

Saudi Arabian Ductile Iron Pipe Co. Ltd (SADIP)

Ductile Iron Pipes, Fittings and Accessories



AMIAANTIT PIPE SYSTEMS

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1 Amiantit – Group of Companies

The Amiantit Group is a leading global industrial organisation that manufactures high quality pipe systems, researches, develops, owns and licenses advanced pipe technologies and provides water management services.



The Group supports global infrastructure development projects and delivers to municipal, industrial, agricultural and energy markets worldwide.

The Group has a presence in more than 70 countries, including 34 wholly-owned or joint venture manufacturing facilities in the Middle East, Europe, North America and Latin America, North Africa, the Far East, Central Asia, the Indian Subcontinent and in Africa.



Amiantit's manufacturing capabilities are supported by technology companies and sales offices around the globe.

Other members of the Group are predominantly limited liability companies – owned by the Amiantit Group in varying percentages and operating under individual commercial registrations.

2 Introduction

SADIP Saudi Arabian Ductile Iron Pipes Co. Ltd (SADIP) is one of Amiantit Group of Companies. It was established in 1988 when a joint venture between Amiantit Group and Saint Gobain (Pont A. Mousson) was made.

- SADIP is producing ductile iron pipes in the range of 80 mm to 800 mm diameter and fittings in the range of DN 80 mm to DN 2600 mm.
- SADIP is awarded ISO 9001/9002 since 1994 and later won the King's Prize for the ideal plant in 1994.
- SADIP product is complying with International Standards, i.e. ISO 2531 & BSEN 545 and can provide customized product as per customer request.



3 Production Process



1. Raw Materials



2. Charging Raw Materials



3. Melting



4. Magnesium Treatment



5. Metal Pouring



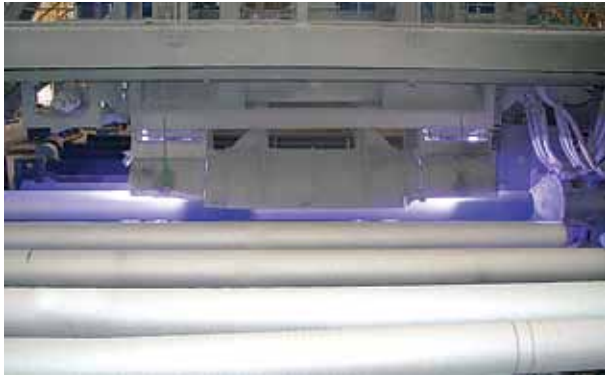
6. Core Machine



7. Casting



8. Heat Treatment



9. Zinc Metallic Coating



10. Hydro-test



11. Cement Lining



12. Bituminous Coating



13. Shipping



14. Final Product at the project site

4 History of Ductile Iron

Grey Iron is being produced since hundreds of years. In 1948, a major event occurred when small amount of magnesium were added to molten cast iron.

It was found that the Flaky Graphite were changed to spheroidal shape, accordingly all mechanical properties of the metal were changed, the new metal is called Ductile Iron.



This gray cast iron pipeline was in service for more than 330 years. Today such pipes are manufactured from ductile iron. Ductile iron possesses all excellent properties of gray cast iron. Furthermore it has much better mechanical properties.

Advantages Of Ductile Iron Pipes

- High tensile strength, good elastic module and excellent ductility, making it suitable for high stress applications and where pressure surge may be experienced.
- Ductile iron pipes have a high corrosion resistance.
- 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.
- Transmission of gas & fuel.



In the previously used Grey Iron the carbon was present in flake form, rendering the material brittle.



In ductile iron the graphite particles appear as small spheres, eliminating any risk of crack propagation. The material is no longer brittle. It is strong and ductile.

5 Mechanical Properties

Mechanical Properties	Symbol	Unit	Value	
			Pipes	Fittings
1. Minimum Tensile Strength	Rm	MPa	420	420
2. Minimum Yield Strength	Rp0.2	MPa	300**	300
3. Minimum Elongation at break	A	(%)	10	5
4. Maximum Hardness		HB	230	250

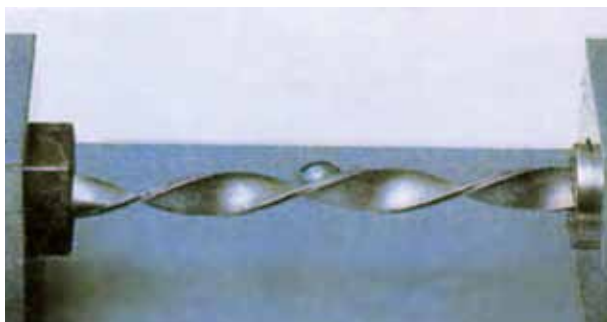
The following physical values are generally given for ductile iron and used for calculation purposes

Mechanical Properties	Symbol	Unit	Value
1. Density	p	kg/m ³	7050
2. Modulus of Elasticity	E*	MPa	170000
3. Poisson's Ratio	V*	-	0.28
4. Thermal Expansion co-efficient*	∞	-	11.5x10 ⁻⁶ k ⁻¹
5. Roughness Equivalent*** co-efficient (water transfer)	K*	-	0.03 mm (single pipe) 0.1 (for the main)
6. Corresponding Value for Hazen Williams formula	C*	-	147 for single pipe 138 for the main

* These values are not defined by ISO standard consequently they are not committed contractually.

** 270 MPa are allowed with an elongation at break is greater than 12%.

*** For further details regarding roughness of D.I. pipes, please consult SADIP.



Torsion of a strip



Deformation of a small DN pipe under external loading.



Hardness test



Micro analysis



Tensile strength and elongation

6 Standard Specifications and Approvals

6.1 Specifications

ISO 2531	Ductile Iron Pipes, Fittings and Accessories for Pressure Pipelines.
ISO 7186	Ductile Iron Products for Sewage applications.
BSEN 545	Ductile Iron Pipes, Fittings and Accessories and their joints for water pipelines. Requirements and test methods.
BSEN 598	Ductile Iron Pipes, Fittings and Accessories and their joints for sewerage applications. Requirements and test methods.
ISO 4179	Ductile Iron Pipes for pressure and Non pressure Pipelines- Centrifugal Cement Mortar Lining General Requirements.
BS 4027	Specification for sulfate-resisting Portland cement. Requirements for composition, strength, physical and chemical properties of three strength classes.
ISO 8179	Ductile Iron Pipes – External Zinc Coating.
BS 3416	Specification for Bitumen based coatings for cold application, suitable for use in contact with potable water.
ISO 4633	Rubber Seals- Joint Rings for water supply, Drainage and Sewerage Pipelines- Specs for materials.
BS 2494	Specification for elastomeric seals for joints in pipe work and pipelines.
ISO 8180	Ductile Iron Pipes-Polyethylene Sleeving.
ISO 7005-2	Metallic flanges – part 2 cast iron flanges.
ISO 4014	Hexagon head bolts – produced grades A and B.
ISO 4032	Hexagon nuts, style 1 – produced grades A and B.

6.2 Approvals

Bahrain:

Approved by Ministry of Electricity and Water (WDD specifications)

Kuwait:

Ministry of Water and Electricity approval for water and sewer applications

Oman:

MHEW (Ministry of Housing, Electricity & Water) approval pipes and fittings for all water and sewerage applications

Qatar:

ASHGHAL (Public Authority – Drainage Affairs) approval pipes and fittings for sewer applications

Qatar:

Kahramaa (Qatar General Electricity & Water Corporation) approval pipes and fittings for water applications and repair & maintenance.

Kingdom of Saudi Arabia:

Approval for water, sewerage and irrigation by Ministry of Water & Electricity as well as from Ministry of Municipal & Rural Affairs & approval in Civil Defense Approval in RCJY (Royal Commission for Jubail & Yanbu)

Turkey:

Approved by ISKI (Istanbul Water and Sewerage Administration)

UAE:

ADWEA (Abu Dhabi Water & Electricity Authority) approval for water applications and approval in ADSSC (Abu Dhabi Sewage Service Company).

Others:

Approvals for water and/or sewerage in Egypt, Iraq, Yemen, Jordan, Lebanon, Syria, Libya, Romania



7 Technical Comparison

Technical Comparison ISO 2531, BSEN545 & ANSI / AWWA Specifications vs SADIP Standard Specifications

	SADIP	ISO 2531	BSEN 545 (REPLACES BSI 4772)	ANSI / AWWA C151 / A21.51	REMARKS
Markings	<ul style="list-style-type: none"> Manufacturer's Name Nominal Size Year of Manufacture Symbol of Ductile Iron Additional Marking on request 	<ul style="list-style-type: none"> Manufacturer's Name Nominal Size Year of Manufacture Symbol of Ductile Iron 	<ul style="list-style-type: none"> Manufacturer's Name Nominal Size Year of Manufacture Symbol of Ductile Iron BSEN 545 	<ul style="list-style-type: none"> Manufacturer's Name Country Where Cast Weight Class or Nominal Thickness Casting period Year of Manufacture Letter's "DI" or Ductile Iron 	Sadip to provide additional markings.
Min. wall Thickness	4.7 mm	4.7 mm	4.7 mm	<ul style="list-style-type: none"> Std. Thickness – 5.1 mm Thickness Class 53 – 6.8 mm 	ANSI/AWWA wall thickness depending on class requirements
Min. Mechanical Properties	T. Strength = 420 Mpa. Elongation = 10%	420 Mpa. 10%	420 Mpa 10%	– 60,000 PSI (414 Mpa) – 10%	OK
Hardness	< 230 HB	< 230 HB	< 230 HB	N/A	N/A
Hydro–test	(DN 100 – 300) – 60 BAR (DN 350 – 600) – 50 BAR (DN 700 – 2000) – 35 BAR	(DN 100 – 300) – 50 BAR (DN 350 – 600) – 40 BAR (DN 700 – 1000) – 32 BAR (DN 1100 – 2000) – 25 BAR	(DN 100 – 300) – 50 BAR (DN 350 – 600) – 40 BAR (DN 700 – 1000) – 32 BAR (DN 1100 – 2000) – 25 BAR	(Pressure Class 350) – 35 Bars Min. for all sizes	OK
Cement Thickness	(DN 100 – 300) Nominal – 3.5 mm Min. ave. – 3.0 mm Min. 1 pt. – 2.0 mm (DN 350 – 600) Nominal – 5.0 mm Min. ave. – 4.5 mm Min. 1 pt. – 3.5 mm (DN 700 – 1200) Nominal – 6.0 mm Min. ave. – 5.5 mm Min. 1 pt. – 4.5 mm (DN 1400 – 2000) Nominal – 9.0 mm Min. 1 pt. – 6.0 mm	(ISO 4179) (DN 100 – 300) Nominal – 3.0 mm Min. 1 pt. – 2.0 mm (DN 350 – 600) Nominal – 5.0 mm Min. 1 pt. – 3.0 mm (DN 700 – 1200) Nominal – 6.0 mm Min. 1 pt. – 3.5 mm (DN 1400 – 2000) Nominal – 9.0 mm Min. 1 pt. – 6.0 mm	(DN 100 – 300) Nominal – 4.0 mm Min. 1 pt. – 2.5 mm (DN 350 – 600) Nominal – 5.0 mm Min. 1 pt. – 3.0 mm (DN 700 – 1200) Nominal – 6.0 mm Min. 1 pt. – 3.5 mm (DN 1400 – 2000) Nominal – 9.0 mm Min. 1 pt. – 6.0 mm	ANSI / AWWA C104/A21 – 4 (14" – 24") (DN 100–300) Min. Thickness = 1.6 mm (14" – 24") (DN 350–600) Min. Thickness = 2.4 mm (30" – 64") (DN 700–1600) Min. Thickness = 3.2 mm Note: Double thickness shall be furnished upon request.	OK
Acceptable Cement Cracks	(DN 100 – 300) – 0.6 max. (DN 350 – 600) – 0.7 max. (DN 700 – 2000) – 0.8 max.	(DN 100 – 300) – 0.6 max. (DN 350 – 600) – 0.7 max. (DN 700 – 1200) – 0.8 max. (DN 1400 – 2000) – 0.8 max	(DN 100 – 300) – 0.4 max. (DN 350 – 600) – 0.5 max. (DN 700 – 1200) – 0.6 max. (DN 1400 – 2000) – 0.8 max.	<ul style="list-style-type: none"> Circumferential cracks of any length are acceptable Longitudinal cracks with lengths equal to or less than the pipe circumference are acceptable. 	OK
Zinc	200 gm / m ²	(ISO 8179) 130 gm / m ²	130 gm / m ²	Asphaltic Outside Coating 25 µm Minimum	Outside coating material differs from SADIP
Bituminous Paint	100 µm min. at 1pt. 120 µm Ave. min.*	50 µm. Min at 1 pt. 70 µm. Ave. min.	50 µm. Min at 1 pt. 70 µm. Ave. min.		
External Diameter	DN 100 – 118 mm DN 150 – 170 mm DN 200 – 222 mm DN 250 – 274 mm DN 300 – 326 mm DN 350 – 378 mm DN 400 – 429 mm DN 500 – 532 mm DN 600 – 635 mm DN 700 – 738 mm DN 800 – 842 mm DN 900 – 945 mm DN 1000 – 1048 mm DN 1100 – 1152 mm DN 1200 – 1255 mm DN 1400 – 1462 mm DN 1500 – 1565 mm DN 1600 – 1668 mm DN 1800 – 1875 mm DN 2000 – 2082 mm	DN 100 – 118 mm DN 150 – 170 mm DN 200 – 222 mm DN 250 – 274 mm DN 300 – 326 mm DN 350 – 378 mm DN 400 – 429 mm DN 500 – 532 mm DN 600 – 635 mm DN 700 – 738 mm DN 800 – 842 mm DN 900 – 945 mm DN 1000 – 1048 mm DN 1100 – 1152 mm DN 1200 – 1255 mm DN 1400 – 1462 mm DN 1500 – 1565 mm DN 1600 – 1668 mm DN 1800 – 1875 mm DN 2000 – 2082 mm	DN 100 – 118 mm DN 150 – 170 mm DN 200 – 222 mm DN 250 – 274 mm DN 300 – 326 mm DN 350 – 378 mm DN 400 – 429 mm DN 500 – 532 mm DN 600 – 635 mm DN 700 – 738 mm DN 800 – 842 mm DN 900 – 945 mm DN 1000 – 1048 mm DN 1100 – 1152 mm DN 1200 – 1255 mm DN 1400 – 1462 mm DN 1500 – 1565 mm DN 1600 – 1668 mm DN 1800 – 1875 mm DN 2000 – 2082 mm	DN 100 (4 in.) – 122.0 mm DN 150 (6 in.) – 175.2 mm DN 200 (8 in.) – 230.0 mm DN 250 (10 in.) – 282.0 mm DN 300 (12 in.) – 335.2 mm DN 350 (14 in.) – 388.6 mm DN 400 (16 in.) – 442.0 mm DN 500 (20 in.) – 548.6 mm DN 600 (24 in.) – 655.3 mm DN 700 (30 in.) – 812.0 mm DN 800 (32 in.) – 914.0 mm mm DN 900 (36 in.) – 972.8 mm DN 1000 (40 in.) – 1130.3 mm DN 1200 (48 in.) – 1290.3 mm DN 1400 (56 in.) – 1462.0 mm DN 1500 (60 in.) – 1564.9 mm DN 1600 (64 in.) – 1668.0 mm	External diameter is bigger than SADIP
Impact Test	9.49 Joules Min. (Upon Customers Request)	N/A	N/A	9.49 Joules Min.	OK

8 Maximum Pressures

The maximum pressures for SADIP pipeline components are indicated in the table below (The components are designed to accept the following values):

Maximum allowable pressure Excluding pressure surges	Maximum operating pressure Including pressure surges	Maximum site test pressure
Values given in the table	Values given in the table +20%	Values given in the table +50%

Maximum allowable pressure

Allowable operating pressure for SADIP ductile iron pipes and fittings in bar (excluding pressure surge) are as follows:

D.I. Pipes		(K9) Fittings
DN 80	64	64
DN 100	64	64
DN 125	64	64
DN 150	64	57
DN 200	62	50
DN 250	54	46
DN 300	49	43
DN 350	45	41
DN 400	42	40
DN 450	40	40
DN 500	38	38
DN 600	36	36
DN 700	34	34
DN 800	32	32
DN 900	31	31
DN 1000	30	30
DN 1100	29	29
DN 1200	28	28
DN 1400	28	28
DN 1500	27	27
DN 1600	27	27
DN 1800	26	26
DN 2000	26	26

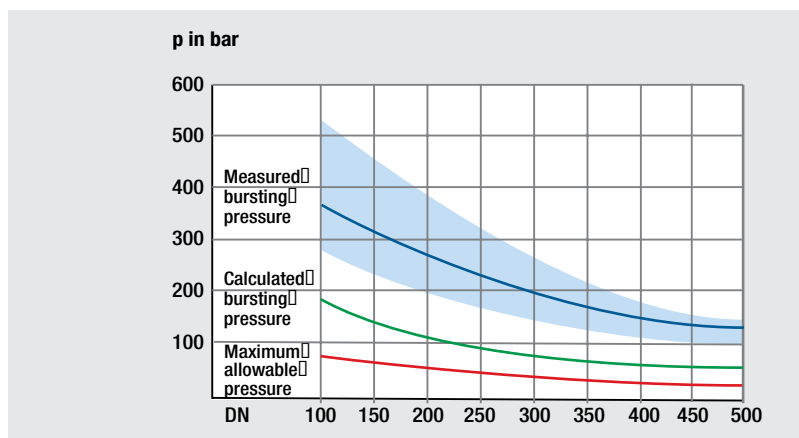
All SADIP pipes and fittings are subjected to hydrostatic test pressure 100% as follows:

DN	Pipes		Fittings	
	bar*	bar**	bar*	bar**
100 – 300	60	50	60	25
350 – 600	45	40	45	16
700 – 1000	35	32	35	10
1100 – 2000	30	25	30	10

* = SADIP Actual Test Pressure

** = ISO 2531 requirement for Pressure Test

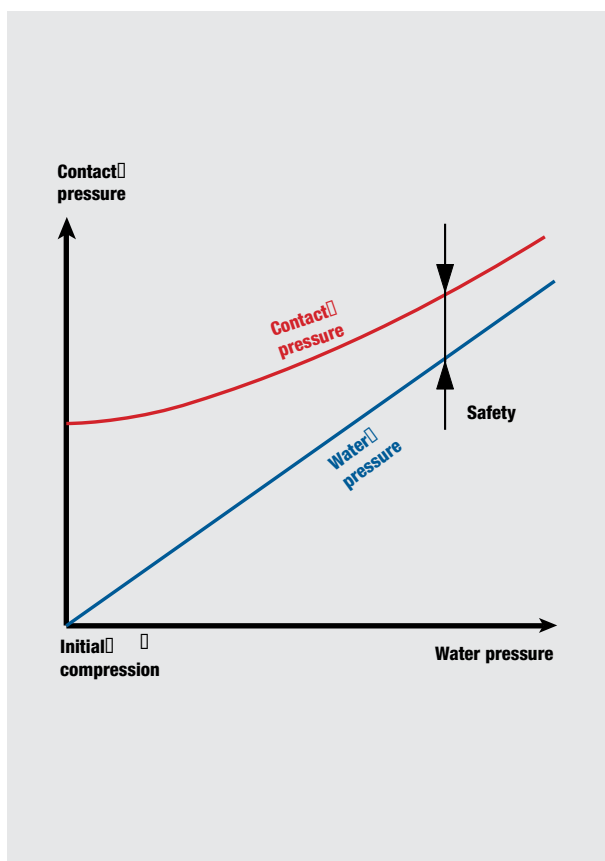
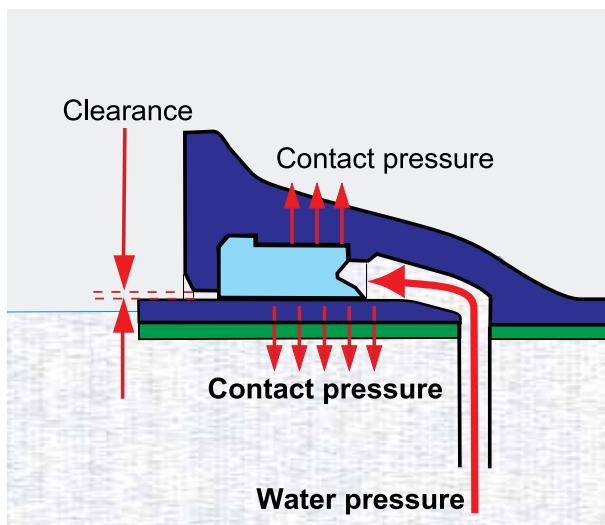
The graph below shows that bursting pressure is more than double the maximum allowable pressure.



9 Pipe Joints

The standard joints for the pipes are designed so that contact pressure between the gasket and the metal increases as the water pressure increases, thus a perfect seal is guaranteed.

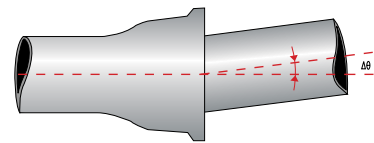
The rubber gasket for the pipes is standard type where a triduct gasket is offered for fittings which similar to tyton joint. These gaskets are EDPM rubber according to ISO 4633.



Pipes Deflection

SADIP socket – spigot joints permits angular deflection which gives the following advantages:

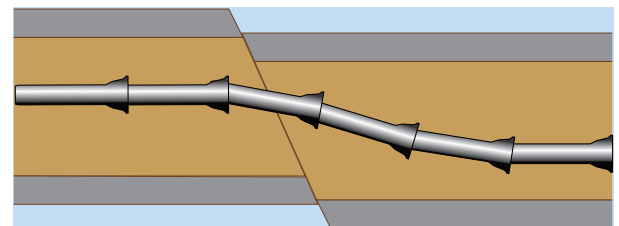
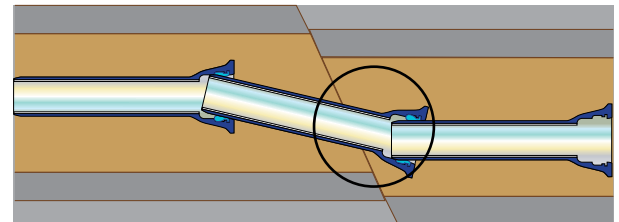
- Accommodation of ground movements as shown in the diagrams below.
- Allowing adjustment while installation.
- Reducing the number of bends required.



DN 80-150	DN 200-300	DN 350-600	DN 700-800	DN 900-2000
5°	4°	3°	2°	1°30'

Permissible deflection of each joint in degrees ($\Delta\theta$)

Ground level



10 Product Range

10.1 Pipe Specifications

Ductile Iron (Socket & Spigot) pipes are manufactured by centrifugal process to meet in every aspect the requirements of International Standard ISO 2531, BSEN545.

All pipes have standard 2 GS push - on joint.
The standard effective length of the pipe is 6.0 meters.
However, 10% of the pipes can be supplied shorter than 6 meters as per ISO 2531.

Internal Coating

Pipes are lined internally with Portland cement (Sulphate resistant type V). Cement is applied by centrifugal process in compliance with ISO 4179. Thickness of cement is according to ISO & BSEN standards.

SADIP can offer any different specification or coating as per customer requirement.

External Coating

Pipes are coated externally by pure metallic Zinc (minimum 99.995 purity) at a rate of 200 g/m², which represents 50% more than the requirement of ISO 8179 (DN 900 mm and above 130 g/m² or 200 g/m² as per customer request).

Zinc is then covered by 120 microns of bituminous paint as per ISO 8179-1.

SADIP can offer any different specification or coating as per customer requirement.

Marking

The following marking is casted on each pipe (on the socket):

- The nominal diameter of the pipe (DN).
- The type of socket (STD) which means standard type.
- The manufacturer mark (SADIP).
- An indication that the casting is of the ductile iron (2GS).
- Date and ladle no. of casting.

...other markings on request

SADIP Ductile Iron Pipes Specifications

Nominal Diameter DN (mm)	Average Effective Length (L) (m)	Wall Thickness e (mm)	Cement Lining Thickness (mm)	Max Working Pressure (bar)	Mass (kg/m)	Angular Deflection (deg.)*	Max. Depth of Cover with Truck Load (m)
100	6	6.0	3.5	64	18.5	5.0	17.00
125	6	6.0	3.5	64	23.0	5.0	13.00
150	6	6.0	3.5	64	27.5	5.0	10.30
200	6	6.3	3.5	62	37.0	4.0	7.40
250	6	6.8	3.5	54	48.0	4.0	6.50
300	6	7.2	3.5	49	61.0	4.0	6.10
350	6	7.7	5.0	45	80.5	3.0	5.80
400	6	8.1	5.0	42	95.5	3.0	5.60
450	6	8.6	5.0	40	113.0	3.0	5.50
500	6	9.0	5.0	38	131.0	3.0	5.30
600	6	9.9	5.0	36	170.0	3.0	5.10
700	6	10.8	6.0	34	219.0	2.0	5.10
800	6	11.7	6.0	32	269.0	2.0	4.80
900	6	12.6	6.0	31	320.0	1.3	4.70
1000	6	13.5	6.0	30	378.0	1.3	4.60
1100	6	14.4	6.0	29	440.0	1.3	4.40
1200	6	15.3	6.0	28	506.0	1.3	4.30
1400	6	17.1	9.0	28	694.0	1.3	4.10
1500	6	18.0	9.0	27	779.0	1.3	4.00
1600	6	18.9	9.0	27	868.0	1.3	3.90
1800	6	20.7	9.0	26	1058.0	1.3	3.80
2000	6	22.5	9.0	26	1266.0	1.3	3.60

* Maximum angular deflection will not affect the sealing of rubber gasket

Pipes manufactured by SADIP.

Pipes not manufactured by SADIP but can be supplied.

10.2 Coating

Zinc Coating

All SADIP pipes and fittings are coated externally by pure metallic zinc at the rate of 200g/m² which represents 50% increase over ISO standards, then zinc is covered by a bituminous paint of 120 microns.

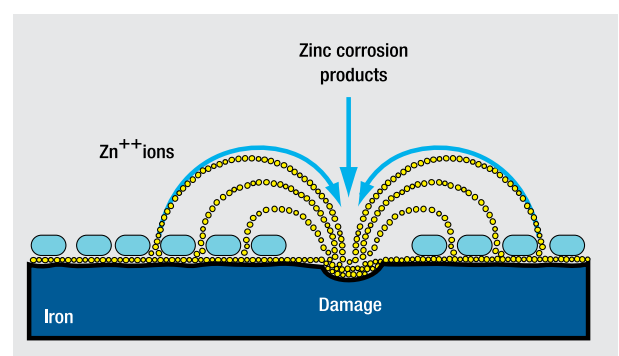
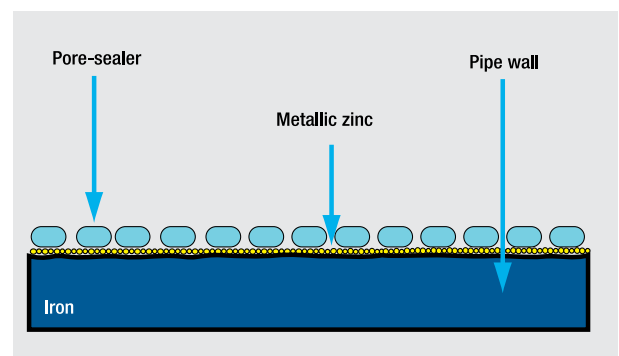
One of the particular features of zinc coating is its capacity for restoring the continuity of the protective layer at points where it is locally damaged. The Zn^{++} ions migrate to plug the damaged area and are then converted into stable insoluble zinc product as shown below.

Zinc coating is considered the built in Cathodic Protection due to the huge amount of zinc distributed uniformly all over the pipe. The table below shows the amount of zinc in kgs over 1km of the pipe.



Pipe Size (mm, in.)	Zn coating kg/km
DN 100 (4 inch)	75
DN 125 (5 inch)	91
DN 150 (6 inch)	107
DN 200 (8 inch)	140
DN 250 (10 inch)	173
DN 300 (12 inch)	205
DN 350 (14 inch)	238
DN 400 (16 inch)	270
DN 450 (18 inch)	302
DN 500 (20 inch)	335
DN 600 (24 inch)	399
DN 700 (28 inch)	464
DN 800 (32 inch)	530
DN 900 (36 inch) *	386
DN 1000 (40 inch) *	428
DN 1100 (44 inch) *	471
DN 1200 (48 inch) *	513
DN 1400 (56 inch) *	598
DN 1500 (60 inch) *	640
DN 1600 (64 inch) *	682
DN 1800 (72 inch) *	766
DN 2000 (80 inch) *	851

* 130 g/m²



PU Coating (internal and external)

One hundred percent solids plural components polyurethane are protecting many different structures today, such as storage tanks, oil and gas piping, water and wastewater tank internals, bridges, ships and other marine facilities.

The products have been effective because of their outstanding life expectancy and performance, resistance to aggressively corrosive environments, high abrasion resistance, low temperature curing capability, strong adhesion, high film build, fast application, and compliance with the most rigorous regulations on volatile organic compound (VOC) emissions.

Polyurethane is highly resistant against abrasion and erosion, aggressive products such as chemicals, gases, diluted acid, water suspended materials, water, crude oil, swage, petroleum.

100% solids polyurethane coatings usually consist of two components: One isocyanate-rich solution and one polyol-rich solution. Such a polyurethane coating film is formed when the two components are combined: a rapid an exothermic chemical polymerization reaction takes place.



Cement Lining

Cement lining is applied internally by a centrifugal process, in which the mortar is introduced into the pipe and rotated at high speed, giving excellent compaction.

The lining is then cured under controlled temperature and humidity giving it the optimum mechanical strength and also producing a very smooth surface which reduces head losses and guarantees long-term hydraulic efficiency.



Cement Lining is an active coating, when the pipe is filled, the mortar gradually absorbs water, which becomes enriched in Alkaline substances. Consequently, it is non-corrosive when it reaches the proximity of the metal wall. Also, cement lining demonstrated the ability to withstand limited pipe deflection and good performance under high top loads.

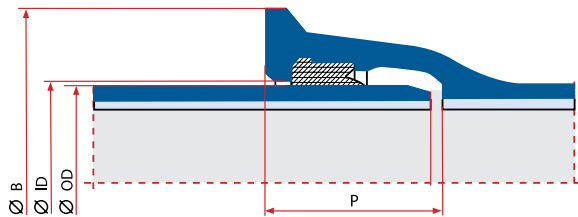
Type	EXTERNAL	
	Pipes	Fittings
Standard Coating External Supplementary Protection	Metallic Zinc + bituminous paint + Polyethylene Sleeving (applied on site)	Metallic Zinc + bituminous paint + Polyethylene Sleeving (applied on site)
Special Coatings	Polyurethane Different kinds of Epoxy (F.B.E., Ceramic Epoxy, Coal Tar, SIPTANK256, etc...)	Polyurethane Different kinds of Epoxy (F.B.E., Ceramic Epoxy, Coal Tar, SIPTANK256, etc...)

Type	INTERNAL	
	Pipes	Fittings
Standard Coating	Blast Furnace Cement mortar	Blast Furnace Cement mortar
Internal Reinforced protections	High Alumina cement mortar Lining	High Alumina cement mortar Lining
	Polyurethane Different kinds of Epoxy (F.B.E., Ceramic Epoxy, Coal Tar, SIPTANK256, etc...)	Polyurethane Different kinds of Epoxy (F.B.E., Ceramic Epoxy, Coal Tar, SIPTANK256, etc...)

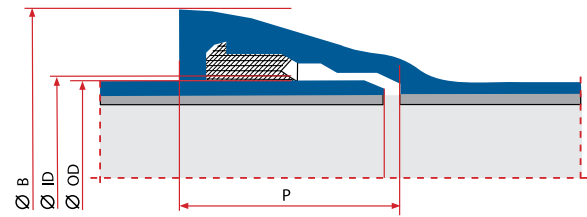
10.3 Pipes and Joints

10.3.1 Pipes

STANDARD PUSH-ON PIPES



DN 80 to 1200



DN 1400 to 1800

Ductile Iron Pipes (K9) Standard Type

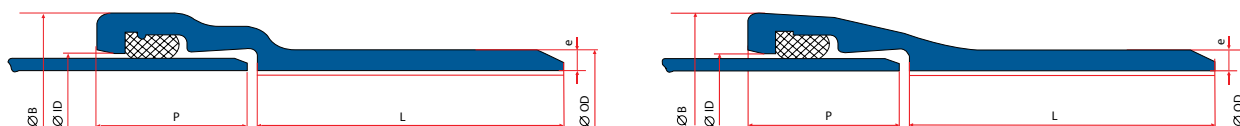
Nominal Diameter DN	Average effective length L m	Barrel		Socket			Average Mass	
		e thickness mm	OD mm	ID mm	P mm	B mm	L:6 m kg	Per Meter kg
80	6	6.0	98	101	90	168	87.5	15.00
100	6	6.0	118	121	92	189	109.0	18.50
125	6	6.0	144	147	95	216	137.0	23.00
150	6	6.0	170	173	98	243	164.0	27.50
200	6	6.3	222	225	104	296	222.0	37.00
250	6	6.8	274	277	104	353	290.0	48.00
300	6	7.2	326	329	105	410	364.0	61.00
350	6	7.7	378	381	108	465	482.0	80.50
400	6	8.1	429	432	110	517	573.0	95.50
450	6	8.6	480	483	113	575	676.0	113.00
500	6	9.0	532	535	115	630	781.0	131.00
600	6	9.9	635	638	120	739	1,018.0	170.00
700	6	10.8	738	741	145	863	1,314.0	219.00
800	6	11.7	842	845	145	974	1,614.0	269.00
900	6	12.6	945	948	145	1,082	1,920.0	320.00
1000	6	13.5	1048	1,051	155	1,191	2,268.0	378.00
1100	6	14.4	1,151	1,154	160	1,300	2,658.0	443.00
1200	6	15.3	1,255	1,258	165	1,412	3,036.0	506.00
1400	6	17.1	1,462	1,465	245	1,592	4,164.0	694.00
1500	6	18.0	1,565	1,568	265	1,710	4,674.0	779.00
1600	6	18.9	1,668	1,671	265	1,816	5,208.0	868.00
1800	6	20.7	1,875	1,878	275	2,032	6,348.0	1,058.00

* Maximum angular deflection will not affect the sealing of the rubber gasket

Pipes manufactured by SADIP

Pipes not manufactured by SADIP but can be supplied

TYTON (TRIDUCT) PUSH-ON PIPES



Ductile Iron Pipes (K9) Tyton (Triduct) Type

Nominal Diameter DN	Barrel		Socket			Average Mass	
	e thickness mm	OD mm	ID mm	P mm	B mm	L: 6 m kg	Per Meter kg
80	6.0	98	101	84	142	87.50	15.00
100	6.0	118	121	88	163	109.00	18.50
150	6.0	170	173	94	217	164.00	27.50
200	6.3	222	225	100	278	222.00	37.00
250	6.8	274	277	105	336	290.00	48.00
300	7.2	326	329	110	393	364.00	61.00
350	7.7	378	381	110	448	482.00	80.50
400	8.1	429	432	110	500	573.00	95.50
500	9.0	532	535	120	604	781.00	131.00
600	9.9	635	638	120	713	1,018.00	170.00
700	10.8	738	741	150	824	1,314.00	219.00
800	11.7	842	845	160	943	1,614.00	269.00
900	12.6	945	948	175	1,052	1,920.00	320.00
1000	13.5	1048	1,051	185	1,158	2,268.00	378.00
1100	14.4	1,151	1,154	200	1,267	2,658.00	443.00
1200	15.3	1,255	1,258	215	1,377	3,036.00	506.00
1400	17.1	1,462	1,465	215	1,632	4,164.00	694.00
1600	18.9	1,668	1,671	265	1,850	5,208.00	868.00
1800	20.7	1,875	1,878	275	2,049	6,348.00	1,058.00
2000	22.5	2,082	2,085	285	2,231	7,596.00	1,266.00

* Maximum angular deflection will not affect the sealing of the rubber gasket

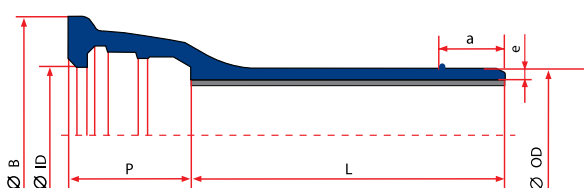
 Pipes manufactured by SADIP

 Pipes not manufactured by SADIP but can be supplied

LOCKED PUSH-ON PIPES

The Locked Push-On pipes are similar to the standard type, except that pipe is supplied with weld bead at the near end of the spigot (distance “a” in below drawing). The purpose of the weld bead is to make the pipe suitable to accommodate restrained joint. Restrained joints are required on above ground.

Locked pipe can be supplied with full-restrained joint accessories (glands, rings, bolts & nuts).

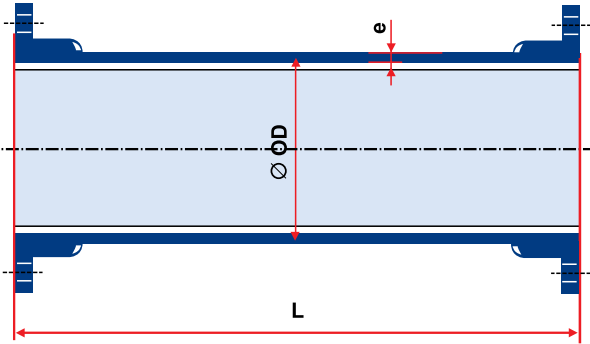


Ductile Iron Pipes (K9) Locked Type

Nominal Diameter DN	Average effective length L m	Barrel		Socket			Spigot	Average mass	
		e mm	OD mm	ID mm	P mm	B mm	a mm	L: 6m kg	L: 1m kg
80	6	6.0	98	101	90	168	85.0	87.5	15.0
100	6	6.0	118	121	92	189	90.0	109.0	18.5
125	6	6.0	144	147	95	216	90.0	137.0	23.0
150	6	6.0	170	173	98	243	95.0	164.0	27.5
200	6	6.3	222	225	104	296	100.0	222.0	37.0
250	6	6.8	274	277	104	353	110.0	290.0	48.0
300	6	7.2	326	329	105	410	115.0	364.0	61.0
350	6	7.7	378	381	108	465	114.0	482.0	80.5
400	6	8.1	429	432	110	517	113.0	573.0	95.5
450	6	8.6	480	483	113	575	119.0	676.0	113.0
500	6	9.0	532	535	115	630	125.0	781.0	131.0
600	6	9.9	635	638	120	739	135.0	1018.0	170.0
700	6	10.8	738	741	145	863	158.0	1314.0	219.0
800	6	11.7	842	845	145	974	165.0	1613.0	269.0

FLANGED PIPES

Flanged pipes are class K9, centrifugally cast with welded flanges PN10, 16 or 25 (PN 40 for diameter \leq DN 300). Gaskets for flanges are normally EPDM elastomer rubber as per ISO 4633. The normal gasket can be improved by steel reinforced rubber gasket.



Flanged Ductile Iron Pipes (K9)* (Centrifugally Cast Pipes)

Nominal Diameter DN	Barrel		Barrel per meter kg/m	** Masses			
	Iron thickness e (K9) mm	OD mm		of two flanges			
				PN 10 kg	PN 16 kg	PN 25 kg	PN 40 kg
80	6.0	98	14.0	6.4	6.4	6.4	6.4
100	6.0	118	17.4	7.4	7.4	8.4	8.4
150	6.0	170	26.2	12.1	12.1	13.7	17.6
200	6.3	222	35.2	19.5	17.0	20.5	30.0
250	6.8	274	45.9	27.0	24.5	31.0	-
300	7.2	326	57.6	34.5	36.0	48.5	-
350	7.7	378	76.4	41.0	49.0	65.0	-
400	8.1	429	90.6	50.0	61.0	85.0	-
500	9.0	532	123.1	69.0	98.0	126.0	-
600	9.9	635	159.7	98.0	151.0	179.0	-
700	10.8	738	205.4	134.0	424.0	519.0	-
800	11.7	842	251.3	180.0	541.0	669.0	-
900	12.6	945	300.7	215.0	-	-	-
1000	13.5	1048	354.3	269.0	-	-	-
1100	14.4	1151	412.0	343.0	-	-	-
1200	15.3	1255	474.2	409.0	-	-	-
1400	17.1	1462	641.6	512.0	-	-	-

* These pipes can be supplied in all lengths between 0.3 m and 5.9 m, where intergrally cast pipe max. length is 2.5 m

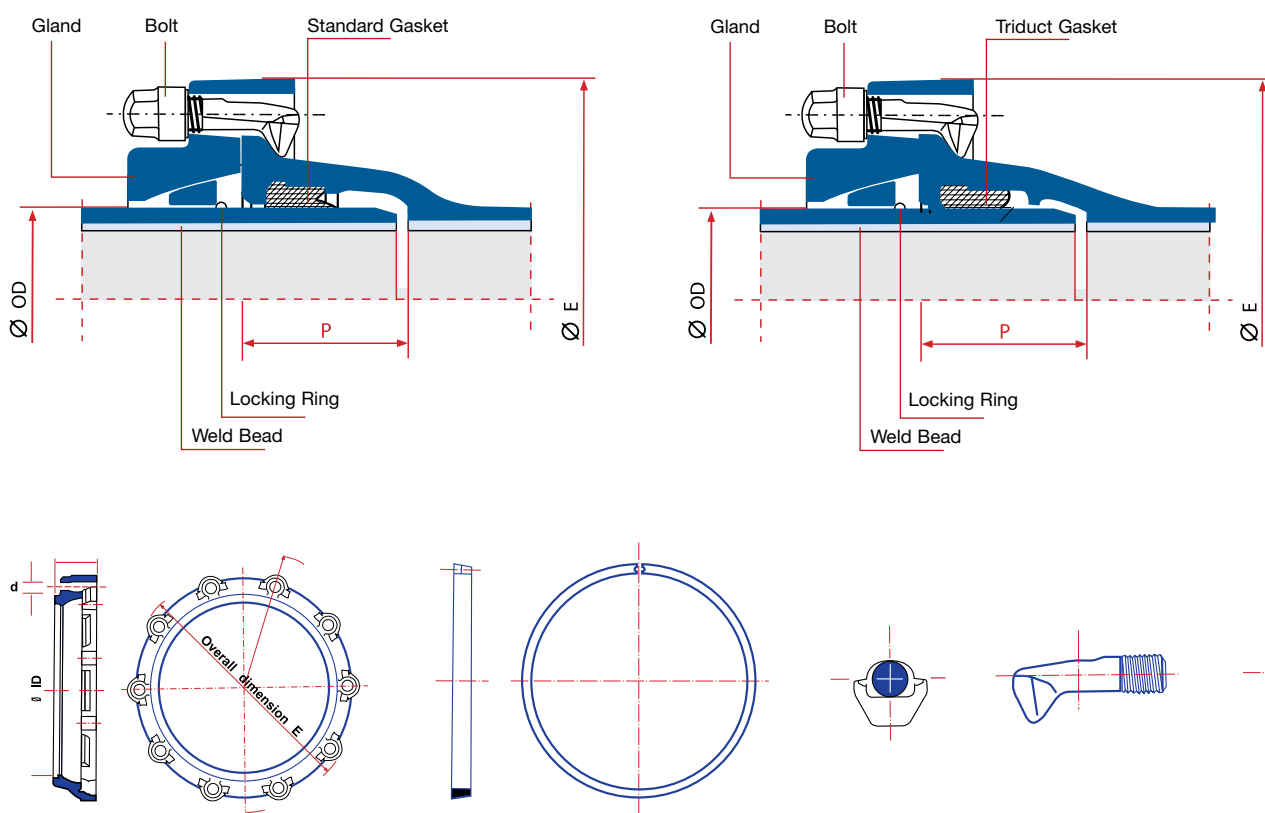
** The masses indicated here are average values

10.3.2 Joints

Lock (Restrained) Joints consist of two main types of joints, the “locked standard” and “locked triduct”. These joints differ only in the shape of the gasket.

The other joint accessories, as well as the method of assembly, are identical for both types of joints. These locked joints are produced by means of:

- Weld bead executed at the works and located at the spigot end of the pipe.
- A circular split locking ring, with a convex spherical shape on the outside, and having a roughly trapezoidal section. This ring rests against the weld bead.
- A special gland which locks the split ring. This gland is equipped with bolts which grip the socket rim and lock the joint.



Nominal Diameter DN	OD mm	P		E mm	ID	Bolt		Masses				
		Standard mm	Triduct mm			Number	Diameter length mm	Gland kg	Ring kg	Standard Gasket kg	Triduct Gasket kg	per bolt kg
80	98	90	84	234	104.0	4	D2-22X70	3.5	0.55	0.14	0.140	0.35
100	118	92	88	255	128.0	4		4.8	0.48	0.20	0.165	0.35
150	170	98	94	311	154.0	6		7.5	0.93	0.29	0.235	0.35
200	222	104	100	364	179.0	8		9.5	1.50	0.38	0.390	0.35
250	274	104	105	457	231.0	6	D7-27X102	21.0	2.80	0.50	0.510	0.75
300	326	105	110	516	285.3	8		28.0	3.70	0.71	0.715	0.75
350	378	108	110	570	338.2	8		28.5	4.50	0.90	0.830	0.75
400	429	110	110	618	390.5	10		36.0	4.50	1.10	1.150	0.75
500	532	115	120	734	442.0	16		58.0	6.70	1.54	1.700	0.75
600	635	120	120	840	544.5	20		63.5	9.60	2.16	2.400	0.75
700	738	145	150	958	648.0	24	27x123	109.0	14.60	2.87	3.500	0.92
800	842	145	160	1069	862.0	30	27X123	115.0	11.20	3.67	4.900	0.92

10.4 Fittings and Flanges

Ductile iron fittings are in accordance with the international standard ISO 2531 & BSEN545. Fittings socket is of a triduct push-on joint. Flange joints are dimensioned and drilled according to ISO 2531, PN 10, 16 OR 25 (PN40 for diameters \leq DN300). All fittings are class K12 except the Tees which are class K14.



Internal Coating

Fittings are lined internally with portland cement (sulphate resistance type V) as per ISO 4179.

External Coating

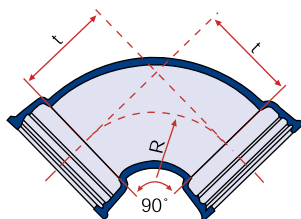
Fittings are coated externally by pure metallic zinc (minimum 99.995 purity) with thickness of 100 microns. Zinc is then covered by 120 microns of bituminous paint as per ISO 8179-2.

Marking

The marking of fittings is in accordance with the standard ISO 2531.

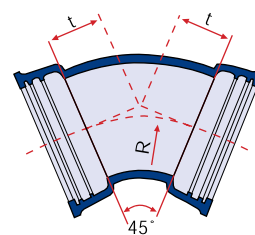
10.4.1 Bends

DOUBLE SOCKET – 90° BENDS



Nominal Diameter DN	R mm	t mm	Mass kg
80	74	91	7.9
100	87	105	10.3
150	133	152	18.5
200	160	180	30.5
250	240	262	50.5
300	290	314	73.0
350	340	370	83.0
400	390	420	113.0
500	485	520	183.0
600	580	620	273.0
700	–	720	399.0
800	–	820	535.0
900	–	920	813.0
1000	–	1020	1045.0
1100	–	1120	1253.0
1200	–	1220	1663.0
1400	–	1220	1949.0
1500	–	1270	2276.0
1600	–	1290	2626.0
1800	–	1320	3948.0
2000	–	1360	4204.0
2200	–	1400	–
2400	–	1460	–
2600	–	1520	–

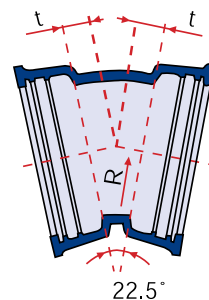
DOUBLE SOCKET – 45° BENDS



Nominal Diameter DN	R mm	t mm	Mass kg
80	95	56	7.2
100	115	66	9.4
150	177	92	16.4
200	193	100	24.0
250	297	145	41.5
300	346	167	56.5
350	346	168	73.5
400	392	189	91.0
500	501	237	149.0
600	595	280	216.0
700	725	335	312.0
800	809	364	419.0
900	–	415	496.0
1000	–	460	635.0
1100	–	505	856.0
1200	–	550	986.0
1400	–	515	1273.0
1500	–	540	1640.0
1600	–	565	1740.0
1800	–	610	2296.0
2000	–	660	2970.0
2200	–	710	3962.0
2400	–	755	4665.0
2600	–	805	5721.0

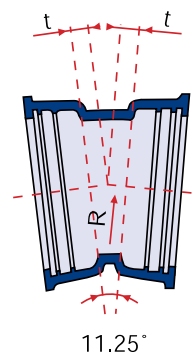
DOUBLE SOCKET – 22.5° BENDS

Nominal Diameter DN	R mm	t mm	Mass kg
80	75	32	6.5
100	87	35	8.3
150	115	42	13.5
200	155	51	20.5
250	191	60	33.0
300	226	69	43.0
350	266	78	58.0
400	326	92	71.0
500	402	110	111.0
600	522	138	158.0
700	615	157	232.0
800	711	170	307.0
900	–	220	373.0
1000	–	240	470.0
1100	–	260	644.0
1200	–	285	716.0
1400	–	260	933.0
1500	–	270	1377.0
1600	–	280	1659.0
1800	–	305	1663.0
2000	–	330	2144.0
2200	–	355	2707.0
2400	–	380	3359.0
2600	–	400	4087.0



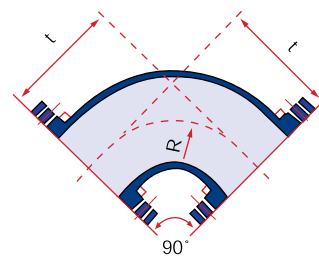
DOUBLE SOCKET – 11.25° BENDS

Nominal Diameter DN	R mm	t mm	Mass kg
80	233	40	6.8
100	228	40	8.5
150	274	46	13.8
200	324	52	20.0
250	238	45	31.5
300	264	50	40.5
350	290	54	54.0
400	316	58	65.0
500	417	71	100.0
600	588	92	136.0
700	533	87	197.0
800	624	90	255.0
900	–	120	305.0
1000	–	130	381.0
1100	–	140	525.0
1200	–	150	568.0
1400	–	130	747.0
1500	–	140	908.0
1600	–	140	1007.0
1800	–	155	1331.0
2000	–	165	1702.0
2200	–	190	2183.0
2400	–	205	2709.0
2600	–	215	3290.0



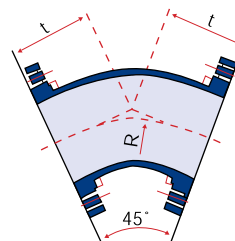
DOUBLE FLANGED – 90° BENDS

Nominal Diameter DN	R mm	t mm	Mass with flange			
			PN 10 kg	PN 16 kg	PN 25 kg	PN 40 kg
80	74	165	10.4	10.4	10.6	10.6
100	87	180	13.0	13.0	14.0	14.0
150	133	220	23.0	23.0	25.0	25.0
200	160	260	37.5	37.5	40.5	44.0
250	240	350	59.0	58.0	64.0	86.0
300	290	400	85.0	83.0	91.0	122.0
350	366	450	124.0	129.0	144.0	-
400	409	500	167.0	166.0	191.0	-
500	495	600	265.0	287.0	306.0	-
600	581	700	388.0	431.0	453.0	-
700	695	800	564.0	561.0	640.0	-
800	785	900	782.0	778.0	886.0	-
900	-	1000	698.0	745.0	-	-
1000	-	1100	907.0	990.0	-	-
1100	-	1200	1164.0	1234.0	-	-
1200	-	1300	1452.0	1562.0	-	-
1400	-	1350	1948.0	2062.0	-	-
1500	-	1400	2273.0	2449.0	-	-
1600	-	1450	2663.0	2841.0	-	-
1800	-	1500	3348.0	3572.0	-	-



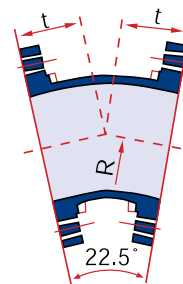
DOUBLE FLANGED – 45° BENDS

Nominal Diameter DN	R mm	t mm	Mass with flange			
			PN 10 kg	PN 16 kg	PN 25 kg	PN 40 kg
80	95	130	9.8	9.8	10.0	10.0
100	115	140	12.1	12.1	13.1	13.1
150	177	160	21.0	21.0	23.0	23.0
200	193	180	31.0	31.0	34.0	37.5
250	297	243	53.0	52.0	58.0	79.0
300	346	274	74.0	72.0	79.0	113.0
350	346	306	100.0	100.0	114.0	-
400	392	337	124.0	133.0	151.0	-
500	501	400	197.0	223.0	235.0	-
600	595	463	289.0	339.0	345.0	-
700	725	478	341.0	338.0	414.0	-
800	809	529	452.0	448.0	557.0	-
900	-	580	519	567	-	-
1000	-	630	668	751	-	-
1100	-	695	857	927	-	-
1200	-	750	1050	1178	-	-
1400	-	775	1388	1524	-	-
1500	-	810	1677	1853	-	-
1600	-	845	1915	2119	-	-
1800	-	910	2465	2717	-	-
2000	-	980	3149	3455	-	-
2200	-	880	3446	3804	-	-
2400	-	945	4277	4719	-	-
2600	-	1005	5175	5695	-	-



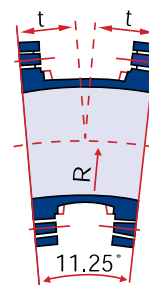
DOUBLE FLANGED - 22.5 BENDS

Nominal Diameter DN	R mm	t mm	Mass with Flange			
			PN 10 kg	PN 16 kg	PN 25 kg	PN 40 kg
80	75	105	9.1	9.1	9.3	9.3
100	87	110	11.0	11.0	12.0	12.0
150	115	109	18.2	18.2	20.0	20.0
200	155	131	27.0	27.0	30.0	33.5
250	191	167	40.0	44.5	50.0	70.0
300	226	175	60.0	59.0	66.0	99.0
350	266	215	84.0	85.0	98.0	-
400	326	239	104.0	113.0	131.0	-
500	402	272	160.0	186.0	198.0	-
600	522	320	234.0	284.0	290.0	-
700	615	300	261.0	258.0	334.0	-
800	711	335	340.0	336.0	445.0	-
900	-	581	525.6	577.0	638.0	-
1000	-	632	677.0	760.0	838.0	-
1100	-	683	877.0	947.0	800.0	-
1200	-	735	1052.0	1183.0	1283.0	-
1400	-	835	1498.0	1633.0	-	-
1500	-	886	1838.0	2014.0	-	-
1600	-	940	2120.0	2324.0	-	-
1800	-	480	1549.0	1801.0	-	-
2000	-	520	1967.0	2273.0	-	-
2100	-	540	2371.0	2700.0	-	-
2200	-	560	2485.0	2819.0	-	-
2400	-	600	-	-	-	-
2600	-	640	-	-	-	-



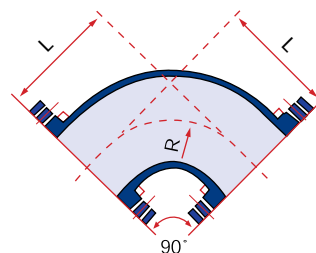
DOUBLE FLANGED - 11.25 BENDS

Nominal Diameter DN	R mm	t mm	Mass with Flange			
			PN 10 kg	PN 16 kg	PN 25 kg	PN 40 kg
80	233	113	9.4	9.4	9.6	9.6
100	228	115	11.3	11.3	12.3	12.3
150	274	113	18.5	18.5	20.5	20.5
200	324	132	27.0	27.0	30.0	33.5
250	238	152	44.0	43.0	49.0	69.0
300	264	156	57.0	56.0	63.0	97.0
350	290	191	80.0	80.0	94.0	-
400	316	205	97.0	106.0	124.0	-
500	417	233	148.0	174.0	186.0	-
600	588	274	215.0	265.0	271.0	-
700	533	230	227.0	223.0	299.0	-
800	624	255	290.0	286.0	395.0	-
900	-	581	528.6	576.0	637.0	-
1000	-	632	681.0	764.0	842.0	-
1100	-	683	882.0	952.0	805.0	-
1200	-	735	1059.0	1189.0	1289.0	-
1400	-	835	1507.0	1612.0	-	-
1500	-	885	1849.0	2025.0	-	-
1600	-	940	2132.0	2337.0	-	-
1800	-	345	1251.0	1279.0	-	-
2000	-	375	1580.0	1886.0	-	-
2100	-	390	1939.0	2267.0	-	-
2200	-	405	1996.0	2330.0	-	-
2400	-	435	2421.0	2825.0	-	-
2600	-	465	2900.0	3370.0	-	-



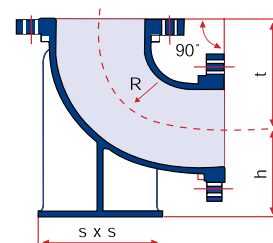
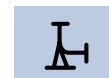
LONG RADIUS BENDS (DOUBLE FLANGED-90°)

Nominal Diameter DN	L mm	Mass		
		PN 10 kg	PN 16 kg	PN 25 kg
80	380	14.5	14.5	14.5
100	400	18.0	18.0	19.0
125	425	23.5	23.5	24.1
150	450	30.1	30.1	32.1
200	500	45.9	45.4	49.6
250	550	66.4	65.2	73.2
300	600	90.8	89.5	101.0
350	660	115.8	121.6	138.4
400	700	116.2	157.4	180.0
450	750	184.0	184.0	221.0
500	800	222.0	252.6	275.8
600	900	326.2	377.0	407.6
700	1000	454.4	484.2	-
800	1100	617.4	655.0	-
900	1200	798.6	846.4	-
1000	1300	1025.0	1108.0	-
1100	1400	1315.0	1385.0	-
1200	1500	1592.8	1721.6	-



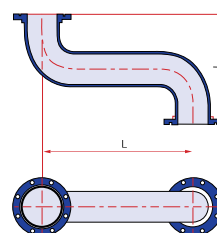
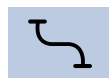
DUCKFOOT BENDS (DOUBLE FLANGED-90°)

Nominal Diameter DN	R mm	t mm	Duck foot		Mass with flange			
			h mm	s mm	PN 10 kg	PN 16 kg	PN 25 kg	PN 40 kg
80	74	165	110	180	13.8	13.8	14.0	14.0
100	87	180	125	200	17.2	17.2	18.2	18.2
150	133	220	160	250	31.5	31.5	33.5	33.5
200	160	260	190	300	48.0	48.0	51.0	55.0
250	240	350	225	350	85.0	84.0	90.0	111.0
300	290	400	255	400	119.0	117.0	125.0	158.0
350	366	450	290	450	170.0	164.0	183.0	-
400	409	500	320	500	225.0	217.0	245.0	-
500	495	600	385	600	360.0	373.0	394.0	-
600	581	700	450	700	537.0	569.0	592.0	-
700	695	800	515	800	764.0	746.0	822.0	-
800	785	900	580	900	1026.0	1003.0	1112.0	-
900	-	1000	645	1000	1152.0	1290.0	-	-
1000	-	1100	710	1100	1629.0	1698.0	-	-
1100	-	1200	776	1200	2080.0	2150.0	-	-
1200	-	1300	840	1300	2599.0	2709.0	-	-



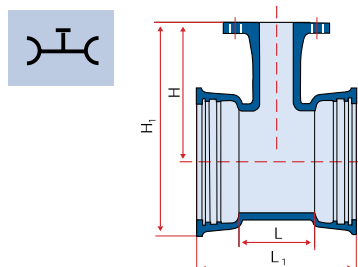
FLANGED "S" (HEIGHT ADJUSTMENT BENDS)

Nominal Diameter DN	L mm	I mm	Mass kg
80	500	350	16.0
100	500	350	19.5
150	500	350	31.6



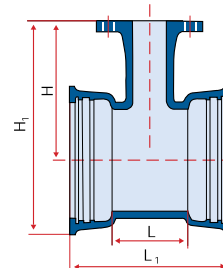
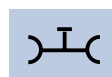
10.4.2 Tees

DOUBLE SOCKET TEES WITH FLANGED BRANCH



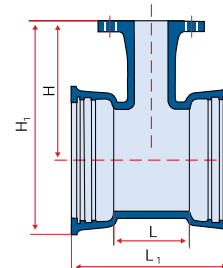
Nominal Diameter		L mm	L1 mm	H mm	H1 mm	Mass with flange			
Body DN	Branch dn					PN 10 kg	PN 16 kg	PN 25 kg	PN 40 kg
80	40	145	315	149	232	10.5	10.5	10.5	10.5
	65	145	315	174	257	11.9	11.9	12.0	12.0
	80	183	353	165	248	13.0	13.0	13.1	13.1
100	65	150	326	186	279	14.1	14.1	14.2	14.2
	80	185	361	177	270	15.2	15.2	15.3	15.3
	100	210	386	180	273	16.5	16.5	17.0	17.0
150	65	154	342	201	321	18.7	19.7	19.8	19.8
	80	165	353	210	330	21.0	21.0	21.0	21.0
	100	190	378	215	335	22.5	22.5	23.0	23.0
	150	305	493	220	340	30.0	30.0	31.0	31.0
200	65	159	359	234	381	27.0	27.0	27.0	27.0
	80	170	370	240	387	27.5	27.5	27.5	27.5
	100	195	395	245	392	30.0	30.0	28.0	28.0
	150	250	450	245	392	36.0	36.0	37.0	37.0
	200	360	560	260	407	45.5	45.0	47.0	48.5
250	65	164	474	272	447	41.0	41.0	41.0	41.0
	80	200	-	270	-	47.0	47.0	47.0	-
	100	234	444	270	445	47.0	47.0	47.0	47.0
	150	251	461	280	455	52.0	52.0	52.0	53.0
	200	344	554	290	465	62.0	62.0	64.0	66.0
	250	404	614	300	475	73.0	73.0	76.0	86.0
300	65	237	457	297	501	55.0	55.0	55.0	55.0
	80	237	457	298	502	56.0	56.0	56.0	56.0
	100	237	457	300	504	57.0	57.0	57.0	57.0
	150	347	567	310	514	70.0	70.0	71.0	71.0
	200	347	567	320	524	74.0	74.0	76.0	77.0
	250	467	687	305	509	90.0	89.0	92.0	103.0
	300	467	687	340	544	99.0	98.0	102.0	118.0
350	100	196	415	330	562	73.0	73.0	73.0	-
	150	316	535	340	572	87.0	87.0	88.0	-
	200	316	535	350	582	91.0	91.0	93.0	-
	250	370	589	360	592	104.0	104.0	106.0	-
	300	435	655	370	-	113.0	113.0	118.0	-
	350	485	705	380	612	131.0	132.0	138.0	-
400	100	196	415	360	618	84.0	84.0	84.0	-
	150	316	535	370	628	100.0	100.0	101.0	-
	200	316	535	380	638	105.0	104.0	106.0	-
	250	429	649	390	648	125.0	124.0	127.0	-
	300	429	649	400	658	133.0	132.0	136.0	-
	350	495	715	410	-	143.0	146.0	153.0	-
	400	546	765	420	678	162.0	167.0	176.0	-
450	100	215	455	395	682	98.5	98.5	99.0	-
	150	270	510	400	687	119.0	119.0	119.0	-
	200	325	565	410	697	122.0	122.0	122.0	-
	250	375	615	420	707	141.0	140.0	140.0	-
	300	455	695	430	717	149.0	149.0	149.0	-
	350	495	735	440	727	166.0	169.0	169.0	-
	400	560	800	450	737	177.0	181.0	181.0	-
	450	620	860	460	747	192.0	200.0	200.0	-
500	100	210	450	420	734	119.0	119.0	120.0	-
	150	325	565	430	744	143.0	143.0	144.0	-
	200	325	565	440	754	147.0	147.0	149.0	-
	250	444	683	450	764	173.0	173.0	176.0	-
	300	444	683	460	774	181.0	180.0	184.0	-
	350	500	740	470	784	192.0	195.0	203.0	-
	400	555	795	480	794	215.0	219.0	228.0	-
	450	620	860	490	804	220.0	228.0	244.0	-
600	500	675	915	500	814	258.0	271.0	277.0	-
	100	335	525	500	849	182.0	182.0	183.0	-
	150	285	575	490	859	177.0	177.0	178.0	-
	200	336	620	500	869	192.0	192.0	193.0	-
	250	380	670	510	879	219.0	218.0	222.0	-
	300	448	687	520	889	228.0	228.0	231.0	-

DOUBLE SOCKET TEES WITH FLANGED BRANCH (CONT.)



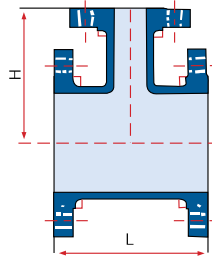
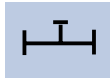
Nominal Diameter		L mm	L1 mm	H mm	H1 mm	Mass with flange			
Body DN	Branch dn					PN 10 kg	PN 16 kg	PN 25 kg	PN 40 kg
600	350	500	740	530	899	252.0	255.0	263.0	-
	400	566	805	540	909	271.0	275.0	284.0	-
	450	620	860	550	919	285.0	293.0	309.0	-
	500	685	925	560	919	304.0	309.0	331.0	-
	600	796	1035	580	949	373.0	398.0	401.0	-
700	100	345	645	510	941	242.0	242.0	243.0	-
	150	365	665	520	951	262.0	262.0	263.0	-
	200	365	665	525	956	265.0	265.0	266.0	-
	250	365	665	535	966	272.0	271.0	274.0	-
	300	575	875	540	971	300.0	300.0	306.0	-
	400	585	885	555	986	347.0	351.0	360.0	-
	500	810	1110	570	1001	391.0	406.0	418.0	-
	600	915	1215	585	1016	474.0	499.0	502.0	-
	700	915	1215	600	1031	491.0	499.0	527.0	-
800	100	350	670	570	1056	304.0	304.0	305.0	-
	150	361	681	580	1066	332.0	332.0	333.0	-
	200	361	681	585	1071	335.0	335.0	336.0	-
	250	361	681	585	1071	350.0	349.0	352.0	-
	300	580	900	600	1086	371.0	371.0	377.0	-
	400	581	901	615	1101	430.0	435.0	444.0	-
	500	815	1135	630	1116	522.0	537.0	549.0	-
	600	1021	1341	645	1131	617.0	642.0	645.0	-
	700	1045	1365	660	1146	620.0	635.0	669.0	-
	800	1021	1341	675	1161	663.0	674.0	715.0	-
	900	1170	1520	750	1290	867.0	878.0	926.0	-
900	100	355	705	630	1170	378.0	378.0	378.0	-
	150	355	705	640	1180	381.0	381.0	382.0	-
	200	355	705	645	1185	420.0	419.0	422.0	-
	250	375	725	635	1175	474.0	474.0	477.0	-
	300	590	940	660	1200	455.0	455.0	461.0	-
	400	590	940	675	1215	532.0	536.0	545.0	-
	500	820	1170	690	1230	666.0	681.0	693.0	-
	600	820	1170	705	1245	798.0	813.0	826.0	-
	700	1050	1400	720	1260	788.0	803.0	837.0	-
	800	1050	1400	735	1275	808.0	823.0	876.0	-
	900	1170	1520	750	1290	867.0	878.0	926.0	-
1000	100	360	730	690	1285	461.0	461.0	462.0	-
	150	360	730	700	1295	464.0	464.0	465.0	-
	200	360	730	705	1300	510.0	510.0	512.0	-
	250	385	755	705	1300	570.0	519.0	522.0	-
	300	595	965	720	1315	570.0	569.0	579.0	-
	400	595	965	735	1330	639.0	644.0	653.0	-
	500	830	1200	750	1345	852.0	867.0	879.0	-
	600	830	1200	765	1360	1007.0	1032.0	1035.0	-
	700	1055	1425	780	1375	985.0	1000.0	1032.0	-
	800	1055	1425	795	1390	1006.0	1021.0	1074.0	-
	900	1290	1660	810	1405	1052.0	1076.0	1137.0	-
1100	1000	1290	1660	825	1420	1115.0	1137.0	1200.0	-
	200	370	770	765	1398	782.0	782.0	784.0	-
	400	600	1000	795	1428	930.0	934.0	945.0	-
	600	830	1230	825	1458	1079.0	1102.0	1114.0	-
	800	1065	1465	855	1488	1321.0	1335.0	1388.0	-
	1000	1295	1695	885	1518	1560.0	1595.0	1681.0	-
	1100	1410	1810	900	1533	1679.0	1714.0	1814.0	-
	1200	1535	1965	975	1663	1682.0	2018.0	1846.0	-
	1300	1730	2130	1010	1796	1709.0	1728.0	1777.0	-
	1400	1970	2500	1210	2135	3129.0	3186.0	3349.0	-
	1600	2200	2730	1240	2165	3517.0	4607.0	4792.0	-
1200	100	375	805	810	1498	763.0	763.0	763.0	-
	150	375	805	820	1508	803.0	806.0	806.0	-
	200	375	805	825	1513	811.0	811.0	811.0	-
	300	605	1035	840	1528	917.0	917.0	923.0	-
	400	605	1035	855	1543	1010.0	1010.0	1031.0	-
	500	840	1270	870	1558	1018.0	1018.0	1044.0	-
	600	840	1270	885	1573	1000.0	1027.0	1067.0	-
	700	1070	1500	900	1588	1169.0	1184.0	1218.0	-
	800	1070	1500	915	1603	1190.0	1210.0	1295.0	-
	900	1300	1730	930	1618	1367.0	1427.0	1452.0	-
	1000	1300	1730	945	1663	1406.0	1448.0	1556.0	-
1400	1200	1535	1965	975	1663	1682.0	2018.0	1846.0	-
	100	385	815	910	1726	1120.0	1120.0	1120.0	-
	200	385	815	920	1736	1189.0	1189.0	1189.0	-
	400	800	1230	950	1766	1357.0	1368.0	1374.0	-
	600	1030	1460	980	1796	1478.0	1505.0	1519.0	-
	800	1260	1690	1010	1826	1709.0	1728.0	1777.0	-
	1000	1495	1925	1040	1856	1955.0	1996.0	2075.0	-
	1200	1725	2155	1070	1886	2375.0	2439.0	2539.0	-
	1400	1960	2390	1100	1916	2697.0	2765.0	2917.0	-
	1600	2200	2730	1240	2165	3517.0	4607.0	4792.0	-
	1800	2440	3070	1380	2405	4939.0	5119.0	5499.0	-
1600	100	400	930	1020	1945	1261.0	1261.0	1261.0	-
	200	400	930	1030	1955	1361.0	1361.0	1361.0	-
	400	810	1340	1060	1985	1561.0	1565.0	1576.0	-
	600	1040	1570	1090	2015	1908.0	1934.0	1942.0	-
	800	1275	1805	1120	2045	2192.0	2211.0	2264.0	-
	1000	1505	2035	1150	2075	2480.0	2522.0	2607.0	-
	1200	1740	2270	1180	2105	2799.0	2863.0	2962.0	-
	1400	1970	2500	1210	2135	3129.0	3186.0	3349.0	-
	1600	2200	2730	1240	2165	3517.0	4607.0	4792.0	-
	1800	2440	3070	1380	2405	4939.0	5119.0	5499.0	-
	2000	2680	3310	1520	2645	5361.0	5541.0	5921.0	-
1800	100	710	1260	1155	2179	1930.0	1930.0	-	-
	200	710	1260	1155	2179	1934.0	1934.0	-	-
	250	710	1260	1155	2179	1941.0	1940.0	-	-
	300	710	1260	1155	2179	1948.0	1948.0	-	-
	350	765	1315	1165	2189	2028.0	2031.0	-	-
	400	825	1375	1170	2194	2115.0	2120.0	-	-
	450	880	1430	1180	2704	2198.0	2206.0	-	-
	500	940	1430	1185	2209	2286.0	2301.0	-	-

DOUBLE SOCKET TEES WITH FLANGED BRANCH (CONT.)



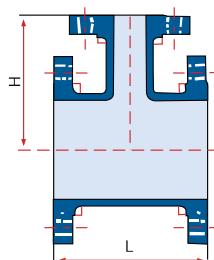
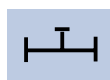
Nominal Diameter		L mm	L1 mm	H mm	H1 mm	Mass with Flange			
Body DN	Branch dn					PN 10 kg	PN 16 kg	PN 25 kg	PN 40 kg
1800	600	1055	1605	1200	2214	2414	2440	-	-
	700	1170	1720	1215	2239	2646	2661	-	-
	800	1285	1835	1230	2254	2748	2767	-	-
	900	1405	1955	1245	2269	3032	3056	-	-
	1000	1520	2070	1260	2284	3095	3137	-	-
	1100	1635	2185	1275	2299	3455	3490	-	-
	1200	1750	2300	1290	2314	3460	2524	-	-
	1400	1980	2530	1320	2344	4089	4072	-	-
	1500	2100	2650	1335	2359	4360	4447	-	-
	1600	2215	2765	1350	2374	4581	4577	-	-
	1800	2445	2995	1380	2404	5190	5059	-	-
2000	200	720	1290	1265	2380	2414	1934	-	-
	250	720	1290	1265	2380	2421	2421	-	-
	300	720	1290	1265	2380	2429	2429	-	-
	350	780	1350	1275	2390	2531	2534	-	-
	400	840	1410	1280	2395	2635	2640	-	-
	450	895	1465	1290	2405	2733	2741	-	-
	500	950	1520	1295	2410	2830	2845	-	-
	600	1065	1635	1310	2425	2988	3015	-	-
	700	1185	1755	1325	2440	3261	3261	-	-
	800	1300	1870	1340	2455	3484	3484	-	-
	900	1415	1985	1355	2470	3705	3729	-	-
	1000	1530	2100	1370	2485	3790	3832	-	-
	1100	1650	2220	1385	2500	4200	4235	-	-
	1200	1760	2330	1400	2515	4426	4491	-	-
	1400	1995	2565	1430	2545	4645	4713	-	-
	1500	2110	2680	1445	2560	5227	5315	-	-
	1600	2225	2795	1460	2575	5481	5583	-	-
	1800	2460	3030	1490	2605	6037	6163	-	-
	2000	2690	3260	1520	2635	6626	6779	-	-
2100	600	1075	-	1365	-	3294	3320	-	-
	700	1310	-	1380	-	3700	3715	-	-
	800	1305	-	1395	-	3698	3717	-	-
	900	1420	-	1410	-	3897	3921	-	-
	1000	1535	-	1425	-	4104	4145	-	-
	1100	1655	-	1440	-	4334	4369	-	-
	1200	1770	-	1455	-	4532	4596	-	-
	1400	2000	-	1485	-	4943	5010	-	-
	1500	2120	-	1500	-	5199	5287	-	-
	1600	2230	-	1515	-	5391	5493	-	-
	1800	2465	-	1545	-	5827	5953	-	-
	2000	2695	-	1575	-	6278	6430	-	-
	2100	2810	-	1590	-	6593	6757	-	-
2200	600	1080	-	1420	-	3832	3858	-	-
	700	1195	-	1435	-	4050	4065	-	-
	800	1310	-	1450	-	4273	4292	-	-
	900	1430	-	1465	-	4500	4523	-	-
	1000	1540	-	1480	-	4715	4756	-	-
	1100	1660	-	1495	-	4964	4999	-	-
	1200	1775	-	1510	-	5180	5244	-	-
	1400	2005	-	1540	-	5626	5693	-	-
	1500	2125	-	1555	-	5900	5988	-	-
	1600	2240	-	1570	-	6118	6220	-	-
	1800	2470	-	1600	-	6579	6705	-	-
	2000	2700	-	1630	-	7063	7216	-	-
	2100	2820	-	1645	-	7404	7569	-	-
	2200	2935	-	1660	-	7592	7759	-	-
2400	600	1090	-	1530	-	4651	4677	-	-
	700	1210	-	1545	-	4916	4931	-	-
	800	1320	-	1560	-	5162	5182	-	-
	900	1440	-	1575	-	5426	5450	-	-
	1000	1555	-	1590	-	5685	5726	-	-
	1100	1670	-	1605	-	5959	5994	-	-
	1200	1785	-	1620	-	6209	6273	-	-
	1400	2020	-	1650	-	6733	6801	-	-
	1500	2135	-	1665	-	7031	7119	-	-
	1600	2250	-	1680	-	7282	7384	-	-
	1800	2480	-	1710	-	7808	7934	-	-
	2000	2715	-	1740	-	8368	8251	-	-
	2100	2830	-	1755	-	8731	8895	-	-
	2200	2945	-	1770	-	8950	9117	-	-
	2400	3180	-	1800	-	9543	9746	-	-
2600	600	1100	-	1640	-	5424	5454	-	-
	700	1220	-	1655	-	5729	5744	-	-
	800	1335	-	1670	-	6025	6044	-	-
	900	1450	-	1685	-	6315	6339	-	-
	1000	1565	-	1700	-	6612	6654	-	-
	1100	1685	-	1715	-	6936	6971	-	-
	1200	1800	-	1730	-	7223	7288	-	-
	1400	2030	-	1750	-	7801	7869	-	-
	1500	2150	-	1775	-	8157	8244	-	-
	1600	2260	-	1790	-	8430	8532	-	-
	1800	2495	-	1820	-	9041	9167	-	-
	2000	2725	-	1850	-	9659	9401	-	-
	2100	2845	-	1865	-	10069	10233	-	-
	2200	2960	-	1880	-	10322	10489	-	-
	2400	3190	-	1910	-	10972	11175	-	-
	2600	3420	-	1940	-	11622	11857	-	-

ALL FLANGED TEES



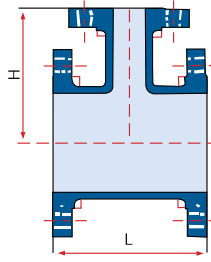
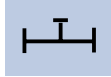
Nominal Diameter		L mm	H mm	Mass with flange			
Body DN	Branch dn			PN 10 kg	PN 16 kg	PN 25 kg	PN 40 kg
80	65	330	165	15.0	15.0	15.3	15.3
	80	330	165	15.3	15.3	15.6	15.6
100	65	360	175	17.8	17.8	18.9	18.9
	80	360	175	18.1	18.1	19.3	19.3
	100	360	180	19.0	19.0	20.5	20.5
150	65	440	200	29.5	29.5	31.5	31.5
	80	440	205	30.0	30.0	32.0	32.0
	100	440	210	31.0	31.0	33.5	33.5
	150	440	220	35.0	35.0	38.0	38.0
200	65	520	225	43.0	43.0	46.0	51.0
	80	520	235	43.5	43.5	46.5	51.0
	100	520	240	44.5	44.5	48.0	52.0
	150	520	250	48.5	48.0	52.0	56.0
	200	520	260	52.0	51.0	56.0	61.0
250	65	360	272	52.0	51.0	56.0	75.0
	80	430	250	57.0	56.0	62.0	80.0
	100	430	270	58.0	57.0	63.0	81.0
	150	447	280	63.0	62.0	68.0	87.0
	200	540	290	74.0	73.0	80.0	99.0
	250	600	300	84.0	83.0	92.0	118.0
300	65	450	297	74.0	72.0	79.0	113.0
	80	450	298	75.0	73.0	81.0	103.0
	100	450	300	75.0	74.0	81.0	108.0
	150	560	310	89.0	87.0	96.0	118.0
	200	560	320	93.0	120.0	100.0	129.0
	250	680	305	108.0	106.0	117.0	147.0
	300	680	340	117.0	115.0	126.0	165.0
350	65	424	322	89.0	91.0	103.0	-
	80	470	310	97.0	98.0	110.0	-
	100	470	330	97.0	98.0	111.0	-
	150	590	340	113.0	114.0	128.0	-
	200	590	350	117.0	119.0	132.0	-
	250	644	360	129.0	130.0	145.0	-
	300	850	425	140.0	145.0	166.0	-
	350	760	380	157.0	159.0	178.0	-
400	80	490	355	112.0	121.0	140.0	-
	100	490	360	114.0	123.0	141.0	-
	150	610	370	133.0	142.0	160.0	-
	200	610	380	137.0	146.0	164.0	-
	250	724	390	158.0	167.0	185.0	-
	300	724	400	164.0	173.0	191.0	-
	350	900	450	170.0	183.0	215.0	-
	400	840	420	195.0	208.0	235.0	-
450	100	950	395	177.0	193.0	215.0	-
	150	950	375	180.0	196.0	219.0	-
	200	950	375	183.0	199.0	220.0	-
	250	950	375	194.0	210.0	237.0	-
	300	950	475	199.0	215.0	242.0	-
	350	950	475	207.0	227.0	260.0	-
	400	950	475	210.0	230.0	263.0	-
	450	950	475	216.0	240.0	272.0	-
500	100	535	420	168.0	194.0	206.0	-
	150	650	430	192.0	218.0	230.0	-
	200	650	440	196.0	222.0	234.0	-
	250	768	450	223.0	249.0	261.0	-
	300	768	460	229.0	255.0	267.0	-
	350	1000	500	239.0	268.0	298.0	-
	400	880	480	263.0	293.0	314.0	-
	450	1000	500	249.0	298.0	327.0	-
	500	1000	500	306.0	345.0	363.0	-

ALL FLANGED TEES (CONT.)



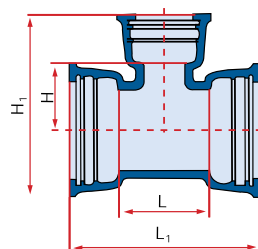
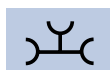
Nominal Diameter		L mm	H mm	Mass with flange			
Body DN	Branch dn			PN 10 kg	PN 16 kg	PN 25 kg	PN 40 kg
600	100	700	480	255.0	305.0	311.0	-
	200	700	500	265.0	315.0	321.0	-
	250	1100	450	307.0	360.0	392.0	-
	300	812	520	303.0	353.0	359.0	-
	350	1100	550	326.0	380.0	413.0	-
	400	930	540	344.0	398.0	413.0	-
	450	1100	550	338.0	417.0	448.0	-
	500	1100	550	349.0	420.0	464.0	-
	600	1160	580	444.0	519.0	528.0	-
700	100	540	510	253.0	295.0	-	-
	150	650	520	282.0	299.0	355.0	-
	200	650	525	285.0	302.0	359.0	-
	250	650	535	291.0	308.0	366.0	-
	300	760	540	319.0	342.0	-	-
	400	870	555	366.0	388.0	452.0	-
	500	980	670	442.0	481.0	-	-
	600	1200	585	494.0	536.0	594.0	-
	700	1200	600	510.0	536.0	619.0	-
800	100	580	570	345	383	-	-
	150	585	575	349	387	-	-
	200	690	585	352	390	-	-
	300	800	600	413	443	-	-
	400	910	615	441	484	-	-
	500	1020	630	561	599	-	-
	600	1350	645	613	678	-	-
	700	1350	660	663	711	-	-
	800	1350	675	657	715	-	-
900	100	620	630	428	476	-	-
	150	675	635	432	480	-	-
	200	730	645	436	484	-	-
	300	840	660	523	569	-	-
	400	950	675	541	594	-	-
	500	1060	690	726	784	-	-
	600	1500	705	787	860	-	-
	700	1500	720	843	901	-	-
	800	1560	735	860	913	-	-
	900	1500	750	853	924	-	-
1000	100	660	690	524	572	-	-
	150	715	695	534	582	-	-
	200	770	705	546	629	-	-
	300	880	720	651	739	-	-
	400	990	735	668	755	-	-
	500	1100	750	955	1007	-	-
	600	1650	765	1007	1116	-	-
	700	1650	780	1067	1152	-	-
	800	1650	795	1085	1168	-	-
	900	1650	810	1095	1219	-	-
	1000	1650	825	1105	1229	-	-
1100	400	1030	795	839	913	-	-
	600	1250	825	990	1083	-	-
	800	1470	855	1160	1245	-	-
	1000	1690	885	1345	1450	-	-
	1100	1800	900	1450	1555	-	-
1200	100	660	810	996	1082	-	-
	150	715	815	998	1084	-	-
	200	775	825	1000	1086	-	-
	300	890	840	1004	1160	-	-
	400	1010	855	1008	1122	-	-
	500	1125	870	1095	1250	-	-
	600	1240	885	1101	1256	-	-
	700	1355	900	1279	1423	-	-
	800	1470	915	1291	1439	-	-
	900	1585	930	1427	1662	-	-
	1000	1700	945	1494	1664	-	-
	1200	1935	975	1806	1970	-	-

ALL FLANGED TEES (CONT.)



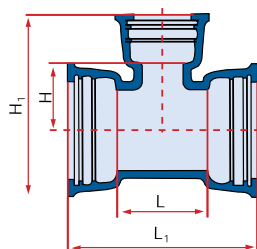
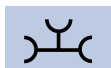
Nominal Diameter		L mm	H mm	Mass with flange			
Body DN	Branch dn			PN 10 kg	PN 16 kg	PN 25 kg	PN 40 kg
1400	100	970	905	1227	1363	-	-
	200	1085	920	1231	1367	-	-
	400	1315	950	1514	1656	-	-
	600	1550	980	1555	1818	-	-
	800	1780	1010	1886	2041	-	-
	1000	2015	1040	2131	2309	-	-
	1200	2245	1070	2262	2431	-	-
	1400	2480	1100	2545	2715	-	-
1600	100	1020	1015	1874	2078	-	-
	200	1135	1030	7880	2084	-	-
	400	1370	1060	2000	2210	-	-
	600	1600	1090	2167	2398	-	-
	800	1065	1120	2452	2675	-	-
	1000	2063	1150	2740	2986	-	-
	1200	2300	1180	3058	3327	-	-
	1400	2535	1210	3208	3444	-	-
1800	1600	2765	1240	3586	3854	-	-
	100	1075	1125	2348	2600	-	-
	200	1190	1140	2350	2602	-	-
	400	1420	1170	2574	2835	-	-
	600	1655	1200	2694	2972	-	-
	800	1885	1230	3023	3299	-	-
	1000	2120	1260	3375	3669	-	-
	1200	2355	1290	3740	4056	-	-
2000	1400	2585	1320	3910	4190	-	-
	1600	2820	1350	4328	4641	-	-
	1800	3050	1380	4750	5086	-	-
	200	1235	1250	2840	3246	-	-
	400	1470	1280	3002	3314	-	-
	600	1705	1310	3309	3642	-	-
	800	1935	1340	3505	3796	-	-
	1000	2170	1370	4112	4459	-	-
2200	1200	2400	1400	4314	4644	-	-
	1400	2635	1430	4966	5340	-	-
	1600	2865	1460	5202	5567	-	-
	1800	3100	1490	5668	6055	-	-
	2000	3330	1520	6185	6599	-	-
	600	1560	1420	3975	4334	-	-
	800	1780	1450	4298	4654	-	-
	1000	2000	1480	4753	5128	-	-
2400	1200	2220	1510	5026	5413	-	-
	1400	2440	1540	5709	6106	-	-
	1600	2660	1570	6234	6664	-	-
	1800	2880	1600	6474	6934	-	-
	2000	3100	1630	7316	7795	-	-
	2200	3320	1660	7954	8464	-	-
	600	1620	1530	4418	4849	-	-
	800	1840	1560	5200	5671	-	-
2600	1000	2060	1590	5721	6211	-	-
	1200	2280	1620	5963	6432	-	-
	1400	2500	1650	6804	7317	-	-
	1600	2720	1680	7392	7937	-	-
	1800	2940	1710	7614	8145	-	-
	2000	3160	1740	8591	9185	-	-
	2200	3380	1770	9275	9901	-	-
	2400	3600	1800	10031	10715	-	-
2600	600	1680	1640	5214	5711	-	-
	800	1900	1670	6076	6596	-	-
	1000	2120	1700	6673	7213	-	-
	1200	2340	1730	7289	7850	-	-
	1400	2560	1760	7585	8123	-	-
	1600	2780	1790	8564	9159	-	-
	1800	3000	1820	9213	9831	-	-
	2000	3220	1850	9505	10128	-	-
2600	2200	3440	1880	10647	11323	-	-
	2400	3660	1910	11455	12188	-	-
	2600	3880	1940	12230	12988	-	-

ALL SOCKET TEES



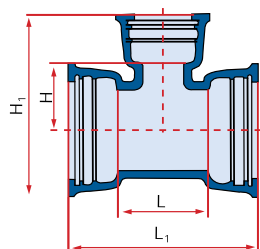
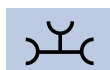
Nominal Diameter		L mm	L ₁ mm	H mm	H ₁ mm	Mass kg
Body DN	Branch dn					
80	80	183	353	92	260	15.00
100	80	185	361	104	283	20.00
	100	210	386	105	287	21.95
150	80	165	353	136	342	20.10
	100	190	378	140	349	29.85
	150	305	493	152	367	38.40
200	80	170	370	167	399	26.50
	100	195	395	170	405	28.50
	150	250	450	177	418	33.50
	200	360	560	180	427	41.50
250	100	234	444	185	448	47.50
	150	251	461	190	459	59.00
	200	344	554	200	475	63.00
	250	404	614	205	485	71.50
300	100	237	457	210	502	54.50
	150	347	567	220	518	69.85
	200	347	567	220	524	72.00
	250	467	687	230	539	86.00
	300	467	687	235	549	91.00
350	100	195	415	230	550	68.75
	150	315	535	240	566	85.45
	200	315	535	250	582	88.50
	250	369	589	255	592	103.00
	300	435	655	285	-	111.00
	350	485	705	265	607	123.00
400	100	195	415	260	606	83.00
	150	315	535	270	622	101.00
	200	315	535	270	628	105.00
	250	429	649	280	643	120.00
	300	429	649	310	678	127.00
	350	495	715	315	-	137.00
	400	545	765	295	663	155.00
450	100	215	455	320	-	106.00
	150	270	510	320	-	117.00
	200	325	565	320	-	121.00
	250	375	615	325	-	138.00
	300	445	695	335	-	146.00
	350	495	735	340	-	161.00
	400	560	800	345	-	175.00
	450	620	860	350	-	190.00
500	100	210	450	310	712	124.00
	150	325	565	320	728	132.00
	200	325	565	320	734	139.00
	250	443	683	330	749	159.00
	300	443	683	335	759	167.00
	350	500	740	365	-	187.00
	400	555	795	345	769	198.00
	450	620	860	375	-	214.00
	500	675	915	355	789	231.00
600	100	220	460	395	-	169.00
	150	285	525	395	-	175.00
	200	335	575	370	839	178.00
	250	380	680	400	-	205.00
	300	447	687	385	864	211.00
	350	500	740	415	-	246.00
	400	565	805	395	874	248.00
	450	620	860	425	-	280.00
	500	685	925	430	-	296.00
	600	795	1035	415	904	325.00

ALL SOCKET TEES (CONT.)



Nominal Diameter		L mm	L ₁ mm	H mm	H ₁ mm	Mass kg
Body DN	Branch dn					
700	100	230	530	400	919	235.00
	150	290	590	400	925	240.00
	200	345	645	410	941	243.00
	300	575	875	460	-	326.00
	400	575	875	430	971	330.00
	500	810	1110	480	-	380.00
	600	810	1110	450	1001	417.00
	700	925	1225	500	-	536.00
800	100	235	555	450	1019	272.00
	150	295	615	450	1025	277.00
	200	350	670	460	1041	300.00
	300	580	900	510	-	395.00
	400	580	900	480	1071	390.00
	500	815	1135	530	-	472.00
	600	815	1135	500	1101	581.00
	700	1045	1365	550	-	586.00
900	800	1045	1326	525	1370	630.00
	100	355	705	545	-	360.00
	150	355	705	545	-	386.00
	200	355	705	545	-	458.00
	300	590	940	570	-	462.00
	400	590	940	570	-	556.00
	500	820	1170	590	-	574.00
	600	820	1170	590	-	833.00
1000	700	1050	1400	615	-	878.00
	800	1050	1400	615	-	903.00
	900	1170	1570	625	-	944.00
	100	360	730	595	-	443.00
	150	360	730	595	-	474.00
	200	360	730	595	-	557.00
	300	595	965	620	-	564.00
	400	595	965	620	-	672.00
1100	500	830	1200	640	-	690.00
	600	830	1200	640	-	1008.00
	700	1055	1425	665	-	1081.00
	800	1055	1425	665	-	1129.00
	900	1290	1660	685	-	1150.00
	1000	1290	1660	685	-	1209.00
	200	370	770	650	-	710.00
	400	600	1000	670	-	909.00
1200	600	830	1230	690	-	1052.00
	800	1065	1465	715	-	1313.00
	1000	1295	1695	735	-	1504.00
	1100	1410	1810	745	-	162.00
	100	375	805	700	-	648.00
1400	150	375	805	700	-	685.00
	200	375	805	700	-	725.00
	300	605	1035	720	-	816.00
	400	605	1035	720	-	978.00
	500	715	1145	740	-	1095.00
	600	840	1270	740	-	1139.00
	700	955	1385	765	-	1390.00
	800	1070	1500	765	-	1449.00
	900	1185	1615	785	-	1596.00
	1000	1300	1730	785	-	1657.00
	1200	1535	1965	805	-	1900.00
	100	385	815	820	-	790.00
1400	200	385	815	820	-	890.00
	400	800	1230	820	-	890.00
	600	1030	1460	840	-	1096.00
	800	1260	1690	865	-	1340.00
	1000	1495	1925	885	-	1527.00

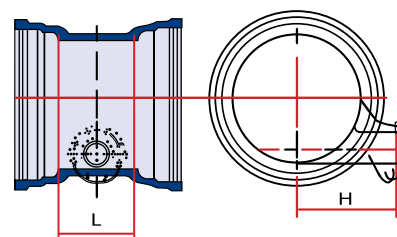
ALL SOCKET TEES (CONT.)



Nominal Diameter		L mm	L ₁ mm	H mm	H ₁ mm	Mass kg
Body DN	Branch dn					
1600	1200	1725	2155	905	-	1774.00
	1400	1960	2390	930	-	2049.00
	100	400	930	920	-	2323.00
	200	400	930	920	-	-
	400	810	1340	920	-	-
	600	1040	1570	940	-	-
	800	1275	1805	965	-	-
	1000	1505	2035	985	-	-
	1200	1740	2270	1010	-	-
	1400	1970	2500	1030	-	-
	1600	2200	2730	1050	-	-
1800	100	410	960	1020	-	-
	200	410	960	1020	-	-
	400	820	1370	1020	-	-
	600	1055	1605	1040	-	-
	800	1285	1835	1065	-	-
	1000	1520	2070	1085	-	-
	1200	1750	2300	1110	-	-
	1400	1980	2530	1130	-	-
	1600	2215	2765	1150	-	-
	1800	2445	2995	1175	-	-
2000	200	420	990	1120	-	-
	400	830	1400	1120	-	-
	600	1065	1635	1140	-	-
	800	1300	1870	1165	-	-
	1000	1530	2100	1185	-	-
	1200	1760	2330	1210	-	-
	1400	1995	2565	1230	-	-
	1600	2225	2795	1250	-	-
	1800	2460	3030	1275	-	-
	2000	2690	3260	1295	-	-
2200	600	1080	-	1240	-	-
	800	1310	-	1265	-	-
	1000	1540	-	1285	-	-
	1200	1775	-	1310	-	-
	1400	2005	-	1330	-	-
	1600	2240	-	1350	-	-
	1800	2470	-	1375	-	-
	2000	2700	-	1395	-	-
	2200	2935	-	1415	-	-
	2400	3180	-	1540	-	-
2400	600	1090	-	1340	-	-
	800	1320	-	1365	-	-
	1000	1555	-	1385	-	-
	1200	1785	-	1410	-	-
	1400	2020	-	1430	-	-
	1600	2250	-	1450	-	-
	1800	2480	-	1475	-	-
	2000	2715	-	1495	-	-
	2200	2945	-	1515	-	-
	2400	3180	-	1540	-	-
2600	600	1100	-	1440	-	-
	800	1335	-	1465	-	-
	1000	1565	-	1485	-	-
	1200	1800	-	1510	-	-
	1400	2030	-	1530	-	-
	1600	2260	-	1550	-	-
	1800	2495	-	1575	-	-
	2000	2725	-	1595	-	-
	2200	2960	-	1615	-	-
	2400	3190	-	1640	-	-
	2600	3420	-	1660	-	-

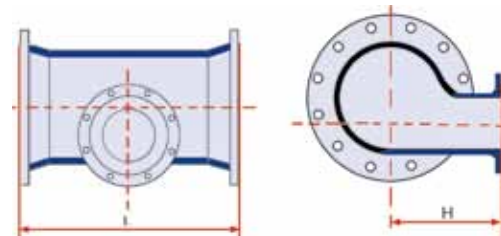
DOUBLE SOCKET LEVEL INVERT TEES WITH FLANGED BRANCH

Mass with Flange		L mm	H mm			
Large DN	Small dn			PN 10 kg	PN 16 kg	PN 25 kg
200	80	245	250	39.5	39.5	39.5
250	80	250	275	49.5	49.5	49.5
300	80	255	300	62.0	62.0	62.0
350	100	280	325	83.0	83.0	83.5
400	100	280	350	97.5	97.5	98.0
450	100	285	375	115	115	116
500	100	290	400	134	134	134
600	100	295	450	173	173	173
700	150	360	500	-	296	-
800	150	365	550	-	360	-
900	150	370	600	-	467	-
1000	200	435	650	-	569	-
1100	200	440	700	-	725	-
1200	200	445	750	-	840	-
1400	200	460	850	-	-	-
1500	200	465	900	-	-	-
1600	400	700	950	-	-	-
1800	400	715	1050	-	-	-
2000	400	725	1150	-	-	-
2100	400	730	1200	-	-	-
2200	400	735	1250	-	-	-
2400	400	750	1350	-	-	-
2600	400	760	1450	-	-	-



ALL FLANGE LEVEL-INVERT TEE PN16

Mass with Flange		L mm	H mm	Weight kg
Large DN	Small dn			
100	80	360	195	19,5
150	80	440	220	29,5
200	80	520	250	42,5
	100	520	250	43,5
250	80	700	275	66,0
	100	700	275	68,0
300	80	800	305	92,0
	100	800	305	95,5
	150	800	305	99,0
350	80	850	340	121,0
	100	850	340	123,0
	150	850	340	128,0
400	80	900	365	153,0
	100	900	365	156,0
	150	900	365	162,0
	200	900	365	167,0
450	80	950	380	188,0
	100	950	380	189,0
	150	950	380	197,0
	200	950	380	202,0
500	80	1000	400	237,0
	100	1000	400	241,0
	150	1000	400	248,0
	200	1000	400	255,0
600	80	1100	435	350,0
	100	1100	435	351,0
	150	1100	435	360,0
	200	1100	435	370,0
700	150	600	500	262,0
	200	650	500	268,0
800	150	670	540	379,0
	200	690	540	388,0
900	150	720	580	481,0
	200	730	580	483,0
1000	150	770	630	625,0
	200	770	630	627,0
1100	150	800	660	743,0
	200	850	660	773,0
1200	150	800	700	910,0
	200	850	700	945,0

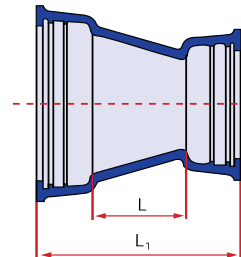


10.4.3 Reducers

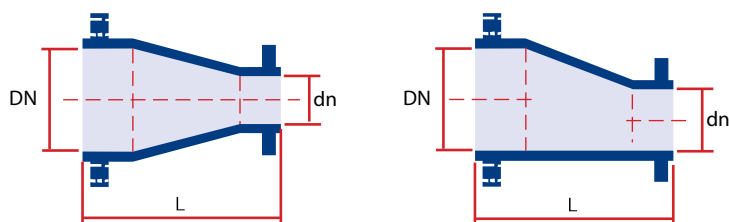
DOUBLE SOCKET REDUCERS



Nominal Diameter		L mm	L ₁ mm	Mass kg
Large DN	Small dn			
100	80	104	277	8.0
150	80	170	349	11.9
	100	130	312	12.0
200	100	230	418	17.9
	150	125	319	17.6
250	150	225	424	29.0
	200	125	330	29.0
300	150	325	529	39.0
	200	225	435	39.0
	250	125	340	37.5
350	200	360	-	48.0
	250	260	-	47.0
	300	188	408	53.5
400	250	360	-	60.5
	300	260	-	58.0
	350	177	397	65.0
450	350	260	-	62.4
	400	160	-	56.7
500	250	560	-	86.0
	300	460	-	90.0
	350	360	-	88.0
	400	260	-	83.0
600	400	460	-	128.0
	500	235	475	129.0
700	400	680	-	183.0
	500	480	-	194.0
	600	320	550	176.0
800	600	480	760	250.0
	700	280	590	226.0
900	700	480	318	318.0
	800	280	288	283.0
1000	800	480	392	392.0
	900	280	354	354.0
1100	1000	280	457	457.0
1200	1000	480	570	570.0
1400	1200	360	711	711.0
1500	1400	260	-	742.0
1600	1400	360	951	957.0
1800	1600	360	1235	1235.0
2000	1800	360	1566	1566.0
2200	2000	360	1943	1943.0
2400	2200	360	2374	2374.0
2600	2400	360	2877	2877.0



DOUBLE FLANGED REDUCERS

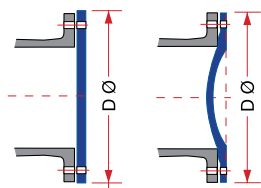
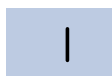


Nominal Diameter		L mm	Mass with flange			
Large DN	Small dn		PN 10 kg	PN 16 kg	PN 25 kg	PN 40 kg
80	50	251.0	8.4	8.4	8.4	8.4
100	80	200.0	9.3	9.4	9.9	9.9
150	80	311.0	15.6	15.6	16.6	16.6
	100	272.0	15.7	15.7	17.2	17.2
200	100	385.0	22.8	22.7	24.7	26.5
	150	300.0	23.5	23.5	26.0	28.0
250	150	319.0	35.0	34.5	38.0	47.0
	200	300.0	33.5	33.0	37.0	53.0
300	150	424.0	46.0	45.5	50.0	64.0
	200	323.0	46.5	46.0	51.0	67.0
	250	300.0	44.0	43.0	49.5	81.0
350	200	650.0	61.5	64.0	74.0	-
	250	600.0	109.0	101.0	120.0	-
	300	300.0	67.0	67.0	76.0	-
400	200	700.0	73.5	77.5	90.5	-
	250	650.0	77.0	81.5	96.0	-
	300	600.0	92.0	92.0	104.0	-
	350	300.0	77.0	82.0	97.0	-
450	250	700.0	89.5	97.0	112.0	-
	300	650.0	93.5	101.0	117.0	-
	350	600.0	95.6	106.0	126.0	-
	400	300.0	70.5	83.0	105.0	-
500	300	700.0	109.0	122.0	138.0	-
	350	600.0	160.0	160.0	184.0	-
	400	600.0	127.0	145.0	160.0	-
	450	300.0	83.0	104.0	126.0	-
600	350	750.0	147.0	174.0	193.0	-
	400	600.0	210.0	-	-	-
	450	650.0	151.0	183.0	260.0	-
	500	600.0	174.0	212.0	221.0	-
700	400	800.0	196.0	212.0	-	-
	500	600.0	281.0	266.0	328.0	-
	600	600.0	317.0	308.0	375.0	-
800	300	1200.0	280.0	299.0	354.0	-
	350	1100.0	272.0	294.0	352.0	-
	400	1000.0	264.0	287.0	343.0	-
	450	900.0	263.0	286.0	347.0	-
	500	804.0	500.0	-	-	-
	600	600.0	458.0	-	-	-
	700	600.0	410.0	370.0	483.0	-
900	300	1400	366.0	390.0	456.0	-
	350	1300	360.0	384.0	53.0	-
	400	1200	348.0	378.0	450.0	-
	450	1100	340.0	372.0	444.0	-
	500	1000	338.0	370.0	443.0	-
	600	800	318.0	360.0	435.0	-
	700	700	321.0	352.0	448.0	-
	800	600	308.0	352.0	162.0	-
1000	300	1600	477.0	518.0	602.0	-
	350	1500	466.0	511.0	598.0	-
	400	1400	456.0	503.0	593.0	-
	450	1300	446.0	495.0	584.0	-
	500	1200	433.0	490.0	580.0	-
	600	1000	422.0	490.0	582.0	-
	700	800	396.0	442.0	555.0	-
	800	700	399.0	448.0	575.0	-
	900	600	373.0	438.0	577.0	-
1100	500	1400	569.0	619.0	730.0	-
	600	1200	542.0	604.0	718.0	-
	700	1000	515.0	562.0	696.0	-
	800	800	483.0	532.0	681.0	-
	900	700	476.0	530.0	690.0	-
	1000	600	474.0	543.0	720.0	-

Nominal Diameter		L mm	Mass with flange			
Large DN	Small dn		PN 10 kg	PN 16 kg	PN 25 kg	PN 40 kg
1200	500	1715	740.0	820.0	929.0	-
	600	1530	718.0	809.0	920.0	-
	700	1345	711.0	777.0	909.0	-
	800	1160	688.0	758.0	904.0	-
	900	975	652.0	726.0	883.0	-
	1000	790	586.0	692.0	866.0	-
	1100	605	566.0	655.0	851.0	-
1400	600	1960	1070.0	1163.0	-	-
	700	1775	1039.0	1121.0	-	-
	800	1590	1034.0	1105.0	-	-
	900	1405	998.0	1074.0	-	-
	1000	1220	916.0	1052.0	-	-
	1100	1035	914.0	1005.0	-	-
	1200	850	814.0	947.0	-	-
1500	700	1990	1287.0	1390.0	-	-
	800	1805	1254.0	1361.0	-	-
	900	1620	1211.0	1317.0	-	-
	1000	1435	1174.0	1297.0	-	-
	1100	1250	1127.0	1250.0	-	-
	1200	1065	1074.0	1216.0	-	-
	1400	695	914.0	1058.0	-	-
1600	800	2020	1476.0	1597.0	-	-
	900	1835	1429.0	1555.0	-	-
	1000	1650	1424.0	1547.0	-	-
	1100	1465	1377.0	1502.0	-	-
	1200	1280	1324.0	1468.0	-	-
	1400	910	1103.0	1273.0	-	-
	1500	725	1073.0	1250.0	-	-
1800	900	2265	1971.0	2121.0	-	-
	1000	2080	1920.0	1961.0	-	-
	1100	1895	1910.0	2057.0	-	-
	1200	1710	1858.0	2024.0	-	-
	1400	1340	1701.0	1870.0	-	-
	1500	1155	1610.0	1810.0	-	-
	1600	970	1436.0	1664.0	-	-
2000	1000	2510	2588.0	2782.0	-	-
	1100	2325	2538.0	2690.0	-	-
	1200	2140	2512.0	2705.0	-	-
	1400	1770	2358.0	2553.0	-	-
	1500	1585	2268.0	2494.0	-	-
	1600	1400	2176.0	2405.0	-	-
	1800	1030	1800.0	2079.0	-	-
2100	1200	2355	2897.0	3116.0	-	-
	1400	1985	2747.0	2968.0	-	-
	1500	1800	2659.0	2911.0	-	-
	1600	1615	2569.0	2822.0	-	-
	1800	1245	2300.0	2576.0	-	-
	2000	875	1974.0	2276.0	-	-
2200	1400	2200	3168.0	3385.0	-	-
	1500	2015	3070.0	3328.0	-	-
	1600	1830	2980.0	3240.0	-	-
	1800	1460	2712.0	2994.0	-	-
	2000	1090	2250.0	2570.0	-	-
	2100	905	2218.0	2552.0	-	-
2400	1500	2445	4006.0	4322.0	-	-
	600	2260	3919.0	4238.0	-	-
	1800	1890	3557.0	3997.0	-	-
	2000	1520	3338.0	3704.0	-	-
	2100	1335	3171.0	3563.0	-	-
	2200	1150	2765.0	3134.0	-	-
2600	1600	2690	4943.0	5286.0	-	-
	800	2320	4682.0	5047.0	-	-
	2000	1950	4364.0	4755.0	-	-
	2100	1765	4194.0	4611.0	-	-
	2200	1580	3996.0	4419.0	-	-
	2400	1210	3311.0	3748.0	-	-

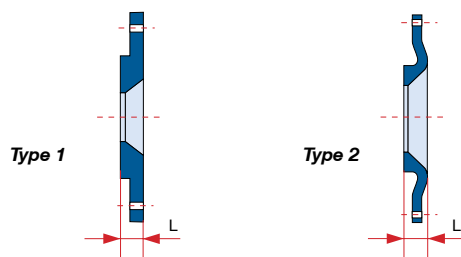
10.4.4 Reducing & Capping

BLANK FLANGE



Nominal Diameter DN	D				Mass			
	PN 10 mm	PN 16 mm	PN 25 mm	PN 40 mm	PN 10 kg	PN 16 kg	PN 25 kg	PN 40 kg
65	185	185	185	185	3.1	3.1	3.0	3.6
80	200	200	200	200	3.5	3.5	3.5	4.2
100	220	220	235	235	4.3	4.3	4.8	5.8
150	285	285	300	300	7.2	7.2	8.6	12.3
200	340	340	360	375	11.0	10.8	13.9	23.4
250	400	400	425	450	16.9	16.6	22.0	34.5
300	455	455	485	515	26.5	26.5	33.0	51.0
350	505	520	555	-	32.5	37.5	47.5	-
400	565	580	620	-	45.5	45.0	63.0	-
500	670	715	730	-	70.0	84.0	101.0	-
600	780	840	845	-	106.0	133.0	156.0	-
700	895	910	960	-	153.0	166.0	221.0	-
800	1015	1025	1085	-	214.0	230.0	311.0	-
900	224	286	-	-	-	-	-	-
1000	293	387	-	-	-	-	-	-
1100	405	518	-	-	-	-	-	-
1200	575	662	-	-	-	-	-	-
1400	739	994	-	-	-	-	-	-
1500	808	1092	-	-	-	-	-	-
1600	1239	1409	-	-	-	-	-	-
1800	1717	1858	-	-	-	-	-	-
2000	2272	2407	-	-	-	-	-	-

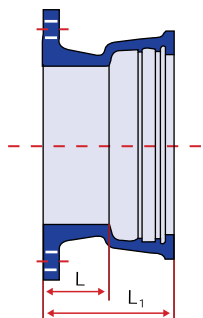
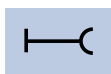
REDUCING FLANGES



Nominal Diameter DN	Branch dn	PN 10			PN 16			PN 25		
		Type	L mm	Mass kg	Type	L mm	Mass kg	Type	L mm	mass kg
100	40	1	40.0	5.0	1	40.0	5.0	-	-	-
200	80	1	40.0	12.1	1	40.0	12.1	-	-	-
	100	1	40.0	12.0	1	40.0	12.0	1	47.0	14.8
250	100	-	-	-	1	42.0	17.9	1	43.5	25.6
300	100	2	41.5	24.0	2	36.5	24.0	-	-	-
	150	2	43.0	25.5	2	43.0	24.0	-	-	-
	200	1	46.0	26.0	2	46.0	26.5	-	-	-
350	250	2	46.0	35.0	2	48.0	39.0	1	54.5	58.0
400	100	2	20.0	44.0	2	22.0	47.0	-	-	-
	150	2	31.0	45.0	2	29.0	50.0	-	-	-
	200	2	46.0	46.0	2	47.0	48.0	2	54.0	63.0
	250	2	48.0	44.5	2	50.0	47.5	2	56.5	63.0
	300	2	49.0	41.0	2	51.0	44.0	2	56.5	62.0
600	100	2	2.0	105.0	2	4.0	131.0	-	-	-
	150	2	8.0	106.0	2	10.0	132.0	-	-	-
	200	2	17.0	107.0	2	20.0	128.0	2	29.0	151.0
700	500	1	56.0	103.0	1	67.0	125.0	-	-	-

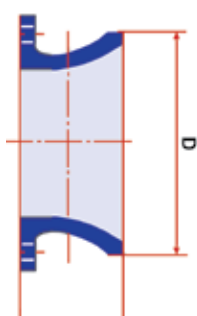
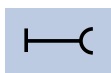
10.4.5 Straight Fittings

FLANGED SOCKET PIECES



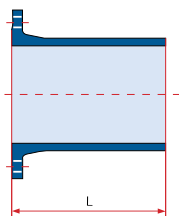
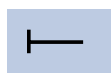
Nominal Diameter DN	L mm	L ₁ mm	Mass with flange			
			PN 10 kg	PN 16 kg	PN 25 kg	PN 40 kg
80	110	195.0	7.5	7.5	7.6	7.6
100	110	198.0	9.1	9.1	9.6	9.6
150	115	209.0	15.0	15.0	16.0	16.0
200	120	220.0	21.0	21.0	23.0	24.0
250	125	230.0	35.5	35.0	38.0	46.0
300	130	240.0	44.5	44.5	48.0	62.0
350	135	245.0	59.0	59.0	66.0	-
400	140	250.0	65.0	69.0	78.0	-
500	170	290.0	85.0	98.0	104.0	-
600	180	300.0	124.0	149.0	152.0	-
700	190	340.0	158.0	166.0	196.0	-
800	200	360.0	211.0	220.0	262.0	-
900	210	235.0	235.0	258.0	356.0	-
1000	220	293.0	293.0	324.0	458.0	-
1100	230	406.4	406.4	413,8.0	550.0	-
1200	240	456.0	456.0	521.0	664.0	-
1400	310	654.0	654.0	723.0	882.0	-
1500	320	773.0	773.0	857.0	939.0	-
1600	330	887.0	887.0	989.0	-	-
1800	350	1125.0	1125.0	1251.0	-	-
2000	370	1414.0	1414.0	1567.0	-	-
2200	390	1767.0	1767.0	1934.0	-	-
2400	410	2150.0	2150.0	2352.0	-	-
2600	480	2563.0	2563.0	2798.0	-	-

FLANGED BELL MOUTH



Nominal Diameter DN	D ₁ mm	L mm	Mass with flange		
			PN 10 kg	PN 16 kg	PN 25 kg
80	150	130	5.2	5.2	5.2
100	175	135	6.2	6.2	6.7
150	230	150	10.1	10.1	11.1
200	290	170	15.0	14.8	16.8
250	345	183	21.0	20.5	24.5
300	405	205	28.5	28.5	33.5
350	460	220	35.5	38.0	46.0
400	520	240	45.0	49.5	60.5
450	575	255	54.0	62.0	73.0
500	635	275	67.0	80.0	91.0
600	750	310	96.5	120.0	132.0
700	865	345	135.0	146.0	-
800	980	380	182.0	197.0	-
900	1095	415	231.0	250.0	-
1000	1210	450	297.0	331.0	-
1100	1325	485	370.0	405.0	-
1200	1440	520	457.0	512.0	-
1400	1670	590	646.0	702.0	-
1500	1785	625	763.0	851.0	-
1600	1900	660	906.0	995.0	-
1800	2130	730	1185.0	1297.0	-
2000	2360	800	1530.0	1668.0	-
2100	2475	835	1753.0	1918.0	-
2200	2590	870	1964.0	2135.0	-
2400	2820	940	2485.0	2713.0	-
2600	3035	1010	2989.0	3242.0	-

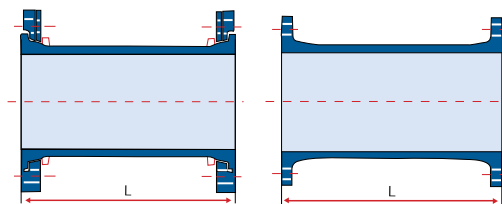
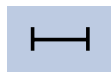
FLANGED SPIGOT PIECES*



Nominal Diameter DN	L	Mass with flange				
		PN 10 kg	PN 16 kg	PN 25 kg	PN 40 kg	
80	350	7.9	8.0	8.0	7.9	
100	350	9.6	9.6	10.1	9.6	
150	400	17.1	17.1	18.1	17.1	
200	400	24.5	24.0	25.5	27.5	
250	400	33.0	33.0	35.5	46.0	
300	450	46.0	45.0	49.0	65.0	
350	450	58.0	58.0	64.0	-	
400	480	70.0	74.0	83.0	-	
500	520	104.0	117.0	123.0	-	
600	560	144.0	169.0	172.0	-	
700	600	189.0	187.0	225.0	-	
800	600	239.0	250.0	291.0	-	
900	600	272.0	295.0	-	-	
1000	600	328.0	369.0	-	-	
1100	600	394.0	430.0	-	-	
1200	600	456.0	520.0	-	-	
1400	710	664.0	732.0	-	-	
1500	745	812.0	900.0	-	-	
1600	780	922.0	1024.0	-	-	
1800	850	1196.0	1322.0	-	-	
2000	920	1534.0	1687.0	-	-	
2200	990	1948.0	2115.0	-	-	
2400	1060	2409.0	2611.0	-	-	
2600	1130	2918.0	3153.0	-	-	

* Lengths can be supplied from the range of 0.3 m up to 5.9 m as per customer request.

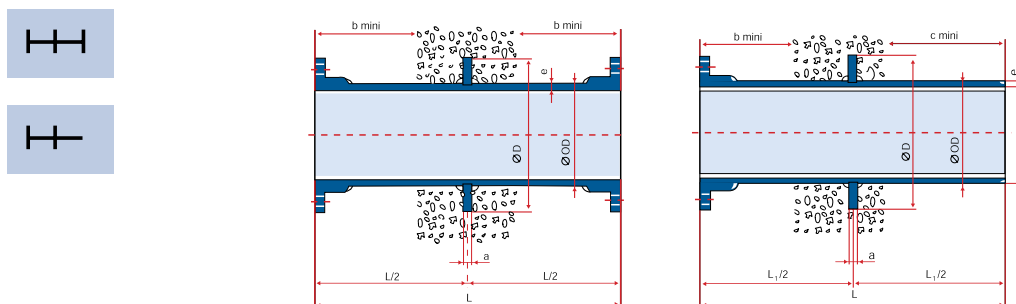
DOUBLE FLANGED DUCTILE IRON SHORT PIECES



Nominal Diameter DN	Effective Length "L", 250 mm Mass with flange				Effective Length "L", 500mm Mass with flange				
	PN 10 kg	PN 16 kg	PN 25 kg	PN 40 kg	PN 10 kg	PN 16 kg	PN 25 kg	PN 40 kg	
80	9.6	9.6	9.8	9.8	12.9	12.9	13.3	13.3	
100	11.5	11.5	12.5	12.9	13.4	13.4	16.9	16.9	
150	19.0	19.0	21.0	21.0	26.0	26.0	28.0	28.0	
200	26.5	26.0	29.0	31.5	36.5	36.0	39.5	42.0	
250	40.5	39.5	45.5	63.0	57.0	56.0	62.0	79.0	
300	53.0	52.0	59.0	84.0	75.0	73.0	80.0	106.0	
350	69.0	71.0	83.0	-	99.0	100.0	112.0	-	
400	80.0	88.0	106.0	-	113.0	123.0	141.0	-	
500	95.0	122.0	157.0	-	104.0	117.0	138.0	-	
600	129.0	178.0	201.0	-	139.0	166.0	215.0	-	
700	207.0	170.0	265.0	-	289.0	255.0	350.0	-	
800	267.0	223.0	352.0	-	373.0	329.0	458.0	-	
900	318.0	264.0	426.0	-	447.0	393.0	556.0	-	
1000	395.0	340.0	556.0	-	550.0	495.0	711.0	-	
1200	-	-	-	-	549.0	661.0	822.0	-	

Above pipes can be supplied with different lengths, also one or more puddles can be made.

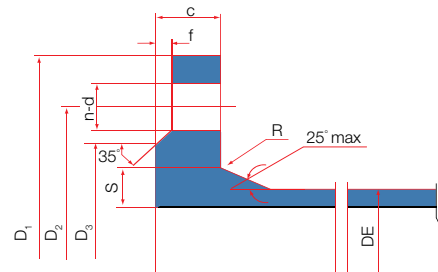
ANCHORING PIPES (FLANGE SPIGOT WITH PUDDLE & DOUBLE FLANGE WITH PUDDLE)



Nominal Diameter DN	L mm	L1 mm	e mm	OD mm	D mm	a mm	b min mm	c min mm	Mass of short flanged anchoring pipes, with flanges				Mass of flange spigot, with flanges			
									PN 10 kg	PN 16 kg	PN 25 kg	PN 40 kg	PN 10 kg	PN 16 kg	PN 25 kg	PN 40 kg
80	600	700	6.0	98	200	16.0	120	200	17.5	17.5	17.5	17.5	15.7	15.7	15.7	15.7
100	600	700	6.1	118	220	16.0	120	200	21.0	21.0	22.0	22.0	18.9	18.9	19.4	19.4
150	600	700	6.3	170	285	18.0	130	200	33.0	33.0	34.5	38.5	30.0	30.0	30.5	32.5
200	600	700	6.4	222	340	20.0	130	200	44.5	44.6	48.0	58.0	39.5	39.5	41.5	46.0
250	1000	1000	6.8	274	400	20.0	155	300	79.0	80.0	86.0	-	67.0	68.0	71.0	-
300	1000	1000	7.2	326	455	20.5	155	300	104.0	107.0	118.0	-	86.0	88.0	94.0	-
350	1000	1000	7.7	378	505	20.5	170	300	130.0	138.0	154.0	-	109.0	113.0	122.0	-
400	1000	1000	8.1	429	565	20.5	170	300	156.0	167.0	191.0	-	131.0	135.0	147.0	-
500	1000	1000	9.0	532	670	22.5	190	300	213.0	249.0	277.0	-	178.0	193.0	206.0	-
600	1000	1000	9.9	635	780	25.0	200	300	286.0	339.0	354.0	-	237.0	263.0	271.0	-
700	1500	1500	10.8	738	895	27.5	220	300	480.0	586.0	-	-	413.0	481.0	-	-
800	1500	1500	11.7	842	1015	30.0	240	300	610.0	-	-	-	519.0	-	-	-
900	1500	1500	12.6	945	1115	32.5	260	300	621.0	See integral flange spigot anchoring pipe with puddle flange		-	729.0	See integral flanged anchoring pipes with puddle flange		-
1000	1500	1500	13.5	1048	1230	35.0	300	300	745.0			-	880.0			-

Above pipes can be supplied with different lengths, also one or more puddles can be made.

10.4.6 Flanges



FIXED FLANGE (PN 10) - RF*

Nominal Diameter DN	PN 10 Flange										
	D1	D2	D3	DE	c	f	S	R	d	size	n
80	200	160	132	98	19.0	3	15.0	6	19	M16	8
100	220	180	156	118	19.0	3	15.0	6	19	M16	8
150	285	240	211	170	19.0	3	15.0	8	23	M20	8
200	340	295	266	222	20.0	3	16.0	8	23	M20	8
250	400	350	319	274	22.0	3	17.5	10	23	M20	12
300	455	400	370	326	24.5	4	19.5	10	23	M20	12
350	505	460	429	378	24.5	4	19.5	10	23	M20	16
400	565	515	480	429	24.5	4	19.5	10	28	M24	16
450	615	565	530	480	24.5	4	20.5	12	28	M24	20
500	670	620	582	532	26.5	4	21.0	12	28	M24	20
600	780	725	682	635	30.0	5	24.0	12	31	M27	20
700	895	840	794	738	32.5	5	23.0	16	31	M27	24
800	1025	950	901	842	35.0	5	24.5	16	34	M30	24
900	1115	1050	1001	945	37.5	5	26.5	16	34	M30	28
1000	1230	1160	1112	1048	40.0	5	28.0	16	37	M33	28
1100	1340	1270	1218	1152	42.5	5	30.0	20	37	M33	32
1200	1455	1380	1328	1255	45.0	5	31.5	20	40	M36	32
1400	1675	1590	1530	1462	46.0	5	32.0	20	43	M39	36
1500	1785	1700	1640	1668	47.5	5	33.0	20	43	M39	36
1600	1915	1820	1750	1565	49.0	5	34.5	20	49	M45	40
1800	2115	2020	1950	1875	52.0	5	36.5	20	49	M45	44
2000	2325	2230	2150	2082	55.0	5	38.5	20	49	M45	48
2200	2550	2440	2370	2288	59.0	6	41.5	20	56	M52	52
2400	2750	2650	2570	2495	62.0	6	43.5	20	56	M52	56
2600	2960	2850	2780	2702	65.0	6	45.5	20	56	M52	60

FIXED FLANGE (PN 16) - RF*

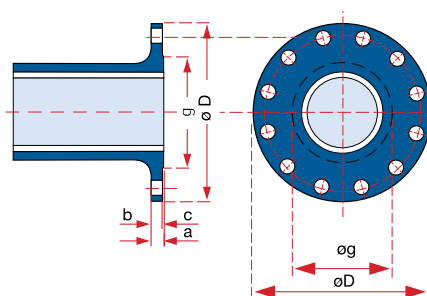
Nominal Diameter DN	PN 16 Flange										
	D1	D2	D3	DE	c	f	S	R	d	size	n
80	200	160	132	98	19.0	3	15.0	6	19	M16	8
100	220	180	156	118	19.0	3	15.0	6	19	M16	8
150	285	240	211	170	19.0	3	15.0	8	23	M20	8
200	340	295	266	222	20.0	3	16.0	8	23	M20	12
250	400	355	319	274	22.0	3	17.5	10	28	M24	12
300	455	410	370	326	24.5	4	19.5	10	28	M24	12
350	520	470	429	378	26.5	4	21.0	10	28	M24	16
400	580	525	480	429	28.0	4	22.5	10	31	M27	16
450	640	585	548	480	30.0	4	24.0	12	31	M27	20
500	715	650	609	532	31.5	4	25.0	12	34	M30	20
600	840	770	720	635	36.0	5	29.0	12	37	M33	20
700	910	840	794	738	39.5	5	27.5	16	37	M33	24
800	1025	950	901	842	43.0	5	30.0	16	40	M36	24
900	1125	1050	1001	945	46.5	5	32.5	16	40	M36	28
1000	1255	1170	1112	1048	50.0	5	35.0	16	43	M39	28
1100	1355	1270	1218	1152	53.5	5	37.5	20	43	M39	32
1200	1485	1390	1328	1255	57.0	5	40.0	20	49	M45	32
1400	1685	1590	1530	1462	60.0	5	42.0	20	49	M45	36
1500	1820	1710	1640	1565	62.5	5	44.0	20	56	M52	36
1600	1930	1820	1750	1668	65.5	5	45.5	20	56	M52	40
1800	2130	2020	1950	1875	70.0	5	49.0	20	56	M52	44
2000	2345	2230	2150	2082	75.0	5	52.5	20	62	M56	48
2200	2555	2440	2370	2288	81.0	6	56.5	20	62	M56	52
2400	2765	2650	2570	2495	86.0	6	60.0	20	62	M56	56
2600	2965	2850	2780	2702	91.0	6	63.5	20	62	M56	60

*Raised Face

FIXED FLANGE (PN 25)

Nominal Diameter DN	PN 25 Flange									Bolts	
	D1	D2	D3	DE	c	f	S	R	d	size	n
80	200	160	132	98	19.0	3	15.0	6	19	M16	8
100	235	190	156	118	19.0	3	15.0	6	23	M20	8
150	300	250	211	170	20.0	3	16.0	8	28	M24	8
200	360	310	274	222	22.0	3	17.5	8	28	M24	12
250	425	370	330	274	24.5	3	19.5	10	31	M27	12
300	485	430	389	326	27.5	4	22.0	10	31	M27	16
350	555	490	448	378	30.0	4	24.0	10	34	M30	16
400	620	550	503	429	32.0	4	25.5	10	37	M33	16
450	670	600	548	480	34.5	4	27.5	12	37	M33	20
500	730	660	609	532	36.5	4	29.0	12	37	M33	20
600	845	770	720	635	42.0	5	33.5	12	40	M36	20
700	960	875	820	738	46.5	5	32.5	16	43	M39	24
800	1085	990	928	842	51.0	5	35.5	16	49	M45	24
900	1185	1090	1028	945	55.5	5	39.0	16	49	M45	28
1000	1320	1210	1140	1048	60.0	5	42.0	16	56	M52	28
1100	1420	1310	1240	1152	64.5	5	45.0	20	56	M52	32
1200	1530	1420	1350	1255	69.0	5	48.5	20	56	M52	32
1400	1755	1640	1560	1462	74.0	5	52.0	20	62	M56	36
1600	1975	1860	1780	1668	81.0	5	56.5	20	62	M56	40
1800	2195	2070	1985	1875	88.0	5	61.5	20	70	M64	44
2000	2425	2300	2210	2082	95.0	5	66.5	20	70	M64	48

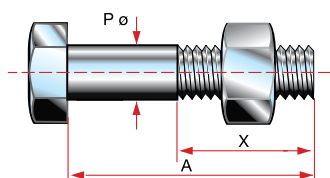
ROTABLE FLANGE (PN 10, 16, 25, 40))



Nominal Diameter DN	PN 10					PN 16				
	Diameter mm		Thickness mm			Diameter mm		Thickness mm		
	D	g	a	b	c	D	g	a	b	c
80	200	132	23	20	3	200	132	23	20	3
100	220	156	23	20	3	220	156	23	20	3
150	285	211	26	23	3	285	211	26	23	3
200	340	266	29	26	3	340	266	29	26	3
250	400	319	32	29	3	400	319	32	29	3
300	455	370	36	32	4	455	370	36	32	4
350	505	429	39	35	4	520	429	39	35	4
400	565	482	42	38	4	580	480	42	38	4
500	670	582	48	44	4	715	582	48	44	4
600	780	682	55	50	5	840	682	55	50	5

Nominal Diameter DN	PN 25					PN 40				
	Diameter mm		Thickness mm			Diameter mm		Thickness mm		
	D	g	a	b	c	D	g	a	b	c
80	200	132	23	20	3	200	132	23	20	3
100	235	156	23	20	3	235	156	23	20	3
150	300	211	26	23	3	300	211	26	23	3
200	360	266	29	26	3	375	266	33	30	3
250	425	319	32	29	3	450	345	37	34	3
300	485	370	36	32	4	515	409	42	38	4
350	555	429	39	35	4	-	-	-	-	-
400	620	482	42	38	4	-	-	-	-	-
500	730	582	48	44	4	-	-	-	-	-
600	845	682	55	50	5	-	-	-	-	-

BOLTS FOR FLANGES

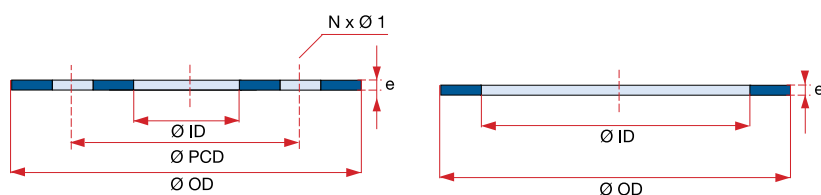


Nominal Diameter DN	PN 10				PN 16				PN 25				PN 40			
	No.	Type	L/X		No.	Type	L/X		No.	Type	L/X		No.	Type	L/X	
40	4	HM 16	85/87		4	HM 16	85/57		4	HM 16	85/57		4	HM 16	85/57	
50	4	HM 16	85/87		4	HM 16	85/57		4	HM 16	85/57		4	HM 16	85/57	
60	4	HM 16	85/87		4	HM 16	85/57		8	HM 16	85/57		4	HM 16	85/57	
65	4	HM 16	85/87		4	HM 16	85/57		8	HM 16	85/57		4	HM 16	85/57	
80	8	HM 16	85/87		8	HM 16	85/57		8	HM 16	85/57		4	HM 16	85/57	
100	8	HM 16	90/62		8	HM 16	90/62		8	HM 20	100/72		8	HM 20	100/72	
125	8	HM 16	90/62		8	HM 16	90/62		8	HM 24	110/82		8	HM 24	110/82	
150	8	HM 20	100/72		8	HM 20	100/72		8	HM 24	110/82		8	HM 24	110/82	
200	8	HM 20	100/72		12	HM 20	100/72		12	HM 24	110/82		12	HM 27	130/90	
250	12	HM 20	110/76		12	HM 24	110/82		12	HM 27	130/90		12	HM 30	140/93	
300	12	HM 20	120/83		12	HM 24	130/93		16	HM 27	130/90		16	HM 30	140/93	
350	16	HM 20	130/93		16	HM 24	130/93		16	HM 30	140/93		-	-	-	-
400	16	HM 24	140/103		16	HM 27	150/105		16	HM 33	150/100		-	-	-	-
450	20	HM 24	130/93		20	HM 27	130/90		20	HM 33	150/100		-	-	-	-
500	20	HM 24	150/110		20	HM 30	160/110		20	HM 33	160/100		-	-	-	-
600	20	HM 27	170/122		20	HM 33	180/117		20	HM 36	180/110		-	-	-	-
700	24	HM 27	150/105		24	HM 33	150/100		24	HM 39	180/105		-	-	-	-
800	24	HM 30	160/110		24	HM 36	160/92		24	HM 45	190/110		-	-	-	-
900	28	HM 30	160/110		28	HM 36	160/92		28	HM 45	190/110		-	-	-	-
1000	28	HM 33	180/117		28	HM 39	180/105		28	HM 52	230/130		-	-	-	-
1100	32	HM 33	160/100		32	HM 39	180/105		32	HM 52	230/130		-	-	-	-
1200	32	HM 36	180/110		32	HM 45	210/115		32	HM 52	230/130		-	-	-	-
1400	36	HM 39	180/105		36	HM 45	210/115		-	-	-	-	-	-	-	-
1500	36	HM 39	180/105		36	HM 52	230/130		-	-	-	-	-	-	-	-
1600	40	HM 45	190/110		40	HM 52	230/130		-	-	-	-	-	-	-	-
1800	44	HM 45	190/110		48	HM 56	260/133		-	-	-	-	-	-	-	-
2000	48	HM 45	190/110		48	HM 56	260/133		-	-	-	-	-	-	-	-

BOLT TORQUES FOR FLANGES

Nominal Diameter DN	Bolting torques for flanges of	
	PN 10 mN	PN 16 mN
80	40	40
100	40	40
125	40	40
150	40	50
200	50	60
250	60	140
300	60	120
350	60	130
400	100	170
450	120	170
500	160	280
600	180	310
700	200	350
800	360	490
1000	380	660
1100	390	690
1200	510	970
1400	620	1140
1500	720	1500
1600	870	1540

GASKETS FOR FLANGES



Nominal Diameter DN	Thickness mm	Half Face PN 10 & PN 16		Full Face PN 10					Full Face PN 16				
		ID mm	OD mm	ID mm	PCD mm	OD mm	N nos	d1 mm	ID mm	PCD mm	OD mm	N nos	d1 mm
80	3.0	85.0	132.0	85.0	160.0	200.0	8	19.0	85.0	160.0	200.0	8	19.0
100	3.0	105.0	156.0	105.0	180.0	220.0	8	19.0	105.0	180.0	220.0	8	19.0
125	3.0	124.0	184.0	124.0	210.0	250.0	8	19.0	124.0	210.0	250.0	8	19.0
150	3.0	155.0	211.0	155.0	240.0	285.0	8	23.0	155.0	240.0	285.0	8	23.0
200	3.0	205.0	266.0	205.0	295.0	340.0	8	23.0	205.0	295.0	340.0	8	23.0
250	3.0	255.0	319.0	255.0	350.0	400.0	12	23.0	255.0	355.0	400.0	12	28.0
300	3.0	305.0	370.0	305.0	400.0	455.0	12	23.0	305.0	410.0	455.0	12	28.0
350	5.0	355.0	429.0	355.0	460.0	505.0	16	23.0	355.0	470.0	520.0	16	28.0
400	5.0	410.0	480.0	410.0	515.0	565.0	16	28.0	410.0	525.0	580.0	16	31.0
450	5.0	452.0	544.0	452.0	565.0	615.0	20	28.0	452.0	585.0	640.0	20	31.0
500	5.0	510.0	609.0	510.0	620.0	670.0	20	28.0	510.0	650.0	715.0	20	34.0
600	5.0	610.0	720.0	610.0	725.0	780.0	20	31.0	610.0	770.0	840.0	20	37.0
700	6.0	716.0	794.0	716.0	840.0	895.0	24	31.0	716.0	840.0	910.0	24	37.0
800	6.0	807.0	901.0	807.0	950.0	1015.0	24	34.0	807.0	950.0	1025.0	24	40.0
900	6.0	907.0	1001.0	907.0	1050.0	1115.0	28	34.0	907.0	1050.0	1125.0	28	40.0
1000	6.0	1009.0	1112.0	1009.0	1160.0	1230.0	28	37.0	1009.0	1170.0	1255.0	28	43.0
1100	6.0	1110.0	1215.0	1110.0	1270.0	1340.0	32	37.0	1110.0	1270.0	1355.0	32	43.0
1200	6.0	1212.0	1328.0	1212.0	1380.0	1455.0	32	40.0	1212.0	1390.0	1485.0	32	49.0
1400	6.0	1409.0	1530.0	1409.0	1590.0	1675.0	36	43.0	1409.0	1590.0	1685.0	36	49.0
1500	6.0	1511.0	1640.0	1511.0	1700.0	1785.0	36	43.0	1511.0	1710.0	1820.0	36	56.0
1600	6.0	1612.0	1750.0	1612.0	1820.0	1915.0	40	49.0	1612.0	1820.0	1930.0	40	56.0
1800	6.0	1815.0	1950.0	1815.0	2020.0	2115.0	44	49.0	1815.0	2020.0	2130.0	44	56.0
2000	6.0	2019.0	2150.0	2019.0	2230.0	2325.0	48	49.0	2019.0	2230.0	2345.0	48	62.0
2200	6.0	2215.0	2370.0	2215.0	2440.0	2550.0	52	56.0	2215.0	2440.0	2555.0	52	62.0
2400	6.0	2418.0	2570.0	2418.0	2650.0	2750.0	56	56.0	2418.0	2650.0	2765.0	56	62.0
2600	6.0	2622.0	2780.0	2622.0	2850.0	2960.0	60	56.0	2622.0	2850.0	2965.0	60	62.0

Standard

For pipes of DN 80 to 1600

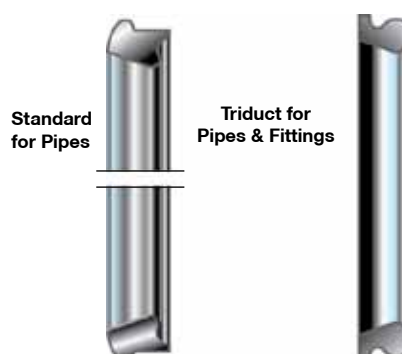
Nominal Diameter DN	Mass kg
80	0.140
100	0.165
125	0.200
150	0.235
200	0.390
250	0.510
300	0.720
350	0.830
400	1.150
450	1.520
500	1.700
600	2.100
700	3.500
800	4.900
900	6.200
1000	7.800
1200	9.270
1400	17.600
1600	24.600

Triduct

For fittings of DN 80 to 1600

Nominal Diameter DN	Mass kg
80	0.140
100	0.165
125	0.200
150	0.235
200	0.390
250	0.510
300	0.720
350	0.830
400	1.150
450	1.520
500	1.700
600	2.100
700	3.500
800	4.900
900	6.200
1000	7.800
1200	9.270
1400	17.600
1600	24.600

Rubber Gaskets (Elastomer Rubber)



The masses indicated here are average values. They may vary as a function of the elastomer rubber used.

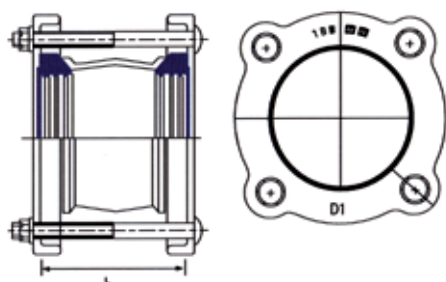
10.5 Repair and Maintenance Pieces

10.5.1 Couplings

Designed to join pipes of various outside diameters with the same or different nominal bore, such as steel pipes, ductile iron pipes, UPVC pipes, cast iron pipes, asbestos cement pipes and other rigid pipe materials.

The ability of couplings to join dissimilar pipe materials is a bonus feature in both repair or permanent situations.

UNIVERSAL COUPLING



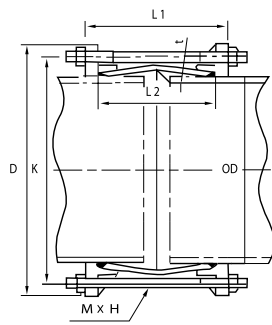
Material Specification

PIPE	① Ductile Iron	BS 2789 Grade 420/12
GLAND	② Ductile Iron	BS 2789 Grade 420/12
BARREL	③ Steel	BS 2789 Grade 420/12
SEALING RUBBER	④ EPDM	BS 2494 -Type W
STUD	⑤ Stainless Steel Bolts, Nuts & Washers	
COATING	Fusion Bonded Epoxy 250µm Thickness	
TORQUE	M12 Bolts (55 - 65 Nm) M16 Bolt (95 -105 Nm)	

Size	OD Range	L mm	Bolts	No.
DN 80	088 - 103	102	M12 x 102	4
DN 100	108 - 128	102	M12 x 102	4
DN 125	132 - 146	102	M12 x 110	4
DN 150	158 - 181	102	M12 x 165	4
DN 175	192 - 209	102	M12 x 165	4
DN 200	218 - 235	102	M12 x 165	6
DN 225	250 - 267	102	M12 x 165	6
DN 250	262 - 289	102	M12 x 165	6
DN 300	315 - 332	102	M12 x 165	6
DN 300	322 - 339	102	M12 x 165	6
DN 300	340 - 360	102	M12 x 165	6
DN 350	351 - 368	152	M16 x 240	8
DN 350	374 - 391	152	M16 x 240	8
DN 400	400 - 429	152	M16 x 240	8
DN 400	404 - 429	152	M16 x 240	8

Size	OD Range	L mm	Bolts	No.
DN 400	425 - 442	152	M16 x 240	8
DN 450	455 - 472	152	M16 x 240	10
DN 450	476 - 493	152	M16 x 240	10
DN 500	500 - 532	152	M16 x 240	10
DN 500	527 - 544	152	M16 x 240	10
DN 500	555 - 572	152	M16 x 240	10
DN 500	566 - 583	152	M16 x 240	10
DN 500	582 - 599	152	M16 x 240	10
DN 600	600 - 630	152	M16 x 240	12
DN 600	630 - 647	152	M16 x 240	12
DN 600	645 - 679	152	M16 x 240	12
DN 600	662 - 679	152	M16 x 240	12
DN 600	675 - 692	152	M16 x 240	12

FLEXIBLE COUPLING



Material Specification

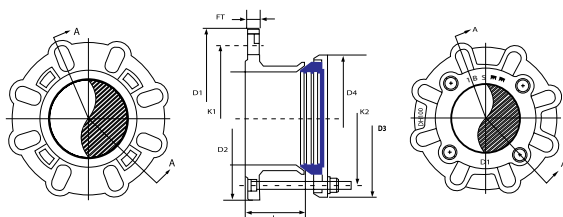
PPE	① Ductile Iron	BS 2789 Grade 420/12
GLAND	② Ductile Iron	BS 2789 Grade 420/12
BARREL	③ Ductile Iron	BS 2789 Grade 420/12
SEALING RUBBER	④ EPDM	BS 2494 -Type W
STUD	⑤ Stainless Steel Bolts Nuts & Washers	
COATING	Fusion Bonded Epoxy	250µm Thickness
TORQUE	M12 Bolts (55 - 65 Nm) M16 Bolt (95 -105 Nm)	

DN	D	K	OD	L1	L2	t	M	N
80	180	152	98 ^{+2.1} _{-2.6}	178	102	7.0	12	4
100	202	174	118 ^{+2.2} _{-3.0}	178	102	7.5	12	4
150	257	230	170 ^{+2.3} _{-3.0}	178	102	8.0	12	6
200	310	282	222 ^{+2.4} _{-3.5}	178	102	8.5	12	6
250	363	336	274 ^{+2.5} _{-3.5}	178	102	9.0	12	6
300	390	360	326 ^{+2.6} _{-3.5}	178	102	10.0	12	6
350	484	450	378 ^{+2.7} _{-3.5}	262	152	10.5	16	8
400	540	505	429 ^{+2.8} _{-4.0}	262	152	11.0	16	8
450	588	554	480 ^{+2.9} _{-4.0}	262	152	11.5	16	10
500	652	612	532 ^{+3.0} _{-4.0}	262	152	12.0	16	10
600	751	715	635 ^{+3.2} _{-4.0}	262	152	13.5	16	12
700	860	820	738 ^{+3.4} _{-4.5}	262	152	14.5	16	12
800	965	925	842 ^{+1.0} _{-4.5}	262	152	16.0	16	14
900	1065	1026	945 ^{+1.0} _{-5.0}	278	178	17.0	16	16
1000	1180	1140	1048 ^{+1.0} _{-5.0}	278	178	18.0	16	16
1100	1287	1245	1152 ^{+1.0} _{-6.0}	290	178	19.5	16	20
1200	1400	1353	1255 ^{+1.0} _{-6.0}	290	178	20.5	16	22
1400	1622	1570	1462 ^{+1.0} _{-7.0}	290	178	23.0	16	24
1500	1728	1675	1565 ^{+1.0} _{-7.0}	290	178	24.0	16	26
1600	1833	1780	1668 ^{+1.0} _{-7.0}	290	178	25.5	16	28
1800	2060	2000	1875 ^{+1.0} _{-7.0}	437	254	28.0	16	32
2000	2258	2200	2082 ^{+1.0} _{-8.0}	437	254	30.0	16	36

10.5.2 Flange Adaptors

UNIVERSAL FLANGE ADAPTOR

Covering a similar range to the straight coupling, flange adaptors are manufactured to join plain ended pipe to flanged valves, fittings, flow meters and pipes. Flange drillings are available to all international standards or to customer specifications.

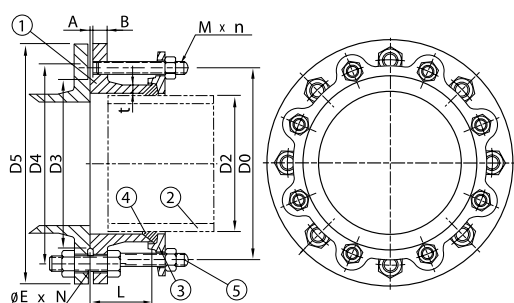


Material Specification

BODY & GLAND	Ductile Iron, GGG50
SEALING RUBBER	EPDM to BS2494
STUD BOLT	Stainless Steel Bolts, Nuts & Washers
COATING	Fusion Bonded Epoxy, 250 Microns
STUD TORQUE	M12 (50 - 55); M16 (95 - 105) M20 (145 - 150)

DN	D2	L	PN10						PN16					
			K1	FT	FL BOLT		N	M x n	K1	FT	FL BOLT		N	M x n
80	088 - 103	73	160	16	8	Φ19.0	4	M12 x 102	160	16	8	Φ19.0	4	M12 x 102
100	108 - 128	76	180	16	8	Φ19.0	4	M12 x 110	180	16	8	Φ19.0	4	M12 x 110
125	132 - 146	76	210	16	8	Φ19.0	4	M12 x 110	210	16	8	Φ19.0	4	M12 x 110
150	158 - 181	76	240	16	8	Φ23.0	4	M12 x 110	240	16	8	Φ23.0	4	M12 x 110
175	192 - 209	76	270	17	8	Φ23.0	4	M12 x 110	270	17	8	Φ23.0	4	M12 x 110
200	218 - 235	76	295	17	8	Φ23.0	4	M12 x 110	295	17	12	Φ23.0	6	M12 x 110
225	250 - 267	76	325	20	8	Φ23.0	6	M12 x 120	325	20	12	Φ23.0	6	M12 x 120
250	262 - 289	90	350	22	12	Φ23.0	6	M12 x 120	355	22	12	Φ28.0	6	M12 x 120
300	315 - 332	90	400	22	12	Φ23.0	6	M12 x 120	410	22	12	Φ28.0	6	M12 x 120
300	322 - 339	90	400	22	12	Φ23.0	6	M12 x 120	410	22	12	Φ28.0	6	M12 x 120
300	340 - 360	90	400	22	12	Φ23.0	6	M12 x 120	410	22	12	Φ28.0	6	M12 x 120
350	351 - 368	108	460	25	16	Φ23.0	8	M16 x 146	470	25	16	Φ28.0	8	M16 x 146
350	374 - 391	108	460	25	16	Φ23.0	8	M16 x 146	470	25	16	Φ28.0	8	M16 x 146
400	400 - 429	108	515	25	16	Φ28.0	8	M16 x 146	525	25	16	Φ31.0	8	M16 x 146
400	404 - 429	108	515	25	16	Φ28.0	8	M16 x 146	525	25	16	Φ31.0	8	M16 x 146
400	425 - 442	108	515	25	16	Φ28.0	8	M16 x 146	525	25	16	Φ31.0	8	M16 x 146
450	455 - 472	108	565	25	20	Φ28.0	10	M16 x 146	585	25	20	Φ31.0	10	M16 x 146
450	476 - 493	108	565	25	20	Φ28.0	10	M16 x 146	585	25	20	Φ31.0	10	M16 x 146
500	500 - 532	114	620	26	20	Φ28.0	10	M16 x 152	650	26	20	Φ34.0	10	M16 x 152
500	527 - 544	114	620	26	20	Φ28.0	10	M16 x 152	650	26	20	Φ34.0	10	M16 x 152
500	555 - 572	114	620	26	20	Φ28.0	10	M16 x 152	650	26	20	Φ34.0	10	M16 x 152
500	566 - 583	114	620	26	20	Φ28.0	10	M16 x 152	650	26	20	Φ34.0	10	M16 x 152
500	582 - 599	114	620	26	20	Φ28.0	10	M16 x 152	650	26	20	Φ34.0	10	M16 x 152
600	600 - 630	114	725	26	20	Φ31.0	10	M16 x 152	770	26	20	Φ37.0	10	M16 x 152
600	630 - 647	114	725	26	20	Φ31.0	10	M16 x 152	770	26	20	Φ37.0	10	M16 x 152
600	645 - 679	114	725	26	20	Φ31.0	10	M16 x 152	770	26	20	Φ37.0	10	M16 x 152
600	662 - 679	114	725	26	20	Φ31.0	10	M16 x 152	770	26	20	Φ37.0	10	M16 x 152
600	675 - 692	114	725	26	20	Φ31.0	10	M16 x 152	770	26	20	Φ37.0	10	M16 x 152

FLANGE ADAPTOR – DCI PIPE

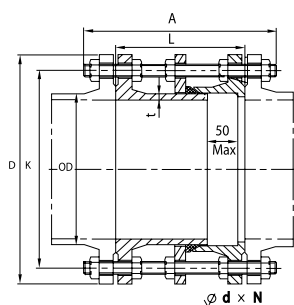


Material Specification

BODY & GLAND	Ductile Iron, GGG50
SEALING RUBBER	EPDM to BS 2494
STUD BOLT	Stainless Steel Bolts, Nuts & Washers
COATING	Fusion Bonded Epoxy, 250 Microns
STUD TORQUE	M12 (50 - 55); M16 (95 - 105) M20 (145 - 150)

DN	D2	L	PN10							PN16							PN25						
			D5	D4	B	D0	E	N	M x n	D5	D4	B	D0	E	N	M x n	D5	D4	B	D0	E	N	M x n
80	98	73	200	160	12.0	160	19.0	8	M12 x 102	200	160	12.0	160	19.0	8	M12 x 102	200	160	19.0	160	19.0	8	M16 x 102
100	118	76	220	180	12.0	180	19.0	8	M12 x 110	220	180	12.0	180	19.0	8	M12 x 110	235	190	19.0	190	23.0	8	M16 x 110
150	170	76	285	240	16.0	240	23.0	8	M12 x 110	285	240	16.0	240	23.0	8	M12 x 110	300	250	19.0	250	28.0	8	M16 x 110
200	222	76	340	295	16.0	295	23.0	8	M12 x 110	340	295	16.0	295	23.0	12	M12 x 110	360	310	20.0	310	28.0	12	M16 x 110
250	274	90	400	350	19.0	350	23.0	12	M12 x 120	400	355	19.0	355	28.0	12	M12 x 120	425	370	22.0	370	31.0	12	M16 x 120
300	326	90	455	400	19.0	400	23.0	12	M12 x 120	455	410	19.0	410	28.0	12	M12 x 120	485	430	22.0	430	31.0	16	M16 x 120
350	378	108	505	460	23.0	460	23.0	16	M16 x 146	520	470	23.0	470	28.0	16	M16 x 146	555	490	25.0	490	34.0	16	M20 x 146
400	429	108	565	515	23.0	515	28.0	16	M16 x 146	580	525	23.0	525	31.0	16	M16 x 146	620	550	25.0	550	37.0	16	M20 x 146
450	480	108	615	565	24.0	565	28.0	20	M16 x 146	640	585	24.0	585	31.0	20	M16 x 146	670	600	25.0	600	37.0	20	M20 x 146
500	532	114	670	620	25.0	620	28.0	20	M16 x 152	715	650	25.0	650	34.0	20	M16 x 152	730	660	25.0	660	37.0	20	M20 x 152
600	635	114	780	725	25.0	725	31.0	20	M16 x 152	840	770	25.0	770	37.0	20	M16 x 152	845	770	25.0	770	40.0	20	M20 x 152
700	738	114	895	840	25.0	840	31.0	24	M16 x 152	910	840	25.0	840	37.0	24	M16 x 152	960	875	25.0	875	43.0	24	M20 x 152
800	842	114	1015	950	25.0	950	34.0	24	M16 x 152	1025	950	25.0	950	40.0	24	M16 x 152	1085	990	25.0	990	49.0	24	M20 x 152
900	945	114	1115	1050	25.0	1050	34.0	28	M16 x 152	1125	1050	25.0	1050	40.0	28	M16 x 152	1185	1090	25.0	1090	49.0	28	M20 x 152
1000	1048	114	1230	1160	27.0	1160	37.0	28	M16 x 152	1255	1170	27.0	1170	43.0	28	M16 x 152	1320	1210	38.0	1210	56.0	28	M20 x 152
1100	1125	127	1340	1270	38.0	1270	37.0	32	M16 x 165	1355	1270	38.0	1270	43.0	32	M16 x 165	1420	1310	38.0	1310	56.0	32	M20 x 165
1200	1255	127	1455	1380	38.0	1380	40.0	32	M16 x 165	1485	1390	38.0	1390	49.0	32	M16 x 165	1530	1420	38.0	1420	56.0	32	M20 x 165
1400	1462	127	1675	1590	38.0	1590	43.0	36	M16 x 165	1685	1590	38.0	1590	49.0	36	M16 x 165	1755	1640	38.0	1640	62.0	36	M20 x 165
1500	1565	127	1758	1700	40.0	1700	43.0	36	M16 x 165	1820	1710	40.0	1710	56.0	36	M16 x 165							
1600	1668	190	1915	1820	60.0	1820	49.0	40	M16 x 235	1930	1820	60.0	1820	56.0	40	M16 x 165							
1800	1875	190	2115	2020	60.0	2020	49.0	44	M16 x 235	2130	2020	60.0	2020	56.0	44	M16 x 235							
2000	2082	190	2325	2230	60.0	2230	49.0	48	M16 x 235	2345	2230	60.0	2230	62.0	48	M16 x 235							

10.5.3 Dismantling Joints



A double flange composite fitting, featuring a telescopic action between a flanged spigot and a flange adaptor, specially designed to provide longitudinal adjustment in flanged pipe systems. Dismantling joints also provide a simple

method for the installation and removal of flanged valves, pumps, flow meters and flanged pipework.

Material Specification

BODY & GLAND	Ductile Iron
SEALING RUBBER	EPDM, BS 2494
STUD BOLT	Stainless Steel Bolts, Nuts & Washers
COATING	Fusion Bonded Epoxy, 250 Microns

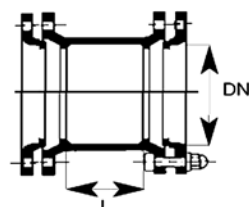
DN	OD	L	A	PN10				PN16				PN25			
				D	K	d	STUDxNOS	D	K	d	STUDxNOS	D	K	d	STUDxNOS
80	98	200	284	200	160	19.0	M16x8	200	160	19.0	M16x8	200	160	19.0	M16x8
100	118	200	284	220	180	19.0	M16x8	220	180	19.0	M16x8	235	190	23.0	M20x8
150	170	200	290	285	240	23.0	M20x8	285	240	23.0	M20x8	300	250	28.0	M24x8
200	222	220	312	340	295	23.0	M20x8	340	240	23.0	M20x12	360	310	28.0	M24x12
250	274	230	332	400	350	23.0	M20x12	400	355	28.0	M24x12	425	370	31.0	M27x12
300	326	260	367	455	400	23.0	M20x12	455	410	28.0	M24x12	485	430	31.0	M27x16
350	378	260	371	505	460	23.0	M20x16	520	470	28.0	M24x16	555	490	34.0	M30x16
400	429	270	390	565	515	28.0	M24x16	580	525	31.0	M27x16	620	550	37.0	M33x16
450	480	270	394	615	565	28.0	M24x20	640	585	31.0	M27x20	670	600	37.0	M33x20
500	532	280	411	670	620	28.0	M24x20	715	650	34.0	M30x20	730	660	37.0	M33x20
600	635	300	444	780	725	31.0	M27x20	840	770	37.0	M33x20	845	770	40.0	M36x20
700	738	300	451	895	840	31.0	M27x24	910	840	37.0	M33x24	960	875	43.0	M39x24
800	842	320	484	1015	950	34.0	M30x24	1025	950	40.0	M36x24	1085	990	49.0	M45x24
900	945	320	491	1115	1050	34.0	M30x28	1125	1050	40.0	M36x28	1185	1090	49.0	M45x28
1000	1048	340	522	1230	1160	37.0	M33x28	1255	1170	43.0	M39x28	1320	1210	56.0	M52x28
1100	1125	350	539	1340	1270	37.0	M33x32	1355	1270	43.0	M39x32	1420	1310	56.0	M52x32
1200	1255	370	576	1455	1380	40.0	M36x32	1458	1390	49.0	M45x32	1530	1420	56.0	M56x32
1400	1462	380	592	1675	1590	43.0	M39x36	1685	1590	49.0	M45x36	1755	1640	62.0	M56x36
1500	1565	410	639	1785	1700	43.0	M39x36	1820	1710	56.0	M52x36	-	-	-	-
1600	1668	410	644	1915	1820	49.0	M45x40	1930	1820	56.0	M52x40	-	-	-	-
1800	1875	440	684	2115	2020	49.0	M45x44	2130	2020	56.0	M52x44	-	-	-	-
2000	2082	460	720	2325	2230	49.0	M45x48	2345	2230	62.0	M56x48	-	-	-	-
2100	2164	480	790	2430	2335	49.0	M45x52	2450	2335	62.0	M56x52	-	-	-	-
2200	2288	500	820	2550	2440	56.0	M52x52	2555	2440	62.0	M56x52	-	-	-	-

10.5.4 Collars

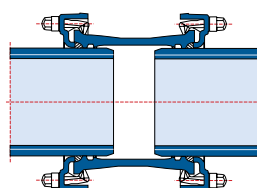
COLLARS (EXPRESS AND/OR M.J. TYPE JOINT)



Nominal Diameter DN	L mm	L1 mm	Mass kg	Nominal Diameter DN	L mm	L1 mm	Mass kg
80	158	328	8.8	900	240	-	282.0
100	160	334	10.8	1000	250	-	349.0
150	165	351	16.7	1100	260	-	465.8
200	170	368	23.5	1200	270	-	560.0
250	175	351	31.5	1400	340	-	816.0
300	180	360	40.5	1500	350	-	829.0
350	185	405	55.0	1600	360	-	1094.0
400	190	410	67.0	1800	380	-	1427.0
500	200	440	100.0	2000	400	-	1818.0
600	210	450	131.0	2200	420	-	2272.0
700	220	500	183.0	2400	440	-	2794.0
800	230	510	226.0	2600	460	-	3390.0



Collars \geq DN 700 mm



Collars \leq DN 600 mm

10.6 PE Sleeves

Polyethylene sleeve 200 micron thickness (250 microns is available you request) is supplied in accordance with ISO 8180 and AWWA C-105.

! Note: SADIP can offer any different specification or coating as per customer requirement.



11 Storage and Laying Instructions

11.1 Pipe Storage

General Recommendations

1. The storage area must be flat. The ground must not be marshy or unstable and it must not contain any corrosive material.
2. On arrival in storage area the goods must be inspected and if there is any damage (degradation of the internal or external coating), it must be repaired before going into stock.
3. The pipes must be stocked in the respective stakes according to diameter in accordance with a logical stock plan. The same is applied for fittings and accessories.
4. It is always desirable to protect coating from the effects of weathering and prolonged exposure to the sun.
5. Use shaped hooks covered with special protection of plastic material or rubber, to avoid any damages to the internal coating of the pipes. (See fig. 1)
6. Wooden spacers (timbers, wedges, etc) must be strong enough and of good quality.
7. Precautions must be taken when the pipes have special coating.

Please consult SADIP for assistance.

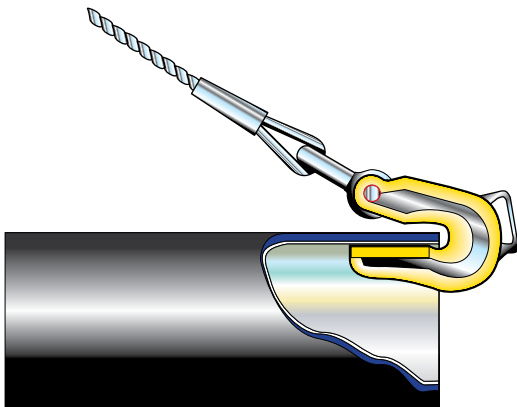
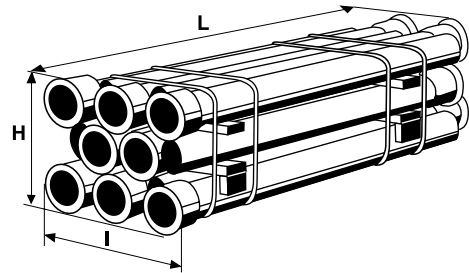


Figure 1

Bundling of Pipes

1. DN ≤ 300 pipes are bundled and protected with orange plugs on both socket and spigot.
2. DN > 300 pipes are not bundled



DN	Bundle composition	L	Overall Width I	Overall Height H	Average bundle mass
	No. of beds x no of pipes	m	m	m	m
80	3 x 5	6.30	0.57	0.42	1,313
100	2 x 5	6.30	0.67	0.34	1,145
150	2 x 3	6.30	0.59	0.48	1,044
200	2 x 3	6.30	0.75	0.56	1,326
250	2 x 2	6.30	0.63	0.67	1,156
300	2 x 2	6.30	0.74	0.77	1,452

Storage of the Gaskets

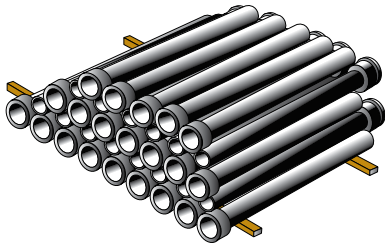
As in ISO 4633 and 2230: Mainly the ring shall be stored in accordance with the following precautionary measures:

1. Storage temperature should be below 25°C and preferably below 15°C.
2. Elastomer rubber should be protected from light, direct sun light and strong artificial light with a high ultraviolet content.
3. As ozone is particularly deleterious, storage room should not contain any equipment which is capable of generating ozone such as mercury vapour lamps, high voltage electrical equipment, electric motors or other equipments which may cause electric sparks or silent electrical discharge.
4. Elastomer rubber should be stored in a normal position that is free from tension, compression and other deformation.

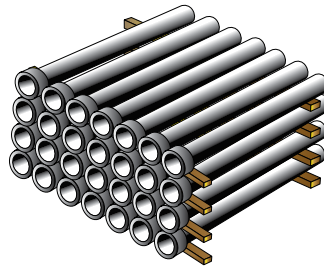
The maximum period for dispatching gaskets of the water type from the works or store of SADIP is fixed at three years after manufacturing.

Stacking Arrangement

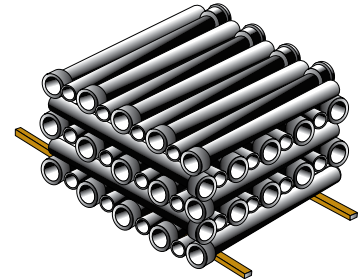
Pipes can be stacked in one of the three cases shown here



Case 1



Case 2



Case 3

Max No. of layers as a function of stack formation for kg pipes													
DN	80	100	150	200	250	300	350	400	500	600	700	800	
Case # 1	70	58	40	31	25	21	18	16	12	10	7	6	
Case # 2 & 3	30	27	22	18	16	14	12	11	8	7	5	4	



11.2 Assembly of Push-On Joint

The method described below is given as an example. The method of making the joint and equipment used may vary, providing of course that the principles of assembling and recommendations specified will be strictly observed.

1. Using a wire brush and a rag, carefully clean the inside of the socket particularly the gasket recesses. In particular, remove any deposits of earth, sand, etc. also clean the spigot of the pipe to be joined and the gasket itself. Check the presence of the chamfer, as well as the absence of any damage on the spigot of the pipe. (See fig 1 & 2 →)
2. Check the condition of the gasket and insert it into its recess, with the lips pointing towards the bottom of the socket. Make sure that the gasket is correctly compressed all the way round. (See fig 3 →)
3. Coat with lubricating paste recommended and supplied by SADIP, the spigot end of the pipe and the exposed surface of the gasket (See fig 4 & 5 →). The gasket recess must not be coated with lubricating paste, except for small diameter pipes or fitting when problems arise on fitting the gasket.
4. Center the spigot in the socket and hold the pipe in a position by resting it on two wedges of tamped earth or better, gravel.
5. Push in the spigot until the first mark disappears inside the socket. The second mark must still be visible after assembly. (see fig 6 →)
6. Check that the gasket is correctly in position by inserting the end of a metal ruler through the annular spigot and socket gap until it touches the gasket. The ruler must penetrate to the same depth around the whole circumference.
7. Jointing must be done with well aligned pipes. Make sure that the curvature after assembly does not exceed the permissible angular deflection of particular joint.

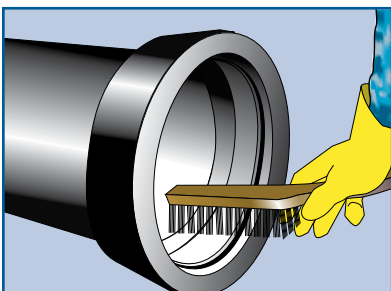


Fig. 1

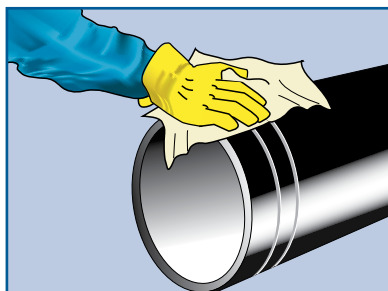


Fig. 2

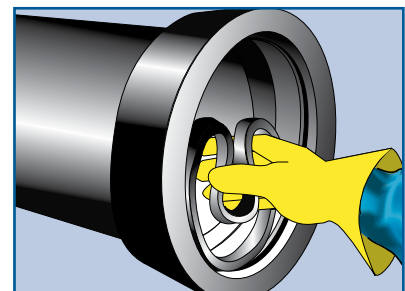


Fig. 3

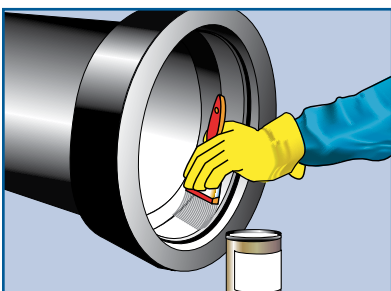


Fig. 4

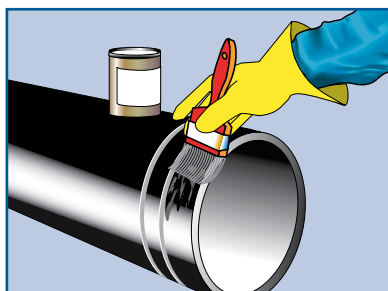


Fig. 5

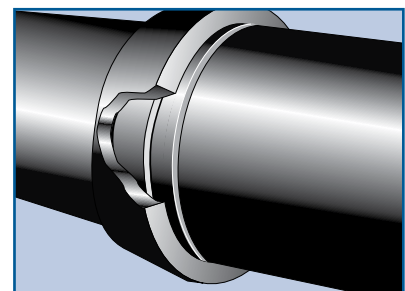


Fig. 6

11.3 Assembly of Locked Joint System

In this case, please follow the same assembly procedure of Push-on joint in general with additional to the following points:

1. Check the presence and correctness of the chamfer and welded-bead at the end of the pipe spigot (or flange spigot piece).
 2. Carefully clean the split ring and the gland, particularly at the points of contact.
 3. Place the gland and the split ring on the end of the barrel of the pipe to be joined beyond the welded bead. (See fig 1 →)
- Since the internal diameter of split ring is less than the external diameter of the welded, its necessary for DN<400mm to open up this ring by means of V shaped wedge inserted between the two ends of split ring. (See fig 2 →)
4. Make a mark on the pipe to be laid at a distance "a" from the weld bead. The value of "a" is given in opposite table. (See fig 1 and table 1 →)
 5. Insert the spigot of the pipe to be joined into the socket, making sure that they are joined and aligned until the marking on the barrel is directly in line with the end of the socket. This operation is carried out with the aspect discussed in "Push-on Assembly".
 6. Check that the gasket is always correctly positioned in its recess using the feeler as discussed before.
 7. Bring the split ring into contact with weld bead. Ensure that it makes good contact all the way round and that it fits snugly against the pipe spigot.
 8. Bring the gland into contact with split ring. It is essential to center the gland. This operation carried out easily by means of three wooden wedges positioned around the circumference of the pipe.
 9. Fit the bolts and tighten the nuts by hand until they make contact with gland. Check the correct position of the latter then gradually tighten the nuts with a wrench proceeding the same way as for car wheel nuts.
 10. Using a torque wrench, complete the tightening of nuts until contact is made between the gland and face of the socket.
- Note.** The lifting gear must be removed only when the locked joint has been fully assembled.
11. If necessary, deflect the joint by rotating the pipe around the "spherical joint", within the limits indicated before in this brochure.

DN	80 to 100	150 to 200	250 to 500	600 to 800
a	20 mm	25 mm	30 mm	35 mm

Table 1 – Distance of weld bead

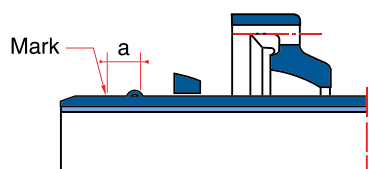


Fig. 1

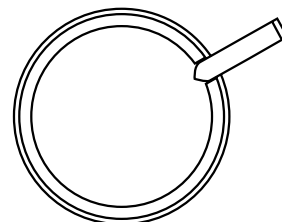


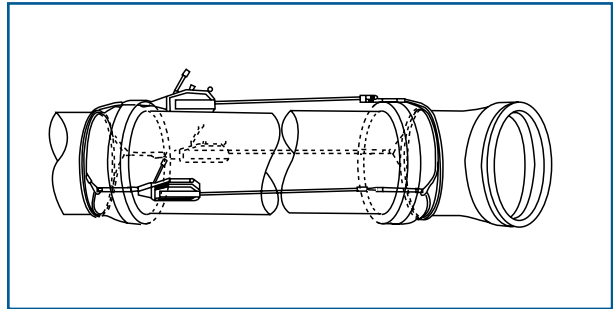
Fig. 2

11.4 Pipe Laying Equipments

Equipment for Joining Push-On Joint Pipes & Straight Fittings

Mechanical Winches

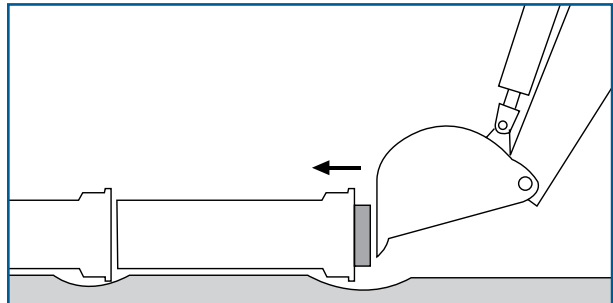
- DN 150 to 300:
TIRFOR 516 winch with wire rope and protected hooks.
- DN 350 to 600:
TIRFOR 532 winch with wire rope and protected hooks.
- DN 700 & above:
2 TIRFOR 532 winches, diametrically opposite 2 wire ropes and 2 protected hooks.



Assembly using digger bucket

Taking a few precautions, it is possible to use the hydraulic force of the arm and bucket of a mechanical digger to join pipes and straight fittings. In this case:

- place a wooden batten between the pipe and digger bucket,
- push slowly and steadily, observing the rules for pipe joining.

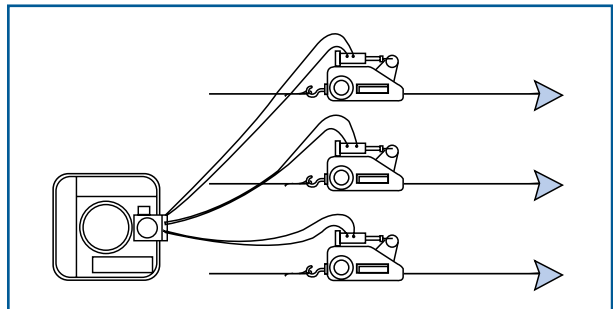


Hydraulic jack winch

This method is similar to the mechanical winch (see below). It provides excellent distribution of the joining force as well as straight line movement of the pipe being joined. The winches are controlled by a hydraulic unit. The number and disposition of the winches are identical to that for the mechanical winches.

Lever Assembly Tool: DN 80 TO 400

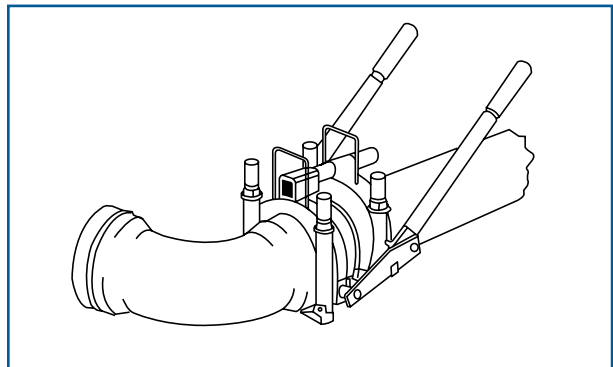
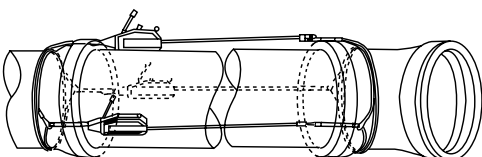
This equipment can also be used for piping joint.



Equipments for jointing Push-On Fittings

Mechanical Winches

DN 500 & above: 3 TIRFOR 532 winches arranged 120° apart, 3 shackles and 6 wire ropes.



11.5 Polyethylene Sleeving

General

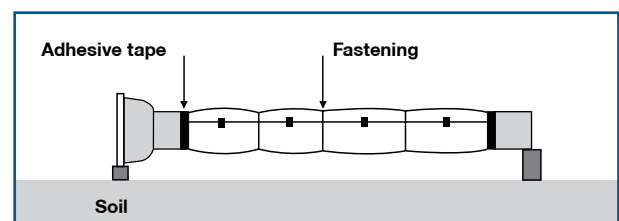
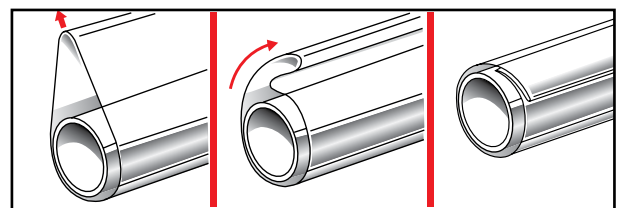
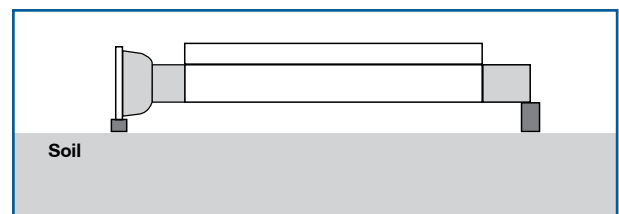
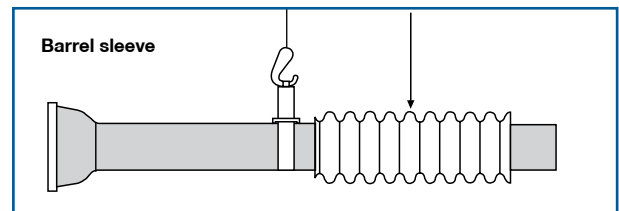
Polyethylene sleeving is a tubular film of low density polyethylene slipped over and snugly fitted to a pipe at the time of laying. It is used to supplement the basic pipe coating (metallic zinc + bituminous paint) in certain cases of highly corrosive soils, or in the presence of stray currents. Standard : ISO 8180

Application

Pipes and fittings must be clean and dry before sleeving

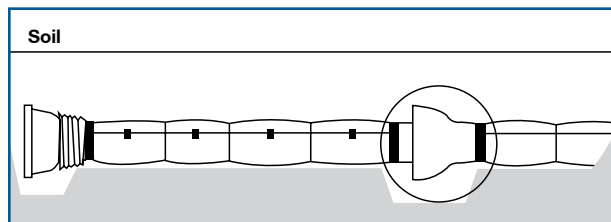
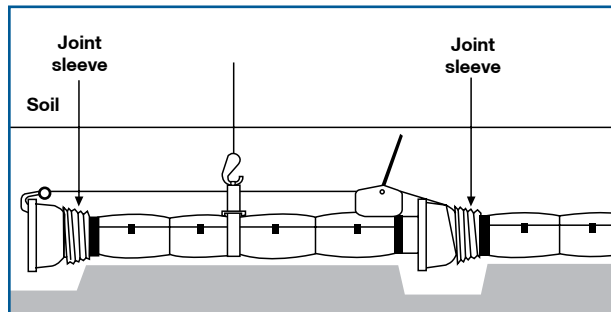
Sleeving Preparation

- Cut the barrel and joint sleeves to the dimensions indicated in the section (Material required & dimensions)
- Before lowering the pipe into the trench, raise it up and slip the pleated sleeving along the barrel.
- With the pipe supported on two wooden blocks, spread the sleeving along the whole length of the barrel and fit it snugly to the latter by folding it over at the top of the pipe. The sleeving must not move or bulge.
- The sleeving must fit in the pipes as tight as possible (importance of the fold and ties)
- The barrel and joint sleeve overlaps must provide total continuity of protection.
- The fold must always be made at the top of the pipes, to limit the risk of damage during backfilling.
- Fasten the fold up with tape
- Fasten the sleeve ends to the barrel by wrapping adhesive tape around the circumference, overlapping the barrel sleeving junction, to give a watertight overwrap.
- Apply intermediate fastening (plastic coated steel wire) every 1.5m.
- Slip on the joint sleeve.



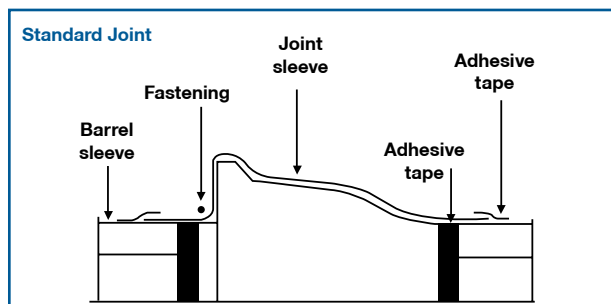
Joint Sleeving

- Lower the pipe into the trench.
- Joint the pipe with appropriate equipment. The fold must still be at the top of the pipe
- Bring the joint sleeve over the socket and spigot. A sufficiently large excavation must have been made under the joint to allow satisfactory application of this sleeve, (room for tape wrapping and ties.)

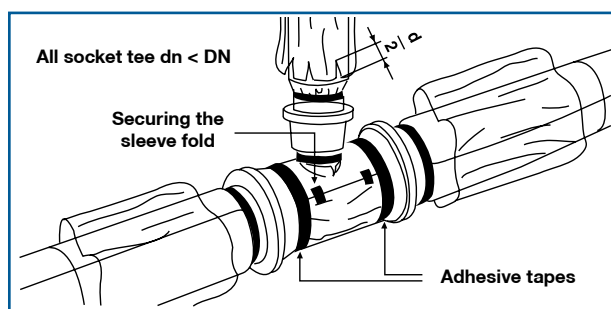
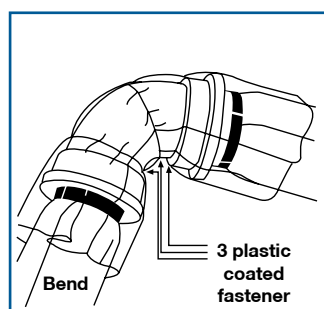


Sleeving of Fittings

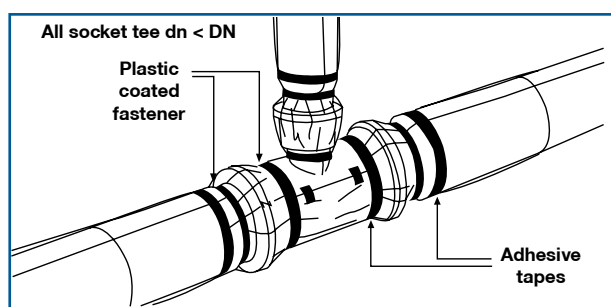
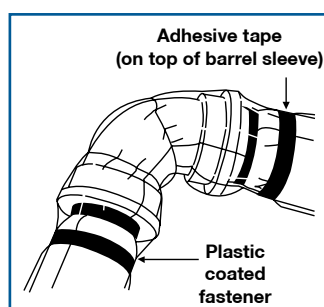
- Use the same polyethylene sleeving to protect fittings. Depending on their shape, two or three pieces of sleeving may be necessary. Application must comply with the same recommendations (particularly fitting the sleeving as snugly as possible.)

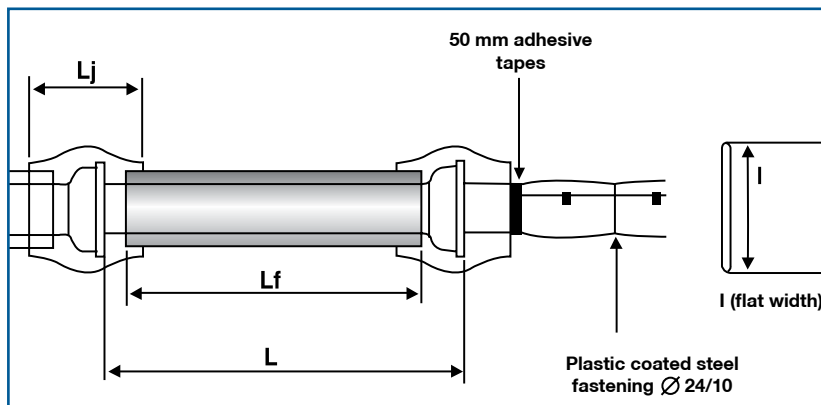


Application



Final Assembly





Materials required & Dimensions

Nominal Diameter DN	L m	Sleeve					Tie fasteners		Adhesive tape		Sleeve mass per metre	
		Barrel		Joint		E u m	No./ pipe	Length per pipe m	No./ pipe	Length per pipe m	Barrel	Joint
		I m	Lf m	Standard Triduct Locked	LJ m						kg	kg
				I m								
60	6	0.315	5.7	0.315	0.70	200	4	1.8	4	1.2	0.117	0.117
80	6	0.315	5.7	0.315	0.70	200	4	2.0	4	1.6	0.117	0.117
100	6	0.315	5.7	0.315	0.70	200	4	2.3	4	1.8	0.117	0.117
150	6	0.400	5.7	0.400	0.70	200	4	2.9	4	2.6	0.148	0.148
200	6	0.560	5.7	0.560	0.70	200	4	3.6	4	3.4	0.210	0.210
250	6	0.710	5.7	0.710	0.70	200	4	4.2	4	4.4	0.263	0.263
300	6	0.710	5.7	0.710	0.70	200	4	4.9	4	5.2	0.263	0.263
350	6	0.900	5.7	0.900	0.70	200	4	5.6	4	6.0	0.333	0.333
400	6	0.900	5.7	0.900	0.70	200	4	6.2	4	6.8	0.333	0.333
500	6	1.120	5.7	1.120	0.70	200	4	8.3	4	8.4	0.437	0.437
600	6	1.250	5.7	1.250	0.70	200	4	9.6	4	10.0	0.463	0.463
700	6	1.600	6.7	1.600	0.80	200	5	13.6	4	11.6	0.593	0.593
800	6	1.800	6.7	1.800	0.80	200	5	15.3	4	13.2	0.666	0.666



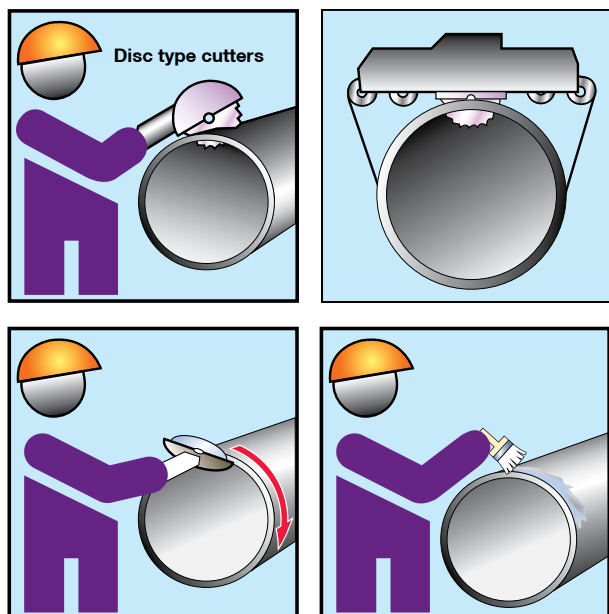
11.6 Cutting Pipes

Pipes must be cut on site as infrequently as possible by using disc-type cutter. Such operations, which require particular care, must be carried out without fail in a plane perpendicular to the pipe axis.

Before cutting, make sure that the OD of the new spigot "cut area" is within the tolerance of the OD of the old spigot. It's advisable to use guage pipe for cutting on site. Guage pipe has a special mark on the socket face. After cutting the pipe, it is necessary:

- To restore the chamfer at the spigot end of the cut faces of pipe.
- To execute the weld on site (if locked joint.)
- To repair the pipe coating and cement lining if damaged.

Nominal Diameter DN	OD mm	m mm	n mm
80	98	9	3
100	118	9	3
150	170	9	3
200	222	9	3
250	274	9	3
300	326	9	3
350	378	9	3
400	429	9	3
500	532	9	3
600	635	9	3
700	738	15	5
800	842	15	5



Chamfer Restoration

After cutting, complete deburring is recommended. It is essential to restore the chamfer on the cut faces of standard pipes so as to facilitate the assembly of the push-on joint and to prevent any damage to the elastomer (rubber) gasket, which can result in a leaking joint. The geometry of this chamfer must be in accordance with the dimensions below.

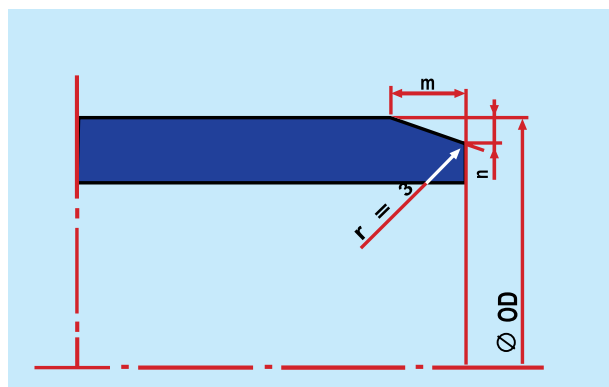
An air operated saw can be used for cutting large diameters (DN 700) (Fein machine for example). The saw can be adapted to make the cut and chamfer at the same time.

Execution of the weld bead (For making restrained joints)

Equipment necessary

- Electric welding set of 130 A minimum with welders accessories (mask gloves, wire brush, scaling hammer, etc.) "Nickel-iron electrode (approx. 55% nickel.)
- Supplied by SADIP on request.
- One copper guide ring per DN.
- Electric pneumatic grinding machine with accessories.

Using the copper ring, mark the position of the weld bead on the end of the barrel. Carefully grind an area at least 25 mm wide at the point where the weld bead will be deposited. (See page 16 for the position of the weld bead)



11.7 Repair of Cement Lining

Any damages at the internal mortar lining caused accidentally during transportation, storage, laying or by rough handling can be repaired easily on site.

- The damaged area should be less than 0.1 m².
- The length of the damaged area should not exceed a quarter of pipe circumference.
- No localized pipe deformation, otherwise cut off the damaged area.

Repair Material: Epoxy

SADIP will supply epoxy materials which come in two packs. Its impact resistance and mechanical strength are by far more than that of concrete pipes.

Main Properties of Repair Epoxy Material:

Compressive Strength	490 kg/m ²
Tensile Strength	155 kg/m ²
Density	1800 kg/m ³
Usable working life	30 to 45 minutes
Shelf life of product	9 months

Mixing

Equal quantity of the two parts are to be mixed well by trowel or other mixing devices.

Tools Needed for Epoxy Application

- Brush
- Trowel
- Palette knife, or sleeker.

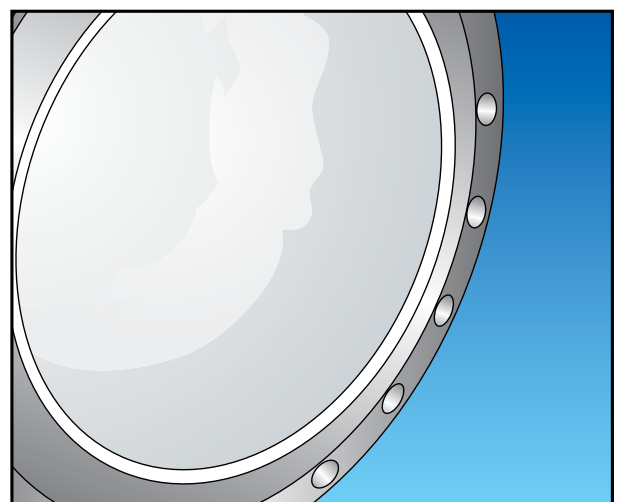
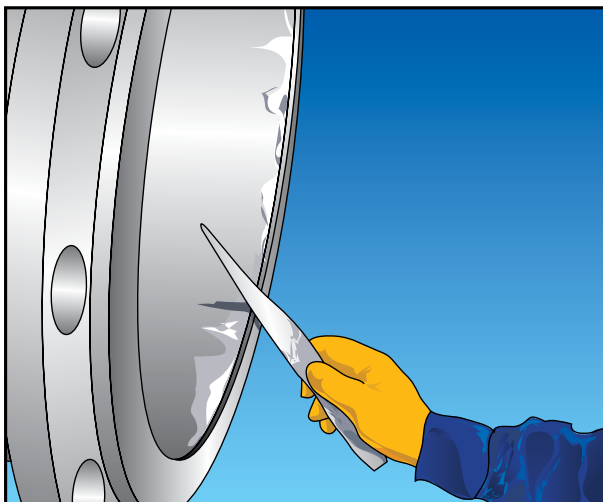
Area Preparation

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 a hammer and cold chisel.
- The edges of cleared zone must be vertical to the iron surface.
- All loose particles like latence, dust, oil, grease and others must be removed prior to application with wire brush, sand paper and air blowing.

Application

- Trowel or other devices are to be used for the application to meet the required level.
- Surface can be finished smoothly by the use of a paint brush dipped in water and by sand paper rubbing.
- Where a deep recess is to be filled, it may be necessary to build up a layer.

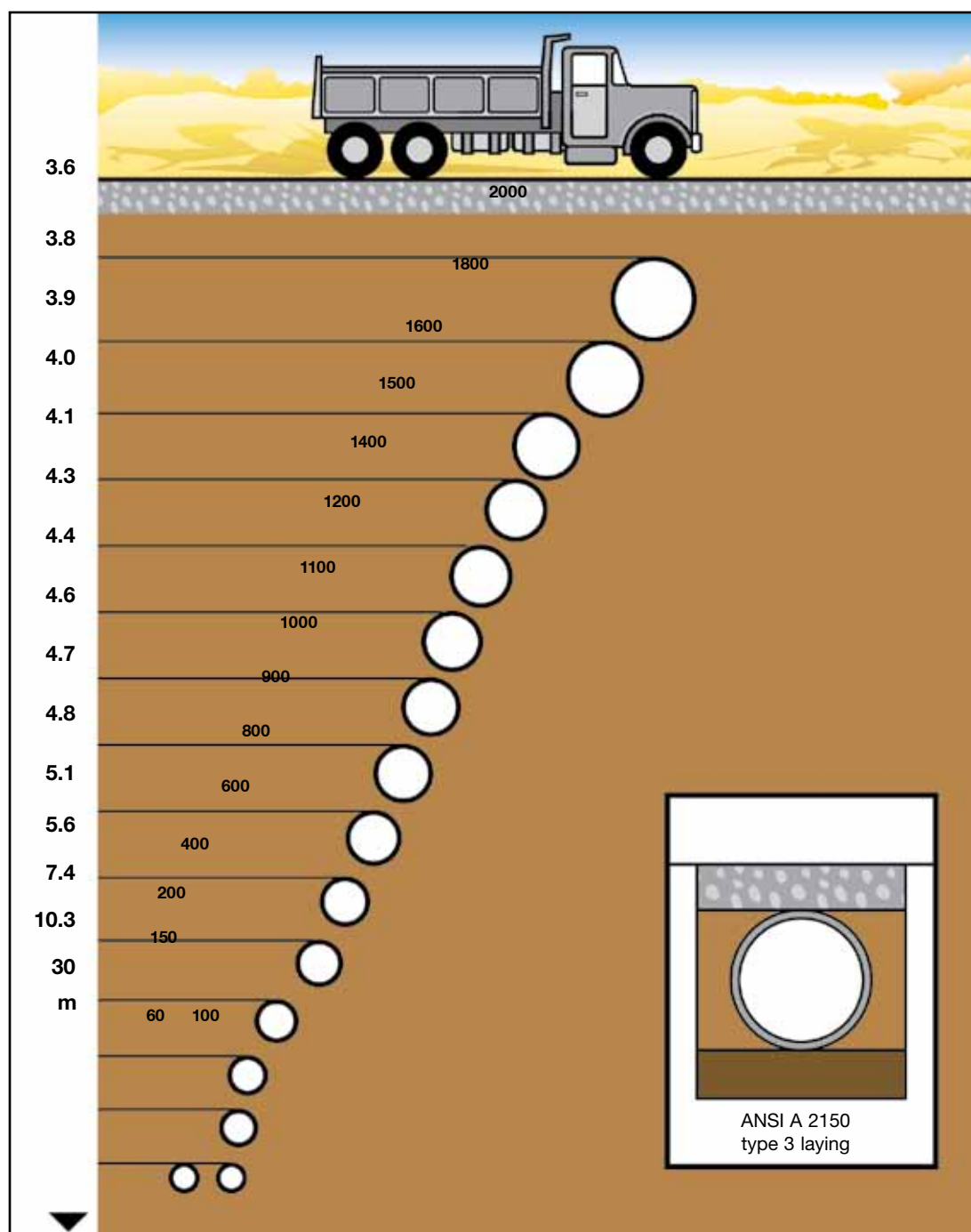


11.8 Depths of Cover

Range of Possibilities

The following illustration shows the maximum and minimum depths of cover with:

- Traffic loading
- K9 pipes
- Type 3 laying in accordance with ANSI A21-50/
AWWA C 150 Standard.



This handbook is intended as a guide only. All values listed in the product specifications are nominal. Unsatisfactory product results may occur due to environmental fluctuations, variations in operating procedures, or interpolation of data. We highly recommend that any personnel using this data have specialised training and experience in the application of these products and their normal installation and operating conditions.

The engineering staff should always be consulted before any of these products are installed to ensure the suitability of the products for their intended purpose and applications.

We hereby state that we do not accept any liability, and will not be held liable, for any losses or damage which may result from the installation or use of any products listed in this handbook as we have not determined the degree of care required for product installation or service. We reserve the right to revise this data, as necessary, without notice. We welcome comments regarding this handbook.



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