

KEY

Ductile Iron pipe & fittings



BS EN 545 – for water pipelines

BS EN 598 – for sewerage applications

by **SUNS PIPELINE COMPANY LIMITED**

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Introduction

KEY brand Ductile Iron Pipes & Fittings are manufactured by **SUNS** PIPELINES COMPANY LIMITED while **BUN KEE** has been appointed as the sole distributor in Hong Kong and Macau region.

Not only **KEY** by **SUNS** consistently delivers first & foremost the best quality products to clients, but also the most practical technical supports and honorable shipment against customer commitments with proven supplied track records.

SUNS PIPELINES COMPANY LIMITED, which is under **SUNS** industry group, was founded in 2002 with the registered capital of 400 million. **SUNS** is a member of the drafting committee of ductile iron pipe's standard GB/T13295-2013 in China, and we also produce various international standards such as ISO2531, BS EN545 , BS EN598 and ANSI/AWWAC 151 while a great variety of requirements from different end users are mostly fulfilled. **SUNS** is indeed a professional manufacturer of water-cooling ductile iron pipes and matched fittings.

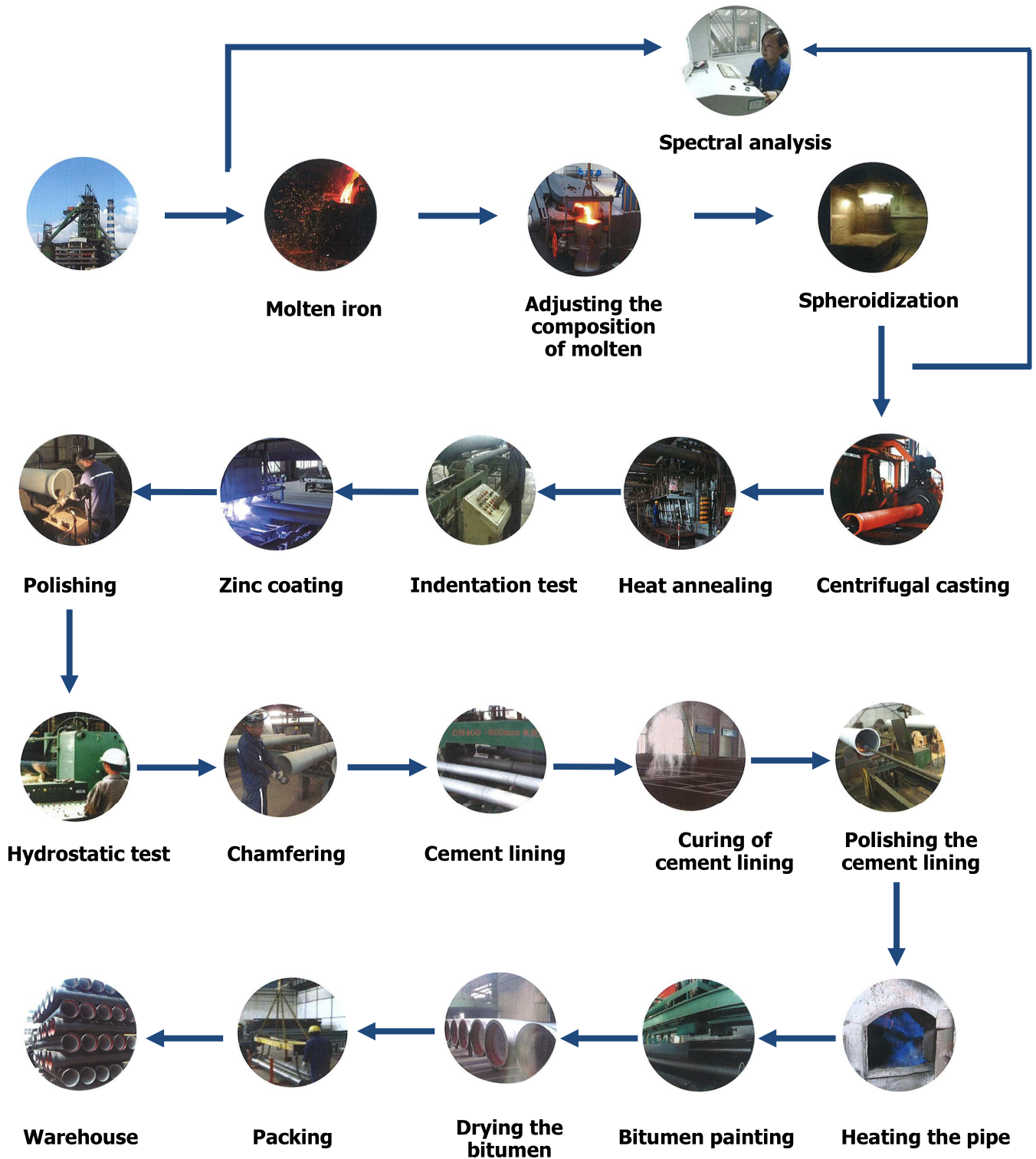
SUNS strictly perform ISO9001 international standard system on maintaining the product quality system. From raw material procurement to finished products, every little process is comprehensively controlled. **SUNS** has also been approved by many product system certification organization such as BV, WRAS, KSD and SGS. **SUNS**'s products have been widely exported to more than 50 countries and regions aboard such as America, Spain, Belgium, England, Italy, Germany, Brazil, Saudi Arabia, Syria, Iraq, Ethiopia, Singapore, Vietnam and Hongkongect.

SUNS succeed in winning the bid of products' supplier towards 2008 Beijing Olympic Games, Nanjing Youth Olympic Games, Shanghai Expo Site, Wanjiazhai diversion project and many fire protection projects. In the past ten years, **SUNS** has already established long-term good cooperation relationship with more than 1000 water utility companies of Beijing, Tianjin, Taiyuan, Shanghai Pudong Veolia and so on. Our products as well as our services have been well acknowledged and accredited by the public.



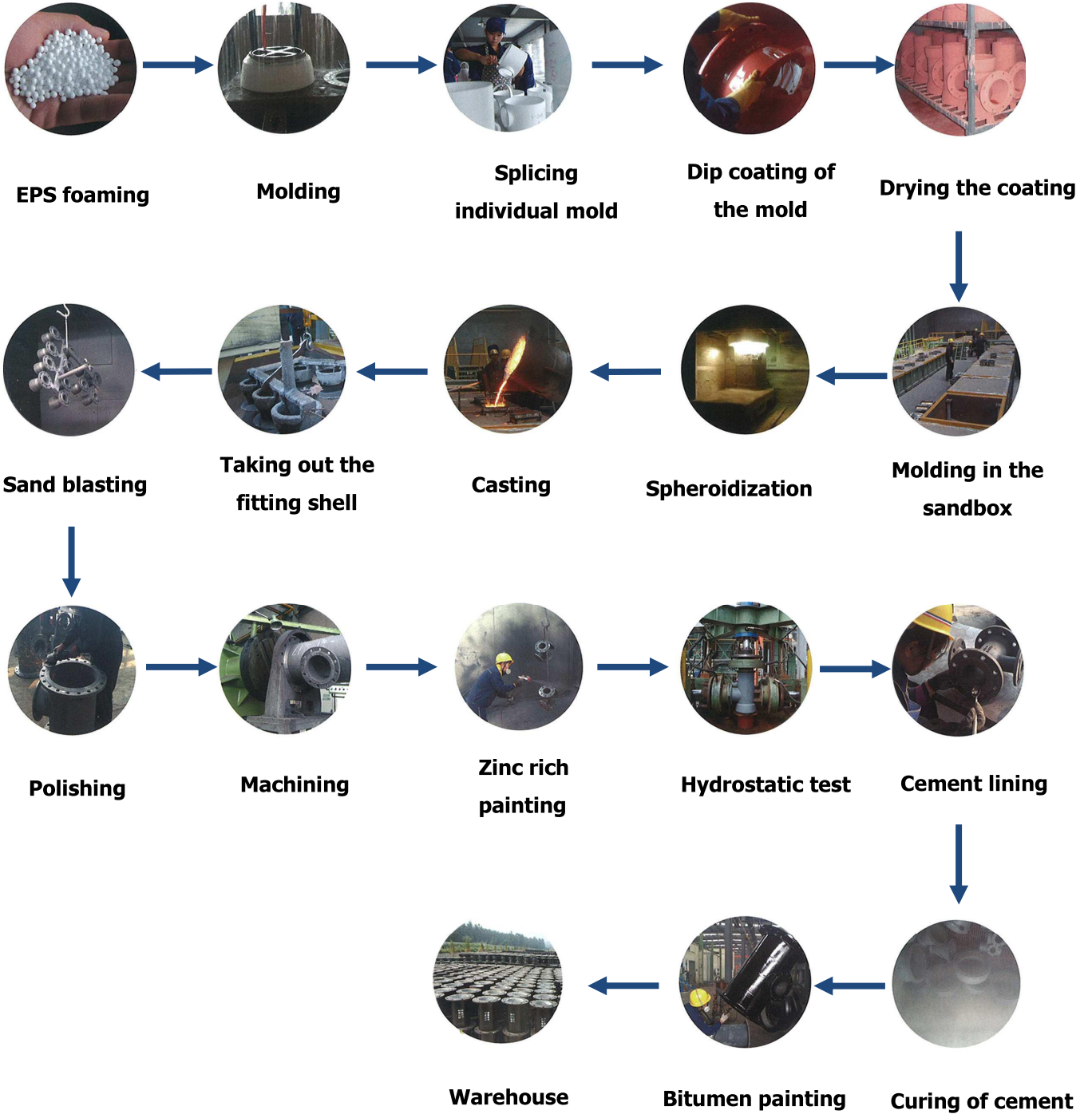
Manufacturing Process

● Ductile Iron Pipes



Manufacturing Process

● Ductile Iron Fittings



Quality Checks & Assurance

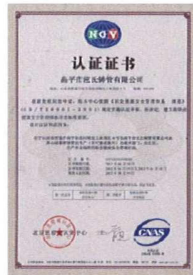
- Quality System
Self-inspection, Inspection each other, Professional inspection of the QC department, Random inspection of stock.
- 87 inspection items for each pipe.
Component analysis, Hydrostatic pressure test, Tensile / Elongation / Brinell hardness test, Wall & coating thickness test, Straightness test....etc
- The comprehensive and professional laboratory.



- Certifications



ISO9001



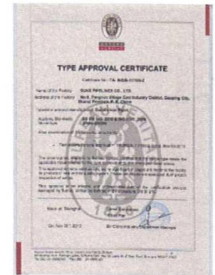
GB/T28001



ISO14001



EN545



EN598

- Advanced inspection equipments
German spectral analyzer, American electric furnace, Ultrasonic thickness tester.

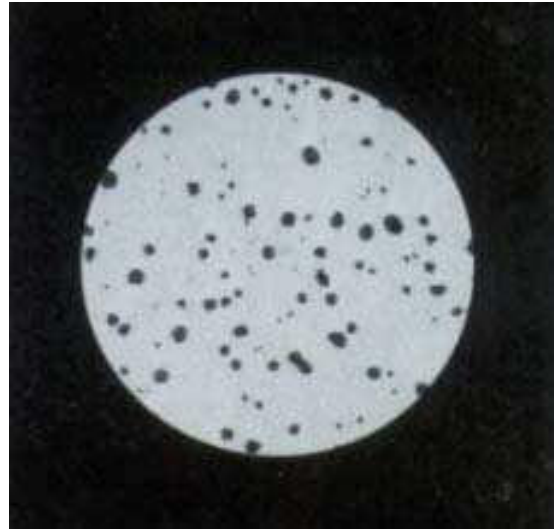


Ductile Iron Properties

Ductile iron, having various technical names while also known as ductile cast iron, nodular cast iron, spheroidal graphite cast iron (SG CI) and spherulitic graphite cast iron. Whilst most varieties of cast iron are brittle, ductile iron has higher ductility among which means having greater impact and fatigue resistance, due to its nodular graphite inclusions.



Microstructure of Cast Iron (Grey Iron)



Microstructure of Ductile Iron

The key yardstick to classify the grade between Ductile Iron to Grey Cast Iron is by comparing their Mechanical Property, namely to measure their tensile strength & elongation values.

Advantage of Ductile Iron Pipes

- High Tensile strength, good elastic module and excellent ductility, making it suitable for high stress applications where pressure surge may be experienced.
- High corrosion resistance with external metallic zinc & finishing coatings.
- Excellent hydraulic flow.
- High working pressure comparing to other types of pipes.
- Ease of installation.
- Long lifetime.
- Can accommodate ground movement.

Main applications of Ductile Iron Pipes

- Drinking and irrigation water networks.
- Sewerage networks.
- Fire fighting systems.
- Water-cooling systems including Sea-water cooling.

Material Characteristics

● Mechanical Properties

	Ductile iron pipe (Centrifugally cast) (BS EN 545)		Ductile iron pipe (Centrifugally cast) (BS EN 598)		Grey cast iron pipe	Steel pipe
Tensile strength (N/ mm ²)	≥ 420				150-260	≥ 400
Elongation (%)	DN80-1000 ≥10				Neglect	≥ 18
	DN1100-2000 ≥7					
Hardness (HB)	≤ 230				≤ 210	Approx. 140
Hydrostatic Pressure test (MPa)	DN80-300	K9 (Class 50 & above)	5.0		-	2.5-3.0
	DN350-600	K9 (Class 40 & above)	4.0			
	DN80-600	K12 (Class 50 & above)	5.0			
	DN700 & above	K9 & K12 (Class 50 & below)	5.0 (max.)			

● Chemical Composition

Chemical components	Ductile iron pipe	Grey cast iron pipe	Steel pipe
Carbon	3.5-4.0	3.2-3.8	0.1-0.2
Silicon	1.9-2.6	1.4 -2.2	0.15-0.4
Manganese	0.15-0.45	0.4 -0.6	0.3-0.6
Phosphorus	≤0.06	≤0.3	0.02-0.03
Sulfur	≤0.02	≤0.1	0.02-0.03
Magnesium	0.03-0.06	-	-

Normative References

BS EN 545	Ductile iron pipes, fittings, accessories and their joints for water pipelines.
BS EN 598	Ductile iron pipes, fittings, accessories and their joints for sewerage applications.
BS 6920	Suitability of non-metallic materials and products for use in contact with water intended for human consumption with regard to their effect on the quality of the water.
BS EN 14901	Epoxy coating (heavy duty) of ductile iron fittings and accessories.
BS EN 681-1	Elastomeric seals. Material requirements for pipe joint seals used in water and drainage applications.
BS EN ISO 6506 - 1	Metallic materials, Hardness testing, Brinell test, Part 1 : Test method.
BS EN ISO 6708	Pipe works components - Definition and selection of DN (nominal size).
BS EN 1092-2	Circular flanges for pipes, valves, fitting and accessories, PN designated – part 2: cast iron flanges.
BS EN 196 & 197-1	Cement – Determination of strength, composition, specifications and conformity criteria for common cements
BS 3416	Specification for bitumen-based coatings for cold application, suitable for use in contact with potable water.
ISO 7268	Pipe components - Definition of nominal pressure.
ISO 8179-2	Ductile iron pipes - External Zinc coating part 2 (Zinc rich paint with finishing layer)
ISO 4633	Rubber seals joint rings for water supply , drainage and sewerage pipelines (specification for materials).

Technical Specification Data

● Wall Thickness

According to BS EN 545:2002 & 2006, the nominal iron wall thickness of pipes and fittings are calculated as a function of the nominal size, DN, by the following formula, with a minimum of 5 mm for centrifugally cast pipe and 7 mm for pipes not centrifugally cast and fittings :

$$e = K (0.5 + 0.001 DN)$$

where **e** is the nominal wall thickness, in millimeters:

DN is the nominal size:

K is a coefficient used for thickness class designation. It is selected from a series of whole numbers: 7, 8, 9,10,11,12...

Referring to the latest BSEN 545:2010, the minimum iron wall thickness of pipes is given as a function of the nominal size, DN, and pressure class C, in table 16 and 17 of BSEN 545:2010

In general, all Ductile Iron Pipes & Fittings under **KEY** brand are fully in compliance with BSEN 545:2002, BSEN 545:2006, and BSEN 545:2010 respectively.

● Allowable Pressures

- Socket & Spigot Joint :

Remarks (Socket & Spigot Joint also named as Flexible Joint, Tyton Joint & Push-in Joint)

The maximum values of **PFA**, **PMA** and **PEA** are calculated as follows:

- a) Allowable Operating Pressure (**PFA**) - Internal pressure, excluding surge, which the pipeline can safely withstand in permanent service.

$$= \frac{20 \times e_{\min} (\text{min. pipe wall thickness in mm}) \times 420 (\text{min. tensile strength of DI})}{(DE - e_{\min}) \times 3 (\text{safety factor})}$$

- b) Allowable Maximum Operating Pressure (**PMA**) - Maximum internal pressure including surge, which the pipeline can safely withstand in service.

$$= 1.2 \times \text{PFA}$$

- c) Allowable Test Pressure (**PEA**) - Maximum hydrostatic pressure applied on site to a newly installed pipeline, for a relatively short duration

$$= \text{PMA} + 5 \text{ bar}$$

Technical Specification Data

● Allowable Pressures

- Flanged joint :

Nominal Diameter (DN)	PN16			PN25			PN40		
	PFA	PMA	PEA	PFA	PMA	PEA	PFA	PMA	PEA
80	16	20	25	40	48	53	40	48	53
100 to 600				25	30	35			
700 to 2000				-	-	-			

● Operation Temperature

Suitable for fluid temperatures between 0°C to 50°C, excluding frost.

● Straightness of Pipe

Pipes have a maximum deviation of 0.125% of their pipe length.

● Angular Deflection for Flexible Joints

(Socket & Spigot Joint / Push-In Joint / Push-on Joint)

The allowable angular deflection on each flexible joint is listed below

- 4° for DN80 to DN300 (per 6M Length)
- 3° for DN350 to DN600 (per 6M Length)
- 2° for DN700 & above (per 6M Length)

● Permissible Straight Draw for Flexible Joints (Axial Movement)

Flexible joints for pipes and fittings are designed to accommodate sufficient axial movement where the allowable minimum withdrawal is 38mm when there is no angular deflection of the joint.

Coatings & Linings

● Coatings & Linings

options are provided as follows upon different applications and requirements:

A) External Coating:

- Metallic Zinc coating with BITUMEN finishing layer ;
- Metallic Zinc coating with EPOXY finishing layer ;
- Zinc Rich Paint with BITUMEN finishing layer (Fittings ONLY)

[Optional coating upon request]

- Metallic zinc with a coat of etching primer and epoxy top coat ;
- Zinc-aluminum coating with finishing layer ;
- Extruded Polyethylene (PE) coating in accordance with BS EN14628 ;
- Polyurethane (PU) coating in accordance with BS EN15189 ;
- Fusion Bonded Epoxy to BS 6920 ;
- Fusion Bonded Epoxy to BS EN14901 ;
- Zinc Rich Paint with Epoxy finishing layer (Fittings ONLY) ;
- Optional sleeving : proprietary type Polyethylene sleeving as a supplement

B) Internal Linings:

- Sulphate-Resistant Cement mortar lining (SRC) ;
- High Alumina Cement mortar lining (HAC) (For Drainage & Sewage Application);

[Optional lining upon request]

- Sulphate-Resistant Cement mortar lining with epoxy seal coat to BS6920 ;
- Polyurethane (PU) lining in accordance with BS EN15655 ;
- Fusion Bonded Epoxy to BS 6920 ;
- Fusion Bonded Epoxy to BS EN14901 ;

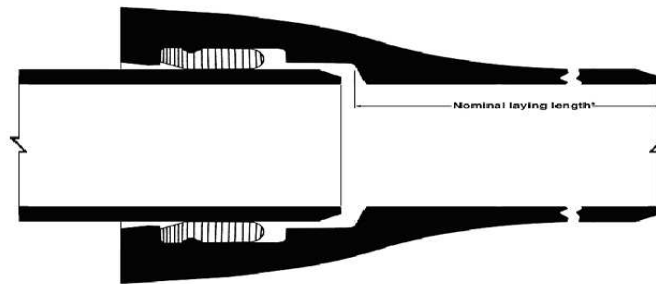
Technical Specification Data

● Jointing Methods

- Flexible Joint

(also named as Socket & Spigot Joint, Push-In Joint, Push-On Joint)

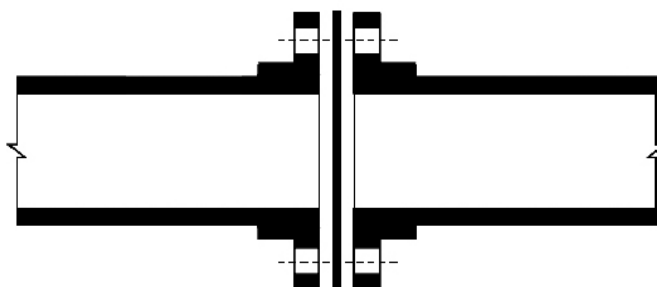
The most popular, quickest, and easiest-to-assemble joint for Ductile Iron pipe-lines while mainly adopted for underground water supply and gravity sewage applications. For accommodation of angular deflection, this joint consists of a single rubber gasket placed in a groove inside the socket end of the pipe. After lubricating the jointing areas in accordance with the manufacturer's instructions, the spigot end of the pipe is being pushed to insert while a pressure-tight and dependable seal is formed by means of the gasket. Proper anchorages shall be applied whilst flexible joint is non-restrained.



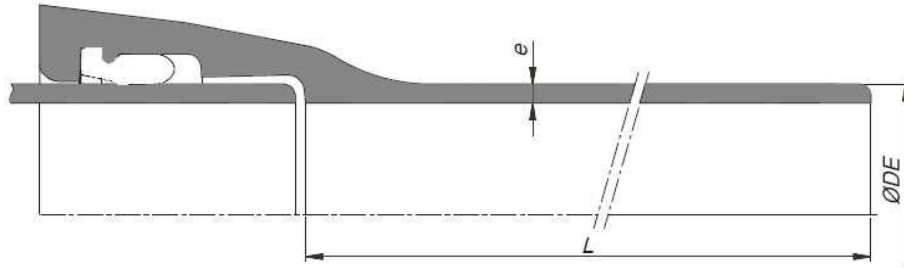
- Flanged Joint

(Cast-on Flanged Joint, Weld-on Flanged Joint, Screw-on Flanged Joint)

Flanged joint is generally utilized for above ground exposed pipeworks including water mains, fire mains, rising mains, air, oil and/or other liquids where rigid, restrained joints are needed. It is widely used in industrial piping systems such as water treatment plants, sewerage treatment plants and other interior pipe-works. The flanges have a machined raised face and drilled holes of whose can be attached by screw-on, cast-on or factory welded.



Dimensions of Pipes BSEN 545:2010 Pressure Class K9



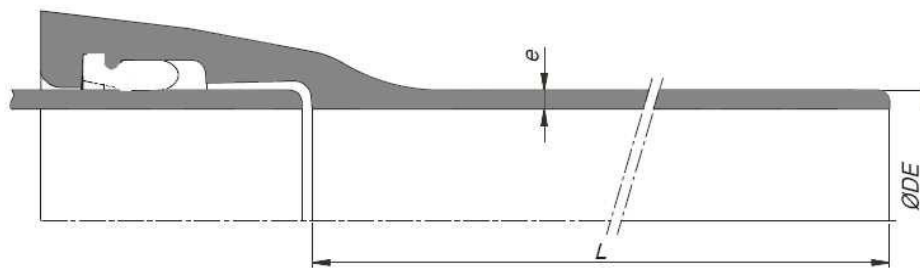
Model No. P5-09

DN	External Diameter DE (mm)		Minimum wall thickness e (mm)							K9	L = 6M	Approx. Mass kg/M (K9)
	Nominal	Limit Deviations	Class 25	Class 30	Class 40	Class 50	Class 64	Class 100				
80	98	+1 / -2.7							4.7	6.0 ^{-1.30}	12.80	
100	118	+1 / -2.8							4.7	6.0 ^{-1.30}	15.80	
150	170	+1 / -2.9							4.0	6.0 ^{-1.30}	24.00	
200	222	+1 / -3.0					3.9			6.3 ^{-1.50}	32.30	
250	274	+1 / -3.1					4.8			6.8 ^{-1.55}	42.50	
300	326	+1 / -3.3				4.6				7.2 ^{-1.60}	50.50	
350	378	+1 / -3.4				5.3				7.7 ^{-1.65}	67.10	
400	429	+1 / -3.5				6.0				8.1 ^{-1.70}	80.30	
450	480	+1 / -3.6				6.8				8.6 ^{-1.75}	96.10	
500	532	+1 / -3.8			5.6					9.0 ^{-1.80}	111.50	
600	635	+1 / -4.0			6.7					9.9 ^{-1.90}	147.00	
700	738	+1 / -4.3			7.8					10.8 ^{-2.00}	187.10	
800	842	+1 / -4.5			8.9					11.7 ^{-2.10}	232.30	
900	945	+1 / -4.8			10.0					12.6 ^{-2.20}	281.80	
1000	1048	+1 / -5.0			11.1					13.5 ^{-2.30}	336.10	
1100	1152	+1 / -6.0			12.0					14.4 ^{-2.40}	395.30	
1200	1255	+1 / -5.8	11.1							15.3 ^{-2.50}	459.60	
1400	1462	+1 / -6.6	12.9							17.1 ^{-2.70}	611.50	
1500	1565	+1 / -7.0	13.9							18.0 ^{-2.80}	695.80	
1600	1668	+1 / -7.4	14.8							18.9 ^{-2.90}	778.00	
1800	1875	+1 / -8.2	16.6							20.7 ^{-3.10}	967.10	

Dimensions of socket & spigot pipes comply with preferred pressure class (table 16) of BSEN 545:2010 standards, also comply with BSEN 545:2006 & BSEN 545:2002 versions

Pipes are supplied in unique standard length of 6.0 metres (limited deviation of +70 / -30 mm), length of pipes other than 6M may be supplied by agreement between the purchaser and manufacturer

Dimensions of Pipes BSEN 545:2010 Pressure Class K12



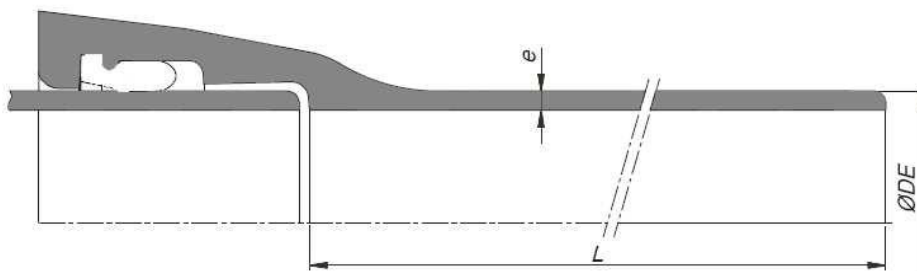
Model No. P5-12

DN	External Diameter DE (mm)		Minimum wall thickness e (mm)					K12	L = 6M	Approx. Mass kg/M (K12)
	Nominal	Limit Deviations	Class 30	Class 40	Class 50	Class 64	Class 100			
80	98	+1 / -2.7					4.7	7.0 ^{-1.38}	14.60	
100	118	+1 / -2.8					4.7	7.2 ^{-1.40}	18.50	
150	170	+1 / -2.9					5.9	7.8 ^{-1.45}	29.10	
200	222	+1 / -3.0				5.0		8.4 ^{-1.50}	41.50	
250	274	+1 / -3.1				6.1		9.0 ^{-1.55}	55.30	
300	326	+1 / -3.3			5.7	7.3		9.6 ^{-1.60}	70.30	
350	378	+1 / -3.4			6.6	8.5		10.2 ^{-1.65}	87.00	
400	429	+1 / -3.5			7.5			10.8 ^{-1.70}	104.80	
450	480	+1 / -3.6			8.4			11.4 ^{-1.75}	124.60	
500	532	+1 / -3.8			9.3			12.0 ^{-1.80}	145.10	
600	635	+1 / -4.0			11.1			13.2 ^{-1.90}	191.80	
700	738	+1 / -4.3		10.4				14.4 ^{-2.00}	244.10	
800	842	+1 / -4.5		11.9				15.6 ^{-2.10}	303.10	
900	945	+1 / -4.8		13.3				16.8 ^{-2.20}	366.60	
1000	1048	+1 / -5.0		14.8				18.0 ^{-2.30}	437.80	
1100	1152	+1 / -6.0		16.2				19.2 ^{-2.40}	514.10	
1200	1255	+1 / -5.8		17.7				20.4 ^{-2.50}	597.50	
1400	1462	+1 / -6.6	15.5					22.8 ^{-2.70}	791.00	
1500	1565	+1 / -7.0	16.6					24.0 ^{-2.80}	898.10	
1600	1668	+1 / -7.4	17.7					25.2 ^{-2.90}	1004.50	
1800	1875	+1 / -8.2	19.9					27.6 ^{-3.10}	1246.30	

Dimensions of socket & spigot pipes comply with preferred pressure class (table 16) of BSEN 545:2010 standard, also comply with BSEN 545:2006 & BSEN 545:2002 versions

Pipes are supplied in unique standard length of 6.0 metres (limited deviation of +70 / -30 mm), length of pipes other than 6M may be supplied by agreement between the purchaser and manufacturer

Dimensions of Pipes BSEN 598:2007 +A1 2009



DN	External Diameter DE (mm)		Minimum wall thickness e (mm)			L = 6M Approx. Mass kg/M (K12)
	Nominal	Limit Deviations	Pressure Pipes	K9	K12	
80	98	+1 / -2.7	4.8 ^{-1.3}	6.0 ^{-1.30}	7.0 ^{-1.38}	14.60
100	118	+1 / -2.8	4.8 ^{-1.3}	6.0 ^{-1.30}	7.2 ^{-1.40}	18.50
150	170	+1 / -2.9	4.8 ^{-1.3}	6.0 ^{-1.30}	7.8 ^{-1.45}	29.10
200	222	+1 / -3.0	4.9 ^{-1.3}	6.3 ^{-1.50}	8.4 ^{-1.50}	41.50
250	274	+1 / -3.1	5.3 ^{-1.3}	6.8 ^{-1.55}	9.0 ^{-1.55}	55.30
300	326	+1 / -3.3	5.6 ^{-1.6}	7.2 ^{-1.60}	9.6 ^{-1.60}	70.30
350	378	+1 / -3.4	6.0 ^{-1.7}	7.7 ^{-1.65}	10.2 ^{-1.65}	87.00
400	429	+1 / -3.5	6.3 ^{-1.7}	8.1 ^{-1.70}	10.8 ^{-1.70}	104.80
450	480	+1 / -3.6	6.7 ^{-1.8}	8.6 ^{-1.75}	11.4 ^{-1.75}	124.60
500	532	+1 / -3.8	7.0 ^{-1.8}	9.0 ^{-1.80}	12.0 ^{-1.80}	145.10
600	635	+1 / -4.0	7.7 ^{-1.9}	9.9 ^{-1.90}	13.2 ^{-1.90}	191.80
700	738	+1 / -4.3	9.6 ^{-2.0}	10.8 ^{-2.00}	14.4 ^{-2.00}	244.10
800	842	+1 / -4.5	10.4 ^{-2.1}	11.7 ^{-2.10}	15.6 ^{-2.10}	303.10
900	945	+1 / -4.8	11.2 ^{-2.2}	12.6 ^{-2.20}	16.8 ^{-2.20}	366.60
1000	1048	+1 / -5.0	12.0 ^{-2.3}	13.5 ^{-2.30}	18.0 ^{-2.30}	437.80
1100	1152	+1 / -6.0	14.4 ^{-2.4}	14.4 ^{-2.40}	19.2 ^{-2.40}	514.10
1200	1255	+1 / -5.8	15.3 ^{-2.5}	15.3 ^{-2.50}	20.4 ^{-2.50}	597.50
1400	1462	+1 / -6.6	17.1 ^{-2.7}	17.1 ^{-2.70}	22.8 ^{-2.70}	791.00
1500	1565	+1 / -7.0	17.9 ^{-2.8}	18.0 ^{-2.80}	24.0 ^{-2.80}	898.10
1600	1668	+1 / -7.4	18.9 ^{-2.9}	18.9 ^{-2.90}	25.2 ^{-2.90}	1004.50
1800	1875	+1 / -8.2	20.7 ^{-3.1}	20.7 ^{-3.10}	27.6 ^{-3.10}	1246.30

Dimensions of socket & spigot pipes comply with preferred pressure class (table 11) of BSEN 598:2007+A1:2009 standard, also comply with BSEN 598:1995 version

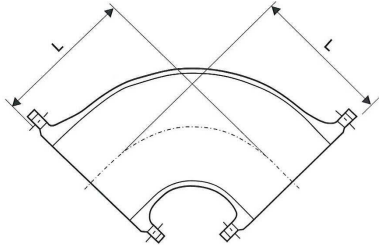
Pipes are supplied in unique standard length of 6.0 metres (limited deviation of +70 / -30 mm), length of pipes other than 6M may be supplied by agreement between the purchaser and manufacturer

Dimensions of Fittings

Flanged fittings are typically equipped with PN16 flanges (PN10, PN25 & PN40 are also available upon request)

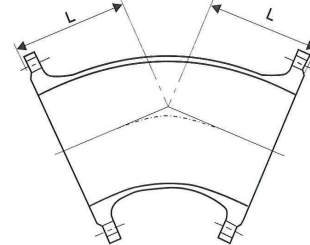
Limit deviations on lengths for fittings in socketed joints = $\pm 20\text{mm}$; flanged joints = $\pm 10\text{mm}$

Double Flanged 90° Bend



DN (mm)	L (mm)
80	165
100	180
150	220
200	260
250	350
300	400
350	450
400	500
450	550
500	600
600	700
700	800
800	900
900	1000
1000	1100
# 1100	1200
# 1200	1300
# 1400	1350
# 1500	1400
# 1600	1450

Double Flanged 45° Bend



DN (mm)	L (mm)
80	130
100	140
150	160
200	180
250	350
300	400
350	298
400	324
450	350
500	375
600	426
700	478
800	529
900	581
1000	632
1100	694
1200	750
1400	775
1500	810
1600	845
1800	910
2000	980

Manufacturer's design length :

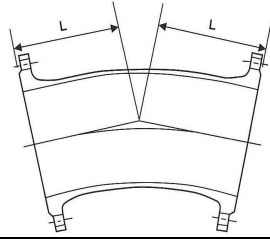
Lengths for # items will be supplied according to manufacturer's design length when BSEN545 (Series A) and/or BSEN598 Standards do not govern the length of these items

△ **Manufacturer's design length :**

Fittings in other lengths also available by agreement between manufacturer and purchaser

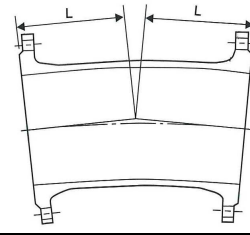
Dimensions of fittings as shown in this catalogue will be subject to manufacturer's final option

Double Flanged 22.5° Bend



	DN (mm)	L (mm)
	80	105
Δ	80	<i>130</i>
	100	110
Δ	100	<i>140</i>
	150	109
Δ	150	<i>160</i>
	200	131
Δ	200	<i>180</i>
	250	190
Δ	250	<i>350</i>
	300	210
Δ	300	<i>400</i>
	350	210
	400	239
Δ	400	<i>324</i>
#	450	<i>349</i>
#	500	<i>375</i>
#	600	<i>426</i>
#	700	<i>478</i>
#	800	<i>529</i>
#	900	<i>581</i>
#	1000	<i>632</i>
#	1100	<i>683</i>
#	1200	<i>735</i>
#	1400	<i>835</i>
#	1500	<i>885</i>
#	1600	<i>940</i>

Double Flanged 11.25° Bend



	DN (mm)	L (mm)
	80	113
Δ	80	<i>130</i>
	100	115
Δ	100	<i>140</i>
	150	113
Δ	150	<i>160</i>
	200	132
Δ	200	<i>180</i>
	250	165
Δ	250	<i>350</i>
	300	175
Δ	300	<i>400</i>
	350	191
Δ	350	<i>298</i>
	400	205
Δ	400	<i>324</i>
#	450	<i>349</i>
#	500	<i>375</i>
#	600	<i>426</i>
#	700	<i>478</i>
#	800	<i>529</i>
#	900	<i>581</i>
#	1000	<i>632</i>
#	1100	<i>683</i>
#	1200	<i>735</i>
#	1400	<i>835</i>
#	1500	<i>885</i>
#	1600	<i>940</i>

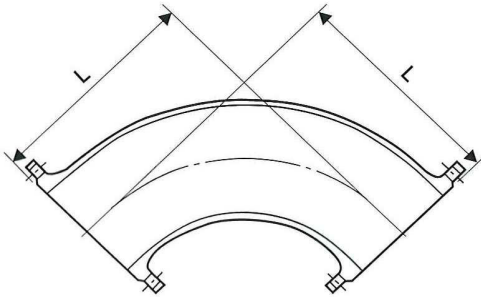
Manufacturer's design length :

Lengths for # items will be supplied according to manufacturer's design length when BSEN545 (Series A) and/or BSEN598 Standards do not govern the length of these items

Δ **Manufacturer's design length :**

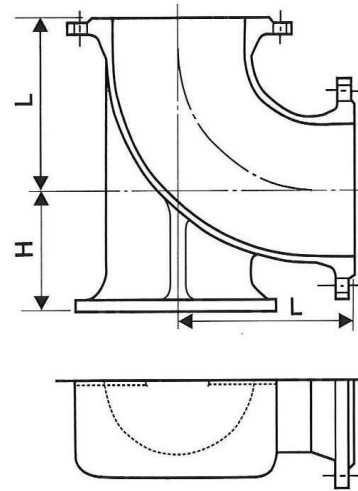
Fittings in other lengths also available by agreement between manufacturer and purchaser
Dimensions of fittings as shown in this catalogue will be subject to manufacturer's final option

Double Flanged 90° Long Radius Bend



	DN (mm)	L (mm)	R (mm)
#	80	380	330
#	100	400	340
#	150	450	385
#	200	500	430
#	250	550	475
#	300	600	515
#	350	650	560
#	400	700	605
#	450	750	650
#	500	800	690
#	600	900	780

Double Flanged 90° Duckfoot Bend



	DN (mm)	L (mm)	H (mm)
#	80	165	110
#	100	180	125
#	150	220	160
#	200	260	190
#	250	350	225
#	300	400	255
#	350	450	290
#	400	500	320
#	450	550	355
#	500	600	385
#	600	700	450
#	700	800	515
#	800	900	580
#	900	1000	645
#	1000	1100	710
#	1100	1200	775
#	1200	1300	840

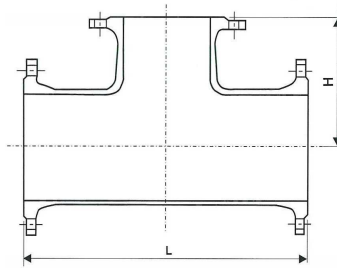
Manufacturer's design length :

Lengths for # items will be supplied according to manufacturer's design length when BSEN545 (Series A) and/or BSEN598 Standards do not govern the length of these items

△ **Manufacturer's design length :**

Fittings in other lengths also available by agreement between manufacturer and purchaser
Dimensions of fittings as shown in this catalogue will be subject to manufacturer's final option

All Flanged Tee



#	DN (mm)	L (mm)	H (mm)
		Body	Branch
#	80 x 50	320	160
#	80 x 65	330	165
	80 x 80	330	165
#	100 x 50	360	170
#	100 x 65	360	170
	100 x 80	360	175
	100 x 100	360	180
#	150 x 50	300	195
	150 x 80	440	205
	150 x 100	440	210
	150 x 150	440	220
#	200 x 50	365	215
	200 x 80	520	235
	200 x 100	520	240
	200 x 150	520	250
	200 x 200	520	260
#	250 x 80	700	265
	250 x 100	700	275
#	250 x 150	700	300
	250 x 200	700	325
	250 x 250	700	350
#	300 x 80	800	290
	300 x 100	800	300
#	300 x 150	800	325
	300 x 200	800	350
#	300 x 250	800	375
	300 x 300	800	400
#	350 x 80	850	325
	350 x 100	850	325

#	DN (mm)	L (mm)	H (mm)
		Body	Branch
#	350 x 150	850	325
	350 x 200	850	325
#	350 x 250	850	325
	350 x 350	850	425
#	400 x 80	900	350
	400 x 100	900	350
#	400 x 150	900	350
	400 x 200	900	350
#	400 x 250	900	350
#	400 x 300	900	450
	400 x 400	900	450
	450 x 100	950	375
#	450 x 150	950	375
	450 x 200	950	375
#	450 x 250	950	375
#	450 x 300	950	475
#	450 x 400	950	475
	450 x 450	950	475
#	500 x 80	1000	400
	500 x 100	1000	400
#	500 x 150	1000	400
	500 x 200	1000	400
#	500 x 250	1000	400
#	500 x 300	1000	500
#	500 x 350	1000	500
	500 x 400	1000	500
#	500 x 450	1000	500
	500 x 500	1000	500
#	600 x 80	1100	450

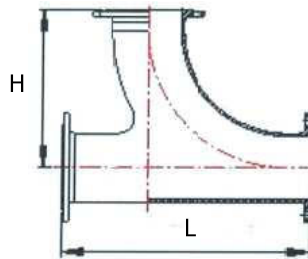
#	DN (mm)	L (mm)	H (mm)
		Body	Banch
#	600 x 100	1100	450
#	600 x 150	1100	450
#	600 x 200	1100	450
#	600 x 250	1100	450
#	600 x 300	1100	550
#	600 x 350	1100	550
#	600 x 400	1100	550
#	600 x 450	1100	550
#	600 x 500	1100	550
#	600 x 600	1100	550
#	700 x 80	518	507
#	700 x 100	540	510
#	700 x 150	595	518
#	700 x 200	650	525
#	700 x 250	705	533
#	700 x 300	760	540
#	700 x 350	815	548
#	700 x 400	870	555
#	700 x 450	925	563
#	700 x 500	980	570
#	700 x 600	1200	585
#	700 x 700	1200	600
#	800 x 80	558	567
#	800 x 100	580	570
#	800 x 150	635	578
#	800 x 200	690	585
#	800 x 250	745	593
#	800 x 300	800	600
#	800 x 350	855	608
#	800 x 400	910	615
#	800 x 450	965	623
#	800 x 500	1020	630
#	800 x 600	1350	645
#	800 x 700	1350	660
#	800 x 800	1350	675

#	DN (mm)	L (mm)	H (mm)
		Body	Banch
#	900 x 80	598	627
#	900 x 100	620	630
#	900 x 150	675	640
#	900 x 200	730	645
#	900 x 250	785	655
#	900 x 300	840	660
#	900 x 350	895	670
#	900 x 400	950	675
#	900 x 450	1005	685
#	900 x 500	1060	690
#	900 x 600	1500	705
#	900 x 700	1500	720
#	900 x 800	1500	735
#	900 x 900	1500	750
#	1000 x 80	638	685
#	1000 x 100	660	690
#	1000 x 150	715	700
#	1000 x 200	770	705
#	1000 x 250	825	715
#	1000 x 300	880	720
#	1000 x 350	935	730
#	1000 x 400	990	735
#	1000 x 450	1045	745
#	1000 x 500	1100	750
#	1000 x 600	1650	765
#	1000 x 700	1650	780
#	1000 x 800	1650	795
#	1000 x 900	1650	810
#	1000 x 1000	1650	825
#	1100 x 400	980	795
#	1100 x 600	1210	825
#	1200 x 80	635	805
#	1200 x 100	660	810
#	1200 x 150	715	820
#	1200 x 200	775	825

#	DN (mm)	L (mm)	H (mm)
		Body	Banch
#	1200 x 250	830	835
#	1200 x 300	890	840
#	1200 x 350	950	850
#	1200 x 400	1005	855
#	1200 x 450	1065	865
#	1200 x 500	1120	870
#	1200 x 600	1240	885
#	1200 x 700	1355	900
#	1200 x 800	1470	915
#	1200 x 900	1585	930
#	1200 x 1000	1700	945
#	1200 x 1100	1820	960
#	1200 x 1200	1935	975
#	1400 x 80	945	900
#	1400 x 100	970	905
#	1400 x 150	1030	915
#	1400 x 200	1085	920
#	1400 x 250	1145	930
#	1400 x 300	1200	935
#	1400 x 350	1260	945
#	1400 x 400	1320	950
#	1400 x 450	1375	960
#	1400 x 500	1435	965
#	1400 x 600	1550	980
#	1400 x 700	1665	995

#	DN (mm)	L (mm)	H (mm)
		Body	Banch
#	1400 x 800	1760	1010
#	1400 x 900	1900	1025
#	1400 x 1000	2015	1040
#	1400 x 1100	2130	1055
#	1400 x 1200	2245	1070
#	1400 x 1400	2480	1100
#	1500 x 600	1575	1035
#	1500 x 800	1810	1065
#	1500 x 1000	2040	1095
#	1600 x 100	1020	1015
#	1600 x 200	1135	1030
#	1600 x 400	1370	1060
#	1600 x 600	1600	1090
#	1600 x 800	1835	1120
#	1600 x 1000	2065	1150
#	1600 x 1200	2300	1180
#	1600 x 1400	2530	1210
#	1600 x 1600	2760	1240
#	1800 x 600	1655	1200
#	1800 x 800	1885	1230
#	1800 x 1000	2120	1260
#	1800 x 1200	2350	1290
#	2000 x 600	1705	1310
#	2000 x 1000	2170	1370
#	2000 x 1400	2635	1430

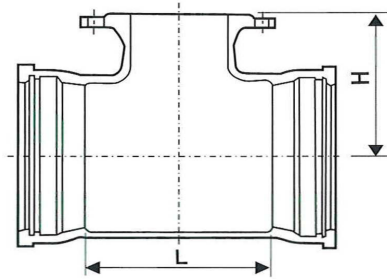
All Flanged Radial Tee



#	DN (mm)	L (mm)	H (mm)
		Body	Banch
#	80 x 80	545	380
#	100 x 100	580	400

#	DN (mm)	L (mm)	H (mm)
		Body	Banch
#	150 x 150	670	450

Double Socket Tee with Flanged Branch



	DN (mm)	L (mm)	H (mm)
		Body	Branch
#	80 x 50	170	155
#	80 x 80	170	165
Δ	80 x 80	185	185
#	100 x 50	185	195
#	100 x 80	170	175
Δ	100 x 80	185	195
#	100 x 100	190	180
Δ	100 x 100	210	200
#	150 x 50	190	220
#	150 x 80	170	205
#	150 x 100	195	210
Δ	150 x 100	210	230
#	150 x 150	255	220
Δ	150 x 150	270	245
#	200 x 80	175	235
#	200 x 100	200	240
Δ	200 x 100	215	255
#	200 x 150	255	250
Δ	200 x 150	270	270
#	200 x 200	315	260
Δ	200 x 200	330	275
#	250 x 80	180	265
#	250 x 100	200	270
#	250 x 150	260	280
#	250 x 200	315	290
#	250 x 250	375	300
Δ	250 x 250	390	320
#	300 x 80	180	295
#	300 x 100	205	300
#	300 x 150	260	310

	DN (mm)	L (mm)	H (mm)
		Body	Branch
#	300 x 200	320	320
#	300 x 250	375	330
#	300 x 300	435	340
#	350 x 80	185	325
#	350 x 100	205	330
#	350 x 150	265	340
#	350 x 200	325	350
#	350 x 250	380	360
#	350 x 350	495	380
#	400 x 80	185	355
#	400 x 100	210	360
#	400 x 150	270	370
#	400 x 200	325	380
#	400 x 250	385	390
#	400 x 300	440	400
#	400 x 400	560	420
#	450 x 100	215	390
#	450 x 150	270	400
#	450 x 200	330	410
#	450 x 250	390	420
#	450 x 300	445	430
#	450 x 400	560	450
#	450 x 450	620	460
#	500 x 80	205	415
#	500 x 100	215	420
#	500 x 150	275	430
#	500 x 200	330	440
#	500 x 250	390	450
#	500 x 300	450	460
#	500 x 350	505	470

	DN (mm)	L (mm)	H (mm)
		Body	Banch
	500 x 400	565	480
#	500 x 450	620	490
	500 x 500	680	500
#	600 x 80	200	475
#	600 x 100	220	480
#	600 x 150	280	490
	600 x 200	340	500
#	600 x 250	395	510
#	600 x 300	455	520
#	600 x 350	510	530
	600 x 400	570	540
#	600 x 450	630	550
#	600 x 500	685	560
	600 x 600	800	580
#	700 x 80	225	505
#	700 x 100	230	510
#	700 x 150	285	520
	700 x 200	345	525
#	700 x 250	400	535
#	700 x 300	460	540
#	700 x 350	520	550
	700 x 400	575	555
#	700 x 450	635	565
#	700 x 500	690	570
#	700 x 600	810	585
	700 x 700	925	600
#	800 x 80	250	565
#	800 x 100	270	570
#	800 x 150	330	580
	800 x 200	350	585
#	800 x 250	410	595
#	800 x 300	465	600
#	800 x 350	525	610
	800 x 400	580	615
#	800 x 450	640	625
#	800 x 500	700	630

	DN (mm)	L (mm)	H (mm)
		Body	Banch
	800 x 600	1045	645
#	800 x 700	930	660
	800 x 800	1045	675
#	900 x 80	255	625
#	900 x 100	270	630
#	900 x 150	320	640
	900 x 200	355	645
#	900 x 250	415	655
#	900 x 300	470	660
#	900 x 350	530	670
	900 x 400	590	675
#	900 x 450	645	685
#	900 x 500	705	690
	900 x 600	1170	705
#	900 x 700	935	720
#	900 x 800	1050	735
	900 x 900	1170	750
#	1000 x 80	260	685
#	1000 x 100	280	690
#	1000 x 150	335	700
	1000 x 200	360	705
#	1000 x 250	420	715
#	1000 x 300	480	720
#	1000 x 350	535	730
	1000 x 400	595	735
#	1000 x 450	650	745
#	1000 x 500	710	750
	1000 x 600	1290	765
#	1000 x 700	940	780
#	1000 x 800	1060	795
#	1000 x 900	1175	810
	1000 x 1000	1290	825
#	1100 x 80	260	745
#	1100 x 100	280	750
#	1100 x 150	330	760
#	1100 x 200	380	765

#	DN (mm)	L (mm)	H (mm)
		Body	Banch
#	1100 x 250	425	775
#	1100 x 300	485	780
#	1100 x 350	540	788
#	1100 x 400	600	795
#	1100 x 450	660	805
#	1100 x 500	715	810
#	1100 x 600	830	825
#	1100 x 700	950	840
#	1100 x 800	1065	855
#	1100 x 900	1180	870
#	1100 x 1000	1295	885
#	1100 x 1100	1410	900
#	1200 x 80	255	805
#	1200 x 100	280	810
#	1200 x 150	335	820
#	1200 x 200	375	825
#	1200 x 250	430	835
#	1200 x 300	490	840
#	1200 x 350	550	848
#	1200 x 400	605	855
#	1200 x 450	665	865
#	1200 x 500	720	870
#	1200 x 600	840	885
#	1200 x 700	955	900
#	1200 x 800	1070	915
#	1200 x 900	1185	930
#	1200 x 1000	1300	945
#	1200 x 1100	1420	960
#	1200 x 1200	1535	975

#	DN (mm)	L (mm)	H (mm)
		Body	Banch
#	1400 x 80	425	900
#	1400 x 100	450	905
#	1400 x 150	510	915
#	1400 x 200	565	920
#	1400 x 250	625	930
#	1400 x 300	680	935
#	1400 x 350	740	945
#	1400 x 400	800	950
#	1400 x 450	855	960
#	1400 x 500	915	965
#	1400 x 600	1030	980
#	1400 x 700	1145	995
#	1400 x 800	1260	1010
#	1400 x 900	1380	1025
#	1400 x 1000	1495	1040
#	1400 x 1100	1610	1055
#	1400 x 1200	1725	1070
#	1400 x 1400	1960	1100
#	1500 x 600	1035	1035
#	1500 x 800	1270	1065
#	1500 x 1000	1500	1595
#	1600 x 100	460	1015
#	1600 x 200	580	1030
#	1600 x 400	810	1060
#	1600 x 600	1040	1090
#	1600 x 800	1275	1120
#	1600 x 1000	1505	1150
#	1600 x 1200	1740	1180
#	1600 x 1400	1970	1210
#	1600 x 1600	2200	1240

Manufacturer's design length :

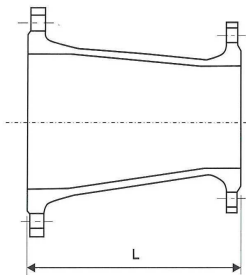
Lengths for # items will be supplied according to manufacturer's design length when BSEN545 (Series A) and/or BSEN598 Standards do not govern the length of these items

△ **Manufacturer's design length :**

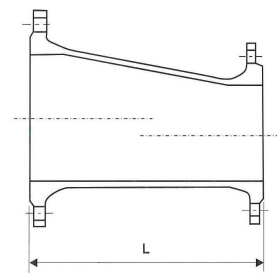
Fittings in other lengths also available by agreement between manufacturer and purchaser
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Double Flanged Taper

Concentric Type



Flat Type

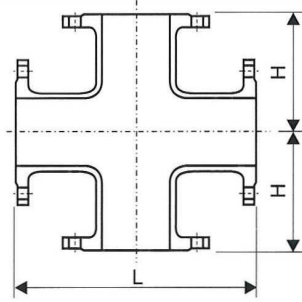


	DN (mm)	L (mm)
#	65 x 50	150
#	65 x 50	200
#	80 x 40	200
#	80 x 50	200
#	80 x 65	200
△	80 x 65	150
#	100 x 50	150
#	100 x 50	300
#	100 x 65	300
#	100 x 80	200
△	100 x 80	150
#	150 x 80	150
#	150 x 80	400
#	150 x 100	150
#	150 x 100	300
#	200 x 80	150
#	200 x 100	600
#	200 x 150	300
△	200 x 150	150
#	250 x 150	600
#	250 x 200	300
△	250 x 200	200
#	300 x 150	600
#	300 x 200	600
#	300 x 250	300
△	300 x 250	200
#	350 x 250	600
#	350 x 300	300
#	400 x 200	700
#	400 x 250	650

	DN (mm)	L (mm)
#	400 x 300	300
△	400 x 300	600
#	400 x 350	300
#	450 x 250	700
#	450 x 300	650
#	450 x 350	600
#	450 x 400	300
#	500 x 250	750
#	500 x 300	700
#	500 x 350	650
#	500 x 400	600
#	500 x 450	300
#	600 x 300	800
#	600 x 350	750
#	600 x 400	700
#	600 x 450	650
#	600 x 500	600
#	700 x 400	800
#	700 x 450	750
#	700 x 500	700
#	700 x 600	600
#	800 x 450	850
#	800 x 500	800
#	800 x 600	700
#	800 x 700	600
#	900 x 450	950
#	900 x 500	900
#	900 x 600	800
#	900 x 700	700
#	900 x 800	600

	DN (mm)	L (mm)
#	1000 x 500	1000
#	1000 x 600	900
#	1000 x 700	800
#	1000 x 800	700
#	1000 x 900	600
#	1100 x 700	900
#	1100 x 800	800
#	1100 x 900	700
#	1100 x 1000	600
#	1200 x 700	1345
#	1200 x 800	1160
#	1200 x 900	975
#	1200 x 1000	790
#	1200 x 1100	605
#	1400 x 800	1590
#	1400 x 900	1405
#	1400 x 1000	1220
#	1400 x 1100	1035
#	1400 x 1200	850
#	1500 x 900	1620
#	1500 x 1000	1435
#	1500 x 1100	1250
#	1500 x 1200	1065
#	1500 x 1400	695
#	1600 x 1000	1650
#	1600 x 1100	1465
#	1600 x 1200	1280
#	1600 x 1400	910
#	1600 x 1500	725
#	1800 x 1600	970
#	2000 x 1800	1030

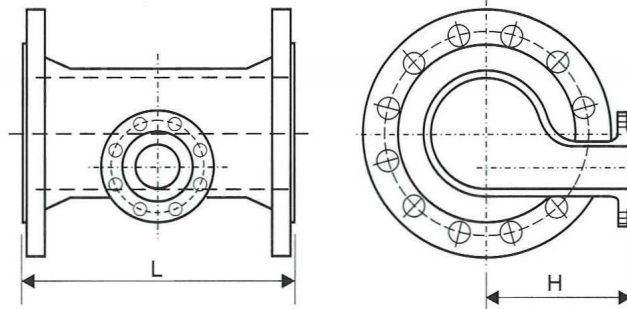
All Flanged Crosses



#	DN (mm)	L (mm)	H (mm)
		L	H
#	80 x 80	330	165
#	100 x 80	360	175
#	100 x 100	360	180
#	150 x 80	440	205
#	150 x 100	440	210
#	150 x 150	440	220
#	200 x 80	520	235
#	200 x 100	520	240
#	200 x 150	520	250
#	200 x 200	520	260
#	250 x 80	700	270
#	250 x 100	700	275
#	250 x 150	700	300
#	250 x 200	700	325
#	250 x 250	700	350
#	300 x 100	800	300
#	300 x 150	800	325
#	300 x 200	800	350
#	300 x 250	800	375
#	300 x 300	800	400
#	350 x 100	850	325
#	350 x 150	850	325
#	350 x 200	850	325
#	350 x 250	850	325
#	350 x 300	850	425
#	350 x 350	850	425
#	400 x 100	900	350
#	400 x 150	900	350
#	400 x 200	900	350
#	400 x 250	900	350

#	DN (mm)	L (mm)	H (mm)
		L	H
#	400 x 300	900	450
#	400 x 350	900	450
#	400 x 400	900	450
#	450 x 100	950	375
#	450 x 150	950	375
#	450 x 200	950	375
#	450 x 250	950	375
#	450 x 300	950	475
#	450 x 350	950	475
#	450 x 400	950	475
#	450 x 450	950	475
#	500 x 100	1000	400
#	500 x 150	1000	400
#	500 x 200	1000	400
#	500 x 250	1000	400
#	500 x 300	1000	500
#	500 x 350	1000	500
#	500 x 400	1000	500
#	500 x 450	1000	500
#	500 x 500	1000	500
#	600 x 100	1100	450
#	600 x 150	1100	450
#	600 x 200	1100	450
#	600 x 250	1100	450
#	600 x 300	1100	550
#	600 x 350	1100	550
#	600 x 400	1100	550
#	600 x 450	1100	550
#	600 x 500	1100	550
#	600 x 600	1100	550

All Flanged Level Invert Tee



#	DN (mm)	(mm)	(mm)
		L	H
#	100 x 80	360	195
#	150 x 80	440	220
#	200 x 80	520	250
#	200 x 100	520	250
#	250 x 80	700	275
#	250 x 100	700	275
#	300 x 80	800	305
#	300 x 100	800	305
#	300 x 150	800	305
#	350 x 80	850	340
#	350 x 100	850	340
#	350 x 150	850	340
#	400 x 80	900	365
#	400 x 100	900	365
#	400 x 150	900	365
#	400 x 200	900	365

#	DN (mm)	(mm)	(mm)
		L	H
#	450 x 80	950	380
#	450 x 100	950	380
#	450 x 150	950	380
#	450 x 200	950	380
#	500 x 80	1000	400
#	500 x 100	1000	400
#	500 x 150	1000	400
#	500 x 200	1000	400
#	600 x 80	1100	435
#	600 x 100	1100	435
#	600 x 150	1100	450
#	600 x 200	1100	450
#	700 x 150	600	500
#	700 x 200	650	500
#	800 x 150	670	540
#	800 x 200	690	540

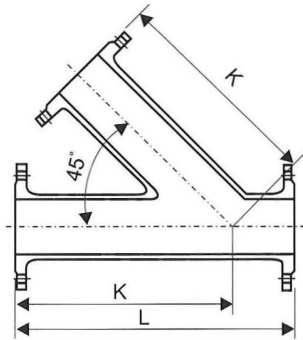
Manufacturer's design length :

Lengths for # items will be supplied according to manufacturer's design length when BSEN545 (Series A) and/or BSEN598 Standards do not govern the length of these items

△ **Manufacturer's design length :**

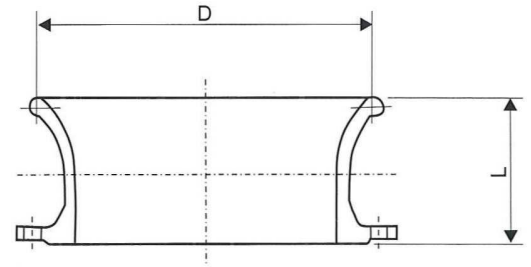
Fittings in other lengths also available by agreement between manufacturer and purchaser
Dimensions of fittings as shown in this catalogue will be subject to manufacturer's final option

All Flanged 45° Tee



#	DN (mm)	L (mm)	K (mm)
		Body	Branch
#	80 x 80	500	375
#	100 x 100	540	405
#	150 x 150	640	480
#	200 x 200	735	560
#	250 x 250	830	640
#	300 x 300	930	715
#	350 x 350	1100	850
#	400 x 400	1250	950
#	450 x 450	1400	1050
#	500 x 500	1520	1150
#	600 x 600	1700	1300

Flanged Bellmouth



#	DN (mm)	D	L
		(mm)	(mm)
#	80	150	130
#	100	175	135
#	150	230	150
#	200	290	170
#	250	345	185
#	300	405	205
#	350	460	220
#	400	520	240
#	450	575	255
#	500	635	275
#	600	750	310
#	700	865	345
#	800	980	380
#	900	1095	415
#	1000	1210	450
#	1100	1325	485
#	1200	1440	520
#	1400	1670	590
#	1500	1785	625
#	1600	1900	660

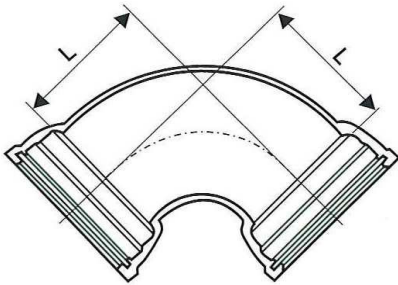
Manufacturer's design length :

Lengths for # items will be supplied according to manufacturer's design length when BSEN545 (Series A) and/or BSEN598 Standards do not govern the lengths of these items

Δ **Manufacturer's design length :**

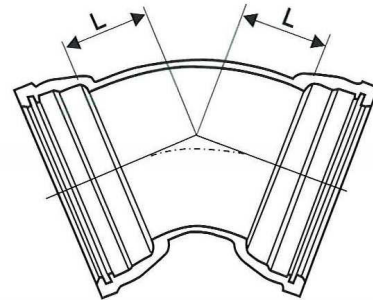
Fittings in other lengths also available by agreement between manufacturer and purchaser
 Dimensions of fittings as shown in this catalogue will be subject to manufacturer's final option

Double Socket 90° Bend



DN (mm)	L (mm)
80	100
100	120
150	170
200	220
250	270
300	320
# 350	370
# 400	408
# 400	420
# 450	470
# 500	520
# 600	620
# 700	720
# 800	820
# 900	920
# 1000	1020
# 1100	1120
# 1200	1220
# 1400	1220
# 1500	1270
# 1600	1290

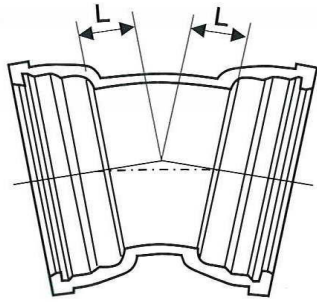
Double Socket 45° Bend



DN (mm)	L (mm)
80	55
100	65
150	85
200	110
250	130
300	150
350	175
400	195
450	220
500	240
600	285
700	330
800	370
900	415
1000	460
1100	505
1200	550
1400	515
1500	540
1600	565
1800	610
2000	660

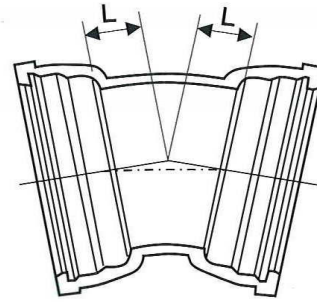
- # **Manufacturer's design length :**
Lengths for # items will be supplied according to manufacturer's design length when BSEN545 (Series A) and/or BSEN598 Standards do not govern the lengths of these items
- △ **Manufacturer's design length :**
Fittings in other lengths also available by agreement between manufacturer and purchaser
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Double Socket 22.5° Bend



DN (mm)	L (mm)
80	40
100	40
150	55
200	65
250	75
300	85
350	95
400	110
450	120
500	130
600	150
700	175
800	195
900	220
1000	240
1100	260
1200	285
1400	260
1500	270
1600	280
1800	305
2000	330

Double Socket 11.25° Bend



DN (mm)	L (mm)
80	30
100	30
150	35
200	40
250	50
300	55
350	60
400	65
450	70
500	75
600	85
700	95
800	110
900	120
1000	130
1100	140
1200	150
1400	130
1500	140
1600	140
1800	155
2000	165

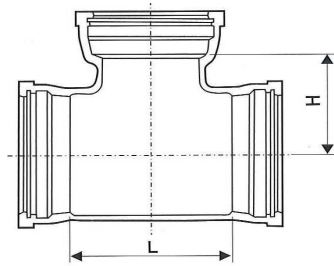
Manufacturer's design length :

Lengths for # items will be supplied according to manufacturer's design length when BSEN545 (Series A) and/or BSEN598 Standards do not govern the lengths of these items

△ **Manufacturer's design length :**

Fittings in other lengths also available by agreement between manufacturer and purchaser
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All Socket Tee



DN (mm)	L (mm)	H (mm)
	Body	Banch
80 x 80	170	85
100 x 80	170	95
100 x 100	190	95
150 x 80	170	120
150 x 100	195	120
150 x 150	255	125
Δ 150 x 150	270	150
200 x 80	175	145
200 x 100	200	145
200 x 150	255	150
200 x 200	315	155
Δ 200 x 200	330	180
250 x 80	180	170
250 x 100	200	170
Δ 250 x 100	220	205
250 x 150	260	175
250 x 200	315	180
Δ 250 x 200	335	210
250 x 250	375	190
300 x 100	205	195
Δ 300 x 100	220	235
300 x 150	260	200
300 x 200	320	205
Δ 300 x 200	335	235
300 x 250	375	210
300 x 300	435	220
# 350 x 80	185	220
# 350 x 100	210	225
# 350 x 150	265	230

DN (mm)	L (mm)	H (mm)
	Body	Banch
# 350 x 200	320	235
# 350 x 250	380	240
# 350 x 300	440	245
# 350 x 350	515	270
# 350 x 350	495	250
# 400 x 80	190	245
# 400 x 100	210	245
# 400 x 150	270	250
# 400 x 200	325	255
# 400 x 250	385	260
# 400 x 300	440	270
# 400 x 350	500	275
# 400 x 400	560	280
# 450 x 80	190	270
# 450 x 100	215	270
# 450 x 150	270	275
# 450 x 200	330	285
# 450 x 250	390	290
# 450 x 300	445	295
# 450 x 350	505	300
# 450 x 400	560	305
# 450 x 450	620	310
# 500 x 80	205	295
# 500 x 100	215	295
# 500 x 150	275	300
# 500 x 200	330	310
# 500 x 250	390	315
# 500 x 300	450	320
# 500 x 350	505	325

#	DN (mm)	L (mm)	H (mm)
		Body	Banch
#	500 x 400	565	330
#	500 x 450	620	335
#	500 x 500	680	340
#	600 x 80	200	345
#	600 x 100	220	345
#	600 x 150	280	350
#	600 x 200	340	360
#	600 x 250	395	365
#	600 x 300	455	370
#	600 x 350	510	375
#	600 x 400	570	380
#	600 x 450	630	385
#	600 x 500	685	390
#	600 x 600	800	400
#	700 x 80	225	400
#	700 x 100	230	400
#	700 x 150	285	400
#	700 x 200	345	405
#	700 x 250	400	415
#	700 x 300	460	420
#	700 x 350	520	425
#	700 x 400	575	430
#	700 x 450	635	435
#	700 x 500	690	440
#	700 x 600	810	450
#	700 x 700	925	460
#	800 x 80	250	450
#	800 x 100	270	460
#	800 x 150	330	460
#	800 x 200	380	460
#	800 x 250	410	465
#	800 x 300	465	470
#	800 x 350	525	475
#	800 x 400	580	480
#	800 x 450	640	485
#	800 x 500	700	490

#	DN (mm)	L (mm)	H (mm)
		Body	Banch
#	800 x 600	815	500
#	800 x 700	930	510
#	800 x 800	1045	525
#	900 x 80	255	505
#	900 x 100	270	505
#	900 x 150	320	505
#	900 x 200	355	505
#	900 x 250	415	515
#	900 x 300	470	520
#	900 x 350	530	525
#	900 x 400	590	530
#	900 x 450	645	535
#	900 x 500	705	540
#	900 x 600	820	550
#	900 x 700	935	560
#	900 x 800	1050	575
#	900 x 900	1170	585
#	1000 x 80	260	555
#	1000 x 100	280	555
#	1000 x 150	335	555
#	1000 x 200	360	555
#	1000 x 250	420	565
#	1000 x 300	480	570
#	1000 x 350	535	575
#	1000 x 400	595	580
#	1000 x 450	650	585
#	1000 x 500	710	590
#	1000 x 600	825	600
#	1000 x 700	940	610
#	1000 x 800	1060	625
#	1000 x 900	1175	635
#	1000 x 1000	1290	645
#	1100 x 80	260	610
#	1100 x 100	280	610
#	1100 x 150	330	610
#	1100 x 200	380	610

#	DN (mm)	L (mm)	H (mm)
		Body	Banch
#	1100 x 250	425	615
#	1100 x 300	485	620
#	1100 x 350	540	625
#	1100 x 400	600	630
#	1100 x 450	660	635
#	1100 x 500	715	640
#	1100 x 600	830	650
#	1100 x 700	950	660
#	1100 x 800	1065	675
#	1100 x 900	1180	685
#	1100 x 1000	1295	695
#	1100 x 1100	1410	705
#	1200 x 80	255	660
#	1200 x 100	280	660
#	1200 x 150	335	660
#	1200 x 200	375	665
#	1200 x 250	430	665
#	1200 x 300	490	670
#	1200 x 350	550	675
#	1200 x 400	605	680
#	1200 x 450	665	685
#	1200 x 500	720	690
#	1200 x 600	840	700
#	1200 x 700	955	710
#	1200 x 800	1070	725
#	1200 x 900	1185	735
#	1200 x 1000	1300	745
#	1200 x 1100	1420	755

#	DN (mm)	L (mm)	H (mm)
		Body	Banch
#	1200 x 1200	1535	770
#	1400 x 80	310	780
#	1400 x 100	330	780
#	1400 x 150	380	780
#	1400 x 200	435	780
#	1400 x 250	485	780
#	1400 x 300	530	780
#	1400 x 350	590	780
#	1400 x 400	620	780
#	1400 x 450	675	785
#	1400 x 500	735	790
#	1400 x 600	850	800
#	1400 x 700	965	810
#	1400 x 800	1080	825
#	1400 x 900	1200	835
#	1400 x 1000	1315	845
#	1400 x 1100	1430	855
#	1400 x 1200	1545	865
#	1400 x 1400	1780	890
#	1500 x 600	855	850
#	1500 x 800	1090	875
#	1500 x 1000	1320	895
#	1600 x 400	630	880
#	1600 x 600	860	900
#	1600 x 800	1095	925
#	1600 x 1000	1325	945
#	1600 x 1200	1560	965
#	1600 x 1400	1790	990
#	1600 x 1600	2020	1010

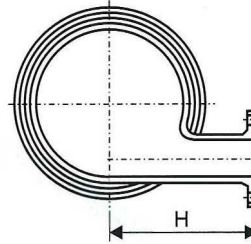
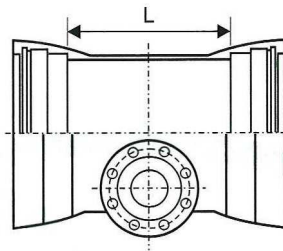
Manufacturer's design length :

Lengths for # items will be supplied according to manufacturer's design length when BSEN545 (Series A) and/or BSEN598 Standards do not govern the lengths of these items

△ **Manufacturer's design length :**

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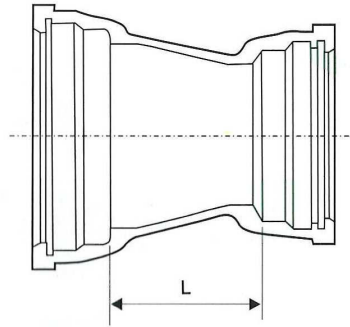
Double Socket Level Invert Tee with Flanged Branch



#	DN (mm)	(mm)	(mm)
		L	H
#	200 x 80	175	235
#	200 x 100	200	240
#	200 x 150	255	250
#	250 x 80	180	265
#	250 x 100	200	270
#	250 x 150	260	280
#	250 x 200	315	290
#	300 x 80	180	295
#	300 x 100	205	300
#	300 x 150	260	310
#	300 x 200	320	320
#	350 x 80	185	325
#	350 x 100	205	330
#	350 x 150	260	340
#	350 x 200	325	350
#	400 x 100	210	360
#	400 x 150	270	370
#	400 x 200	325	380
#	400 x 250	385	390
#	450 x 100	215	390
#	450 x 150	270	400
#	450 x 200	330	410
#	450 x 250	390	420
#	450 x 300	445	430
#	500 x 100	215	420
#	500 x 150	275	430
#	500 x 200	330	440
#	500 x 250	390	450
#	500 x 300	450	460

#	DN (mm)	(mm)	(mm)
		L	H
#	500 x 350	505	470
#	600 x 100	220	480
#	600 x 150	280	490
#	600 x 200	340	500
#	600 x 250	395	510
#	600 x 300	455	520
#	600 x 350	510	530
#	600 x 400	570	540
#	700 x 100	345	510
#	700 x 150	345	520
#	700 x 200	345	525
#	700 x 300	460	540
#	800 x 100	350	570
#	800 x 150	350	580
#	800 x 200	350	585
#	800 x 250	410	595
#	800 x 300	465	600
#	900 x 150	355	630
#	900 x 200	355	645
#	900 x 300	470	660
#	900 x 400	590	675
#	1000 x 100	360	690
#	1000 x 150	360	700
#	1000 x 200	360	705
#	1000 x 300	480	720
#	1200 x 200	375	825
#	1200 x 400	605	855
#	1400 x 200	565	920
#	1400 x 400	800	950
#	1400 x 600	1030	980

Double Socket Taper



	DN (mm)	L (mm)
	100 x 80	90
	150 x 80	190
	150 x 100	150
#	200 x 80	250
	200 x 100	250
	200 x 150	150
	250 x 150	250
	250 x 200	150
	300 x 150	350
	300 x 200	250
	300 x 250	150
	350 x 200	360
	350 x 250	260
	350 x 300	160
#	400 x 80	700
#	400 x 100	660
#	400 x 150	560
#	400 x 200	460
	400 x 250	360
	400 x 300	260
	400 x 350	160
#	450 x 80	800
#	450 x 100	760
#	450 x 150	660
#	450 x 200	560
#	450 x 250	460
#	450 x 300	360

	DN (mm)	L (mm)
	450 x 350	260
	450 x 400	160
#	500 x 80	900
#	500 x 100	860
#	500 x 150	760
#	500 x 200	660
#	500 x 250	560
#	500 x 300	460
	500 x 350	360
	500 x 400	260
#	500 x 450	160
#	600 x 80	1100
#	600 x 100	1060
#	600 x 150	960
#	600 x 200	860
#	600 x 250	760
#	600 x 300	660
#	600 x 350	560
	600 x 400	460
#	600 x 450	360
	600 x 500	260
#	700 x 80	1320
#	700 x 100	1280
#	700 x 150	1180
#	700 x 200	1080
#	700 x 250	980
#	700 x 300	880

	DN (mm)	L (mm)
#	700 x 350	780
#	700 x 400	680
#	700 x 450	580
	700 x 500	480
	700 x 600	280
#	800 x 80	1520
#	800 x 100	1480
#	800 x 150	1380
#	800 x 200	1280
#	800 x 250	1180
#	800 x 300	1080
#	800 x 400	880
#	800 x 450	780
#	800 x 500	680
	800 x 600	480
	800 x 700	280
#	900 x 80	1720
#	900 x 100	1680
#	900 x 150	1580
#	900 x 200	1480
#	900 x 250	1380
#	900 x 300	1280
#	900 x 350	1180
#	900 x 400	1080
#	900 x 450	980
#	900 x 500	880
#	900 x 600	680

	DN (mm)	L (mm)
	900 x 700	480
	900 x 800	280
#	1000 x 80	1920
#	1000 x 100	1880
#	1000 x 150	1780
#	1000 x 200	1680
#	1000 x 250	1580
#	1000 x 300	1480
#	1000 x 350	1380
#	1000 x 400	1280
#	1000 x 450	1180
#	1000 x 500	1080
#	1000 x 600	880
#	1000 x 700	680
	1000 x 800	480
	1000 x 900	280
#	1100 x 80	2120
#	1100 x 100	2080
#	1100 x 150	1980
#	1100 x 200	1880
#	1100 x 250	1780
#	1100 x 300	1680

	DN (mm)	L (mm)
#	1100 x 350	1580
#	1100 x 400	1480
#	1100 x 450	1380
#	1100 x 500	1280
#	1100 x 600	1080
#	1100 x 700	880
#	1100 x 800	680
#	1100 x 900	480
	1100 x 1000	280
#	1200 x 80	2320
#	1200 x 100	2280
#	1200 x 150	2180
#	1200 x 200	2080
#	1200 x 250	1980
#	1200 x 300	1880
#	1200 x 350	1780
#	1200 x 400	1680
#	1200 x 450	1580
#	1200 x 500	1480
#	1200 x 600	1280
#	1200 x 700	1080
#	1200 x 800	880
#	1200 x 900	680

	DN (mm)	L (mm)
	1200 x 1000	480
#	1200 x 1100	280
#	1400 x 80	1480
#	1400 x 100	1460
#	1400 x 1500	1410
#	1400 x 200	1360
#	1400 x 250	1310
#	1400 x 300	1260
#	1400 x 350	1210
#	1400 x 400	1160
#	1400 x 450	1110
#	1400 x 500	1060
#	1400 x 600	960
#	1400 x 700	860
#	1400 x 800	760
#	1400 x 900	660
#	1400 x 1000	560
#	1400 x 1100	460
	1400 x 1200	360
	1500 x 1400	260
	1600 x 1400	360
	1800 x 1600	360
	2000 x 1800	360

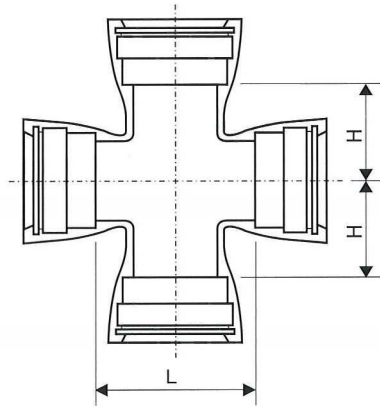
Manufacturer's design length :

Lengths for # items will be supplied according to manufacturer's design length when BSEN545 (Series A) and/or BSEN598 Standards do not govern the lengths of these items

△ **Manufacturer's design length :**

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All Socket Crosses



#	DN (mm)	(mm)	
		L	H
#	80 x 80	170	85
#	100 x 80	170	95
#	100 x 100	190	95
#	150 x 80	170	120
#	150 x 100	195	120
#	150 x 150	255	125
#	200 x 80	175	145
#	200 x 100	200	145
#	200 x 150	255	150
#	200 x 200	315	155
#	250 x 80	180	170
#	250 x 100	200	170
#	250 x 150	260	175
#	250 x 200	315	180
#	250 x 250	375	190
#	300 x 80	180	195
#	300 x 100	205	195
#	300 x 150	260	200
#	300 x 200	320	205
#	300 x 250	375	210
#	300 x 300	435	220
#	350 x 80	185	220
#	350 x 100	210	225
#	350 x 150	265	230
#	350 x 200	320	235
#	350 x 250	380	240
#	350 x 300	440	245

#	DN (mm)	(mm)	
		L	H
#	350 x 350	495	250
#	400 x 80	190	245
#	400 x 100	210	245
#	400 x 150	270	250
#	400 x 200	325	255
#	400 x 250	385	265
#	400 x 300	440	270
#	400 x 350	500	275
#	400 x 400	560	280
#	450 x 80	190	270
#	450 x 100	215	270
#	450 x 150	270	275
#	450 x 200	330	285
#	450 x 250	390	290
#	450 x 300	445	295
#	450 x 350	505	300
#	450 x 400	560	305
#	450 x 450	620	310
#	500 x 80	205	295
#	500 x 100	215	295
#	500 x 150	275	300
#	500 x 200	330	310
#	500 x 250	390	315
#	500 x 300	450	320
#	500 x 350	505	325
#	500 x 400	565	330
#	500 x 450	620	335

#	DN (mm)	(mm)	
		L	H
#	500 x 500	680	340
#	600 x 80	200	345
#	600 x 100	220	345
#	600 x 150	280	350
#	600 x 200	340	360
#	600 x 250	395	365
#	600 x 300	455	370
#	600 x 350	510	375
#	600 x 400	570	380
#	600 x 450	630	385
#	600 x 500	685	390
#	600 x 600	800	400
#	700 x 80	225	400
#	700 x 100	230	400
#	700 x 150	285	400
#	700 x 200	345	405
#	700 x 250	400	415
#	700 x 300	460	420
#	700 x 350	520	425
#	700 x 400	575	430
#	700 x 450	635	435
#	700 x 500	690	440
#	700 x 600	810	450
#	700 x 700	925	460
#	800 x 80	250	450
#	800 x 100	270	460
#	800 x 150	330	460

#	DN (mm)	(mm)	(mm)
		L	H
#	800 x 200	380	460
#	800 x 250	410	465
#	800 x 300	465	470
#	800 x 350	525	475
#	800 x 400	580	480
#	800 x 450	640	485
#	800 x 500	700	490
#	800 x 600	815	500
#	800 x 700	930	510
#	800 x 800	1045	525
#	900 x 80	255	505
#	900 x 100	275	505
#	900 x 150	320	505
#	900 x 200	355	505
#	900 x 250	415	515
#	900 x 300	470	520
#	900 x 350	530	525
#	900 x 400	590	530
#	900 x 450	645	535
#	900 x 500	705	540
#	900 x 600	820	550
#	900 x 700	935	560
#	900 x 800	1050	575
#	900 x 900	1170	585
#	1000 x 80	260	555
#	1000 x 100	280	555
#	1000 x 150	335	555
#	1000 x 200	360	555
#	1000 x 250	420	565
#	1000 x 300	480	570
#	1000 x 350	535	575
#	1000 x 400	595	580

#	DN (mm)	(mm)	(mm)
		L	H
#	1000 x 450	650	585
#	1000 x 500	710	590
#	1000 x 600	825	600
#	1000 x 700	940	610
#	1000 x 800	1060	625
#	1000 x 900	1175	635
#	1000 x 1000	1290	645
#	1100 x 80	260	610
#	1100 x 100	280	610
#	1100 x 150	330	610
#	1100 x 200	380	610
#	1100 x 250	425	615
#	1100 x 300	485	620
#	1100 x 350	540	625
#	1100 x 400	600	630
#	1100 x 450	660	635
#	1100 x 500	715	640
#	1100 x 600	830	650
#	1100 x 700	950	660
#	1100 x 800	1065	675
#	1100 x 900	1180	685
#	1100 x 1000	1295	695
#	1100 x 1100	1410	705
#	1200 x 80	255	660
#	1200 x 100	280	660
#	1200 x 150	335	660
#	1200 x 200	375	665
#	1200 x 250	430	665
#	1200 x 300	490	670
#	1200 x 350	550	675
#	1200 x 400	605	680
#	1200 x 450	665	685

#	DN (mm)	(mm)	(mm)
		L	H
#	1200 x 500	720	690
#	1200 x 600	840	700
#	1200 x 700	955	710
#	1200 x 800	1070	725
#	1200 x 900	1185	735
#	1200 x 1000	1300	745
#	1200 x 1100	1420	755
#	1200 x 1200	1535	765
#	1400 x 80	310	780
#	1400 x 100	330	780
#	1400 x 150	380	780
#	1400 x 200	435	780
#	1400 x 250	485	780
#	1400 x 300	530	780
#	1400 x 350	590	780
#	1400 x 400	620	780
#	1400 x 450	675	785
#	1400 x 500	735	790
#	1400 x 600	850	800
#	1400 x 700	965	810
#	1400 x 800	1080	825
#	1400 x 900	1200	835
#	1400 x 1000	1315	845
#	1400 x 1100	1430	855
#	1400 x 1200	1545	865
#	1400 x 1400	1780	890
#	1500 x 600	855	850
#	1500 x 800	1090	875
#	1500 x 1000	1320	895
#	1600 x 600	860	900
#	1600 x 800	1095	925
#	1600 x 1000	1325	945
#	1600 x 1200	1560	965

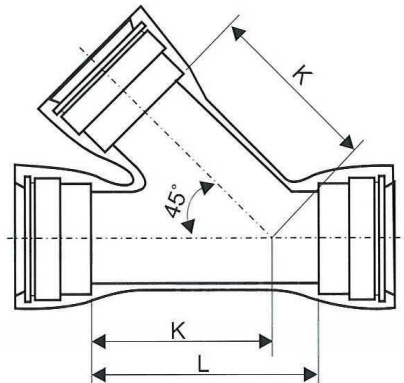
Manufacturer's design length :

Lengths for # items will be supplied according to manufacturer's design length when BSEN545 (Series A) and/or BSEN598 Standards do not govern the lengths of these items

△ **Manufacturer's design length :**

Fittings in other lengths also available by agreement between manufacturer and purchaser
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All Socket 45° Tee



	DN (mm)		L (mm)		K (mm)
			Body	Branch	Branch
#	80	x 80	500		375
#	100	x 100	540		405
#	150	x 150	640		480
#	200	x 200	735		560
#	250	x 250	830		640
#	300	x 300	930		715
#	350	x 350	1100		850
#	400	x 400	1250		950
#	450	x 450	1400		1050
#	500	x 500	1520		1150
#	600	x 600	1700		1300

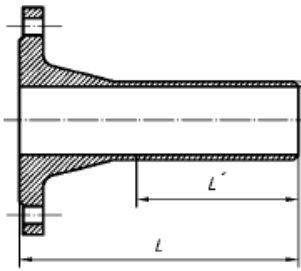
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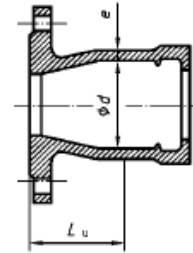
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Flanged Spigot



DN (mm)	L (mm)
80	350
100	360
150	380
200	400
250	420
300	440
350	460
400	480
450	500
500	520
600	560
700	600
800	600
900	600
1000	600
1100	600
1200	600
1400	710
1500	750
1600	780
1800	850
2000	920

Flanged Socket



DN (mm)	L (mm)
80	130
100	130
150	135
200	140
250	145
300	150
350	155
400	160
450	165
500	170
600	180
700	190
800	200
900	210
1000	220
1100	230
1200	240
1400	310
1500	330
1600	330
1800	350
2000	370

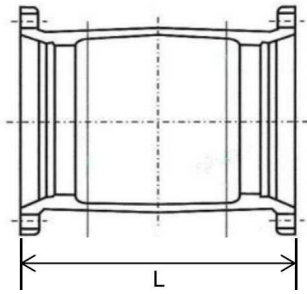
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△ **Manufacturer's design length :**

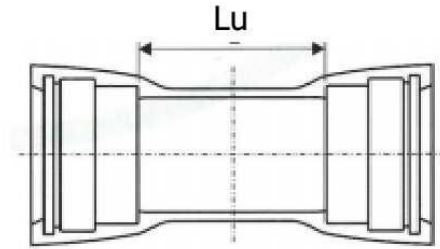
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Mechanical Collar



	DN (mm)	L (mm)
#	80	230
#	80	325
#	100	230
#	100	325
#	150	240
#	150	330
#	200	255
#	200	340
#	250	265
#	250	355
#	300	275
#	300	360
#	350	380
#	400	300
#	450	320
#	500	425
#	600	350
#	700	470
#	800	480

Double Socket Collar



	DN (mm)	Lu (mm)
	80	160
	100	160
	150	165
	200	170
	250	175
	300	180
	350	185
	400	190
Δ	400	161
	450	195
Δ	450	230
	500	200
Δ	500	230
	600	210
Δ	600	355
	700	220
	800	230
	900	240
	1000	250
	1100	260
	1200	270
	1400	340
	1500	350
	1600	360
	1800	380
	2000	400

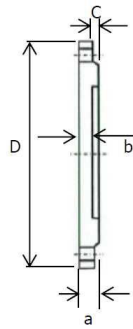
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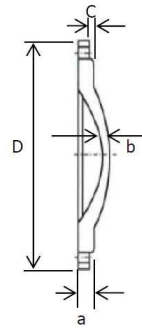
Δ **Manufacturer's design length :**

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Blank Flange



Flat Type



Concave Type

PN16 Blank Flange BS EN1092-2 (Former Standard BS4504)

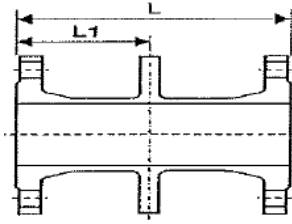
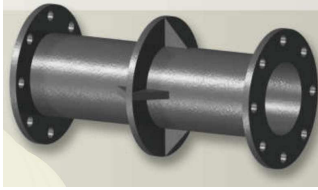
DN (mm)	D (mm)	a (mm)	b (mm)	c (mm)
50	165	19	16	3
65	185	19	16	3
80	200	19	16	3
100	220	19	16	3
150	285	19	16	3
200	340	20	17	3
250	400	22	19	3
300	455	24.5	20.5	4
350	520	26.5	22.5	4
400	580	28	24	4
450	640	30	26	4
500	715	31.5	27.5	4
600	840	36	31	5
700	910	39.5	34.5	5
800	1025	43	38	5
900	1125	46.5	41.5	5
1000	1255	50	45	5
1100	1355	53.5	48.5	5
1200	1485	57	52	5
1400	1685	60	55	5
1500	1820	62.5	57.5	5
1600	1930	65	60	5
1800	2130	70	65	5
2000	2345	75	70	5

PN25 Blank Flange BS EN1092-2 (Former Standard BS4504)

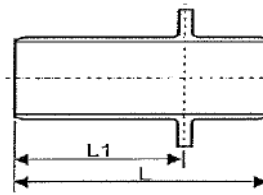
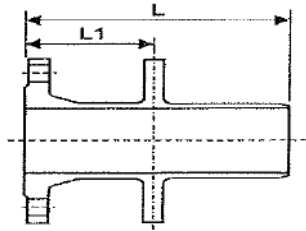
DN (mm)	D (mm)	a (mm)	b (mm)	c (mm)
50	165	19	16	3
65	185	19	16	3
80	200	19	16	3
100	235	19	16	3
150	300	20	17	3
200	360	22	19	3
250	425	24.5	21.5	3
300	485	27.5	23.5	4
350	555	30	26	4
400	620	32	28	4
450	670	34.5	30.5	4
500	730	36.5	32.5	4
600	845	42	37	5

Dimensions of fittings as shown in this catalogue will be subject to manufacturer's final option

Puddle Flange



Double Flanged pipe with Puddle



Flanged Spigot with Puddle

Double Spigot with Puddle

Options : 1) Puddle default at middle position, L1 to be specified **Cast-on or Weld-on** upon client's request
 2) Tailor-made full length &/or with hardness lugs to be specified upon client's special request

DN (mm)	PuddleFlange L = Full Length L1 = Default at middle	Puddle Diameter	
		Puddle Diameter = 1D Equals Flange Diameter	Puddle Diameter = 1.5D Equals 1.5 Flange Diameter
△ 80	600 mm #	200 mm	300 mm
△ 100	600 mm #	220 mm	330 mm
△ 150	600 mm #	285 mm	428 mm
△ 200	600 mm #	340 mm	510 mm
△ 250	800 mm #	400 mm	600 mm
△ 300	800 mm #	455 mm	683 mm
△ 350	1000 mm #	520 mm	780 mm
△ 400	1000 mm #	580 mm	870 mm
△ 450	1200 mm #	640 mm	960 mm
△ 500	1200 mm #	715 mm	1073 mm
△ 600	1500 mm #	840 mm	1260 mm

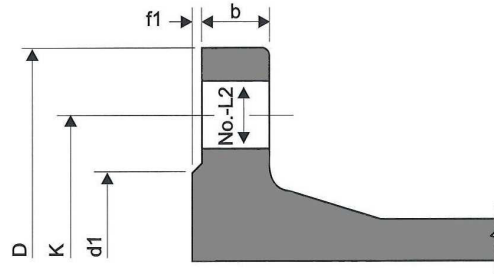
Manufacturer's design length :
 Lengths for # items will be supplied according to manufacturer's design length when BSEN545 and/or BSEN598 Standards do not govern the lengths of these items

△ **Manufacturer's design length :**
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Flange

BS EN1092-2 (Former Standard BS4504)

Bolt holes shall be arranged symmetrically about the horizontal centerline through the flange surface. In the case of TEE, this horizontal centerline is defined with the surface of the branch flange held parallel to the vertical plane.



PN16 Flange to BS EN1092-2 (Former Standard BS4504)

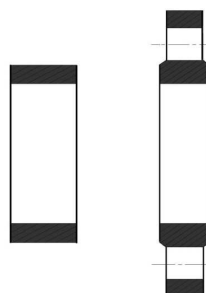
DN (mm)	d1 (mm)	D (mm)	b (mm)	f1 (mm)	K (mm)	L2 (mm)	Bolt	
							Size	No.
80	132	200	16.0	3	160	19	M16	8
100	156	220	16.0	3	180	19	M16	8
150	211	285	16.0	3	240	23	M20	8
200	266	340	17.0	3	295	23	M20	12
250	319	400	19.0	3	355	28	M24	12
300	370	455	20.5	4	410	28	M24	12
350	429	520	22.5	4	470	28	M24	16
400	480	580	24.0	4	525	31	M27	16
450	548	640	26.0	4	585	31	M27	20
500	609	715	27.5	4	650	34	M30	20
600	720	840	31.0	5	770	37	M33	20
700	794	910	34.5	5	840	37	M33	24
800	901	1025	38.0	5	950	41	M36	24
900	1001	1125	41.5	5	1050	41	M36	28
1000	1112	1255	45.0	5	1170	44	M39	28
1100	1218	1355	48.5	5	1270	44	M39	32
1200	1328	1485	52.0	5	1390	50	M45	32
1400	1530	1685	55.0	5	1590	50	M45	36
1600	1750	1930	60.0	5	1820	57	M52	40
1800	1950	2130	65.0	5	2020	57	M52	44

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PN25 Flange to BS EN1092-2 (Former Standard BS4504)

DN (mm)	d1 (mm)	D (mm)	b (mm)	f1 (mm)	K (mm)	L2 (mm)	Bolt	
							Size	No.
80	132	200	16.0	3	160	19	M16	8
100	156	235	16.0	3	190	23	M20	8
150	211	300	17.0	3	250	28	M24	8
200	274	360	19.0	3	310	28	M24	12
250	330	425	21.5	3	370	31	M27	12
300	389	485	23.5	4	430	31	M27	16
350	448	555	26.0	4	490	34	M30	16
400	503	620	28.0	4	550	37	M33	16
450	548	670	30.5	4	600	37	M33	20
500	609	730	32.5	4	660	37	M33	20
600	720	845	37.0	5	770	41	M36	20

Pipe Block



IBC Type FF Type
(PN16)

DN (mm)	DN (mm)
80	500
100	600
150	700
200	800
250	900
300	1000
350	1100
400	1200
450	

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EPDM Gasket for Flange BSEN 1514-1 (formerly BS 4865:Part 1)

BSEN681-1 Type WA / WC / WG available for connecting Flange to BS EN1092-2 (Former Standard BS4504)

NBR (Nitrile Butadiene Rubber) or other raw materials shall be supplied upon request



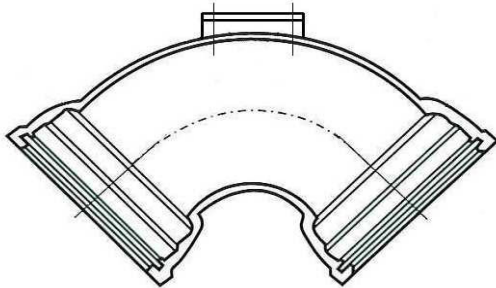
FF Type



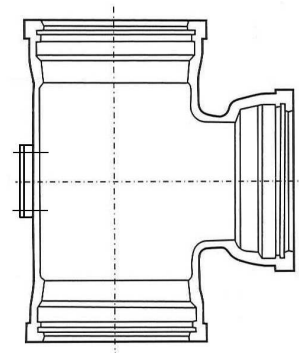
IBC Type

DN (mm)	Thickness Selection	Outside Diameter for PN16		Outside Diameter for PN25	
		FF Type	IBC Type	FF Type	IBC Type
50	3.0mm	165	107	165	107
65		185	127	185	127
80		200	142	200	142
100		220	162	235	168
150	or	285	218	300	224
200	4.5mm	340	273	360	284
250	or	400	329	425	340
300	5.0mm	455	384	485	400
350	or	520	444	555	457
400	6.0mm	580	495	620	514
450		640	555	670	564
500		715	617	730	624
600		840	734	845	731

Fitting with Access Door (For BS EN598)



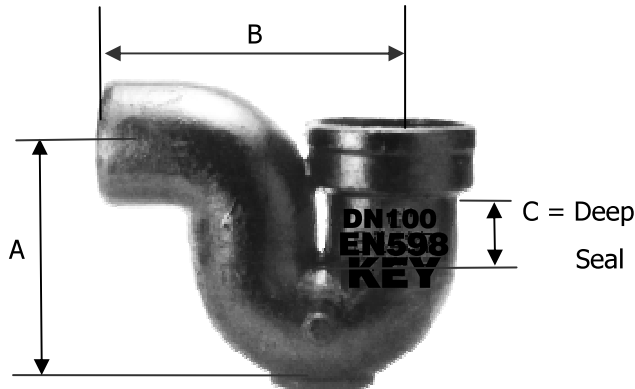
Size range: DN100 – DN1200



Size Range: DN100 – DN1200

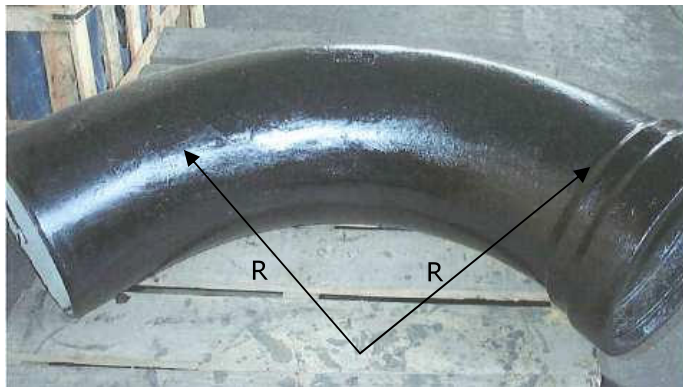
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P-Trap (Socket x Spigot)



	DN (mm)	A (mm)	B (mm)	C (mm)
#	100	275	340	80
#	150	360	450	85
#	200	443	590	85

Long Radius Bend (Socket x Spigot)



	DN (mm)	R (mm)
#	100	300
#	150	300
#	200	400

- # **Manufacturer's design length :**
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- △ **Manufacturer's design length :**
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Installation Guide - Flexible Joint

(Also named as Socket & Spigot Joint / Push-In Joint / Push-on Joint)

1. Trench width

When pipes are laid in the trench, width of trench should be 200mm - 300mm wider than the outside diameter of the pipe-line

2. Cleaning & visual inspection before installation

- 2.1) Remove debris & clean internal socket to ensure it's free from any other foreign objects
- 2.2) Clean external spigot to ensure it's smooth & grease free in surface
- 2.3) Inspect both socket & spigot & ensure they'e in good condition without any defect
- 2.4) Inspect rubber gasket & ensure it's in good condition, correct sizing & proper material

3. Insert rubber gasket into socket

- 3.1) Spread evenly full length of the gasket into the internal socket
 For $DN \leq 300mm$, insert rubber gasket as demonstrated in picture 1
 For $DN > 300mm$, insert rubber gasket as demonstrated in picture 2
- 3.2) Ensure the rubber gasket sits correctly into place of the socket
****DO NOT APPLY LUBRICANT ON THE GASKET BEFORE SITTING INTO THE SOCKET****



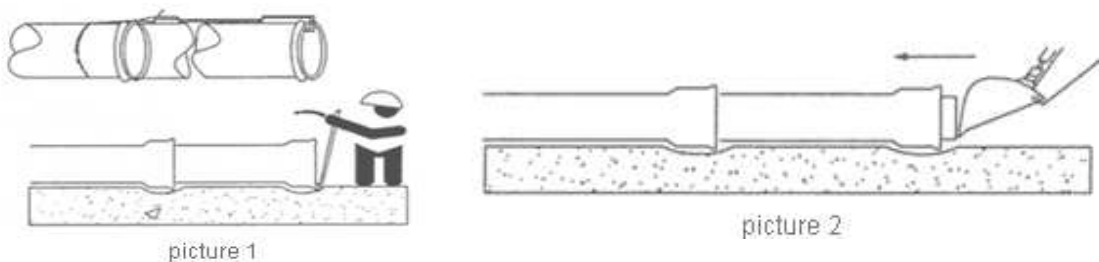
4. Lubrication

- 4.1) Clean again the exposed surface of the rubber ring
- 4.2) Lubricate the exposed surface on rubber ring & the external spigot & as shown below



5. Insert the spigot into the socket

- 5.1) As for pipes $\leq DN400$, please see picture 1
- 5.2) As for pipes $> DN400$, please see picture 2



6. Checking

Having inserted the spigot into the socket, put a metal ruler into the socket gap for ensuring the gasket is correctly seated

The joint is successfully done & ready for next connection with pipe or fitting

Installation Guide - Flanged Joint

Flanged Joints are NOT RECOMMENDED for underground buried installation where settlement & vibration are likely to occur

1. Cleaning & visual inspection before installation

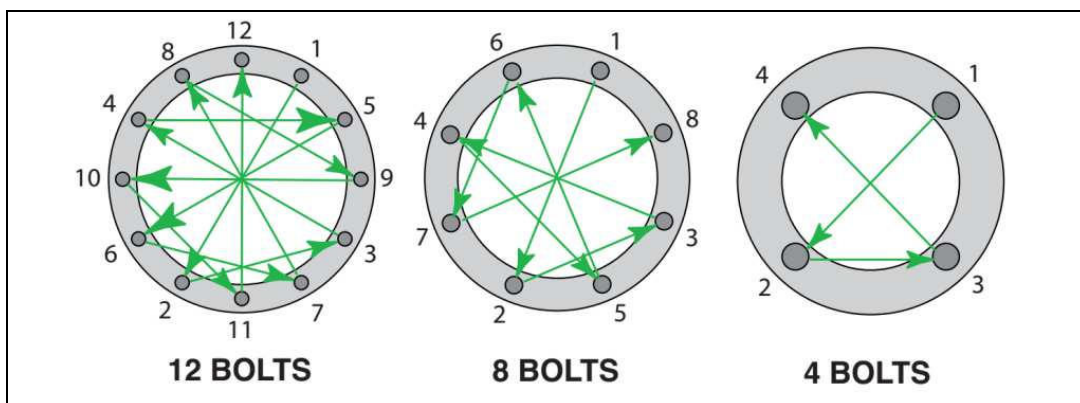
- 1.1) Clean & ensure all flange facing areas are free from any other foreign material
- 1.2) Inspect & ensure all insulation / gaskets are in correct sizing, thickness (t) & proper raw material
- 1.3) Examine all bolts / nuts / washers to assure they are in appropriate material grades and free from burrs, corrosion & damaged threads
- 1.4) Check & ensure the length of the bolt to avoid short bolting or excessive threads
- 1.5) Lubricant shall be applied to bolt threads but NO jointing compound to the gasket

2. Alignment

- 2.1) Make sure that the flange facings are properly aligned & parallel with each other
- 2.2) Gasket shall be carefully placed concentrically between flange facings
- 2.3) Engraved markings of nuts shall always face outward for easy identification

3. Proper tightening of bolts & nuts

- 3.1) Always use appropriate size spanner to hold the bolt head then finger-tighten all nuts
- 3.2) Use adjustable torque wrench to tighten the nut for prevention of over-torque
- 3.3) Tighten nuts in diametrical sequence by 1/3 Nm of final torque (as shown in below diagram)
- 3.4) Apply 2/3 Nm of final torque in same sequence, then 100% final torque until the joint is sealed
- 3.5) If the joint is not sealed at recommended final torque, increase by 10% until completion

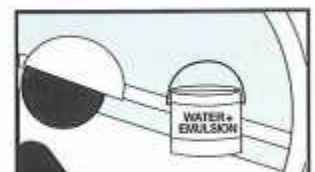


Bolts Tightening Sequence

Repair of Internal Cement Lining

Area Preparation

- Lining repair must be carried out sheltered from frost.
- Rotate the pipe so that the area to be repaired is as close to the bottom as possible.
- Remove the damaged area and 1 or 2 cm of surrounding sound mortar with hammer and cold chisel.
- The edges of cleared zone must be vertical to the iron surface.
- Clean with a wire brush to remove non-adherent material.
- Moisten the repair area.
- A few minutes before making the repair, brush-apply the water emulsion mixture, wetting the original mortar over a width of about 20cm around the edges of the repair zone.



Patching material preparation

- The emulsion must be the same as that used for the keying coat.
- Mix the two dry components, and then the two liquids, to give a pasty consistency mortar, adjust the amount of water if necessary.

Mortar application

- Trowel the mortar on compacting it adequately to restore the thickness.
- Smooth the repaired surface with a palette knife (or sleeker).
- Check that there are no gaps between the fresh mortar and the original material.
- Apply a protective coat of water + emulsion not more than 30 minutes after final smoothing to prevent the patch from drying too quickly and to give it good strength (cover with a damp cloth until set).

Repair of External Coating

- Repair of coatings shall not be carried out if the relative humidity rises above 90% or the weather condition is wet.
- Damaged areas shall be scraped or wire-brush to achieve dust and oil free.
- The first layer of zinc-rich paint shall be applied to pipe surface evenly by using hand brush. Wait until the first layer got cured, apply the bituminous paint or epoxy resin as the finishing layer
- The dry film thickness of external finishing layer shall be measured by a calibrated measuring equipment, i.e. "Coating Thickness Gauge" while mean thickness ≤ 70 microns & local minimum ≤ 50 microns as specified by BS EN 545 / BS EN 598.

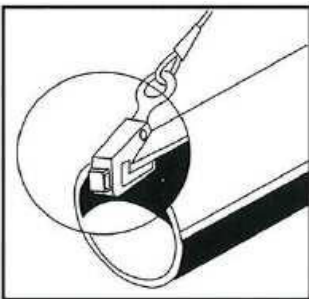
Recommendations for Handling & Storage

Handling

The mechanical strength of ductile iron pipes and fittings, coupled with the robustness of their coatings, make them adequately suitable for site handling conditions

- Sufficient powerful lifting gear shall be used
- Guide the beginning and ending of the lift
- Manoeuvre gently
- Avoid swinging, impacts or pipes rubbing against other pipes, the ground or trailer stanchions

These precautions are particularly important for epoxy sealed pipes, large diameter pipes, or those having special coatings



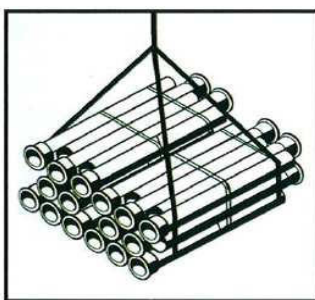
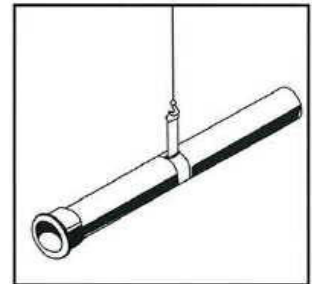
End lifting

- Use hooks with appropriately shape, coated with a polyamide type protection
Please consult us

Barrel lifting

- Use wide flat sling maintained sufficiently & widely apart to prevent accidental slippage
- Prohibit wire ropes which may damage the coating

A single sling may be used on site. In this case, lift the pipe at its centre of gravity, with the sling gripping the pipe to prevent slippage



Bundle lifting

- DN80 to 300 bundles are unloaded with flat textile slings

Packing

- DN \leq 300 : pipes are packed in bundles for efficient logistic & storage,
Fittings are packed in wodden boxes
- DN $>$ 300 : pipes individually packed in bulk
fittings packed on wodden pallets

Pipes in assorted DN are packed in bulk for container shipping



Storage of D.I. pipe & fittings

Storage of D.I. pipes and fittings on-site must permit correct inventory control and facilitate repair work

- Storage area must be level & refrain from marshy ground &/or unstable soil
- Goods shall be inspected upon arrival to the storage area and in case of any damage (e.g. internal or external coating damage), repair shall be carried out immediately before piling up
- Stack pipes in homogeneous order (same diameter) in accordance with a rational storage plan. The same applies for fittings and accessories
- Use sufficiently strong, good quality hard woods (timbers, wedges)
- Minimize lifting & unlifting frequency
- Precautions need to be taken if pipes are with special coating



Storage of gaskets

Gasket should be stored in a cool location, keep out of heat & direct sunlight and strictly having nil contact with petroleum products

Stacking of D.I. pipe & fittings

Bundle stacking

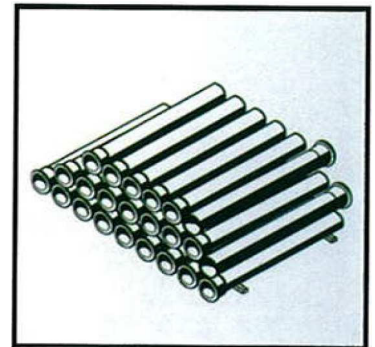
The bundles supplied by SUNS can be stacked in a pile on 80x80x2600mm timber, with 3 or 4 bundles per row, not exceeding a stack height of 2.50m

Check the condition of the bundles periodically: in particular, the condition and tautness of the straps, as well as the general stack stability

Pyramid stack, socket to spigot

Bottom layer : the bottom layer is laid on two timbers. Arranged in parallel, one being 1m from the socket end and the other 1m from the spigot end. The pipes are also parallel with one another. No socket/spigot shall not be in contact with the ground. The pipes at the two ends are secured at the sockets and spigots with large wooden wedges nailed to the timbers. The intermediate pipes are only secured at the spigot end using smaller wedges

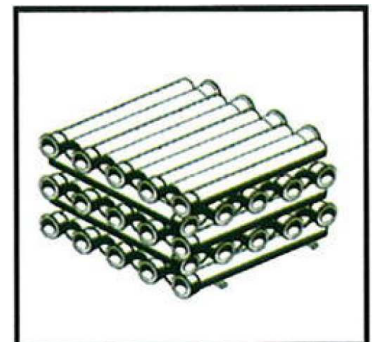
Upper layer : the upper layers consist of pipes laid alternately socket to spigot, with all the sockets in one tier overhanging the spigot ends of the tier below, by the length of the socket plus 10cm (to prevent spigot deformation). The barrels of two consecutive tiers are in contact



Square stacks

Bottom layer : laying and wedging after of the bottom layer is identical to the first method. Barrels shall be in contact while arranged in alternative sockets to spigots order. In additions, the sockets project beyond the spigots of adjacent pipes by the whole socket length plus 50mm. For $DN \geq 150$ pipes stacking shall be on three layers of timber instead of two layers.

Upper layer : each tier consists of parallel pipes laid socket to spigot, as same as those in the bottom layer. The pipes in one tier run at right angles to those in the tier below. Pipe ends are consequently wedged naturally by the alternating sockets in the tier below. This method keeps the packing material to a minimum, but involves individual lifting of pipes because of the stack formation. It is strongly recommended however that it should not be used for pipes with special coatings, in view of the type of support (point contacts)



Further Sampling and Site Testing

For every batch of goods delivered to site, further sampling and confirmatory site testing should be conducted immediately upon delivery or no later than 30days to the maximum. Manufacturer's instructions & recommendations for the proper handling, transport and storage of the goods on site should strictly be followed.



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