İKİTÜRK

Technical Catalogue for Ductile Iron Pipes and Fittings

Installation and usage manual included

İKİTÜRK

Complete Catalogue of Ductile Iron Pipes and Fittings

Accompanied by Installation & Operation Guide

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Scope

This catalogue has been prepared for the client's acquaintance with ductile iron pipes, fittings, valves and accessories and includes terms and definitions, technical specifications, production method, standards and requirements, loading, unloading and pipe storage procedures as well as application aspects of ductile iron pipes and fittings within the nominal range of 80 to 1200 mm.

Among others, Pressurized or non-pressurized conveyance of crude, treated and potable water and sewage industry through aboveground or underground pipelines, is the major application of the mentioned products.

Ductile iron pipes and fittings and its characteristics

Introduction

Developing the approach of producing and supplying ductile iron pipe and fittings for water and sewage transmission from diameter of 80 to 1200 mm and nominal capacity of 120/000 per year, IKITURK Company was established in a ground surfaced 24 hectares.

Establishing quality control system as well as customer orientation, IKITURK succeeded in obtaining ISO 9001, BS OHSAS 18001, ISO 10004 and ISO 10002 standards. Moreover, relying on the high quality of its products in line with global standards ISO 2531, EN 545, ISO 16631, EN 598, ISO 8179-1, ISO 4179 and ISO 16134, this company succeeded in obtaining the Standard mark usage certificate from Iran National Standard Organization according to INSO 21736 and INSO 3732 as well as the quality establishment certificate from Germany DVGW institution.

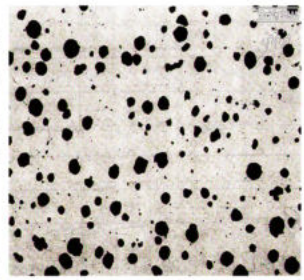
This complex's products intend to transfer drinking water under the supervision of food and drug administration of Iran, medical science university in line with global standard of BS 6920. Obtaining sanitation certificate for applied internal and external coverage as well as other accessories used in pipes and iron ductile fittings in IKITURK Company from Germany's DVGW institution confirms this claim.

*Since the international standards used in this booklet's products include national standards, thus international standards are mentioned in the catalogue.

1. Germany's water and gas association is one of the most accredited companies in issuing certificates in the field of water, gas and sewage standards as well as the acknowledgement regarding products' sanitation state.

Ductile Iron History

Ductile Iron (cast iron with spherical graphite) has a structure with pearlite, ferrite or both matrices with spherical graphite. Carbon used in ductile iron is created in the form of spherical or round graphite.



One of the most important characteristics of ductile iron is proper casting and machining, suitable abrasion resistance, shaping, high resistance against corrosion as well as mechanical properties (tensile strength, ductility and surface hardening).

Pipe: casting of uniform bore, with straight axis, having either socket, spigot or flange ends. Flanged spigots, flanged sockets and collars are excluded in this definition.

Fittings: casting sother than a pipe, which allow pipeline deviation, change of direction or bore. Flanged spigots, flanged sockets and collars are also classified as fittings.

Accessory: any casting other than a pipe or fitting, which is used in a pipeline. Some accessories are listed below:

:: Glands and bolts for mechanical flexible joints.

:: Gland, bolts and locking rings or segments for restrained joints.

1-Ductile Cast iron (Ductile iron)
2-Spheroidal graphite cast iron (nodular cast iron)

Flange: end of a pipe or fitting, extending perpendicularly to its axis, with bolt holes equally spaced in a circle. A flange can be fixed (e.g. integrally cast, screwed-on or welded-on) or adjustable. An adjustable flange comprises a ring, in one or several parts bolted together, which bears on an end joint hub and which can be freely rotated around the barrel axis before jointing.

1- Collar: connecting component used to join spigots of two pipes or fittings.

2- Spigot: male end of a pipe or a fitting.

3- Socket: female end of a pipe or fitting to make the connection with the spigot of the next component.

4- Gasket: sealing component of a joint.

5- Joint: connection between the ends of pipes and/or fittings in which a gasket is used to effect a seal.

6- Flexible joint: joint providing significant angular deflection and movement parallel and/or perpendicular to the pipe axis.

7- Push-in flexible joint: flexible joint assembled by pushing the spigot through the gasket into the socket of the mating component.

8- Mechanical flexible joint: flexible joint in which sealing is obtained by applying pressure to the gasket by mechanical components such as metal ring or gland.

9- Restrained joint: joint in which a means is provided to prevent separation of the assembled joint.

1.Collar
2.Spigot
3.Socket
4.Sealing Gasket
5.Joint
6.Flexible Joint
7.Push-in Flexible Joint

10- Self-anchoring joint: It is a type of restrained joint that makes the fitting stronger and more restrained through friction between metallic teeth and pipe's body.

11- Gland: the component that locks the pieces inside a restrained joint, thus leading a joint to be more restrained.

12- Flanged joint: joint between two flanged ends.

13- Nominal size (DN): alphanumeric designation of size for components of a pipework system, which is used for reference purposes. It comprises the letters DN followed by a dimensionless whole number, which is indirectly related to the physical size, in millimeters, of the bore or outside diameter of the end connections.

14- Nominal pressure (PN): numerical designation, which is a convenient rounded number, used for reference purposes. All components of the same nominal size, DN, designated by the same PN number have compatible mating dimensions.

15- Allowable operating pressure (PFA): maximum internal pressure, excluding surge, which a component can safely withstand in permanent service.

16- Maximum allowable operating pressure (PMA): maximum internal pressure, including surge, which a component can safely withstand in service.

17- Allowable site test pressure (PEA): maximum hydrostatic pressure that a newly installed component can withstand for a relatively short duration, when either fixed above ground level or laid and backfilled underground, in order to measure the integrity and tightness of the pipeline. This test pressure is different from the system test pressure, which is related to the design pressure of the pipeline.

1. Mechanical Flexible Joint
2. Restrained Joint
3. Self-anchoring
4. Gland
5. Flanged Join
6. Nominal Size
7. Nominal Pressure
8. Allowable Operating pressure
9. Maximum Allowable operating pressure

18- Diametral stiffness of a pipe: characteristic of a pipe allowing it to resist diametral deflection under loading.

19- Length: effective length of a pipe and fitting (without the consideration of socket area).

20- Hoop Stress: stress in a pipe or fitting under pressure, acting tangentially to the perimeter of a transverse section.

21- Ovality: out-of-roundness of a pipe section, equal to the equation below:

$$\left[\frac{A1-A2}{A1+A2}\right] X\,100$$

A1: Biggest external diameter of pipe (mm)

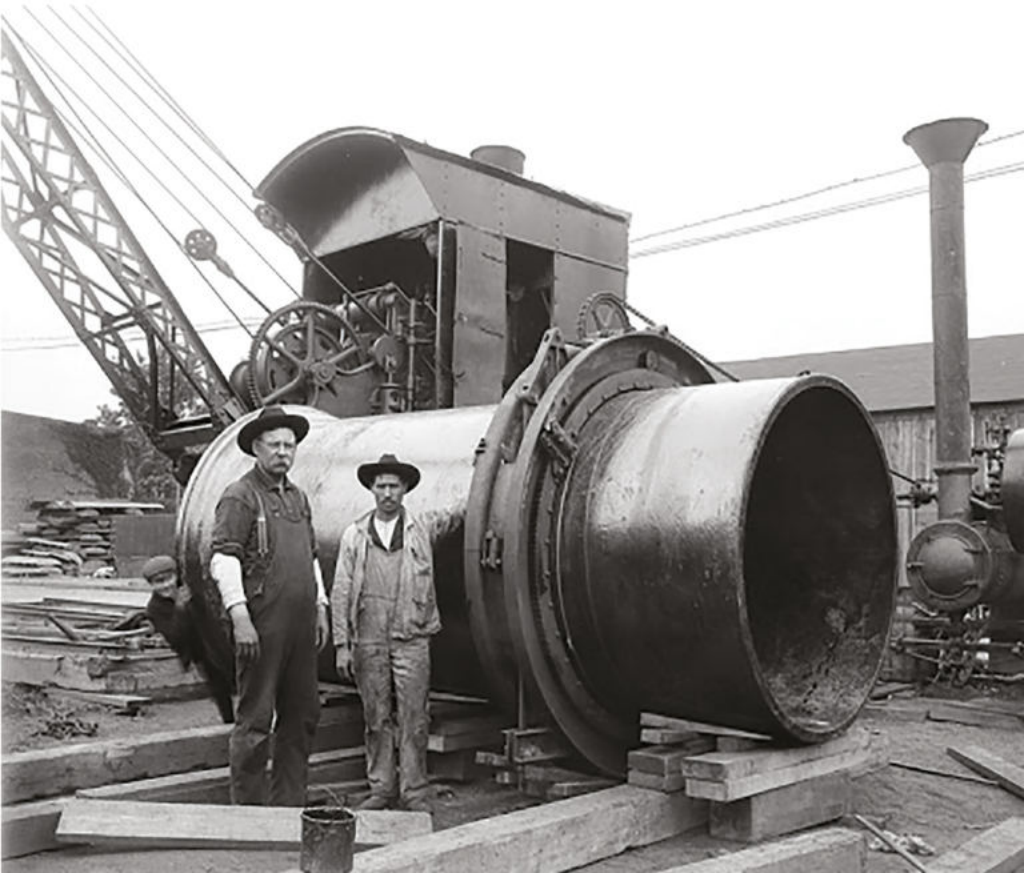
A2: Smallest external diameter of pipe (mm)

1. Allowable Site test pressure
2. Diametral Stiffness
3. Effective lenght
4. Ovality

History of Ductile Iron

Following studies conducted in 1948, it was discovered that adding an amount of magnesium to molten iron after desulphurization operation makes it possible to change flake graphite into spherical graphite.

This new type of cast iron is named ductile iron in the industry. This discovery spread around the world fast and gained a lot of popularity and also began to be used in production of various types of pipes and a variety of industrial and engineering components.



Advantages of ductile iron pipes

:: Instinct resistance of cast iron against corrosion along with improvement of this resistance via various coatings.

:: Appropriate resistance against internal pressures such as surge and external pressures like traffic loads, etc.

:: Suitable for use in loose ground with high level of subterranean waters.

;; Resistance against electrical currents due to use of rubber gasket at the joint points.

:: Adequate resistance against damages caused by displacement and transportation.

:: Flexibility and sufficient resistance against landslides, on faults and earthquake-prone regions with using restrained ductile iron pipe.

:: Capability of being cut and drilled.

;; Appropriate for mountainous areas due to no need for special bedding and precise consideration of soil compaction and trench depth.

;; High working pressure compared to other types of pipes .

:: Easy leakage detection as pipes are made of metal.

:: No need to particular equipment and skilled workforce for assembling and pipeline installation (Due to application of push-in fittings).

Applications of ductile iron pipes

:: Drinking water transfer and distribution lines

:: Industrial and domestic sewage networks

:: Sea water transmission system

:; Irrigation and drainage networks

:: Water treatment plant networks

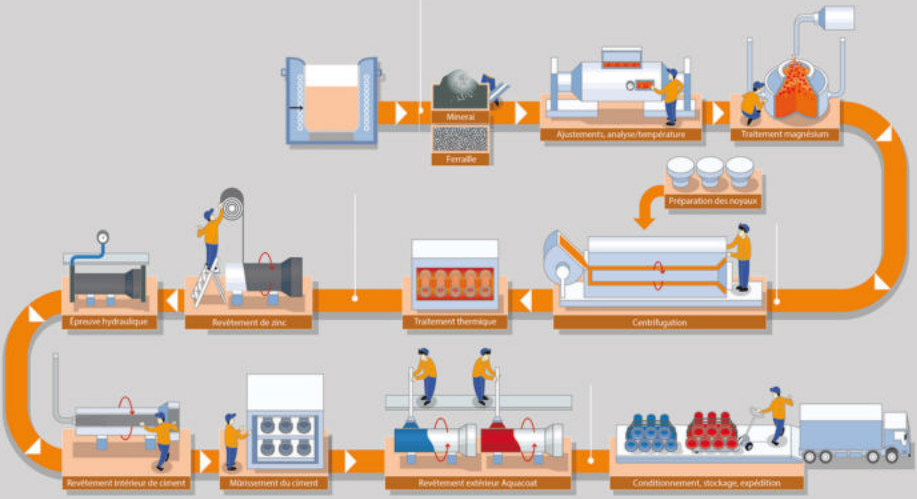
:: Firefighting systems

:: Artificial snow making machine

Ductile iron pipe manufacturing process

IKITURK Company manufactures ductile iron pipes by means of centrifugal casting method. This method is among the most famous of its kind in the world, invented in 1920 by a Brazilian engineer, Dimitri De Lavaud, for production of ductile iron pipes under pressure.

In centrifugal casting, a permanent mold is rotated around its axis at high speed as the molten metal is poured. The molten metal is centrifugally thrown towards the inside mold's wall, where it solidifies after cooling then as cast pipe is extracted from mold. The pipes are heat treatmented in a continuous anneling furnace to change the metal matrix from pearlite to ferrite in order to reduce hardness and improve its ductility and mechanical properties. This process releases the pipe internal stresses and improves grinding and cutting capability.


Minerai
Ferraille
Ajustements, analyse/température
Traitement magnésium
Préparation des noyaux
Centrifugation
Traitement thermique
Revêtement de zinc
Épreuve hydraulique
Revêtement intérieur de ciment
Mûrissement du ciment
Revêtement extérieur Aquacoat
Conditionnement, stockage, expédition

Pressure classification according to ISO 2531:2009 standard

Components with flexible joints shall be classified by the allowable operating pressure (PFA) in bar, prefixed by the letter C. Components with flanged joints shall be classified by the PN number of the flange.

Allowed component pressure relationships shall be the following:

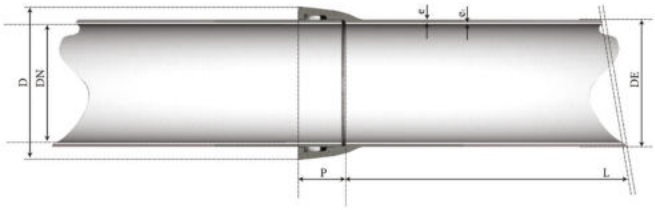
a) Allowed operating pressure (PFA) = C, in bar

b) Allowed maximum operating pressure (PMA) = 1.2 × PFA, in bar

c) Allowed site test pressure (PEA) = (1.2 × PFA) + 5, in bar

The allowed pressures within a pipeline system shall be limited to the lowest pressure classification of all components within the system.

1- PFA: allowable operating pressure
2- PMA: maximum allowable operating pressure
3- PEA: allowable site test pressure



External diameter (DE)

The external diameters (DE) of pipes and fittings spigot end are circumferentially measured. Regarding the possibility that the pipes purchased by a customer turn oval during transportation and maintenance, it is necessary to fulfill the procedure of

Internal diameter (DN)

The nominal values of internal diameters of centrifugally cast pipes, expressed in millimetres, are approximately equal to "DN" of ductile iron pipe after the application of internal lining.

Wall Thickness

Wall thickness is one of the most effective parameters to specify the pressure that pipes can withstand. The basis for calculating the wall thickness is Barlow equation: $t = \frac{PD}{2S}$

ISO 16631: 2016 | EN545: 2010 | ISO 2531: 2009

EN545: 2007 | ISO 2531: 1998

Wall thickness based on ISO 2531:1998/ EN 545: 2007 Standards

The nominal iron wall thickness of pipes shall be calculated as a function of the nominal size, DN, by the following formula;

e= K(0.5+ 0.001DN)

Where "e" is the nominal wall thickness, in millimeters;

"DN" is nominal size

"K" is a coefficient chosen from among such whole numbers as 7, 8, 9, 10, 11, 12, ... used for classification of thickness.

According to this standard, the "K=9" is the most typical thickness class for water supply application.

Product	Thickness	Tolerance
Centrifugal pipes	*6*	*-1/3*
	>6	*-(0/001+1/3 DN)*
Fittings	*7*	*-2/3*
	>7	*-(2/3+0/001 DN)*

Wall thickness based on ISO 2531: 2009 / EN545: 2010

According to these standards, the manufactured pipes are of type C and the number adjacent to it (prefixed by the letter C) indicates the pipe's operating pressure. The minimum wall thickness for pipes, emin , shall be determined using the following equation:

$$e_{min} = \frac{PFA \times SF \times DE}{20R_m + (PFA \times SF)}$$

wheree_{min}: is the minimum pipe wall thickness, in millimeters;

PFA: is the allowed operating pressure, in bar;

SF: is the safety factor (=3);

DE: is the nominal pipe external diameter, in millimetres;

R_m: is the minimum tensile strength of ductile iron, in mega pascals (R_m = 420 MPa);

The nominal thickness is as follow:

Product	Thickness
Centrifugal pipes	$e_{norm} = e_{min} + (۱/۳+۰/۰۰۱ DN)$
Fittings	$e_{norm} = e_{min} + (۲/۳+۰/۰۰۱ DN)$

Note: The minimum thickness of pipe and fittings should not be less than 3 mm.

Pipe Length

Various types of ductile iron pipes are produced and offered according to the table below and the standard length of 6 meters. When a total leng this ordered, IKITURK is able to supply the number of pipes according to the total required length.

Based on the relevant standard, no more than 10% of pipes in each size could be shorter than the standard length. However, pipes cut for testing in factories are exceptions from this rule and are considered standard.

In the following table, the tolerance of pipe's length is presented:

Dimensions in millimeters

Type of casting	Tolerance	
	ISO 2531 :2009	ISO 2531 :1998
Socket and spigot pipes (full (length or shortened	-30 +70	±30
Fittings for socket joints	±20	±20
Pipe and fittings for flanged joints	±10*	±10*

*By agreement between manufacturer and purchaser, smaller tolerances are possible, but not less than ± 3 mm for DN≤ 600 and ± 4 mm for DN > 600.

Straightness of pipes

Pipes shall be straight, with a maximum deviation of 0.125 % of their length.

Material characteristics

Tensile properties

Laboratory under the ISO / IEC 17025 license with the most advanced laboratory equipment. Pipes, fittings and accessories made of ductile iron have the tensile properties given in following table.

Pipes and fittings manufactured by IKITURK are mechanically tested for tensile strength, hardness, etc. in compliance with ISO 2531 international standard.

Type of casting	Minimum percentage elongation after fracture		Minimum tensile strength Rm MPa
	DN 1100-1200	DN 80-1000	DN 80-1200
pipes centrifugally cast	7	10	420
Fitting and accessories	5		

Brinell hardness

The hardness of ductile iron pipe shall be such that they can be cut, tapped, drilled and/or machined with standard tools.

The Brinell hardness shall not exceed 230 HBW for centrifugally cast pipes and 250 HBW for fittings and accessories.

For components manufactured by welding, a higher Brinell hardness is allowed in the heat-affected zone (HAZ) of the weld.

Welding defective pipes

According to ISO 2531 standard, when necessary, pipes and fittings may be repaired, by welding or other methods, to remove surface imperfections and localized defects which do not affect the entire wall thickness.

Works leak tightness test of pipes and fittings

Pipes and fittings are tested in accordance with international standard ISO 2531 and EN 545. The hydrostatic test is carried out on all pipes and fittings before performing external and internal coatings, except for the metallic zinc coating of pipes which may be performed before the test.

Pipes and fittings are subjected to a hydrostatic test for a duration of at least 15 seconds at the minimum internal test pressures given in following table.

The required test pressure for pipe and fittings based on ISO 2531 international standard

Pressure in bar:

DN	pipe		Fittings
	Class	ISO 2531 :1998	all working classes
80-300	K=9	50	25
350-600		40	16
700-1000		32	10
1100-1200		25	10

Pressure in bar:

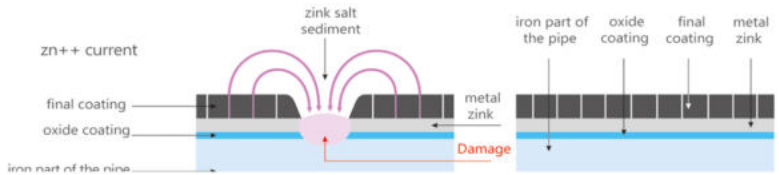
DN	pipe		Fittings
	Class C	ISO 2531 :2009	all working classes
80-300	C40	40	25
350-600	C30	30	16
700-1000	C25	25	10

It should be mentioned that all the fittings in IKITURK Company are subjected to hydrostatic test following the casting process. As for other tests in factory, hydrostatic test can also be done at the presence of customer.

Pure metallic zinc (99.99% Zn)

Zinc coating is one of the most common types of coating used for ductile iron pipes, which is applied along with the final coating. Zinc is an active element in electrochemical table acting as a sacrificial anode in case of occurring damage on coating and prevents from rusting the metal inner layer. Relying on this specification, the external surface of ductile iron pipes are coated using thermal spray method according to ISO 8179-1 standard.

The minimum amount of zinc coating on external surface of pipe is 200 gr/m2. This amount should be not less than 180 gr/m2locally. For less corrosive soils and upon the agreement between customer and producer, the amount of zinc coating could decrease to 130 gr/m2 (This amount should be not less than 110 gr/m2locally).



In the above picture, the protection mechanism of metal zinc coating is presented schematically.

Bituminous coating

In order to increase resistance against corrosion of soil and other environmental factors, bituminous paint with minimum thickness of 70 microns is sprayed uniformly on the outer surface of pipes (This thickness should be not less than 50 microns locally).

Bitumen-Aluminum coating (20% max.)

In special cases when there is a request for higher corrosion resistance, like using pipes against UV emission, such as in above-ground pipelines, instead of bitumen final coating, there is a possibility to use bitumen coating with a maximum of 20% aluminum.

Zinc-Aluminum coting (Zn-15%Al)

Based on research done, Aluminum can rendera passive film on iron surface while metal zinc can result in galvanic protection. Thus, a coating of Zinc-Aluminum alloy (Zinc-15% Aluminum) is able to act quite properly as a coating for ductile iron pipes working on various environments. The presence of two metals simultaneously, leads to combine their advantage which eventually forms a resistance and powerful coating against corrosion.

In order to reach protective characteristic according to ISO 8179-1, a Zn-Al coating has to be applied with amount of at least 400 gr/m2 on the external pipe's surface.

Special coatings

Epoxy

Epoxy paint is a two-components coating based on special epoxy resin and polyamide hardener. Appling a single layer of epoxy coating, according to international standard ISO 8179, on the surface of pipe which forms a resistant film against corrosive agents. After completion of the epoxy paint reaction, it makes a very hard surface that shows great resistant to scratches, abrasion and chemicals. Epoxy paint coating is applied on the surface of ductile iron pipes.

This coating can protect the inner and outer surfaces against corrosive and abrasive factors in extreme environmental conditions. Because of the diversity of epoxy basic materials, this coating has gained a large variety of qualities and functions. IKITURK is ready to coat various pipes by different epoxy paints according to customer demand.

Some advantages

:: High resistance against chemicals and corrosives

:: Proper mechanical and thermal characteristics (high temperature resistance)

:: High stability and adhesion

:: Great resistance against abrasion

:: Electrical insulation

Cement mortar lining

One of the most common lining of ductile iron pipe is cement mortar. Self-healing is considered as one of the unique advantages of this lining. Cement mortar lining is applied by centrifugal method than curing is carried out in an appropriate temperature and humidity condition. From among its advantages, one can mention high density, minimum roughness and adequate adhesiveness. The smooth internal surface can cause higher flow rate and less pressure drop and as a result raise hydraulic efficiency of water.

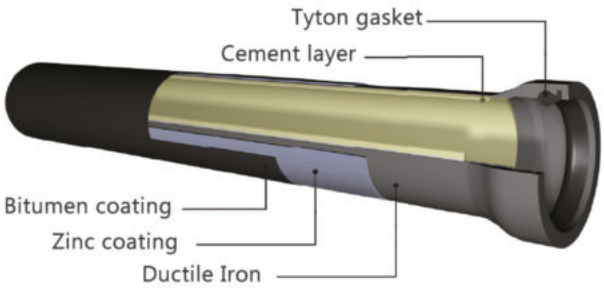
Characteristic of cement layer in accordance with ISO 4179 are given in this table

Dimensions in millimeters

DN	lining thickness		Maximum crack width (potable water)	Maximum crack width (sewerage pipeline)
	Minimum (in one point)	Nominal		
80-300	*2*	*3*	*0.8*	*0.6*
350-600	*3*	*5*	*0.8*	*0.7*
700-1200	*3.5*	*6*	*1*	*0.8*

Clogging the cracks and microscopic pores

When cement lined ductile iron pipe is filled with water, a portion of water permeates the pores of lining, thus freeing a considerable amount of calcium hydrate. Calcium hydrate reacts with calcium bicarbonate in the water to precipitate calcium carbonate, which tends to clog the pores of the mortar and increase the strength of cement layer.



Different cement lining

IKITURK could line its pipes with different kinds of cement layers, according to ISO 2531 or EN 545 standards, by customer's request.

:: Portland Cement (anti-sulphate)

:: Blast furnace slag cement

:: High Aluminum cement

:: Characteristic of each type of cement based on EN 545, are given in the following table:

Density in mg/Lit

High Aluminum cement	Anti-sulphate and blast furnace slag cements	Portland cement	Water characteristics
4	5/5	6	Minimum pH
Unlimited	15	7	Corrosive CO2
Unlimited	3000	400	$SO4^{-}$
Unlimited	500	100	Mg^{++}
Unlimited	30	30	$NH4^{+}$

Markings

All the pipes and fittings are durably and legibly marked according to EN 598, EN 545, ISO 2531and ISO 16631 and contain following information:

:: A reference to international standard

:: The manufacturer's name or mark; i.e. IKITURK

:: Identification of the year of manufacture;

:: Identification as ductile iron;

:: Nominal diameter (DN)

:: The PN rating of flanges, if applicable;

:: The C pressure class of socket and spigot pipe, according to ISO 2531:2009, EN 545:2010

Polyethylene encasement

Polyethylene encasement are complementary coatings for ductile iron pipes that according to ISO 8180 are used as a cost-effective coating for protecting ductile iron pipelines against corrosive soil.

It should be noted that under normal condition some humidity from soil could penetrate into this encasement. Although the humidity trapped there could at first be corrosive, but the oxygen content under the encasement soon comes to end and leading oxidation process to stop.

For more information on maintenance condition, size, installation procedure, etc. see "installation" section in this catalogue.

Push-on Joint (Tyton)

One of the most common type of joints used for ductile iron pipes is Push-On joint (Tyton) which can be assembled easily and quickly. This joint includes a rubber gasket with a special material and design that placed inside the socket of pipe so that the next pipe's spigot could fit into by pressure and get assembled and sealed at the same time. These rubber gaskets are made of EPDM according to ISO 4633 standard.

Size (DN)	Maximum angular deviation (degree)
80-150	5
200-300	4
350-600	3
700-1200	2

Push-on joint advantages

Easy and fast installation, without special equipment and expert manpower

:: Proper angular deflection

:: Not require welding and using bolt and nut

:: Perfect sealing

Dimension and weights specifications of ductile iron pipes according to EN 545:2007 K9 class

Ductile iron pipe with push-in joint (Tyton)
According to EN 545: 2007 K Class

DN	External diameter (DE)		Pipe length (L)	Socket Length (P)	Socket external diameter (D)	Nominal thickness (e)	Nominal Cement thickness (e_1)	Pipe weight with internal cement and external coatings
	(mm)		(m)	(mm)	(mm)	(mm)	(mm)	(Kg)
80	Official	98	6	85	142	6/0	4	90
100	Official	118	6	88	164	6/0	4	111
125	Official	144	6	91	196	6/0	4	137
150	Official	170	6	94	217	6/0	4	163
200	Official	222	6	100	278	6/3	4	225
250	Official	274	6	105	332	6/8	4	296
300	Official	326	6	110	388	7/2	4	375
350	Official	378	6	110	442	7/7	5	474
400	Official	429	6	110	497	8/1	5	567
450	Official	480	6	115	551	8/6	5	669
500	Official	532	6	120	606	9/0	5	774
600	Official	635	6	120	715	9/9	5	1008
700	Official	738	6	150	828	10/8	6	1299
800	Official	842	6	160	940	11/7	6	1596
900	Official	945	6	175	1044	12/6	6	1934
1000	Official	1048	6	185	1156	13.5	6	2206
1100	Official	1152	6	200	1264	14.4	6	2632
1200	Official	1255	6	215	1314	15.3	6	3058

All dimensions except pipe length are presented in mm (millimeter) and kilogram (kg) for weights. Additionally, dimensions and weighs are mentioned without tolerance consideration. All weighs are calculated based on thickness class (K9). In the case of other thickness classes, please contact IKITURK technical experts.

Dimension and weights specifications of ductile iron pipes according ISO 2531:1998 K9 class

Ductile iron pipe with push-in joint (Tyton)
According to ISO 2531: 1998 K Class

DN	External diameter (DE)		Pipe length (L)	Socket Length (P)	Socket external diameter (D)	Nominal thickness (e)	Nominal Cement thickness (e_1)	Pipe weight with internal cement and external coatings
	(mm)		(m)	(mm)	(mm)	(mm)	(mm)	(Kg)
80	Official	98	6	85	142	6/0	3	87
100	Official	118	6	88	164	6/0	3	106
125	Official	144	6	91	196	6/0	3	132
150	Official	170	6	94	217	6/0	3	157
200	Official	222	6	100	278	6/3	3	217
250	Official	274	6	105	332	6/8	3	286
300	Official	326	6	110	388	7/2	3	362
350	Official	378	6	110	442	7/7	5	474
400	Official	429	6	110	497	8/1	5	567
450	Official	480	6	115	551	8/6	5	669
500	Official	532	6	120	606	9/0	5	774
600	Official	635	6	120	715	9/9	5	1008
700	Official	738	6	150	828	10/8	6	1299
800	Official	842	6	160	940	11/7	6	1596
900	Official	945	6	175	1044	12/6	6	1934
1000	Official	1048	6	185	1156	13.5	6	2206
1100	Official	1152	6	200	1264	14.4	6	2632
1200	Official	1255	6	215	1314	15.3	6	3058

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Dimension and weights specifications of ductile iron pipes according ISO 2531:2009 C Class (Preferred class)

Ductile iron pipe with push-in joint (Tyton)
According to ISO 2531: 2009 C Class (Preffered Class)

DN	External diameter (DE)	Pipe length (L)	Preferred pressure class	Socket Length (P)	Socket external diameter (D)	Nominal thickness (e)	Nominal Cement thickness (e_1)	Pipe weight with internal cement and external coatings
	(mm)	(m)	(bar)	(mm)	(mm)	(mm)	(mm)	(Kg)
80	Official 98	6	C40	85	142	4/4	3	69
100	Official 118	6	C40	88	164	4/4	3	84
125	Official 144	6	C40	91	196	4/5	3	106
150	Official 170	6	C40	94	217	4/5	3	126
200	Official 222	6	C40	100	278	4/7	3	172
250	Official 274	6	C40	105	332	5/5	3	243
300	Official 326	6	C40	110	388	6/2	3	321
350	Official 378	6	C30	110	442	6/3	5	410
400	Official 429	6	C30	110	497	6/5	5	479
450	Official 480	6	C30	115	551	6/9	5	568
500	Official 532	6	C30	120	606	7/5	5	672
600	Official 635	6	C30	120	715	8/7	5	910
700	Official 738	6	C25	150	828	8/8	6	1110
800	Official 842	6	C25	160	940	9/6	6	1362
900	Official 945	6	C25	175	1044	10/6	6	1685
1000	Official 1048	6	C25	185	1156	11/6	6	2011
1100	Official 1152	6	C25	200	1264	12/6	6	2362
1200	Official 1255	6	C25	215	1314	13/6	6	2798

All dimensions except pipe length are presented in mm (millimeter) and kilogram (kg) for weights. Additionally, dimensions and weighs are mentioned without tolerance consideration. All weighs are calculated based on thickness class (K9). In the case of other thickness classes, please contact IKITURK technical experts.

Dimension and weights specifications of ductile iron pipes according EN 545: 2010 C Class(Preferred class)

Ductile iron pipe with push-in joint (Tyton)
According to EN 545: 2010 C Class (Preffered Class)

DN	External diameter (DE)	Pipe length (L)	Preferred pressure class	Socket Length (P)	Socket external diameter (D)	Nominal thickness (e)	Nominal Cement thickness (e_1)	Pipe weight with internal cement and external coatings
	(mm)	m	(bar)	(mm)	(mm)	(mm)	(mm)	(Kg)
80	Official 98	6	C40	85	142	4/4	4	72
100	Official 118	6	C40	88	164	4/4	4	88
125	Official 144	6	C40	91	196	4/5	4	111
150	Official 170	6	C40	94	217	4/5	4	132
200	Official 222	6	C40	100	278	4/7	4	181
250	Official 274	6	C40	105	332	5/5	4	253
300	Official 326	6	C40	110	388	6/2	4	333
350	Official 378	6	C30	110	442	6/3	5	410
400	Official 429	6	C30	110	497	6/5	5	479
450	Official 480	6	C30	115	551	6/9	5	568
500	Official 532	6	C30	120	606	7/5	5	672
600	Official 635	6	C30	120	715	8/7	5	910
700	Official 738	6	C25	150	828	8/8	6	1110
800	Official 842	6	C25	160	940	9/6	6	1362
900	Official 945	6	C25	175	1044	10/6	6	1685
1000	Official 1048	6	C25	185	1156	11/6	6	2011
1100	Official 1152	6	C25	200	1264	12/6	6	2362
1200	Official 1255	6	C25	215	1314	13/6	6	2798

All dimensions except pipe length are presented in mm (millimeter) and kilogram (kg) for weights. Additionally, dimensions and weighs are mentioned without tolerance consideration. All weighs are calculated based on thickness class (K9). In the case of other thickness classes, please contact IKITURK technical experts.

Non-preferred Pipes

DN	Peripheral Diameter	Pipe's body nominal Thickness (mm)						
		Class 20	Class 25	Class 30	Class 40	Class 50	Class 64	Class 100
80	98				4/4	4/4	4/4	4/8
100	118				4/4	4/4	4/4	5/5
125	144				4/5	4/5	4/8	6/5
150	170				4/5	4/5	5/3	7/4
200	222				4/7	5/4	6/5	9/2
250	274				5/5	6/4	7/8	11/1
300	326			5/1	6/2	7/4	8/9	12/9
350	378		5/1	6/3	7/1	8/4	10/2	14/8
400	429		5/5	6/5	7/8	9/3	11/3	16/5
450	480		6/1	6/9	8/6	10/3	12/6	18/4
500	532		6/5	7/5	9/3	11/2	13/7	20/2
600	635		7/6	8/7	10/9	13/1	16/1	23/8
700	738	7/3	8/8	9/9	12/4	15	18/5	27/5
800	842	8/1	9/6	11/1	14	16/9	21	
900	945	8/9	10/6	12/3	15/5	18/8	23/4	
1000	1048	9/8	11/6	13/4	17/1	20/7		
1100	1152	10/6	12/6	14/7	18/7	22/7		
1200	1255	11/4	13/6	15/8	20/2			

Preferred pressure class

Non-preferred pressure class

Note: IKITURK Company has the capability of producing non-preferred pipes in C class according to ISO 2531-2009 standard based on customer's request.

Ductile iron pipe with earthquake and subsidence resistant joint (R.J.Pipe)

R.J.Pipe is the IKITURK 's first generation of restrained joint. It is an advanced design of Push-On flexible restrained joint whose it's locking system prevents from pipe separation while earthquake or subsidence. Therefore, these types of pipes are known as earthquake resistant joint.

It is noteworthy that increased safety in water supply networks and significant decrease in water-loss are among the most important advantages of using such pipes.

Based in ISO 16134 standard, R.J Pipe has following technical specifications

joint deflection angle	Expansion/ contraction performance (Axial displacement)	slip-out resistance	Parameter
M_3	S_3	A	R.J.Pipe Class
Less than 7.5°	Less than 0.5% L	More or 3D kN	Component performance

L is the component lenght, in millimeters (mm).
D is the nominal diameter of pipe, in millimeters (mm).
Using restrained joint leads to the integration of pipeline and distribution of stress and strain that is produced among different components of pipeline.

One of the main specification of this kind of joint is ease of assembly and disassembly without bolt and nut.

IKITURK Company is equipped with special laboratories for carrying out exclusive tests related to the R.J.Pipe's performance according to EN 545 and ISO 10804 standards. After a new joint design or applying an effective modification on the joint, by using these advanced facilities, IKITURK is able to performs all the operational and performance tests on the joint to verify design specification.

Details of operational tests performed for the purpose of identifying the proper joint performance and also determining the technical parameters of a restrained joint are described as following table:

Items	Method	Conditions	Position	Objects	References
1	Positive internal hydrostatic Pressure	Test Pressure: (1.5 PFA+5 bar) Test Duration: 2hr No visible leakage	With Shear load: (50DN) / Deflected	To prove the joint's capacity to withstand the hydraulic pressure	EN 545 ISO 2531 ISO 10804
2	Negative Internal Pressure	Test Pressure: -0.9 bar Test Duration: 2hr Maximum Pressure change during the test: 0.09 bar	With Shear load: (50DN) / Deflected	To prove that the joint is airtight	EN 545 ISO 2531 ISO 10804
3	Positive External Hydrostatic Pressure	Test Pressure: 2 bar Test Duration: 2hr No visible leakage	With Shear load (50DN)	To prove that the joint is resistant to ground water	EN 545 ISO 2531 ISO 10804
4	Cyclic Internal Hydrostatic Pressure	24000 Cycles PMA to PMA-5 No Visible Leakage	With Shear load (50DN)	To prove the joint fatigue performance	EN 545 ISO 2531 ISO 10804

0.9 bar below atmospheric pressure (approximately 0.1 barof absolute pressure)

Additionally, the slip-out resistance of R.J.Pipe's joint is measured based on ISO 16134 Standard using special devices.

This joint is selected as one of the best "earthquake resistant joint by the "American's association of ductile iron pipes" in an scientific article titled:

"R.W. Bonds, Ductile iron pipe fittings and their uses" March2017.

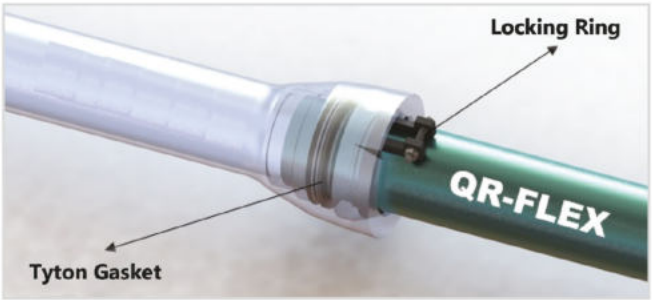
Applications

:: Suitable for earthquake regions and unstable soils, without concrete thrust blocks in the joint place.
:: Suitable for trenchless application systems
:: Suitable for bridge crossing, horizontal directional drilling, highway and railroad crossing

Advantages

:: Suitable Axial displacement and angular deflection with perfect sealing
:: Easy and fast installation without nut and bolt
:: High resistance against hydraulic forces

Quake-resistant ductile iron pipe (Q.R.Flex)

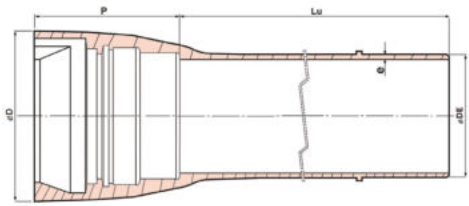


Q.R.Flex is the IKITURK 's newest product. It is a push-on flexible restrained joints with same assembly force similar to tyton joint. One of the unique specifications of Q.R.Flex pipe is its suitable angular deflection and axial movement.

QR-Flex Pipes provide flexible restrained push-on joints for 150 to 250mm Ductile Iron pipe. The QR-Flex Restrained Joint has a working pressure rating equivalent to the working pressure rating of the parent pipe, with a maximum restrained joint working pressure rating of 40bar.Q.R.Flexpipe utilize the conventional Tyton gasket for sealing, that it makes installation much easier and faster.

A ductile iron locking ring, inserted through a slot in the bell face, provide a positive axial lock between the bell interior surface and a retainer weldment on the spigot end of the pipe.

Q.R.Flex resistant joint provides a chain structure along the pipeline so it can distributes the created forces in different points along the pipeline.



Dimensions and weighs characteristics of Q.R Flex ductile iron pipes according to ISO 2531:1998 K9 Class

DN	External diameter (DE)	Pipe length (Lu)	Socket Length (P)	Socket external diameter (D)	Nominal thickness (e)	Pipe weight with internal cement and external coatings
	(mm)	(m)	(mm)	(mm)	(mm)	(Kg)
150	Official 170	6	155	227	6/0	160
200	Official 222	6	163	295	6/3	224
250	Official 274	6	165	350	6/8	293

All dimensions except pipe length are presented in mm (millimeter) and kilogram (kg) for weights. Additionally, dimensions and weighs are mentioned without tolerance consideration. All weighs are calculated based on thickness class (K9). In the case of other thickness classes, please contact IKITURK technical experts.
Cement thickness in various sizes is similar to Tyton joint.

Dimensions and weighs characteristics of Q.R Flex ductile cast iron pipes according to ISO 2531:2009 C Class

DN	External diameter (DE)	Pipe length (Lu)	Preffered Pressure Class	Socket Length (P)	Socket external diameter (D)	Nominal thickness (e)	Pipe weight with internal cement and external coatings
	(mm)	(m)	(bar)	(mm)	(mm)	(mm)	(Kg)
150	Official 170	6	C40	155	227	4/5	134
200	Official 222	6	C40	163	295	4/7	190
250	Official 274	6	C40	165	350	5/5	264

All dimensions except pipe length are presented in mm (millimeter) and kilogram (kg) for weights. Additionally, dimensions and weighs are mentioned without tolerance consideration. All weighs are calculated based on the preferred pressure class. In the case of non-preferred pressure classes, please contact IKITURK technical experts.
Cement thickness in various sizes is similar to Tyton joint.

Water distribution and transmission pipelines during their useful lifetime are subjected to numerous types of pressure.
This naturally includes standard service pressure, but also the following

:: Day/Night pipe pressure cycles;
:: Water hammer (surge);
:: Pressure drops;
:: External pressure from the earth, ground water;
:: Period without pressure prior to commencement of operations;

In each of these situations, the joints are subjected to specific types of stress by named Thrust Forces. For this reason, all joints for ductile iron pipelines are designed and tested in accordance with strict methods in a unique accredited laboratory.

Q.R Flex joint are operationally tested according to ISO 10804 and EN 545 standards similar to R.j.Pipe.

The description of performance tests used to identify the proper function of Q. R. Flex as well as technical parameters of a joint are as follow:

Items	Method	Conditions	Position	Objects	References
1	Positive internal hydrostatic Pressure	Test Pressure: (1.5 PFA+5 bar) Test Duration: 2hr No visible leakage	With Shear load: (50DN)	To prove the joint's capacity to withstand the hydraulic pressure	EN 545 ISO 2531 ISO 10804
			Deflected		
2	Negative Internal Pressure	Test Pressure: -0.9 bar Test Duration: 2hr Maximum Pressure change during the test: 0.09 bar	With Shear load: (50DN)	To prove that the joint is airtight	EN 545 ISO 2531 ISO 10804
			Deflected		
3	Positive External Hydrostatic Pressure	Test Pressure: 2 bar Test Duration: 2hr No visible leakage	With Shear load (50DN)	To prove that the joint is resistant to ground water	EN 545 ISO 2531 ISO 10804
4	Cyclic Internal Hydrostatic Pressure	24000 Cycles PMA to PMA-5 No Visible Leakage	With Shear load (50DN)	To prove the joint fatigue performance	EN 545 ISO 2531 ISO 10804

0.9 bar below atmospheric pressure (approximately 0.1 barof absolute pressure)

In addition, IKITURK studies all its new joints using scientific finite element methods similar to those used in aeronautical and car industries. These design methods and tests guarantee unbeatable durability and reliability.

Application

:: Suitable for all types of soils and grounds especially regions having unstable soil or marshes
:: Regions where installation of inhibitory concrete block is impossible
:: Suitable for trenchless application systems especially horizontal directional drilling
:: In high-steep and hilly regions
:: On faults and earthquake-prone regions

Advantages

:: Improving pipeline resistance against thrust forces and joint protrusion and creating a chain structure in pipeline
:: Reduction execution costs due to needing no shock-absorbing and cement thrust blocks.
:: Easy and quick assembly operation without any glands, bolts and nuts
:: Increase the water networks safety against dangers due to earthquake and land sliding.
:: Considerable reduction of loss-water in transferring pipeline and distribution networks

Schematic of horizontal directional drilling (HDD)

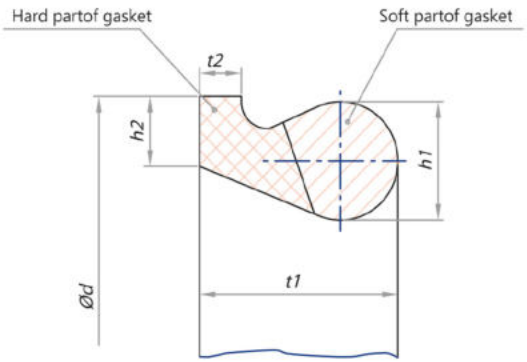
According to ISO 16134 standards, Q.R Flex pipe has following technical specifications:

QR-Flex Functional specifications acc to ISO16134

joint deflection angle	Expansion/ contraction performance (Axial displacement)	slip-out resistance	Parameter
M_3	S_3	A	R.J.Pipe Class
Less than 7.5°	Less than 0.5% L	More or 3D kN	Component performance

L is the component lenght, in millimeters (mm)

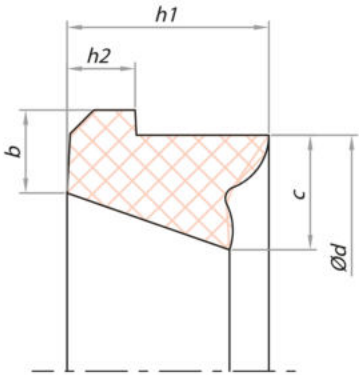
D is the nominal diameter of pipe, in millimeters (mm)



Rubber gasket for push-on joint (Tyton Pipes, R.J Pipes and Q.R. Flex Pipes)

DN	d	h1	h2	t1	t2	Weight
80	126	16	10	26	5	0/13
100	146	16	10	26	5	0/15
125	173	16	10	26	5	0/18
150	200	16	10	26	5	0/22
200	256	18	11	30	6	0/36
250	310	18	11	32	6	0/47
300	366	20	12	34	7	0/66
350	420	20	12	34	7	0/76
400	475	22	13	38	8	1/05
450	528	22	13	40	8	1/2
500	583	25	14	42/5	9	1/6
600	692	27	15	46/5	10	2/3
700	809	33/5	20	56/2	16	4/2
800	919	35/5	21	60/7	16	5/4
900	1026	37/5	22	66/25	18	7/4
1000	1133	39/5	23	70/75	18	8/7

All dimensions are presented in mm (millimeter) and kilogram (kg) for weights. Additionally, .dimensions and weighs are mentioned without tolerance consideration



Rubber gasket for push-on joint (Tyton Pipes, R.J Pipes and Q.R. Flex Pipes)

DN	d	h1	h2	t1	t2	Weight
1100	1217/7	26/3	63	21	35/9	7/3
1200	1326/2	28/1	68/2	23	38/8	9/5

Thin-walled Pipe (L. Pipe)

Introduction:

In recent years Polyethylene, PVC and GRP pipes have been used abundantly in drinking water supply systems

The competitors of such pipes in the field of drinking water distribution are metal pipes. Higher cost and weight of metal pipes make their transportation difficult and their low availability in comparison with polymer pipes in the market has led to their smaller share in drinking water distribution.

Thin-walled ductile iron pipes, L.Pipes, are a new generation of ductile iron pipes whose nominal diameter is based on external diameter (DN/OD) and match with polymeric pipes completely. In addition, they are manfuctured according to polymeric pipes standards. These pipes can be easily joined with PE and PVC pipes or even replaced with them in water distribution lines. On the other hand, the wall thickness of L.Pipe is relatively less than common tyton ductile Iron pipes. Thus, their use in drinking water distribution system is much more logical, engineered and economical due to the dramatic reduction in weight.

The special design of L.Pipe's joint allows suitable angular deviation to designers and contractors of pipe line. Moreover, the force required to transport and assemble the pipes relatively decreases comparing to common ductile iron pipes.

Given the unique characteristics of ductile iron such as inherent resistance against corrosion as well as the recognized advantages of ductile iron pipes such as good sterngth against imposed forces and pressures on pipeline, cheaper pumping cost regarding less current drop, less illegal branching, easier branching, absolutely less fracture and leakage and longer service life comparing to polymeric pipes, these types of pipes have become a suitable alternative for polymeric pipes.

Lower weight and easy transportation, reasonable cost and acceptable performance have made this type of pipe really acceptable among customers. Hanyco is proud to offer various types of fittings which are proper for all types of polymeric and L.pipes made of ductile cast iron. These fittings include: Spigot flange, silent flange, trap, tee, etc.

Applications

:: In regions with limited access to which it is rarely possible to carry pipes with usual weight

:: A suitable replacement for polymeric pipes in drinking water distribution network

:: The best choice in distribution lines with low working pressure

:: Applicable for repair and maintenance of polymeric pipe distribution networks

:: Capable of with standing higher external forces in comparison with polymeric pipes.

Standards

L.Pipe is designed, manufactured and tested according to ISO 16631 international standard and INSO 21376 national standard. Moreover, fittings applicable to L.pipe and polymeric pipes are designed and manufactured according to BS EN 12842 standard.

The inner lining of L.Pipe is anti-sulphate portland cement and is applied by centrifudal method according to ISO 4179 standard.

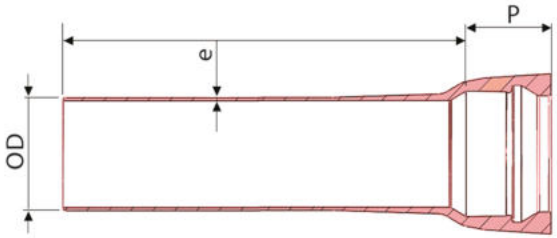
The outer coatings include zinc (with the minimum amount: 200 g/m2) and green epoxy/ polyurethane as finishing layer with minimum thickness of 70 microns according to ISO 8179 standard .

Equivalent diameter of L.Pipe in comparison with polymeric pipes:

Conformity of DN/OD size of L.Pipe and polymer pipes are given in the table below:

PE and PVC pipe size	LP Pipe
DN/OD 90	*DN/OD 90*
DN/OD 110	*DN/OD 110*
DN/OD 125	*DN/OD 125*
DN/OD 160	*DN/OD 160*
DN/OD 200	*DN/OD 200*

Dimension and weights specification of L.Pipe



Dimension and weights specification of L.Pipe according to ISO 16631

DN	External diameter DE	Pipe length L	Preferred Pressure	Socket Length P	Socket external diameter D	Maximum angular deflection	Nominal thickness e	Nominal Cement thickness e_1	Pipe weight with internal cement lining and external coatings
	(mm)	(m)	(Bar)	(mm)	(mm)	Degree	(mm)	(mm)	(Kg)
90	nominal *90*	*6*	*C25*	*84*	*127*	*6*	*3*	*3*	*47*
110	nominal *110*	*6*	*C25*	*87*	*148*	*6*	*3*	*3*	*58*
125	nominal *125*	*6*	*C25*	*92*	*164*	*6*	*3*	*3*	*67*
160	nominal *160*	*6*	*C25*	*97/5*	*202*	*6*	*3/2*	*3*	*90*
200	nominal *200*	*6*	*C25*	*108*	*247*	*6*	*3/4*	*3*	*121*

All dimensions except pipe length are in mm and weights are in Kg. Dimensions and weights are mentioned without tolerance consideration.

Advantages

:: Decrease in water leakage and waste in network due to use of polymeric pipe

:: Elimination of the limitation of maintenance and storage in open area of polymeric pipe

:: Much easier storage and transfer compared to polymeric pipes

:: Prevention of transferring dangerous chemical components to the drinking water

Saving the shipping cost of pipes from the factory

:: Easy installation, usage and cutting in customer's site

:: Compatibility with environment and its relevant requirements

:: Easy leakage tracing due to conductivity of pipe body

:: Proper angular deflection up to 6 degrees

:: Impossibility of illegal branching

:: A green product with high scrab value

:: Less fracture in distribution network

:: Less repair and maintenance

Performance of the L.Pipe

L.Pipes joint is designed and tested in accordance with strict methods in a unique accredited laboratory. The table below gives the details of operational tests that were run on the L.Pipe joint.

Items	Method	Conditions	Position	Objects	References
1	Positive internal hydrostatic Pressure	Test Pressure: (1.5 PFA+5 bar) Test Duration: 2hr No visible leakage	With Shear load: (50DN)	To prove the joint's capacity to withstand the hydraulic pressure	EN 545 ISO 2531 ISO 10804
			Deflected		
2	Negative Internal Pressure	Test Pressure: -0.9 bar Test Duration: 2hr Maximum Pressure change during the test: 0.09 bar	With Shear load: (50DN)	To prove that the joint is airtight	EN 545 ISO 2531 ISO 10804
			Deflected		
3	Positive External Hydrostatic Pressure	Test Pressure: 2 bar Test Duration: 2hr No visible leakage	With Shear load (50DN)	To prove that the joint is resistant to ground water	EN 545 ISO 2531 ISO 10804

L.Pipe fittings

For the purpose of completing a pipeline, various types of L.pipes fittings are manufactured by IKITURK Company.

The sockets are designed in a manner which makes the join to polymeric pipes and L. Pipes easy.

The angular deviation of L.Pipe fittings is about 6 degrees, making the design and installation of pipeline very easy.

List of compatible L.Pipe fittings with polyethylene pipes.

Row	Fitting	**Fitting**
1	Collar	Collar
2	All types of Bends (11/25° , 22/5°. 45°. 90° and Duckfoot)	Bends (11/25° , 22/5° , 45° , 90° and Duckfoot)
3	All types of Tees (All socket tee, Double socket with flange tee, etc.)	Tees (All socket tee, Double socket with flange tee, etc)
4	Taper	Taper
5	Flanged Spigot	Flanged Spigot
6	Flanged Spigot	Flanged Socket

It is noteworthy that the amount of weight reduction in L.Pipe is 40 to 50 percent compared to common tyton ductile iron pipe.

Rubber gasket for L.Pipe

L. Pipe rubber gasket is designed in a way that is compatible with polymeric pipes. The special design of these gaskets makes the best sealing in the place of joint.

These gaskets are designed and manufactured according to international standard of ISO 4633.

Ductile iron fittings

One of the most important elements of a pipeline are fittings as they play a critical role in completion of a pipeline and changing its direction. Access to compatible fittings is considered as one of the main advantages of a pipe which encourages contractors to select and use a certain type of pipe.

IKITURK is the manufacturer of a wide range of fittings from DN 80 to DN 1200 mm by means of Lost Foam Casting (LFC) method with a capacity of 3000 tons per year for the first time in Iran.

IKITURK manufactures various types of fittings including Tyton fittings, R.J.Pipe fittings, Q.R.Flex fittings, Thin-walled-L.pipes fittings match to polymeric pipes, Integrated or loosed flange fittings, Bolted gland fittings in all types of tees, Bends, tapers, flanged spigot, flanged socket, etc.

It is possible to apply various internal and external coatings according to the table below:

Row	Internal lining	External coatings	Standard
1	Anti-sulphate portland cement	Metallic Zinc+ Bituminous paint or liquid Epoxy	ISO 8179
2	High-Alumina cement	Metallic Zinc+ Bituminous paint or liquid Epoxy	EN 598
3	Powder epoxy paint	Powder epoxy paint	EN 14901
4	Powder epoxy paint	Bituminous paint	ISI 8179

For more information about specifications of bolted gland and Integrated or loosed flange fittings, please contact IKITURK's experts.

For other lining and coatings, please contact IKITURK's experts.

Ductile iron pipe with puddle

Ductile iron pipe with Puddle, commonly known as Puddle Flange Pipe, is one of popular products of IKITURK. These pipes are mainly employed in pipelines to increase stability and resistance to implementing forces on pipe line structure. Puddles work as a preventive agent against hydraulic forces and help protect pipe line from forces caused by sudden changes in fluid pressure. Therefore, pipes with puddles are laid at the point where the pipe line is connected to the main water supply pipes such as pumping stations and powerhouses. In these cases, the pipe with puddle is planted inside the walls of a container attached to the valve. Moreever, using these pipes in cement blocks could result in more stability and strength in the pipe line over sloped area.

These pipes are manufactured in various lengths and types including Double flanged ductile iron pipe with puddle, Double spigot ductile iron pipe with puddle, Flanged spigot ductile iron pipe with puddle

The position of puddle can vary at customer request.

Sealing Rubber Gasket

The sealing rubber gaskets for ductile iron pipes, supplied by IKITURK . are made from EPDM according to ISO 4633 standard with the highest quality.

Advantages

:: Extremely strong and efficient flexible joint

:: Suitable for in ground or above ground applications

:: Standard Gaskets are manufactured from EPDM rubber providing improved performance over traditional natural rubber

:: High resistance to water, ozone, heat, sewerage, chloramines, UV, and abrasion

:: Joints can be deflected and permit axial movement to compensate for thermal expansion and contraction.

Characteristics and technical specifications of this sealing rubber gasket are given in the table below:

Technical specifications	
Hardness-hard area (shore-A)	5 85+-
Hardness-sealing area (shore-A)	55+-5
Density (gr/cm3)	0.86
Tensile strength	Good
Compression-set	Good
Ozone resistance	Excellent
Stress relaxation	Good
Maximum operating temperature (C)	85

Lubricant

During installation at customer site a kind of soap based putty is used to facilitate assembly of pipes that is provided by IKITURK Company. This material is nontoxic, washable, and without destructive effect on the gaskets.

⃠ **Note:** Due to destructive effect of oil based lubricants on gaskets, such material should not be used in assembly of pipes.

Manhole

:: Introduction

Manhole is generally used for cleaning, inspection and checking equipment, periodical maintenance, etc. The circular metal plates that are seen in streets are manhole lids. The most important function of manholes is to provide access point for different sections of the sewage network. Also, they are used to access underground cables in telecommunication systems.

Manholes are typically made of ductile or cast iron, concrete, composite, etc. Given the long lifespan of ductile iron, it is considered as one of the most cost-effective materials. Manholes are classified based on the applied force on them and the condition of usage.

One of IKITURK's products is Manhole made of ductile iron manufactured by a fully automatic lost foam casting production line. These manholes are designed and examined based on the simulations by finite element software and performance tests according to national and international standards.

Application

The appropriate class of a manhole top or a gully top to be used depends on the place of installation. Various places of installation have been divided into groups numbered 1 to 6, as listed below.

Group 1 (A Class): Areas that can only be used by pedestrians and pedal cyclists. (Maximum force allowed: 15 KN)

Group 2 (B Class): Pedestrian areas and comparable areas, car parks or car parking decks. (Maximum force allowed: 125 KN)

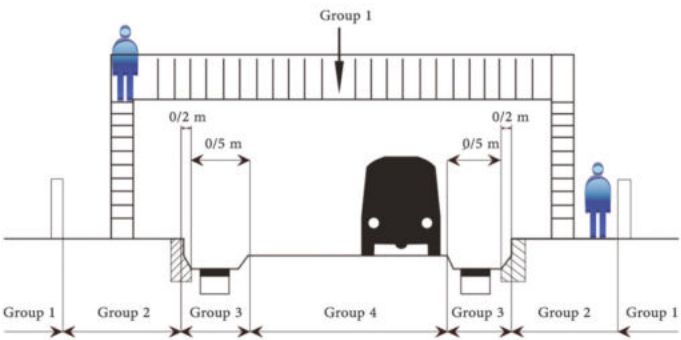
Group 3 (C Class): For gully tops, installed in the area of kerbside channels of roads which, when measured from the kerb edge, extends a maximum of 0,5 m into the carriageway and a maximum of 0,2 m into the pedestrian area. (Maximum force allowed: 250 KN)

Group 4 (D Class): Carriageways of roads (including pedestrian streets), hard shoulders and parking areas, for all types of road vehicles. (Maximum force allowed: 400 KN)

Group 5 (E Class): Areas imposing high wheel loads, e.g. docks, aircraft pavements. (Maximum force allowed: 600 KN)

Group 6 (F Class): Areas imposing particularly high wheel loads, e.g. aircraft pavements. (Maximum force allowed: 900 KN)

It is noteworthy that IKITURK produces ductile iron manhole in two different classes C250 and D400.



Group 5&6 are used at anchorages/harbour and airports.

Manhole Standards

1- EN124-1: 2015: Gully tops and manhole tops for vehicular and pedestrian areas: "Part-1: Definitions, classification, general principles of design, performance requirements and test methods".

2- EN 124-2:2015: Gully tops and manhole tops for vehicular and pedestrian areas: "Part-2: Gully tops and manhole tops made of cast Iron".

3- Iran national standard INSO 14976, "Gully tops and manhole tops for the vehicular and pedestrian area".

Technical specification of ductile iron manhole tops

Class	Type	Frame internal diameter	Frame external diameter	Frame weight (Kg)	Cover external diameter	Cover weight (Kg)	Cover height	Frame Height	Total weight (Kg)
C250	Heavy (H)	647	790	28	644	40	70	85	68
	Light (L)			25		32			57
D400	Heavy (H)	647	790	28	644	43	90		71
	Light (L)			25		34			59

* All dimensions in mm

* Weight tolerance is 0 to +2 Kilograms.

Advantages of ductile iron manhole

:: Suitable for use in regions with harsh environmental conditions

:: Suitable for regions with high traffic loads and high-speed transportation.

:: Long service life and high strength.

:: High resistance against corrosion

:: Adequate resistance against shock.

:: A green product with high scrab value

Product safety

To increase the product safety while the top is closing, it has been designed in a way that it closes to about 60° and then halts. To fully close the lid, it should be pulled forward and fully closed. This mechanism prevents the sudden fall of the lid and the user's injury. The pin of hinge is welded to the manhole's frame body to minimize the possibility of theft.

Shock and noise damper gasket

IKITURK 's Ductile iron manhole tops are equipped with a shock and noise damper gasket.

Wafer Type Butterfly Valves

The new product of IKITURK is Ductile Iron Wafer-type butterfly valves with the following specifications produced by the "Lost Foam Casting" process in a fully automatic production line.

:: Nominal size: DN50-DN 200 mm

:: Working pressure: PN 16 bar

Application

The IKITURK butterfly valve can be used for a wide range of applications including cold and drinking water as well as general industrial applications up to 120 °C and air conditioning installations to isolate or regulate the water flow. Thanks to numerous material options for the valve's disc and seal, special application cases can also be realized without any problems. They are available in nominal sizes from DN50 to DN200 with Working Pressure 10/16 bar.

The use of butterfly valves on transmission lines as a flow controller is not permitted and must be fully open or fully closed. The design of the valve is such that the disc is fully centered in the open position and provides the best conditions for the flow with the lowest pressure loss.

This valve is suitable for installation between flanges which prepared accordance with DIN EN 1092-2 and operating pressure up to 16 bars.

Special Features

:: Licensed based on Iranian standard mark application ISIRI 4841

:: Valve design based on the BS EN 593

:: Valves flanges face to face based on the DIN EN 558-1 Series 20

:: Valves flanged dimensions according to DIN EN 1092-2

:: Sealing capability in both directions

:: Capability to install in all directions (horizontal, vertical and angular)

:: Manual operation by lever (standard equipment up to DN150) or by gearbox and hand wheel for DN200

:: The capability of pneumatic or electric actuator installation on the valve

:: No need for sealing gaskets between flanges

:: Performance tests and Inspection according to DIN EN 12266-1

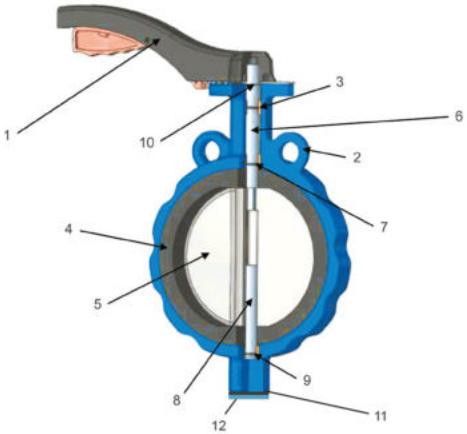
Hydrostatic tests according to DIN EN 12266-1

PN (bar)	Hydrostatic Pressure (bar)	
	Seat	Body
10	*11*	*17*
16	*17.6*	*25*

Coating Specification

All interior and exterior surfaces of the valves body are coated by electrostatic pure epoxy resin paint (RAL 5005 or RAL 5015), Layer thickness at least 250 µm and certified by reputable international organizations for use in drinking water.

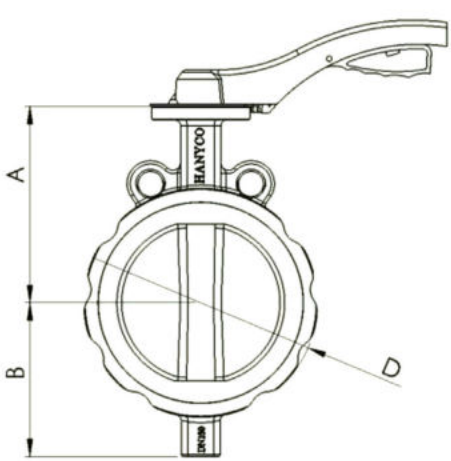
Material

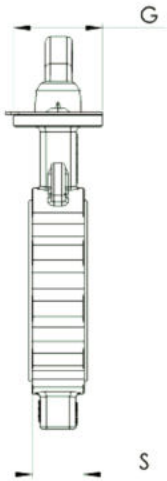


Item Number	Material / Standard	Name of Piece	Spare part
1	Aluminum	Lever	
2	EN-GJS-400-15 *	Body	
3	Brass / PTFE	Bush	+
4	EPDM (NBR on Request)	Liner	
5	AISI 316 (Ni-Plated ductile iron on request)	Disc	
6	AISI 304	Stem (Long)	
7	NBR	O-ring	+
8	AISI 304	Stem (Short)	
9	NBR	O-ring	+
10	DIN 472	Retaining ring	
11	NBR	Washer	+
12	Aluminum	Plug	+

*EN-GJS-500-7 is available based on request.

Lever control wafer-type butterfly valve dimensions & weights





DN mm	A mm	B mm	D mm	G mm	S mm	Flange	Weight Kg
50	120	74	97	65	40	F05	2/3
65	132	86	111	65	43	F05	2/7
80	135	97	127	65	45	F05	3/4
100	156	116	159	90	51	F07	5
125	171	135	184	90	53	F07	6/1
150	184	150	214	90	53	F07	7/5
200 H	236	180	265	125	58	F07	13/5
200 G	236	180	265	125	58	F07	17

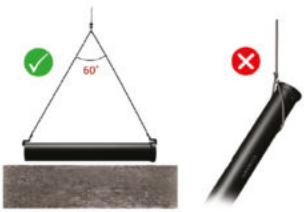
IKITURK Company has the capability of producing wafer-type butterfly valves in DN50- DN150 mm with lever and in DN200 mm with lever (200H) or gearbox (200 G).

A guide to unloading, storage and loading the cast iron pipes

Although the ductile cast iron pipes have unique characteristics such as high stability, resistance against shock, etc, improper transportation and storage could lead to damage to them.

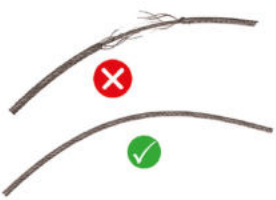
The following information is collected and presented by IKITURK Company and it is hoped that reading these instructions carefully and observing them helps prevent from any probable and unwanted damages.

Special metal hooks with rubber cover are used for the purpose of lifting and moving the pipes.



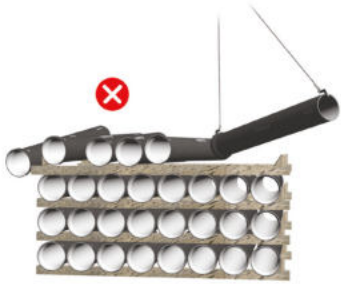
A double wire rope with the angle less than 60 degrees is used to lift the pipes and a single wire should not be used while moving pipes. It should be noted that pipes must be parallel to the ground.

It is necessary to check out the wire ropes from time to time. Using worn out and damaged wires is forbidden and they should be proportional to the weight of pipes.



All workers are obliged to use safety equipment such as shoes, gloves, etc.

Swinging or hitting pipes while moving is absolutely forbidden.



Standing under moving pipes and boxes is forbidden.

Loading

Trucks and trailers used for the purpose of safe shipment of pipes should have steel stakes on both sides and adequate number of wooden baords should be placed on the surface of trucks. It should be mentioned that in case the trailer's wooden deck is in good condition, no boards are needed any more.

Be sure to place high-quality, resistant wood under pipes. Also some wedges could be used to secure the pipes. The height of wedges should be proportional to dimensions of sockets.

When loading is completed, pipes are secured using metal chains and wire ropes or in certain cases by a silk belt. To avoid any damage to the external body of pipes, certain amount of carpet is placed between the belt and pipes. It should be noted that for maximum protection in each row, upper and lower pipes should be placed reversely.

Unloading

:: Make sure pipes are unloaded from the top and then equally from both sides.
:: Wooden wedges should not be removed until the end of unloading phase so that the pipes will not be damaged in case of probable tilt of the truck.
:: Pipes should not be tossed or dropped.

Storage

:: All pipes should be placed parallel.

:: Prior to storage of pipes, make sure the surface is clean and flat. Note that the floor is not wet, unstable or rocky or does not contain corrosive materials. Prior to arrangement of pipes, use two stable quadrilateral pieces of wood with proper height in parallel form so as to control the weight of pipes and prevent them from touching the ground.

Pipe Arrangement

:: To prevent any pressure on pipes, sockets should not be placed between pipes. The best form of arrangement is when sockets and spigots are laid together one after another.

:: Arrangement of pipes in a warehouse is done in three ways as shown below:

Square arrangement

Uniform arrangement

Pyramidal arrangement

:: In the following table, the maximum number of allowed rows for storage based on pipe length and square arrangement are given. It is recommended that ductile cast iron pipes be arranged using square arrangement. Using pyramidal arrangement is permitted for bigger sizes DN200 and lower height in less sloppy levels. In case of using uniform arrangement, normal pieces of wood with a certain height should be used so that the sockets of each row do not touch the other rows.

In case of delivering pipes in package, purchaser should use a forklift corresponding to the volume and weight of the package. Packages should be moved safely one at a time.

Storage and transportation of thin-walled pipes should be carried out in package.

Should you need more technical information for the purpose of other types of arrangement, contact IKITURK 's experts.

Permitted number of ductile cast iron pipes for the purpose of storage in square arrangement

Ductile cast iron Class C (non-preferential)			Ductile cast Iron K9 or Class C (prefential)			Size
Total	Number of floors	Number in each row	Total	Number of floors	Number in each row	
900	18	50	1100	22	50	**80**
720	18	40	880	22	40	**100**
450	15	30	600	20	30	**125**
450	15	30	600	20	30	**150**
312	13	24	432	18	24	**200**
260	13	20	300	15	20	**250**
136	8	17	204	12	17	**300**
120	8	15	150	10	15	**350**
78	6	13	117	9	13	**400**
72	6	12	84	7	12	**450**
55	5	11	77	7	11	**500**
36	4	9	45	5	9	**600**
24	3	8	32	4	8	**700**
21	3	7	28	4	7	**800**
18	3	6	24	4	6	**900**
15	3	5	20	4	5	**1000**
10	2	5	15	3	5	**1100**
8	2	4	12	3	4	**1200**

Loading and shipping ductile cast iron pipes to the customer's site is performed either with or without package. Information about the maximum number of ductile cast iron pipes is provided in the table below.

Pipe	Means of transportation	DN
120	6 wheeled truck	80
100	6 wheeled truck	
110	10 wheeled truck	100
80	6 wheeled truck	
75	10 wheeled truck	150
60	6 wheeled truck	
50	10 wheeled truck	200
40	6 wheeled truck	
54	Truck Trailer	250
40	Truck Trailer	300
40 or 28	Truck Trailer	350
28	Truck Trailer	400
20	Truck Trailer	500
12	Truck Trailer	600
12	Truck Trailer	700
10	Truck Trailer	800
6	Truck Trailer	900-1100
4	Truck Trailer	1200

Using pyramidal arrangement is permitted for bigger sizes DN200

Allowed number of pipes in a package (Size)		
Tyton Pipe	R.J. Pipe	DN
50	49	80
48	42	100
30	30	150
20	24	200
10	15	250
10	15	300
9	6	350
8 or 12	8	400
6	6	500
3	3	600
3	3	700
2	2	800
2	-	900-1000

*It is not possible to packpipes for DN1000 and above.

Allowed number of thin-walled pipes in a package (Size)	
Thin-walled pipe	DN/OD
48	90
42	110
42	125
30	160
30	200

It is noteworthy that it is only possible to load four packages in each step.

Installation Guide

This part contains all the necessary activities required to prepare working conditions and subsequent operations such as transporting pipes, fittings and components m to trenches, pipe threading, trench excavation, piping and installation completion, workshop test (working pressure), disinfection and pipeline operation.

This information is merely collected as a guide to install ductile cast iron pipes and based on existing standards. However, contractor is obliged to perform based on the employer's instructions and other supplementary engineering instructions of counselor and other contract regulations.

Preparation of the piping route

Prior to the start of operations and for the purpose of pipe threading and digging the trennch according to the operational map, the piping route should be investigated and all the physical obstacles ought to be identified and removed. In certain cases such as cutting down trees and passing through gardens, destroying city buildings and facilities, etc. necessary permissions should be obtained.

Urban facilities such as gas transmission lines, pipe lines, water, sewage and telephone, etc. should be marked prior to the excavation based on existing maps and required arrangements should be made accordingly.

Trench Excavation

Trench excavation means to excavate and create a proper channel in any types of ground for the purpose of installation of pipes. In case certain arrangements need to be made based on the technical specifications of land, contractor is obliged to consider all the safety instructions while excavating the trench.

Trench Width

The minimum width of trench depends on the type and width of the pipe, depth of trench, texture and type of the ground. If the width of trench is not specified in the plan, a distance of 40 cm between pipe and wall of trench is recommended for backfilling around the pipe.

Trench Depth

The depth of a pipe trench is mentioned in operational maps and specifications. The depth of piping tranche is a function of ground status, frost depth, type and diameter of the pipe, applied loads and other hydraulic and technical considerations.

Backfilling around ductile cast iron pipes

A. Ductile cast iron pipes Class K9

Backfilling around ductile cast iron K9 class is different depending on the working pressure and depth of the trench and is classified in five different categories:

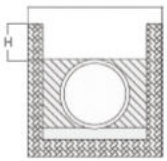
TYPE 1 The pipe is laid on the smooth trench and without any bedding. No particular backfilling is performed around the pipe.

TYPE 2 The pipe is laid on the smooth trench and without any bedding. The soil around the pipe is relatively compacted up to the height of the middle of the pipe.

TYPE 3 The pipe is laid on a layer of smooth soil with the height of 10 Cm. The soil around the pipe is compacted up to the height of the pipe crown (top).

TYPE 4 The pipe is laid on a mixed layer of soil and sand with the thickness of 10 Cm. Granular materials are poured around the pipe up to the top of the pipe and is 80% compacted according to AASHTO T-99 standard.

TYPE 5 A layer of granular materials with the thickness of 10 cm is poured from under the pipe up to the height of top of the pipe (crown) and is 90% compacted according to Proctor, AASHTO T-99.



Minimum backfilling required for ductile cast iron pipes per trench depth (considering traffic load)

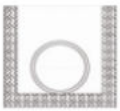
DN															H (M)
1200	1100	1000	900	800	700	600	500	400	350	300	250	200	150	100	
															0/5
															1
															1/5
															2
															2/5
															3
															3/5
															4
															4/5
															5
															5/5
															6
															7
															8
															9
															10

Type1 Type2 Type3 Type4 Type5

B. Ductile cast iron pipes Class C

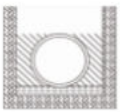
Backfilling around ductile cast iron C class is different depending on the working pressure and depth of the trench and is classified in five different categories:

TYPE 1 The pipe is laid on the smooth trench and without any bedding. No particular backfilling is performed around the pipe.

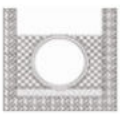


TYPE 2 The pipe is laid on the smooth trench and without any bedding. The soil around the pipe is relatively compacted up to the height of the middle of the pipe.

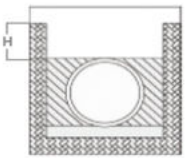
TYPE 3 The pipe is laid on a layer of smooth soil with the height of 10 Cm. The soil around the pipe is compacted up to the height of the pipe crown (top).



TYPE 4 The pipe is laid on a mixed layer of soil and sand with the thickness of 10 Cm. Granular materials are poured around the pipe up to the top of the pipe and is 80% compacted according to AASHTO T-99 standard.



TYPE 5 A layer of granular material with the thickness of 10 cm is poured on the pipe up to the height of top of the pipe (crown) and is 90% compacted according to Proctor, AASHTO T-99.

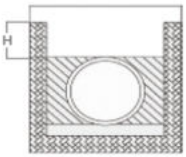


Minimum backfilling required for ductile cast iron pipes per trench depth (considering ing traffic load)

C50					
DN					H (M)
300	250	200	150	100	
					0/5
					1
					1/5
					2
					2/5
					3
					3/5
					4
					4/5
					5
					5/5
					6
					7
					8
					9
					10

C40									
DN									H (M)
600	500	400	350	300	250	200	150	100	
									0/5
									1
									1/5
									2
									2/5
									3
									3/5
									4
									4/5
									5
									5/5
									6
									7
									8
									9
									10

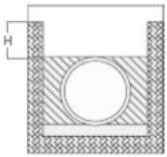
Type1 Type2 Type3 Type4 Type5



Minimum backfilling required for ductile cast iron pipes per trench depth (considering ing traffic load)

C30										H (M)
DN										
1200	1100	1000	900	800	700	600	500	400	350	
										0/5
										1
										1/5
										2
										2/5
										3
										3/5
										4
										4/5
										5
										5/5
										6
										7
										8
										9
										10

Type1 Type2 Type3 Type4 Type5



Minimum backfilling required for ductile cast iron pipes per trench depth (considering ing traffic load)

C25										
DN										H (M)
1200	1100	1000	900	800	700	600	500	400	350	
										0/5
										1
										1/5
										2
										2/5
										3
										3/5
										4
										4/5
										5
										5/5
										6
										7
										8
										9
										10

C20						
DN						H (M)
1200	1100	1000	900	800	700	
						0/5
						1
						1/5
						2
						2/5
						3
						3/5
						4
						4/5
						5
						5/5
						6
						7
						8
						9
						10

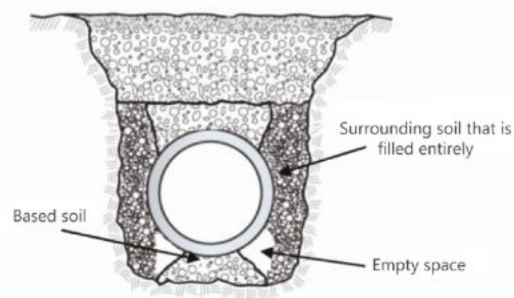
Type1 Type2 Type3 Type4 Type5

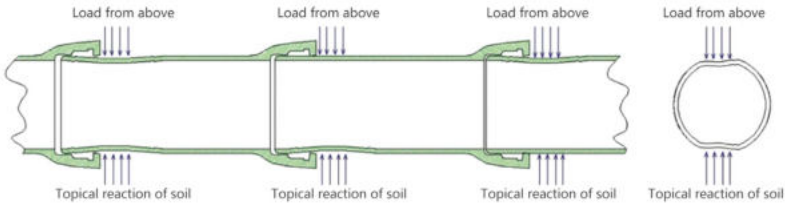
Installation C-Class pipes

Installation Guide

1.Whether the soil around the pipe should be compacted or not, this term is used:" soil is relatively compacted" (for instance the soil compaction type 2). In high-compacted soils (such as proctor and AASHT09), it should be noted that firstly the initial soil should be layered around the pipe. Consequently, depending on the compaction required, each layer of soil will be compacted using compactor excavator. Afterwards, the next layer will be charged into the trench.
To this aim, considering the dimensions of excavator, the dimensions of trench should be removed in a way that it will be layered while filling the trench. In addition, the same excavator is used to move and direct the soil toward the beneath of pipe.

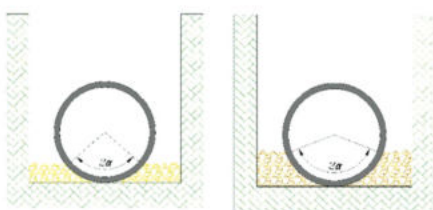
2. It should be noted that if the soil required to fill the trench is suddenly poured into it and then compacted, the space beneath the pipe will remain empty or the soil will not even be compacted. As a result, as soon as the final filler soil is added to the trench, the presence of this empty space beneath the pipe leads to reshaping the cross-section in pipe from round to oval. It can also lead to the increase in the width of the spigot at its joint with socket. This will consequently result in leakage of pipe in a short time (during pipeline hydrostatic test) or long term (Following the traffic load).





3. In cases where it is not possible to widen the trench and the soil around the pipe needs to be compacted (even relatively and partially), some granular materials such as pea gravel (6-12 mm and round shape) should be used beneath the pipe and in the trench, so that a reasonable section of the pipe's external surface is covered by such materials (table1). Consequently, the rest of backfilling process and soil-compaction are performed according to the type mentioned in Catalogue. If the filling of trench is performed following the pipe assembly, it should be noticed that the section beneath the pipe is in contact with the mentioned granular materials. In other words, the beneath of pipe should be fully filled with granular materials.

Filling & Compacting	Thin-walled LPs	DN/OD
	(Degree)	(Mpa)
Type 1	*30*	1
Type 2	*45*	2
Type 3	*60*	2.75
Type 4	*90*	3.5
Type 5	*150*	5



In this method of bedding, we can make certain that there will not be any empty space remaining beneath the pipe and it will not deform as a result of pressure and non-compacted soil.

In cases where it is possible, have worker use Vibration devices (with width less than 20-30 cm) to compact the soil around the pipe.

Width (frog) 30cm

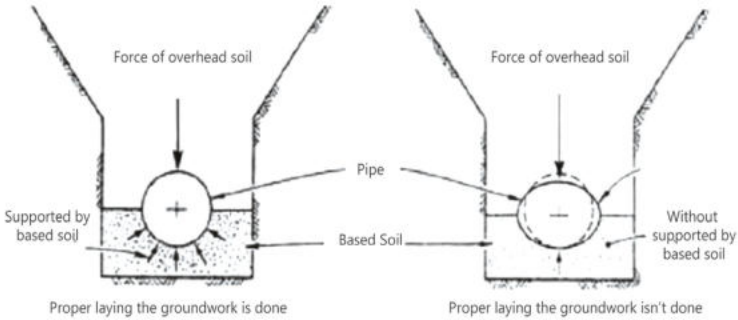
Width (plate) 60cm

4. In cases where the depth of trench is more than 2 meters and the soil of the region is prone to falling while using manual compactor, in addition to using granular materials on pipe bedding mentioned in part 3, it is also possible to connect compactors to excavator for the purpose of soil compaction.

For this reason, the width of trench should correspond the compactor's dimensions.

5. In cases where it is not possible to use soil-compacting tools, granular materials as well as a wide trench, and the project operator intends to use plastic materials such as concrete, soil-cement mixture, etc., corresponding considerations should be taken into account following the pipe assembly and prior to charging the filler soil into the trench. What is important here is that, following the filling of trench using plastic materials, we must make sure that they become dry and stable. For this reason, at the joint of spigot and socket certain holes should be excavated with the depth of trench. Their stability (holes) should be controlled depending on the used materials and using controlling measures.

In case where the filling is performed before the materials becomes stable and dry, the pipe spigot will increase in width particularly at the joint with socket leading to a weak sealing and leakage as well. Moreover, if the filler soil is not layered in the trench, the same result will be brought about.



6. For pipes bigger than DN 400 size, it is suggested to use the soil-compaction 2 or stronger.

7. "Soil must be relatively compacted" in the table of soil-compaction means that, following the soil compaction, its reaction module reaches the expected limitation. This amount is shown in table 1 of this guide for different types of soil compaction as the soil reaction module with Parameter E.

It is evident that prior to the commencement of pipeline operations, the mechanical specifications of soil including humidity- density should be obtained for the optimized compaction of soil. Therefore, performing the soil compaction while the humidity of soil is not suitable could lead to the weak stability of pipe bedding. In cases where the humidity of soil is more than the expected amount, it is much probable that pipes get out from soil in case of bending in pipeline.

If the soil compaction instruction is not observed, lack of pipe sealing could occur in trenches not as deep as the required amount for soil compaction.

In case a region's soil is not compactable or there is no solution but digging deep trenches or passing through traffic loads is inevitable, it is necessary to consult with experts of this company to choose the proper working class of pipe as well as the proper condition for creating trench.

Transportation of Pipe and Components to the installation Site and Commission (Threading)

Contractor could refer to the "Guide to unloading, storage and loading the ductile cast iron pipes" of this catalogue, in order to obtain the right instructions regarding shipping and unloading. Moreover, considering the external cover of pipes, avoid placing them directly on the ground. In this case, it is possible to use wooden boards. Contractors should plan in a way that prevents from long threading of pipes. Therefore, pipe threading in urban regions is performed in line with the speed of piping. Moreover, certain measures should be taken to prevent from moving pipes to mountainous and sloppy regions.

To prevent from entering soil and other materials to the pipes while threading, it is required to put caps on the pipes following the excavation operation so that no pollutions or animals can get into the pipes. For the purpose of facilitation the piping operation, pipes should be threaded in a way so that the socket is placed towards the piping direction.

Examination before installation

1) Ductile cast iron pipe

Quality of the pipe and fittings should be visually tested prior to installation. Any types of physical damages to the external and internal surface, ovality and pollution inside the pipes should be thoroughly investigated and repaired according to standards if required. In case of any damages to the external surface while cutting or carrying, it is necessary to repair it following the procedures below:

a. Firstly the damaged spot should be cleaned.
b. Secondly, the damaged point should be repaired using brush and proper color (Epoxy or Bitumen).

According to ISO 4179 standard repairing the damaged cement internal coverage (which is possible to get damaged while transportation) is legal and performed as below:

Required material:

- Portland cement (Type5)
- River Sand (Seko Bond)
- Fast setting additives
- Water

Required tools:

- Trowel
- Hammer
- Brush
- Metal pen
- Plastic

Procedure:

- Firstly remove the damaged cement layer using metal pen and hammer and clean the place with brush.
- Afterwards mix the sand and cement by the ratio of 3 to 2 and additive and water by the ratio of 1 to 2.
- Use the brush to wet the repair zone and put the prepared material on the place using trowel.
- At the end, apply plastic to cover the repaired cement layer to help it stabilize
- While removing the cement layer, wear safety goggles to protect your eyes.

2) Sealing Gasket:

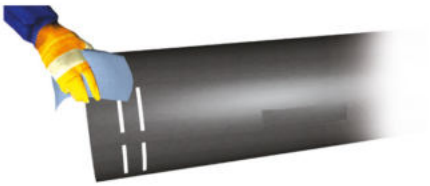
Prior to installation operation, it is necessary to examine sealing gaskets to ensure they do not have any cracks, tears and cuts. Moreover, rubber gaskets should be kept indoors. They should not be exposed to sunlight or any types of UV. They should also be kept in a cool place.

According to ISO 4633 and ISO 2230 standards, gaskets should be kept in the following conditions:

1-Temperature of the warehouse should be less than 52 degrees centigrade and preferably less than 15 degrees.
2- Gaskets should not be exposed to the direct sunlight, intense artificial lights or UV.
3- Ozone is harmful for rubber; there should not be ozone-producing tools such as Mercury-Vapor lamp in warehouse.
4- Gaskets should be kept away from high-voltage electrical devices, electrical motors and devices having static electricity discharge.
5- Gaskets should not be under tension or pressure.
6- Gaskets should be kept clean.
Duration of storing gaskets in warehouse should be as short as possible. As long as all the storing requirements are observed, up to 3 years after fabrication, gaskets maintain their desirable quality.

Installation Guide

:: Firstly, thoroughly clean the grooves on socket and spigot using a smooth brush.



:: After making a point of cleaning sockets and lubricating them with a proper soap-based lubricant, start the assembly operation by placing a gasket which matches the size and type of pipe.

:: Pick the proper gasket matching with the type and size of the pipe. By making a curve or ring in the gasket fix it in its proper place.

:: For pipes with diameter more than 500 mm, you'd better make two curves or rings in the gasket. Make sure that the gasket is placed in its proper groove.

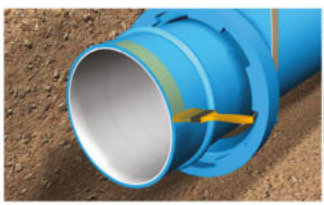
:: Following making the proper bevel on the spigot, place two pipes in the same direction (according to the producer's instruction) and if necessary use a suitable wedge to do so.

Instructions on installation of RJ Pipe (resistant-against- earthquake fitting):

Firstly, remove the insulated wire (gland keeper) used to fix the gland on spigot as well as safe transportation of pipe and components from the gland. Then, remove and clean any pollutions and external materials from the end of the spigot, socket internal wall and gland internal wall using a brush.

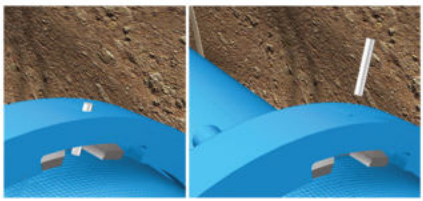
:: After cleaning the socket and lubricating it with a proper soap-based lubricant, start the assembly operation by placing the fitting gasket.

:: Lubricate the inner part of the socket and tip of the spigot again using a lubricant.



:: Place the end of the spigot on which the locking ring is welded with the proper distance in to the socket so that both pipes are in the same direction (use a proper wedge if required) and assemble both pipes by applying a uniform pressure preferably using proper tools such as crowbar or mechanical winches.

:: Move the gland toward the spigot so that its caps are placed on the spigot plugs. Move it toward the spigot and rotate so that its plugs place behind the pipe's caps.



:: Depending on the size of the pipe, three or four holes with certain distances are placed on the gland. After placing the locking rim in its proper place, it is necessary that a split elastic pin is placed inside the hole corresponding the locking rim.

:: It is recommended to place the end of the pin above the external surface of the gland so that the assembly operation becomes easy. For the purpose of preventing the gland from rotating around the socket, proper locking rim should be chosen. One locking rim is adequate.

Proper equipment for assembling the ductile cast iron pipes

For the purpose of assembling the ductile cast iron pipes, it is necessary to use proper equipment such as crowbar (For sizes smaller than DN 80- DN 120) or mechanical winches (for sizes bigger than DN 150, one winch or more depending on the size of the pipe). It should be noted that the allowed assembly pressure is indicated on the spigot using two lines.

Cutting Pipes

Prior to cutting, make sure the "scissors" sign is marked on the pipe (can be cut) (Calibrated pipe). It is not recommended to cut the calibrated pipes with more than four meters distance from the spigot head.

Proper equipment for cutting pipes

DN 80-DN 700 size: All types of cutting devices such as stone cutter, shearing machine, guillotine saw, etc.

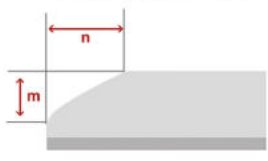
DN 800-DN 1200 size: Pneumatic cutting saw

Cutting section (Spigot bevel)

In case of cutting the pipes, spigot should be beveled first according to the specifications below:

DN	n	m
100-300	9	2
350-600	9	3
700-1200	15	5

All dimensions in mm



Ovality

In case of improper carrying and storage, ovality might occur in pipes particularly bigger sizes. In this case, pipe assembly might hardly occur and ovality should be prevented prior to the assembly.

Essential equipment for prevention of ovality (400-90 mm)

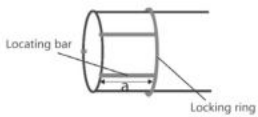
- Manual Hydraulic Jack (Number 1)
- Hook and chain (Number 2)
- Chain size and the capacity of the hydraulic jack depend on the pipe size.

Ovality prevention steps

:: Placing the hydraulic jack as well as necessary equipment on the pipe and fastening the chain in order to create the necessary pressure force
:: Releasing the chain, removing the pneumatic force and jack from the pipe
:: Control the equipment performance to prevent from damaging the interior surface
:: Pipe installation while placing the device in proper place
:: Precise control of ovality

Guide to welding the RJ. Pipe welding (Resistant- against- earthquake pipe):

In the event that the R.J Pipe is cut in pipeline for any reason or should the customer buy the pipe without welded ring from producer (while installation), the following guideline could be used for the purpose of welding the locking ring around the spigot of R.J Pipe.

Welding using SMAW method			Welding process
One- sided welding			Type of fitting
Thickness	Standard	Type of Cast Iron	Technical characteristics of base metal
5 to 12 mm	EN-GJS400-15	SG cast iron	
Electrode diameter	ANSI/AWS-A5.15	Type of electrode	Technical characteristics of filler metal
3.25 mm		ENiFe-CI	
Current polarity		Transitional mode	Electrical characteristics
DCEP current and electrode are connected to the positive electrode and the minimum .ampere is used		Short Circuit	
Progress speed: 6-3 mm / s	22 to 24 V	75 to 100 A	Welding method
Welding in horizontal status			Welding status
			Fitting Scheme

Pipeline Hydro test under pressure

The length of pipeline test' section should be considered based on the following criteria:

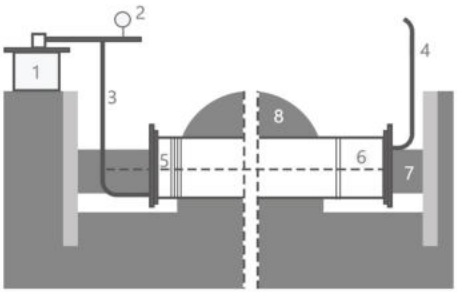
:: Environmental condition

:: Water accessibility

:: Number of fitting pieces and peripherals

:: Difference of height between pipeline different parts

Regarding the pneumatic pipeline, the length of test's section should not be more than 1500 meters:



1. Pump
2. Barometer
3. Connecting pipe
4. Bleed valve
5. Bottom end piece
6. Top end piece
7. Supportive block
8. Pretest backfill

Post-welding operations

:: Cleaning the welded area

:: Covering the damaged area using a brush (Acknowledged by producer)

Pipeline Support

All the fittings such as elbows, tees, convertor and flanges should be supported before test using supportive blocks or fittings and supportive facilities.
Segregation and sealing the tested components should be performed using blind flange or other blockers with proper working pressure. If for application reasons, valves are used as a blocker, the test pressure shall not be more than valves' working pressure. While evaluating the total leakage for a part of test, the allowed rate of valves' leakage should be considered.

Backfilling before test

This part of backfilling is generally performed using a proper and acknowledged soil to support the axial forces during the test. Its height is usually 30 cm from the top of the pipe (crown). For diameters bigger than 600 mm, it can be more than 30 cm and based on the characteristics of the scheme.

Pipeline filling

Normally, filling must be performed from the lowest point of the testing area and with the slowest speed to make sure the full air release.
In high points, pipeline should be equipped with air bleeding system. It is recommended that the flow rate is not more than 10% of the designed flow rate while filling.

⃠ Pipeline with cement coverage requires a post-filling period of time (depending on the humidity) to absorb water using cement coverage.

⃠ Test methods of this part could be only applied for pressure test by water. In addition, pressure test by air is not performed due to safety issues.

Preliminary operations

After filling and prior to the test, keep the testing area under working pressure for adequate amount of time so that it becomes stable in terms of movement of pipe and water absorption by internal coverage.

According to standards, it is recommended that this time shall not be less than 24 hours. Consequently, all the fittings, supports and blockers should be visually examined and repaired if they are damaged (after water release).

Once you have confirmed all conditions, increase pressure steadily to reach the following amount:

:: For working pressure less than or equal 1.5:10 bars working pressure

:: For working pressure less than 10 bars, plus 5 bar

Various types of tests

Pressure decrease test:

Keep the test pressure constant for at least one hour by pumping and precision of +-0.1. Consequently, turn off the pump and don't allow more water to enter the testing area at least for following time periods:

:: One hour for DN≤600

:: Three hours for 600<DN≤1400

Following these periods, measure the pressure on testing area.

Determine the waste water by measuring the required water for pumping to the testing area for the purpose of returning the pressure to the test pressure with precision of +-1%.

Constant pressure test

Fix the test pressure for at least one hour by pumping and precision of +-0.1. Consequently keep the pressure test (+- 0.1) in the testing area by pumping for at least following periods:

Test acceptance criteria

The amount of waste water should not be more than 0.001 liter / hour (Pipeline in Km, pipe's nominal size (mm), Static pressure).

:: One hour for DN≤600

:: Three hours for 600<DN≤1400

Pipe Disinfection

Upon completion of all the operations and installation of valve and pipes as well as water pressure test, pipe line is disinfected. For this purpose, chloride is added to the water and the remaining chloride should be steadily examined to make sure the concentration of chloride is not less than 25 gram / m3 during 24 hours. During the test, all the valves (On/ off) should be turned on and off several times so that the chloride contacts with all parts of valve.

General washing of pipeline should be done in less than 24 (Maximum 24 hours) hours following the test and disinfection using chloride water with standard concentration of drinking water. Sampling and hygienic test of the water is performed based on the instructions of supervision unit.

For more information you can refer to ANSI/AWWA C 651.

Step by Step guide to Polyethylene sheath installation

:: According to ISO 8180 Standard, two methods have been presented to install polyethylene sheath for both dry and wet trenches.

Sheath installation on dry trench

:: Cut out a part of polyethylene sheath which is 60 cm longer than the pipe length. Fully clean the pipe body. Put the polyethylene sheath from the spigot on, while the pipe is pendant on the air using proper equipment. The polyethylene sheath shall be compacted like accordion in the distance between belt and end of the pipe so that the end of the pipe could be seen.

:: Gradually move the pipe down in to the trench and place the end of the pipe in the previous pipe socket.

:: Move the pipe's supportive belt toward the socket. Keep the pipe at a short distance from trenche's bed so that it would be possible to stretch the polyethylene sheath towards socket. Then, stretch the polyethylene layers fully toward the pipe's body.

:: In this step, stretch the previous pipe's polyethylene layer at the joint of the two pipes and tighten it using a special tap in its place.

:: Fold up the additional polyethylene layer on the length of the pipe; and put it on the bottom layer using a tape so that it wouldn't be severely compacted. Consequently, we tighten it with 90 cm of distance using an adhesive tape.

:: In case of probable damage to the polyethylene layer, cover it up using an adhesive. If the damaged area is huge, cover up the area using a polyethylene sheet and seal the edges fully with an adhesive.

:: In order to prevent any damage while filling the trench, it is suggested that polyethylene layer have some relative freedom in the fitting area. The soil used should be devoid of any stones, wood, clod and other materials having adverse impacts on polyethylene layer. While backfilling make sure the equipment does not hit the polyethylene layer.

Sheath installation in a wet trench

:: In wet sheaths, pipe should be covered with polyethylene before entering the trench.

:: Cut the polyethylene sheath 60 cm longer than the length of the pipe. Then, stretch it on the pipe.

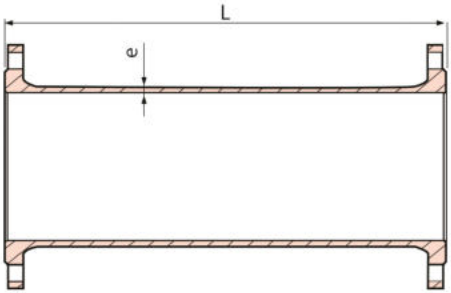
:: Stretch the polyethylene sheath on the pipe so that it is 30 cm redundant on both ends.

:: Roll up the additional part on the length of the pipe. Then tighten it using an adhesive tape peripherally with a distance of 60 cm from each other on the body of the pipe, so that the minimum distance between pipe and polyethylene sheath remains.

The first and the last adhesive tape should cause the full sealing of polyethylene layer around the pipe. Then, stretch the compacted section (Accordion) on the head and the end of the pipe and place it on each other at the joint spot

:: You should be careful that the polyethylene layer would not be damaged while pipe assembly.
Follow the installation steps same as the previous method.

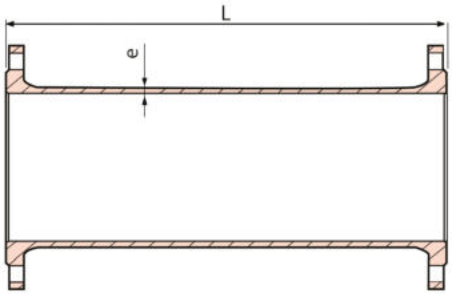
⃠ In order to lift the pipes with polyethylene cover, use covered steel cables or intertwined bands to prevent from damaging the polyethylene layer.



Double flanged ductile iron pipe (Casting)

DN	e	L	m		
			PN 10	PN 16	PN 25
	(mm)	(mm)	(kg)		
80	7	1000	20	20	20
100	7/2	1000	25	25	26
150	7/8	1000	39	39	41
200	8/4	1000	55	54	58
250	9	1000	75	73	81
300	9/6	1000	96	95	106
350	10/2	1000	118	121	142
400	10/8	1000	141	148	169
500	12	1000	195	219	238
600	13/2	1000	259	306	326
700	14/4	1000	337	356	416
800	15/6	1000	429	451	539
900	16/8	1000	509	502	615
1000	18	1000	648	640	774
1100	19/2	1000	746	737	892
1200	20/4	1000	911	596	1062

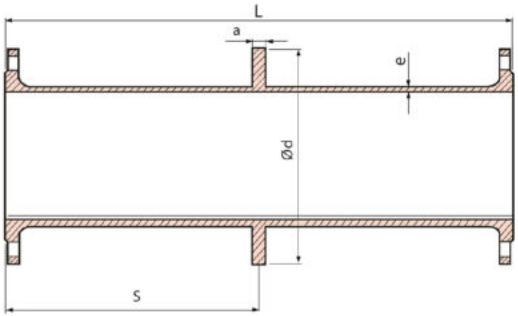
Note1. Maximum length of a one-piece pipe manufactured in casting method is 1000 mm. however, this length can be increased to max. 6000 mm by means of welding at the request of customer.
Note2. All weights have been calculated based on thickness class of K 12. In case you require other classes, please contact technical experts of IKITURK



Double welding flanged pipe

DN	e	L	m		
			PN 10	PN 16	PN 25
	(mm)	(mm)	(kg)		
80	6	1000	20	20	20
100	6	1000	24	24	24
150	6	1000	35	35	37
200	6/3	1000	50	52	52
250	6/8	1000	68	70	73
300	7/2	1000	99	106	108
350	7/7	1000	109	112	133
400	8/1	1000	130	137	157
500	9	1000	181	206	224
600	9/9	1000	244	291	311
700	10/8	1000	317	336	396
800	11/7	1000	408	431	518
900	12/6	1000	474	467	571
1000	13/5	1000	599	591	726
1100	14/4	1000	702	692	849
1200	15/3	1000	862	847	1010

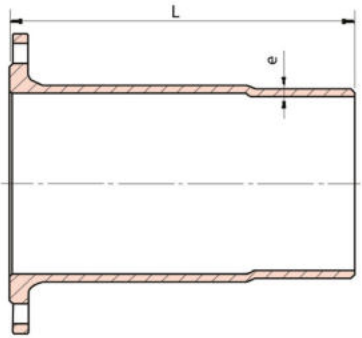
Note 1. Production of double welding flanged pipes of various lengths and maximum length of 6000 mm is possible.
Note 2. All weights have been calculated based on thickness class of K 9. In case you require other classes, please contact technical experts of IKITURK



Double flanged ductile iron pipe with puddle (Casting)

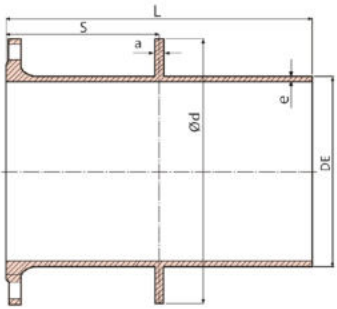
DN	e	a	L	d	m		
					PN 10	PN 16	PN 25
	(mm)	(mm)	(mm)	(mm)	(kg)		
80	7	16	1000	200	24	24	24
100	7/2	16	1000	220	28	28	29
150	7/8	18	1000	285	45	45	47
200	8/4	20	1000	340	64	63	67
250	9	20	1000	400	86	85	92
300	9/6	20/5	1000	455	110	109	120
350	10/2	20/5	1000	505	134	137	159
400	10/8	20/5	1000	565	160	167	188
500	12	22/5	1000	670	220	245	264
600	13/2	25	1000	780	293	342	362
700	14/4	27/5	1000	895	385	404	465
800	15/6	30	1000	1015	493	516	605

Note1. Maximum length of a one-piece pipe manufactured in casting method is 1100 mm. however, this length can be increased to max. 6000 mm by means of welding at the request of customer.
Note 2. Parameter S indicates the point where a puddle is set at the order of customers and its tolerance is +/-5.
Note 3. All weights have been calculated based on thickness class of K 12. In case you require other classes, please contact technical experts of IKITURK



Flange spigot

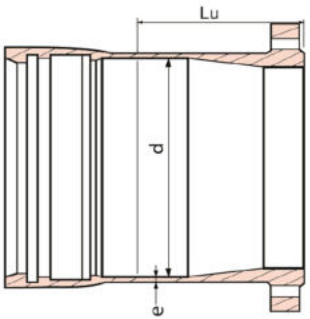
DN	DE mm	e mm	L mm	m (kg)		
				PN 10	PN 16	PN 25
80	98	7	350	8	8	8
100	118	7/2	360	10	10	10
150	170	7/8	380	16	16	17
200	222	8/4	400	24	23	25
250	274	9	420	33	32	36
300	326	9/6	440	44	44	49
350	378	10/2	460	56	57	68
400	429	10/8	480	69	72	82
500	532	12	520	100	113	122
600	635	13/2	560	140	164	174
700	738	14/4	600	192	202	232
800	842	15/6	600	243	255	298
900	945	16/8	600	296	305	349
1000	1048	18	600	374	406	490
1100	1152	19/2	600	432	427	506
1200	1255	20/4	600	524	517	601



Flanged spigot ductile iron pipe with puddle (Casting)

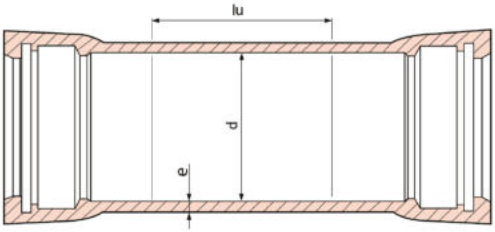
DN	DE mm	e mm	a mm	L mm	d mm	m (kg)		
						PN 10	PN 16	PN 25
80	98	7	16	1000	200	20	20	20
100	118	7/2	16	1000	220	24	24	25
150	170	7/8	18	1000	285	39	39	40
200	222	8/4	20	1000	340	55	55	57
250	274	9	20	1000	400	73	72	76
300	326	9/6	20/5	1000	455	87	87	92
350	378	10/2	20/5	1000	505	112	114	124
400	429	10/8	20/5	1000	565	134	137	148
500	532	12	22/5	1000	670	183	196	205
600	635	13/2	25	1000	780	241	265	276
700	738	14/4	27/5	1000	895	315	324	355
800	842	15/6	30	1000	1015	398	409	454

Note1. Maximum length of a one-piece pipe manufactured in casting method is 1000 mm. however, this length can be increased to max. 6000 mm by means of welding at the request of customer.
Note 2. Parameter S indicates the point where a puddle is set at the order of customers and its tolerance is +/-5.
Note 3. All weights have been calculated based on thickness class of K 12. In case you require other classes, please contact technical experts of IKITURK



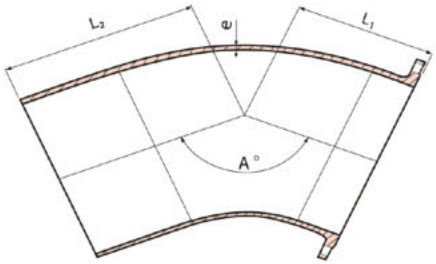
Flange socket tyton

DN	d mm	e mm	Lu mm	m (kg)		
				PN 10	PN 16	PN 25
80	109	7	160	8	8	8
100	130	7/2	160	10	10	11
150	183	7/8	165	16	16	17
200	235	8/4	170	24	24	26
250	288	9	175	33	32	36
300	340	9/6	180	42	42	47
350	393	10/2	185	51	53	63
400	445	10/8	190	64	67	77
500	550	12	200	90	102	112
600	655	13/2	210	127	151	161
700	760	14/4	220	181	190	220
800	865	15/6	230	239	250	294
900	970	16/8	210	273	291/5	-
1000	1075	18	220	335	367	-



Collar tyton

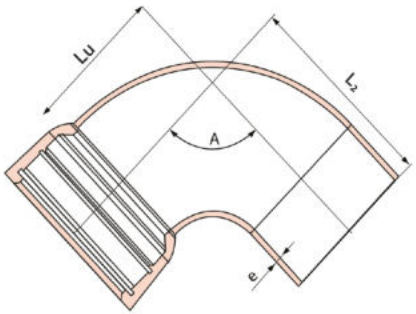
DN	d mm	e mm	lu mm	m Kg
80	109	7	160	8
100	130	7/2	160	10
150	183	7/8	165	16
200	235	8/4	170	26
250	288	9	175	33
300	340	9/6	180	44
350	393	10/2	185	53
400	445	10/8	190	63
500	550	12	200	91
600	655	13/2	210	125
700	760	14/4	220	184
800	865	15/6	230	231
900	970	16/8	240	319
1000	1075	18	250	395



Flanged spigot bend †

A / DN	11/25°						22/5°						45°						90°					
	L_1 mm	L_2 mm	e mm	m (Kg) PN 10	m (Kg) PN 16	PN 25	L_1 mm	L_2 mm	e mm	m (Kg) PN 10	m (Kg) PN 16	PN 25	L_1 mm	L_2 mm	e mm	m (Kg) PN 10	m (Kg) PN 16	PN 25	L_1 mm	L_2 mm	e mm	m (Kg) PN 10	m (Kg) PN 16	
80	113	210	7	8	8	8	130	220	7	7	7	7	130	289	7	9	9		165	280	7	8	8	
100	115	210	7/2	10	10	11	140	220	7/2	10	10	10	140	323	7/2	12	12		180	300	7/2	11	11	
150	113	215	7/8	16	16	17	160	235	7/8	17	17	18	160	359	7/8	20	20		220	350	7/8	20	20	
200	132	220	8/4	24	24	26	180	245	8/4	26	26	28	180	396	8/4	30	30		260	400	8/4	33	32	
250	165	230	9	36	35	39	106	255	9	23	22	26	360	586	9	60	59		350	450	9	57	56	
300	175	235	9/6	38	37	43	210	265	9/6	40	39	45	400	480	9/6	73	73		400	500	9/6	72	72	
350	191	240	10/2	61	63	74	131	275	10/2	41	43	53	298	543	10/2	89	90		450	550	10/2	109	111	
400	104	245	10/8	55	58	68	149	290	10/8	55	58	69	324	581	10/8	116	119		500	600	10/8	151	155	
500	121	275	12	80	93	102	176	330	12	82	94	103	375	679	12	172	185		600	720	12	232	244	
600	138	285	13/2	112	135	145	203	350	13/2	120	144	154	426	755	13/2	251	274		700	820	13/2	353	376	
700	154	345	14/4	169	179	209	234	425	14/4	180	190	220	478	908	14/4	370	380		800	830	14/4	512	522	
800	171	360	15/6	224	235	279	256	445	15/6	240	252	295	529	981	15/6	495	506		750	876	15/6	711	640	

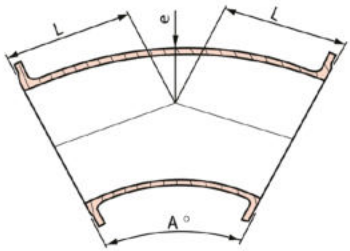
† Designed based on factory standards



Socket-spigot bend †

A / DN	11/25°				22/5°				45°				90°			
	Lu mm	L2 mm	e mm	m Kg	Lu mm	L2 mm	e mm	m Kg	Lu mm	L2 mm	e mm	m Kg	Lu mm	L2 mm	e mm	m Kg
80	30	247	7	8	40	274	7	8	55	222	7	8	100	280	7	9
100	30	263	7/2	10	40	298	7/2	11	65	229	7/2	11	120	300	7/2	11
150	35	262	7/8	16	55	329	7/8	19	85	254	7/8	19	170	350	7/8	20
200	40	278	8/4	26	65	351	8/4	31	110	268	8/4	29	220	400	8/4	33
250	50	311	9	37	75	277	9	32	130	290	9	42	270	450	9	49
300	55	160	9/6	34	85	225	9/6	40	150	329	9/6	56	320	500	9/6	64
350	60	321	10/2	63	95	296	10/2	55	175	315	10/2	71	370	550	10/2	94
400	65	231	10/8	57	110	321	10/8	71	195	320	10/8	89	420	600	10/8	125
500	75	260	12	83	130	370	12	106	240	364	12	136	520	720	12	186
600	85	267	13/2	115	150	397	13/2	151	285	380	13/2	189	620	820	13/2	276
700	95	349	14/4	189	175	509	14/4	244	330	449	14/4	296	720	900	14/4	402
800	110	363	15/6	258	195	533	15/6	329	370	481	15/6	392	670	870	15/6	580

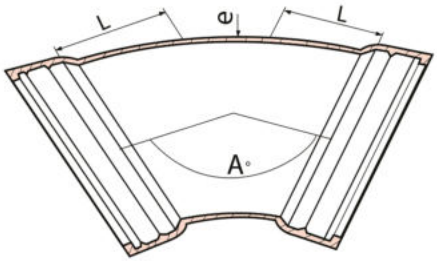
† Designed based on factory standards



Double flanged bend

A / DN	11/25°					22/5°					45°					90°				
	L mm	e mm	m (Kg) PN 10	m (Kg) PN 16	m (Kg) PN 25	L mm	e mm	m (Kg) PN 10	m (Kg) PN 16	m (Kg) PN 25	L mm	e mm	m (Kg) PN 10	m (Kg) PN 16	m (Kg) PN 25	L mm	e mm	m (Kg) PN 10	m (Kg) PN 16	m (Kg) PN 25
80	113	7	9	9	10	130	7	10	10	11	130	7	10	10	11	165	7	10	10	11
100	115	7/2	11	11	13	140	7/2	12	12	14	140	7/2	12	12	14	180	7/2	12	12	14
150	113	7/8	17	17	20	160	7/8	19	19	23	160	7/8	19	19	23	220	7/8	21	21	25
200	132	8/4	26	25	31	180	8/4	29	28	36	180	8/4	29	28	35	260	8/4	33	32	39
250	165	9	39	37	49	106	9	32	31	42	360	9	58	57	70	350	9	53	52	65
300	175	9/6	53	52	68	210	9/6	56	56	73	400	9/6	81	81	100	400	9/6	75	74	92
350	191	10/2	67	70	100	131	10/2	56	59	88	298	10/2	85	88	120	450	10/2	100	103	138
400	104	10/8	61	68	98	149	10/8	71	78	109	324	10/8	109	116	150	500	10/8	132	139	175
500	121	12	88	112	144	176	12	103	128	161	375	12	156	181	220	600	12	193	218	261
600	138	13/2	124	171	211	203	13/2	148	195	237	426	13/2	226	274	323	700	13/2	286	334	389
700	154	14/4	174	193	278	234	14/4	211	230	319	478	14/4	320	339	439	800	14/4	410	429	538
800 †	171	15/6	237	259	381	256	15/6	283	306	433	529	15/6	431	454	595	750	15/6	476	498	540
900 †	185	16/8	292	285	397/5	285	16/8	360	353/5	466	581	16/8	551/5	624	657	1000	16/8	729	858	835
1000	201	18	403	395	529	327	18	505	497	631	535	18	662	826	789	1100	18	976	1136	1102
1100	213	19/2	470	460	616	333	19/2	585	525	730	578	19/2	803	793	941	1193	19/2	1204	1194	1350
1200	231	20/4	611	705	762	331	20/4	721	850	872	631	20/4	1033	1230	1184	1301	20/4	1538	1750	1689

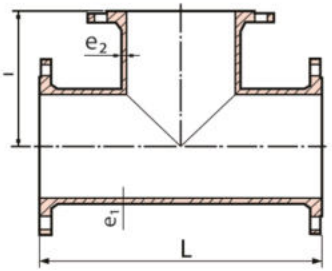
† 90 degree bend with 800 DN and 45 degree bend with 900 DN have been designed based on factory standards.



Double socket bend

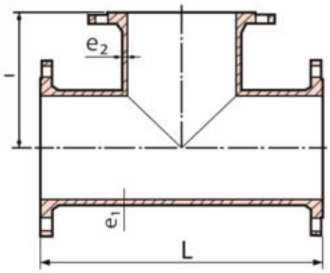
A / DN	11/25°			22/5°			45°			90°		
	L mm	e mm	m Kg	L mm	e mm	m Kg	L mm	e mm	m Kg	L mm	e mm	m Kg
80	30	7	7	40	7	7	55	7	7	100	7	8
100	30	7/2	8/5	40	7/2	9	65	7/2	10	120	7/2	11
150	35	7/8	14	55	7/8	15	85	7/8	16	170	7/8	20
200	40	8/4	23	65	8/4	25	110	8/4	28	220	8/4	34
250	50	9	31	75	9	34	130	9	38	270	9	49
300	55	9/6	42	85	9/6	46	150	9/6	54	320	9/6	70
350 †	60	10/2	53	95	10/2	59	175	10/2	72	370	10/2	95
400 †	65	10/8	64	110	10/8	74	195	10/8	92	420	10/8	126
500 †	75	12	93	130	12	108	240	12	136	520	12	189
600 †	85	13/2	130	150	13/2	153	285	13/2	199	620	13/2	282
700 †	95	14/4	205	175	14/4	242	330	14/4	309	720	14/4	431
800 †	110	15/6	295	195	15/6	342	370	15/6	433	670	15/6	565
900 †	120	16/8	336/5	220	16/8	405	415	16/8	529/5	935	16/8	778
1000 †	130	18	423	256	18	526	464	18	683	1029	18	1090

† Designed based on factory standards



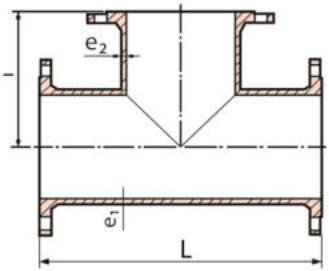
All flanged tee-Series A

DN	dn	L mm	l mm	K12					K14				
				e1 mm	e2 mm	m (kg)			e1 mm	e2 mm	m (kg)		
						PN 10	PN 16	PN 25			PN 10	PN 16	PN 25
80	80	330	165	6/9	6/9	15	15	15	8/1	8/1	16	16	16
100	80	360	175	7/2	6/9	18	18	19	8/4	8/1	19	19	20
100	100	360	180	7/2	7/2	19	19	20	8/4	8/4	20	20	21
150	80	440	205	7/8	6/9	27	27	29	9/1	8/1	29	29	31
150	100	440	210	7/8	7/2	28	28	30	9/1	8/4	30	30	32
150	150	440	220	7/8	7/8	31	31	34	9/1	9/1	33	33	36
200	80	520	235	8/4	6/9	40	39	43	9/8	8/1	44	42	46
200	100	520	240	8/4	7/2	41	40	45	9/8	8/4	44	43	48
200	150	520	250	8/4	7/8	44	43	48	9/8	9/1	48	47	51
200	200	520	260	8/4	8/4	48	47	53	9/8	9/8	52	50	56
250	80	500	265	9/0	6/9	53	51	58	10/5	8/1	56	55	62
250	100	700	275	9/0	7/2	64	63	70	10/5	8/4	70	68	76
250	150	700	300	9/0	7/8	68	66	74	10/5	9/1	73	72	80
250	200	700	325	9/0	8/4	72	71	79	10/5	9/8	79	77	86
250	250	700	350	9/0	9/0	79	77	87	10/5	10/5	86	83	94
300	80	550	290	9/6	6/9	70	69	80	11/2	8/1	73	73	83
300	100	800	300	9/6	7/2	88	87	98	11/2	8/4	94	93	104
300	150	800	325	9/6	7/8	92	91	102	11/2	9/1	98	97	109
300	200	800	350	9/6	8/4	96	95	107	11/2	9/8	103	101	114
300	250	800	375	9/6	9/0	102	101	115	11/2	10/5	110	108	122
300	300	800	400	9/6	9/6	110	109	125	11/2	11/2	117	116	132



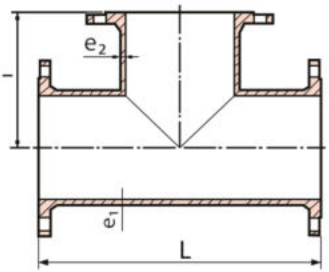
All flanged tee-Series A

DN	dn	L mm	l mm	K12					K14				
				e1 mm	e2 mm	m (kg)			e1 mm	e2 mm	m (kg)		
						PN 10	PN 16	PN 25			PN 10	PN 16	PN 25
350	80	600	325	10/2	6/9	89	92	113	11/9	8/1	96	99	120
350	100	850	325	10/2	7/2	110	114	135	11/9	8/4	121	124	146
350	150	850	325	10/2	7/8	113	116	138	11/9	9/1	124	127	149
350	200	850	325	10/2	8/4	116	119	142	11/9	9/8	127	130	153
350	250	850	325	10/2	9	120	123	148	11/9	10/5	131	134	158
350	300	850	425	10/2	9/6	132	135	161	11/9	11/2	143	146	172
350	350	850	425	10/2	10/2	138	143	174	11/9	11/9	150	155	187
400	80	650	350	10/8	6/9	110	119	137	12/6	8/1	119	128	146
400	100	900	350	10/8	7/2	136	146	164	12/6	8/4	149	159	177
400	150	900	350	10/8	7/8	139	149	167	12/6	9/1	152	162	180
400	200	900	350	10/8	8/4	142	151	171	12/6	9/8	155	165	184
400	250	900	350	10/8	9	146	155	176	12/6	10/5	159	169	189
400	300	900	450	10/8	9/6	157	167	189	12/6	11/2	171	181	203
400	350	900	450	10/8	10/2	162	174	202	12/6	11/9	177	190	217
400	400	900	450	10/8	10/8	169	183	210	12/6	12/6	184	199	226
500	80	1000	400	12	6/9	198	228	242	14	8/1	219	249	262
500	100	1000	400	12	7/2	200	229	243	14	8/4	220	249	264
500	150	1000	400	12	7/8	202	231	246	14	9/1	222	252	267
500	200	1000	400	12	8/4	205	234	249	14	9/8	225	254	270
500	250	1000	400	12	9	208	237	255	14	10/5	229	258	275
500	300	1000	500	12	9/6	219	248	267	14	11/2	240	270	288
500	350	1000	500	12	10/2	224	255	280	14	11/9	246	278	302
500	400	1000	500	12	10/8	230	264	287	14	12/6	252	286	309
500	500	1000	500	12	12	245	288	310	14	14	268	311	333
600	80	1100	450	13/2	6/9	281	334	348	15/4	8/1	310	365	378
600	100	1100	450	13/2	7/2	282	336	350	15/4	8/4	311	365	379
600	150	1100	450	13/2	7/8	284	338	352	15/4	9/1	313	368	381
600	200	1100	450	13/2	8/4	287	340	356	15/4	9/8	316	370	385
600	250	1100	500	13/2	9	293	346	363	15/4	10/5	323	376	393
600	300	1100	550	13/2	9/6	301	354	373	15/4	11/2	330	384	402



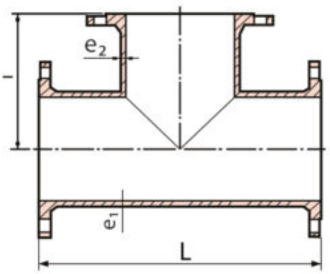
All Flanged Tee-Series A

DN	dn	L mm	l mm	K12					K14				
				e1 mm	e2 mm	m (kg)			e1 mm	e2 mm	m (kg)		
						PN 10	PN 16	PN 25			PN 10	PN 16	PN 25
600	350	1100	550	13/2	10/2	305	361	385	15/4	11/9	336	392	415
600	400	1100	550	13/2	10/8	311	369	392	15/4	12/6	341	400	422
600	500	1100	550	13/2	12	324	392	413	15/4	14	355	423	444
600	600	1100	550	13/2	13/2	342	421	443	15/4	15/4	374	453	474
700	80	650	500	14/4	6/9	258	282	336	16/8	8/1	279	303	357
700	100	650	505	14/4	7/2	259	283	338	16/8	8/4	279	304	359
700	150	650	515	14/4	7/8	262	287	342	16/8	9/1	282	307	362
700	200	650	525	14/4	8/4	265	289	345	16/8	9/8	285	309	365
700	250	650	530	14/4	9	270	294	351	16/8	10/5	289	313	370
700	300	760	540	14/4	9/6	300	324	383	16/8	11/2	323	348	406
700	350	820	550	14/4	10/2	317	345	408	16/8	11/9	345	372	435
700	400	870	555	14/4	10/8	334	363	426	16/8	12/6	363	393	455
700	500	1050	570	14/4	12	389	428	489	16/8	14	424	465	525
700	600	1200	585	14/4	13/2	441	493	554	16/8	15/4	484	536	596
700	700	1200	600	14/4	14/4	467	505	585	16/8	16/8	512	550	630
800	80	690	560	15/6	6/9	343	365	453	18/2	8/1	368	390	478
800	100	690	565	15/6	7/2	344	366	454	18/2	8/4	368	391	479
800	150	690	575	15/6	7/8	346	368	457	18/2	9/1	371	394	482
800	200	690	585	15/6	8/4	349	371	461	18/2	9/8	374	396	486
800	250	910	590	15/6	9	417	439	530	18/2	10/5	453	474	565
800	300	910	600	15/6	9/6	421	443	535	18/2	11/2	456	478	571
800	350	910	610	15/6	10/2	424	449	547	18/2	11/9	461	485	583
800	400	910	615	15/6	10/8	429	455	552	18/2	12/6	465	491	589
800	500	1150	630	15/6	12	511	545	642	18/2	14	558	593	690
800	600	1350	645	15/6	13/2	585	631	729	18/2	15/4	643	689	786
800	700	1350	660	15/6	14/4	610	642	759	18/2	16/8	668	700	818
800	800	1350	675	15/6	15/6	642	676	807	18/2	18/2	703	736	868



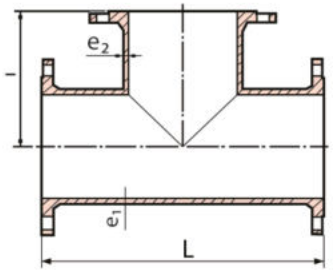
All flanged tee-Series A

DN	dn	L mm	l mm	K14				
				e1 mm	e2 mm	m (kg)		
						PN 10	PN 16	PN 25
900	80	730	620	19/6	8/1	455	447	560
900	100	730	625	19/6	8/4	456	448	561/5
900	150	730	635	19/6	9/1	458	450	564
900	200	730	645	19/6	9/8	461	510	568
900	250	950	650	19/6	10/5	554	547	662
900	300	950	660	19/6	11/2	557	550	668
900	350	950	670	19/6	11/9	564	563/5	676
900	400	950	675	19/6	12/6	563	663	684
900	500	1500	690	19/6	14	813/5	806	926/5
900	600	1500	705	19/6	15/4	839	946	951/5
900	700	1500	720	19/6	16/8	843	979	979
900	800	1500	735	19/6	18/2	827/5	859	1021/5
900	900	1500	750	19/6	19/6	903	1016	1061



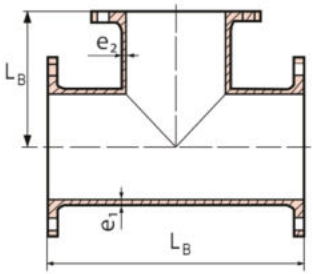
All flanged tee-Series A

DN	dn	L mm	l mm	K14				
				e1 mm	e2 mm	m (kg)		
						PN 10	PN 16	PN 25
1000	80	770	685	21	8.1	601	630	727
1000	100	770	690	21	8.4	602	592	728
1000	150	770	70	21	9.1	604	645	731
1000	200	770	705	21	9.8	607	692	734
1000	250	990	710	21	10.5	716	708	845
1000	300	990	720	21	11.2	720	708	851
1000	350	990	725	21	11.9	726	713	858
1000	400	990	735	21	12.6	731	830	867
1000	500	1320	750	21	14	910	1023	1044
1000	600	1650	765	21	15.4	1095	1227	1228
1000	700	1650	780	21	16.8	1098	1195	1254
1000	800	1650	795	21	18.2	1126	1285	1295
1000	900	1650	810	21	16.8	1153	1136	1331
1000	1000	1650	825	21	21	1213	1352	1401
1100	200	982	883	22.4	9.8	821	811	968
1100	250	982	875	22.4	10.5	825	815	973
1100	300	982	840	22.4	11.2	827	816	977
1100 †	400	982	835	22.4	12.6	837	827	993
1100 †	600	982	865	22.4	15.4	884	875	1036
1100	700	1407	900	22.4	16.8	1135	1123	1311
1100	800	1407	915	22.4	18.2	1164	1152	1353
1100	900	1407	930	22.4	19.6	1193	1180	1391
1100	1000	1407	920	22.4	21	1243	1229	1450
1100	1100	1642	907	22.4	22.4	1405	1391	1623



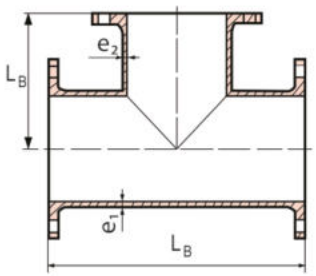
All flanged tee-Series A

DN	dn	L mm	l mm	K14				
				e1 mm	e2 mm	m (kg)		
						PN 10	PN 16	PN 25
1200	100	712	815	23/8	8/4	805	788	956
1200	200	712	825	23/8	9/8	810	791	962
1200	250	712	835	23/8	10/5	813	793	966
1200	300	767	845	23/8	11/2	853	832	1008
1200	350	767	850	23/8	11/9	858	837	1015
1200	400	767	855	23/8	12/6	862	920	1023
1200	500	1002	870	23/8	14	1036	1013	1194
1200†	600	1002	885	23/8	15/4	1060	1090	1216
1200	700	1117	900	23/8	16/8	1135	1110	1316
1200 †	800	1232	915	23/8	18/2	1235	1208	1428
1200	900	1462	930	23/8	19/6	1409	1381	1611
1200 †	1000	1462	945	23/8	21	1463	1434	1675
1200	1200	1697	975	23/8	23/8	1732	1820	1957



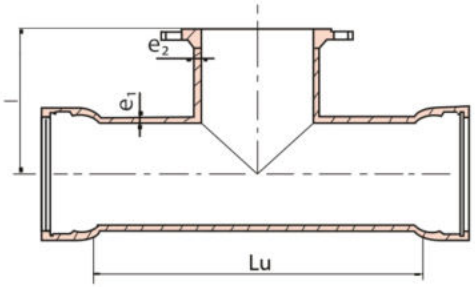
All Flanged Tee-Series B

DN	dn	L_B mm	l_B mm	K12					K14				
				e1 mm	e2 mm	m (kg) PN 10	m (kg) PN 16	m (kg) PN 25	e1 mm	e2 mm	m (kg) PN 10	m (kg) PN 16	m (kg) PN 25
80	80	330	165	6/9	6/9	15	15	15	8/1	8/1	16	16	16
100	80	330	170	7/2	6/9	17	17	18	8/4	8/1	18	18	19
100	100	360	180	7/2	7/2	19	19	20	8/4	8/4	20	20	21
150	80	360	200	7/8	6/9	25	25	27	9/1	8/1	26	26	28
150	100	380	205	7/8	7/2	23	26	28	9/1	8/4	28	28	30
150	150	440	220	7/8	7/8	31	31	34	9/1	9/1	33	33	36
200	80	380	225	8/4	6/9	34	33	37	9/8	8/1	37	36	40
200	100	400	230	8/4	7/2	36	35	40	9/8	8/4	38	37	42
200	150	460	245	8/4	7/8	41	40	45	9/8	9/1	45	44	48
200	200	520	260	8/4	8/4	48	47	53	9/8	9/8	52	50	56
250	80	405	265	9/0	6/9	48	46	53	10/5	8/1	50	49	56
250	100	425	270	9/0	7/2	49	48	55	10/5	8/4	53	51	59
250	150	485	280	9/0	7/8	56	54	62	10/5	9/1	59	58	66
250	200	540	290	9/0	8/4	62	61	69	10/5	9/8	67	65	74
250	250	600	300	9/0	9/0	71	69	79	10/5	10/5	77	74	85
300	80	425	295	9/6	6/9	61	60	71	11/2	8/1	63	63	73
300	100	450	300	9/6	7/2	64	63	74	11/2	8/4	66	65	76
300	150	505	310	9/6	7/8	71	70	81	11/2	9/1	74	73	85
300	200	565	320	9/6	8/4	79	78	90	11/2	9/8	83	81	94
300	250	620	330	9/6	9/0	87	86	100	11/2	10/5	93	91	105
300	300	680	340	9/6	9/6	98	97	113	11/2	11/2	103	102	118



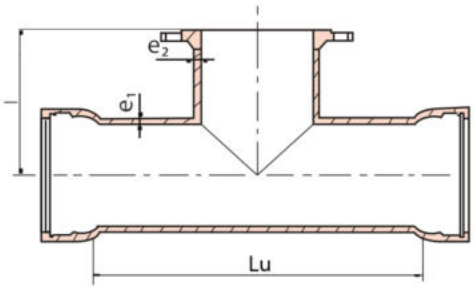
All Flanged Tee-Series B

DN	dn	L_B mm	l_B mm	K12					K14				
				e_1 mm	e_2 mm	m (kg)			e_1 mm	e_2 mm	m (kg)		
						PN 10	PN 16	PN 25			PN 10	PN 16	PN 25
350	80	445	325	10/2	6/9	76	79	100	11/9	8/1	81	84	105
350	100	470	330	10/2	7/2	78	82	103	11/9	8/4	84	87	109
350	150	530	340	10/2	7/8	86	89	111	11/9	9/1	93	96	118
350	200	585	350	10/2	8/4	95	98	121	11/9	9/8	102	105	128
350	250	645	360	10/2	9	104	107	132	11/9	10/5	113	116	140
350	350	760	380	10/2	10/2	127	132	163	11/9	11/9	137	142	174
400	80	470	355	10/8	6/9	92	101	119	12/6	8/1	98	107	125
400	100	490	360	10/8	7/2	94	104	122	12/6	8/4	101	111	129
400	150	550	370	10/8	7/8	104	114	132	12/6	9/1	111	121	139
400	200	610	380	10/8	8/4	114	123	143	12/6	9/8	122	132	151
400	250	665	390	10/8	9	124	133	154	12/6	10/5	134	144	164
400	300	725	400	10/8	9/6	136	146	168	12/6	11/2	146	156	178
400	400	840	420	10/8	10/8	160	174	201	12/6	12/6	173	188	215
500	100	535	420	12	7/2	135	164	178	14	8/4	144	173	188
500	150	592	430	12	7/8	145	174	189	14	9/1	156	186	201
500	200	650	440	12	8/4	157	186	201	14	9/8	169	198	214
500	300	767	460	12	9/6	183	212	231	14	11/2	199	229	247
500	400	885	480	12	10/8	212	246	269	14	12/6	231	265	288
500	500	1000	500	12	12	245	288	310	14	14	268	311	333
600	100	700	500	13/2	7/2	209	263	277	15/4	8/4	226	280	294
600	200	700	500	13/2	8/4	215	268	284	15/4	9/8	232	286	301
600	300	815	520	13/2	9/6	246	299	318	15/4	11/2	266	320	338
600	400	930	540	13/2	10/8	278	336	356	15/4	12/6	303	362	384
600	500	1047	560	13/2	12	316	384	405	15/4	14	345	413	434
600	600	1165	580	13/2	13/2	360	439	461	15/4	15/4	394	473	494



Double socket with flanged tee

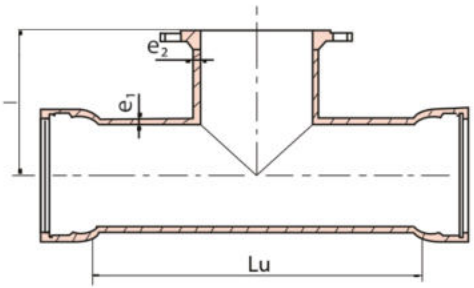
DN	dn	Lu mm	l mm	K12					K14				
				e1 mm	e2 mm	m (kg)			e1 mm	e2 mm	m (kg)		
						PN 10	PN 16	PN 25			PN 10	PN 16	PN 25
80	80	170	165	7/0	7/0	13	13	13	8/1	8/1	13	13	13
100	80	170	175	7/2	7/0	15	15	15	8/4	8/1	16	16	16
	100	190	180	7/2	7/2	16	16	17	8/4	8/4	17	17	17
150	150	255	220	7/8	7/8	28	28	28	9/1	9/1	29	29	30
	100	195	210	7/8	7/2	23	23	23	9/1	8/4	24	24	24
	80	170	205	7/8	7/0	21	21	21	9/1	8/1	22	22	22
200	200	315	260	8/4	8/4	45	45	46	9/8	9/8	47	47	49
	150	255	250	8/4	7/8	38	38	39	9/8	9/1	40	40	41
	100	200	240	8/4	7/2	33	33	34	9/8	8/4	35	35	35
	80	175	235	8/4	7/0	31	31	31	9/8	8/1	32	32	32
250	250	375	300	9/0	9/0	64	63	66	10/5	10/5	67	67	70
	200	315	290	9/0	8/4	55	54	56	10/5	9/8	58	57	59
	150	260	280	9/0	7/8	48	48	49	10/5	9/1	50	50	51
	100	200	270	9/0	7/2	42	42	42	10/5	8/4	43	43	44
	80	180	265	9/0	7/0	40	40	40	10/5	8/1	41	41	41
300	300	435	340	9/6	9/6	88	88	93	11/2	11/2	92	91	97
	250	380	330	9/6	9/0	77	77	80	11/2	10/5	82	81	84
	200	320	320	9/6	8/4	68	68	70	11/2	9/8	72	71	73
	150	260	310	9/6	7/8	60	60	61	11/2	9/1	63	63	64
	100	205	300	9/6	7/2	54	54	54	11/2	8/4	56	56	56
	80	180	295	9/6	7/0	51	51	51	11/2	8/1	53	53	53



Double socket with flanged tee

DN	dn	Lu mm	l mm	K12					K14				
				e1 mm	e2 mm	m (kg) PN 10	m (kg) PN 16	m (kg) PN 25	e1 mm	e2 mm	m (kg) PN 10	m (kg) PN 16	m (kg) PN 25
350	80	185	325	10/2	7/0	63	63	63	11/9	8/1	65	65	65
	100	205	330	10/2	7/2	65	65	66	11/9	8/4	68	68	68
	150	270	340	10/2	7/8	74	74	75	11/9	9/1	77	77	78
	200	325	350	10/2	8/4	82	82	84	11/9	9/8	87	86	88
	250	385	360	10/2	9/0	92	92	95	11/9	10/5	98	97	101
	300	420	370	10/2	9/6	113	113	118	11/9	11/2	121	120	126
	350	495	380	10/2	10/2	113	114	125	11/9	11/9	120	122	132
400	80	185	355	10/8	7/0	73	73	73	12/6	8/1	75	75	75
	100	210	360	10/8	7/2	77	77	77	12/6	8/4	80	80	80
	150	270	370	10/8	7/8	86	86	87	12/6	9/1	90	90	91
	200	325	380	10/8	8/4	95	95	97	12/6	9/8	101	100	102
	250	385	390	10/8	9/0	106	106	109	12/6	10/5	113	112	116
	300	440	400	10/8	9/6	118	117	123	12/6	11/2	124	124	129
	350	480	410	10/8	10/2	119	121	132	12/6	11/9	126	128	138
	400	560	420	10/8	10/8	143	146	156	12/6	12/6	153	156	166
500 †	100	215	420	12/0	7/2	110	110	111	14/0	8/4	115	115	116
	200	330	440	12/0	8/4	130	130	131	14/0	9/8	137	136	138
	400	565	480	12/0	10/8	185	189	199	14/0	12/6	198	202	212
	500	680	500	12/0	12/0	218	230	240	14/0	14/0	235	247	257
600 †	200	340	500	13/2	8/4	174	174	175	15/4	9/8	183	183	185
	250	380	500	13/2	9/0	226	225	229	15/4	10/5	237	236	239
	400	570	540	13/2	10/8	237	240	250	15/4	12/6	256	259	269
	600	800	580	13/2	13/2	317	341	351	15/4	15/4	343	367	377

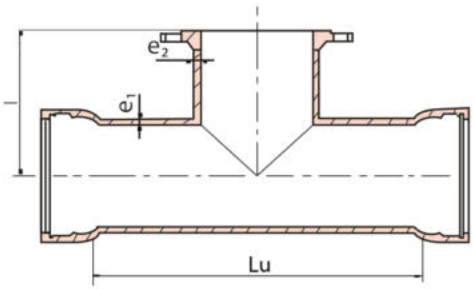
† Other sizes of the same family can be manufactured at the order of customers.



Double socket with flanged tee

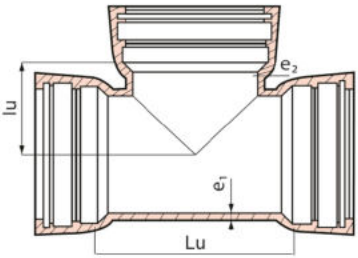
DN	dn	Lu mm	l mm	K12					K14				
				e1 mm	e2 mm	m (kg) PN 10	m (kg) PN 16	m (kg) PN 25	e1 mm	e2 mm	m (kg) PN 10	m (kg) PN 16	m (kg) PN 25
700 †	200	345	525	14/4	8/4	253	252	254	16/8	9/8	264	263	265
	400	575	555	14/4	10/8	323	327	337	16/8	12/6	344	347	358
	700	925	600	14/4	14/4	461	471	501	16/8	16/8	497	507	537
800 †	200	350	585	15/6	8/4	343	343	345	18/2	9/8	357	356	358
	400	580	615	15/6	10/8	427	430	441	18/2	12/6	451	455	465
	600	810	645	15/6	13/2	592	616	626	18/2	15/4	637	661	671
	800	1045	675	15/6	15/6	648	659	702	18/2	18/2	697	709	752
900	200	355	645	-	-	-	-	-	19/6	9/8	-	403/5	-
	400	590	675	-	-	-	-	-	19/6	12/6	-	516/5	-
	600	1170	705	-	-	-	-	-	19/6	15/4	-	799	-
	900	1170	750	-	-	-	-	-	19/6	19/6	-	862	-
1000	200	360	705	-	-	-	-	-	21	9/8	-	495	-
	400	595	735	-	-	-	-	-	21	12/6	-	625	-
	600	1290	765	-	-	-	-	-	21	15/4	-	1006	-
	1000	1290	825	-	-	-	-	-	21	21	-	1117	-

† Other sizes of the same family can be manufactured at the order of customers.



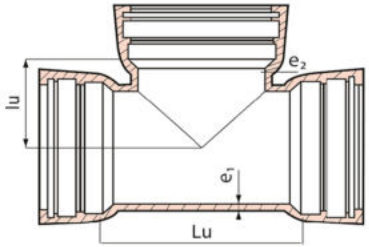
Double socket with flanged tee

DN	dn	Lu mm	l mm	K14				
						m (kg)		
				e1 mm	e2 mm	PN 10	PN 16	PN 25
900	200	355	645	19/6	9/8	-	403/5	-
	400	590	675	19/6	12/6	-	516/5	-
	600	1170	705	19/6	15/4	-	799	-
	900	1170	750	19/6	19/6	-	862	-
1000	200	360	705	21	9/8	-	495	-
	400	595	735	21	12/6	-	625	-
	600	1290	765	21	15/4	-	1006	-
	1000	1290	825	21	21	-	1117	-



All socket tee

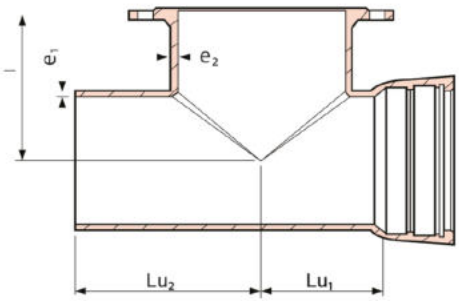
DN	dn	Lu mm	lu mm	K12			K14		
				e1 mm	e2 mm	m kg	e1 mm	e2 mm	m Kg
80	80	170	85	6/9	6/9	12	8/1	8/1	12
100	100	190	95	7/2	7/2	15	8/4	8/4	16
100	80	170	95	7/2	6/9	14	8/4	8/1	14
150	150	255	125	7/8	7/8	26	9/1	9/1	27
150	100	195	120	7/8	7/2	21	9/1	8/4	22
150	80	170	120	7/8	6/9	20	9/1	8/1	21
200	200	315	155	8/4	8/4	43	9/8	9/8	45
200	150	255	150	8/4	7/8	36	9/8	9/1	38
200	100	200	145	8/4	7/2	32	9/8	8/4	33
200	80	175	145	8/4	6/9	30	9/8	8/1	31
250	250	375	190	9	9	60	10/5	10/5	63
250	200	315	180	9	8/4	53	10/5	9/8	55
250	150	260	175	9	7/8	46	10/5	9/1	48
250	100	200	170	9	7/2	40	10/5	8/4	42
250	80	180	170	9	6/9	39	10/5	8/1	40



All socket tee

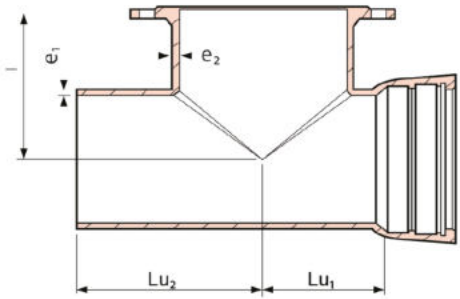
DN	dn	Lu mm	lu mm	K12			K14		
				e1 mm	e2 mm	m kg	e1 mm	e2 mm	m Kg
300	300	435	220	9/6	9/6	82	11/2	11/2	87
300	250	375	210	9/6	9	73	11/2	10/5	77
300	200	320	205	9/6	8/4	66	11/2	9/8	69
300	150	260	200	9/6	7/8	58	11/2	9/1	60
300	100	205	195	9/6	7/2	52	11/2	8/4	54
350 †	350	500	255	10/2	10/2	108	11/9	11/9	114
400 †	400	560	280	10/8	10/8	134	12/6	12/6	142
500 †	500	680	340	12	12	204	14	14	219
600 †	600	800	400	13/2	13/2	297	15/4	15/4	319
700 †	700	920	460	14/4	14/4	457	16/8	16/8	490
800 †	800	1045	523	15/6	15/6	650	18/2	18/2	695

† Designed based on factory standards
All fittings of various sizes in each category can be produced at the request and order of customers.



Socket - spigot with flanged tee

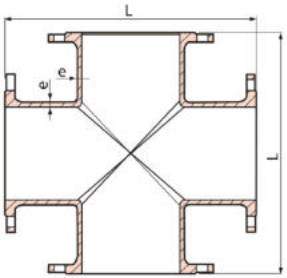
DN	dn	e1 mm	Lu1 mm	Lu2 mm	e2 mm	l mm	m (kg)	
							PN 10	PN 16
100	80	8/7	85	272	8/1	175	16	16
150	100	9/4	97/5	272/5	8/4	210	23	23
150	80	9/4	85	257	8/1	205	21	21
200	150	10/1	127/5	312/5	9/1	250	38	38
200	100	10/1	100	260	8/4	240	31	31
200	80	10/1	87/5	244/5	8/1	235	29	29
250	200	10/8	157/5	352/5	9/8	290	57	56
250	150	10/8	130	300	9/1	280	48	48
250	100	10/8	100	265	8/4	270	40	40
250	80	10/8	90	257	8/1	265	38	38
300	250	11/6	190	395	10/5	330	79	79
300	200	11/6	160	340	9/8	320	68	67
300	150	11/6	130	285	9/1	310	57	57
300	100	11/6	102/5	237/5	8/4	300	48	48
300	80	11/6	90	242	8/1	295	46	46
350	80	12/3	92/5	229/5	8/1	325	56	56
350	100	12/3	102/5	247/5	8/4	330	60	60
350	150	12/3	135	305	9/1	340	72	72
350	200	12/3	162/5	327/5	9/8	350	81	80
350	250	12/3	192/5	382/5	10/5	360	94	93



Socket - spigot with flanged tee †

DN	dn	e1 mm	Lu1 mm	Lu2 mm	e2 mm	l mm	m (kg)	
							PN 10	PN 16
400	80	13/0	92/5	214/5	8/1	355	63	63
400	100	13/0	105	235	8/4	360	68	68
400	150	13/0	135	290	9/1	370	81	81
400	200	13/0	162/5	317/5	9/8	380	92	91
400	250	13/0	192/5	372/5	10/5	390	107	106
400	300	13/0	220	420	11/2	400	121	121
500	100	14/4	107/5	227/5	8/4	420	96	96
500	200	14/4	165	335	9/8	440	127	126
500	400	14/4	282/5	527/5	12/6	480	200	204
600	200	15/9	170	310	9/8	500	160	160
600	400	15/9	285	500	12/6	540	247	251
700	200	17/3	172/5	309/5	9/8	525	215	214
700	400	17/3	187/5	449/5	12/6	555	330	334
800	200	18/8	175	292	9/8	585	271	270
800	400	18/8	290	522	12/6	615	405	409
800	600	18/8	522/5	859/5	15/4	645	628	652

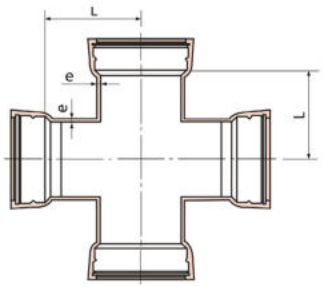
† Designed based on factory standards
This fitting can be manufactured at 25 Bar work pressure at the request of customers.



All flanged cross

DN	dn	e (mm)	L (mm)	m (kg)		
				PN 10	PN 16	PN 25
80	80	8/1	330	21	21	21
100	100	8/4	360	25	25	27
150	150	9/1	440	42	42	46
200	200	9/8	520	65	63	71
250	250	10/5	700	107	104	118
300	300	11/2	800	146	144	165
350	350	11/9	850	185	191	234
400	400	12/6	900	225	239	280
500	500	14	1000	321	370	407
600	600	15/4	1100	441	536	576
700	700	16/8	1200	-	670	-
800	800	18/2	1350	-	809	-

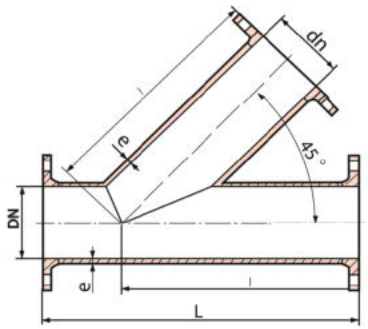
This type of cross can be produced with various sized flanges at the request of customers.



All socket cross †

DN	dn	e (mm)	L (mm)	m (kg)
80	80	8/1	85	16
100	100	8/4	95	20
150	150	9/1	125	34
200	200	9/8	155	57
250	250	10/5	190	79
300	300	11/2	220	107
350	350	11/9	255	139
400	400	12/6	280	170
500	500	14	340	256

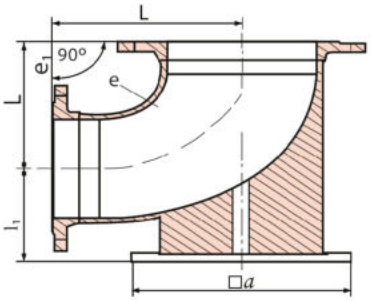
† Designed based on factory standards
This type of cross can be produced with various sized sockets at the request of customers.



All flanged tee with 45º branch †

DN	dn	e mm	L mm	l mm	m (Kg)	
					PN 10	PN 16
80	80	7	360	280	18	18
100	100	7/2	400	310	21	21
150	150	7/8	500	390	37	37
200	200	8/4	600	470	59	58
250	250	9	700	550	88	86
300	300	9/6	930	715	138	136
350	350	10/2	900	700	161	166
400	400	10/8	1000	800	208	219

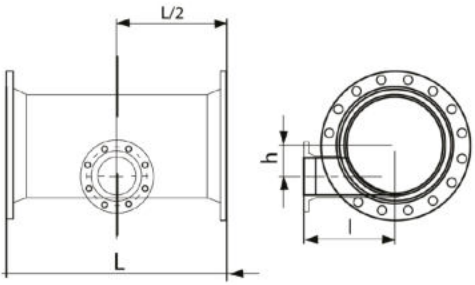
† Designed based on factory standards
All fittings of various sizes in each category can be produced at the request and order of customers.



Double flanged duckfoot bend

A / DN	L mm	e mm	l1 mm	a mm	m (Kg)	
					PN10	PN16
80	165	7	110	180	15	15
100	180	7/2	125	200	19	19
150	220	7/8	160	250	34	34
200	260	8/4	190	300	58	57
250	350	9	225	350	90	88
300	400	9/6	255	400	127	126
350	450	10/2	290	450	170	173
400	500	10/8	320	500	219	227
500	600	12	385	600	338	363
600	700	13/2	450	700	572	625

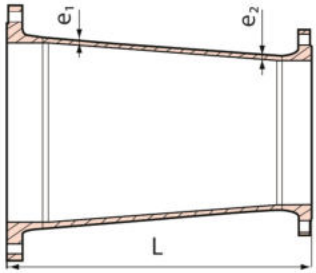
Note: This fitting can be manufactured at 25 Bar work pressure at the request of customers.



All flanged inverted tee †

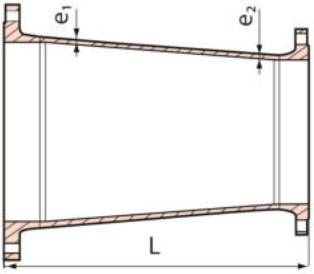
DN	dn	e_1 mm	e_2 mm	L mm	l m	h mm	m (kg)		
							PN 10	PN 16	PN 25
200	100	9/8	8/4	520	250	52	44	44	49
250	150	10/5	9/1	700	265	51	77	78	85
300	100	11/2	8/4	800	305	104	94	95	105
	150	11/2	9/1	800	305	78	96	98	106
	250	11/2	10/5	800	320	26	103	104	117
350	250	11/9	10/5	850	340	52	130	134	157
400	100	12/6	8/4	900	365	155/5	150	157	185
	150	12/6	9/1	900	365	129/5	153	160	180
	300	12/6	11/2	900	380	51	165	172	197
500	300	14	11/2	1000	450	103	236	262	285
600	150	15/4	9/1	1100	450	232/5	314	362	381
	200	15/4	9/8	1100	450	206/5	320	368	388
	300	15/4	10/5	1100	580	154/5	326	374	397
700	350	16/8	11/9	815	525	180	346	368	436
800	150	18/2	9/1	690	500	336	374	396	485
900	150	-	-	730	580	381/2	464	480	570
	200	-	-	730	580	355/3	466	590	573
	400	-	-	950	680	253/5	579	572	695
1000	300	11/2	9/1	990	650	354	726	718	857
1200	200	11/2	10/5	592	750	507	742	727	894
	250	11/9	10/5	900	750	482	947	930	1101
	300	12/6	8/4	767	750	456	862	847	1017
	1000	12/6	9/1	1500	850	101	1449	1429	1661

† Designed based on factory standards
This type of cross can be produced with various sized sockets at the request of customers.



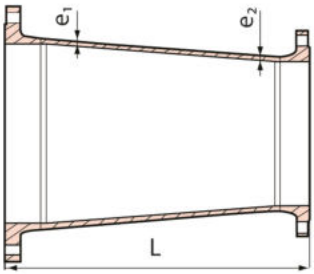
Double flanged taper

DN	dn	e1 mm	e2 mm	L mm	m (kg)		
					PN 10	PN 16	PN 25
100	80	7/2	7	200	10	10	11
150	80	7/8	7	200	14	14	15
150	100	7/8	7/2	200	14	14	16
200	80	8/4	7	300	21	21	23
200	100	8/4	7/2	300	22	21	24
200	150	8/4	7/8	300	25	25	28
250	80	9	7	300	24	24	27
250	100	9	7/2	300	28	27	31
250	150	9	7/8	300	32	31	36
250	200	9	8/4	300	35	34	40
300	80	9/6	7	300	38	37	44
300	100	9/6	7/2	300	38	37	44
300	150	9/6	7/8	300	42	42	48
300	200	9/6	8/4	300	47	46	53
300	250	9/6	9	300	48	46	56
350	150	10/2	7/8	600	62	64	78
350	200	10/2	8/4	300	50	51	64
350	250	10/2	9	300	56	57	71
350	300	10/2	9/6	300	59	60	77
400	150	10/8	7/8	750	83	87	99
400	200	10/8	8/4	300	57	60	73
400	250	10/8	9	300	63	66	80
400	300	10/8	9/6	300	71	74	90
400	350	10/8	10/2	300	72	78	101



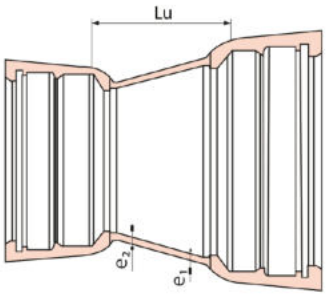
Double flanged taper

DN	dn	e1 mm	e2 mm	L mm	m (kg)		
					PN 10	PN 16	PN 25
500	200	12	8/4	800	116	129	142
500	250	12	9	700	116	129	143
500	300	12	9/6	600	113	126	142
500	350	12	10/2	600	124	139	161
500	400	12	10/8	600	134	152	173
600	250	13/2	9	900	168	193	208
600	300	13/2	9/6	600	140	165	181
600	350	13/2	10/2	600	149	177	200
600	400	13/2	10/8	600	162	191	213
600	500	13/2	12	600	177	217	238
700	300	14/4	9/6	900	214	224	262
700	350	14/4	10/2	700	200	212	256
700	400	14/4	10/8	600	196	210	253
700	500	14/4	12	600	212	236	278
700	600	14/4	13/2	600	270	307	351
800	400	15/6	10/8	600	239	254	311
800	500	15/6	12	600	256	281	337
800	600	15/6	13/2	600	282	319	377
800	700	15/6	14/4	600	306	328	409
900	200	16/8	8/4	1600	379	375	433/5
900	300	16/8	9/6	1400	374	370/5	432/5
900	400	16/8	10/8	1200	368	364	431/5
900	500	16/8	12	1000	363	415	424
900	600	16/8	13/2	800	354	420	414
900	700	16/8	14/4	600	311	347	395
900	800	16/8	15/6	600	343	373	440/5



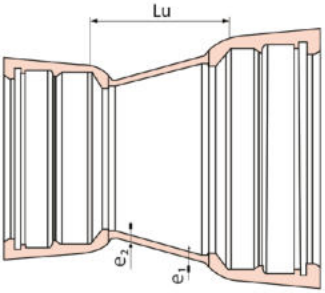
Double flanged taper

DN	dn	e1 mm	e2 mm	L mm	m (kg)		
					PN 10	PN 16	PN 25
1000	400	18	10/8	1400	490	550	565
1000	600	18	13/2	1000	475	504	546
1000	700	18	14/4	800	432	464	526
1000	800	18	15/6	950	522	470	630
1000	900	19	16/8	600	429	455	545
1100	700	19/2	14/4	1000	545	538	649
1100	800	19/2	15/6	800	513	505	630
1100	900	19/2	16/8	700	506	497	631
1100	1000	19/2	18	600	520	520	656
1200	600	20/4	13/2	1530	796	789	879
1200	800	20/4	15/6	1160	739	870	858
1200	1000	20/4	18	790	680	760	819



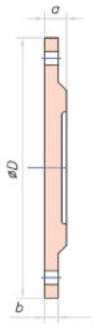
Double socket tyton taper

DN	dn	e1 mm	e2 mm	lu mm	m Kg
100	80	7/2	7	90	9
150	80	7/8	7	190	14
150	100	7/8	7/2	150	14
200	100	8/4	7/2	250	23
200	150	8/4	7/8	150	23
250	150	9	7/8	250	32
250	200	9	8/4	150	33
300	100	9/6	7/2	430	43
300	150	9/6	7/8	350	44
300	200	9/6	8/4	250	45
300	250	9/6	9	150	43
350	150	10/2	7/8	460	58
350	200	10/2	8/4	360	60
350	250	10/2	9	260	58
350	300	10/2	9/6	160	56
400	150	10/8	7/8	560	73
400	200	10/8	8/4	460	74
400	250	10/8	9	360	74
400	300	10/8	9/6	260	72
400	350	10/8	10/2	160	69



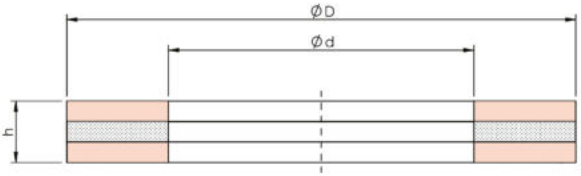
Double socket tyton taper

DN	dn	e_1 mm	e_2 mm	lu mm	m Kg
500	100	12	7/2	860	116
500	150	12	7/8	760	115
500	200	12	8/4	660	115
500	250	12	9	560	112
500	300	12	9/6	460	110
500	350	12	10/2	360	108
500	400	12	10/8	260	103
600	100	13/2	7/2	1060	174
600	150	13/2	7/8	960	172
600	200	13/2	8/4	860	173
600	250	13/2	9	760	169
600	300	13/2	9/6	660	166
600	350	13/2	10/2	560	161
600	400	13/2	10/8	460	157
600	500	13/2	12	260	140
700	200	14/4	8/4	1080	263
700	250	14/4	9	980	256
700	300	14/4	9/6	880	254
700	350	14/4	10/2	780	248
700	500	14/4	12	480	227
700	600	14/4	13/2	280	207
800	400	15/6	10/8	880	347
800	500	15/6	12	680	328
800	600	15/6	13/2	480	307
800	700	15/6	14/4	280	297
900	700	16/8	14/4	480	350
900	800	16/8	15/6	280	322
1000	800	18	15/6	480	434
1000	900	18	16/8	280	400



Blank Flange

DN	PN 10				PN 16				PN 25			
	D	a	b	m (kg)	D	a	b	m (kg)	D	a	d	m Kg
80	200	19	16	3	200	19	16	3	200	19	16	3
100	220	19	16	4	220	19	16	4	235	19	16	4/5
150	285	19	16	7	285	19	16	8	300	20	17	8
200	340	20	17	10	340	20	17	12	360	22	19	13
250	400	22	19	16	400	22	19	18/5	425	24/5	21/5	21
300	455	24/5	20/5	22	455	24/5	20/5	26/5	485	27/5	23/5	30
350	505	24/5	20/5	29	520	26/5	22/5	32/5	555	30	26	44
400	565	24/5	20/5	38	580	28	24	40	620	32	28	60
500	670	26	5	58	715	31/5	27/5	85	730	36/5	32/5	95/5
600	780	30	25	88/5	840	36	31	133	845	42	37	148
700	895	32/5	27/5	126	910	39/5	34/5	172	960	46/5	41/5	213
800	1015	35	30	178	1025	43	38	240	1085	51	46	301
900	1115	37/5	32/5	229/5	1125	46/5	41/5	315	1185	55/5	50/5	400
1000	1230	40	35	303	1255	50	45	426	1320	60	55	545
1100	1340	42/5	37/5	401	1355	53/5	48/5	514	1420	64/5	59/5	690/5
1200	1455	45	40	514/5	1485	57	52	669/5	1530	69	64	877



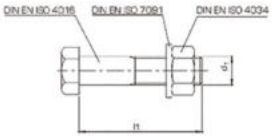
Flanged Gasket

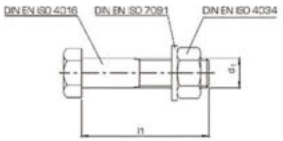
DN	d	D PN 10	D PN 16	D PN 25	D PN 40
80	89	142	142	142	142
100	115	163	162	168	168
150	169	218	218	224	224
200	220	273	273	284	290
250	273	328	329	340	352
300	324	378	384	400	417
350	356	438	444	457	474
400	407	489	495	514	546
450	458	539	555	564	571
500	508	594	617	624	628
600	610	695	734	731	747
700	712	810	804	833	-
800	813	917	911	942	-
900	915	1017	6011	1042	-
1000	1016	1124	1128	1154	-
1100	1120	1231	1228	1254	-
1200	1220	1341	1342	1364	-

DN	80-600	700-1200
Min h(PN<25)	3	5
Min h(PN40)	4	-

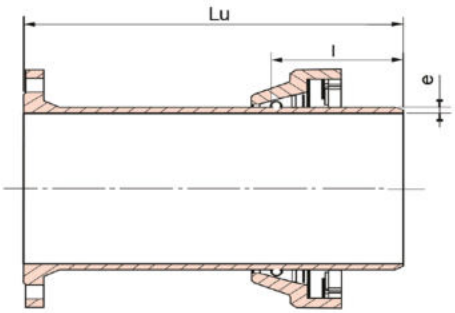
The material for production of flange washer can be NR or EPDM at the request of customers. Hardness of washers must be 60 to 70 Shore A.

Hexagon head screwst and nuts for flanges



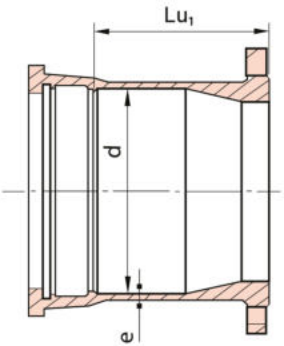


DN	PN 10			PN 16			PN 25			PN 40		
	d_1	l_1	qty per joint	d_1	l_1	qty per joint	d_1	l_1	qty per joint	d_1	l_1	qty per joint
80	*M16*	*65*	*8*	*M16*	*65*	*8*	*M16*	*65*	*8*	*M16*	*65*	*8*
100	*M16*	*65*	*8*	*M16*	*65*	*8*	*M20*	*80*	*8*	*M20*	*80*	*8*
125	*M16*	*65*	*8*	*M16*	*65*	*8*	*M24*	*100*	*8*	*M24*	*100*	*8*
150	*M20*	*80*	*8*	*M20*	*80*	*8*	*M24*	*100*	*8*	*M24*	*100*	*8*
200	*M20*	*80*	*8*	*M20*	*80*	*12*	*M24*	*100*	*12*	*M27*	*110*	*12*
250	*M20*	*80*	*12*	*M24*	*100*	*12*	*M27*	*110*	*12*	*M30*	*120*	*12*
300	*M20*	*90*	*12*	*M24*	*100*	*12*	*M27*	*100*	*16*	*M30*	*120*	*16*
350	*M20*	*90*	*16*	*M24*	*100*	*16*	*M30*	*120*	*16*	*M33*	*130*	*16*
400	*M24*	*100*	*16*	*M27*	*110*	*16*	*M33*	*130*	*16*	*M36*	*140*	*16*
450	*M24*	*100*	*20*	*M27*	*110*	*20*	*M33*	*130*	*20*	*M36*	*140*	*20*
500	*M24*	*100*	*20*	*M30*	*120*	*20*	*M33*	*130*	*20*	*M39*	*150*	*20*
600	*M27*	*110*	*20*	*M33*	*130*	*20*	*M36*	*140*	*20*	*M45*	*180*	*20*
700	*M27*	*120*	*24*	*M33*	*130*	*24*	*M39*	*150*	*24*	-	-	-
800	*M30*	*120*	*24*	*M36*	*140*	*24*	*M45*	*180*	*24*	-	-	-
900	*M30*	*130*	*28*	*M36*	*160*	*28*	*M45*	*180*	*28*	-	-	-
1000	*M33*	*140*	*28*	*M39*	*160*	*28*	*M52*	*200*	*28*	-	-	-
1200	*M36*	*160*	*32*	*M45*	*180*	*32*	*M52*	*220*	*32*	-	-	-



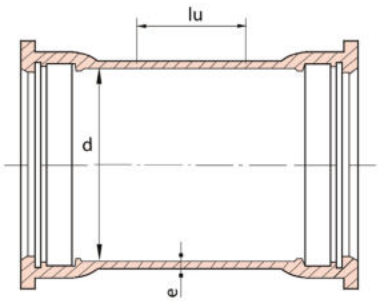
Flanged spigot R.J.Pipe

DN	e mm	l mm	Lu mm	m (kg)		
				PN 10	PN 16	PN 25
80	7	97	350	16	16	16
100	7/2	101	360	19	19	19
150	7/8	108	380	29	29	30
200	8/4	114	400	40	40	42
250	9	119	420	55	54	58
300	9/6	123	440	74	74	79
350	10/2	124	460	94	96	107
400	10/8	124	480	109	112	123
500	12	136	520	161	174	183
600	13/2	136	560	221	246	256
700	14/4	166	600	314	323	354
800	15/6	176	600	403	415	459



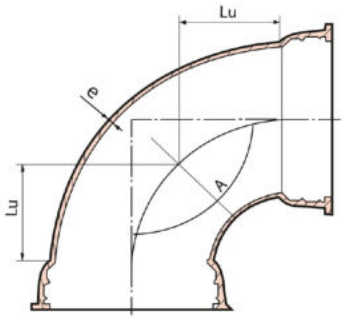
Flanged socket R.J.Pipe

DN	d mm	e mm	Lu1 mm	m (kg)		
				PN 10	PN 16	PN 25
80	109	7	160	9	9	9
100	130	7/2	160	11	11	11
150	183	7/8	165	16	16	17
200	235	8/4	170	25	25	27
250	288	9	175	34	33	37
300	340	9/6	180	43	43	48
350	393	10/2	185	53	54	65
400	445	10/8	190	65	69	79
500	550	12	200	92	104	114
600	655	13/2	210	130	154	164
700	760	14/4	220	185	195	224
800	865	15/6	230	244	255	299



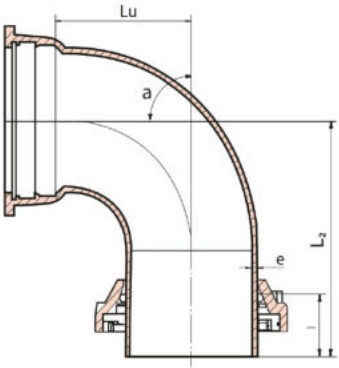
Collar tyton R.J Pipe

DN	d mm	e mm	lu mm	m Kg
80	109	7	160	9
100	130	7/2	160	11
150	183	7/8	165	17
200	235	8/4	170	28
250	288	9	175	35
300	340	9/6	180	46
350	393	10/2	185	56
400	445	10/8	190	66
500	550	12	200	95
600	655	13/2	210	131
700	760	14/4	220	193
800	865	15/6	230	241



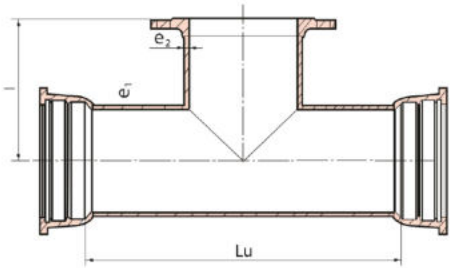
Double socket bend - R.J.Pipe

A / DN	11/25°			22/5°			45°			90°		
	Lu mm	e mm	m Kg	Lu mm	e mm	m Kg	Lu mm	e mm	m Kg	Lu mm	e mm	m Kg
80	30	7	8	40	7	8	55	7	8	100	7	9
100	30	7/2	9/5	40	7/2	10	65	7/2	11	120	7/2	12
150	35	7/8	15	55	7/8	16	85	7/8	17	170	7/8	21
200	40	8/4	25	65	8/4	27	110	8/4	30	220	8/4	36
250	50	9	33	75	9	36	130	9	40	270	9	51
300	55	9/6	44	85	9/6	48	150	9/6	56	320	9/6	72
350	60	10/2	56	95	10/2	62	175	10/2	75	370	10/2	98
400	65	10/8	67	110	10/8	77	195	10/8	95	420	10/8	129
500	75	12	97	130	12	112	240	12	140	520	12	193
600	85	13/2	136	150	13/2	159	285	13/2	205	620	13/2	288
700	95	14/4	214	175	14/4	251	330	14/4	318	720	14/4	440
800	110	15/6	305	195	15/6	352	370	15/6	443	670	15/6	580



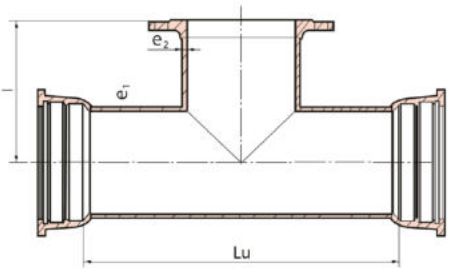
Socket-spigot bend R.J.Pipe

A / DN	11/25°					22/5°					45°					90°				
	Lu mm	L2 mm	l mm	e mm	m Kg	Lu mm	L2 mm	l m	e mm	m Kg	Lu mm	L2 mm	l mm	e mm	m Kg	Lu mm	L2 mm	l mm	e mm	m Kg
80	30	212	97	7	15	40	222	97	7	15	55	222	97	7	15	100	282	97	7	16
100	30	219	101	7/2	18	40	229	101	7/2	18	65	229	101	7/2	18	120	309	101	7/2	20
150	35	234	108	7/8	27	55	254	108	7/8	28	85	254	108	7/8	29	170	369	108	7/8	33
200	40	243	114	8/4	39	65	268	114	8/4	41	110	268	114	8/4	43	220	423	114	8/4	51
250	50	265	119	9	53	75	290	119	9	55	130	290	119	9	71	270	485	119	9	71
300	55	299	123	9/6	72	85	329	123	9/6	76	150	329	123	9/6	93	320	537	123	9/6	98
350	60	280	124	10	91	95	315	124	10/2	97	175	315	124	10/2	118	370	590	124	10/2	134
400	65	275	124	11	102	110	320	124	10/8	112	195	320	124	10/8	140	420	630	124	10/8	165
500	75	309	136	12	153	130	364	136	12	168	240	364	136	12	210	520	754	136	12	251
600	85	315	136	13	207	150	380	136	13/2	231	285	380	136	13/2	295	620	850	136	13/2	362
700	95	369	166	14	315	175	449	166	14/4	353	330	449	166	14/4	443	720	994	166	14/4	546
800	110	396	176	16	428	195	481	176	15/6	476	370	481	176	15/6	597	670	870	176	15/6	630



Double socket with flanged tee R.J.Pipe

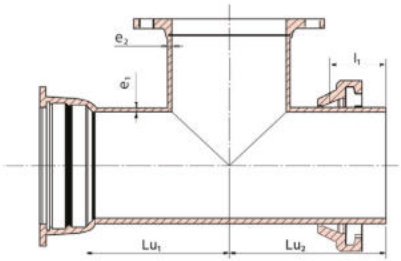
DN	dn	Lu mm	l mm	K12					K14				
				e1 mm	e2 mm	m (kg)			e1 mm	e2 mm	m (kg)		
						PN 10	PN 16	PN 25			PN 10	PN 16	PN 25
80	80	170	165	7/0	7/0	14	14	14	8/1	8/1	14	14	14
100	80	170	175	7/2	7/0	16	16	16	8/4	8/1	17	17	17
	100	190	180	7/2	7/2	17	17	18	8/4	8/4	18	18	18
150	150	255	220	7/8	7/8	29	29	29	9/1	9/1	30	30	31
	100	195	210	7/8	7/2	24	24	24	9/1	8/4	25	25	25
	80	170	205	7/8	7/0	22	22	22	9/1	8/1	23	23	23
200	200	315	260	8/4	8/4	47	47	48	9/8	9/8	49	49	51
	150	255	250	8/4	7/8	40	40	41	9/8	9/1	42	42	43
	100	200	240	8/4	7/2	35	35	36	9/8	8/4	37	37	37
	80	175	235	8/4	7/0	33	33	33	9/8	8/1	34	34	34
250	250	375	300	9/0	9/0	66	65	68	10/5	10/5	69	69	72
	200	315	290	9/0	8/4	57	56	58	10/5	9/8	60	59	61
	150	260	280	9/0	7/8	50	50	51	10/5	9/1	52	52	53
	100	200	270	9/0	7/2	44	44	44	10/5	8/4	45	45	46
	80	180	265	9/0	7/0	42	42	42	10/5	8/1	43	43	43
300	300	435	340	9/6	9/6	90	90	95	11/2	11/2	94	93	99
	250	380	330	9/6	9/0	79	79	82	11/2	10/5	84	83	86
	200	320	320	9/6	8/4	70	70	72	11/2	9/8	74	73	75
	150	260	310	9/6	7/8	62	62	63	11/2	9/1	65	65	66
	100	205	300	9/6	7/2	56	56	56	11/2	8/4	58	58	58
	80	180	295	9/6	7/0	53	53	53	11/2	8/1	55	55	55



Double socket with flanged tee R.J.Pipe

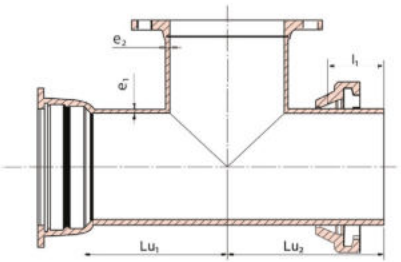
DN	dn	Lu mm	l mm	K12					K14				
				e1 mm	e2 mm	m (kg)			e1 mm	e2 mm	m (kg)		
						PN 10	PN 16	PN 25			PN 10	PN 16	PN 25
350	80	185	325	10/2	7/0	66	66	66	11/9	8/1	68	68	68
	100	205	330	10/2	7/2	68	68	69	11/9	8/4	71	71	71
	150	270	340	10/2	7/8	77	77	78	11/9	9/1	80	80	81
	200	325	350	10/2	8/4	85	85	87	11/9	9/8	90	89	91
	250	385	360	10/2	9/0	95	95	98	11/9	10/5	101	100	104
	300	420	370	10/2	9/6	115	172	127	11/9	11/2	122	179	134
	350	495	380	10/2	10/2	116	117	128	11/9	11/9	123	125	135
400	80	185	355	10/8	7/0	76	76	76	12/6	8/1	78	78	78
	100	210	360	10/8	7/2	80	80	80	12/6	8/4	83	83	83
	150	270	370	10/8	7/8	89	89	90	12/6	9/1	93	93	94
	200	325	380	10/8	8/4	98	98	100	12/6	9/8	104	103	105
	250	385	390	10/8	9/0	109	109	112	12/6	10/5	116	115	119
	300	440	400	10/8	9/6	121	120	126	12/6	11/2	127	127	132
	350	480	410	10/8	10/2	122	124	134	12/6	11/9	129	131	141
	400	560	420	10/8	10/8	146	149	159	12/6	12/6	156	159	169
500 †	100	215	420	12/0	7/2	114	114	115	14/0	8/4	119	119	120
	200	330	440	12/0	8/4	134	134	135	14/0	9/8	141	140	142
	400	565	480	12/0	10/8	189	193	203	14/0	12/6	202	206	216
	500	680	500	12/0	12/0	222	234	244	14/0	14/0	239	251	261
600 †	200	340	500	13/2	8/4	180	180	181	15/4	9/8	189	189	191
	250	380	500	13/2	9/0	232	231	235	15/4	10/5	243	242	246
	400	570	540	13/2	10/8	243	246	256	15/4	12/6	262	265	275
	600	800	580	13/2	13/2	323	347	357	15/4	15/4	349	373	383
700 †	200	345	525	14/4	8/4	262	261	263	16/8	9/8	273	272	274
	400	575	555	14/4	10/8	332	336	346	16/8	12/6	353	356	367
	700	925	600	14/4	14/4	470	480	510	16/8	16/8	506	516	546
800 †	200	350	585	15/6	8/4	353	353	355	18/2	9/8	367	366	368
	400	580	615	15/6	10/8	437	440	451	18/2	12/6	461	465	475
	600	810	645	15/6	13/2	602	626	636	18/2	15/4	647	671	681
	800	1045	675	15/6	15/6	658	669	712	18/2	18/2	707	719	762

† Other sizes of the same family can be manufactured at the order of customers.



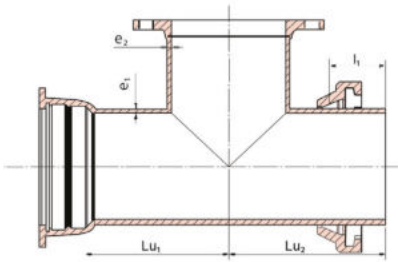
Socket-spigot with flanged tee R.J.Pipe

DN	dn	e1 mm	Lu1 mm	Lu2 mm	e2 mm	l1 mm	l mm	m (kg)		
								PN 10	PN 16	PN 25
80	80	8/4	85	277	8/1	97	165	22	22	22
100	80	8/7	85	287	8/1	101	175	25	25	25
	100	8/7	95	297	8/4	101	180	27	27	27
150	150	9/4	127/5	345	9/1	108	220	43	43	44
	100	9/4	97/5	312/5	8/4	108	210	38	38	38
	80	9/4	85	302/5	8/1	108	205	36	36	36
200	200	10/1	157/5	378/5	9/8	114	260	66	65	67
	150	10/1	127/5	351	9/1	114	250	58	58	59
	100	10/1	100	318/5	8/4	114	240	52	52	53
	80	10/1	87/5	308/5	8/1	114	235	50	50	50
250	250	10/8	187/5	416/5	10/5	119	300	92	91	95
	200	10/8	157/5	386/5	9/8	119	290	82	82	84
	150	10/8	130	359	9/1	119	280	75	75	75
	100	10/8	100	326/5	8/4	119	270	67	67	68
	80	10/8	90	316/5	8/1	119	265	65	65	65



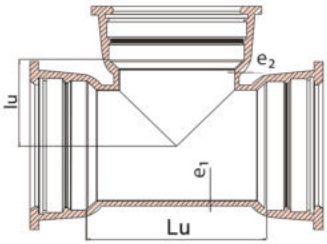
Socket-spigot with flanged tee R.J.Pipe

DN	dn	e1 mm	Lu1 mm	Lu2 mm	e2 mm	l1 mm	l mm	m (kg)		
								PN 10	PN 16	PN 25
300	300	11/6	217/5	451/5	11/2	123	340	124	124	129
	250	11/6	190	424	10/5	123	330	114	113	116
	200	11/6	160	394	9/8	123	320	104	103	105
	150	11/6	130	366/5	9/1	123	310	95	95	96
	100	11/6	102/5	334	8/4	123	300	87	87	87
	80	11/6	90	324	8/1	123	295	84	84	84
350	80	12/3	92/5	325	8/1	124	325	106	106	106
	100	12/3	102/5	335	8/4	124	330	109	109	109
	150	12/3	135	367/5	9/1	124	340	118	118	119
	200	12/3	162/5	395	9/8	124	350	128	128	130
	250	12/3	192/5	425	10/5	124	360	139	139	142
	350	12/3	247/5	485	11/9	124	380	164	165	176
400	80	13/0	92/5	320	8/1	124	355	117	117	117
	100	13/0	105	330	8/4	124	360	122	122	122
	150	13/0	135	362/5	9/1	124	370	132	132	133
	200	13/0	162/5	390	9/8	124	380	143	142	144
	250	13/0	192/5	420	10/5	124	390	155	155	158
	300	13/0	220	447/5	11/2	124	400	167	167	172
	400	13/0	280	510	12/6	124	420	196	200	210
500	100	14/4	107/5	354	8/4	136	420	181	181	181
	200	14/4	165	414	9/8	136	440	204	203	205
	400	14/4	282/5	534	12/6	136	480	267	270	281
	500	14/4	340	601/5	14/0	136	500	306	319	328



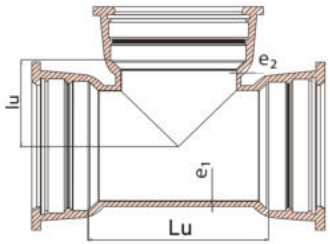
Socket-spigot with flanged tee R.J.Pipe

DN	dn	e1 mm	Lu1 mm	Lu2 mm	e2 mm	l1 mm	l mm	m (kg)		
								PN 10	PN 16	PN 25
600	200	15/9	170	415	9/8	136	500	268	268	270
	400	15/9	285	535	12/6	136	540	341	345	355
	600	15/9	400	665	15/4	136	580	436	460	471
700	200	17/3	172/5	464	9/8	166	525	385	385	387
	400	17/3	187/5	584	12/6	166	555	498	501	512
	700	17/3	462/5	699	16/8	166	600	609	618	648
800	200	18/8	175	486	9/8	176	585	505	505	507
	400	18/8	290	606	12/6	176	615	603	607	617
	600	18/8	522/5	736	15/4	176	645	757	781	791
	800	18/8	522/5	959/5	18/2	176	675	897	909	953



All socket tee - R.J Pipe

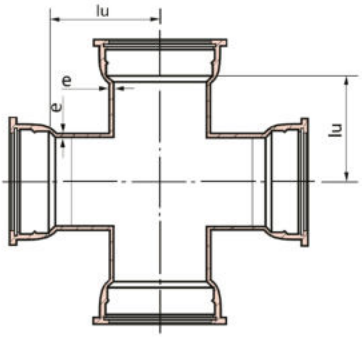
DN	dn	Lu mm	lu mm	K12			K14		
				e1 mm	e2 mm	m (kg)	e1 mm	e2 mm	m kg
80	80	170	85	6/9	6/9	13	8/1	8/1	14
100	100	190	95	7/2	7/2	17	8/4	8/4	18
100	80	170	95	7/2	6/9	15	8/4	8/1	16
150	150	255	125	7/8	7/8	27	9/1	9/1	28
150	100	195	120	7/8	7/2	23	9/1	8/4	24
150	80	170	120	7/8	6/9	21	9/1	8/1	22
200	200	315	155	8/4	8/4	46	9/8	9/8	48
200	150	255	150	8/4	7/8	39	9/8	9/1	40
200	100	200	145	8/4	7/2	34	9/8	8/4	35
200	80	175	145	8/4	6/9	33	9/8	8/1	34
250	250	375	190	9	9	63	10/5	10/5	66
250	200	315	180	9	8/4	56	10/5	9/8	58
250	150	260	175	9	7/8	48	10/5	9/1	50
250	100	200	170	9	7/2	43	10/5	8/4	44
250	80	180	170	9	6/9	41	10/5	8/1	42



All socket tee - R.J Pipe

DN	dn	Lu mm	lu mm	K12			K14		
				e_1 mm	e_2 mm	m (kg)	e_1 mm	e_2 mm	m kg
300	300	435	220	9/6	9/6	85	11/2	11/2	90
300	250	375	210	9/6	9	76	11/2	10/5	80
300	200	320	205	9/6	8/4	69	11/2	9/8	72
300	150	260	200	9/6	7/8	60	11/2	9/1	63
300	100	205	195	9/6	7/2	55	11/2	8/4	56
350 †	350	500	255	10/2	10/2	114	11/9	11/9	121
400 †	400	560	280	10/8	10/8	141	12/6	12/6	149
500 †	500	680	340	12	12	214	14	14	229
600 †	600	800	400	13/2	13/2	312	15/4	15/4	334
700 †	700	920	460	14/4	14/4	481	16/8	16/8	513
800 †	800	1045	523	15/6	15/6	679	18/2	18/2	724

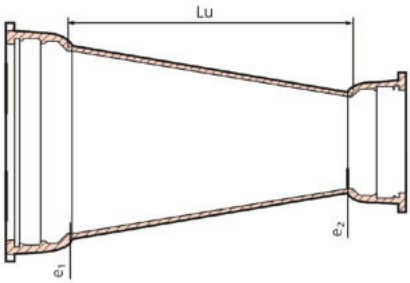
† Other sizes of the same family can be manufactured at the order of customers.



All socket cross R.J Pipe

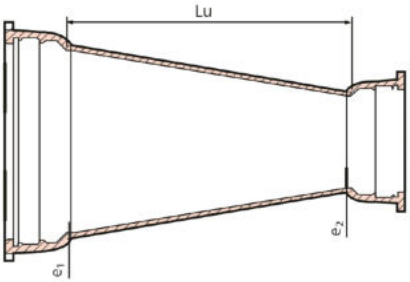
DN	dn	e (mm)	Lu (mm)	m (kg)
80	80	8/12	85	18
100	100	8/4	95	22
150	150	9/1	125	36
200	200	9/8	155	61
250	250	10/5	190	83
300	300	11/2	220	111
350	350	11/9	255	145
400	400	12/6	280	176
500	500	14	340	264
600	600	15/4	400	384

† This type of cross can be produced with various sized sockets at the request of customers.



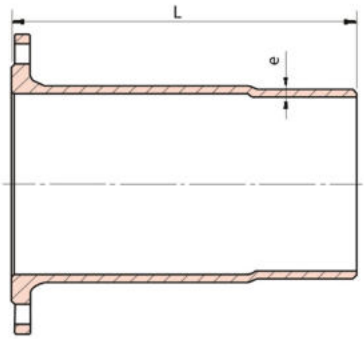
Double socket tyton taper
R.J Pipe

DN	dn	e_1 mm	e_2 mm	Lu mm	m Kg
100	80	7/2	7	90	10
150	80	7/8	7	190	15
	100	7/8	7/2	150	15
200	100	8/4	7/2	250	25
	150	8/4	7/8	150	25
250	150	9	7/8	250	33
	200	9	8/4	150	35
300	150	9/6	7/8	350	45
	200	9/6	8/4	250	47
	250	9/6	9	150	45
350	200	10/2	8/4	360	62
	250	10/2	9	260	60
	300	10/2	9/6	160	58



Double socket tyton taper
R.J Pipe

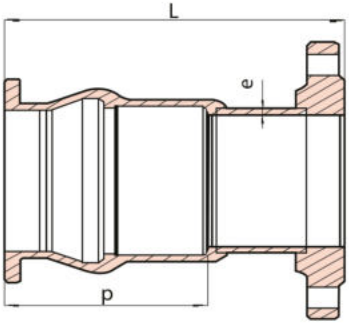
DN	dn	e_1 mm	e_2 mm	Lu mm	m Kg
400	250	10/8	9	360	77
	300	10/8	9/6	260	74
	350	10/8	10/8	160	72
500	300	12	9/6	460	113
	350	12	10/8	360	112
	400	12	12	260	106
600	350	13/2	10/8	560	166
	400	13/2	12	460	161
	500	13/2	12	260	145
700	350	14/4	10/8	780	254
	500	14/4	12	480	233
	600	14/4	13/2	280	215
800	600	15/6	13/2	480	315
	700	15/6	14/4	280	306



Flanged spigot L.Pipe

DN/OD	L mm	e mm	m Kg
90	160	5/7	6
110	170	5/7	8
125	180	5/7	9
140	185	5/7	10
160	190	5/7	13
200*	210	5/7	17

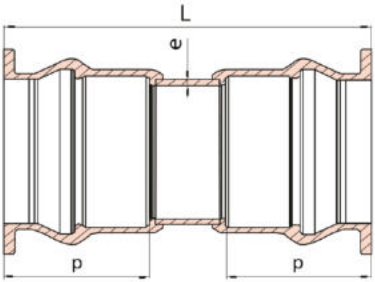
* Drilling in OD200 size is possible based on PN10.



Flanged socket L.Pipe

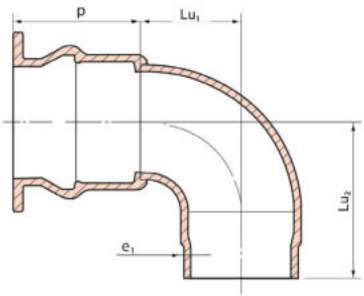
DN/OD	L mm	e mm	P mm	m Kg
90	137	5/7	96	5
110	140	5/7	97	7
125	145	5/7	97	8
140	148	5/7	99	8
160	151	5/7	102	10
200*	157	5/7	105	13

* Drilling in OD200 size is possible based on PN10.



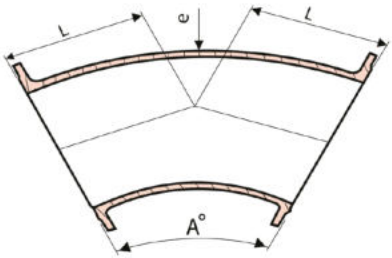
Collar L.Pipe

DN/OD	L mm	e mm	P mm	m Kg
90	265	5/7	96	4
110	275	5/7	97	5
125	295	5/7	97	7
140	305	5/7	99	8
160	315	5/7	102	10
200	335	5/7	105	13



Socket-spigot bend L.Pipe

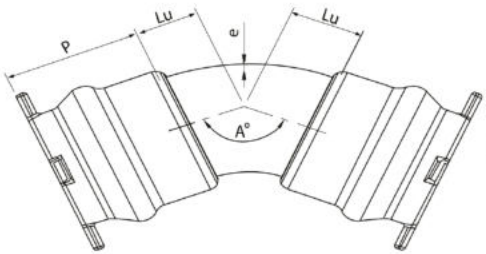
A / DN/OD	e1 mm	P mm	11/25°			22/5°			45°			90°		
			Lu1 mm	Lu2 mm	m Kg	Lu1 mm	Lu2 mm	m Kg	Lu1 mm	Lu2 mm	m Kg	Lu1 mm	Lu2 mm	m Kg
90	5/7	93	25	275	6	25	275	6	50	300	7	75	325	7
110	5/7	99	30	290	8	30	290	8	60	320	9	85	345	9
125	5/7	104	35	305	10	30	300	10	65	335	11	110	380	12
140	5/7	107	30	300	11	30	300	11	65	335	12	110	380	13
160	5/7	110	30	310	13	35	315	13	70	350	15	130	410	16
200	5/7	116	30	320	17	40	330	18	70	360	19	160	450	22



Double flanged bend - L.Pipe

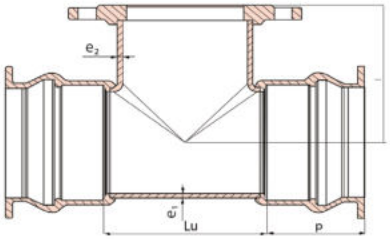
A / DN/OD	e mm	11/25°		22/5°		45°		90°	
		L mm	m Kg	L mm	m Kg	L mm	m Kg	L mm	m Kg
90	5/7	25	7	30	7	50	7	165	8
110	5/7	29/5	9	29/5	9	59/5	10	160	11
125	5/7	30	11	30	11	65	12	200	14
140	5/7	30	10	35	10	70	12	200	14
160	5/7	35	14	35	14	70	16	200	18
200*	5/7	30	31	40	31	70	33	250	38

* Drilling in OD200 size is possible based on PN10.



Double socket bend - L.Pipe

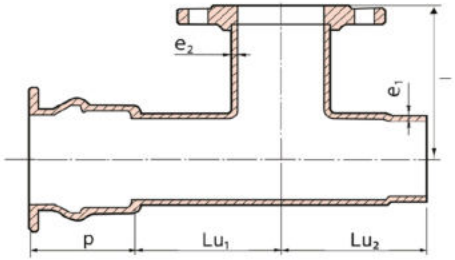
A / DN/OD	P mm	11/25°			22/5°			45°			90°		
		Lu mm	e mm	m Kg	Lu mm	e mm	m Kg	Lu mm	e mm	m Kg	Lu mm	e mm	m Kg
90	*93*	*25*	*5/7*	*4*	*30*	*5/7*	*4*	*50*	*5/7*	*5*	*75*	*5/7*	*5*
110	*99*	*30*	*5/7*	*5*	*30*	*5/7*	*5*	*60*	*5/7*	*6*	*85*	*5/7*	*7*
125	*104*	*30*	*5/7*	*7*	*30*	*5/7*	*7*	*65*	*5/7*	*8*	*110*	*5/7*	*8*
140	*107*	*30*	*5/7*	*8*	*35*	*5/7*	*8*	*70*	*5/7*	*9*	*110*	*5/7*	*10*
160	*110*	*35*	*5/7*	*9*	*35*	*5/7*	*9*	*70*	*5/7*	*10*	*130*	*5/7*	*12*
200	*116*	*35*	*5/7*	*11*	*40*	*5/7*	*11*	*70*	*5/7*	*13*	*160*	*5/7*	*16*



Double socket with flanged tee L.Pipe

DN/OD	dn/od	DN Flange	P mm	e_1 mm	Lu mm	e_2 mm	l mm	m kg
90	90	80	93	5/7	115	5/7	160	9
110	90	80	99	5/7	105	5/7	170	10
110	110	100	99	5/7	125	5/7	170	12
125	90	80	104	5/7	105	5/7	170	11
125	110	100	104	5/7	125	5/7	180	13
125	125	125	104	5/7	150	5/7	180	14
140	90	80	107	5/7	105	5/7	185	12
140	110	100	107	5/7	125	5/7	195	13
140	125	125	107	5/7	150	5/7	200	14
140	140	125	107	5/7	150	5/7	200	14
160	90	80	110	5/7	105	5/7	200	14
160	110	100	110	5/7	125	5/7	205	15
160	125	125	110	5/7	150	5/7	210	17
160	140	125	110	5/7	150	5/7	220	17
160	160	150	110	5/7	175	5/7	220	19
200	90	80	116	5/7	140	5/7	225	17
200	110	100	116	5/7	160	5/7	230	19
200	125	125	116	5/7	185	5/7	240	21
200	140	125	116	5/7	185	5/7	245	21
200	160	150	116	5/7	210	5/7	245	23
200	200*	200	116	5/7	260	5/7	250	33

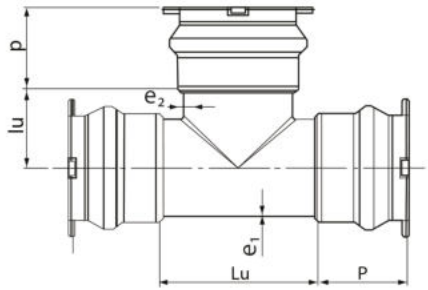
* Drilling in OD200 size is possible based on PN10.



Socket spigot with flanged tee L.Pipe

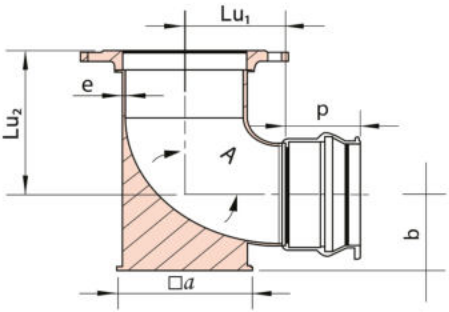
DN/OD	dn/od	P mm	e1&e2 mm	Lu1 mm	Lu2 mm	l mm	m kg
90	90	93	5/7	58	167	160	8
110	90	99	5/7	53	185	170	10
110	110	99	5/7	63	185	170	11
125	90	104	5/7	53	197	170	11
125	110	104	5/7	63	197	180	12
125	125	104	5/7	75	197	180	13
140	90	107	5/7	53	210	185	11
140	110	107	5/7	63	210	195	12
140	125	107	5/7	75	210	200	13
140	140	107	5/7	75	210	200	13
160	90	110	5/7	53	227	200	13
160	110	110	5/7	63	227	205	15
160	125	110	5/7	75	227	210	16
160	140	110	5/7	75	227	220	16
160	160	110	5/7	88	227	220	18
200	90	116	5/7	70	260	225	15
200	110	116	5/7	80	260	230	17
200	125	116	5/7	93	260	240	18
200	140	116	5/7	93	260	245	20
200	160	116	5/7	105	260	245	21
200	200*	116	5/7	130	260	250	29

* Drilling in OD200 size is possible based on PN10.



All socket tee L.Pipe

DN/OD	dn/od	P mm	p mm	e1 mm	Lu mm	e2 mm	lu mm	m kg
90	90	93	93	5/7	105	5/7	50	7
110	90	99	93	5/7	105	5/7	60	8
110	110	99	99	5/7	125	5/7	60	8
125	90	104	93	5/7	105	5/7	70	9
125	110	104	99	5/7	125	5/7	70	10
125	125	104	104	5/7	150	5/7	70	12
140	90	107	93	5/7	105	5/7	75	10
140	110	107	99	5/7	125	5/7	75	11
140	125	107	104	5/7	150	5/7	75	12
140	140	107	107	5/7	150	5/7	75	13
160	90	110	93	5/7	105	5/7	85	12
160	110	110	99	5/7	125	5/7	85	13
160	125	110	104	5/7	150	5/7	85	14
160	140	110	107	5/7	150	5/7	85	14
160	160	110	110	5/7	175	5/7	85	15
200	90	116	93	5/7	140	5/7	105	15
200	110	116	99	5/7	160	5/7	105	16
200	125	116	104	5/7	160	5/7	105	17
200	140	116	107	5/7	185	5/7	105	18
200	160	116	110	5/7	210	5/7	105	19
200	200	116	116	5/7	240	5/7	105	21

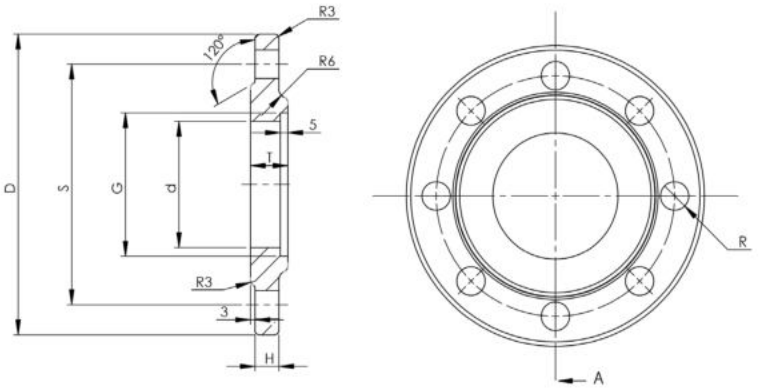


Socket flanged bend duckfoot L.Pipe

DN/OD	e mm	P mm	Lu1 mm	Lu2 mm	a mm	b mm	m (Kg) PN 16
90	*5/7*	*93*	*75*	*165*	*107*	*110*	*9*
110	*5/7*	*99*	*85*	*160*	*126*	*125*	*12*
125	*5/7*	*104*	*110*	*200*	*146*	*120*	*15*
140	*5/7*	*107*	*110*	*200*	*164*	*128*	*18*
160	*5/7*	*110*	*130*	*200*	*186*	*132*	*20*
200*	*5/7*	*116*	*160*	*250*	*220*	*152*	*27*

* Drilling in OD200 size is possible based on PN10.

L.Pipe flanged



OD	D mm	S mm	d mm	H mm	T mm	G mm	R mm	m kg
90	*200*	*160*	*84*	*16*	*25*	*95/4*	*19*	*3*
110	*220*	*180*	*100*	*16*	*25*	*115/4*	*19*	*4/2*
125	*250*	*210*	*119*	*16*	*25*	*130/4*	*19*	*4/9*
140	*250*	*210*	*125*	*16*	*25*	*145*	*19*	*4/6*
160	*285*	*240*	*150*	*16*	*25*	*164/6*	*23*	*6/4*
200	*340*	*295*	*193*	*17*	*25*	*204/4*	*23*	*14/6*

Other technical remarks

Note 1: All dimensions of Tyton, earthquake resistant and thin-walled (LP) fittings are in millimeters and weights in kilograms. Dimensions and weights are also listed without considering the tolerance. For more information, contact with IKITURK technical experts.

Note 2: In designing some of earthquake resistant and thin-walled (LP) fittings, in addition to complying with international standards, factory standards have also been used.

Note 3: Due to the casting capabilities of the Lost Foam Castingmethod, which is the main fittings production method in IKITURK Company, it is possible to produce and supply special custom fittings according to the customer's request.

For more information contact IKITURK technical experts.

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