</td><td>0.7</td></tr><tr><td>DN70</td><td>661114</td><td>90</td><td>1.2</td></tr><tr><td>DN100</td><td>661174</td><td>110</td><td>2.1</td></tr><tr><td>DN125</td><td>661234</td><td>125</td><td>3.3</td></tr><tr><td>DN150</td><td>661294</td><td>145</td><td>4.9</td></tr><tr><td>DN200</td><td>662784</td><td>175</td><td>8.1</td></tr><tr><td>DN250</td><td>233621</td><td>225</td><td>13.8</td></tr><tr><td>DN300</td><td>233622</td><td>260</td><td>28.0</td></tr></table>	Size	Above ground	X	Weight (kg)	DN50	661054	75	0.7	DN70	661114	90	1.2	DN100	661174	110	2.1	DN125	661234	125	3.3	DN150	661294	145	4.9	DN200	662784	175	8.1	DN250	233621	225	13.8	DN300	233622	260	28.0
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DN250	233621	225	13.8																																		
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<p>Long and Medium radius bend</p> 	<table><tr><th>Size</th><th>Above ground</th><th>Below ground</th><th>x1</th><th>a</th><th>x2</th><th>b</th><th>Weight (kg)</th></tr><tr><td>DN100 Long</td><td>235125L</td><td>232105</td><td>255</td><td>55</td><td>255</td><td>55</td><td>5.5</td></tr><tr><td>DN100 Long</td><td>236505</td><td>—</td><td>945</td><td>55</td><td>255</td><td>55</td><td>20.0</td></tr><tr><td>DN150 Medium</td><td>235126L</td><td>232106</td><td>250</td><td>80</td><td>250</td><td>80</td><td>8.5</td></tr></table>	Size	Above ground	Below ground	x1	a	x2	b	Weight (kg)	DN100 Long	235125L	232105	255	55	255	55	5.5	DN100 Long	236505	—	945	55	255	55	20.0	DN150 Medium	235126L	232106	250	80	250	80	8.5				
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DN100 Long	235125L	232105	255	55	255	55	5.5																														
DN100 Long	236505	—	945	55	255	55	20.0																														
DN150 Medium	235126L	232106	250	80	250	80	8.5																														
<p>Rest bend</p> 	<table><tr><th>Size</th><th>Above ground</th><th>Below ground</th><th>x1</th><th>a</th><th>x2</th><th>b</th><th>Weight (kg)</th></tr><tr><td>DN100</td><td>100263</td><td>232110</td><td>260</td><td>55</td><td>251</td><td>55</td><td>5.7</td></tr><tr><td>DN150</td><td>—</td><td>232150</td><td>278</td><td>80</td><td>278</td><td>80</td><td>8.9</td></tr></table>	Size	Above ground	Below ground	x1	a	x2	b	Weight (kg)	DN100	100263	232110	260	55	251	55	5.7	DN150	—	232150	278	80	278	80	8.9												
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<p>Short radius access bend 88°</p> 	<table><tr><th>Size</th><th>Above ground</th><th>X</th><th>Weight (kg)</th></tr><tr><td>DN100</td><td>661174A</td><td>110</td><td>3.3</td></tr><tr><td>DN150</td><td>232741</td><td>145</td><td>6.1</td></tr></table>	Size	Above ground	X	Weight (kg)	DN100	661174A	110	3.3	DN150	232741	145	6.1																								
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<p>Bend 45° with 250 mm spigot</p> 	<table><tr><th>Size</th><th>Above ground</th><th>X1</th><th>X2</th><th>K</th><th>Weight (kg)</th></tr><tr><td>DN70</td><td>662054</td><td>250</td><td>60</td><td>190</td><td>2.6</td></tr><tr><td>DN100</td><td>662074</td><td>250</td><td>70</td><td>180</td><td>4.2</td></tr></table>	Size	Above ground	X1	X2	K	Weight (kg)	DN70	662054	250	60	190	2.6	DN100	662074	250	70	180	4.2																		
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<p>Bend 88° with 250 mm spigot</p> 	<table><tr><th>Size</th><th>Above ground</th><th>X1</th><th>X2</th><th>K</th><th>Weight (kg)</th></tr><tr><td>DN70</td><td>662064</td><td>250</td><td>60</td><td>160</td><td>2.8</td></tr><tr><td>DN100</td><td>662084</td><td>250</td><td>110</td><td>140</td><td>4.6</td></tr></table>	Size	Above ground	X1	X2	K	Weight (kg)	DN70	662064	250	60	160	2.8	DN100	662084	250	110	140	4.6																		
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(1) Product codes listed in 'Above ground' and 'Below ground' columns.

(2) DN = nominal diameter.

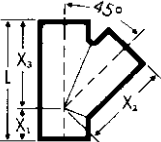
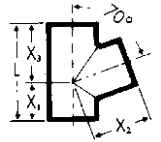
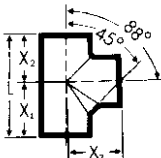
Figure 1 Fittings and dimensions (mm) (continued)<sup>(1)(2)</sup>

<p>Bend 135° for ventilation</p> 	<table><tr><th>Size</th><th>Above ground</th><th>X</th><th>L</th><th>K</th><th>Weight (kg)</th></tr><tr><td>DN100</td><td>662774</td><td>312</td><td>150</td><td>100</td><td>5.0</td></tr></table>	Size	Above ground	X	L	K	Weight (kg)	DN100	662774	312	150	100	5.0																								
Size	Above ground	X	L	K	Weight (kg)																																
DN100	662774	312	150	100	5.0																																
<p>S-bends offset</p> 	<table><tr><th>Size</th><th>Above ground</th><th>Offset</th><th>X</th><th>L</th><th>Weight (kg)</th></tr><tr><td>DN100</td><td>662864</td><td>65</td><td>70</td><td>205</td><td>2.5</td></tr><tr><td>DN100</td><td>665874</td><td>130</td><td>70</td><td>270</td><td>3.5</td></tr><tr><td>DN100</td><td>662884</td><td>200</td><td>70</td><td>340</td><td>4.5</td></tr></table>	Size	Above ground	Offset	X	L	Weight (kg)	DN100	662864	65	70	205	2.5	DN100	665874	130	70	270	3.5	DN100	662884	200	70	340	4.5												
Size	Above ground	Offset	X	L	Weight (kg)																																
DN100	662864	65	70	205	2.5																																
DN100	665874	130	70	270	3.5																																
DN100	662884	200	70	340	4.5																																
<p>Short double bend 88°</p> 	<table><tr><th>Size</th><th>Above ground</th><th>X<sub>1</sub></th><th>X<sub>2</sub></th><th>X<sub>3</sub></th><th>Weight (kg)</th></tr><tr><td>DN50</td><td>661484</td><td>50</td><td>100</td><td>121</td><td>1.2</td></tr><tr><td>DN70</td><td>661494</td><td>60</td><td>120</td><td>145</td><td>1.8</td></tr><tr><td>DN100</td><td>661504</td><td>70</td><td>140</td><td>170</td><td>3.2</td></tr><tr><td>DN125</td><td>661514</td><td>80</td><td>160</td><td>195</td><td>4.6</td></tr><tr><td>DN150</td><td>661524</td><td>90</td><td>180</td><td>219</td><td>7.0</td></tr></table>	Size	Above ground	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	Weight (kg)	DN50	661484	50	100	121	1.2	DN70	661494	60	120	145	1.8	DN100	661504	70	140	170	3.2	DN125	661514	80	160	195	4.6	DN150	661524	90	180	219	7.0
Size	Above ground	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	Weight (kg)																																
DN50	661484	50	100	121	1.2																																
DN70	661494	60	120	145	1.8																																
DN100	661504	70	140	170	3.2																																
DN125	661514	80	160	195	4.6																																
DN150	661524	90	180	219	7.0																																
<p>Long double bend 88°</p> 	<table><tr><th>Size</th><th>Above ground</th><th>X<sub>1</sub></th><th>X<sub>2</sub></th><th>X<sub>3</sub></th><th>Weight (kg)</th></tr><tr><td>DN70</td><td>662734</td><td>60</td><td>301</td><td>273</td><td>3.2</td></tr><tr><td>DN100</td><td>662744</td><td>70</td><td>312</td><td>291</td><td>4.8</td></tr><tr><td>DN125</td><td>662754</td><td>80</td><td>322</td><td>308</td><td>6.8</td></tr><tr><td>DN150</td><td>662764</td><td>90</td><td>334</td><td>326</td><td>9.6</td></tr></table>	Size	Above ground	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	Weight (kg)	DN70	662734	60	301	273	3.2	DN100	662744	70	312	291	4.8	DN125	662754	80	322	308	6.8	DN150	662764	90	334	326	9.6						
Size	Above ground	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	Weight (kg)																																
DN70	662734	60	301	273	3.2																																
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(1) Product codes listed in 'Above ground' and 'Below ground' columns.

(2) DN = nominal diameter.

Figure 1 Fittings and dimensions (mm) (continued)<sup>(1)(2)</sup>

<div>Single branch 45°</div> 	<table><tr><th>Size</th><th>Above ground</th><th>Below ground</th><th>X<sub>2</sub></th><th>X<sub>3</sub></th><th>L</th><th>Weight (kg)</th></tr><tr><td>50 x 50</td><td>664004</td><td>—</td><td>115</td><td>115</td><td>160</td><td>1.2</td></tr><tr><td>70 x 50</td><td>663034</td><td>—</td><td>130</td><td>130</td><td>170</td><td>1.6</td></tr><tr><td>70 x 70</td><td>663064</td><td>—</td><td>145</td><td>145</td><td>200</td><td>2.1</td></tr><tr><td>100 x 50</td><td>663094</td><td>—</td><td>150</td><td>150</td><td>180</td><td>2.3</td></tr><tr><td>100 x 70</td><td>663124</td><td>—</td><td>170</td><td>170</td><td>215</td><td>3.0</td></tr><tr><td>100 x 100</td><td>663154</td><td>232077</td><td>190</td><td>190</td><td>260</td><td>3.8</td></tr><tr><td>125 x 50</td><td>663184</td><td>—</td><td>170</td><td>170</td><td>190</td><td>3.2</td></tr><tr><td>125 x 70</td><td>663214</td><td>—</td><td>185</td><td>185</td><td>225</td><td>4.0</td></tr><tr><td>125 x 100</td><td>663244</td><td>—</td><td>210</td><td>210</td><td>270</td><td>5.0</td></tr><tr><td>125 x 125</td><td>663274</td><td>—</td><td>230</td><td>230</td><td>305</td><td>6.1</td></tr><tr><td>150 x 70</td><td>663334</td><td>—</td><td>205</td><td>205</td><td>235</td><td>5.3</td></tr><tr><td>150 x 100</td><td>663364</td><td>232080</td><td>225</td><td>225</td><td>280</td><td>6.5</td></tr><tr><td>150 x 125</td><td>663394</td><td>—</td><td>245</td><td>245</td><td>315</td><td>7.7</td></tr><tr><td>150 x 150</td><td>663424</td><td>232082</td><td>265</td><td>265</td><td>355</td><td>9.2</td></tr><tr><td>200 x 70</td><td>663484</td><td>—</td><td>235</td><td>235</td><td>250</td><td>8.0</td></tr><tr><td>200 x 100</td><td>663514</td><td>232083</td><td>260</td><td>260</td><td>300</td><td>9.8</td></tr><tr><td>200 x 125</td><td>663544</td><td>—</td><td>280</td><td>280</td><td>335</td><td>11.9</td></tr><tr><td>200 x 150</td><td>663574</td><td>232085</td><td>300</td><td>300</td><td>375</td><td>13.3</td></tr><tr><td>200 x 200</td><td>663604</td><td>232086</td><td>340</td><td>340</td><td>455</td><td>17.2</td></tr><tr><td>250 x 100</td><td>663634</td><td>—</td><td>305</td><td>305</td><td>320</td><td>15.4</td></tr><tr><td>250 x 125</td><td>664504</td><td>—</td><td>330</td><td>330</td><td>365</td><td>17.7</td></tr><tr><td>250 x 150</td><td>664514</td><td>—</td><td>350</td><td>350</td><td>405</td><td>20.2</td></tr><tr><td>250 x 200</td><td>663644</td><td>—</td><td>380</td><td>380</td><td>470</td><td>24.8</td></tr><tr><td>250 x 250</td><td>663654</td><td>232111</td><td>430</td><td>430</td><td>560</td><td>31.5</td></tr><tr><td>300 x 100</td><td>663664</td><td>—</td><td>345</td><td>345</td><td>350</td><td>22.0</td></tr><tr><td>300 x 125</td><td>664524</td><td>—</td><td>360</td><td>360</td><td>375</td><td>23.9</td></tr><tr><td>300 x 150</td><td>664534</td><td>—</td><td>380</td><td>380</td><td>415</td><td>26.9</td></tr><tr><td>300 x 200</td><td>664444</td><td>—</td><td>440</td><td>440</td><td>485</td><td>34.0</td></tr><tr><td>300 x 250</td><td>663674</td><td>—</td><td>465</td><td>465</td><td>580</td><td>42.1</td></tr><tr><td>300 x 300</td><td>663684</td><td>232112</td><td>505</td><td>505</td><td>660</td><td>50.1</td></tr></table>	Size	Above ground	Below ground	X <sub>2</sub>	X <sub>3</sub>	L	Weight (kg)	50 x 50	664004	—	115	115	160	1.2	70 x 50	663034	—	130	130	170	1.6	70 x 70	663064	—	145	145	200	2.1	100 x 50	663094	—	150	150	180	2.3	100 x 70	663124	—	170	170	215	3.0	100 x 100	663154	232077	190	190	260	3.8	125 x 50	663184	—	170	170	190	3.2	125 x 70	663214	—	185	185	225	4.0	125 x 100	663244	—	210	210	270	5.0	125 x 125	663274	—	230	230	305	6.1	150 x 70	663334	—	205	205	235	5.3	150 x 100	663364	232080	225	225	280	6.5	150 x 125	663394	—	245	245	315	7.7	150 x 150	663424	232082	265	265	355	9.2	200 x 70	663484	—	235	235	250	8.0	200 x 100	663514	232083	260	260	300	9.8	200 x 125	663544	—	280	280	335	11.9	200 x 150	663574	232085	300	300	375	13.3	200 x 200	663604	232086	340	340	455	17.2	250 x 100	663634	—	305	305	320	15.4	250 x 125	664504	—	330	330	365	17.7	250 x 150	664514	—	350	350	405	20.2	250 x 200	663644	—	380	380	470	24.8	250 x 250	663654	232111	430	430	560	31.5	300 x 100	663664	—	345	345	350	22.0	300 x 125	664524	—	360	360	375	23.9	300 x 150	664534	—	380	380	415	26.9	300 x 200	664444	—	440	440	485	34.0	300 x 250	663674	—	465	465	580	42.1	300 x 300	663684	232112	505	505	660	50.1
	Size	Above ground	Below ground	X <sub>2</sub>	X <sub>3</sub>	L	Weight (kg)																																																																																																																																																																																																																			
	50 x 50	664004	—	115	115	160	1.2																																																																																																																																																																																																																			
	70 x 50	663034	—	130	130	170	1.6																																																																																																																																																																																																																			
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	100 x 50	663094	—	150	150	180	2.3																																																																																																																																																																																																																			
	100 x 70	663124	—	170	170	215	3.0																																																																																																																																																																																																																			
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	125 x 50	663184	—	170	170	190	3.2																																																																																																																																																																																																																			
	125 x 70	663214	—	185	185	225	4.0																																																																																																																																																																																																																			
	125 x 100	663244	—	210	210	270	5.0																																																																																																																																																																																																																			
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	150 x 100	663364	232080	225	225	280	6.5																																																																																																																																																																																																																			
	150 x 125	663394	—	245	245	315	7.7																																																																																																																																																																																																																			
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	200 x 70	663484	—	235	235	250	8.0																																																																																																																																																																																																																			
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	200 x 125	663544	—	280	280	335	11.9																																																																																																																																																																																																																			
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	250 x 250	663654	232111	430	430	560	31.5																																																																																																																																																																																																																			
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<div>Single branch 70°</div> 	<table><tr><th>Size</th><th>Above ground</th><th>X<sub>1</sub></th><th>X<sub>2</sub></th><th>L</th><th>Weight (kg)</th></tr><tr><td>50 x 50</td><td>663014</td><td>55</td><td>80</td><td>135</td><td>0.9</td></tr><tr><td>70 x 50</td><td>663044</td><td>55</td><td>90</td><td>140</td><td>1.3</td></tr><tr><td>70 x 70</td><td>663074</td><td>70</td><td>100</td><td>170</td><td>1.6</td></tr><tr><td>100 x 50</td><td>663104</td><td>55</td><td>100</td><td>155</td><td>1.9</td></tr><tr><td>100 x 70</td><td>663134</td><td>70</td><td>120</td><td>180</td><td>2.3</td></tr><tr><td>100 x 100</td><td>663164</td><td>85</td><td>120</td><td>180</td><td>2.9</td></tr><tr><td>125 x 50</td><td>663194</td><td>55</td><td>120</td><td>165</td><td>2.7</td></tr><tr><td>125 x 70</td><td>663224</td><td>70</td><td>130</td><td>190</td><td>3.2</td></tr><tr><td>125 x 100</td><td>663254</td><td>85</td><td>145</td><td>225</td><td>4.8</td></tr><tr><td>150 x 100</td><td>663374</td><td>85</td><td>155</td><td>235</td><td>5.3</td></tr><tr><td>150 x 125</td><td>663404</td><td>100</td><td>170</td><td>265</td><td>6.2</td></tr><tr><td>150 x 150</td><td>663434</td><td>115</td><td>180</td><td>295</td><td>7.1</td></tr></table>	Size	Above ground	X <sub>1</sub>	X <sub>2</sub>	L	Weight (kg)	50 x 50	663014	55	80	135	0.9	70 x 50	663044	55	90	140	1.3	70 x 70	663074	70	100	170	1.6	100 x 50	663104	55	100	155	1.9	100 x 70	663134	70	120	180	2.3	100 x 100	663164	85	120	180	2.9	125 x 50	663194	55	120	165	2.7	125 x 70	663224	70	130	190	3.2	125 x 100	663254	85	145	225	4.8	150 x 100	663374	85	155	235	5.3	150 x 125	663404	100	170	265	6.2	150 x 150	663434	115	180	295	7.1																																																																																																																																											
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<div>Single branch 88°</div> 	<table><tr><th>Size</th><th>Above ground</th><th>Below ground</th><th>X<sub>1</sub></th><th>X<sub>3</sub></th><th>L</th><th>Weight (kg)</th></tr><tr><td>50 x 50</td><td>663024</td><td>—</td><td>66</td><td>80</td><td>145</td><td>0.9</td></tr><tr><td>70 x 50</td><td>663054</td><td>—</td><td>72</td><td>90</td><td>155</td><td>1.4</td></tr><tr><td>70 x 70</td><td>663084</td><td>—</td><td>83</td><td>95</td><td>180</td><td>1.7</td></tr><tr><td>100 x 50</td><td>663114</td><td>—</td><td>76</td><td>105</td><td>170</td><td>2.1</td></tr><tr><td>100 x 70</td><td>663144</td><td>—</td><td>88</td><td>110</td><td>190</td><td>2.4</td></tr><tr><td>100 x 100</td><td>663174</td><td>232113</td><td>105</td><td>120</td><td>220</td><td>2.9</td></tr><tr><td>125 x 50</td><td>663204</td><td>—</td><td>82</td><td>120</td><td>180</td><td>3.0</td></tr><tr><td>125 x 70</td><td>663234</td><td>—</td><td>93</td><td>125</td><td>200</td><td>3.4</td></tr><tr><td>125 x 100</td><td>663264</td><td>—</td><td>110</td><td>130</td><td>235</td><td>4.0</td></tr><tr><td>125 x 125</td><td>663294</td><td>—</td><td>123</td><td>135</td><td>260</td><td>4.6</td></tr><tr><td>150 x 50</td><td>663324</td><td>—</td><td>100</td><td>140</td><td>200</td><td>4.4</td></tr><tr><td>150 x 100</td><td>663384</td><td>232114</td><td>115</td><td>145</td><td>245</td><td>5.5</td></tr><tr><td>150 x 125</td><td>663414</td><td>—</td><td>128</td><td>150</td><td>275</td><td>6.2</td></tr><tr><td>150 x 150</td><td>663444</td><td>232115</td><td>142</td><td>155</td><td>300</td><td>6.9</td></tr></table>	Size	Above ground	Below ground	X <sub>1</sub>	X <sub>3</sub>	L	Weight (kg)	50 x 50	663024	—	66	80	145	0.9	70 x 50	663054	—	72	90	155	1.4	70 x 70	663084	—	83	95	180	1.7	100 x 50	663114	—	76	105	170	2.1	100 x 70	663144	—	88	110	190	2.4	100 x 100	663174	232113	105	120	220	2.9	125 x 50	663204	—	82	120	180	3.0	125 x 70	663234	—	93	125	200	3.4	125 x 100	663264	—	110	130	235	4.0	125 x 125	663294	—	123	135	260	4.6	150 x 50	663324	—	100	140	200	4.4	150 x 100	663384	232114	115	145	245	5.5	150 x 125	663414	—	128	150	275	6.2	150 x 150	663444	232115	142	155	300	6.9																																																																																																																
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	150 x 150	663444	232115	142	155	300	6.9																																																																																																																																																																																																																			

(1) Product codes listed in 'Above ground' and 'Below ground' columns.

(2) DN = nominal diameter.

Figure 1 Fittings and dimensions (mm) (continued)<sup>(1)(2)</sup>

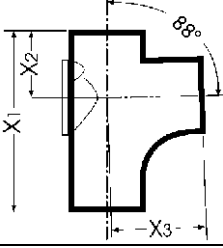
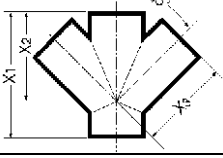
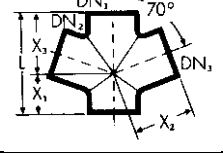
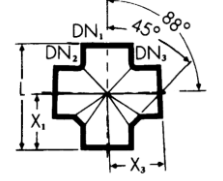
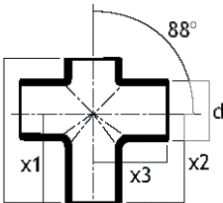
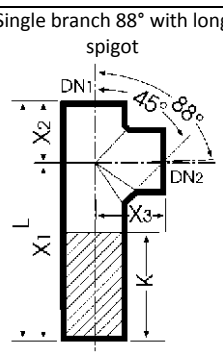
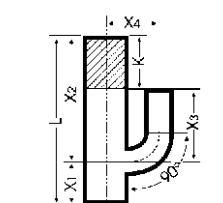
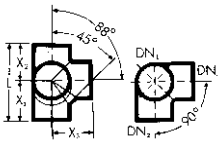
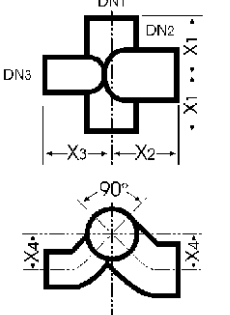
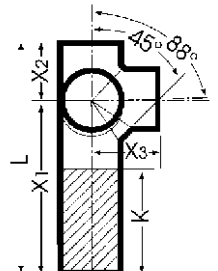
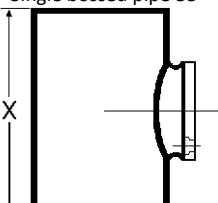
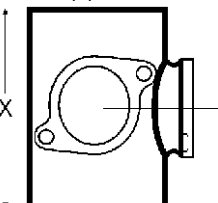
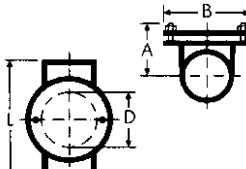
<p>Swept entry branch 88° - with and without access</p> 	<table><tr><th>Size</th><th>Above ground</th><th>Below ground</th><th>Access</th><th>X<sub>1</sub></th><th>X<sub>2</sub></th><th>X<sub>3</sub></th><th>Weight (kg)</th></tr><tr><td>100 x 100</td><td>663174S</td><td>—</td><td>No</td><td>270</td><td>102</td><td>150</td><td>3.7</td></tr><tr><td>100 x 100</td><td>663174SA</td><td>232131</td><td>Yes</td><td>270</td><td>102</td><td>150</td><td>4.7</td></tr><tr><td>150 x 100</td><td>235684</td><td>—</td><td>No</td><td>300</td><td>117</td><td>202</td><td>7.0</td></tr><tr><td>150 x 150</td><td>238060</td><td>—</td><td>Yes</td><td>300</td><td>117</td><td>202</td><td>10.4</td></tr></table>	Size	Above ground	Below ground	Access	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	Weight (kg)	100 x 100	663174S	—	No	270	102	150	3.7	100 x 100	663174SA	232131	Yes	270	102	150	4.7	150 x 100	235684	—	No	300	117	202	7.0	150 x 150	238060	—	Yes	300	117	202	10.4		
Size	Above ground	Below ground	Access	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	Weight (kg)																																				
100 x 100	663174S	—	No	270	102	150	3.7																																				
100 x 100	663174SA	232131	Yes	270	102	150	4.7																																				
150 x 100	235684	—	No	300	117	202	7.0																																				
150 x 150	238060	—	Yes	300	117	202	10.4																																				
<p>Double branch 45°</p> 	<table><tr><th>Size</th><th>Above ground</th><th>Below ground</th><th>X<sub>1</sub></th><th>X<sub>2</sub> / X<sub>3</sub></th><th>Weight (kg)</th></tr><tr><td>100 x 100</td><td>100260</td><td>232117</td><td>260</td><td>190</td><td>4.0</td></tr><tr><td>150 x 100</td><td>661444</td><td>232118</td><td>280</td><td>225</td><td>8.4</td></tr><tr><td>150 x 150</td><td>—</td><td>15015045D</td><td>355</td><td>265</td><td>12.6</td></tr></table>	Size	Above ground	Below ground	X <sub>1</sub>	X <sub>2</sub> / X <sub>3</sub>	Weight (kg)	100 x 100	100260	232117	260	190	4.0	150 x 100	661444	232118	280	225	8.4	150 x 150	—	15015045D	355	265	12.6																		
Size	Above ground	Below ground	X <sub>1</sub>	X <sub>2</sub> / X <sub>3</sub>	Weight (kg)																																						
100 x 100	100260	232117	260	190	4.0																																						
150 x 100	661444	232118	280	225	8.4																																						
150 x 150	—	15015045D	355	265	12.6																																						
<p>Double branch 68°</p> 	<table><tr><th>Size</th><th>Above ground</th><th>Below ground</th><th>X<sub>1</sub></th><th>X<sub>2</sub> / X<sub>3</sub></th><th>L</th><th>Weight (kg)</th></tr><tr><td>100 x 100 x 100</td><td>663864</td><td>232116</td><td>85</td><td>130</td><td>215</td><td>3.5</td></tr><tr><td>125 x 100 x 100</td><td>663954</td><td>—</td><td>85</td><td>145</td><td>215</td><td>5.0</td></tr></table>	Size	Above ground	Below ground	X <sub>1</sub>	X <sub>2</sub> / X <sub>3</sub>	L	Weight (kg)	100 x 100 x 100	663864	232116	85	130	215	3.5	125 x 100 x 100	663954	—	85	145	215	5.0																					
Size	Above ground	Below ground	X <sub>1</sub>	X <sub>2</sub> / X <sub>3</sub>	L	Weight (kg)																																					
100 x 100 x 100	663864	232116	85	130	215	3.5																																					
125 x 100 x 100	663954	—	85	145	215	5.0																																					
<p>Double branch 88°</p> 	<table><tr><th>Size</th><th>Above ground</th><th>Below ground</th><th>X<sub>1</sub></th><th>X<sub>3</sub></th><th>L</th><th>Weight (kg)</th></tr><tr><td>100 x 50 x 50</td><td>663814</td><td>—</td><td>100</td><td>105</td><td>180</td><td>2.2</td></tr><tr><td>100 x 70 x 70</td><td>663844</td><td>—</td><td>102</td><td>110</td><td>190</td><td>2.7</td></tr><tr><td>100 x 100 x 100</td><td>663874</td><td>232119</td><td>120</td><td>120</td><td>230</td><td>3.2</td></tr><tr><td>150 x 100 x 70</td><td>664184</td><td>—</td><td>130</td><td>130</td><td>245</td><td>6.3</td></tr><tr><td>150 x 100 x 100</td><td>664084</td><td>—</td><td>130</td><td>145</td><td>245</td><td>7.1</td></tr></table>	Size	Above ground	Below ground	X <sub>1</sub>	X <sub>3</sub>	L	Weight (kg)	100 x 50 x 50	663814	—	100	105	180	2.2	100 x 70 x 70	663844	—	102	110	190	2.7	100 x 100 x 100	663874	232119	120	120	230	3.2	150 x 100 x 70	664184	—	130	130	245	6.3	150 x 100 x 100	664084	—	130	145	245	7.1
Size	Above ground	Below ground	X <sub>1</sub>	X <sub>3</sub>	L	Weight (kg)																																					
100 x 50 x 50	663814	—	100	105	180	2.2																																					
100 x 70 x 70	663844	—	102	110	190	2.7																																					
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<p>Swept double branch 88°</p> 	<table><tr><th>Size</th><th>Above ground</th><th>d</th><th>x1</th><th>x2</th><th>x3</th><th>L</th><th>Weight (kg)</th></tr><tr><td>DN100</td><td>100264</td><td>100</td><td>170</td><td>170</td><td>150</td><td>270</td><td>4.5</td></tr></table>	Size	Above ground	d	x1	x2	x3	L	Weight (kg)	DN100	100264	100	170	170	150	270	4.5																										
Size	Above ground	d	x1	x2	x3	L	Weight (kg)																																				
DN100	100264	100	170	170	150	270	4.5																																				
<p>Single branch 88° with long spigot</p> 	<table><tr><th>Size</th><th>Above ground</th><th>X<sub>1</sub></th><th>X<sub>3</sub></th><th>L</th><th>K<sub>(2)</sub></th><th>Weight (kg)</th></tr><tr><td>100 x 100</td><td>664454</td><td>325</td><td>115</td><td>430</td><td>210</td><td>4.6</td></tr></table>	Size	Above ground	X <sub>1</sub>	X <sub>3</sub>	L	K <sub>(2)</sub>	Weight (kg)	100 x 100	664454	325	115	430	210	4.6																												
Size	Above ground	X <sub>1</sub>	X <sub>3</sub>	L	K <sub>(2)</sub>	Weight (kg)																																					
100 x 100	664454	325	115	430	210	4.6																																					
<p>Parallel branch</p> 	<table><tr><th>Size</th><th>Above ground</th><th>X<sub>1</sub></th><th>X<sub>3</sub></th><th>X<sub>4</sub></th><th>L</th><th>Weight (kg)</th></tr><tr><td>100 x 70</td><td>236354</td><td>100</td><td>175</td><td>125</td><td>400</td><td>6.5</td></tr></table>	Size	Above ground	X <sub>1</sub>	X <sub>3</sub>	X <sub>4</sub>	L	Weight (kg)	100 x 70	236354	100	175	125	400	6.5																												
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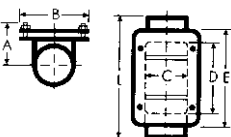
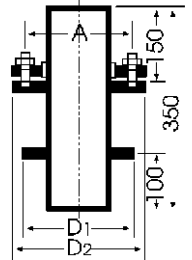
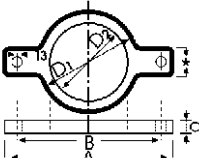
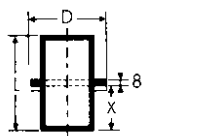
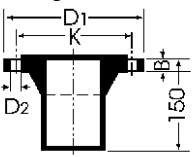
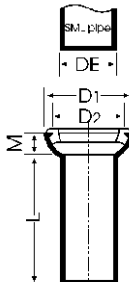
Figure 1 Fittings and dimensions (mm) (continued)<sup>(1)(2)</sup>

<p>Corner branch 88°</p> 	<table><tr><th>Size</th><th>Above ground</th><th>X<sub>1</sub></th><th>X<sub>3</sub></th><th>L</th><th>Weight (kg)</th></tr><tr><td>100 x 70 x 70</td><td>662044</td><td>102</td><td>110</td><td>190</td><td>2.7</td></tr><tr><td>100 x 100 x 100</td><td>662034</td><td>115</td><td>115</td><td>220</td><td>3.4</td></tr><tr><td>125 x 70 x 70</td><td>662024</td><td>107</td><td>125</td><td>200</td><td>3.7</td></tr><tr><td>125 x 100 x 100</td><td>662014</td><td>125</td><td>130</td><td>235</td><td>5.0</td></tr><tr><td>150 x 100 x 100</td><td>664434</td><td>130</td><td>145</td><td>245</td><td>7.1</td></tr></table>	Size	Above ground	X <sub>1</sub>	X <sub>3</sub>	L	Weight (kg)	100 x 70 x 70	662044	102	110	190	2.7	100 x 100 x 100	662034	115	115	220	3.4	125 x 70 x 70	662024	107	125	200	3.7	125 x 100 x 100	662014	125	130	235	5.0	150 x 100 x 100	664434	130	145	245	7.1
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125 x 100 x 100	662014	125	130	235	5.0																																
150 x 100 x 100	664434	130	145	245	7.1																																
<p>Combination branch</p> 	<table><tr><th>Size</th><th>Above ground</th><th>X<sub>1</sub></th><th>X<sub>2</sub></th><th>X<sub>3</sub></th><th>X<sub>4</sub></th><th>Weight (kg)</th></tr><tr><td>100 x 100 x 70</td><td>665834</td><td>115</td><td>140</td><td>130</td><td>70</td><td>4.5</td></tr><tr><td>100 x 100 x 100</td><td>665924</td><td>115</td><td>140</td><td>140</td><td>70</td><td>5.0</td></tr></table>	Size	Above ground	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	X <sub>4</sub>	Weight (kg)	100 x 100 x 70	665834	115	140	130	70	4.5	100 x 100 x 100	665924	115	140	140	70	5.0															
Size	Above ground	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	X <sub>4</sub>	Weight (kg)																															
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100 x 100 x 100	665924	115	140	140	70	5.0																															
<p>Corner branch 88° with long spigot</p> 	<table><tr><th>Size</th><th>Above ground</th><th>X<sub>1</sub></th><th>X<sub>3</sub></th><th>L</th><th>K<sub>(2)</sub></th><th>Weight (kg)</th></tr><tr><td>100 x 100 x 100</td><td>664464</td><td>325</td><td>115</td><td>430</td><td>210</td><td>5.2</td></tr></table>	Size	Above ground	X <sub>1</sub>	X <sub>3</sub>	L	K <sub>(2)</sub>	Weight (kg)	100 x 100 x 100	664464	325	115	430	210	5.2																						
Size	Above ground	X <sub>1</sub>	X <sub>3</sub>	L	K <sub>(2)</sub>	Weight (kg)																															
100 x 100 x 100	664464	325	115	430	210	5.2																															
<p>Single bossed pipe 88°</p> 	<table><tr><th>Size</th><th>Above ground</th><th>X</th><th>Weight (kg)</th></tr><tr><td>DN50</td><td>240581</td><td>140</td><td>1.2</td></tr><tr><td>DN70</td><td>663054B</td><td>145</td><td>1.6</td></tr><tr><td>DN100</td><td>663114B</td><td>150</td><td>2.1</td></tr><tr><td>DN150</td><td>232746</td><td>175</td><td>3.8</td></tr></table>	Size	Above ground	X	Weight (kg)	DN50	240581	140	1.2	DN70	663054B	145	1.6	DN100	663114B	150	2.1	DN150	232746	175	3.8																
Size	Above ground	X	Weight (kg)																																		
DN50	240581	140	1.2																																		
DN70	663054B	145	1.6																																		
DN100	663114B	150	2.1																																		
DN150	232746	175	3.8																																		
<p>Double and corner bossed pipe 90°</p> 	<table><tr><th>Size</th><th>Above ground</th><th>X</th><th>Weight (kg)</th></tr><tr><td>DN100 Double</td><td>663114DB</td><td>150</td><td>2.9</td></tr><tr><td>DN150 Double</td><td>237738</td><td>175</td><td>3.8</td></tr><tr><td>DN100 Corner</td><td>663114CB</td><td>150</td><td>2.3</td></tr></table>	Size	Above ground	X	Weight (kg)	DN100 Double	663114DB	150	2.9	DN150 Double	237738	175	3.8	DN100 Corner	663114CB	150	2.3																				
Size	Above ground	X	Weight (kg)																																		
DN100 Double	663114DB	150	2.9																																		
DN150 Double	237738	175	3.8																																		
DN100 Corner	663114CB	150	2.3																																		
<p>Short pipes with round access door</p> 	<table><tr><th>Size</th><th>Above ground</th><th>Below ground</th><th>A</th><th>B</th><th>D</th><th>L</th><th>Weight (kg)</th></tr><tr><td>DN50</td><td>669580</td><td></td><td>59</td><td>105</td><td>53</td><td>175</td><td>2.1</td></tr><tr><td>DN70</td><td>669583</td><td></td><td>69</td><td>125</td><td>73</td><td>205</td><td>2.9</td></tr><tr><td>DN100</td><td>669586</td><td>232134</td><td>84</td><td>159</td><td>104</td><td>250</td><td>5.5</td></tr></table>	Size	Above ground	Below ground	A	B	D	L	Weight (kg)	DN50	669580		59	105	53	175	2.1	DN70	669583		69	125	73	205	2.9	DN100	669586	232134	84	159	104	250	5.5				
Size	Above ground	Below ground	A	B	D	L	Weight (kg)																														
DN50	669580		59	105	53	175	2.1																														
DN70	669583		69	125	73	205	2.9																														
DN100	669586	232134	84	159	104	250	5.5																														

(1) product codes listed in 'Above ground' and 'Below ground' columns.

(2) DN = nominal diameter.

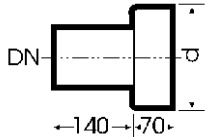
Figure 1 Fittings and dimensions (mm) (continued)<sup>(1)(2)</sup>

<p>Short pipes with rectangular access door</p> 	<table><tr><th>Size</th><th>Above ground</th><th>Below ground</th><th>A</th><th>B</th><th>C</th><th>D</th><th>E</th><th>L</th><th>Weight (kg)</th></tr><tr><td>DN100</td><td>669624</td><td>232096</td><td>83</td><td>160</td><td>100</td><td>200</td><td>230</td><td>320</td><td>7.6</td></tr><tr><td>DN125</td><td>669627</td><td></td><td>101</td><td>190</td><td>125</td><td>225</td><td>255</td><td>355</td><td>10.3</td></tr><tr><td>DN150</td><td>669630</td><td>232099</td><td>112</td><td>215</td><td>150</td><td>250</td><td>280</td><td>395</td><td>14.5</td></tr><tr><td>DN200</td><td>669633</td><td>232101</td><td>137</td><td>262</td><td>200</td><td>300</td><td>330</td><td>465</td><td>22.0</td></tr><tr><td>DN250</td><td>669612</td><td>232137</td><td>170</td><td>330</td><td>259</td><td>350</td><td>380</td><td>540</td><td>36.5</td></tr><tr><td>DN300</td><td>669615</td><td>232140</td><td>195</td><td>380</td><td>309</td><td>400</td><td>430</td><td>610</td><td>51.0</td></tr></table>	Size	Above ground	Below ground	A	B	C	D	E	L	Weight (kg)	DN100	669624	232096	83	160	100	200	230	320	7.6	DN125	669627		101	190	125	225	255	355	10.3	DN150	669630	232099	112	215	150	250	280	395	14.5	DN200	669633	232101	137	262	200	300	330	465	22.0	DN250	669612	232137	170	330	259	350	380	540	36.5	DN300	669615	232140	195	380	309	400	430	610	51.0
Size	Above ground	Below ground	A	B	C	D	E	L	Weight (kg)																																																														
DN100	669624	232096	83	160	100	200	230	320	7.6																																																														
DN125	669627		101	190	125	225	255	355	10.3																																																														
DN150	669630	232099	112	215	150	250	280	395	14.5																																																														
DN200	669633	232101	137	262	200	300	330	465	22.0																																																														
DN250	669612	232137	170	330	259	350	380	540	36.5																																																														
DN300	669615	232140	195	380	309	400	430	610	51.0																																																														
<p>Pipe with wall flange</p> 	<table><tr><th>Size</th><th>Above ground</th><th>A</th><th>D1</th><th>D2</th><th>Weight (kg)</th></tr><tr><td>DN100</td><td>662224</td><td>191</td><td>190</td><td>230</td><td>8.8</td></tr></table>	Size	Above ground	A	D1	D2	Weight (kg)	DN100	662224	191	190	230	8.8																																																										
Size	Above ground	A	D1	D2	Weight (kg)																																																																		
DN100	662224	191	190	230	8.8																																																																		
<p>Bearing ring with rubber gasket for downpipe supports</p> 	<table><tr><th>Size</th><th>Above ground</th><th>A</th><th>B</th><th>C</th><th>Weight (kg)</th></tr><tr><td>DN50</td><td>666314</td><td>193</td><td>148</td><td>25</td><td>0.8</td></tr><tr><td>DN70</td><td>666324</td><td>214</td><td>166</td><td>26</td><td>1.0</td></tr><tr><td>DN100</td><td>666334</td><td>250</td><td>202</td><td>28</td><td>1.3</td></tr><tr><td>DN125</td><td>666344</td><td>274</td><td>225.5</td><td>28</td><td>1.5</td></tr><tr><td>DN150</td><td>666354</td><td>301</td><td>253.5</td><td>30</td><td>2.0</td></tr><tr><td>DN200</td><td>666374</td><td>360</td><td>310.5</td><td>30</td><td>3.0</td></tr><tr><td>DN250</td><td>227152</td><td>442</td><td>392</td><td>34</td><td>5.6</td></tr><tr><td>DN300</td><td>227153</td><td>495</td><td>445</td><td>39</td><td>7.4</td></tr></table>	Size	Above ground	A	B	C	Weight (kg)	DN50	666314	193	148	25	0.8	DN70	666324	214	166	26	1.0	DN100	666334	250	202	28	1.3	DN125	666344	274	225.5	28	1.5	DN150	666354	301	253.5	30	2.0	DN200	666374	360	310.5	30	3.0	DN250	227152	442	392	34	5.6	DN300	227153	495	445	39	7.4																
Size	Above ground	A	B	C	Weight (kg)																																																																		
DN50	666314	193	148	25	0.8																																																																		
DN70	666324	214	166	26	1.0																																																																		
DN100	666334	250	202	28	1.3																																																																		
DN125	666344	274	225.5	28	1.5																																																																		
DN150	666354	301	253.5	30	2.0																																																																		
DN200	666374	360	310.5	30	3.0																																																																		
DN250	227152	442	392	34	5.6																																																																		
DN300	227153	495	445	39	7.4																																																																		
<p>Downpipe supports</p> 	<table><tr><th>Size</th><th>Above ground</th><th>D</th><th>L</th><th>X</th><th>Weight (kg)</th></tr><tr><td>DN50</td><td>661544</td><td>87</td><td>200</td><td>96</td><td>1.3</td></tr><tr><td>DN70</td><td>661554</td><td>106</td><td>200</td><td>96</td><td>1.6</td></tr><tr><td>DN100</td><td>661564</td><td>145</td><td>200</td><td>96</td><td>2.3</td></tr><tr><td>DN125</td><td>661574</td><td>170</td><td>200</td><td>96</td><td>3.0</td></tr><tr><td>DN150</td><td>661584</td><td>195</td><td>200</td><td>96</td><td>4.0</td></tr><tr><td>DN200</td><td>661594</td><td>245</td><td>200</td><td>96</td><td>6.0</td></tr><tr><td>DN250</td><td>661604</td><td>340</td><td>300</td><td>146</td><td>19.5</td></tr><tr><td>DN300</td><td>661614</td><td>390</td><td>300</td><td>146</td><td>25.5</td></tr></table>	Size	Above ground	D	L	X	Weight (kg)	DN50	661544	87	200	96	1.3	DN70	661554	106	200	96	1.6	DN100	661564	145	200	96	2.3	DN125	661574	170	200	96	3.0	DN150	661584	195	200	96	4.0	DN200	661594	245	200	96	6.0	DN250	661604	340	300	146	19.5	DN300	661614	390	300	146	25.5																
Size	Above ground	D	L	X	Weight (kg)																																																																		
DN50	661544	87	200	96	1.3																																																																		
DN70	661554	106	200	96	1.6																																																																		
DN100	661564	145	200	96	2.3																																																																		
DN125	661574	170	200	96	3.0																																																																		
DN150	661584	195	200	96	4.0																																																																		
DN200	661594	245	200	96	6.0																																																																		
DN250	661604	340	300	146	19.5																																																																		
DN300	661614	390	300	146	25.5																																																																		
<p>Flanged connector</p> 	<table><tr><th>Size</th><th>Above ground</th><th>D1</th><th>D2</th><th>B</th><th>K</th><th>Weight (kg)</th></tr><tr><td>100</td><td>665934</td><td>220</td><td>18</td><td>24</td><td>180</td><td>5.8</td></tr><tr><td>125</td><td>665944</td><td>250</td><td>18</td><td>26</td><td>210</td><td>8.0</td></tr><tr><td>150</td><td>665954</td><td>285</td><td>22</td><td>26</td><td>240</td><td>93.8</td></tr><tr><td>200</td><td>665964</td><td>340</td><td>22</td><td>26</td><td>295</td><td>14.5</td></tr></table>	Size	Above ground	D1	D2	B	K	Weight (kg)	100	665934	220	18	24	180	5.8	125	665944	250	18	26	210	8.0	150	665954	285	22	26	240	93.8	200	665964	340	22	26	295	14.5																																			
Size	Above ground	D1	D2	B	K	Weight (kg)																																																																	
100	665934	220	18	24	180	5.8																																																																	
125	665944	250	18	26	210	8.0																																																																	
150	665954	285	22	26	240	93.8																																																																	
200	665964	340	22	26	295	14.5																																																																	
<p>Sleeved connector</p> 	<table><tr><th>Size</th><th>Above ground</th><th>D1</th><th>D2</th><th>L</th><th>M</th><th>DE</th><th>Weight (kg)</th></tr><tr><td>100</td><td>662194</td><td>144</td><td>125.5</td><td>250</td><td>40</td><td>110</td><td>3.3</td></tr><tr><td>125</td><td>662204</td><td>172</td><td>151.5</td><td>250</td><td>42.5</td><td>135</td><td>4.6</td></tr><tr><td>150</td><td>662214</td><td>201</td><td>178.5</td><td>250</td><td>45</td><td>160</td><td>6.1</td></tr></table>	Size	Above ground	D1	D2	L	M	DE	Weight (kg)	100	662194	144	125.5	250	40	110	3.3	125	662204	172	151.5	250	42.5	135	4.6	150	662214	201	178.5	250	45	160	6.1																																						
Size	Above ground	D1	D2	L	M	DE	Weight (kg)																																																																
100	662194	144	125.5	250	40	110	3.3																																																																
125	662204	172	151.5	250	42.5	135	4.6																																																																
150	662214	201	178.5	250	45	160	6.1																																																																

- (1) Product codes listed in 'Above ground' and 'Below ground' columns.  
(2) DN = nominal diameter.

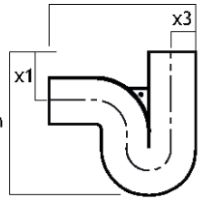
Figure 1 Fittings and dimensions (mm) (continued)<sup>(1)(2)</sup>

Stoneware connector



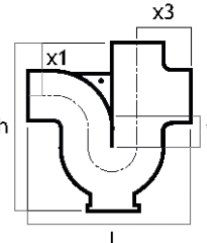
Size	Above ground	d	Weight (kg)
DN100	664924	159 ± 2.0	4.9
DN125	664934	187 ± 3.5	6.7
DN150	664944	218 ± 3.5	9.7
DN200	664954	278 ± 3.5	13.3

Plain trap



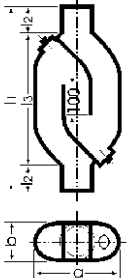
Size	Above ground	Below ground	L	h	x1	x3	Weight (kg)
DN100	100261	232125	370	297	80	55	7.3

Branch trap



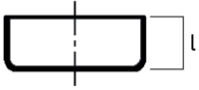
Size	Above ground	L	h	w	x1	x3	Weight (kg)
DN50	669562	190	250	60	68	68	2.8
DN70	669563	265	293	60	93	93	5.5
DN100	669564	325	392	100	110	110	8.5
DN125	669565	390	446	100	130	130	13.0
DN150	669566	470	493	100	145	145	19.5
DN200	669567	600	500	100	180	200	33.0

Rainwater pipe syphon



Size	Above ground	a	b	l <sub>1</sub>	l <sub>2</sub>	Weight (kg)
70	669557	195	90	472	80	9.0
100	669558	276	124	588	90	18.5
125	669559	344	144	687	100	28.5
150	669560	374	179	742	110	38.0

Plugs – blank end



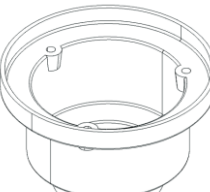
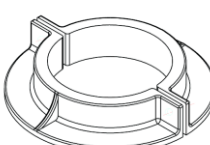
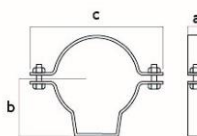




Size	Above ground	Below ground	L	Weight (kg)
DN50	665504	—	30	0.2
DN70	665514	—	35	0.4
DN100	665524	232091	40	0.5
DN125	665534	—	45	1.1
DN150	665544	232093	50	1.7
DN200	665554	232094	60	3.1
DN250	665564	232126	70	6.0
DN300	665574	232127	80	9.5

(1) Product codes listed in 'Above ground' and 'Below ground' columns.

(2) DN = nominal diameter.


Figure 1 Fittings and dimensions (mm) (continued)<sup>(1)(2)</sup>

<p>Plugs – tapped end</p> 	<table><tr><th>Size</th><th>Above ground</th><th>L</th><th>Tap dia</th><th>Weight (kg)</th></tr><tr><td>DN50</td><td>665504TE</td><td>30</td><td>40(1½")</td><td>0.2</td></tr><tr><td>DN70</td><td>665514TE</td><td>35</td><td>50(2")</td><td>0.4</td></tr><tr><td>DN100</td><td>665524TE</td><td>40</td><td>50(2")</td><td>0.9</td></tr><tr><td>DN150</td><td>665544TE</td><td>50</td><td>50(2")</td><td>1.7</td></tr><tr><td>DN200</td><td>665554TE</td><td>60</td><td>50(2")</td><td>3.1</td></tr></table>	Size	Above ground	L	Tap dia	Weight (kg)	DN50	665504TE	30	40(1½")	0.2	DN70	665514TE	35	50(2")	0.4	DN100	665524TE	40	50(2")	0.9	DN150	665544TE	50	50(2")	1.7	DN200	665554TE	60	50(2")	3.1												
Size	Above ground	L	Tap dia	Weight (kg)																																							
DN50	665504TE	30	40(1½")	0.2																																							
DN70	665514TE	35	50(2")	0.4																																							
DN100	665524TE	40	50(2")	0.9																																							
DN150	665544TE	50	50(2")	1.7																																							
DN200	665554TE	60	50(2")	3.1																																							
<p>End Caps – plug</p> 	<table><tr><th>Size</th><th>Above ground</th><th>Weight (kg)</th></tr><tr><td>DN100</td><td>664804</td><td>1.1</td></tr><tr><td>DN125</td><td>664814</td><td>1.4</td></tr><tr><td>DN150</td><td>664824</td><td>2.1</td></tr><tr><td>DN200</td><td>664834</td><td>3.3</td></tr></table>	Size	Above ground	Weight (kg)	DN100	664804	1.1	DN125	664814	1.4	DN150	664824	2.1	DN200	664834	3.3																											
Size	Above ground	Weight (kg)																																									
DN100	664804	1.1																																									
DN125	664814	1.4																																									
DN150	664824	2.1																																									
DN200	664834	3.3																																									
<p>Bellmouth gully</p> 	<table><tr><th>Size</th><th>Below ground</th><th>Weight (kg)</th></tr><tr><td>DN100/150</td><td>BG100</td><td>2.9</td></tr></table>	Size	Below ground	Weight (kg)	DN100/150	BG100	2.9																																				
Size	Below ground	Weight (kg)																																									
DN100/150	BG100	2.9																																									
<p>Puddle flange</p> 	<table><tr><th>Size</th><th>Below ground</th><th>Weight (kg)</th></tr><tr><td>DN100</td><td>PF100</td><td>4.0</td></tr><tr><td>DN150</td><td>PF150</td><td>6.0</td></tr></table>	Size	Below ground	Weight (kg)	DN100	PF100	4.0	DN150	PF150	6.0																																	
Size	Below ground	Weight (kg)																																									
DN100	PF100	4.0																																									
DN150	PF150	6.0																																									
<p>Ductile iron support bracket</p> 	<table><tr><th>Size</th><th>Above ground</th><th>Below ground</th><th>A</th><th>B</th><th>C</th><th>Weight (kg)</th></tr><tr><td>DN50</td><td>DB050</td><td></td><td>28</td><td>62</td><td>114</td><td>0.40</td></tr><tr><td>DN70</td><td>DB070</td><td></td><td>28</td><td>72</td><td>135</td><td>0.50</td></tr><tr><td>DN100</td><td>DB100</td><td>DB100BG</td><td>28</td><td>88</td><td>167</td><td>0.60</td></tr><tr><td>DN150</td><td>DB150</td><td>DB150BG</td><td>30.5</td><td>114</td><td>216</td><td>0.85</td></tr><tr><td>DN200</td><td>DB200</td><td>DB200BG</td><td>30.5</td><td>148</td><td>267</td><td>1.60</td></tr></table>	Size	Above ground	Below ground	A	B	C	Weight (kg)	DN50	DB050		28	62	114	0.40	DN70	DB070		28	72	135	0.50	DN100	DB100	DB100BG	28	88	167	0.60	DN150	DB150	DB150BG	30.5	114	216	0.85	DN200	DB200	DB200BG	30.5	148	267	1.60
Size	Above ground	Below ground	A	B	C	Weight (kg)																																					
DN50	DB050		28	62	114	0.40																																					
DN70	DB070		28	72	135	0.50																																					
DN100	DB100	DB100BG	28	88	167	0.60																																					
DN150	DB150	DB150BG	30.5	114	216	0.85																																					
DN200	DB200	DB200BG	30.5	148	267	1.60																																					
<p>‘O’ Ring rubber coupling</p> 	<table><tr><th>Size</th><th>Above ground</th></tr><tr><td>DN100</td><td>100111</td></tr><tr><td>DN125</td><td>100112</td></tr><tr><td>DN150</td><td>100113</td></tr><tr><td>DN200</td><td>100114</td></tr></table> <p>For connection from Harmer SML pipe to female end SML stoneware connector.</p>	Size	Above ground	DN100	100111	DN125	100112	DN150	100113	DN200	100114																																
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<p>‘A’ Ring rubber coupling</p> 	<table><tr><th>Size</th><th>Above ground</th></tr><tr><td>DN100</td><td>100100</td></tr><tr><td>DN125</td><td>100101</td></tr><tr><td>DN150</td><td>100102</td></tr><tr><td>DN200</td><td>100103</td></tr></table> <p>For connection to Harmer SML pipe with stoneware connector.</p>	Size	Above ground	DN100	100100	DN125	100101	DN150	100102	DN200	100103																																
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DN200	100103																																										

(1) Product codes listed in 'Above ground' and 'Below ground' columns.

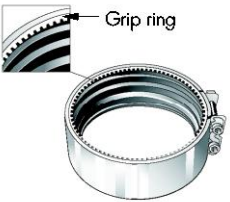
(2) DN = nominal diameter.

Figure 2 Couplings<sup>(1)(2)</sup>



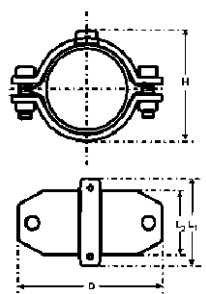
Harmer Duo  
electrical continuity clip

Size	Above ground	Below ground	Dia	Height	Width	Torque (Nm)
DN50	3140/50		69	85.0	63	3.5 to 9
DN70	3140/70		89	105.0	63	3.5 to 9
DN100	3140/100	3140/100	119	135.0	63	3.5 to 9
DN125	3140/125		144	160.0	76	3.5 to 9
DN150	3140/150	3140/150	169	185.0	76	3.5 to 9
DN200	3140/200	3140/200	221	361.0	76	3.5 to 9
DN250	3140/250	3140/250	283	458.5	147	3.5 to 9
DN300	3140/300	3140/300	335	540.0	147	3.5 to 9



Harmer Grip  
Grip ring

Size	Above ground	Dia	Height	Width	Torque (Nm)
DN50	3176/50	75	90	55	7 to 9
DN70	3176/70	95	110	55	7 to 9
DN100	3176/100	125	140	55	7 to 9
DN125	3176/125	125	165	70	7 to 9
DN150	3176/150	175	190	70	7 to 9
DN200	3176/200	220	255	70	7 to 9



Ductile cast-iron coupling

Size	Above ground	Below ground	H	D	L <sub>1</sub>	L <sub>2</sub>	Torque (Nm)	Weight (kg)
DN50	235849		79	111	50	68	Up to 25	0.6
DN70	235526		89	132	50	68	Up to 25	0.7
DN100	235537	235359	134	168	60	78	Up to 25	1.1
DN150	235358	235362	184	230	71	89	Up to 25	1.9
DN200	235527	235363	231	278	82	100	Up to 25	3.5

(1) Product codes listed in 'Above ground' and 'Below ground' columns.

(2) DN = nominal diameter.

## 2 Manufacture

2.1 The cast iron products are manufactured using specified raw materials in a cupola furnace, and poured into permanent moulds and centrifugally cast.

2.2 As part of the assessment and ongoing surveillance of product quality, the BBA has:

- agreed with the manufacturer the quality control procedures and product testing to be undertaken
- assessed and agreed the quality control operated over batches of incoming materials
- monitored the production process and verified that it is in accordance with the documented process
- evaluated the process for management of nonconformities
- checked that equipment has been properly tested and calibrated
- undertaken to carry out the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control operated by the manufacturer are being maintained.

2.3 The management system of the Certificate holder has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 by Centre For Assessment Ltd (Certificate 02/1832).

## 3 Delivery and site handling

3.1 Pipe and fittings bear the Certificate holder's (or, in the case of bought-in products, the manufacturer's) name or logo, the nominal diameter, CE marking, Standard EN 877 and a code indicating place and date of manufacture.

3.2 The system components for above-ground applications should be protected from impacts, for example from heavy vehicles such as fork-lift trucks.

3.3 The products can either be moved manually or lifted into position with mechanical plant, depending on their weight (see Table 1 and Figure 1).

## Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Harmer SML Cast Iron Drainage System Pipes, Couplings and Fittings For Above-Ground and Below-Ground Applications.

## Design Considerations

### 4 Use



4.1 Harmer SML Cast Iron Drainage System Pipes, Couplings and Fittings For Above-Ground and Below-Ground Applications are satisfactory for use in domestic, commercial and public buildings in accordance with BS EN 12056-1 : 2000, BS EN 12056-2 : 2000, BS EN 12056-3 : 2000 and BS EN 752 : 2008 for the conveyance of surface water and domestic sewage as is permitted to be discharged into public sewers by the Water Industry Act 1991, and surface water and sewage as is permitted and defined by the Sewerage (Scotland) Act 1968 and the Water and Sewerage Services (Northern Ireland) Order 2006.

4.2 This Certificate does not cover the use of any of the products for trade effluent.

### 5 Practicability of installation

The products are designed to be installed by a competent general builder, or a contractor, experienced with this type of system.

### 6 Strength



Harmer SML Cast Iron pipes, adaptors and fittings will have adequate resistance to the forms of loading associated with installation and normal service conditions, where pipes to BS EN 877 : 1999 are suitable.

### 7 Performance of joints



7.1 The joints, when correctly installed, will not be adversely affected by thermal expansion or contraction.

7.2 The joints will remain watertight under conditions of pipeline movement in excess of those expected to occur in normal good drainage practice.

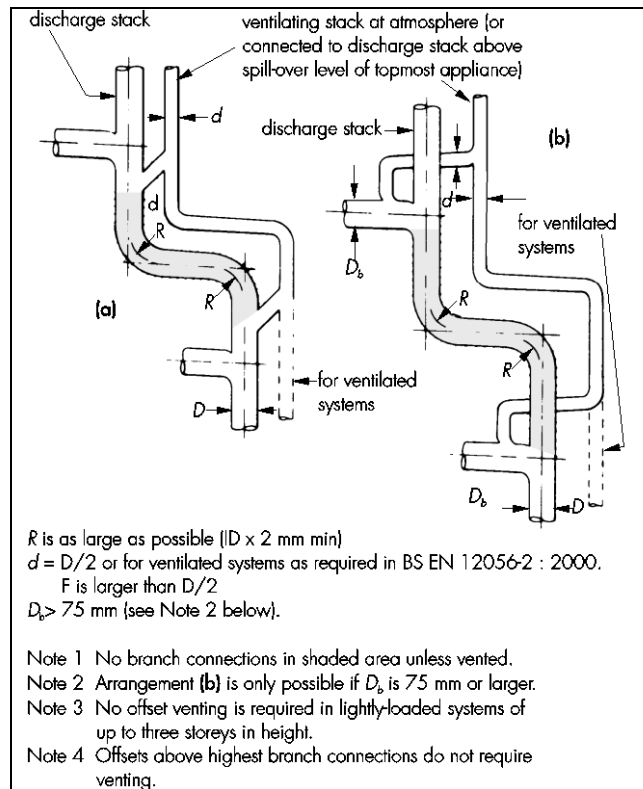
### 8 Flow characteristics



8.1 A system comprising the cast-iron pipe and fittings (including swept entry branches and other accessories) will have satisfactory flow characteristics. Non-swept branch connections are restricted in accordance with BS EN 12056-2 : 2000.

8.2 The use of offsets in the wet portion of a discharge stack should be avoided. However, if the S-bend offsets are to be fitted in this position, large radius bends should be used (see BS EN 12056-2 : 2000). A ventilation stack may be necessary above and below the offset (see Figure 3).

Figure 3 Offsets in discharge stacks



## 9 Resistance to chemicals

The products will be unaffected by the types and quantities of chemicals likely to be found in the effluents defined in section 4.1.

## 10 Resistance to elevated temperatures

The products have adequate resistance to the temperatures likely to be found in a soil and waste system designed in accordance with BS EN 877 : 1999.

## 11 Properties in relation to fire



11.1 The products are non-combustible and are classified as A1\* in accordance with BS EN 877 : 1999.

11.2 The Building Regulations concerning the prevention of fire spread, eg by fire-stopping, must be taken into account at the design stage.

11.3 In above-ground applications when greater diameters are used, special attention must be taken to confirm whether or not the system has to be encased by protective shafts or isolated between separating elements.

## 12 Noise



In common with all types of pipe materials, where the products penetrate a floor or wall separating habitable rooms, they should be installed in an enclosure to limit sound transmission.

## 13 Maintenance



13.1 Drains incorporating the products can be maintained using jetting equipment, or rodded using conventional flexible drain rods. Toothed root cutters, as used with some mechanical cleaning systems, could damage the internal coatings and should not be used.

13.2 Sections of a system can be removed and replaced. Access must be provided in accordance with BS EN 12056-2 : 2000, BS EN 12056-3 : 2000 and BS EN 752 : 2008.

## 14 Durability



When used within the conditions and recommendations given in this Certificate, the products will have a serviceable life equivalent to conventional cast-iron drainage systems. When used externally, the pipes should be painted regularly to prevent surface oxidation.

## 15 Reuse and recyclability

The cast-iron components and fittings are fully recyclable.

## Installation

### 16 General

Installation of Harmer SML Cast Iron Drainage System Pipes, Couplings and Fittings For Above-Ground Applications should be in accordance with BS EN 12056-1 : 2000, BS EN 12056-2 : 2000, BS EN 12056-3 : 2000 and BS EN 12056-5 : 2000, this Certificate and the Certificate holder's technical literature.

### 17 Procedure

#### General

17.1 Installation of Harmer SML Cast Iron Drainage System Pipes, Couplings and Fittings for Above-Ground and Below-Ground applications should be in accordance with BS EN 12056-1 : 2000, BS EN 12056-2 : 2000, BS EN 12056-3 : 2000 and BS EN 12056-5 : 2000, BS EN 752 : 2008, BS EN 1610 : 2015, Approved Document H and the Certificate holder's technical literature.

17.2 Pipes can be cut to length on site with a circular saw or abrasive disc cutter. Pipe ends should be cut square, painted and thoroughly cleaned and deburred before jointing to ensure a good sealed fit.

17.3 When tightening the coupling nuts and bolts, reference must be made to the correct torque settings specified.

#### Above-ground applications

17.4 Pipes must be adequately supported at a maximum spacing of 2 m between two bracket supports both horizontally and vertically. Moreover, the length of pipe between a bracket and a coupling should not exceed 750 mm. In buildings up to five floors, downpipes must be secured against declining by a downpipe support installed just above the basement ceiling, or by using stack pipe support brackets. In buildings higher than five floors, an additional downpipe support must be installed for every fifth floor.

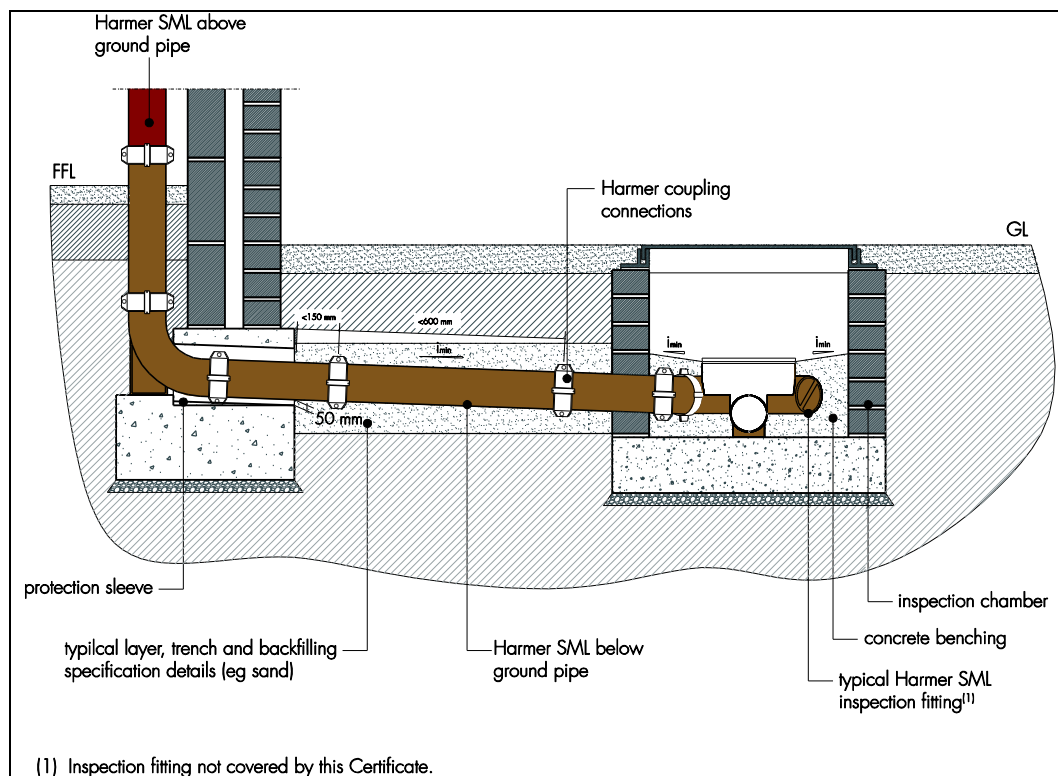
17.5 Horizontal pipes must be fastened at every change in direction or branch. To prevent pendular movement of the pipe run, a specific fixed-point bracket should be used every 10 to 15 m. The horizontal pipes must be installed at a minimum fall of 20 mm per metre in accordance with BS EN 12056-2 : 2000, and feeder pipes should be connected to the main pipe using a 45° branch in the direction of the flow. Any length of pipe with a change in direction or gradient should have adequate means for access.

## Below-ground applications

17.6 Pipes bedded in a ground trench should be laid to even gradients, ensuring a velocity higher than 0.7 m/s for self-cleaning purposes.

17.7 Where pipes will be subject to settlement (such as when built into a structure or leaving inspection chambers) two joints as close as possible to the point of exit, a maximum of 600 mm apart, should be provided to act as a rocker pipe (see Figure 4).

Figure 4 Typical buried installation



17.8 Puddle flanges should be installed where pipe passes through a structure that is below the water table, to reduce the risk of water ingress to building.

## Technical Investigations

### 18 Tests

Tests were carried out in accordance with the relevant clauses of BS EN 877 : 1999 to determine:

- resistance to elevated temperature cycling
- performance of jointing.

### 19 Investigations

19.1 An evaluation of data was made to assess:

- system design
- resistance to chemicals
- practicability of installation
- suitability of materials
- effect of crossflow
- quality of castings

- effect of elevated temperature on pressure tightness of joints
- compatibility with other paints
- flame resistance
- durability\*
- external coating for below-ground applications
- effect of elevated temperature cycling
- ease of jointing
- fitness for use below ground
- machinability.

19.2 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 752 : 2008 *Drain and sewer systems outside buildings*

BS EN 877 : 1999 + A1 : 2006 *Cast iron pipes and fittings, their joints and accessories for the evacuation of water from buildings — Requirements, test methods and quality assurance*

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

BS EN 12056-1 : 2000 *Gravity drainage systems inside buildings — General and performance requirements*

BS EN 12056-2 : 2000 *Gravity drainage systems inside buildings — Sanitary pipework, layout and calculation*

BS EN 12056-3 : 2000 *Gravity drainage systems inside buildings — Roof drainage, layout and calculation*

BS EN 12056-5 : 2000 *Gravity drainage systems inside buildings — Installation and testing, instructions for operation, maintenance and use*

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

### 20 Conditions

#### 20.1 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 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.

20.2 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.

20.3 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.

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

20.5 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.

20.6 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.