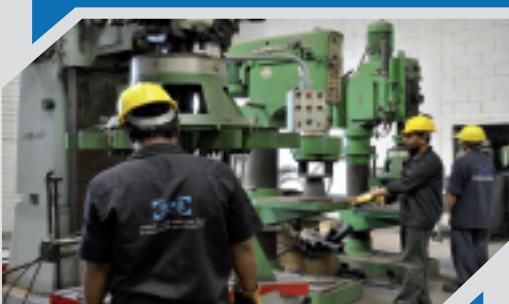


**Ductile Iron  
Pipe Fittings**

**SPS Saudi Pipe Systems**



**Ductile Iron Pipe Fittings**



**Technical  
Catalogue**



**ISO 2531 : 2009 (E)**





## **Ductile Iron Pipe Fittings**

**Saudi Pipe Systems Co. Ltd. (SPS)**

**[www.pipes.sa](http://www.pipes.sa)**

# Introduction





## \* Saudi Pipe Systems Co. Ltd. (SPS) Introduction

Saudi Pipe System Co. Ltd. (SPS) an ISO 9001 - 2008 certified offers the most comprehensive range of ductile iron pipe fittings Systems for use in both potable water and sewerage application in the Middle East. Being at the forefront of innovation means that its customers continuously receive state-of-the-art products and top class services. At the same time all products and facilities are subject to stringent quality controls and conform to relevant BS,EN and ISO standards.

SPS has its own foundry. The foundry has fully automatic machines with expert and well experienced engineers and other skilled operators and produces engineered casting/fittings of variety of metals.

SPS has a wide range of fittings designed and developed according to the related international standards by its own team, which include high qualified, experienced, and highly skilled engineers. Company had high capacity production facilities with precision CNC machines, automated production lines and PCL control test equipment's All test equipment's are always readily calibrated in order to maintain its accuracy and effectively to give the 100% correct results.

Over the decades of experience through aggressive research and development programs in the field of diverse applications as water networks distribution systems, Fire Fighting networks, Chilled Water System, Sewage and Storm Water network, potable/waste water fittings reaching all over the world allows us to better understand the needs of our customers and offer them high quality and competitive solutions. Investing on flexible manufacturing facilities and high technology, SPS targets to offer shorter delivery times and wider product range to its customers.

- SPS is producing ductile iron fitting in the range of DN 80 – DN 2600
- SPS is awarded ISO 9001:2008
- SPS product is complying with international standards, i.e ISO 2531 & BSEN 545 & BSEN 598 and can provide customized product as per customer request.

# Ductile Iron Pipe Fittings



## Quality Assurance:

SPS products are being passed through various important QC tests under the supervision of QC Engineers. All raw materials are tested and checked properly in the most advanced QC Laboratories by the well experienced and qualified QC engineers and chemists prior to release for production.

Products specifications and related ISO/BS/DIN/ASTM/ANSI and other related standards are shown under each product in the following page of catalogue.



## Features and Benefits of ductile cast iron

Ductile cast iron, also called ductile iron, spheroidal graphite iron, or nodular cast iron, is a type of cast iron invented in 1943. While most varieties of cast iron are brittle, ductile cast iron is much more flexible and elastic, due to its nodular graphite inclusions.

Graphite particles exist in the form of sphericity in ductile cast iron. Size of graphite particles are restricted to 67- class and spheroidizing rate should not be less than 80%. Thus after the spheroidizing process, ductile iron will be endowed with mechanical properties of both cast iron and steel.

Much of the production of ductile iron is in the form of ductile cast iron pipe, used for water and sewer lines. Ductile cast iron pipe is stronger and easier to tap, requires less support and provides greater flow area compared with pipes made from other materials like PVC, concrete, polyethylene, or steel.



## Corrosion protection of pipeline

Pipelines transferring potable/sewage water or gas will be greatly influenced by the chemical and physical property of soil. Things will become more serious when pipes are joined to be a long and continuous electrify entity. Thanks to its joint sealed by insulating rubber gasket every 4 - 6 meter, ductile cast iron pipe obtained a high resistance to corrosion caused by electric current. Plenty of cast iron pipelines which have been laying underground for over 100 years are still working in good condition nowadays.



# Ductile Iron Pipe Fittings



## Ductile fittings are suitable for:

- Potable water
- Sewage pressure – and gravity pipelines in water protection zones II and III
- Industrial sewage pipelines
- Culverts
- Bridge pipelines
- Transport – and distribution pipelines for irrigation systems
- Transport of sea water



Ductile cast iron metallographic  
(as cast)



Grey cast iron metallographic



Ductile cast iron metallographic  
(after annealing)

## Quality System & Product Accreditation:

Ever since its inception, SPS has well understood the importance of a sound quality Management System. As a result, it could lead in the world's one of the fierce competitive markets of GCC countries. A comprehensive program in the development of a Quality Management System as per the guidelines of ISO 9001:2008 certificate. The company has been awarded with ISO 9001:2008 certificate. The company has been awarded with many other governmental licenses and approvals and certificates of appreciation also.



# Ductile Iron Pipe Fittings



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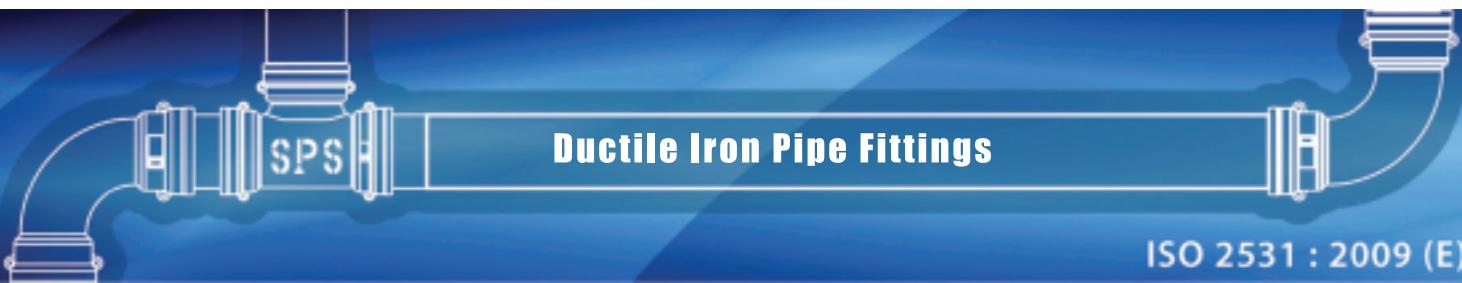
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Saudi Pipe Systems Co. Ltd. [SPS]



## Ductile Iron Pipe Fittings

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### Ductile Iron Pipes Introduction GENERAL TECHNICAL SPECIFICATIONS

Based on ISO 2531 and BS 4772 but incorporating proposed amendments now being considered by the appropriate ISO and BSI technical committees.

#### 1. CLASS DESIGNATIONS AND CALCULATIONS OF STANDARD WALL THICKNESS OF PIPES AND FITTINGS

1) The system of class designations used in this specification follows that established in ISO 2531.

##### Each designation comprises:

- a) A prefix K; this initial letter of "Class" in German.
- b) A whole number; This is the selected coefficient inserted into the formula provided for the calculation of mean wall thickness

2) Calculation of standard wall thickness of pipes and fittings.

(a) Except for class K9 pipes up to and including DN 200, the standard wall thickness of pipes and fittings are calculated as a function of their nominal size by the formula:

$$E = K (0.50.001 + DN)$$

Where

e : is the standard wall thickness in millimeters

DN : is the nominal size

K : is the selected whole number coefficient (9, 12 and 14 being applicable to the classes designated K9, K12 and K14 respectively).

(b) The standard wall thickness of class K9 pipes up to and including DN 200 are calculated by the formula:

$$e = 5.8 + 0.003 DN$$

(c) The thickness of Fittings is calculated as a function of nominal diameter DN by using the formula in clause 4, with

K = 14 for Tees, thus

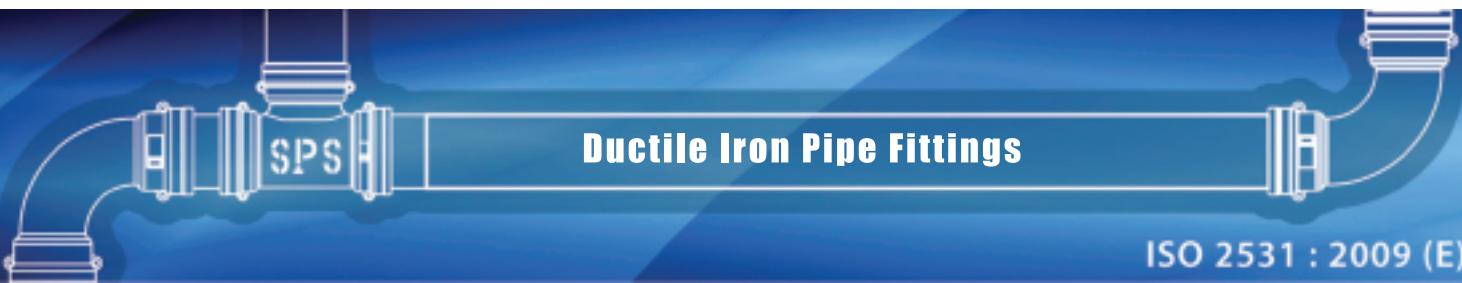
$$e = 7 + 0.014 DN$$

K = 12 for other fittings, thus

$$e = 6 + 0.012 DN$$

#### 2. PIPES

- 1) Standard pipe with flexible joints shall be class K9.
- 2) Standard pipe with flanges screwed or cast-on shall be class K12.
- 3) Standard pipes with flanges welded-on shall be class K9.
- 4) The standard lengths and thickness of pipes are shown in our catalog. Lengths of pipes other than those shown may be supplied by agreement between the purchaser and the manufacturer and shall be deemed to comply with the requirements of this specifications.
- 5) In the case of centrifugally cast pipes, the increase or decrease, in the thickness of the pipe wall shall be obtained variation of the internal diameter only.



### 3. FITTINGS

- 1) Standard fittings without branches shall be class K12
- 2) Standard fittings with branches shall be class K14
- 3) Modifications to the thickness of the wall of fittings may be obtained by modification of the external diameter (plugs, change pieces and flanged spigot pieces excepted) or of internal diameter.

### 4. TYPES OF JOINTS

#### 1) Flexible Joints

Details of flexible joints, either of the 'Push in' type or of the 'Mechanical' type, shall be in accordance with the manufacturer's standard dimensions and tolerances.

As the manufacturing dimensions and tolerances of individual types of joint may differ, the manufacturer's guidance should be obtained with regard to interchangeability where pipes and fittings of differing design are to be jointed. Unless otherwise specified by the purchaser, the gasket shall be manufactured from elastic materials complying with the requirements of BS 2494 and be compatible with the fluid to be carried. The gasket shall be of such size and shape that, when jointed in accordance with the manufacturer's instructions, it shall provide a positive seal within the manufacturer's range of maximum joint deflection and withdrawal under all combinations of joint and gasket dimensional tolerance, and in the range of pressure likely to occur in the pipeline including, where applicable, those below atmospheric pressure.

#### 2) Flanged Joints

(a) Flanged joints shall be designed to facilitate attachment to flanges whose dimensions and tolerances comply with ISO 7005-2 or EN 1092-2. This ensures interconnection between all flanged components (pipes, fittings, valves, etc.) of the same DN and PN and adequate joint performance. Bolts and nuts shall comply, as a minimum, with the requirements of ISO 4016 and ISO 4034, property class 4.6. Where washers are required, they shall comply with ISO 7091.

(b) Dimensional details of flanges designated PN10, PN16 and PN25 are shown in BS4772/ISO 2531. The nominal pressure ratings for these flanges are applicable to the temperature range 10°C to 120°C; the manufacturers should be consulted where pressure- temperature conditions are out of this range.

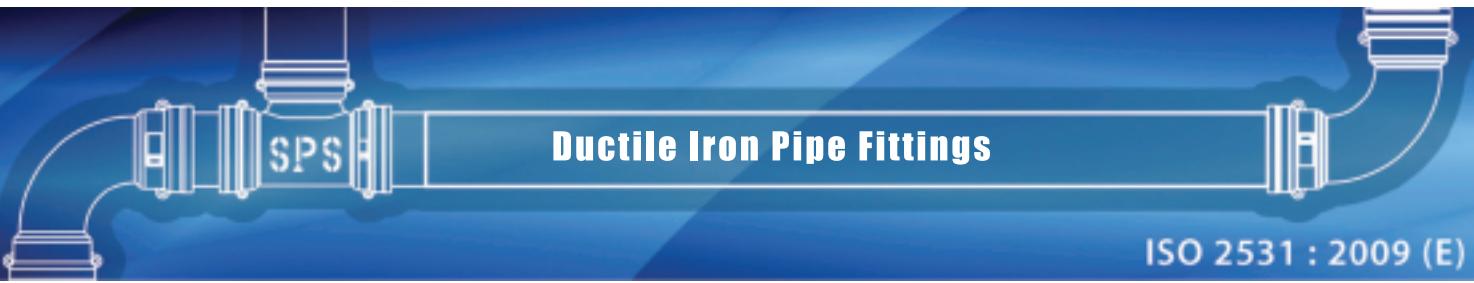
**NOTE: Flanges to this specification are dimensionally compatible with the corresponding flanges BS4504.**

(c) The faces of flanges of pipes shall be at right angles to, and concentric with, axis of the bore, the faces of the flanges on fittings shall be at right angles to the directional axes. Flanges shall be faced over the jointing surface with a tool mark finish having a pitch 10.3±mm; serrations may be spiral or concentric.

(d) Bolt holes shall be drilled unless the purchaser agrees that they shall be cored. The pitch circle diameter of the bolt holes shall be concentric with the bore. The bolt holes shall be located off the center lines (unless otherwise specified by the purchaser) and where there are two or more flanges, the bolt holes shall be aligned.

(e) Ductile iron pipes having ductile iron screwed-on flanges shall be sealed at the threaded joint between the pipe and the flange by a suitable sealing compound. The standard sealing compound applied to the joint shall be suitable sealing for use with raw and potable water up to a temperature of 100°C, natural and town gas and industrial effluents treated so as to be acceptable for discharge into public sewers, alternative types of sealing compound for pipes used for other duties, such as the carrying of industrial effluents of chemicals, shall be the subject of an agreement between the manufacturer and the purchaser.

(f) Ductile iron pipes with ductile iron welded-on flanges shall have a pipe to flange weld attachment of a design proven by tests not to be the limiting factor in the integrity of the flanged pipe when subjected to excessive hydraulic pressure, bending moments and bolting loads.



## Ductile Iron Pipe Fittings

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**NOTE: Where this type of flange is laid underground, consideration should be given to external protecting if the soil is aggressive.**

### 5. MARKING

All pipes and fittings shall be durably and legibly marked and shall bear at least the following indications:

- a) a reference to this International Standard, i.e. ISO 2531;
- b) the manufacturer's name or mark;
- c) identification of the year of manufacture, if applicable;
- d) identification as ductile iron;
- e) the DN;
- f) the PN rating of flanges, if applicable;
- g) the C pressure class of socket and spigot pipe, if applicable.

Items b) to f) shall be cast-on or cold stamped. Items a) and g) can be applied by any method, e.g. painted on the castings.

If necessary, each fitting shall bear an indication of its main characteristics.

The pipes, fittings and accessories with a nominal size greater than DN 300 shall also bear the year of manufacture.

### 6. QUALITY AND QUALITY CONTROL

1- The metal used shall be such that the pipes and fittings are of ductile iron complying with the mechanical properties specified in Table 1.

2- The manufacturer shall carry out test to enable the quality of pipes and fittings to be controlled during manufacture to ensure continuing compliance with requirements of this specification and shall keep records of all such tests, records of these tests shall be available for inspection by the purchaser, or his representative. (see Annexure-C)

**Table 1 – Mechanical Properties:**

Nominal Size DN mm	Type of Casting	Tensile Strength Min.	0.20% Proof Stress Min.	Elongation Min.
		N/mm <sup>2</sup>	N/mm <sup>2</sup>	%
80 – 1000	Centrifugally Cast Pipes	420	300	10x
Over 1000	Centrifugally Cast Pipes	420	300	7
All Sizes	Pipes Not Centrifugally Cast and Fittings	400	300	5

x7% for pipes thicker than class K12

The proof stress shall only be measured when specially agreed between the manufacturer and purchaser and shall be measured under conditions, which shall be specified by the purchaser on his enquiry and order.

### 7. HEAT TREATMENT

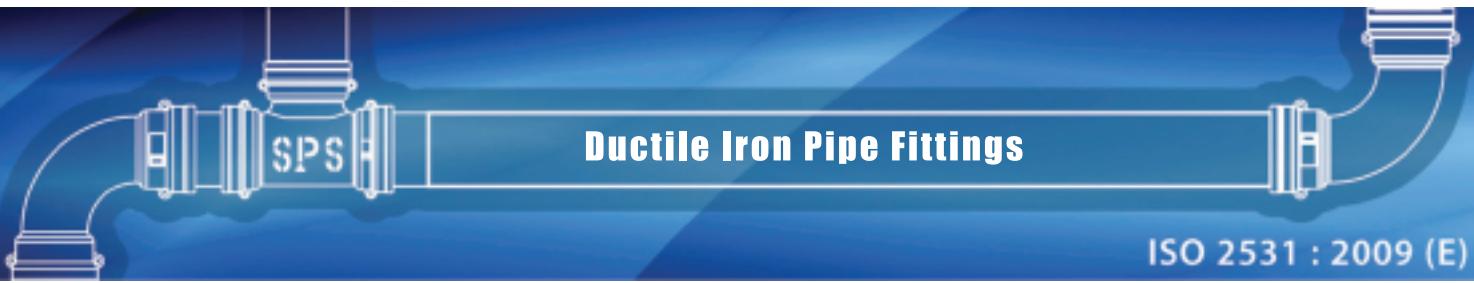
1) Pipes which are centrifugally cast in unlined water-cooled moulds shall be heat treated in order to achieve the necessary mechanical properties and to relieve casting stresses; provided the specified mechanical properties are met, pipes cast under controlled cooling conditions need not be heat treated.

2) The manufacturer may supply fittings in the 'As Cast' conditions or alternatively subject them to heat treatment, whichever method is employed, the representative test results shall conform to the minimum mechanical property requirements of Table 1 and in the case of heat treated fittings, the test pieces shall be subjected to the same heat treatment process.

### 8. CONDITION OF PIPES AND FITTINGS

1) Pipes and fittings shall be removed from the mould with every necessary precaution to avoid warping or shrinkage defects detrimental to their good quality.

2) Pipes and fittings shall be sound and free from surface or other defects detrimental to their functional quality.



## Ductile Iron Pipe Fittings

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- 3) Minor cavities on jointing faces may only be rectified by a process agreed between the manufacturer and purchaser.
- 4) The quality of the casting shall be such that they can be cut, drilled, tapped and machined. Should the purchaser consider that the casting do not comply with this requirement, hardness test shall be carried out as specified in clause 16.

### 9. TESTING FOR STRAIGHTNESS AND UNIFORMITY

All pipes shall be tested for straightness and uniformity of thickness and diameter. The deviation of the pipe from the straight shall not be more than 0.00125 times the effective length of the pipe.

### 10. TOLERANCES ON DIMENSIONS

#### External diameters of pipes and fittings

- 1) The tolerances for the external diameter DE of the spigots of pipes, flanged spigot pieces, and change pieces, and of plugs, shall not be greater than those specified in Table 2 when measured circumferentially using a diameter tape.
- 2) For nominal sizes up to and including DN300, the tolerance for the external diameter DE of pipes shall apply to the full length of the barrel of pipes.

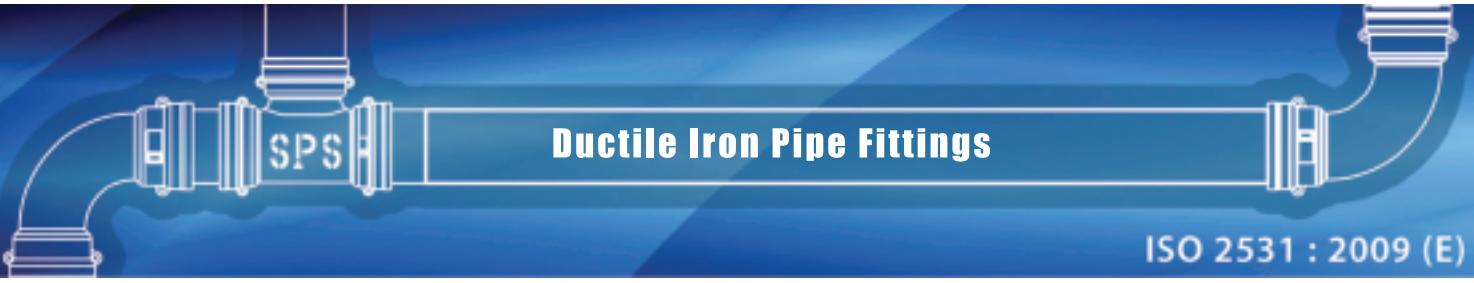
**NOTE: The spigots of pipes cut in field may require preparation in accordance with the manufacturer's recommendations prior to jointing.**

- 3) No tolerance is specified in this standard for the external diameters of fittings (Flanged spigot pieces, change pieces and plugs excepted,) or for pipes with flanges cast on.
- 4) The measured difference between the maximum and minimum axes of individual spigots shall not exceed the appropriate value in Table 2.

**NOTE: Certain types of flexible joint will accept some degree of spigot ovality. However, where the admissible spigot ovality applicable to such joints is smaller than is detailed in Table 2, the values shall be detailed in the manufacturer's catalogue.**

**Table 2 Tolerances on the External Diameters of the Spigots of Pipes and (Where Applicable) Fittings**

Nominal Size DN	Tolerance on the external diameter of spigots and of plugs (DE)		Maximum ovality of spigots (DE) +
mm	mm		mm
80-150	+ 1.0	-3.0	5
200-350	+ 1.0	-3.5	10
400-500	+ 1.0	-4.0	20
600-800	+ 1.0	-4.5	30
900-1000	+ 1.0	-5.0	40
1100-1200	+ 1.0	-6.0	50
1400	+ 1.0	-7.0	55
1600	+ 1.0	-8.0	65



## Ductile Iron Pipe Fittings

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### Tolerance on thickness

The tolerance on the wall thickness shall be in accordance with Table 3

**Table 3 Tolerance on Wall and Flange Thickness**

Type of casting	Dimensions	Tolerance in MM
Centrifugally Cast pipe	Wall thickness (e) Flange thickness (b)	-(1.3 + 0.001 DN <sub>x</sub> ) +/- (1+0.05b)
Pipes not Centrifugally Cast and Fittings	Wall thickness (e) Flange thickness (b)	-(2.3+0.001 DN) +/- (1+0.05b)

xFor DN80 DN100 class K9 ductile iron pipes only, the minimum wall thickness shall be 4.8mm

DN = Nominal size in millimeters

b = Thickness of flange in millimeters

### Tolerance on length

1)The tolerance on the lengths of pipes and fittings shall be in accordance with table 4 and 4a.

**Table 4 Tolerance on Lengths of Pipes**

Type of casting	DN	Tolerance mm
Socket and spigot centrifugally cast pipes Double plain-ended centrifugally cast pipes	All	+/-3.0
Flanged pipes of up to and including 2M in length	All	+/-3.0
Flanged pipes of over 2M but less than 3M in length	All	+/-4.0
Flanged pipes of 3M and over in length	All	+/-5.0

2)By agreement with the purchaser the manufacturer may supply pipes with flexible joints of each size on the order in lengths shorter than the standard length.

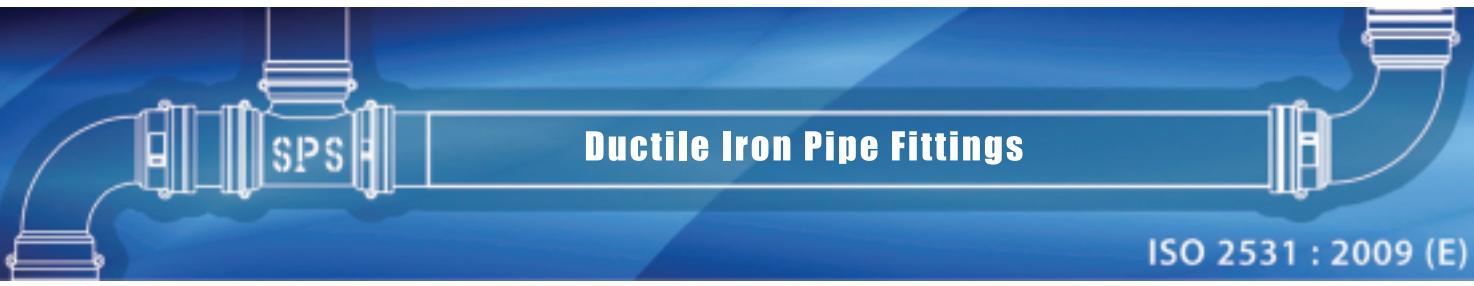
3)The manufacturer may supply 10% of the pipes with flexible joints on any one order from which test rings have been taken. It is permissible to supply up to 5% 150mm shorter than the minimum standard length with the balance being no more than 100mm shorter than the minimum standard length.

**Table 4a Tolerance on Lengths of Fittings**

**Dimensions in millimeters**

Type of casting	Tolerance
Socket and spigot pipes (full length or shortened)	-30 +70
Fittings for socketed joints	$\pm 20$
Pipes and fittings for flanged joints	$\pm 10^a$

<sup>a</sup> By agreement between manufacturer and purchaser, smaller tolerances are possible, but not less than  $\pm 3$  mm for DN < 600 and  $\pm 4$  mm for DN > 600.



## Ductile Iron Pipe Fittings

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### 11. TOLERANCES ON STANDARD MASS

1)The standard mass is dependent upon the design of the ends of pipes and fittings and shall be calculated on the nominal dimensions taking the density of ductile iron as 7050 kg/m<sup>3</sup>

2)The tolerances on standard mass are detailed in Table 5.

**Table 5 – Tolerance on Standard Mass**

DN	Type of casting	Tolerances
80 – 200 250 – 1600	Centrifugally cast pipes Centrifugally cast pipes	+/-8.0% +/-5.0%
All sizes	Pipes not centrifugally cast	+/-8.0%
All sizes	Standard fittings, except bends and fittings with branches	+/-8.0%
All sizes	Standard bends and standard fittings with branches non-standard fittings	-12%

xnegative tolerance only is specified.

3)Each pipe DN 150 and over shall be weighed individually to ensure compliance with the tolerances specified in Table 5.

4)Fittings, and pipes below DN 150, need not be weighed individually unless otherwise specified by the purchaser on his enquiry, or order.

### 12. WORKS PROOF TESTS

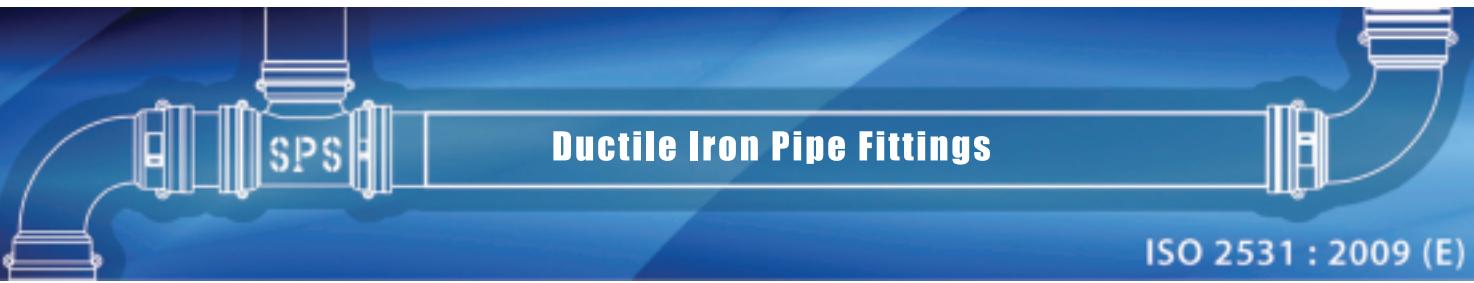
1)Before being coated, each pipe and fitting shall be hydrostatically tested by a proven means at the foundry to the satisfaction of the purchaser or his representative. The outside surfaces of the pipe or fitting shall be dry before testing.  
The hydrostatic pressure shall be applied steadily and maintained for a period sufficient to facilitate adequate inspection but in no case shall this period be less than 15 seconds.

The internal pressure imposed on the pipe or fitting shall be measured by an accurate pressure gauge and means shall be provided for attaching the gauge of the purchaser or his representative. The pipes and fittings shall withstand the works hydrostatic test pressure specified in Table 6 without showing signs of leakage, sweating or other failure of any kind.

2)All pipes and fittings, except those having restricted pressure ratings, shall be capable of withstand the field test pressure specified in Appendix A.

3)Pipes and fittings with flexible joints supplied for pipelines to be used for the conveyance of gas, shall, where specified by the purchaser and agreed by the manufacturer, be tested with air to a pressure of 3.5 bar (gauge) in addition to the hydrostatic test, while under air pressure, the fittings shall be totally immersed in water, or alternatively, coated with a suitable foaming agent in order to check for leakage.

4)Where specially agreed between the purchaser and the manufacturer, standard all flanged ductile iron fittings, and pipes with cast-on flanges may be works hydrostatically tested to pressure up to, but not exceeding 16 bar, 25 bar and 40 bar for castings with PN10, PN16 and PN25 flanges respectively.



## Ductile Iron Pipe Fittings

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**NOTE: The hydrostatic test applied to fittings is a leak tightness test only. The application of high hydrostatic pressure to fittings is precluded due to the risk of distortion resulting from the high restraining loads imposed on the fittings by standard test apparatus.**

**Table 6 – Works Hydrostatic Proof Test Pressures and Works Leak Tightness Test Pressures**

Nominal Size DN	Proof test pressure				Leak Tightness test pressure for fittings and for pipes with cast-on flanges	
	Centrifugally cast pipes with flexible joints	Pipes with screwed or Welded-on flanges				
		PN 10 Flange	PN 16 Flange	PN 25 Flange		
MM	Bar	Bar	Bar	Bar	Bar	
80 – 300	50	16	25	32	25	
350 – 600 700 – 800	40 32	16 16	25 25	32x 32	16 10	
900 – 1200 1400 – 1600	32 25	16 -	25 -	- -	10 -	

## PREFERRED PRESSURE CLASSES

Preferred pressure classes of components with flexible joints are C25, C30, and C40. Other pressure classes are allowable, including C20, C50, C64 and C100.

Pressure classes for components with flanged joints are PN10, PN16, PN25 AND PN40.

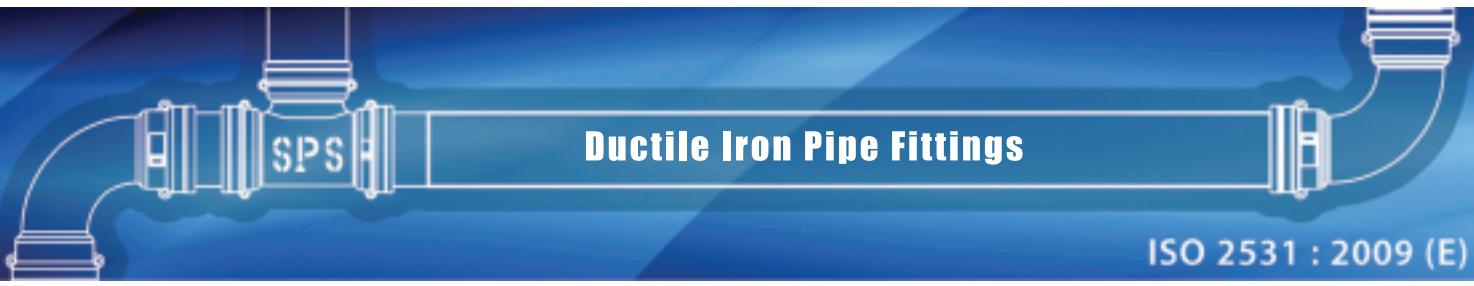
Allowable pressures of components are as given in the following Tables 6a and 6b.

**Table 6a – Allowable pressures of components with flexible joints for preferred classes**

Pressure class C	Allowable operating pressure PFA bar	Maximum allowable operating pressure PMA bar	Allowable site test pressure PEA bar
25	25	30	35
30	30	36	41
40	40	48	53

**Table 6b – Allowable pressures of components with flexible joints for preferred classes**

Pressure class PN	Allowable operating pressure PFA bar	Maximum allowable operating pressure PMA bar	Allowable site test pressure PEA bar
10	10	12	17
16	16	20	25
25	25	30	35
40	40	48	53



## Ductile Iron Pipe Fittings

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### 13. SURFACE PROTECTION

1. All Fittings shall be coated externally by Zinc and Bitumen according to ISO 8179 as specified in Table 7.
2. All Fittings shall be lined internally by cement mortar according to ISO 4179 as specified in Table 7.
3. Special protection inside and outside by Epoxy.
4. Coatings may be applied by dipping, brush, spray or roller.
5. No coating shall be applied to any casting unless its surfaces are clean, dry and free of rust.

**Table 7 :**

EXTERNAL COATING	BY ZINC AND BITUMEN ACCORDING TO ISO 8179
INTERNAL LINING	BY CEMENT MORTAR ACCORDING TO ISO 4179

#### 13.1 COATINGS AND LININGS FOR FITTINGS AND ACCESSORIES

Fittings and accessories shall normally be delivered internally and externally coated.

##### 13.1a External coatings

Ductile iron pipeline systems can be installed in a wide range of external operating environments. These environments can be characterized according to their aggressivity. For relevant factors, see Annexure-A.

Coatings specified by relevant International Standards are available as specified in Annexure-A. Other coatings are available.

##### 13.1b Internal linings

Ductile iron pipeline systems can be used to convey a wide range of raw waters and potable waters. These internal environments can be characterized by their aggressivity. Relevant factors to be considered for cement mortar linings without seal coats are given in Annexure 2.

Linings specified by relevant International Standards are available as specified in Annexure 2. Other linings are also available.

### 14. MANUFACTURER'S CERTIFICATE

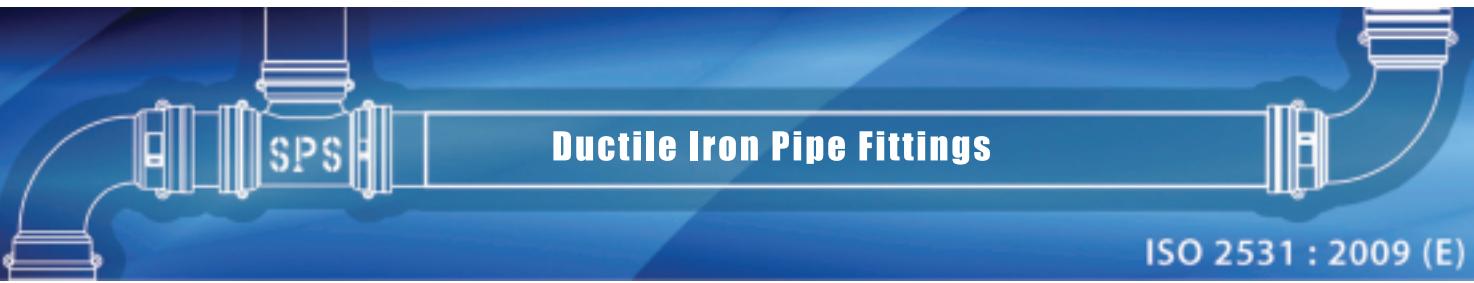
The manufacturer shall, on request, supply to the purchaser a signed certificate stating, at the purchaser's option, either:

- a) That the pipes or fittings comply in all respects with the provisions of this specification: or
- b) The results of all the specified tests.

### 15. INSPECTION

The inspector appointed by the purchaser and accredited by the manufacturer shall have access at all reasonable times to those parts of the works engaged on the manufacture and testing of the pipes or fittings he has ordered.

If, at the time of placing the order, the purchaser states that he wishes to carry out inspection during manufacture up to the point of dispatch, the manufacturer may inform the purchaser or his agent in advance of the manufacturing date. Should the purchaser or his agent not be present at the agreed time, then the manufacturer will be entitled to proceed with production and inspection and shall not be required to re-inspect. Records of the inspection will be available for examination by the purchaser or his agent at a later date.



## Ductile Iron Pipe Fittings

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### 16. PURCHASER'S OPTIONAL TENSILE TEST

#### Selection of bar test pieces

1) If stated on the enquiry and subsequent order that the purchaser wishes to witness the tests on bar test pieces in respect of the pipes and fittings to the order, the bar test pieces may be selected by the purchaser or his representative during manufacture.

2) Should the purchaser or his representative not be present at the agreed time of manufacture, then the manufacturer shall be entitled to proceed with the selection of test pieces and testing. The results of the tests will be recorded for later examination by the purchaser and the test pieces shall be retained for a minimum of 14 days.

3) For the purpose of selection and approving the bar test pieces, the pipes and fittings to that order shall be divided arbitrarily into batches as follows.

#### Maximum batch size for tensile testing

Type of casting	DN	Maximum batch size	
		Batch sampling system	Process control testing system
Centrifugally cast pipes	40 to 300	200 pipes	1200 pipes
	350 to 600	100 pipes	600 pipes
	700 to 1000	50 pipes	300 pipes
	1100 to 2600	25 pipes	150 pipes
Pipes not cast centrifugally, fittings and accessories	All sizes	4 t <sup>a</sup>	48 t <sup>a</sup>

<sup>a</sup> Mass of crude castings, excluding risers

Any pipes remaining after dividing into batches as specified, should be considered as a batch and where the total order is less than the appropriate batch size, then the order shall be considered as a batch. The batch may contain pipes of any size within the groups specified above.

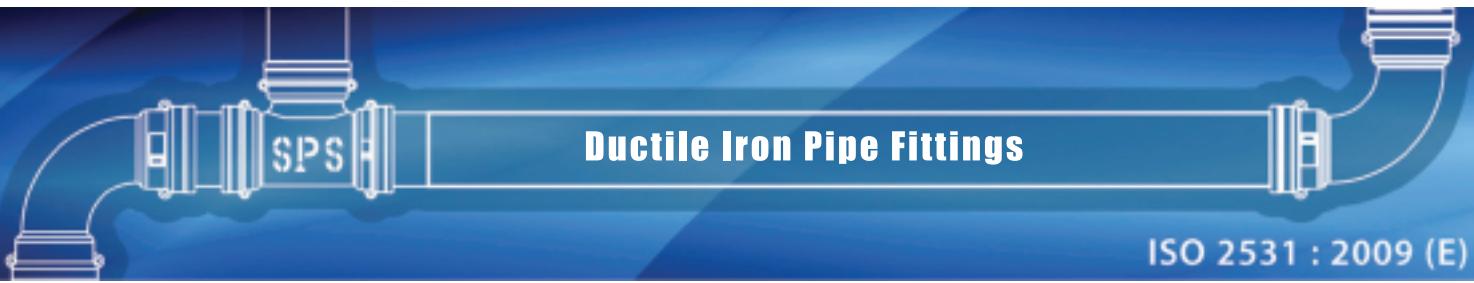
One bar test piece shall be taken from each batch and, should the batch contain pipes of more than one size, the bar test piece selected shall be regarded as being representative of all the pipes in the batch, irrespective of size.

Bar test pieces representative of pipes, not centrifugally cast, and fittings may be taken from a sample cast separately but shall be cast from the same iron as that used for the manufacture of the castings they represent and, where applicable, shall have been subjected to the same heat treatment.

Alternatively, bar test pieces may be taken from a sample cast integrally with the pipe or fittings at the manufacturer's option. Dimensions of bar test pieces.

1) Bar test pieces taken from centrifugally cast pipes shall be cut from the spigot end, and when prepared of testing, shall be representative of the metal at approximately mid-thickness, and the axis of the bar test piece shall be parallel to the axis of the pipe from which it was taken. Each bar test piece shall include a cylindrical part having a diameter of 3.565 to 3.580 mm and a gauge length of 3.54 or 5.0 times its diameter.

2) Where the sample is cast separately, its dimensions shall conform to the requirements of BS 2789. Where sample is internally cast it shall comply with the dimensions given in Table 8.



## Ductile Iron Pipe Fittings

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**Table 8 – Dimensions of Integrally Cast Test Samples**

Description of casting represented	Dimensions		
	Length	Width	Thickness
	MM	MM	MM
Non-centrifugally cast pipe and fittings, having a wall thickness of up to and including 12.5 MM	55-75	46-65	12.5
Non-centrifugally cast pipe and fittings, having a wall thickness of over 12.5 MM	55-75	45-65	16

3) Method of test. The method of testing shall be in accordance with that normally used for quality control purposes by the manufacturer, unless otherwise agreed between the manufacturer and the purchaser.

4) Results of tensile test. Each bar test piece selected in accordance with 16.1) shall be tested and shall be considered satisfactory if the test results comply with the mechanical properties specified in Table 1.

5) Retests. Should a bar test representing any batch fail the tensile test, two further tests shall be carried out on bar test pieces selected by the purchaser, or his agent from two other pipes of the same batch. If either of these additional bar test pieces fails the tensile test, the batch represented shall be deemed not to comply with this specification.

### 17. HARDNESS TEST

1) Should the purchaser consider that the quality of the casting does not comply with the requirements of 8.4) hardness test shall be carried out on the castings after slight grinding.

2) The tests shall be in accordance with BS 240: Part 1, except the period of application shall be  $15 \pm 1$ s.

3) The results of the hardness tests shall not exceed 230 HB for centrifugally cast pipes, and 250 HB for all other castings. Should the surface hardness of the castings exceed these values, the castings shall be deemed not to comply with this standard.

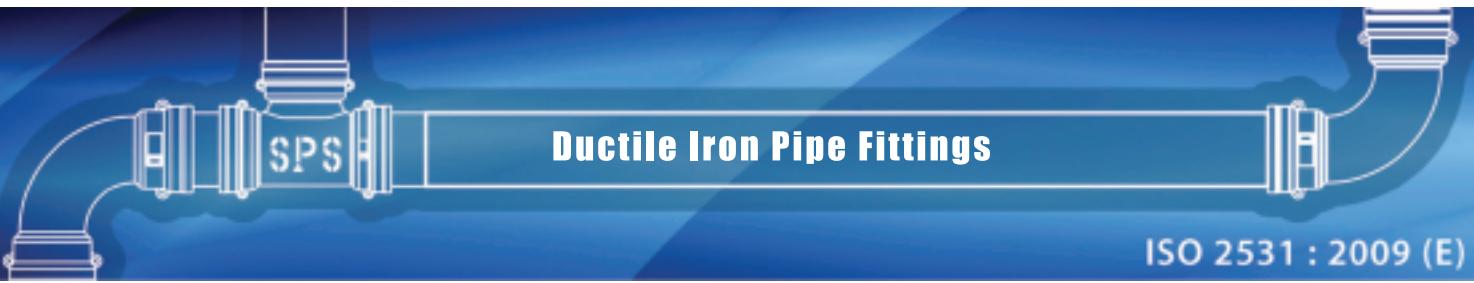
### Appendix A

Pressure ratings and maximum field hydrostatic test pressures for standard thickness ductile iron pipes and fittings after installation:

**Table 9. Hydraulic pressure ratings for ductile iron pipes and fittings in accordance with BS4772**

Nominal Size DN	Hydraulic pressure rating				
	Pipelines Incorporating flanges to:			Pipelines without any flanged joints	
	PN 10	PN 16	PN 25		
	Bar (gauge)	Bar (gauge)	Bar (gauge)	Bar (gauge)	
80 – 300	10	16	25	40	
350 – 1200	10	16	25	25	
1400 – 1600x	-	-	-	-	

xHydraulic pressure ratings for pipes and fittings DN 1400 to DN 1600 shall be by agreement between the purchaser and the manufacturer.



## Ductile Iron Pipe Fittings

ISO 2531 : 2009 (E)

**NOTE 1: The hydraulic pressure ratings for pipes and fittings with flanges are applicable to the temperature range 10°C to 120°C. The manufacturer should be consulted in connection with pressure ratings for temperature outside this range.**

**NOTE 2: Attention is drawn to CP 2010: Part 2, which provides guidance on the field-testing of pipelines.**

**Table 10. Maximum field hydrostatic test pressures for ductile iron pipes and fittings in accordance with BS4772**

Nominal	Maximum field hydrostatic test pressure				
Size	Pipelines			Pipelines without any flanged joints	
DN	Incorporating flanges to:				
	PN 10	PN 16	PN 25		
	Bar (gauge)	Bar (gauge)	Bar (gauge)	Bar (gauge)	
80 – 300	16	25	40	45	
350 – 600	16	25	30xx	30	
700 – 1200	16	25	30xxx	30	
1400 – 1600x	-	-	-	-	

xField hydrostatic test pressures for pipes and fittings DN 1400 to DN 1600 shall be by agreement between the purchaser and the manufacturer.

xx40 bar for pipelines having all joints flanged.

xxxHigher pressures may be agreed between the purchaser and the manufacturer, but fittings may, depending on operating conditions, require strengthening.

**NOTE: These field test pressures should be applied only to ductile iron pipelines when the pipeline and its fittings are properly anchored. This explains why field test pressures for ductile iron pipelines may be greater than the factory test pressures for fittings since the test rig at the factory does not allow proper anchoring under high pressures without distortion of the casting. For further information relating to field testing of pipelines are CP 2010: Part 3.**

## Appendix B

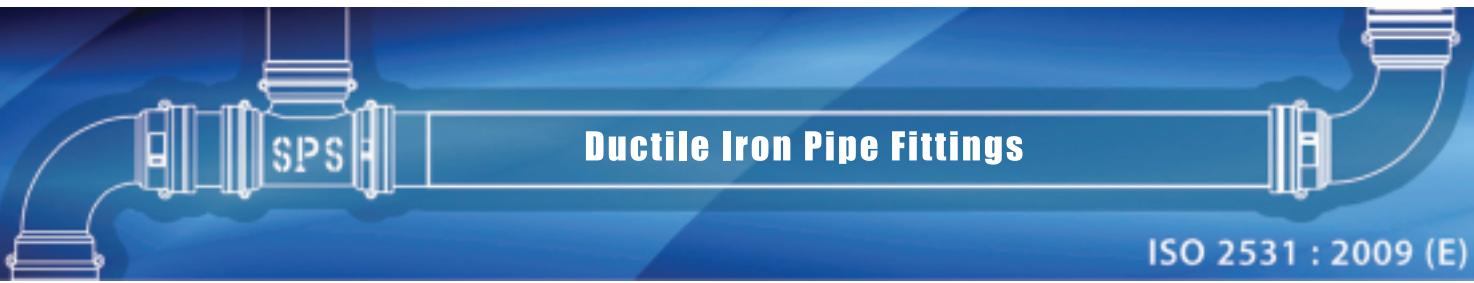
### Specification for Cement mortar lining

#### C.1 Materials

C.1.1 Cement. The cement used shall be ordinary Portland cement in accordance with BS 12, except that, where specified by the purchaser, or at the manufacturer's option, sulphate-resisting cement in accordance with BS 4027 or Portland blast furnace cement in accordance with BS 146: Part 2: may be used.

C.1.2 Sand. The sand shall consist of inert, granular material having hard, durable uncoated grains. The sand shall comply with the requirements of zone 4 of table 2 of BS 882k 1201: Part 2: 1973 when sampled and tested in accordance with BS 812.

C.1.3. Water. The water shall be obtained from the public water supply and shall contain no constituent that adversely affects the quality of the cement or, in the case of potable water, the water flowing through the main. The presence of solid inorganic particles is, however, admissible, providing they do not contain any constituents that impair the curing of the cement mortar or cause deterioration of water quality in the case of potable water mains.



## Ductile Iron Pipe Fittings

ISO 2531 : 2009 (E)

### C.2. Cement mortar mix

C.2.1. The cement mortar mix shall comprise cement, sand and water, which shall be thoroughly mixed, and be of such consistency as to provide a dense and homogeneous lining. Any additive shall be agreed between the purchaser and manufacturer.

C.2.2. The cement mortar mix shall contain at least one part by mass of cement to 3.5 parts by mass of sand.

### C.3. Application of lining

C.3.1. Pipes shall be lined centrifugally or by a centrifugal applicator head. Fittings shall be lined by any process, which produces linings with a surface finish comparable with the lining in the pipes.

C.3.2. The surface on to which the coating is to be applied shall be free from all loose scale, foreign bodies, or any other material that could be detrimental to good contact between the metal and the coating.

C.3.3. The process of lining shall be so controlled as to ensure that a continuous layer of cement mortar is produced over the bore of the pipe fitting.

C.3.4. The inside of the sockets and the faces of flanges shall be free from cement mortar.

### C.4. Repair of damaged lining by the manufacturer.

Small areas of damaged linings may be repaired by cutting back the lining to the metal surface, by thoroughly wetting the exposed surfaces of the metal and of the adjacent lining, and by patching with fresh, stiff cement mortar worked in thoroughly to ensure a good bond with the exposed surfaces. The repaired area shall be cured in accordance with C.5.

### C.5. Curing of lining.

C.5.1. Curing of the lining shall be conducted in such a manner as to produce a properly hydrated cement mortar lining that is both hard and durable. Curing shall be carried out at not less than 40°C.

C.5.2. Curing shall be effected under controlled atmosphere conditions. Curing by the application of bitumen coating shall be by agreement between the purchaser and the manufacturer.

C.5.3. The bitumen coating shall comply with the requirements of BS 3416 for type 2 material applied by spray or brush while the lining is still moist.

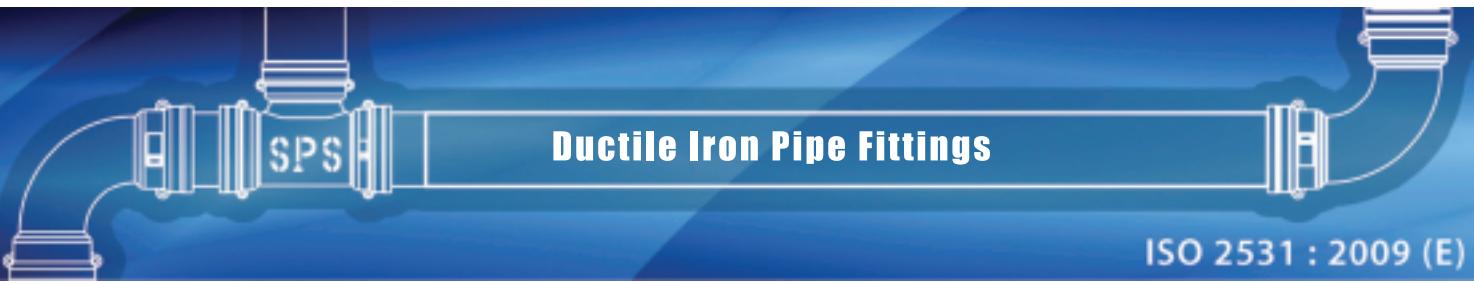
The bitumen coating shall not impart color, taste or odour to potable water after drying for 48 h.

### C.6. Thickness of lining.

C.6.1. The thickness of linings shall be as specified in Table 11.

**Table 11. Thickness of linings**

Nominal Size DN	Thickness		
	Nominal	Minimum arithmetical mean value	Individual minimum
mm	mm	mm	mm
80-300	3.0	2.5	1.5
350-600	5.0	4.5	2.5
700-1200	6.0	5.5	3.0
1400-2000	9.0	8.0	4.0



## Ductile Iron Pipe Fittings

ISO 2531 : 2009 (E)

C.6.2. The thickness of linings may be tested by spear measurement or by gauge. Where 'spear measurement' is used, the lining shall be pierced using a hardened steel point, not larger than 1.5 mm diameter; immediately after application of the lining to the bore of the pipe, or fitting, and before the cement mortar has set.

The thickness shall be measured at each end of the pipe in at least one section perpendicular to the pipe axis.

At each section which, for pipes DN 200 and above, shall be at least 200 mm from the pipe end, measurements being taken in four places at 90° intervals. The arithmetical mean value and the individual minimum values of the four measurements in each section shall be not less than those in Table 07.

### C.7. Surface condition of linings

The surface of the lining shall be substantially smooth but the fine crazing associated with cement rich surfaces shall be permitted. Isolated shrinkage cracks shall be acceptable provided their width does not exceed 0.8 mm. The surface shall be substantially free from laitance and any sand segregation present shall be minimal.

### C.8. Identification

Where cement mortar lined pipes have been bitumen coated, or coated internally they shall carry a means of identification to distinguish them from pipes that have coated internally and externally in accordance with 16.1. This identification shall appear on the barrel of the pipe but otherwise the position shall be at the manufacturer's option.

## Appendix C. Cutting of existing pipelines

Where existing pipes are cut, the outside diameter, as measured circumferentially by diameter tape, may differ in size from the diameter and tolerances specified in Table 2.

Pipe manufacturers state that the large majority of pipes so cut generally have diameters in the range shown in Table 12.

Manufacturers of slip-on coupling, split couplings, wrap around fittings, or similar fittings and equipment that depend on the outside diameter of the pipe for their location and effective installation, who claim that such items are compatible with the pipes specified in this standard, are advised to note these diameters.

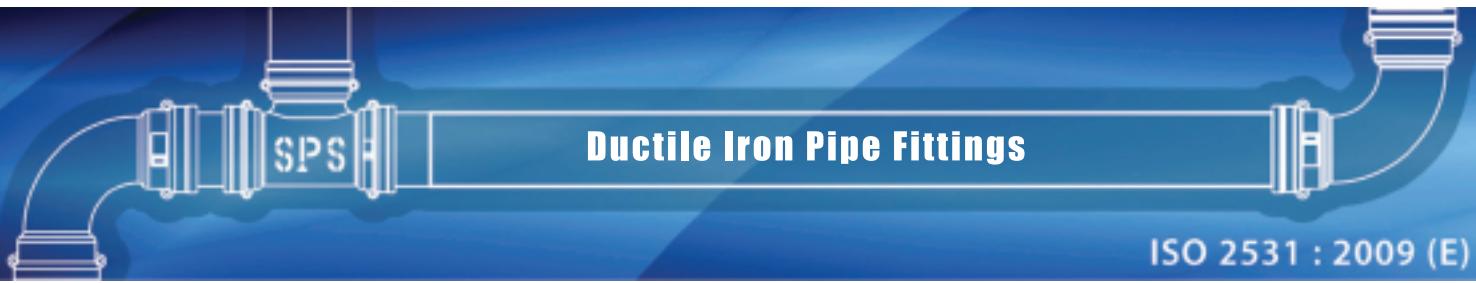
Furthermore it is recommended that their catalogues should (a) specify the extent to which their products will meet these requirements, and (b) make recommendations for fitting where necessary.

**Table 12. Diameters of the barrels of cut pieces.**

Nominal size DN	Minimum diameter	Maximum diameter
mm	mm	Mm
350	374.5	379.0
400	425.0	431.0
450	476.0	483.0
500	527.0	538.0
600	630.0	640.5
700	732.5	743.5
800	836.0	848.0
900	940.0	948.0
1000	1043.0	1051.0
1100	1146.0	1155.0
1200	1249.0	1258.5

**NOTE 1. For sizes above 1200mm the manufacturer should be consulted.**

**NOTE 2. Diameters are measured circumferentially with a diameter tape.**



## Ductile Iron Pipe Fittings

ISO 2531 : 2009 (E)

### Hydrostatic test pressure

Diameter	Pipes	Fittings
DN80 to DN300	50 bar	25 bar
DN350 to DN600	40 bar	16 bar
DN700 to DN1000	32 bar	10 bar
DN1100 to DN1200	25 bar	10 bar
DN1400 to DN1600	25 bar	10 bar
DN1800 to DN2000	25 bar	bar
DN2100 to DN2600	25 bar	bar

PIPES.....Standard K=9

FITTINGS.....Standard K=14 for tees

for other fittings

Pipes, DN450, DN1100 are according to the extension of ISO requirements.

### Tensile strength, Elongation and proof stress

	Pipe		Fittings
	DN80 to DN1000	DN1100 to DN2000	
Tensile Strength	Min. 420 N/mm <sup>2</sup>		Min. 400 N/mm <sup>2</sup>
Elongation	Min. 10%	Min. 7%	Min. 5%
Proof Stress	Min. 300 N/mm <sup>2</sup>		Min. 300 N/mm <sup>2</sup>

### Tolerance

1- Thickness: +

No limit

### x The proof stress shall only be measured upon

(1.30,001+ND) mm  
(ND: Nominal diameter)

special agreement and order conditions which  
shall be specified in the order  
xx 0,0102 kgf/mm<sup>2</sup> = 1N/mm<sup>2</sup>

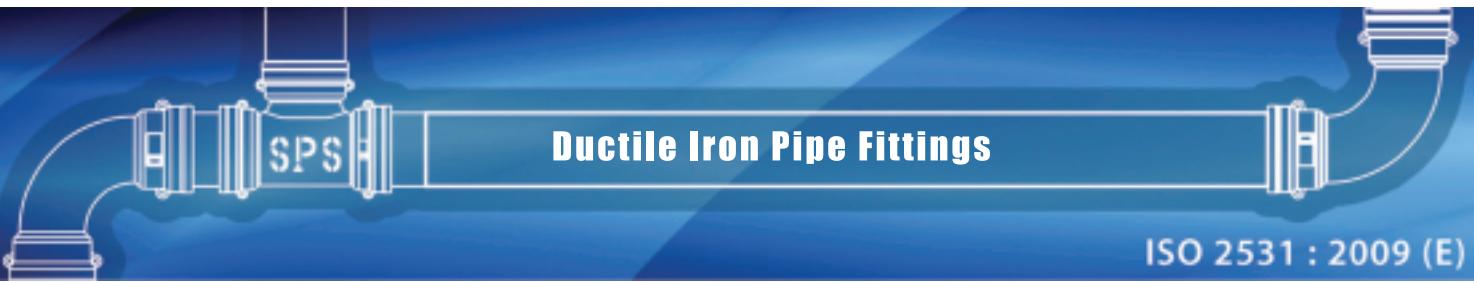
2- Weight

Ø200 mm and under: : ±8%

Ø300 mm and under:

### Coating and lining materials

	Pipe	Fitting
Outside (External)	<ul style="list-style-type: none"> <li>° Zinc and bituminous Point</li> <li>° Black bituminous (coal-tar coating)</li> <li>° Tar-epoxy coating</li> </ul>	<ul style="list-style-type: none"> <li>° Zinc and bitumen according to ISO 8179</li> <li>° Black bituminous (coal-tar coating)</li> <li>° Tar-epoxy coating</li> </ul>
Inside (Internal)	<ul style="list-style-type: none"> <li>° Black bituminous (coal-tar coating)</li> <li>° Tar-epoxy coating</li> <li>° Sulphate-resistant cement mortar lining</li> <li>° Cement mortar lining with seal coating</li> <li>° Fusion bonded Epoxy lining (any colour) F.B.E</li> </ul>	<ul style="list-style-type: none"> <li>° Black bituminous (coal-tar coating)</li> <li>° Tar-epoxy coating</li> <li>° Sulphate-resistant cement mortar lining</li> <li>° Cement mortar lining with seal coating</li> <li>° Fusion bonded Epoxy lining (any colour) F.B.E</li> </ul>



### Annexure-A (informative)

#### External protection

##### A.1 Factors characterizing aggressivity of external operating environments

- Resistivity
- pH;
- water table level;
- stray currents;
- corrosion cells;
- contamination.

##### A.2 Centrifugally cast pipe coatings for protection against aggressive external operating environments

- Metallic zinc with finishing layer, in accordance with ISO 8179-1;
- zinc rich paint with finishing layer, in accordance with ISO 8179-2;
- polyethylene sleeving, in accordance with ISO 8180.

**For other types of pipe coatings, including their repair method, refer to national standards or pipe manufacturers.**

##### A.3 Fittings and accessories coatings for protection against aggressive external operating environments

- Metallic zinc with finishing layer, in accordance with ISO 8179-1;
- zinc rich paint with finishing layer, in accordance with ISO 8179-2;
- polyethylene sleeving, in accordance with ISO 8180.

**For other types of fitting and accessory coatings, including their repair method, refer to national standards or pipe manufacturers.**

### Annexure-B (informative)

#### Internal protection

##### B.1 Factors characterizing aggressivity of raw and potable waters

- pH;
- sulfates;
- magnesium;
- ammonium;
- aggressive CO<sub>2</sub>.

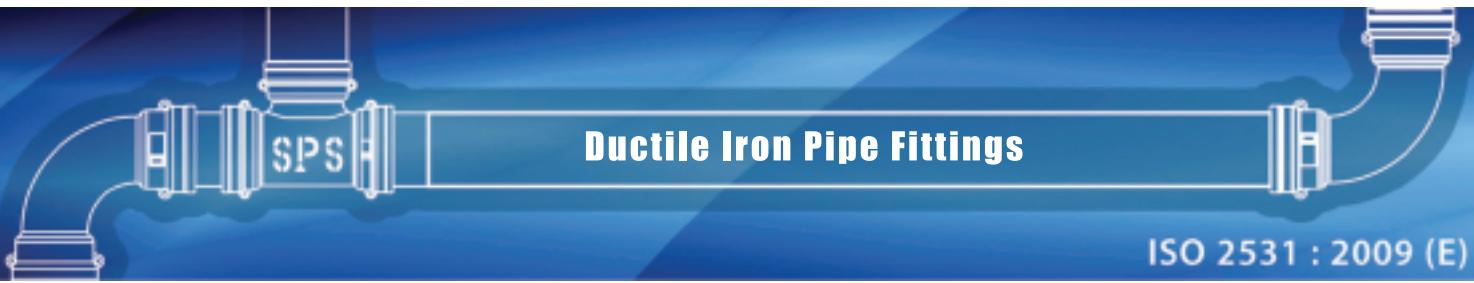
##### B.2 Centrifugally cast pipe linings for protection against aggressive raw and potable waters

- Portland cement mortar, in accordance with ISO 4179;
- blast furnace slag cement mortar, in accordance with ISO 4179 ;
- cement mortar with seal coat, in accordance with ISO 16132.

**For other types of pipe linings, including their repair method, refer to national standards or the pipe manufacturers.**

##### B.3 Fitting and accessory linings for protection against aggressive raw and potable waters

- Portland cement mortar, in accordance with ISO 4179;
- blast furnace slag cement mortar, in accordance with ISO 4179;
- cement mortar with seal coat, in accordance with ISO 16132.



**For other types of fitting and accessory linings, including their repair method, refer to national standards or the pipe manufacturers.**

## **Annexure-c (normative) Quality Assurance**

### **C.1 General**

The manufacturer has the responsibility to demonstrate the conformity of his products with this International Standard by carrying out type tests (see C.2)

### **C.2 Type tests**

The type tests specified in Clauses 6 and 12 and Table 6, are carried out either by the manufacturer or, at his request, by a competent testing institute in order to demonstrate compliance with the requirements of this International Standard. Full reports of these type tests are retained by the supplier of pipes, fittings and gaskets as evidence of compliance.

If fittings or gaskets are supplied separately from pipes, full reports of the type tests on these components, and their compatibility with pipes, shall be made available to the client by the fitting or gasket suppliers.

### **C.3 Quality control**

The manufacturer controls the quality of his products during their manufacture by a system of process control in order to comply with the technical requirements of this International Standard.

It is recommended that the manufacturer's quality system conform to ISO 9001.

If certification to ISO 9001 is involved, it is recommended that the certification body be accredited to the relevant International Standard, as applicable.

## **Bibliography**

1. ISO 4179:2005, Ductile iron pipes and fittings for pressure and non-pressure pipelines – cement mortar lining
2. ISO 6708:-2), Pipe work components – Definition and selection of DN, NPS and A
3. ISO 7268, Pipe components – Definition and selection of PN, Class and K
4. ISO 8179-1, Ductile iron pipes – External zinc-based coating – Part 1: Metallic zinc with finishing layer
5. ISO 8179-2, Ductile iron pipes – External zinc coating – Part 2: zinc rich paint with finishing layer
6. ISO 8180, Ductile iron pipelines – Polyethylene sleeving for site application
7. ISO 9001, Quality management systems – Requirements
8. ISO 16132, Ductile iron pipes and fittings – Seal coats for cement mortar linings

## **Normative References**

- ISO 4016, Hexagon head bolts – Product grade C
- ISO 4034, Hexagon nuts – Product grade C
- ISO 4633, Rubber seals – Joint rings for water supply, drainage and sewerage pipelines – Specification for materials
- ISO 6506-1, Metallic materials – Brinell hardness test – Part 1: Test method
- ISO 7005-2, Metallic flanges – Part 2: Cast iron flanges
- ISO 7091, Plain washers – Normal series – Product grade C
- ISO 10803, Design method for ductile iron pipes
- ISO 10804, Restrained joint systems for ductile iron pipelines – Design rules and type testing
- EN 1092-2, Flanges and their joints – Circular flanges for pipes, valves, fittings and accessories, PN designated – Part 2: Cast iron flanges.

# Lengthening pieces



## Type of Lengthening pieces

- Standard Push-On Pipes
- Flange Anchored Pipes
- Flanged Spigot
- Collar
- Flanged Socket
- Push-On Joint Type

- \* Features:
- Epoxy coating as per request.
  - For any other dimensions contact the factory.



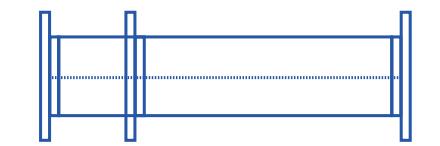
## Ductile Iron Fabricated Flanged Pipe

- SPS can manufacture any configuration of Ductile Iron Fabricated Flanged Pipe to suit your specific requirements in nominal bore 80mm – 2600mm and up to a maximum length of 6m. All fabricated pipe work is manufactured using K9 barrel as standard.
- This service is particularly useful where pressure pipelines are installed above ground such as water treatment plants, pumping stations and where flanged pipe is needed to be made to exact lengths.
- Where pipes need to be cast in concrete walls such as inlet and outlet pipe work, SPS can apply a fixed puddle flange to any configuration of pipe.
- This facility is available in both standards BS EN545 for potable water and BS EN593 for sewage and waste water applications. Standard Flange Drilling is PN16 according to BS 4504, or with special drillings as required.

### ISO 2531 - 2009(E)



Double Flange Pipe



Double Flange Pipe with Puddle Flange



Flange Spigot Pipe



Flange Spigot Pipe with Puddle Flange



Flange Socket Pipe



Flange Socket Pipe with Puddle Flange



Socket Spigot Pipe



Socket Spigot Pipe with Puddle Flange



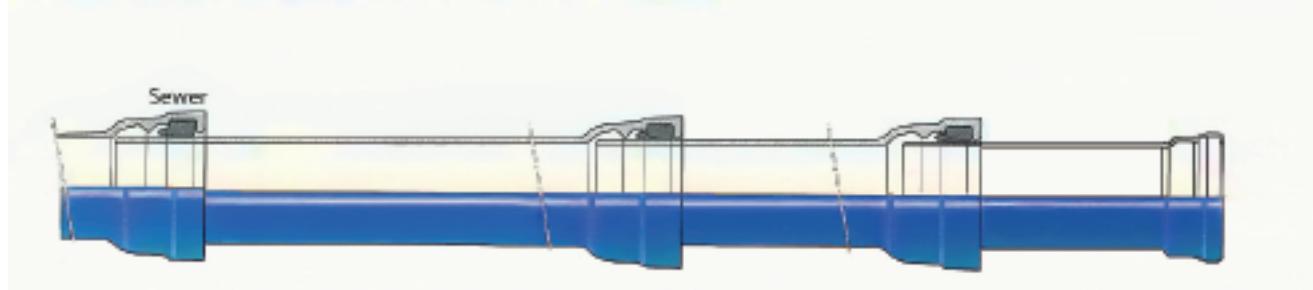
Double Spigot Pipe



Double Spigot Pipe with Puddle Flange

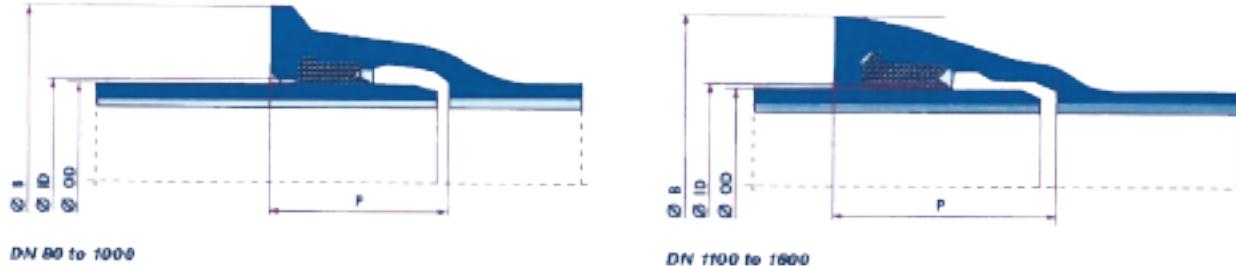


## Way of Installation



Connection Required	Methods		
	Type	DN Range	Sketch
Flange / Socket Connection	Flange adapter	DN 50 - 2000	
	Flange socket	DN 80 - 2600	
Spigot / spigot Connection	Coupling	DN 50 - 2000	
Flange / Spigot Connection	Flange/ spigot end	DN 80 - 2600	
Flange / flange Connection	Dismantling Joint	DN 80 - 2000	

## Standard Push-On Pipes



**K9 ISO 2531 - 2009(E)**

Nominal Diameter DN	Barrel Ductile iron pipes ( kg ) Standard Eye		Socket			Average weight			
	e ( ductile iron ) mm	OD mm				ductile iron kg	total kg	ductile iron kg	total kg
80	6	98	101	90	168	75.5	87.5	13	15
100	6.1	118	121	92	189	95	109	16	18.5
150	6.3	170	173	98	243	144	164	24	27.5
200	6.4	222	225	104	296	194	222	32.5	37
250	6.8	274	227	103	353	225	290	42.5	48
300	7.2	326	329	105	410	333	364	54	61
350	7.7	326	329	108	465	433	482	67.5	80.5
400	8.1	429	432	110	517	482	573	80.5	95.5
450	8.6	480	483	113	575	574	676	96	113
500	9	532	535	115	630	669	781	112	131
600	9.9	635	638	120	739	882	1018	147	170
700	10.8	738	741	145	863	1298	1512	186	217
800	11.7	842	845	145	974	1609 1878	1855 2168	230	265
900	12.6	945	948	154	1082	1951 2277	2228 2604	279	319
1000	13.5	1048	1051	155	1191	2326 2710	2634 3073	333	377
1100	14.4	1151	1154	160	1300	2734	3074	393	441
1200	15.3	1255	1258	165	1412	3858	4130	455	500
1400	17.1	1462	1465	245	1632	4653	5606	600	552
1500	18	1565	1568	265	1745	5475	6279	678	777
1600	19.9	1668	1671	265	1850	6138	6996	760	865
1800	20.7	1875	1878	275	2049	7556	8521	937	1056
2000	22.5	2082	2085	290	2265	9850	10117	1127	1255

Note:

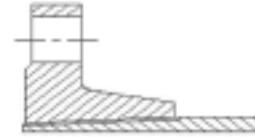
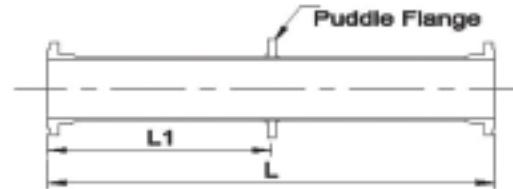
- The references apply to pipes of average effective length.
- The total masses include the ductile iron and the coatings mentioned above.

Dimensions are in mm and weight in Kilogram

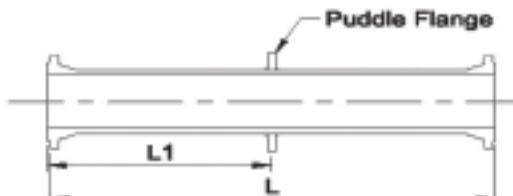


## Flange Anchored Pipes

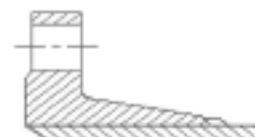
Flanged pipe with screwed - on flanges ,K9 ,K12  
DN 80 - DN 600  
L, L1 to be specified



Flanged pipe with cast - on flanges ,K12  
DN 1200 - DN 2000  
L, L1 to be specified



Flanged pipe with weld - on flanges ,K12  
DN 80 - DN 1000  
L, L1 to be specified

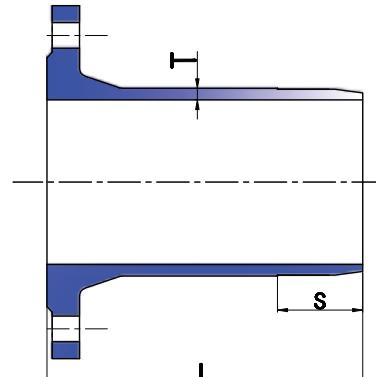


**K-9,K12 ISO 2531 2009-(E)**

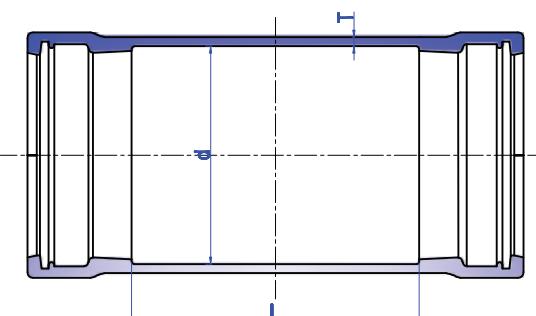
Nominal Diameter DN	Body				Weight Kg			Puddle flange	
	K = 9		K = 12		Flange				
	e=mm	kg/m	e(mm)	kg(mm)	PN10	PN16	PN25		
80	6	12.2	7	14.1	2.9	2.9	2.9	2.1	
100	6	15.1	7.2	17.7	3.3	3.8	3.8	2.1	
150	6	22.8	7.8	28	5.1	5.1	6.1	2.8	
200	6.3	30.6	8.4	39.7	7.1	6.9	8.9	4	
250	6.8	40.2	9	52.8	9.9	9.6	13.2	5.7	
300	7.2	50.8	9.6	67.3	12.9	12.6	18	6.5	
350	7.7	63.2	10.2	83.1	14.7	17.4	25.3	8.1	
400	8.1	75.5	10.8	100	17.7	22.2	33.2	10.7	
450	8.5	91.2	11.4	118.3	20.2	28.1	39	12.3	
500	9	104.3	12	138.2	24.3	37.7	48.3	13.9	
600	9.9	137.1	13.2	181.8	33.7	57.4	69.2	18.2	
700	10.8	173.9	14.4	230.8	46.3	85		26.2	
800	11.7	215.2	15.6	285.5	62.1	77		34.7	
900	12.6	260.2	16.8	345.4	73	92		41	
1000	13.5	309.3	18	410.6	92.9	127.4		51.7	
1200	15.3	420.1	20.4	557.8	138	192.9		77.1	
1400	17.1	547.2	22.8	726.8	174.7	231.5		90	
1600	18.9	690.3	25.2	916.9	241.8	331.1		110	
1800	20.7	850.1	27.6	1129.3	281.9	393.7		125	
2000	22.5	1026.3	30	1363.4	336.5	474.5		145	
2200	24.3	1218.3	32.4	1618.6	345.6	512.3			
2400	26.1	1427.2	34.8	1896.2	398.8	601			
2600	27.9	1652.4	37.2	2195.6	436.9	672			

Dimensions are in mm and weight in Kilogram

## Flanged Spigot



## Collar



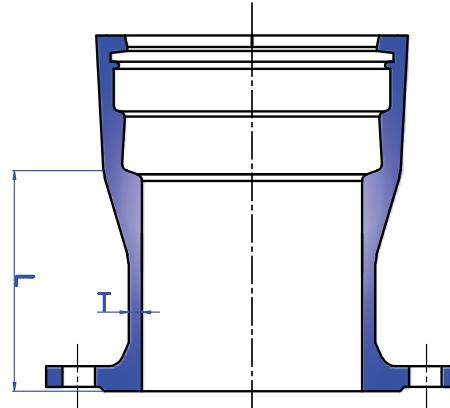
K-12 ISO 25312009-(E)

DN	T	Flanged Spigot					Collar		
		L	S	Mass ( kg )			L	d	Weight ( kg )
				PN10	PN16	PN25			
80	7	350	215	7.8	7.8	7.8	160	109	9.3
100	7.2	360	215	9.7	9.7	10.2	160	130	12.2
150	7.8	380	225	15.8	15.8	16.7	165	183	17.7
200	8.4	400	230	23	23	23	170	235	24.6
250	9	420	240	32	32	35.5	175	288	32.9
300	9.6	440	250	42.5	42.5	47.5	180	340	42.8
350	10.2	460	260	53	55	63.5	185	393	57.3
400	10.8	480	270	65.5	70	81	190	445	71.6
450	11.4	500	280	78.5	87	98	195	498	80
500	12	520	290	96	109	120	200	550	104.2
600	13.2	560	310	136	159	171	210	655	146.2
700	14.4	600	330	185	194		220	760	192
800	15.6	600	330	233	245		230	865	250.6
900	16.8	600	330	280	295		240	970	316.2
1000	18	600	330	339	369		250	1075	390
1100	19.2	600	330	394	430		260	1180	465.8
1200	20.4	600	330	473	520		270	1285	560
1400	22.8	710	390	691	723		340	1492	816
1500	24	745	410	812	900		350	1596	829
1600	25.2	780	430	957	1024		360	1699	1094
1800	27.6	850	470	1242	1322		380	1906	1427
2000	30	920	500	1591	1687		400	2133	
2200	32.4	990	540	1948	2115		420	2320	
2400	34.8	1060	570	2409	2611		440	2527	
2600	37.2	1130	610	2918	3153		460	2734	

All Weight Are Subject to +/-5% Dimensions are in mm and weight in Kilogram



## Flanged Socket

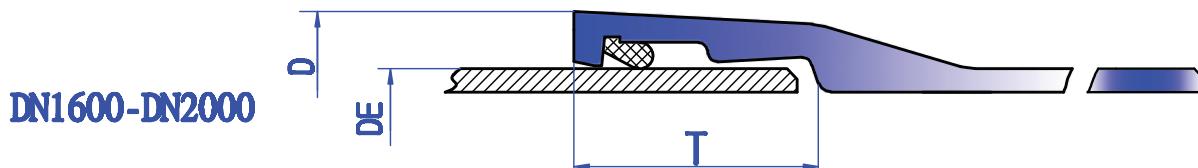
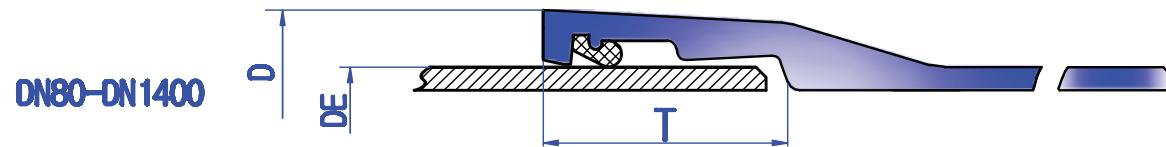


**K-12 ISO 2531 - 2009(E)**

DN	T	L	Weight ( kg )		
			PN10	PN16	PN25
80	7	130	8.3	8.3	8.3
100	7.2	130	10.2	10.2	10.7
150	7.8	135	16.4	16.4	17.3
200	8.4	140	24.5	24.5	26
250	9	145	32	32	35.5
300	9.6	150	39	39	44
350	10.2	155	47	48	60
400	10.8	160	60	60	75
450	11.4	165	70.5	78	88.5
500	12	170	84	93	107
600	13.2	180	112	135	146
700	14.4	190	161	161	216
800	15.6	200	209	209	287
900	16.8	210	259	259	356
1000	18	220	323	323	458
1100	19.2	230	406.4	414	550
1200	20.4	240	482	521	664
1400	22.8	310	654	723	882
1500	24	320	773	857	939
1600	25.2	330	887	989	
1800	27.6	350	1125	1251	
2000	30	370	1414	1567	
2200	32.4	390	1767	1934	
2400	34.8	410	2150	2352	
2600	37.2	480	2563	2798	

All Weight Are Subject to +/-5% Dimensions are in mm and weight in Kilogram

## Push-On Joint Type



Nominal Diameter DN	mm		
	DE	D	T
80	98	142	84
100	118	163	88
150	170	217	94
200	222	278	100
250	274	336	105
300	326	393	110
350	378	448	110
400	429	500	110
500	532	604	120
600	635	713	120
700	738	824	150
800	842	943	160
900	945	1052	175
1000	1048	1158	185
1200	1255	1377	215
1400	1462	1632	239
1600	1668	1850	265
1800	1875	2049	275
2000	2082	2231	285

Dimensions are in mm and weight in Kilogram



## Tee



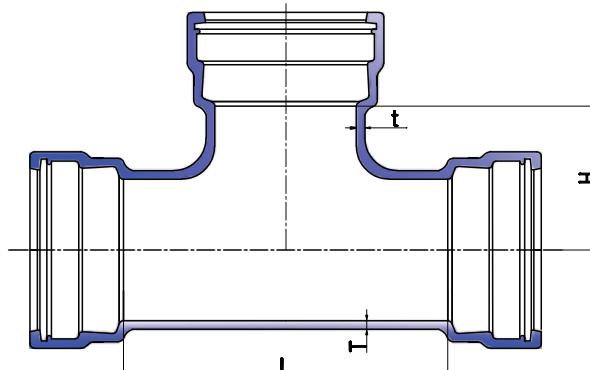
### Type of Tee

- All –Socket Tee
- Double-Socket Tee with Flanged Branch
- Double-Socket Level Invert Tee with Flanged Branch
- All Flanged Tee
- All Flanged Level Invert Tee
- All Flanged Cross

\* Features:  
- Epoxy coating as per request.  
- For any other dimensions contact the factory.



## All-Socket tee

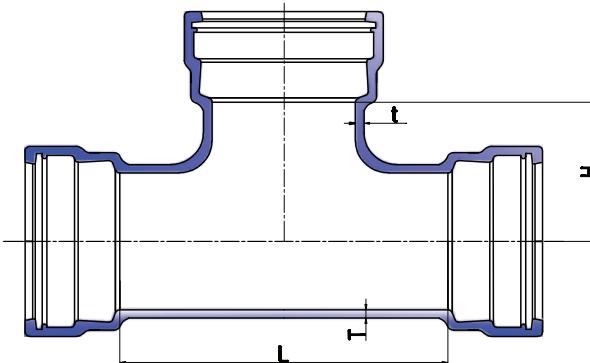


K-14 ISO 2531 - 2009(E)

DNxdn	T	L ( MM )	t	H	Weight ( kg )
80x80	7	170	7	85	13.8
100x80	7.2	170	7	95	16.7
100x100	7.2	190	7.2	95	18.2
150x80	7.8	170	7	120	24.5
150x100	7.8	195	7.2	120	26.5
150x150	7.8	255	7.8	125	31.5
200x80	8.4	175	7	145	35
200x100	8.4	200	7.2	145	37.5
200x150	8.4	255	7.8	150	43
200x200	8.4	315	8.4	155	50.5
250x80	9	200	7	210	47
250x100	9	200	7.2	210	48
250x150	9	315	7.8	220	59
250x200	9	315	8.4	220	63.5
250x250	9	375	9	230	71.5
300x100	9.6	205	7.2	235	54.5
300x150	9.6	320	7.8	245	68
300x200	9.6	320	8.4	245	72
300x250	9.6	375	9	250	85.5
300x300	9.6	435	9.6	260	90.5
350x100	10.2	205	7.2	260	70.5
350x150	10.2	325	7.8	270	86.5
350x200	10.2	325	8.4	270	90.5
350x250	10.2	375	9	275	105
350x300	10.2	440	9.6	285	111
350x350	10.2	495	10.2	290	124
400x100	10.8	210	7.2	285	83
400x150	10.8	325	7.8	295	101
400x200	10.8	325	8.4	295	105
400x250	10.8	375	9	300	116
400x300	10.8	440	9.6	310	127
400x350	10.8	495	10.2	315	137
400x400	10.8	560	10.8	320	155

All Weight Are Subject to +/-5% Dimensions are in mm and weight in Kilogram

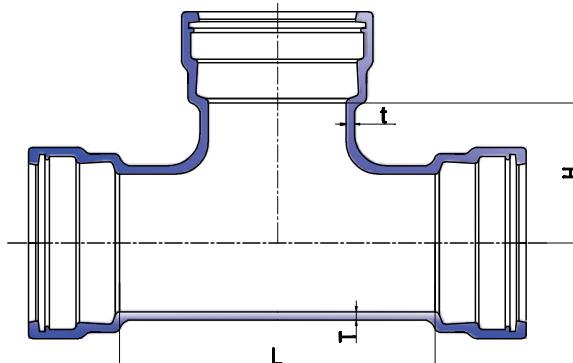
## All-Socket tee



DNxdn	T	L	t	H	Weight ( kg )
450x100	11.4	215	7.2	320	106
450x150	11.4	330	7.8	320	117
450x200	11.4	330	8.4	320	121
450x250	11.4	375	9	325	138
450x300	11.4	445	9.6	335	146
450x350	11.4	495	10.2	340	161
450x400	11.4	560	10.8	345	175
450x450	11.4	620	11.4	350	190
500x100	12	215	7.2	345	115
500x150	12	330	7.8	345	135
500x200	12	330	8.4	345	139
500x250	12	380	9	350	161
500x300	12	450	9.6	360	167
500x350	12	500	10.2	365	187
500x400	12	565	10.8	370	198
500x450	12	620	11.4	375	214
500x500	12	680	12	380	231
600x100	13.2	220	7.2	395	169
600x150	13.2	340	7.8	395	175
600x200	13.2	340	8.4	395	178
600x250	13.2	380	9	400	205
600x300	13.2	455	9.6	410	211
600x350	13.2	500	10.2	415	246
600x400	13.2	570	10.8	420	248
600x450	13.2	620	11.4	425	280
600x500	13.2	685	12	430	296
600x600	13.2	800	13.2	440	325
700x100	14.4	345	7.2	445	279
700x150	14.4	345	7.8	445	283
700x200	14.4	345	8.4	445	289
700x300	14.4	460	9.6	460	326
700x400	14.4	575	10.8	470	361
700x500	14.4	650	12	480	411
700x600	14.4	810	13.2	490	461
700x700	14.4	925	14.4	500	536

All Weight Are Subject to +/-5% Dimensions are in mm and weight in Kilogram

## All-Socket tee

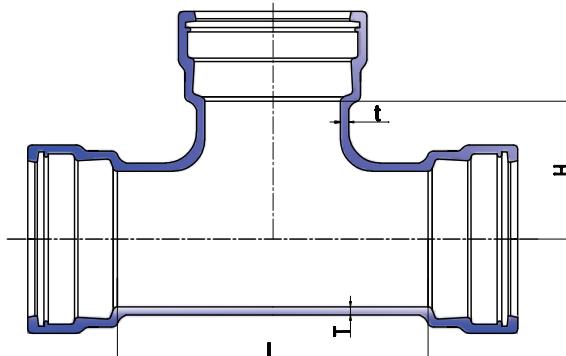


K-14 ISO 2531 - 2009(E)

DNxdn	T	L	t	H	Weight ( kg )
800x100	15.6	350	7.2	495	341
800x150	15.6	350	7.8	495	347
800x200	15.6	350	8.4	495	353
800x300	15.6	465	9.6	510	399
800x400	15.6	580	10.8	520	439
800x500	15.6	815	12	530	472
800x600	15.6	1045	13.2	540	629
800x700	15.6	1045	14.4	550	665
800x800	15.6	1045	15.6	565	701
900x100	16.8	355	7.2	545	446
900x150	16.8	355	7.8	545	450
900x200	16.8	355	8.4	545	458
900x300	16.8	590	9.6	570	535
900x400	16.8	590	10.8	570	556
900x500	16.8	820	12	590	803
900x600	16.8	1170	13.2	590	833
900x700	16.8	1050	14.4	615	878
900x800	16.8	1170	15.6	615	903
900x900	16.8	1170	16.8	625	944
1000x100	18	360	7.2	595	626
1000x150	18	360	7.8	595	632
1000x200	18	360	8.4	595	640
1000x300	18	595	9.6	620	761
1000x400	18	595	10.8	620	786
1000x500	18	830	12	640	900
1000x600	18	1290	13.2	640	1008
1000x700	18	1055	14.4	665	1081
1000x800	18	1290	15.6	665	1129
1000x900	18	1290	16.8	685	1150
1000x1000	18	1290	18	685	1209
1100x200	19.2	370	8.4	650	710
1100x400	19.2	600	10.8	670	909
1100x600	19.2	830	13.2	690	1052

All Weight Are Subject to +/-5% Dimensions are in mm and weight in Kilogram

## All-Socket tee



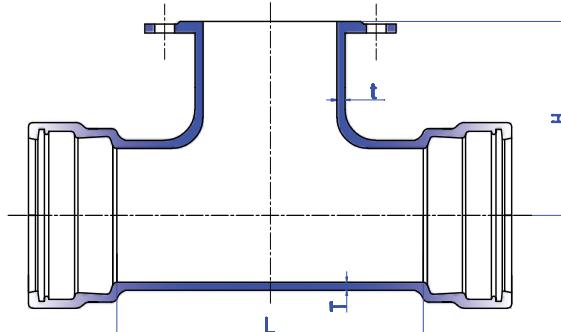
**For other dimensions  
consult our factory**

**K-14 ISO 2531 - 2009(E)**

DNxdn	T	L	t	H	Weight ( kg )
1100x800	19.2	1065	15.6	1313	710
1100x1000	19.2	1295	18.0	1504	909
1100x1100	19.2	1410	19.2	1626	1052
1200x100	20.4	375	7	700	713
1200x150	20.4	375	7.8	700	719
1200x200	20.4	375	8.4	700	725
1200x300	20.4	605	9.6	720	963
1200x400	20.4	605	10.8	720	978
1200x500	20.4	715	12	740	1095
1200x600	20.4	840	13.2	740	1139
1200x700	20.4	955	14.4	765	1390
1200x800	20.4	1070	15.6	765	1449
1200x900	20.4	1185	16.8	785	1596
1200x1000	20.4	1300	18	785	1657
1200x1200	20.4	1535	20.4	805	1900
1400x100	22.8	385	7.2	820	916
1400x200	22.8	385	8.4	820	923
1400x400	22.8	800	10.8	820	1133
1400x600	22.8	1030	13.2	840	1679
1400x800	22.8	1260	15.6	865	1910
1400x1000	22.8	1495	18	885	2441
1400x1200	22.8	1725	20.4	905	2795
1400x1400	22.8	1960	22.8	930	3124
1600x100	25.2	400	7.2	920	2323
1600x200	25.2	400	8.4	920	
1600x400	25.2	810	10.8	920	
1600x600	25.2	1040	13.2	940	
1600x800	25.2	1275	15.6	965	
1600x1000	25.2	1505	18	985	
1600x1200	25.2	1740	20.4	1010	
1600x1400	25.2	1970	22.8	1030	
1600x1600	25.2	2200	25.2	1050	

All Weight Are Subject to +/- 5% Dimensions are in mm and weight in Kilogram

## Double Socket Tee With Flange Branch

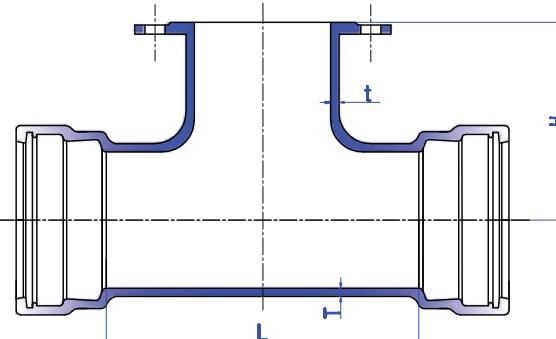


K-14 ISO 2531 - 2009(E)

DNxdn	T	L	t	H	Weight ( kg )		
					PN10	PN16	PN25
80x80	7	170	7	165	14.7	14.7	14.7
100x80	7.2	170	7	175	17.5	17.5	17.5
100x100	7.2	190	7.2	180	18.9	18.9	18.9
150x80	7.8	170	7	205	25.5	25.5	25.5
150x100	7.8	195	7.2	210	27	27	27.5
150x150	7.8	255	7.8	220	32.5	32.5	33.5
200x80	8.4	175	7	235	36.5	36.5	36.5
200x100	8.4	200	7.2	240	38.5	38.5	39
200x150	8.4	255	7.8	250	44.5	44.5	45.5
200x200	8.4	315	8.4	260	51.5	51	53
250x80	9	200	7	270	47	47	47
250x100	9	200	7.2	270	47.5	47.5	47.5
250x150	9	255	7.5	280	59	59	59
250x200	9	315	8.4	290	62.5	62.5	60
250x250	9	375	9	300	71	71	71
300x100	9.6	205	7.2	300	55	55	55
300x150	9.6	320	7.8	320	68.5	68.5	68.5
300x200	9.6	320	8.4	320	72	72	71.5
300x250	9.6	375	9	330	83	83	81
300x300	9.6	435	9.6	340	92	92	91.5
350x100	10.2	205	7.2	330	71	71	71
350x150	10.2	260	7.8	340	82.3	82.3	81.3
350x200	10.2	325	8.4	350	90.5	90.5	90.5
350x250	10.2	375	9	360	103	103	114
350x300	10.2	440	9.6	370	113	113	113
350x350	10.2	495	10.2	380	123	123	126
400x100	10.8	210	7.2	360	84	84	84
400x150	10.8	323	7.8	380	102	102	102
400x200	10.8	325	8.4	380	105	105	105
400x250	10.8	375	9	390	119	119	118
400x300	10.8	440	9.6	400	129	129	129
400x350	10.8	495	10.2	410	143	143	146
400x400	10.8	560	10.8	420	155	155	160

All Weight Are Subject to +/- 5% Dimensions are in mm and weight in Kilogram

## Double Socket Tee With Flange Branch

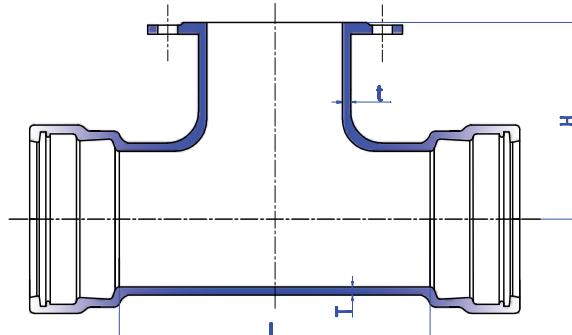


**K-14 ISO 2531 - 2009(E)**

DNxdn	T	L	t	H	Weight ( kg )		
					PN10	PN16	PN25
450x100	11.4	215	7.2	395	98.5	98.5	99
450x150	11.4	330	7.8	410	119	119	120
450x200	11.4	330	8.4	410	122	122	124
450x250	11.4	375	9	420	141	140	140
450x300	11.4	445	9.6	430	149	149	154
450x350	11.4	495	10.2	440	166	169	169
450x400	11.4	560	10.8	450	177	181	192
450x450	11.4	620	11.4	460	192	200	211
500x100	12	215	7.2	420	114	114	114
500x150	12	330	7.8	440	137	137	138
500x200	12	330	8.4	440	140	140	142
500x250	12	380	9	450	165	165	169
500x300	12	450	9.6	460	171	171	176
500x350	12	500	10.2	470	192	195	203
500x400	12	565	10.8	480	201	206	217
500x450	12	620	11.4	490	220	228	244
500x500	12	680	12	500	236	249	260
600x100	13.2	220	7.2	480	146	146	147
600x150	13.2	285	7.8	490	187	187	188
600x200	13.2	340	8.4	500	180	180	182
600x250	13.2	380	9	510	219	218	222
600x300	13.2	455	9.6	520	216	216	221
600x350	13.2	500	10.2	530	252	255	263
600x400	13.2	570	10.8	540	252	257	268
600x450	13.2	620	11.4	550	285	293	309
600x500	13.2	685	12	560	304	309	331
600x600	13.2	800	13.2	580	338	362	374
700x100	14.4	345	7.2	525	242	242	243
700x150	14.4	345	7.8	520	254	258	247
700x200	14.4	345	8.4	525	249	249	251
700x300	14.4	460	9.6	540	300	300	306
700x400	14.4	575	10.8	555	329	333	344
700x500	14.4	690	12	570	391	406	418
700x600	14.4	810	13.2	585	421	445	456
700x700	14.4	925	14.5	600	476	487	525

All Weight Are Subject to +/- 5% Dimensions are in mm and weight in Kilogram

## Double Socket Tee With Flange Branch

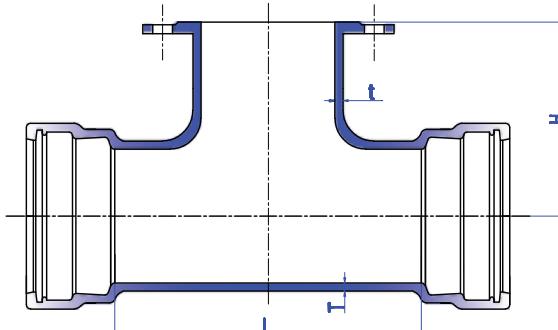


K-14 ISO 2531 - 2009(E)

DNxdn	T	L	t	H	Weight ( kg )		
					PN10	PN16	PN25
800x100	15.6	350	7.2	585	304	304	305
800x150	15.6	350	7.8	580	308	308	309
800x200	15.6	350	8.4	585	311	311	313
800x300	15.6	580	9.6	600	371	371	377
800x400	15.6	580	10.8	615	405	410	421
800x500	15.6	815	12	630	522	537	549
800x600	15.6	1045	13.2	645	588	612	624
800x700	15.6	1045	14.4	660	620	635	669
800x800	15.6	1045	15.6	675	640	655	708
900x100	16.8	355	7.2	630	378	378	378
900x150	16.8	355	7.8	640	381	381	382
900x200	16.8	355	8.4	645	385	384	386
900x300	16.8	590	9.6	660	455	455	461
900x400	16.8	590	10.8	675	497	502	513
900x500	16.8	820	12	690	666	681	693
900x600	16.8	1170	13.2	705	758	782	794
900x700	16.8	1050	14.4	720	788	803	837
900x800	16.8	1170	15.6	735	808	823	876
900x900	16.8	1170	16.8	750	835	854	920
1000x100	18	360	7.2	690	461	461	462
1000x150	18	360	7.8	700	464	464	465
1000x200	18	360	8.4	705	467	467	469
1000x300	18	595	9.6	720	552	552	558
1000x400	18	595	10.8	735	598	603	614
1000x500	18	830	12	750	852	867	879
1000x600	18	1290	13.2	765	958	982	994
1000x700	18	1055	14.4	780	985	1000	1032
1000x800	18	1290	15.6	795	1006	1021	1074
1000x900	18	1290	16.8	810	1052	1076	1137
1000x1000	18	1290	18	825	1044	1086	1192

All Weight Are Subject to +/- 5% Dimensions are in mm and weight in Kilogram

## Double Socket Tee With Flange Branch



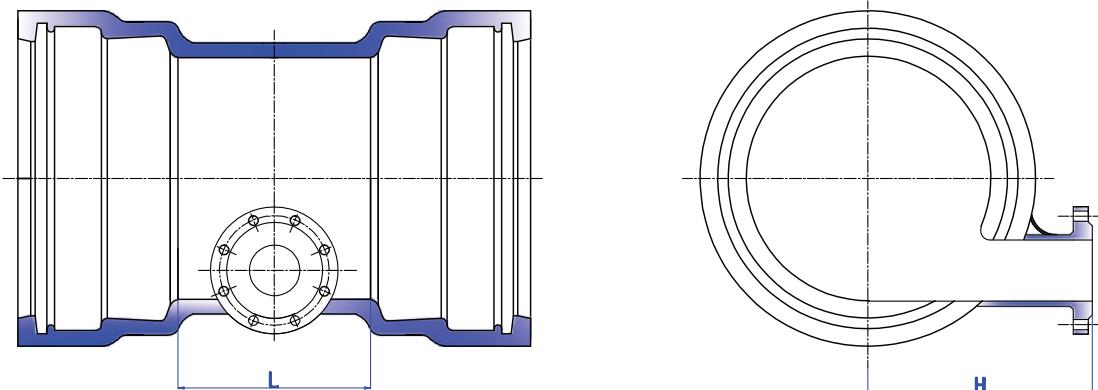
For other dimensions  
consult our factory

**K-14 ISO 2531 - 2009(E)**

DNxdn	T	L	t	H	Weight ( kg )		
					PN10	PN16	PN25
1200x100	20.4	375	7	810	763	763	763
1200x150	20.4	375	7.8	820	806	806	806
1200x200	20.4	375	8.4	825	682	682	684
1200x300	20.4	605	9.6	840	917	917	923
1200x400	20.4	605	10.8	855	852	856	867
1200x500	20.4	840	12	870	980	1018	1044
1200x600	20.4	840	13.2	885	1031	1055	1067
1200x700	20.4	1070	14.4	900	1169	1184	1218
1200x800	20.4	1070	15.6	915	1227	1242	1295
1200x900	20.4	1300	16.8	930	1367	1427	1452
1200x1000	20.4	1300	18	945	1436	1470	1556
1200x1200	20.4	1535	20.4	975	1682	1736	1846
1400x100	22.8	385	7.2	910	1120	1120	1120
1400x200	22.8	385	8.4	920	1189	1189	1189
1400x400	22.8	800	10.8	950	1357	1368	1374
1400x600	22.8	1030	13.2	980	1478	1505	1519
1400x800	22.8	1260	15.6	1010	1709	1728	1777
1400x1000	22.8	1495	18	1040	1955	1996	2075
1400x1200	22.8	1725	20.4	1070	2375	2439	2539
1400x1400	22.8	1960	22.8	1100	2697	2765	2917
1600x100	25.2	400	7.2	1020	1261	1261	1261
1600x200	25.2	400	8.4	1030	1361	1361	1361
1600x400	25.2	810	10.8	1060	1561	1565	1576
1600x600	25.2	1040	13.2	1090	1908	1934	1942
1600x800	25.2	1275	15.6	1120	2192	2211	2264
1600x1000	25.2	1505	18	1150	2480	2522	2607
1600x1200	25.2	1740	20.4	1180	2799	2863	2962
1600x1400	25.2	1970	22.8	1210	3129	3186	3349
1600x1600	25.2	2200	25.2	1240	3517	4607	4792

All Weight Are Subject to +/- 5% Dimensions are in mm and weight in Kilogram

## Double Socket Level Invert Tee With Flanged Branch



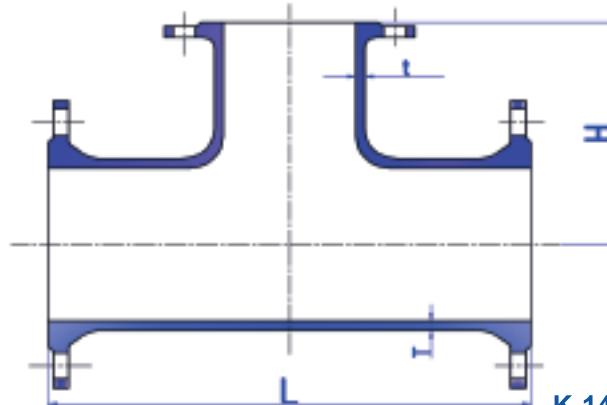
K-14 ISO 2531 - 2009(E)

L	DN*dn	H	Weight ( kg )		
			PN10	PN16	PN25
245	200*80	250	39.5	39.5	39.5
250	250*80	275	49.5	49.5	49.5
255	300*80	300	62	62	62
280	350*100	325	83	83	83.5
280	400*100	350	97.5	97.5	98
285	450*100	375	115	115	116
290	500*100	400	134	134	134
295	600*100	450	173	173	173
360	700*150	500	255	255	256
365	800*150	550			
370	900*150	600			
435	1000*200	650			
440	1100*200	700			
445	1200*200	750			
460	1400*200	850			
465	1500*200	900			
700	1600*400	950			
715	1800*400	1050			
725	2000*400	1150			
730	2100*400	1200			
735	2200*400	1250			
750	2400*400	1350			
760	2600*400	1450			

All Weight Are Subject to +/- 5% Dimensions are in mm and weight in Kilogram



### All-Flanged tee

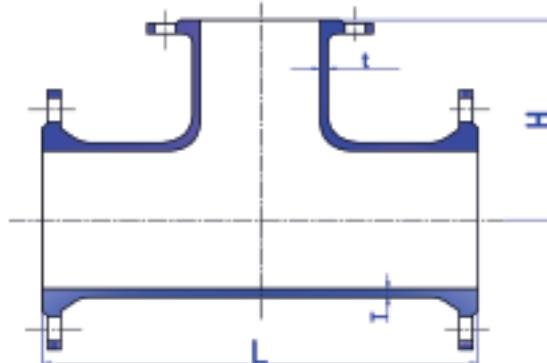


K-14 ISO 2531 - 2009(E)

DN*dn	T	L	t	H	Weight ( kg )		
					PN10	PN16	PN25
80*80	7	330	7	165	15.8	15.8	15.8
100*80	7.2	360	7	175	18.6	18.6	19.6
100*100	7.2	360	7.2	180	19.5	19.5	21
150*80	7.8	440	7	205	29	29	31
150*100	7.8	440	7.2	210	30	30	32.5
150*150	7.8	440	7.8	220	33.5	33.5	36.5
200*80	8.4	520	7	235	43	42.5	46.5
200*100	8.4	520	7.2	240	44	43.5	48
200*150	8.4	520	7.8	250	47	47	52
200*200	8.4	520	8.4	260	51	50.5	56.5
250*80	9	700	7	270	49.7	49.3	56.7
250*100	9	700	7.2	275	68.5	68	76
250*150	9	700	7.8	325	73.5	73	81
250*200	9	700	8.4	325	77.5	76.5	86
250*250	9	700	9	350	84	83	93.5
300*100	9.6	800	7.2	300	94.5	93.5	105
300*150	9.6	800	7.8	350	99	98.5	110
300*200	9.6	800	8.4	350	103	102	115
300*250	9.6	800	9	375	109	108	121
300*300	9.6	800	9.6	400	117	116	132
350*100	10.2	850	7.2	325	117	123	139
350*150	10.2	850	7.8	325	120	126	143
350*200	10.2	850	8.4	325	124	129	147
350*250	10.2	850	9	325	128	134	154
350*300	10.2	850	9.6	425	140	145	166
350*350	10.2	850	10.2	425	145	153	177
400*100	10.8	900	7.2	350	146	155	178
400*150	10.8	900	7.8	350	149	158	181
400*200	10.8	900	8.4	350	152	161	185
400*250	10.8	900	9	350	151	161	198
400*300	10.8	900	9.6	450	168	177	204
400*350	10.8	900	10.2	450	170	183	215
400*400	10.8	900	10.8	450	179	193	226

All Weight Are Subject to +/- 5% Dimensions are in mm and weight in Kilogram

## All-Flanged tee



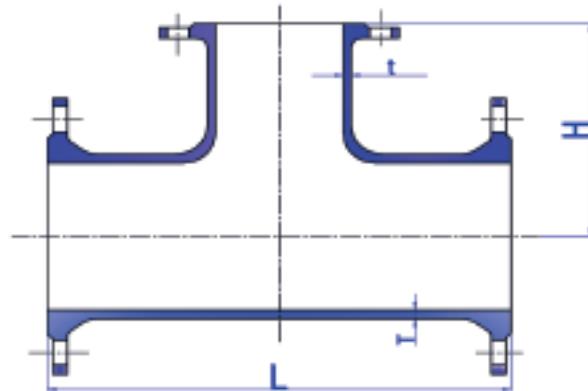
K-14 ISO 2531 - 2009(E)

DNxdn	T	L	t	H	Weight ( kg )		
					PN10	PN16	PN25
450x100	11.4	950	7.2	375	177	193	215
450x150	11.4	950	7.8	375	180	196	219
450x200	11.4	950	8.4	375	183	199	222
450x250	11.4	950	9	375	194	210	237
450x300	11.4	950	9.6	475	199	215	242
450x350	11.4	950	10.2	475	207	227	260
450x400	11.4	950	10.8	475	210	230	263
450x450	11.4	950	11.4	475	216	240	272
500x100	12	1000	7.2	400	215	242	264
500x150	12	1000	7.8	400	218	245	267
500x200	12	1000	8.4	400	221	248	271
500x250	12	1000	9	400	218	258	280
500x300	12	1000	9.6	500	237	264	291
500x350	12	1000	10.2	500	239	268	298
500x400	12	1000	10.8	500	248	279	311
500x450	12	1000	11.4	500	249	298	327
500x500	12	1000	12	500	261	301	333
600x100	13.2	1100	7.2	450	301	340	352
600x150	13.2	1100	7.8	450	309	356	381
600x200	13.2	1100	8.4	450	312	359	388
600x250	13.2	1100	9	450	307	360	392
600x300	13.2	1100	9.6	550	328	375	404
600x350	13.2	1100	10.2	550	329	380	413
600x400	13.2	1100	10.8	550	338	390	424
600x450	13.2	1100	11.4	550	338	417	448
600x500	13.2	1100	12	550	349	420	464
600x600	13.2	1100	13.2	550	367	438	473
700x100	14.4	540	7.2	510	235	295	
700x150	14.4	595	7.8	515	255	296	
700x200	14.4	650	8.4	525	281	304	
700x250	14.4	705	9	530	289	320	
700x300	14.4	760	9.6	540	319	342	
700x400	14.4	870	10.8	555	358	386	
700x500	14.4	980	12	570	442	481	
700x600	14.4	1200	13.2	585	476	523	
700x700	14.4	1200	14.4	600	499	534	

All Weight Are Subject to +/- 5% Dimensions are in mm and weight in Kilogram



### All-Flanged tee

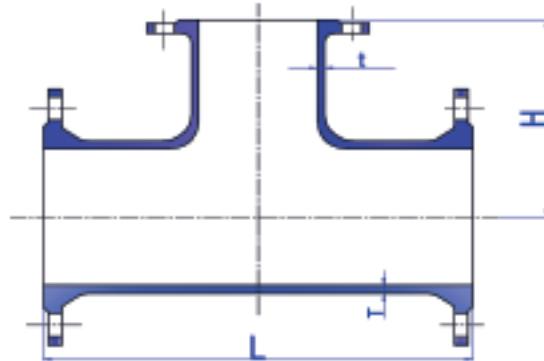


K-14 ISO 2531 - 2009(E)

DNxdn	T	L	t	H	Weight ( kg )	
					PN10	PN16
800x100	15.6	580	7.2	570	345	383
800x150	15.6	585	7.8	575	349	387
800x200	15.6	690	8.4	585	368	397
800x300	15.6	800	9.6	600	413	443
800x400	15.6	910	10.8	615	459	493
800x500	15.6	1020	12	630	561	599
800x600	15.6	1350	13.2	645	633	687
800x700	15.6	1350	14.4	660	663	711
800x800	15.6	1350	15.6	675	685	730
900x100	16.8	620	7.2	630	428	476
900x150	16.8	675	7.8	635	432	480
900x200	16.8	730	8.4	645	454	492
900x300	16.8	840	9.6	660	523	569
900x400	16.8	950	10.8	675	561	604
900x500	16.8	1060	12	690	726	784
900x600	16.8	1500	13.2	705	810	872
900x700	16.8	1500	14.4	720	843	901
900x800	16.8	1500	15.6	735	860	913
900x900	16.8	1500	16.8	750	887	944
1000x100	18	660	7.2	690	524	572
1000x150	18	715	7.8	695	534	582
1000x200	18	770	8.4	705	570	638
1000x300	18	880	9.6	720	651	739
1000x400	18	990	10.8	735	694	767
1000x500	18	1100	12	750	955	1007
1000x600	18	1650	13.2	765	1036	1129
1000x700	18	1650	14.4	780	1067	1152
1000x800	18	1650	15.6	795	1085	1168
1000x900	18	1650	16.8	810	1095	1219
1000x1000	18	1650	18	825	1150	1253

All Weight Are Subject to +/- 5% Dimensions are in mm and weight in Kilogram

## All-Flanged tee



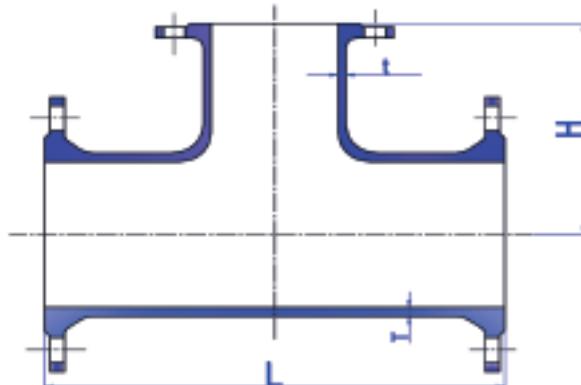
For other dimensions  
consult our factory

K-14 ISO 2531 - 2009(E)

DNxdn	T	L	t	H	Weight ( kg )	
					PN10	PN16
1100x400	19.2	1030	10.8	795	839	913
1100x600	19.2	1250	13.2	825	990	1083
1100x800	19.2	1470	15.6	855	1160	1245
1100x1000	19.2	1690	18	885	1345	1450
1100x1100	19.2	1800	19.2	900	1450	1555
1200x100	20.4	660	7	810	996	1082
1200x150	20.4	715	7.8	815	998	1084
1200x200	20.4	775	8.4	825	1000	1086
1200x300	20.4	890	9.6	840	1004	1160
1200x400	20.4	1070	10.8	855	1008	1122
1200x500	20.4	1125	12	870	1095	1250
1200x600	20.4	1290	13.2	885	1178	1312
1200x700	20.4	1355	14.4	900	1279	1423
1200x800	20.4	1510	15.6	915	1367	1492
1200x900	20.4	1585	16.8	930	1427	1662
1200x1000	20.4	1730	18	945	1570	1714
1200x1200	20.4	1950	20.4	975	1806	1970
1400x100	22.8	970	7.2	905	1227	1363
1400x200	22.8	1085	8.4	920	1231	1367
1400x400	22.8	1315	10.8	950	1514	1656
1400x600	22.8	1320	13.2	980	1527	1665
1400x800	22.8	1540	15.6	1010	1755	1884
1400x1000	22.8	1760	18	1040	1995	2143
1400x1200	22.8	2245	20.4	1070	2262	2431
1400x1400	22.8	2200	22.8	1100	2545	2715
1600x100	25.2	1020	7.2	1015	1874	2078
1600x200	25.2	1135	8.4	1030	1880	2084
1600x400	25.2	1370	10.8	1060	2000	2210
1600x600	25.2	1380	13.2	1090	2019	2221
1600x800	25.2	1600	15.6	1120	2294	2487
1600x1000	25.2	1820	18	1150	2578	2791
1600x1200	25.2	2040	20.4	1180	2888	3122
1600x1400	25.2	2260	22.8	1210	3208	3444
1600x1600	25.2	2480	25.2	1240	3586	3854

All Weight Are Subject to +/- 5% Dimensions are in mm and weight in Kilogram

### All-Flanged tee

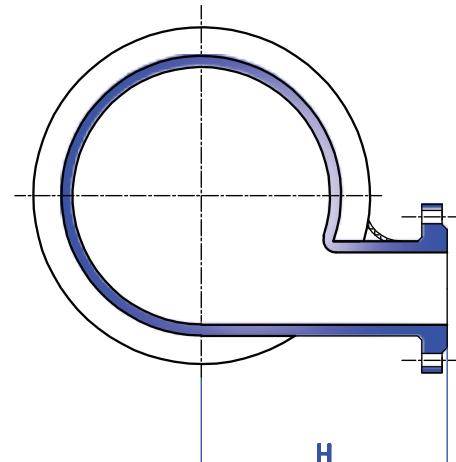
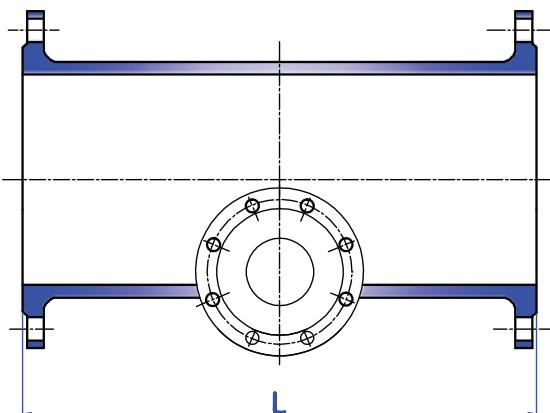


**K-14 ISO 2531 - 2009(E)**

DNxdn	T	L	t	H	Weight ( kg )	
					PN10	PN16
1800x100	27.6	1075	7.2	1125	2348	2600
1800x200	27.6	1190	8.4	1140	2350	2602
1800x400	27.6	1420	10.8	1170	2574	2835
1800x600	27.6	1440	13.2	1200	2521	2768
1800x800	27.6	1660	15.6	1230	2848	3087
1800x1000	27.6	1880	18	1260	3184	3442
1800x1200	27.6	2100	20.4	1290	3543	3822
1800x1400	27.6	2320	22.8	1320	3910	4190
1800x1600	27.6	2540	25.2	1350	4328	4641
1800x1800	27.6	2760	27.6	1380	4750	5086
2000x200	30	1235	8.4	1250	2940	3246
2000x400	30	1470	10.8	1280	3002	3314
2000x600	30	1500	13.2	1310	3119	3419
2000x800	30	1720	15.6	1340	3505	3796
2000x1000	30	1940	18	1370	3898	4209
2000x1200	30	2160	20.4	1400	4314	4644
2000x1400	30	2380	22.8	1430	4733	5066
2000x1600	30	2600	25.2	1460	5202	5567
2000x1800	30	2820	27.6	1490	5668	6055
2000x2000	30	3040	30	1520	6185	6599
2200x600	32.4	1560	13.2	1420	3975	4334
2200x800	32.4	1780	15.6	1450	4298	4654
2200x1000	32.4	2000	18	1480	4753	5128
2200x1200	32.4	2220	20.4	1510	5026	5413
2200x1400	32.4	2440	22.8	1540	5709	6106
2200x1600	32.4	2660	25.2	1570	6234	6664
2200x1800	32.4	2880	27.6	1600	6474	6934
2200x2000	32.4	3100	30	1630	7316	7795
2200x2200	32.4	3320	32.4	1660	7954	8464
2400x600	34.8	1620	13.2	1530	4418	4849
2400x800	34.8	1840	15.6	1560	5200	5671
2400x1000	34.8	2060	18	1590	5721	6211
2400x1200	34.8	2280	20.4	1620	5963	6432
2400x1400	34.8	2500	22.8	1650	6804	7317
2400x1600	34.8	2720	25.2	1680	7392	7937
2400x1800	34.8	2940	27.6	1710	7614	8145
2400x2000	34.8	3160	30	1740	8591	9185
2400x2200	34.8	3380	32.4	1770	9275	9901
2400x2400	34.8	3600	34.8	1800	10031	10715

All Weight Are Subject to +/- 5% Dimensions are in mm and weight in Kilogram

## All Flange Level Invert Tee



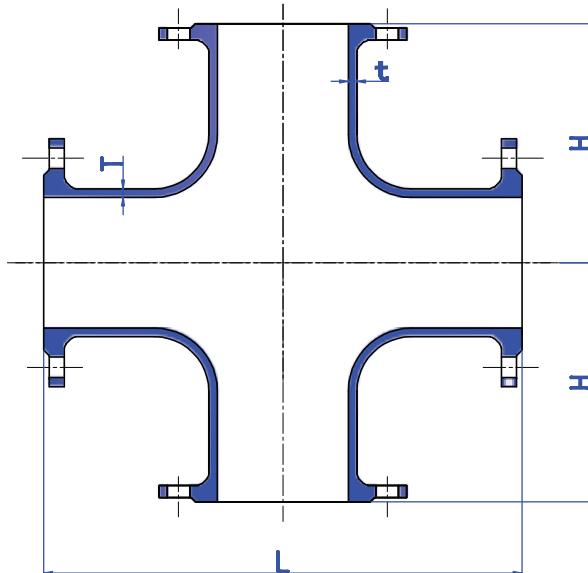
K-14 ISO 2531 - 2009(E)

DN×dn	L	H	Weight ( kg )		
			PN10	PN16	PN25
200×80	520	235	43.52	43.52	47.32
250×80	700	265	68.05	67.25	75.05
300×80	800	290	94.57	93.77	104.97
350×100	850	290	117.85	124.05	141.15
400×100	900	350	145.81	157.01	180.11
450×100	950	375	179.92	195.72	218.02
600×100	1100	400	302.81	355.81	384.71
600×150	1100	425	308.51	361.51	390.91
600×200	1100	450	315.62	368.62	398.92
700×150	595	500	256.91	287.11	357.51
800×150	635	525	336.82	375.22	474.62
900×150	675	550	416.23	464.03	585.83
1000×200	770	650	557.49	640.49	797.99
1200×200	775	700	771.99	900.59	1101.49
1400×200	1085	750	1240.54	1376.74	1683.04
1500×200	1110	800	1489.5	1647.3	
1600×400	1370	1000	1967.53	2177.13	2542.63
1800×400	1420	1050	2170.09	2427.49	2918.19
2000×400	1475	1100	2664.56	2975.76	3692.46
2100×400	1310	1150	2820.12	3154.12	
2200×400	1340	1150	2955.78	3294.78	
2400×400	1400	1280	3557.97	3967.97	
2600×400	1460	1350	4188.03	4663.83	

All Weight Are Subject to +/- 5% Dimensions are in mm and weight in Kilogram



## All Flange Level Cross



**K-14 ISO 2531 - 2009(E)**

DNxdn	t	L	H	Weight ( kg )
80x80	8.1	330	165	20.5
100x100	8.4	360	180	24.5
150x150	9.1	440	220	41
200x200	9.8	520	260	60.5
250x250	10.5	700	350	99.5
300x300	11.2	800	400	143
350x350	11.9	850	425	189
400x400	12.6	900	450	236
450x450	13.3	950	475	286
500x500	14	1000	500	370
600x600	15.4	1100	550	542
700x700	16.8	1200	600	-
800x800	18.2	1350	675	-
900x900	19.6	1500	750	-
1000x1000	21	1650	825	-
1100x1100	22.4	1780	890	-
1200x1200	23.8	1950	975	-
1400x1400	26.6	2250	1125	-
1600x1600	29.4	2330	1020	-

All Weight Are Subject to +/- 5% Dimensions are in mm and weight in Kilogram

# Standard Elbow



## Type of Elbow

- Double-Socket ( $11.25^\circ, 22.5^\circ, 45^\circ, 90^\circ$ )
- Double-Flange ( $11.25^\circ, 22.5^\circ, 45^\circ, 90^\circ$ )
- Double-Flange  $90^\circ$  Duck Foot bend
- Double-Flange  $90^\circ$  Long Radius bend
- Flange Bell Mouth

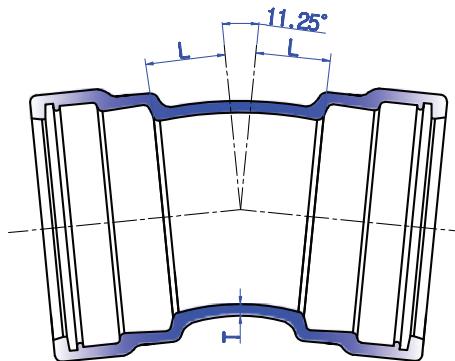


### \* Features:

- Epoxy coating as per request.
- For any other dimensions contact the factory.



## 11.25° Socket Elbow

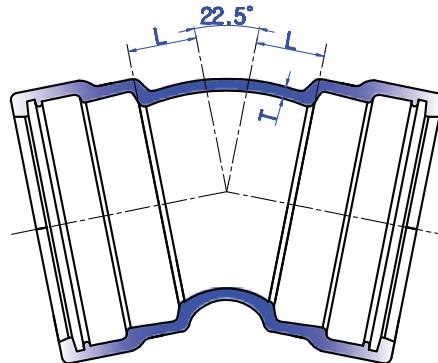


**K-12 ISO 2531 - 2009(E)**

DN	T	L	Weight ( kg )
			Double-socket
80	7	30	7.4
100	7.2	30	9.7
150	7.8	35	16.2
200	8.4	40	25.5
250	9	50	33.5
300	9.6	55	43
350	10.2	60	58
400	10.8	65	70
450	11.4	70	83.5
500	12	75	98.5
600	13.2	85	131
700	14.4	95	186
800	15.6	110	243
900	16.8	120	309
1000	18	130	386
1100	19.2	140	525
1200	20.4	150	588
1400	22.8	130	747
1500	24	140	908
1600	25.2	140	1007
1800	27.6	155	1331
2000	30	165	1702
2200	32.4	190	
2400	34.8	205	
2600	37.2	215	

All Weight Are Subject to +/- 5% Dimensions are in mm and weight in Kilogram

## 22.5° Socket Elbow



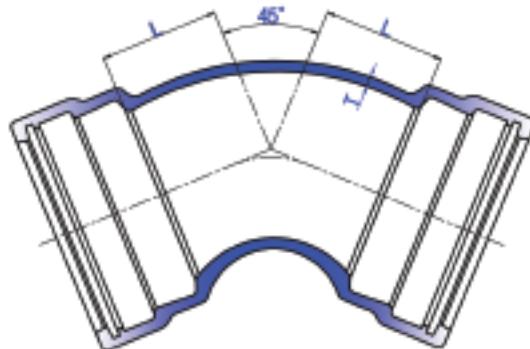
K-12 ISO 2531 - 2009(E)

DN	T	L	Weight ( kg )
			Double-socket
80	7	40	7.7
100	7.2	40	10
150	7.8	55	17.3
200	8.4	65	27.5
250	9	75	36
300	9.6	85	47
350	10.2	95	64
400	10.8	110	78.5
450	11.4	120	95
500	12	130	113
600	13.2	150	154
700	14.4	175	223
800	15.6	195	291
900	16.8	220	377
1000	18	240	474
1100	19.2	260	644
1200	20.4	285	736
1400	22.8	260	933
1500	24	270	1377
1600	25.2	280	1259
1800	27.6	305	1663
2000	30	330	2144
2200	32.4	355	2707
2400	34.8	380	3359
2600	37.2	400	4087

All Weight Are Subject to +/- 5% Dimensions are in mm and weight in Kilogram



## 45° Socket Elbow

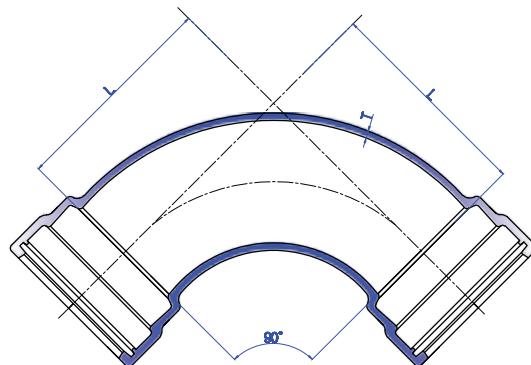


**K-12 ISO 2531 - 2009(E)**

DN	T	L	Weight ( kg )
			Double-socket
80	7	55	8.1
100	7.2	65	10.8
150	7.8	85	18.8
200	8.4	110	31
250	9	130	41.5
300	9.6	150	55
350	10.2	175	76
400	10.8	195	94
450	11.4	220	117
500	12	240	141
600	13.2	285	199
700	14.4	330	288
800	15.6	370	382
900	16.8	415	501
1000	18	460	640
1100	19.2	505	856
1200	20.4	550	1007
1400	22.8	515	1273
1500	24	540	1640
1600	25.2	565	1740
1800	27.6	610	2296
2000	30	660	2970
2200	32.4	710	
2400	34.8	755	
2600	37.2	805	

All Weight Are Subject to +/- 5% Dimensions are in mm and weight in Kilogram

## 90° Socket Elbow

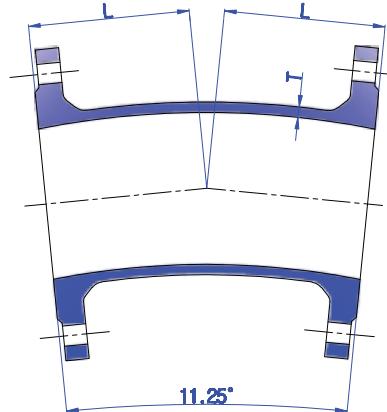


K-12 ISO 2531 - 2009(E)

DN	T	L	Weight ( kg )
<b>Double-socket</b>			
80	7	100	9
100	7.2	120	12.1
150	7.8	170	22
200	8.4	220	36.5
250	9	270	51.5
300	9.6	320	70.5
350	10.2	370	97.5
400	10.8	420	124
450	11.4	470	156
500	12	520	193
600	13.2	620	280
700	14.4	720	455
800	15.6	820	605
900	16.8	920	813
1000	18	1020	1045
1100	19.2	1120	1253
1200	20.4	1220	1663
1400	22.8	1220	2419
1500	24	1270	2276
1600	25.2	1290	3382
1800	27.6	1320	
2000	30	1360	
2200	32.4	1400	
2400	34.8	1460	
2600	37.2	1520	

All Weight Are Subject to +/- 5% Dimensions are in mm and weight in Kilogram

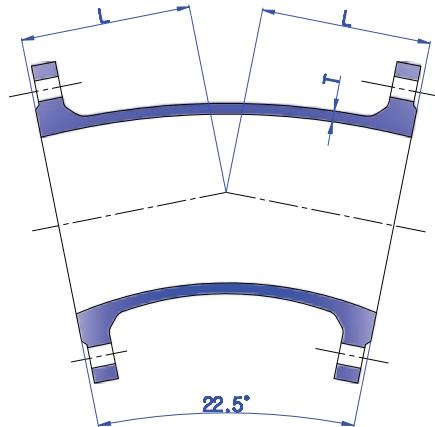
## 11.25° Double-flanged Elbow


**K-12 ISO 2531 - 2009(E)**

(DN)	T (mm)	L (mm)	Weight ( kg )		
			PN10	PN16	PN25
80	7	130	9.5	9.5	9.5
100	7.2	140	11.5	11.5	12.5
125	7.5	150	14.8	14.8	16
150	7.8	160	19.1	19.1	21
200	8.4	180	28.5	28	32
250	9	350	56.5	56	63.5
300	9.6	400	79.5	79	89.5
350	10.2	298	79	84	100
400	10.8	324	100	109	131
450	11.4	349	123	139	160
500	12	375	152	179	200
600	13.2	426	222	269	294
700	14.4	478	313	336	--
800	15.6	529	426	455	--
900	16.8	581	546	584	--
1000	18	632	704	773	--
1100	19.2	683	882	952	--
1200	20.4	735	1094	1204	--
1400	22.8	835	1560	1674	--
1500	24	885	1849	2025	--
1600	25.2	940	2203	2382	--
1800	27.6	345	1342	1566	--
2000	30	375	1694	1970	--
2100	31.2	390	1939	2267	--
2200	32.4	405	1995.8	2329.8	--
2400	34.8	435	2420.2	2824.8	--
2600	37.2	465	2899.8	3369.4	--

All Weight Are Subject to +/- 5% Dimensions are in mm and weight in Kilogram

## 22.5° Double-flanged Elbow

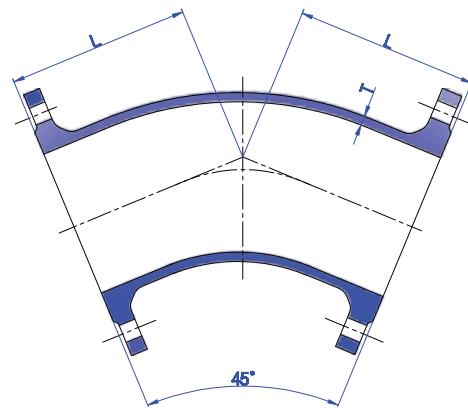


K-12 ISO 2531 - 2009(E)

(DN)	T	L	Weight ( kg )		
			PN10	PN16	PN25
80	7	130	9.4	9.4	9.4
100	7.2	140	11.5	11.5	12.5
125	7.5	150	14.7	14.7	15.9
150	7.8	160	19.1	19.1	21
200	8.4	180	28.5	28	32
250	9	350	56.5	56	63.5
300	9.6	400	79	78.5	89
350	10.2	298	78.5	84	99.5
400	10.8	324	99.5	109	131
450	11.4	349	122	138	160
500	12	375	151	178	199
600	13.2	426	221	268	292
700	14.4	478	311	334	—
800	15.6	529	423	453	—
900	16.8	581	543	581	—
1000	18	632	700	769	—
1100	19.2	683	877	947	—
1200	20.4	735	1088	1198	—
1400	22.8	835	1551	1664	—
1500	24	885	1838	2014	—
1600	25.2	940	2190	2369	—
1800	27.6	480	1640	1864	—
2000	30	520	2081	2357	—
2100	31.2	540	2371	2700	—
2200	32.4	560	2484.8	2818.8	—
2400	34.8	600	3032.8	3427.8	—
2500	37.2	640	3645.8	4116.4	—

All Weight Are Subject to +/- 5% Dimensions are in mm and weight in Kilogram

## 45° Double-flanged Elbow

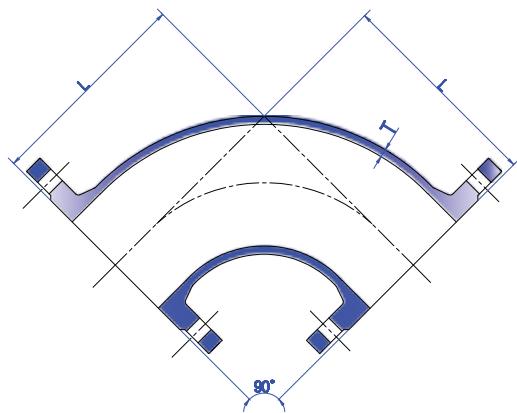


**K-12 ISO 2531 - 2009(E)**

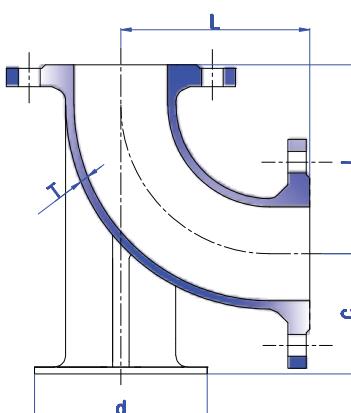
DN	T	L	Weight ( kg )		
			PN10	PN16	PN25
80	7	130	9.3	9.3	9.3
100	7.2	140	11.4	11.4	12.5
150	7.8	160	18.9	18.9	21
200	8.4	180	28	27.5	31.5
250	9	350	55.5	54.5	62
300	9.6	400	77.5	76.5	87.5
350	10.2	298	77	82.5	98
400	10.8	324	97.5	107	129
450	11.4	349	120	135	157
500	12	375	148	175	196
600	13.2	426	216	263	287
700	14.4	478	304	328	—
800	15.6	529	414	444	—
900	16.8	581	531	569	—
1000	18	632	684	753	—
1100	19.2	695	857	927	—
1200	20.4	735	1062	1172	—
1400	22.8	775	1431	1544	—
1500	24	810	1677	1853	—
1600	25.2	845	1972	2151	—
1800	27.6	910	2539	2763	—
2000	30	980	3243	3519	—
2200	32.4	880	3446	3804	—
2400	34.8	945	4277	4719	—
2600	37.2	1005	5175	5695	—

All Weight Are Subject to +/- 5% Dimensions are in mm and weight in Kilogram

### 90° Double-flanged Elbow



### 90° Double-flanged duckfoot Elbow



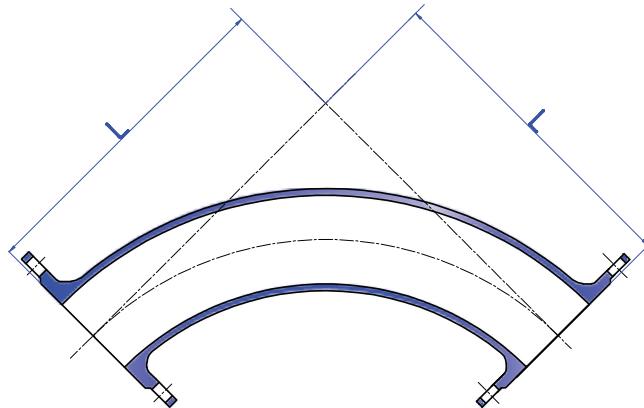
K-12 ISO 2531 - 2009(E)

DN	T	90° bends			90° duckfoot bends						
		L	Weight ( kg )			L	c	d	Weight ( kg )		
			PN10	PN16	PN25				PN10	PN16	PN25
80	7	165	9.6	9.6	9.6	165	110	180	14.8	14.8	14.8
100	7.2	180	12	12	13	180	125	200	18.2	18.2	19.2
150	7.8	220	20.5	20.5	22.5	220	160	250	31.5	31.5	33.5
200	8.4	260	31.5	31	35	260	190	300	49	48.5	52.5
250	9	350	50.5	49.5	57	350	225	350	78.5	77.5	85
300	9.6	400	70	69.5	80	400	255	400	111	111	121
350	10.2	450	90.5	96	112	450	290	450	147	153	168
400	10.8	500	117	126	148	500	320	500	192	201	223
450	11.4	550	147	163	184	550	350	550	245	261	283
500	12	600	184	211	232	600	385	600	309	336	357
600	13.2	700	277	324	348	700	450	700	475	522	546
700	14.4	800	394	418		800	515	800	684	708	
800	15.6	900	543	573		900	580	900	944	974	
900	16.8	1000	708	746		1000	645	1000	1252	1290	
1000	18	1100	919	988		1100	710	1100	1629	1698	
1100	19.2	1200	1164	1234		1200	775	1200	2080	2150	
1200	20.4	1300	1452	1562		1300	840	1300	2599	2709	
1400	22.8	1350	1948	2062							
1500	24	1400	2273	2449							
1600	25.2	1450	2663	2841							
1800	27.6	1500	3348	3572							

All Weight Are Subject to +/- 5% Dimensions are in mm and weight in Kilogram



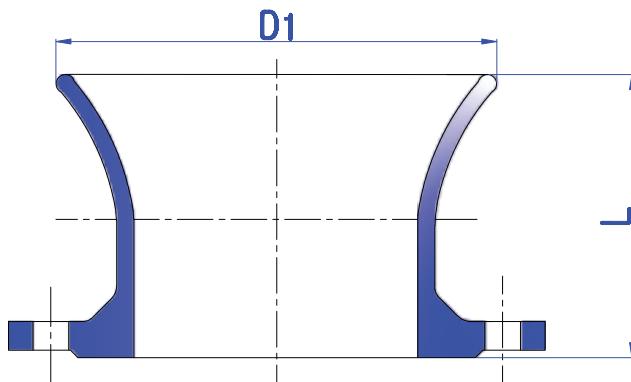
### 90° Double-flanged long radius Elbow



K-12 ISO 2531 - 2009(E)

DN	L	Weight ( kg )		
		PN10	PN16	PN25
80	380	14.5	14.5	14.5
100	400	18	18	19
125	425	23.5	23.5	24.1
150	450	30.5	30.5	32.5
200	500	46.5	46	50
250	550	67	66	73.5
300	600	91	90.5	101
350	650	117	122	138
400	700	149	158	180
450	750	184	200	221
500	800	227	254	275
600	900	332	379	403
700	1000	466	489	--
800	1100	632	661	--
900	1200	816	854	--
1000	1300	1048	1117	--
1100	1400	1315	1385	--
1200	1500	1627	1737	--

### Flanged bell mouth



K-12 ISO 2531 - 2009(E)

DN	D1	L	Weight ( kg )		
			PN10	PN16	PN25
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	14.8	16.8
250	345	183	21	20.5	24.5
300	405	205	28.5	28.5	33.5
350	460	220	35.5	38	46
400	520	240	45	49.5	60.5
450	575	255	54	62	73
500	635	275	67	80	91
600	750	310	96.5	120	132
700	865	345	135	146	
800	980	380	182	197	
900	1095	415	231	250	
1000	1210	450	297	331	
1100	1325	485	370	405	
1200	1440	520	457	512	
1400	1670	590	646	702	
1500	1785	625	763	851	
1600	1900	660	906	995	
1800	2130	730	1185	1297	
2000	2360	800	1530	1668	
2100	2475	835	1753	1918	
2200	2590	870	1964	2135	
2400	2820	940	2485	2713	
2600	3050	1010	2989	3242	

All Weight Are Subject to +/- 5% Dimensions are in mm and weight in Kilogram

# Taper / Reducer



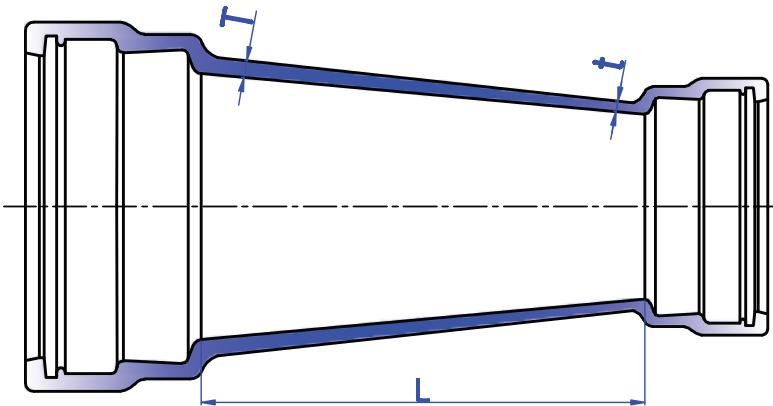
## Type of Taper / Reducer

- Double-Socket Reducer
- Double Flanged Reducer (Concentric & Eccentric)

\* Features:  
- Epoxy coating as per request.  
- For any other dimensions contact the factory.



## Double-Socket Reducer

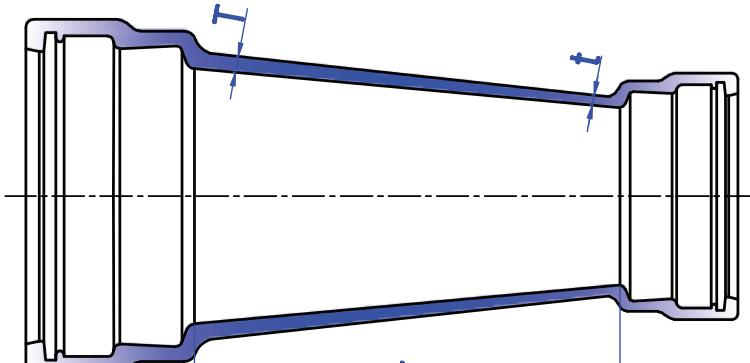


**K-12 ISO 2531 - 2009(E)**

L	DNxdn	T	t	Weight ( kg )
				Double-Socket
90	100x80	7.2	7	9.2
190	150x80	7.8	7	14.9
150	150x100	7.8	7.2	15.3
250	200x100	8.4	7.2	23.5
150	200x150	8.4	7.8	24
250	250x150	9	7.8	32.5
150	250x200	9	8.4	33
350	300x150	9.6	7.8	43
250	300x200	9.6	8.4	43.5
150	300x250	9.6	9	41.5
360	350x200	10.2	8.4	59
260	350x250	10.2	9	51
160	350x300	10.2	9.6	52.5
360	400x250	10.8	9	72
260	400x300	10.8	9.6	67.5
160	400x350	10.8	10.2	62

All Weight Are Subject to +/- 5% Dimensions are in mm and weight in Kilogram

## Double-Socket Reducer

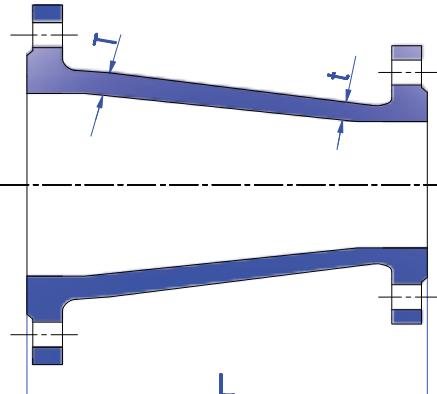
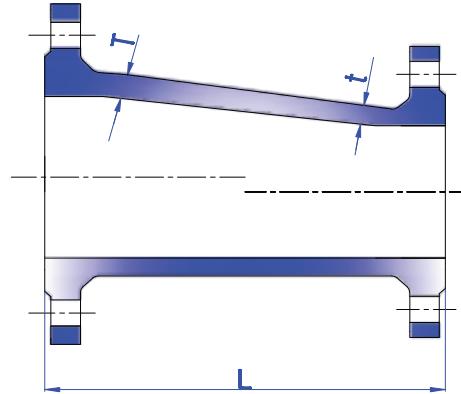


K-12 ISO 2531 - 2009(E)

DNxdn	T	t	L	Weight ( kg )
				Double-Socket
450x350	11.4	10.2	260	83
450x400	11.4	10.8	160	77.5
500x350	12	10.2	360	98
500x400	12	10.8	260	97
600x400	13.2	10.8	460	143
600x500	13.2	12	260	129
700x500	14.4	12	480	198
700x600	14.4	13.2	280	179
800x600	15.6	13.2	480	252
800x700	15.6	14.4	280	234
900x700	16.8	14.4	480	323
900x800	16.8	15.6	280	292
1000x800	18	15.6	480	397
1000x900	18	16.8	280	359
1100x1000	19.2	18	280	457
1200x1000	20.4	18	480	582
1400x1200	22.8	20.4	360	973
1500x1400	24	22.8	260	
1600x1400	25.2	22.8	360	951
1800x1600	27.6	25.2	360	1235
2000x1800	30	27.6	360	1566
2200x2000	32.4	30	360	1943
2400x2200	34.8	32.4	360	2374
2600x2400	37.2	34.8	360	2877

All Weight Are Subject to +/-5% Dimensions are in mm and weight in Kilogram

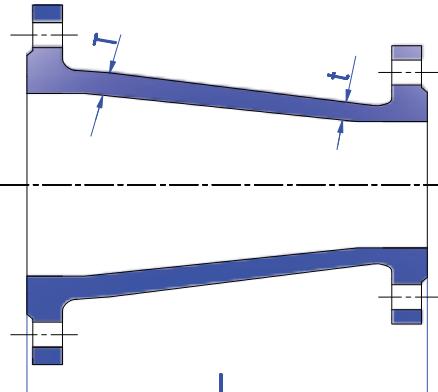
## Double-flanged Reducer


**Concentric Type**

**Eccentric Type**
**K-12 ISO 2531 - 2009(E)**

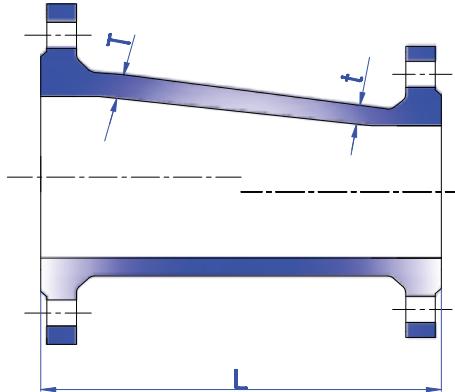
DNxdn	T	t	L	Weight ( kg )		
				PN10	PN16	PN25
100x80	7.2	7	200	9.4	9.4	9.9
150x80	7.8	7	400	16.4	16.4	17.4
150x100	7.8	7.2	300	15.3	15.3	16.8
200x100	8.4	7.2	600	27.5	27.5	30
200x150	8.4	7.8	300	22.5	22	25
250x150	9	7.8	600	39	39	43.5
250x200	9	8.4	300	31	30.5	36
300x100	9.6	7.2	700	50.5	50.5	57
300x150	9.6	7.8	650	48.5	48.5	55
300x200	9.6	8.4	600	52	51.5	59
300x250	9.6	9	300	41	40	49
350x200	10.2	8.4	650	61.5	64	74
350x250	10.2	9	600	65.5	67.5	79
350x300	10.2	9.6	300	50	52.5	66
400x200	10.8	8.4	700	73.5	77.5	90.5
400x250	10.8	9	650	77	81.5	96
400x300	10.8	9.6	600	80.5	85	101
400x350	10.8	10.2	300	60	67	86
450x250	11.4	9	700	89.5	97	112
450x300	11.4	9.6	650	93.5	101	117
450x350	11.4	10.2	600	95.5	106	125
450x400	11.4	10.8	300	70.5	83	105
500x300	12	9.6	700	109	122	138
500x350	12	10.2	650	111	127	145
500x400	12	10.8	600	113	131	153
500x450	12	11.7	300	83	104	126
600x350	13.2	10.2	750	147	174	193
600x400	13.2	10.8	700	150	178	201

All Weight Are Subject to +/- 5% Dimensions are in mm and weight in Kilogram

## Double-flanged Reducer



**Concentric Type**



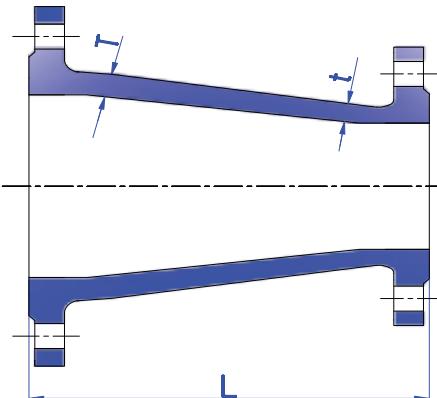
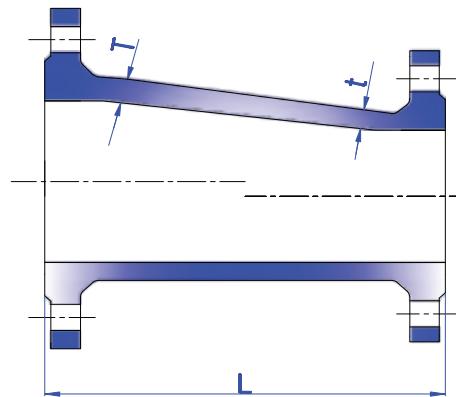
**Eccentric Type**

**K-12 ISO 2531 - 2009(E)**

DNxdn	T	t	L	Weight ( kg )	
				PN10	PN16
600x450	13.2	11.4	650	151	183
600x500	13.2	12	600	154	191
700x400	14.4	10.8	800	196	212
700x450	14.4	11.4	750	197	217
700x500	14.4	12	700	200	225
700x600	14.4	13.2	600	204	239
800x450	15.6	11.4	900	263	286
800x500	15.6	12	800	256	284
800x600	15.6	13.2	700	260	298
800x700	15.6	14.4	600	263	290
900x500	16.8	12	1000	338	370
900x600	16.8	13.2	800	318	360
900x700	16.8	14.4	700	321	352
900x800	16.8	15.6	600	325	358
1000x600	18	13.2	1000	422	480
1000x700	18	14.4	800	396	442
1000x800	18	15.6	700	399	448
1000x900	18	16.8	600	393	446
1100x700	19.2	14.4	1000	515	562
1100x800	19.2	15.6	800	483	532
1100x900	19.2	16.8	700	476	530
1100x1000	19.2	18	600	474	543
1200x700	20.4	14.4	1345	711	777
1200x800	20.4	15.6	1160	638	758
1200x900	20.4	16.8	975	652	726
1200x1000	20.4	18	790	614	703
1200x1100	20.4	19.2	605	566	655

All Weight Are Subject to +/- 5% Dimensions are in mm and weight in Kilogram

## Double-flanged Reducer


**Concentric Type**

**Eccentric Type**
**K-12 ISO 2531 - 2009(E)**

DNxdn	T	t	L	Weight ( kg )	
				PN10	PN16
1400x800	22.8	15.6	1590	1034	1105
1400x900	22.8	16.8	1405	998	1074
1400x1000	22.8	18	1220	961	1052
1400x1100	22.8	19.2	1035	914	1005
1400x1200	22.8	20.4	850	859	971
1500x900	24	16.8	1620	1211	1317
1500x1000	24	18	1435	1174	1297
1500x1100	24	19.2	1250	1127	1250
1500x1200	24	20.4	1065	1074	1216
1500x1400	24	22.8	695	914	1058
1600x1000	25.2	18	1650	1424	1547
1600x1100	25.2	19.2	1465	1377	1502
1600x1200	25.2	20.4	1280	1324	1468
1600x1400	25.2	22.8	910	1165	1311
1600x1500	25.2	24	725	1073	1250
1800x1100	27.6	19.2	1895	1910	2057
1800x1200	27.6	20.4	1710	1858	2024
1800x1400	27.6	22.8	1340	1701	1870
1800x1500	27.6	24	1155	1610	1810
1800x1600	27.6	25.2	970	1517	1718
2000x1200	30	20.4	2140	2512	2705
2000x1400	30	22.8	1770	2358	2553
2000x1500	30	24	1585	2268	2492
2000x1600	30	25.2	1400	2176	2404
2000x1800	30	27.6	1030	1903	2153
2200x1400	32.4	22.8	2200	3168	3385
2200x1500	32.4	24	2015	3070	3328
2200x1600	32.4	25.2	1830	2980	3240

All Weight Are Subject to +/- 5% Dimensions are in mm and weight in Kilogram

# Flanges



## Types of Flanges

- Slip-on Flange PN10
- Slip-on Flange PN16
- Slip-on Flange PN25

### General:

\* The Diameter of the holes has been fixed according to the nominal diameter of the bolts in accordance with following rules.

\* for a bolts <M20: nominal diameter of the bolts +3 mm

\* for a bolts <M22: nominal diameter of the bolts +4 mm

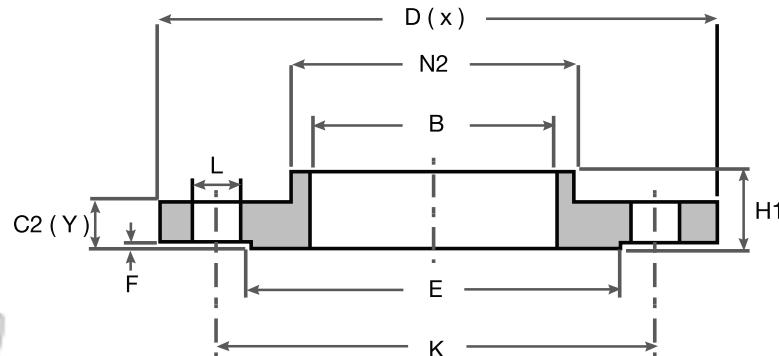
\* for a bolts <M25: nominal diameter of the bolts +6 mm

\* The Flange may have a machined raised face and drilled holes they may also be supplied as cast where particularly accurate moulding processes are used, while respecting the dimension requirements shown in one of the tables, hereafter for a selected nominal diameter and nominal pressure.



**PN10**

**BS4504**



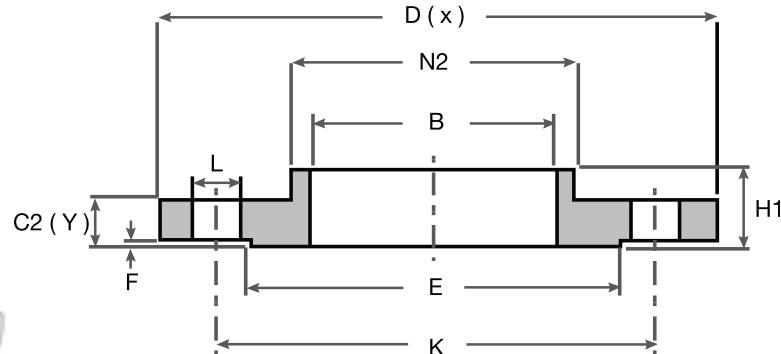
### SLIP ON FLANGE

DN	D	K	L	Number	B	C2	H1	N2	E	F
10	90	60	14	4	18	14	20	30	40	2
15	95	65	14	4	22	14	20	35	45	2
20	105	75	14	4	27.5	16	24	45	58	2
25	115	85	14	4	34.5	16	24	52	68	2
32	140	100	18	4	43.5	16	26	60	78	2
40	150	110	18	4	49.5	16	26	70	88	3
50	165	125	18	4	61.5	18	28	84	102	3
65	185	145	18	4	77.5	18	32	104	122	3
80	200	160	18	8	90.5	20	34	118	138	3
100	220	180	18	8	116	20	40	140	158	3
125	250	210	18	8	141.5	22	44	168	188	3
150	285	240	22	8	170.5	22	44	195	212	3
200	340	295	22	8	221.5	24	44	246	268	2
250	395	350	22	12	276.5	26	46	298	320	3
300	445	400	22	12	327.5	26	46	350	370	4
350	505	460	22	16	359.5	26	53	400	430	4
400	565	515	26	16	411	26	57	456	482	4
450	615	565	26	20	462	28	63	502	532	4
500	670	620	26	20	513.5	28	67	559	585	4
600	780	725	30	20	616.5	28	75	658	685	5
700	895	840	30	24		30			800	5
800	1015	950	33	24		32			905	5
900	1115	1050	33	28		34			1005	5
1000	1230	1160	36	28		34			1110	5
1200	1455	1380	39	32		38			1330	5
1400	1675	1590	42	36		42			1535	5
1600	1915	1820	48	40		46			1760	5
1800	2115	2020	48	44		50			1960	5
2000	2325	2230	48	48		54			2170	5

All Weight Are Subject to +/- 5% Dimensions are in mm and weight in Kilogram

PN16

BS4504



### SLIP ON FLANGE

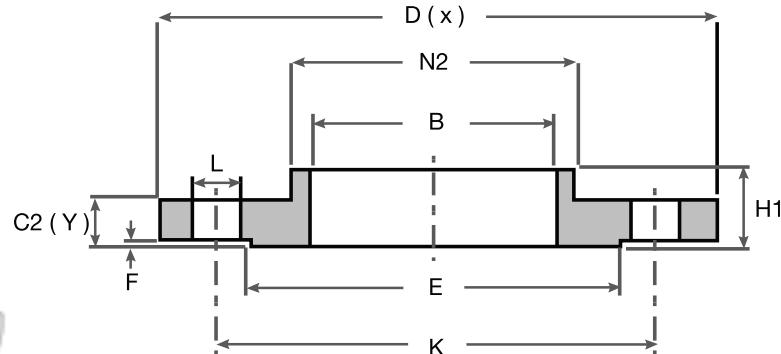
DN	D	K	L	Number	B	C2	H1	N2	E	F
10	90	60	14	4	18	14	20	30	40	2
15	95	65	14	4	22	14	20	35	45	2
20	105	75	14	4	27.5	16	24	45	58	2
25	115	85	14	4	34.5	16	24	52	68	2
32	140	100	18	4	43.5	16	26	60	78	2
40	150	110	18	4	49.5	16	26	70	88	3
50	165	125	18	4	61.5	18	28	84	102	3
65	185	145	18	4	77.5	18	32	104	122	3
80	200	160	18	8	90.5	20	34	118	138	3
100	220	180	18	8	116	20	40	140	158	3
125	250	210	18	8	141.5	22	44	168	188	3
150	285	240	22	8	170.5	22	44	195	212	3
200	340	295	22	12	221.5	24	44	246	268	3
250	405	355	26	12	276.5	26	46	298	320	3
300	460	410	26	12	327.5	28	46	350	378	4
350	520	470	26	16	359.5	30	57	400	438	4
400	580	525	30	16	411	32	63	456	490	4
450	640	585	30	20	462	34	68	502	550	4
500	715	650	33	20	513.5	34	73	559	610	4
600	840	770	36	20	616.5	36	83	658	725	5
700	910	840	36	24		36	83	760	795	5
800	1025	950	39	24		38	90	864	900	5
900	1125	1050	39	28		40	94	968	1000	5
1000	1255	1170	42	28		42	100	1072	1115	5
1200	1485	1390	48	32	-	48	-	-	1330	5
1400	1685	1590	48	36	-	52	-	-	1530	5
1600	1930	1820	56	40	-	58	-	-	1750	5
1800	2130	2020	56	44	-	62	-	-	1950	5
2000	2345	2230	62	48	-	66	-	-	2150	5

All Weight Are Subject to +/- 5% Dimensions are in mm and weight in Kilogram



**PN25**

**BS4504**



### SLIP ON FLANGE

DN	D	K	L	Number	B	C2	H1	N2	E	F
10	90	60	14	4	18	16	22	30	40	2
15	95	65	14	4	22	16	22	35	45	2
20	105	75	14	4	27.5	18	26	45	58	2
25	115	85	14	4	34.5	18	28	52	68	2
32	140	100	18	4	43.5	18	30	60	78	2
40	150	110	18	4	49.5	18	32	70	88	3
50	165	125	18	4	61.5	20	34	84	102	3
65	185	145	18	8	77.5	22	38	104	122	3
80	200	160	18	8	90.5	24	40	118	138	3
100	235	190	22	8	116	24	44	145	162	3
125	270	220	26	8	141.5	26	48	170	188	3
150	300	250	26	8	170.5	28	52	200	218	3
200	360	310	26	12	221.5	30	52	256	278	3
250	425	370	30	12	276.5	32	60	310	335	3
300	485	430	30	16	327.5	34	67	364	395	4
350	555	490	33	16	359.5	38	72	418	450	4
400	620	550	36	16	411	40	78	472	505	4
450	670	600	36	20	462	42	84	520	555	4
500	730	660	36	20	513.5	44	90	580	615	4
600	845	770	39	20	616.5	46	100	684	720	5
700	960	875	42	24		46			820	5
800	1085	990	48	24		50			930	5
900	1185	1090	48	28		54			1030	5
1000	1320	1210	56	28		58			1140	5
1200	1530	1420	56	32					1350	5
1400	1755	1640	62	36					1560	5
1600	1975	1860	62	40					1780	5
1800	2185	2070	70	44					1985	5
2000	2425	2300	70	48					2210	5

All Weight Are Subject to +/- 5% Dimensions are in mm and weight in Kilogram

# Coupling, Adaptor and Dismantling joint

## Dismantling Joint

Dismantling joints are installed in pipelines to facilitate the removal and replacement of valves, pipes or fittings in the line. By removing and adjusting certain stud nuts, the stud and the loosened flanges can be retracted sufficiently to allow for the removal and replacement of the joint and associated pipe or fittings in the pipeline.

### Protection

Coated by (Fusion bonded epoxy) FBE Coat Minimum Thickness:  
200 - 300 microns

### Working Pressure

PN16 (PN10, PN25) As per request

### Drilling

Flanges are drilled according to BS 4504 or DIN 2501 PN10 /  
PN16 and PN25

### Specifications

- Manufactured according to DIN 2633.
- Made of Ductile Iron GGG50/ 40 to DIN EN 1563.
- Rubber Gasket EPDM/SBR.
- Bolts & Nuts Galvanized, Grade 8.8 / SS304.



## Coupling

SPS Coupling joints different outside diameters in UPVC, GRP and Ductile Iron.

### Features

- Easy and quick installation.
- High strength light weight ductile iron construction.
- SPS Universal Flange Adaptor allows an angular deflection of 3° on all sides.

### Protection

Corrosion protection with ( Fusion bonded epoxy )  
min.: 200 - 300 microns.

### Working Pressure

PN16, (PN10 ,PN25) As per request

### Specifications

- Sleeve made of Steel / Ductile Iron GGG50 /40 to DIN EN 1563
- Rings made of Steel / Ductile Iron GGG50 /40 to DIN EN 1563
- Rubber Gasket EPDM/SBR
- Bolts & Nuts Galvanized, Grade 8.8 / SS304.

## Flange Adaptor

SPS Flange Adaptor joints different outside diameters in UPVC, GRP and Ductile Iron.

### Features

- Easy and quick installation.
- High strength light weight ductile iron construction.
- SPS Universal Flange Adaptor allows an angular deflection of 3° on all sides.

### Protection

Corrosion protection with ( Fusion bonded epoxy ) min.: 200 - 300 microns.

### Working Pressure

PN16 (PN10, PN25) As per request

### Drilling

Flanges are drilled according to BS 4504 or DIN 2501 PN10 /  
PN16 and PN25

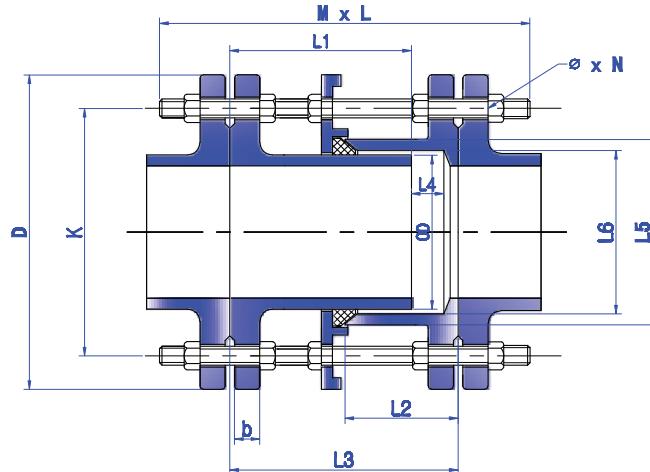
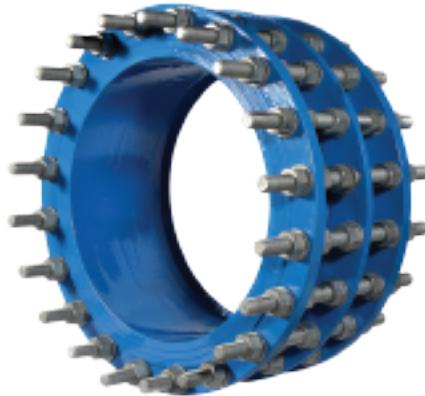
### Specifications

- Flange made of Ductile Iron GGG50 /40 to DIN EN 1563
- Rings made of Ductile Iron GGG50 /40 to DIN EN 1563
- Rubber Gasket EPDM/SBR
- Bolts & Nuts Galvanized, Grade 8.8 / SS304.





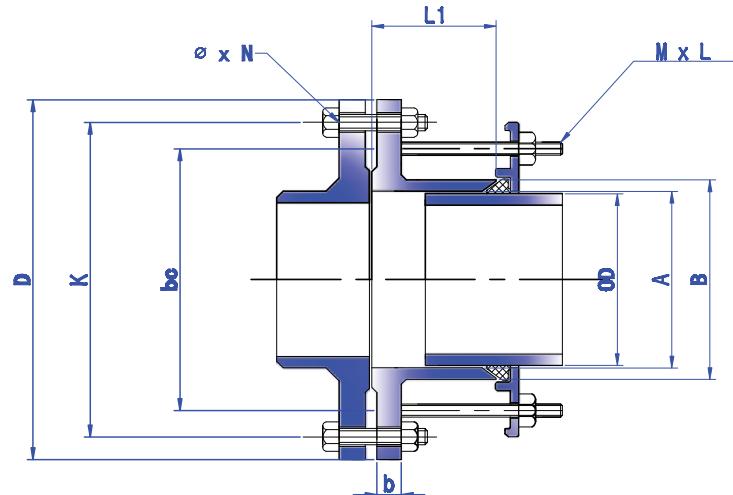
## Dismantling Joint



DN	D	k	b	L1	L2	L3	L4	L5	L6	ø x N	M*L
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
50	165	125	16	175	90	220	45	88	71	19 x 4	M16 x 310
65	185	145	16	175	90	220	45	105	87	19 x 4	M16 x 310
80	200	160	16	175	100	225	50	124	104	19 x 8	M16 x 350
100	220	180	16	185	100	235	50	144	124	19 x 8	M16 x 350
125	250	210	16	200	100	250	50	170	149	19 x 8	M16 x 350
150	285	240	16	200	100	250	50	197	1765	23 x 8	M16 x 360
200	340	295	17	200	100	250	50	250	228	23 x 12	M20 x 380
250	400	355	19	200	100	250	50	302	280	28 x 12	M24 x 410
300	455	410	20.5	215	100	265	50	356	332	28 x 12	M24 x 450
350	520	470	22.5	215	110	265	50	408	384	28 x 16	M24 x 450
400	580	525	24	225	110	275	50	460	435	31 x 16	M27 x 460
450	640	585	26	225	110	275	50	512	486	31 x 20	M27 x 480
500	715	650	27.5	250	115	305	50	564	538	34 x 20	M30 x 500
600	840	770	31	255	115	305	50	668	642	37 x 20	M33 x 520
700	910	840	34.5	255	115	315	60	772	745	37 x 24	M33 x 520
800	1025	950	38	270	115	330	60	878	849	40 x 24	M36 x 550
900	1125	1050	41.5	275	115	335	60	982	953	40 x 28	M36 x 580
1000	1255	1170	45	295	115	355	60	1086	1056	43 x 28	M39 x 580
1200	1485	1390	52	315	127	375	60	1294	1265	49 x 32	M45 x 600
1400	1685	1590	55	330	127	390	60	1504	1474	49 x 36	M45 x 650
1600	1930	1820	60	350	190	410	60	1716	1678	56 x 40	M52 x 700
1800	2130	2020	65	360	190	420	60	1927	1887	56 x 44	M52 x 800
2000	2345	2230	70	400	195	460	60	2126	2087	62 x 48	M56 x 880

Dimensions are in mm and weight in Kilogram

## Flange Adaptor for Ductile Iron Pipe



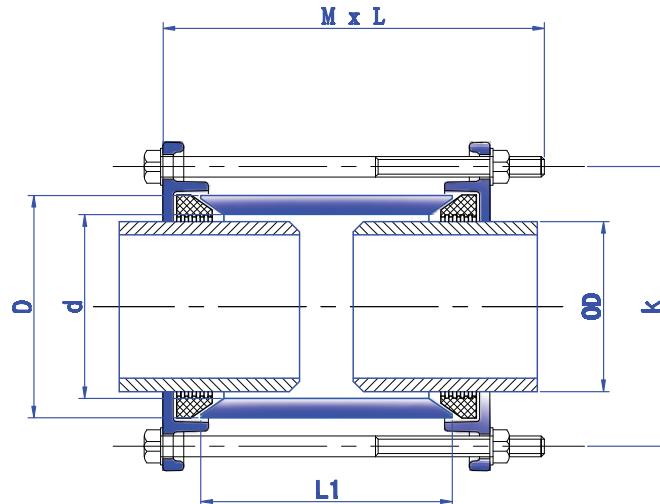
\* Available For GRP & PVC Pipe

DN	OD	D	K	L1	A	B	bc	L1	ø x N	M x L
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
50	66	165	125	73	71	88	125	70	19 x 4	M12 x 110 x 4
65	82	185	145	73	87	105	145	70	19 x 4	M12 x 110 x 4
80	98	200	160	73	104	124	158	73	19 x 8	M12 x 110 x 4
100	118	220	180	73	123	144	180	73	19 x 8	M12 x 110 x 4
125	144	250	210	76	149	170	210	76	19 x 8	M12 x 120 x 4
150	170	285	240	76	175	197	240	76	23 x 8	M12 x 120 x 4
200	222	340	295	80	227	250	295	80	23 x 12	M12 x 130 x 6
250	274	400	355	90	279	302	345	90	28 x 12	M12 x 130 x 6
300	326	455	410	90	332	356	402	90	28 x 12	M12 x 130 x 6
350	378	520	470	100	384	410	460	100	28 x 16	M16 x 150 x 8
400	429	580	525	100	435	460	506	100	31 x 16	M16 x 150 x 8
450	480	640	585	100	486	512	556	100	31 x 20	M16 x 160 x 10
500	532	715	650	100	538	565	605	100	34 x 20	M16 x 160 x 10
600	635	840	770	100	642	668	716	100	37 x 20	M16 x 160 x 10
700	738	910	840	115	745	772	820	115	37 x 24	M16 x 180 x 12
800	842	1025	950	115	849	875	929	115	40 x 24	M16 x 180 x 12
900	945	1125	1050	115	953	982	1030	115	40 x 28	M16 x 180 x 14
1000	1048	1255	1170	115	1056	1086	1143	115	43 x 28	M16 x 180 x 14
1200	1255	1485	1390	115	1265	1295	1359	115	49 x 32	M20 x 200 x 16
1400	1462	1685	1590	127	1474	1504	1576	127	49 x 36	M20 x 220 x 18
1600	1668	1930	1820	190	1678	1716	1790	190	56 x 40	M20 x 240 x 20
1800	1875	2130	2020	190	1887	1927	1997	200	56 x 44	M20 x 240 x 22
2000	2082	2345	2230	195	2087	2126	2193	210	62 x 48	M20 x 250 x 24

Dimensions are in mm and weight in Kilogram



## Coupling For Ductile Iron Pipe



\* Available for GRP & PVC pipe

DN	OD	D	d	K	L1	M x L
	mm	mm	mm	mm	mm	mm
50	66	86	70	125	102	M12 x 170 x 2
65	82	100	86	145	102	M12 x 170 x 4
80	98	124	103	158	102	M12 x 170 x 4
100	118	144	123	178	102	M12 x 170 x 4
150	170	197	175	236	102	M12 x 170 x 4
200	222	250	227	293	102	M12 x 180 x 6
250	274	302	280	345	102	M12 x 190 x 6
300	326	358	332	402	102	M12 x 190 x 6
350	378	410	384	460	152	M16 x 240 x 8
400	429	462	435	506	152	M16 x 240 x 8
450	480	512	486	556	152	M16 x 240 x 10
500	532	564	538	605	152	M16 x 250 x 10
600	635	668	642	616	152	M16 x 250 x 10
700	738	772	745	820	152	M16 x 260 x 12
800	842	875	849	929	152	M16 x 260 x 12
900	945	978	952	1030	178	M16 x 290 x 14
1000	1048	1082	1056	1143	178	M16 x 290 x 14
1100	1152	1189	1160	1254	178	M16 x 310 x 16
1200	1255	1293	1265	1359	178	M16 x 310 x 16
1400	1462	1502	1472	1576	178	M20 x 320 x 18
1500	1565	1614	1575	1684	178	M20 x 340 x 18
1600	1668	1715	1678	1790	178	M20 x 350 x 20
1800	1875	1926	1887	1997	200	M20 x 380 x 22
2000	2082	2138	2096	2193	210	M20 x 380 x 24

Dimensions are in mm and weight in Kilogram

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