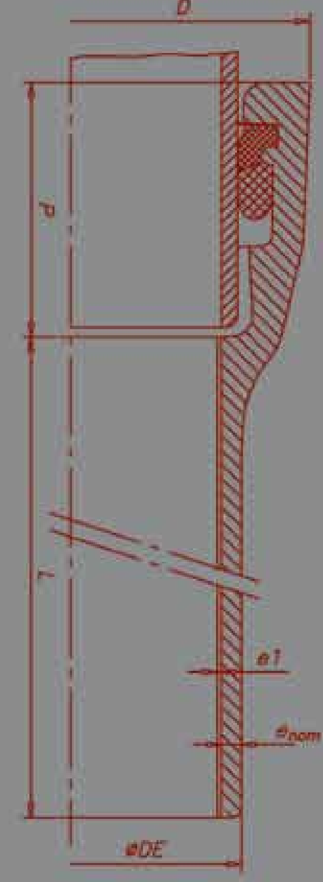
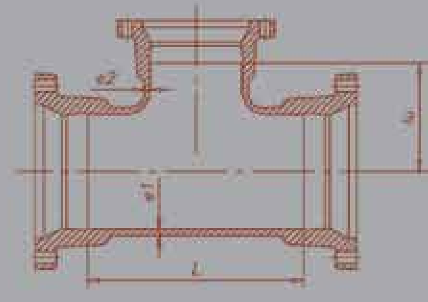
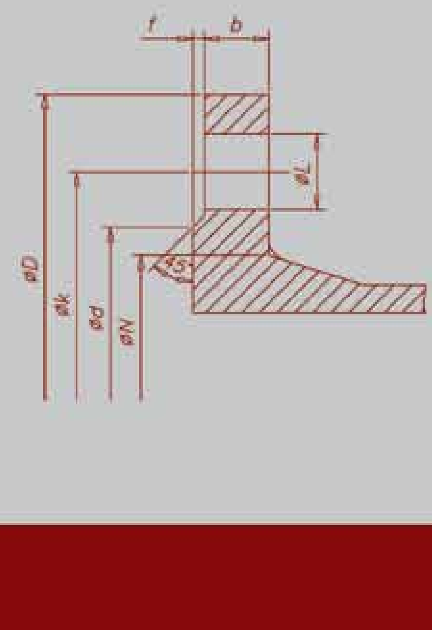






HANYCO

HAMOUN NYZEH CO.

Ductile Iron Pipe Manufacturer

Technical Catalogue

HANYCO

HAMOUN NYZEH COMPANY

Ductile Iron Pipe Manufacturer

شرکت هامون نایزه (هنیکو)

تولید کننده لوله های چدن نشکن

Technical Catalogue

Content

Preface

Hamoun Nyzeh company, (HANYCO) was established in May 2007 to be a supplying source to the growing demand of domestic and regional markets for Ductile Iron Pipe, premeditated to have an annual capacity of 70 thousand metric tons.

Construction operation of the plant started in the same year with the investment of private sector and the test production process successfully took place within about 2 years. The production line with a DN range of 80-700 mm, was fully and perfectly operational 3 months later.

Anti-Sulphate cement in accordance with ISO 4179 and metal Zinc together with bitumen-based paint according to ISO8179-1 are respectively applied to the inner and outer surfaces of the pipes for best protection.

Pipes are of push-on joint type and are sealed by EPDM gaskets which are produced in accordance with ISO 4633.

Hanyco welcomes customers' requirements and demands.

Scope

This catalogue has been prepared for the acquaintance of clients with terms and definitions, technical specifications, production method and standards as well as application aspects of ductile iron pipes and fittings within the nominal range of 80 to 700 mm. Pressurized or non-pressurized conveyance of crude, treated and potable water through overground or underground pipelines, is the noteworthy application of the mentioned products.

Sources & References

The following references and sources have been used for preparing this catalogue:

Normative standards:

ISO 2531 : 2009	Ductile Iron pipes and fittings and other accessories for water networks
ISO 2531 : 1998	Ductile Iron pipes and fittings and other accessories for water networks
EN 545 : 2007	Ductile Iron pipes and fittings and other accessories for water networks
ISO 4179	Internal cement lining for water network pipes
ISO 8179	External metal zinc coating for water network pipes
ISO 4633	Rubber seals -- Joint rings for water supply, drainage and sewerage pipelines

Additional standards:

ISO 10803	Design method for ductile iron pipes
ISO 10804	Restrained joint systems for ductile iron pipelines
EN 1092-2	Cast iron flanges
ISO 7005–2	Metallic flanges -- Part 2: Cast iron flanges
ISO 6708	Pipework components -- Definition and selection of DN (nominal size)
ISO 7268	Pipe components -- Definition of nominal pressure
ISO 7091	Plain washers -- Normal series -- Product grade C
ISO 4016	Hexagon head bolts -- Product grade C
ISO 4034	Hexagon nuts -- Product grade C
ISO 8180	Ductile iron pipelines -- Polyethylene sleeving for site application
ISO 9001 : 2008	Quality management systems -- Requirements
EN 14628	External polyethylene coating for pipes - Requirements and test methods
EN 15189	External polyurethane coating for pipes. Requirements and test methods
EN 14901	Epoxy coating (heavy duty) of ductile iron fittings and accessories - Requirements and test methods
ISO 6506–1	Metallic materials -- Brinell hardness test -- Part 1: Test method

Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ductile iron
Type of cast iron used for pipes, fittings and accessories in which graphite is present primarily in spheroidal form.

pipe
Casting of uniform bore, with straight axis, having either socket, spigot or flanged ends.
NOTE: This does not apply to flanged sockets, flanged spigots and collars, which are classified as fittings.

fitting
Casting other than a pipe, which allows pipeline deviation, change of direction or bore.
NOTE; Flanged sockets, flanged spigots and collars are also classified as fittings.

accessory
Any casting other than a pipe or fitting, which is used in a pipeline.

flange
End of a pipe or fitting, extending perpendicular to its axis, with bolt holes equally spaced in a circle.

NOTE 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.

spigot
Male end of a pipe or fitting.

socket
Female end of a pipe or fitting to make the connection with the spigot of the next component.

gasket
Sealing component of a joint.

flexible joint
Joint providing significant angular deflection and movement parallel and/or perpendicular to the pipe axis.

*mechanical flexible join*t
Flexible joint in which sealing is obtained by applying pressure to the gasket by mechanical means.

push-in flexible joint
Flexible joint assembled by pushing the spigot through the gasket into the socket of the mating component.

restrained joint
Joint in which a means is provided to prevent separation of the assembled joint.

nominal size
DN
Alphanumeric designation of size for components of a pipework system, which is used for reference purposes.

nominal pressure
PN
Numerical designation, which is a convenient rounded number, used for reference purposes.

allowable operating pressure
PFA
Maximum internal pressure, excluding surge, which a component can safely withstand in permanent service.

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.

maximum allowable operating pressure
PMA
Maximum internal pressure, including surge, which a component can safely withstand in service.

diametral stiffness of a pipe
Characteristic of a pipe allowing it to resist diametral deflection under loading.

laying length
Le
Length by which a pipeline progresses when an additional pipe is installed.

hoop stress
σ
Stress in a pipe or fitting under pressure, acting tangentially to the perimeter of a transverse section.

ovality
Out-of-roundness of a pipe section,

Ductile Iron Properties

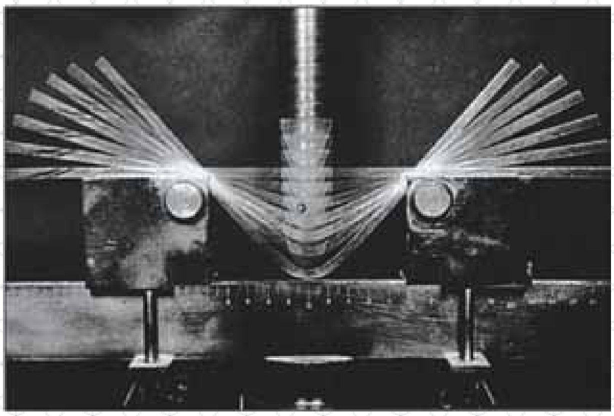
Ductile Iron not only retains all of Gray Iron's attractive qualities, such as machinability and corrosion resistance, but also provides additional strength, toughness, and ductility. Although its chemical properties are similar to those of Gray Iron, Ductile Iron incorporates significant casting refinements, additional metallurgical processes, and superior quality control.

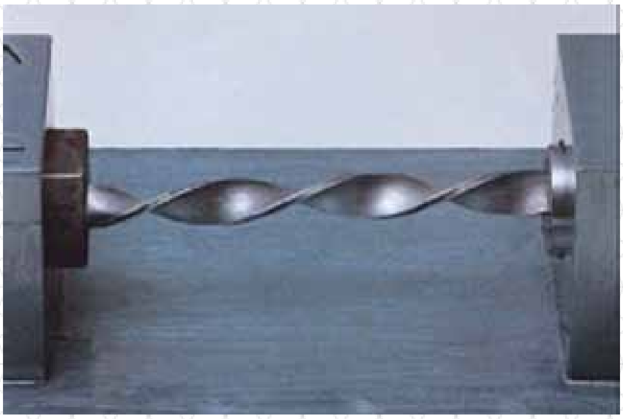
Ductile Iron also differs from Gray Iron in that its graphite form is spheroidal, or nodular, instead of the flake form found in Gray Iron. This change in graphite form is accomplished by adding an inoculant, usually magnesium, to molten iron of appropriate composition during manufacture.
Due to its spheroidal graphite form, Ductile Iron has approximately twice the strength of Gray Iron as determined by tensile, beam, ring bending, and bursting tests. Its impact strength and elongation are many times greater than Gray Iron's.

Ductile Iron's Outstanding Properties

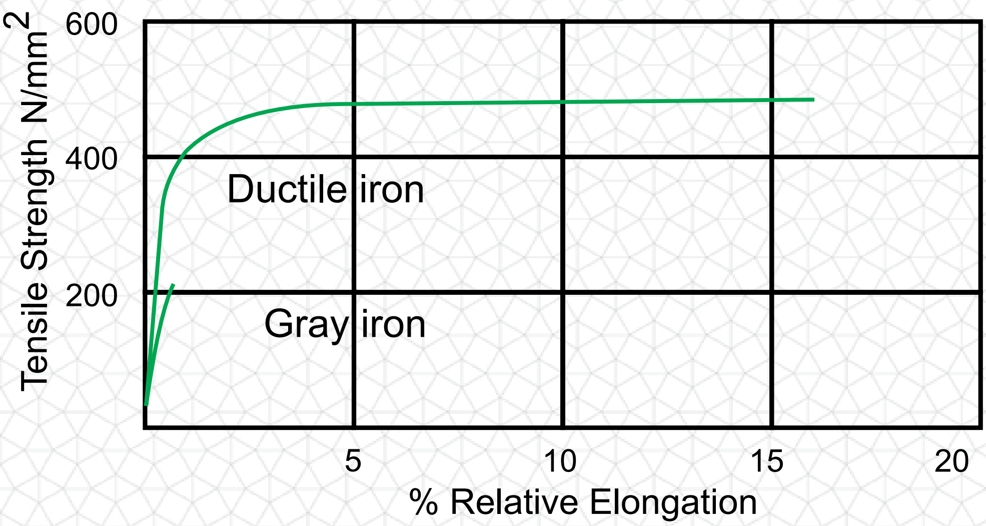
- *Exhibits Tremendous Tensile Strength*
- *Withstands Severe Crushing Loads*
- *Has Great Beam Strength*
- *Is Corrosion Resistant*
- *Has Extremely High Impact Resistance*
- *Demonstrates Tremendous Bursting Strength*
- *Is Easy to Install*
- *Is Virtually Maintenance Free*
- *Offers Impressive Energy Savings*

Ductile Iron pipe can withstand severe crushing loads. The ring test determines a pipe's ability to withstand load over a relatively small area, as would occur in rocky terrain where the pressure of a single rock, plus all the backfill above it, could cause weaker materials to fail. A deflection gauge on the ring-crushing apparatus has been adjusted to accurately record deflection at specified load intervals.





Ductile Iron malleability and flexibility



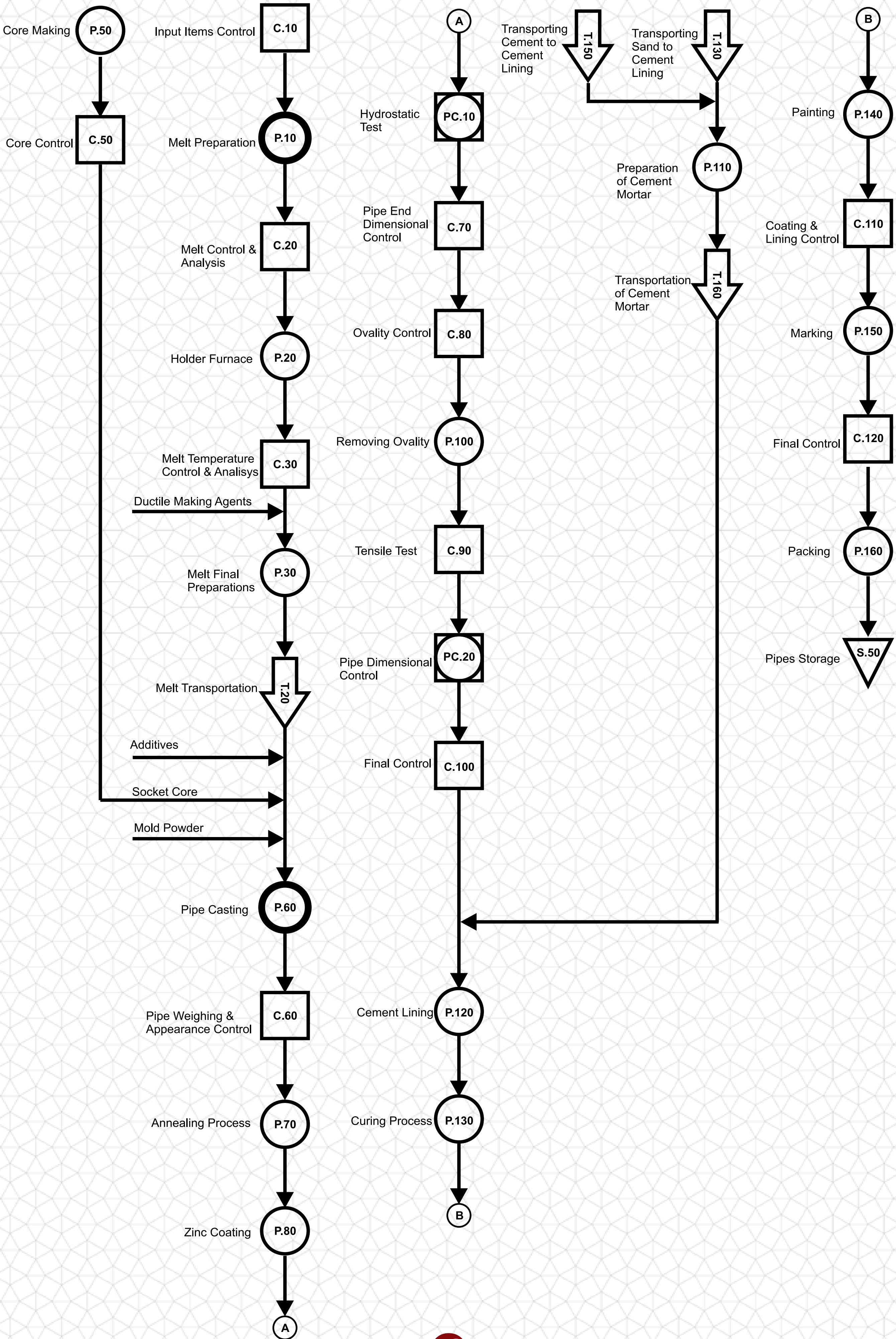
Mechanical characteristics

Ductile Iron Pipe manufacturing process

Pipes manufactured by HNYCO are centrifugally cast. In centrifugal casting, a permanent mold is rotated about its axis at high speeds (300 to 3000 rpm) as the molten metal is poured. The molten metal is centrifugally thrown towards the inside mold wall, where it solidifies after cooling. The casting is usually a fine grain casting with a very fine-grained outer diameter, which is resistant to atmospheric corrosion, a typical situation with pipes. The inside diameter has more impurities and inclusions, which can be machined away.

The pipes are heat treated in a continuous type annealing furnace to change the metal matrix to ferrite to improve ductility and mechanical properties. Zinc coating will then be applied to the pipes which will protect the outer surface of the pipes from corrosion. Each pipe is tested at a specified hydrostatic pressure. After that, pipes are centrifugally lined with cement mortar which gives uniform thickness and smoother internal surface. Finally bitumen coating is sprayed to the external surface of the pipes.

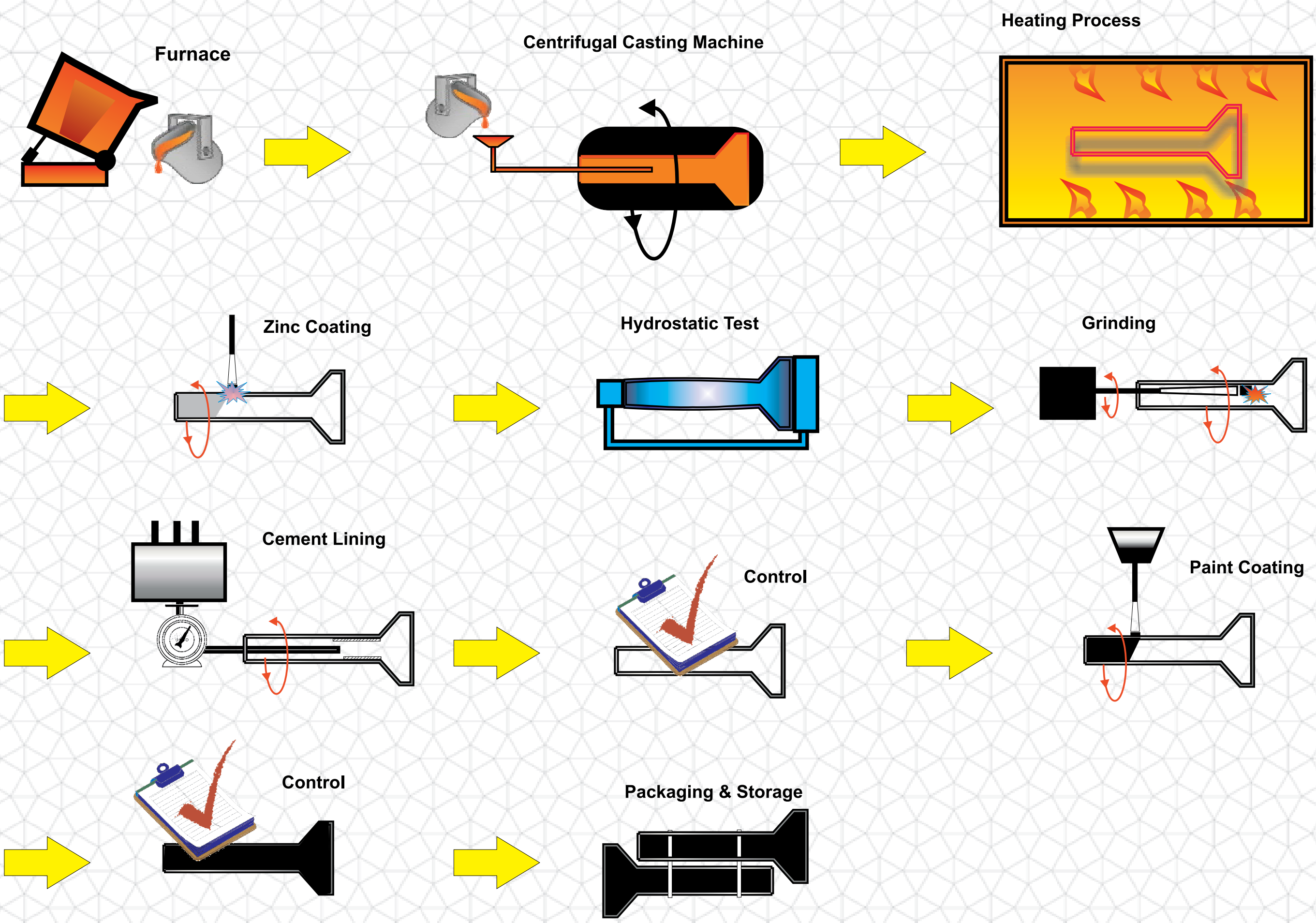
Ductile Iron Pipe production flowchart



Schematic of ductile iron pipe manufacturing process

The manufacturing process of ductile iron pipes is categorized as below:

- *Molten Iron Preparation*
- *Centrifugal pipe casting*
- *Complementary processes and finishing*



Technical requirements

Diameter

External diameter

Below table gives the values of the external diameter, DE, of the spigot end of pipes and fittings, when measured circumferentially. The positive tolerance is +1 mm and applies to all pressure classes of pipes and also to flanged spigot fittings. The negative tolerance depends on the design of each type of joint and shall be as specified in national standards.

In addition, the ovality of the spigot end of pipes and fittings shall
- remain within the tolerances of DE for DN 40 to 200, and
- not exceed 1% of DE for DN 250 to DN 600 or 2 % for DN more than 600

The manufacturer's recommendations should be followed with respect to the necessity and means of ovality correction; certain types of flexible joints can accept the maximum ovality without the need for spigot re-rounding prior to jointing.

DN	DE (mm)	e (mm)	e_1 (mm)	P (mm)	L (m)
80	98	6	3	84	6
100	118	6	3	88	6
125	144	6	3	91	6
150	170	6	3	94	6
200	222	6.3	3	100	6
250	274	6.8	3	105	6
300	326	7.2	3	110	6
350	378	7.7	5	110	6
400	429	8.1	5	110	6
450	480	8.6	5	115	6
500	532	9	5	120	6
600	635	9.9	5	120	6
700	738	10.8	6	150	6

Internal diameter

The nominal values of the internal diameters of centrifugally cast pipes, expressed in millimeters, are approximately equal to the numbers indicating their nominal sizes, DN.

Allowable deviation for internal diameter with cement lining is -10 mm for all pipes in the range of 80-700 mm.

Wall thickness

Wall thickness is one of the factors to specify the pressure that pipes can stand.
The basis for calculating the wall thickness are the hoop stress $\sigma = PD/2T$ and Barlow's equation.

Hamoun Nyzeh Company has the capability of producing pipes in accordance with the previous and recent versions of ISO 2531.

Wall thickness according to ISO 2531:1998 / EN545:

Nominal wall thickness according to this standard is based on this equation: $e_{nom} = K\,(0.5 + 0.001\,DN)$
where e_{nom} is the nominal pipe wall thickness, in millimeters and K is used for determining the pipes classification.

The minimum thickness is calculated according to this table:

product	Thickness **e**	Tolerance
centrifugal pipes	6	-1.3
	> 6	-(1.3 + 0.001 DN)
non-centrifugal pipes and fittings	7	-2.3
	> 7	-(2.3 + 0.001DN)

Wall thickness according to ISO 2531:2009

In this standard nominal wall thickness is based on the e_{min} :

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

where:

e_{min} is minimum wall thickness

PFA= allowable operating pressure (bar)

SF= safety factor of PFA (=3)

DE= external diameter of spigot end (mm)

Rm= minimum tensile strength of ductile iron (MPa)

Nominal thickness is calculated according to tbelow table:

product	Nominal Thickness
pipes	$e_{nom} = e_{min} + (1.3 + 0.001\,DN)$
fittings	$e_{nom} = e_{min} + (2.3 + 0.001\,DN)$

NOTE: For pipes centrifugally cast, the minimum wall thickness, e_{min}, shall not be less than 3.0 mm.

Length

Socket and spigot pipes

According to **ISO 2531:2009**, pipes shall be supplied to the lengths given in below table:

Nominal Length (millimeter)	Standardized lengths (L) meter
80 to 600	4 or 5 or 5.5 or 6 or 9
700	4 or 5.5 or 6 or 7 or 9
NOTE Not all the standardized lengths are available in all companies.	

Hamoun Nyzeh supplies socket pipes with the length of 6 meters. When ordered a total length, Hamoun Nyzeh will be able to supply the number of the pipes according to the total required length.

Fittings

Length of fittings are shown in the tables appended.

Straightness of pipes

Pipes shall be straight, with a maximum deviation of 0,125 % of their length.

Material characteristics

Tensile properties

Ductile Iron Pipes and Fittings have tensile properties according to below table:

Type of casting	**Minimum tensile strength** R_m (MPa)	**Minimum percent elongation after fracture** A **%**
Pipes centrifugally cast	420	10
Pipes not centrifugally cast, fittings and accessories	420	5
By agreement between the manufacturer and the purchaser, the 0,2 % proof stress, Rp02, may be measured. It shall be not less than: 270 MPa when A $\geq$ 12 % for DN 40 to DN 1000 or when A W 10 % for DN > 1000; 300 MPa in other cases. For centrifugally cast pipes of DN 40 to DN 1000 having a design minimum wall thickness of 10 mm or greater, the minimum elongation after fracture shall be 7 %.		

Brinell hardness

The hardness of the various components are such that they can be cut, tapped, drilled and/or machined with standard tools. The Brinell hardness shall not exceed 230 HB for centrifugally cast pipes and 250 HB for non-centrifugally cast pipes, fittings and accessories.

Coating and linings for pipes

HANYCO ductile iron pipes are more resistant to corrosion than other materials. Since pipelines are national assets of any country, for increasing the resistant against corrosion, according to the type of the soil where the pipes are laid and the fluid to flow inside the pipe, special coatings according to international standards **EN545 / ISO 2531** and other standards stated below can be applied to the pipes.

External coatings

Ductile iron pipeline systems can be installed in a wide range of external operating environments. These environments can be characterized according to their aggressivity.

External primary coatings

To protect from corrosion metal zinc is used as the primary coating of ductile iron pipes. There are different methods to apply zinc to the surface of the pipes of which metal spray is the most proper with zinc purity of 99.995 %.

In this method used in Hanyco, metal zinc is melted using DC current of 1000 A by electrical arc where pure zinc is sprayed to the surface of the pipes. This way there will be a highly resistant covering with proper conductivity that acts as a protection against corrosion. Different standard coatings to meet the needs of the customers are as follows:

- Metal spray zinc of 130 gr per square meter according to ISO 8179-1
- Zinc-rich paint of 130 gr per square meter according to ISO 8179-2
- Zinc-Aluminum alloy metal spray of 400 gr. per square meter

External finishing coatings

- Bitumen with minimum thickness of 70 micron according to ISO 8179
- Bitumen with Aluminum with minimum thickness of 100 micron for more resistance
- Epoxy coating according to EN 14901

In addition to the above coatings polyethylene sleeves according to ISO 8180 can also be used at the time of installation of the pipes.

Internal linings

Internal lining are used to :

- Increase the smoothness of the surface where the fluid is running
- Increase the resistance of the surface against corrosion

According to requirements of customers the following linings can be applied to the inner surface of the pipes:

- Portland cement mortar according to ISO 4179
- Portland cement mortar along with sealing covering according to ISO 16132
- High Alumina cement
- Bituminous paint according to ISO 8179
- Polyurethane paint
- Epoxy paint

Cement Mortar Lining

To prevent the inner surface of the pipes from corrosive agents, HANYCO uses cement mortar lining in accordance with ISO 4179. Advantages of this covering layer are as follows:

- smoothing water flow
- protecting against corrosive agents

Properties of Cement Linings

The protective properties of cement linings are due to two properties of cement. The first is the chemically alkaline reaction of the cement and the second is the gradual reduction in the amount of water in contact with the iron. When a cement-lined pipe is filled with water, water permeates the pores of the lining, thus freeing a considerable amount of calcium hydrate. The calcium hydrate reacts with the calcium bicarbonate in the water to precipitate calcium carbonate, which tends to clog the pores of the mortar and prevent further passage of water. The first water in contact with iron through the lining dissolves some of the iron, but free lime tends to precipitate the iron as iron hydroxide, which also closes the pores of the cement. Sulfates are also precipitated as calcium sulfate. Through these reactions, the lining provides a physical as well as a chemical barrier to the corrosive water.

Autogenous Healing

Cracks and lack of lining adherence in pipe and fittings have occasionally been detected prior to installation. These can occur due to shrinkage of linings, temperature variations, and improper handling. In some instances, there have been concerns that the lining would not provide the protection for which it was intended or that it might be dislodged by the flow of the water. Neither of these concerns is justified. Tests conducted by Wagner and reported in an article published in the June 1974 Journal AWWA show that lining fissures, developed while in storage, will heal themselves when put in contact with either flowing or non-flowing water.

Resistance to Soft and Acidic Waters

Waters carry varying amounts of different ions resulting from the disassociation of soluble salts found in soils. Waters that have a very low ion content are aggressive to calcium hydroxide contained in hydrated cements due to the waters' low content of carbonates and bicarbonates. Soft waters may also have acidic characteristics due to the presence of free CO2.

When cement-mortar linings are subjected to very soft water, calcium hydroxide, CA(OH)2, is leached out. The concentration of leachates increases with the aggressiveness of the water and its residual time in the pipe and is inversely proportional to the diameter of the pipe. These waters will also attack calcium silicate hydrates, which form the larger portion of cement hydrates. Although calcium silicate hydrates are almost insoluble, soft waters can progressively hydrolyze them into silica gels, resulting in a soft surface with reduced mechanical strength.Seal-coat will retard this leaching and attack to a great extent; however, as mentioned before, there are very few locations in this country that have sufficiently aggressive waters to necessitate the use of a seal-coat. Also, such aggressive waters may cause toxic metals to leach from piping in customers' homes, making it difficult to pass water quality standards requiring tests at first draw from customers' taps.

Therefore, water quality standards requiring better balanced water chemistry may cause these few communities to treat their water, and further diminish the need for seal-coat.

Cement Features

Ductile iron pipes with portland cement lining are used for conveyance of common type of water. In case of different chemical properties of water in terms of corrosion, special linings mentioned in this catalogue should be applied to the pipes.

Below table shows water characteristics:

water characteristics	Anti-Sulfate cement	Portland Cement	High Alumina cement
Min of PH	5.5	6	4
Max of CO_2	15	7	unlimited
Max of SO_4^-	3000	400	unlimited
Max of Mg^{++}	500	100	unlimited
Max of NH_4^+	30	30	unlimited

Marking

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

a) a reference to International Standard, i.e. ISO 2531;
b) the manufacturer's name or mark; i.e. HANYCO
c) identification of the year of manufacture;
d) identification as ductile iron;
e) the DN;
f) the PN rating of flanges, if applicable;
g) the C pressure class of socket and spigot pipe, if is according to ISO 2531:2009

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

Pipes leak tightness test

The internal hydrostatic pressure shall be raised until it reaches the works hydrostatic test pressure equal to the pressure class and limited to the pressure of Preferred Classes. Higher pressures are permissible. The total duration of the pressure cycle shall be not less than 15 s, including 10 s at test pressure. Visual inspection shall be made during or immediately after the pressure test.

Maximum allowable deviation

Pipes are straight, with a maximum deviation of 0.125 % of their length.
For example a pipe with the length of 6 meters can have a deviation of 7.5 millimeter from the true axis.

Maximum allowable angular deflection

One of the advantages of Ductile Iron Pipes and Fittings with socket is their flexibility while maintaining the sealing properties at the time of installation.

In this table the maximum angular deflection for Tyton sockets is shown:

Diameter (DN)	Maximum angular deflection (degree)
80-300	5
350-400	4
500-700	3

Sealing Gaskets Requirements

HNYCO's sealing gaskets are made of ethylene propylene components with EPDM. Physical and chemical properties of these gaskets are shown below:

Hardness of grasping area (shore-A)	85 ± 5
Hardness of sealing area (shore-A)	55 ± 5
Density (gr/cm^3)	0.86
Tear resistance	good
Resistance and abrasion	good-excellent
Pressure resistance	good
Oxidation resistance	excellent
Max. Service temperature (c°)	70-80

Rubber gaskets are produced according to ISO 4633. Push in joint gaskets and mechanical gaskets are used for Tyton pipes and fittings and for bolted-gland fittings, respectively.

Requirements for bolts and nuts of mechanical fittings

Bolts and nuts used with mechanical and flange fittings are manufactured according to ISO 2531. These bolts and nuts can be made of different materials as below:
- cast iron
- hot or cold galvanized steel
- stainless steel

Pipes and fittings specifications tables

Hanyco's pipes and fittings are supplied according to appended tables.

pipes

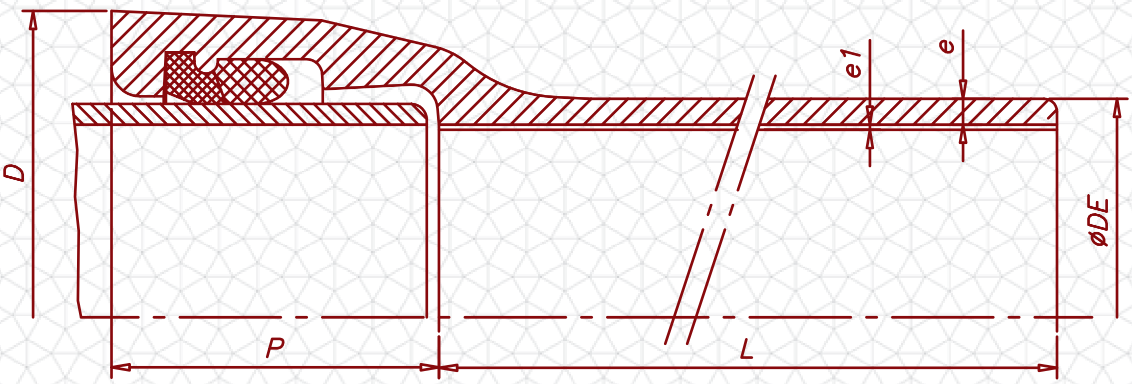
Although Tyton pipes are of most use, double flanged pipes and pipes without socket are suppliable.

fittings and accessories

Fittings are supplied in three forms to meet the application's requirements, specifications of which is brought in appended tables:

- socket fittings
- flanged fittings
- flanged-socket fittings

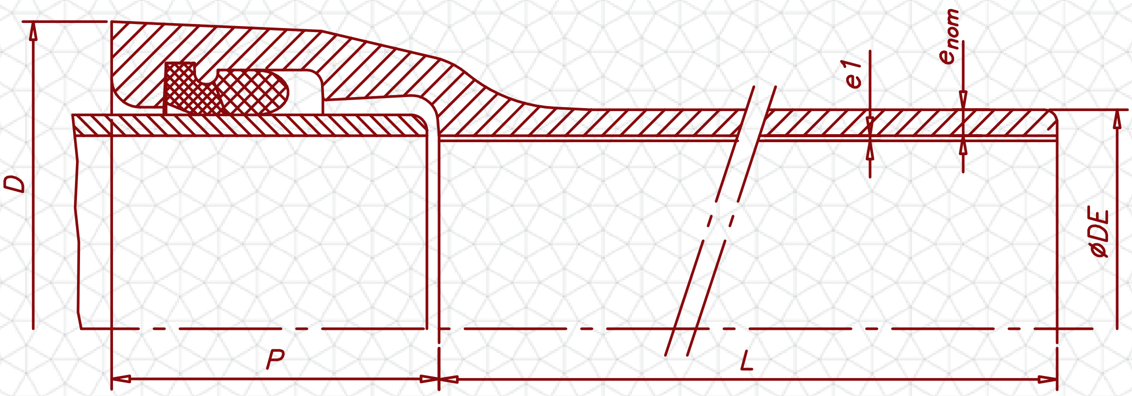
Tyton (push-on joint) Pipes Class K9[1] according to ISO 2531:1998



DN	D	DE	e	e1	P	L	Mass Per Meter Inc.Cement (kg)	Total Mass Inc. Socket & Cement (kg)
80	145	98	6	3	84	6	14.5	87
100	163	118	6	3	88	6	17.7	106
125[2]	196	144	6	3	91	6	22.6	136
150	216	170	6	3	94	6	26.2	157
200	277	222	6.3	3	100	6	36.1	217
250	332	274	6.8	3	105	6	47.9	288
300	386	326	7.2	3	110	6	60.3	362
350	442	378	7.7	5	110	6	79.5	477
400	495	429	8.1	5	110	6	94.5	567
450[2]	551	480	8.6	5	115	6	110.5	663
500	607	532	9	5	120	6	129.0	774
600	715	635	9.9	5	120	6	168.0	1008
700	828	738	10.8	6	150	6	216.6	1300

1 Other classes can be supplied on request
2 Available upon request

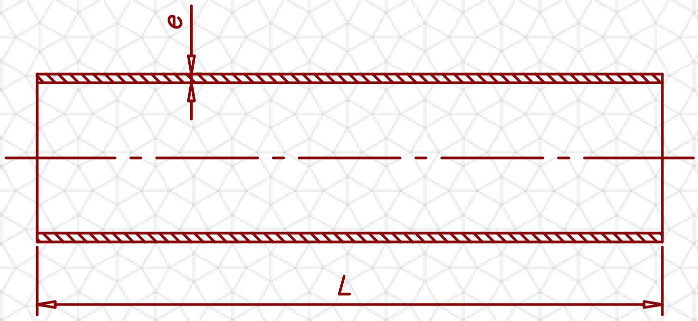
Tyton push-on joint pipes new classes
preferred class[1]
according to ISO 2531:2009



DN	PFA[2] (bar)	D	DE	e_{nom}	e1	P	L	Mass Per Meter Inc.Cement (kg)	Total Mass Inc. Socket & Cement (kg)
80		145	98	4.4	3	84	6	11.5	69
100		163	118	4.4	3	88	6	14.0	84
125[3]		196	144	4.5	3	91	6	18.2	109
150	40	216	170	4.5	3	94	6	21.0	126
200		277	222	4.7	3	100	6	28.7	172
250		332	274	5.5	3	105	6	40.5	243
300		386	326	6.2	3	110	6	53.5	321
350		442	378	6.3	5	110	6	68.3	410
400		495	429	6.5	5	110	6	79.9	479
450[3]	30	551	480	6.9	5	115	6	96.3	578
500		607	532	7.5	5	120	6	112.0	672
600		715	635	8.7	5	120	6	151.7	910
700	25	828	738	8.8	6	150	6	184.9	1110

1 Other pressure classes (50, 64, 100 bar) for all sizes available upon request
2 Allowable operating pressure
3 Available upon request

Spigot Pipes

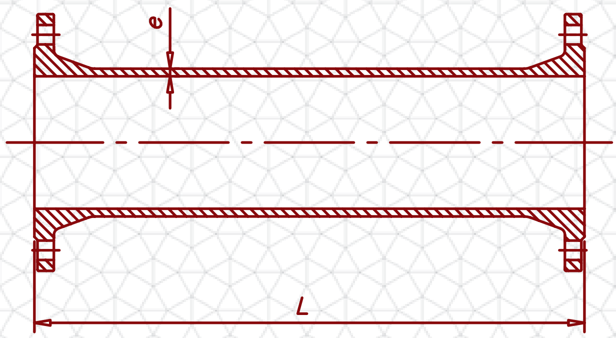


Dimensions in mm
Weights in kg

DN	L	k=9 e	k=9 Mass Per Meter	k=12 e	k=12 Mass Per Meter	k=14 e	k=14 Mass Per Meter
80	to order Max.=6m	6	12	7	15	8.1	16.3
100		6	14.9	7.2	17.7	8.4	20.4
125[1]		6	18.6	7.5	22.1	8.8	25.5
150		6	21.8	7.8	28	9.1	32.4
200		6.3	30.1	8.4	39.7	9.8	46.1
250		6.8	40.2	9	52.8	10.5	61.3
300		7.2	50.8	9.6	67.3	11.2	78.1
350		7.7	63.2	10.2	83.1	11.9	96.5
400		8.1	75.5	10.8	100	12.6	116.2
450[1]		8.6	85	11.4	112.5	13.3	130.7
500		9	104.3	12	138.2	14	160.6
600		9.9	137.1	13.2	181.8	15.4	211.3
700		10.8	173.9	14.4	230.8	16.8	268.4

1 Available upon request

Welded Flange Pipes

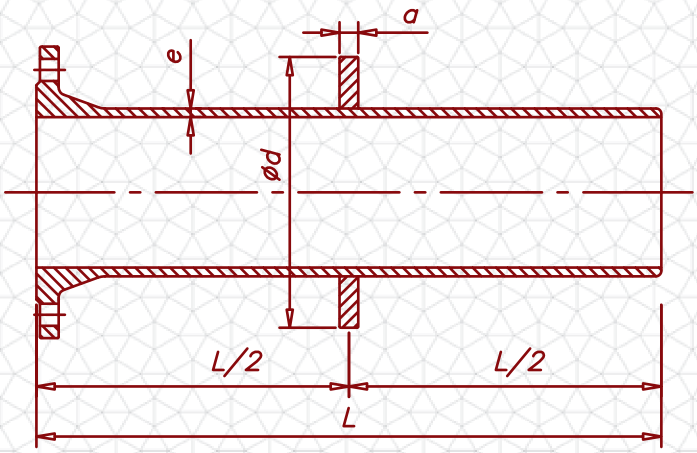


Dimensions in mm
Weights in kg

DN	BARREL K=9 L	BARREL K=9 e	BARREL K=9 Mass Per Meter	Flange Unit Mass PN10	Flange Unit Mass PN16	Flange Unit Mass PN25	Flange Unit Mass PN40
80	to order Max.=6m	6	12	2.9	2.9	2.9	2.9
100		6	14.9	3.3	3.3	3.8	3.8
125 [1]		6	18.6	4.0	4	4.6	5.9
150		6	21.8	4.9	4.9	5.9	8
200		6.3	30.1	6.8	6.6	8.7	14
250		6.8	40.2	9.6	9.2	13.1	23.2
300		7.2	50.8	12.8	12.4	18	33.5
350		7.7	63.2	14.1	17.2	25.5	46.7
400		8.1	75.5	16.3	21.9	33.2	66.9
450 [1]		8.6	85	20.2	28.1	39.0	–
500		9	104.3	21.8	37	48.7	82.3
600		9.9	137.1	30.8	57.3	71.5	124.1
700		10.8	173.9	40.5	55.6	–	–

1 Available upon request

Flange Spigot PIpes
With Puddle Flange in middle

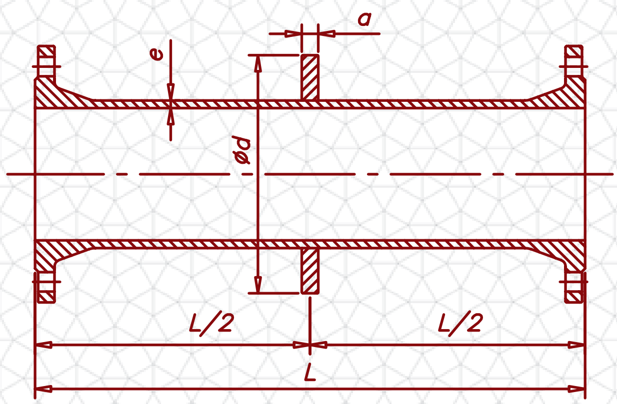


Dimensions in mm

DN	L	e	d	a
80	to order Max.=6m	6	200	16
100		6	220	16
125[1]		6	250	18
150		6	285	18
200		6.3	340	20
250		6.8	400	20
300		7.2	455	20.5
350		7.7	505	20.5
400		8.1	565	20.5
450[1]		8.6	615	21.5
500		9	670	22.5
600		9.9	780	25
700		10.8	895	27.5

1 Available upon request

Double Flanged Pipes
With Puddle Flnge in middle

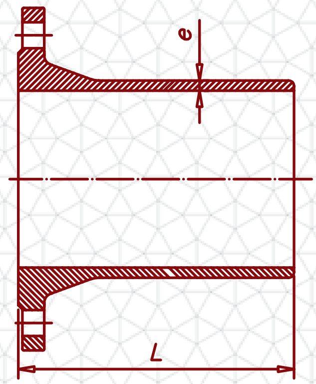


Dimensions in mm

DN	L	e	d	a
80	to order Max.=6m	6	200	16
100		6	220	16
125[1]		6	250	18
150		6	285	18
200		6.3	340	20
250		6.8	400	20
300		7.2	455	20.5
350		7.7	505	20.5
400		8.1	565	20.5
450[1]		8.6	615	21.5
500		9	670	22.5
600		9.9	780	25
700		10.8	895	27.5

1 Available upon request

Flanged Spigot

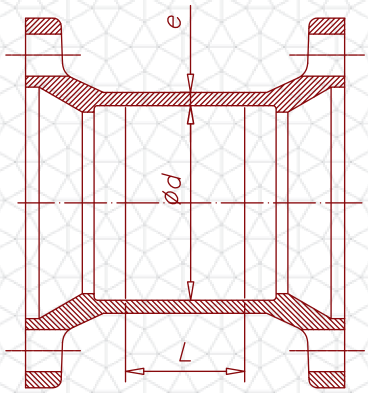


Dimensions in mm
Weights in kg **K=12**

DN	e	L	Mass PN10	Mass PN16	Mass PN25 *	Mass PN40 *
80	7	350	9	9	8	8
100	7.2	360	11	11	11.5	11.5
125[1]	7.5	370	13	13	13.5	13.5
150	7.8	380	16	16	17	–
200	8.4	400	24	24	26	–
250	9	420	36	36	40	–
300	9.6	440	43	43	48	–
350	10.2	460	61	64	72	–
400	10.8	480	76	82	93	–
450[1]	11.4	500	80	92	100	–
500	12	520	85	101	113	–
600	13.2	560	142	169	183	–
700	14.4	600	201	216	–	–

1 Available upon request

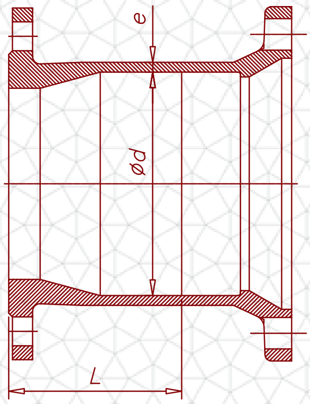
Collar



Dimensions in mm
Weights in kg
K=12

DN	e	d	L	Mass	Working Pressure
80	7	109	160	11	PN25
100	7.2	130	160	14	
125	7.5	156	165	18	
150	7.8	183	165	23	
200	8.4	235	170	30	
250	9	288	175	40	
300	9.6	340	180	52	
350	10.2	393	185	69	
400	10.8	445	190	81	
450	11.4	498	195	96	
500	12	550	200	118	
600	13.2	655	210	146	
700	14.4	760	220	198	PN16

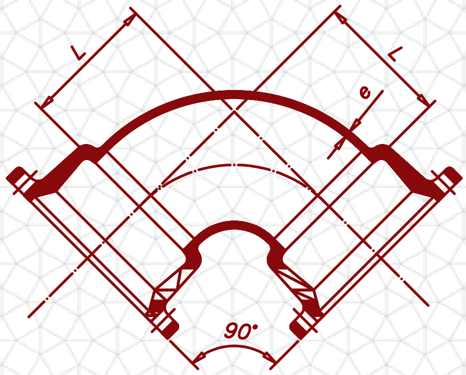
Flanged Socket



Dimensions in mm
Weights in kg
K=12

DN	e	L	d	Mass		
				PN10	PN16	PN25 *
80	7	130	109	12	12	13
100	7.2	130	130	13	13	14
125	7.5	135	156	15	15	16
150	7.8	135	183	18	18	19
200	8.4	140	235	25	25	27
250	9	145	288	34	34	38
300	9.6	150	340	46	46	51
350	10.2	155	393	63	66	77
400	10.8	160	445	74	80	91
450	11.4	165	498	85	100	110
500	12	170	550	100	115	127
600	13.2	180	655	141	167	181
700	14.4	190	760	181	196	210

Double Socket Bend (90°)

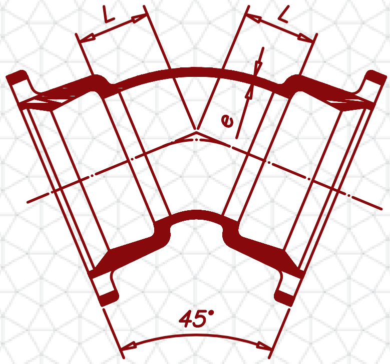


Dimensions in mm
Weights in kg

K=12

DN	e	L	Mass	Working Pressure
80	7	100	14	
100	7.2	120	17	
125	7.5	145	23	
150	7.8	170	30	
200	8.4	220	46	
250	9	270	65	
300	9.6	320	100	PN25
350	10.2	370	123	
400	10.8	420	180	
450	11.4	470	206	
500	12	554	243	
600	13.2	647	318	
700	14.4	741	450	

Double Socket Bend (45°)

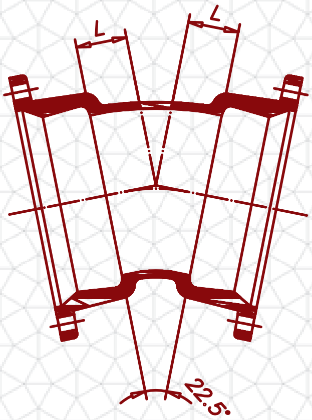


Dimensions in mm
Weights in kg

K=12

DN	e	L	Mass	Working Pressure
80	7	55	12	
100	7.2	65	17	
125	7.5	75	20	
150	7.8	85	28	
200	8.4	110	40	
250	9	130	55	PN25
300	9.6	150	80	
350	10.2	175	100	
400	10.8	195	116	
450	11.4	220	150	
500	12	240	181	
600	13.2	285	248	
700	14.4	330	395	PN16

Double Socket Bend ($22 \frac{1}{2}^{\circ}$)

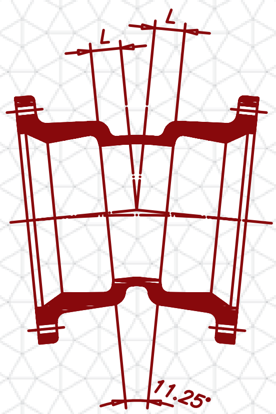


Dimensions in mm
Weights in kg

K=12

DN	e	L	Mass	Working Pressure
80	7	40	14	PN25
100	7.2	40	16	
125	7.5	50	21	
150	7.8	55	27	
200	8.4	65	35	
250	9	75	48	
300	9.6	85	67	
350	10.2	95	87	
400	10.8	110	105	
450	11.4	120	125	
500	12	130	151	
600	13.2	150	200	
700	14.4	175	260	PN16

Double Socket Bend (11 1/4°)

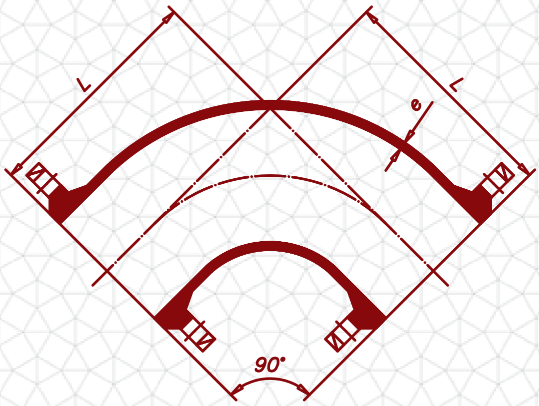


Dimensions in mm
Weights in kg

K=12

DN	e	L	Mass	Working Pressure
80	7	30	14	PN25
100	7.2	30	16	
125	7.5	35	20	
150	7.8	35	26	
200	8.4	40	33	
250	9	50	45	
300	9.6	55	62	
350	10.2	60	83	
400	10.8	65	97	
450	11.4	70	110	
500	12	75	121	
600	13.2	85	168	
700	14.4	95	242	PN16

Double Flanged Bend (90°)

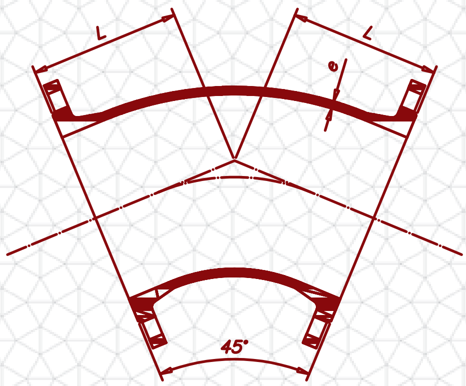


Dimensions in mm
Weights in kg

K=12

DN	e	L	Mass		
			PN10	PN16	PN25 *
80	7	165	10	10	11
100	7.2	180	14	14	15
125	7.5	200	20	20	22
150	7.8	220	25	25	27
200	8.4	260	34	34	38
250	9	350	61	60	68
300	9.6	400	87	86	98
350	10.2	450	108	114	131
400	10.8	500	143	154	177
450	11.4	550	178	198	222
500	12	600	213	243	267
600	13.2	700	310	363	392
700	14.4	800	451	481	–

Double Flanged Bend (45°)

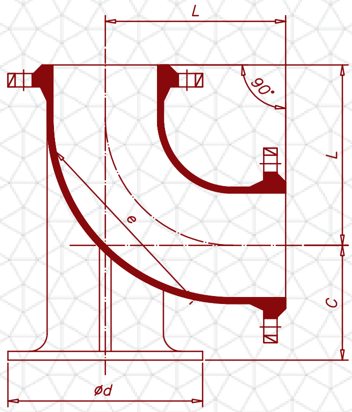


Dimensions in mm
Weights in kg

K=12

DN	e	L	Mass		
			PN10	PN16	PN25*
80	7	130	10	10	11
100	7.2	140	12	12	13
125	7.5	150	16	16	17
150	7.8	160	20	20	22
200	8.4	180	31	30.5	35
250	9	350	63	62	70
300	9.6	400	85	84	95.5
350	10.2	300	84	90	107
400	10.8	325	105	116	139
450	11.4	350	132	153	175
500	12	375	160	190	214
600	13.2	425	221	274	303
700	14.4	480	360	391	–

Double Flanged Duckfoot Bend (90°)

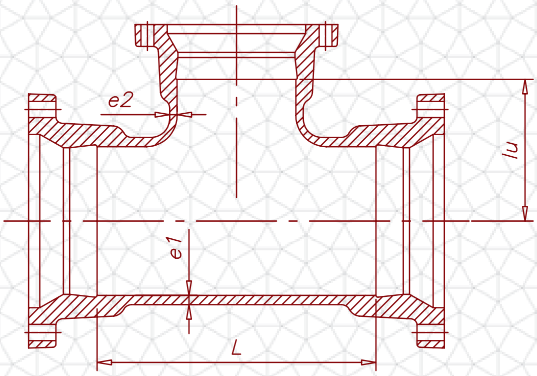


Dimensions in mm
Weights in kg

K=12

DN	e	L	C	d	Mass		
					PN10	PN16	PN25*
80	7	165	110	180	16.5	16.5	–
100	7.2	180	125	200	27.5	27.5	28.5
125	7.5	200	140	225	38	38	39
150	7.8	220	160	250	48	48	50
200	8.4	260	190	300	67	66.5	71
250	9	350	225	350	109	108	116
300	9.6	400	255	400	154	153	165
350	10.2	450	290	450	201	207	224
400	10.8	500	320	500	231	242	265
450	11.4	550	355	550	304	325	348
500	12	600	385	600	377	407	431
600	13.2	700	450	700	572	625	654
700	14.4	800	485	800	790	850	875

All Socket Tee

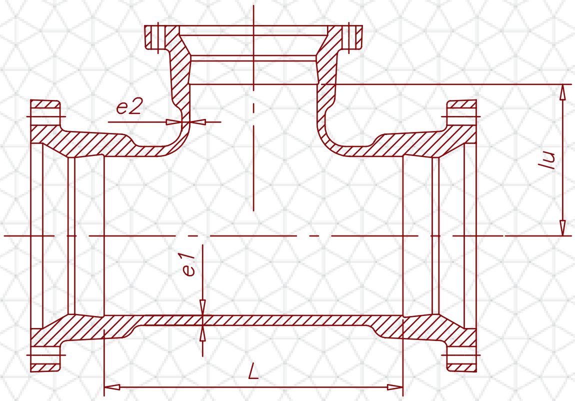


Dimensions in mm
Weights in kg

K=14

DN	dn	e1	e2	L	lu	Mass	Working Pressure
80	80	8.1	8.1	170	85	14	PN25
100	80	8.4	8.1	170	95	25	
	100	8.4	8.4	190	95	30	
125	80	8.8	8.1	170	105	–	
	100	8.8	8.4	195	110	–	
	125	8.8	8.8	225	110	–	
150	80	9.1	8.1	170	120	32	
	100	9.1	8.4	195	120	36	
	150	9.1	8.8	255	125	43	
200	80	9.8	8.1	175	145	45	
	100	9.8	8.4	200	145	47	
	150	9.8	9.1	255	150	54	
	200	9.8	9.8	315	155	62	
250	80	10.5	8.1	200	248	–	
	100	10.5	8.4	200	247	–	
	150	10.5	9.1	315	175	–	
	200	10.5	9.8	315	260	–	
	250	10.5	10.5	375	190	104	

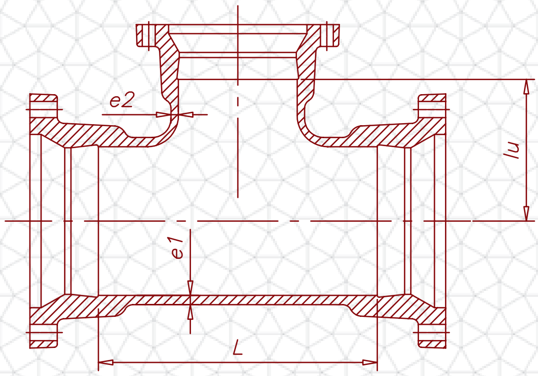
All Socket Tee



Dimensions in mm
Weights in kg
K=14

DN	dn	e1	e2	L	lu	Mass	Working Pressure
300	80	11.2	8.1	205	273	–	
	100	11.2	8.4	205	277	–	
	150	11.2	9.1	320	200	–	
	200	11.2	9.8	320	290	–	
	250	11.2	10.5	435	210	–	
	300	11.2	11.2	435	220	132	
350	80	11.9	8.1	205	308	–	
	100	11.9	8.4	205	307	–	
	150	11.9	9.1	325	230	–	PN25
	200	11.9	9.8	325	320	–	
	250	11.9	10.5	495	240	–	
	300	11.9	11.2	495	337	–	
	350	11.9	11.9	495	344	–	
400	80	12.6	8.1	210	333	–	
	100	12.6	8.4	210	337	–	
	150	12.6	9.1	325	255	–	
	200	12.6	9.8	325	350	–	
	250	12.6	10.5	440	369		

All Socket Tee

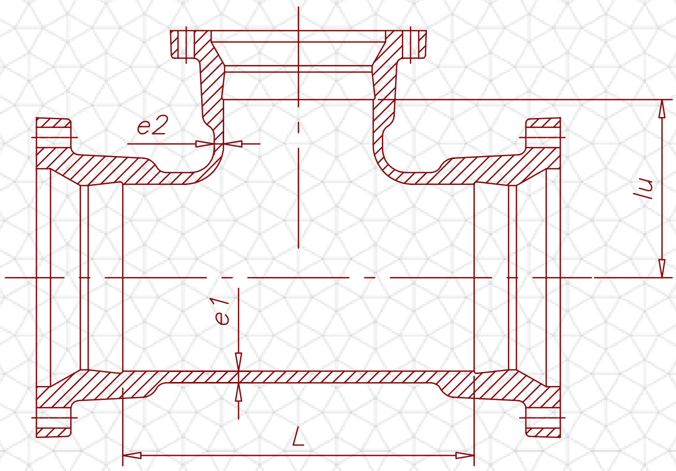


Dimensions in mm
Weights in kg

K=14

DN	dn	e1	e2	L	lu	Mass	Working Pressure
400	300	12.6	11.2	440	367	–	
	350	12.6	11.9	560	275	–	
	400	12.6	12.6	560	381	–	
450	150	13.3	9.1	330	320	–	
	200	13.3	9.8	330	320	–	
	300	13.3	11.2	445	335	–	
	400	13.3	12.6	560	345	–	
	450	13.3	13.3	620	350	–	
500	80	14	8.1	215	398	–	PN25
	100	14	8.4	215	397	–	
	150	14	9.1	330	305	–	
	200	14	9.8	330	410	–	
	250	14	10.5	450	350	–	
	300	14	11.2	450	427	–	
	350	14	11.9	565	434	–	
	400	14	12.6	565	441	–	
	500	14	14	680	454	–	

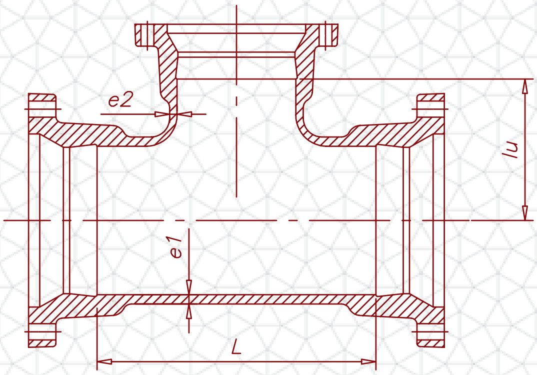
All Socket Tee



Dimensions in mm
Weights in kg
K=14

DN	dn	e1	e2	L	lu	Mass	Working Pressure
600	80	15.4	8.1	340	458	–	PN25
	100	15.4	8.4	340	457	–	
	150	15.4	9.1	340	400	–	
	200	15.4	9.8	340	470	–	
	250	15.4	10.5	570	479	–	
	300	15.4	11.2	570	410	–	
	350	15.4	11.9	570	494	–	
	400	15.4	12.6	570	501	–	
	500	15.4	14	800	514	–	
	600	15.4	15.4	800	527	–	

All Socket Tee

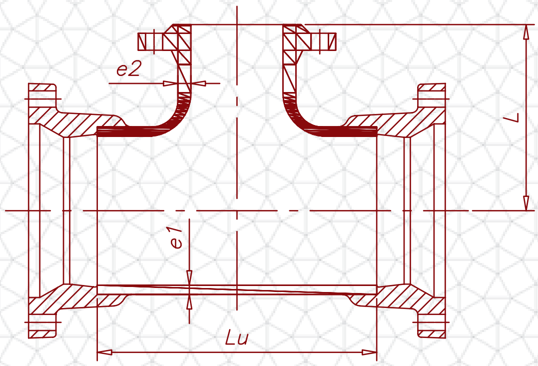


Dimensions in mm
Weights in kg

K=14

DN	dn	e1	e2	L	lu	Mass	Working Pressure
700	80	16.8	8.1	345	478	–	PN25
	100	16.8	8.4	345	487	–	
	150	16.8	9.1	345	493	–	
	200	16.8	9.8	345	495	–	
	250	16.8	10.5	575	499	–	
	300	16.8	11.2	575	460	–	
	350	16.8	11.9	575	514	–	
	400	16.8	12.6	575	516	–	
	500	16.8	14	925	524	–	
	600	16.8	15.4	925	532	–	
	700	16.8	16.8	925	541	–	

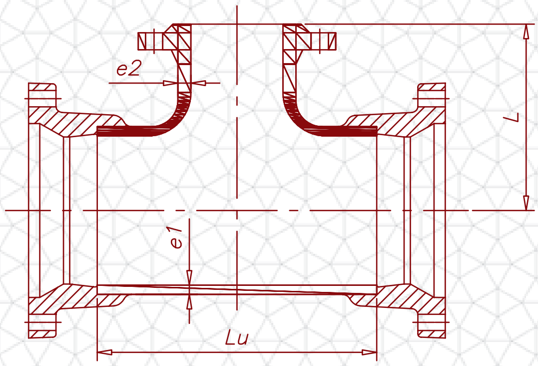
Daouble Socket Tee



Dimensions in mm
Weights in kg
K=14

DN	dn	e1	e2	Lu	L	Mass		
						PN10	PN16	PN25
80	80	8.1	8.1	170	165	15	15	15
100	80	8.4	8.1	170	175	21	21	21
	100	8.4	8.4	190	180	24	24	24.5
125	80	8.8	8.1	170	190	19.4	19.4	19.4
	100	8.8	8.4	195	195	21	21	21.5
	125	8.8	8.8	225	200	23	23	24
150	80	9.1	8.1	170	205	30	30	30
	100	9.1	8.4	195	210	37	37	37.5
	150	9.1	9.1	255	220	39	39	40
200	80	9.8	8.1	175	235	41	41	41
	100	9.8	8.4	200	240	48	48	48.5
	150	9.8	9.1	255	250	54	54	55
	200	9.8	9.8	315	260	60	60	62
250	80	10.5	8.1	200	265	47	47	47
	100	10.5	8.4	200	270	56	56	56.5
	150	10.5	9.1	315	280	59	59	60
	200	10.5	9.8	315	290	72	72	74
	250	10.5	10.5	375	300	82	81.5	85.5

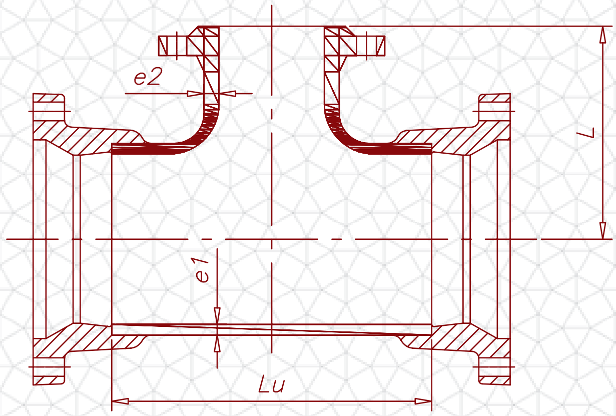
Daouble Socket Tee



Dimensions in mm
Weights in kg
K=14

DN	dn	e1	e2	Lu	L	Mass		
						PN10	PN16	PN25
300	80	11.2	8.1	205	295	55	55	55
	100	11.2	8.4	205	300	74	74	74.5
	150	11.2	9.1	320	310	–	–	–
	200	11.2	9.8	320	320	95	95	97
	250	11.2	10.5	435	330	–	–	–
	300	11.2	11.2	435	340	124	123.5	129
350	80	11.9	8.1	205	330	71	71	71
	100	11.9	8.4	205	330	100	100	100.5
	150	11.9	9.1	325	340	–	–	–
	200	11.9	9.8	325	350	119	119	121
	250	11.9	10.5	495	360	–	–	–
	300	11.9	11.2	495	370	–	–	–
	350	11.9	11.9	495	380	150	153	161.5
400	80	12.6	8.1	210	355	83	83	83
	100	12.6	8.4	210	360	120	120	120.5
	150	12.6	9.1	325	370	–	–	–
	200	12.6	9.8	325	380	140	140	142
	250	12.6	10.5	440	400	171	171	173

Daouble Socket Tee

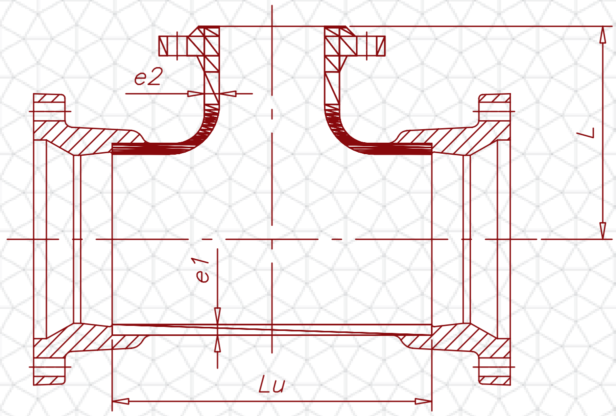


Dimensions in mm
Weights in kg

K=14

DN	dn	e1	e2	Lu	L	Mass PN10	Mass PN16	Mass PN25
400	300	12.6	11.2	440	400	178	178	180
	350	12.6	11.9	560	410	–	–	–
	400	12.6	12.6	560	420	196	201.5	213
450	100	13.3	8.4	215	395	95	95	97
	150	13.3	9.1	330	410	–	–	–
	200	13.3	9.8	330	410	–	–	–
	300	13.3	11.2	445	430	–	–	–
	400	13.3	12.6	560	450	–	–	–
	450	13.3	13.3	620	460	–	–	–
500	80	14	8.1	215	420	113	113	113
	100	14	8.4	215	420	127	127	127.5
	150	14	9.1	330	430	137	137	138
	200	14	9.8	330	440	171	171	173
	250	14	10.5	450	350	–	–	–
	300	14	11.2	450	460	197	197	199
	350	14	11.9	565	470	–	–	–
	400	14	12.6	565	480	235	240.5	252
	500	14	14	680	500	269	284	296

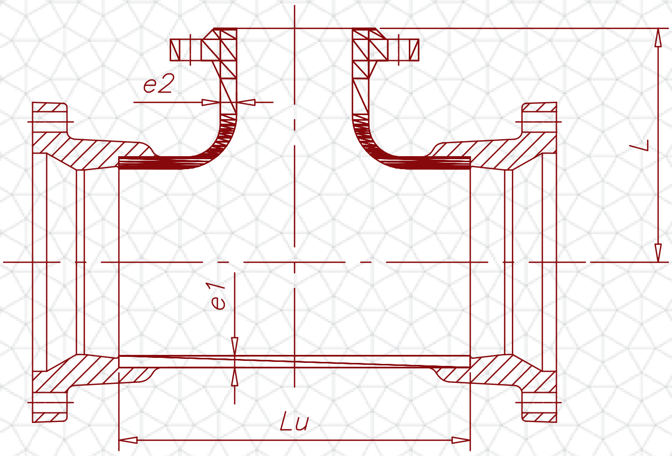
Daouble Socket Tee



Dimensions in mm
Weights in kg
K=14

DN	dn	e1	e2	Lu	L	Mass		
						PN10	PN16	PN25
600	80	15.4	8.1	340	480	–	–	–
	100	15.4	8.4	340	480	–	–	–
	150	15.4	9.1	340	490	–	–	–
	200	15.4	9.8	340	500	229	229	231
	250	15.4	10.5	570	510	–	–	–
	300	15.4	11.2	570	520	–	–	–
	350	15.4	11.9	570	530	–	–	–
	400	15.4	12.6	570	540	298	303.5	315
	500	15.4	14	800	560	–	–	–
	600	15.4	15.4	800	580	393.5	420	434

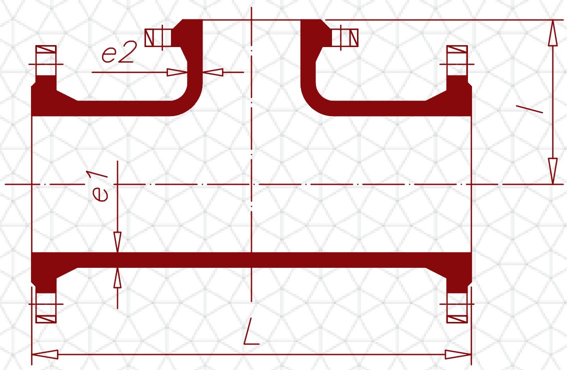
Daouble Socket Tee



Dimensions in mm
Weights in kg
K=14

DN	dn	e1	e2	Lu	L	Mass		
						PN10	PN16	PN25
700	80	16.8	8.1	345	500	–	–	–
	100	16.8	8.4	345	510	–	–	–
	150	16.8	9.1	345	520	–	–	–
	200	16.8	9.8	345	525	294	294	–
	250	16.8	10.5	575	530	–	–	–
	300	16.8	11.2	575	540	–	–	–
	350	16.8	11.9	575	550	–	–	–
	400	16.8	12.6	575	555	371	376.5	–
	500	16.8	14	925	570	–	–	–
	600	16.8	15.4	925	585	–	–	–
	700	16.8	16.8	925	600	526	541	–

All Flanged Tee

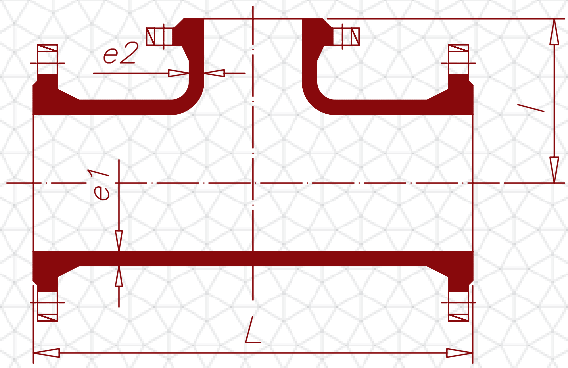


Dimensions in mm
Weights in kg
K=14

DN	dn	e1	L	e2	l	Mass PN10	Mass PN16	Mass PN25*
80	80	8.1	330	8.1	165	16	16	16
100	80	8.4	360	8.1	175	20	20	21
	100	8.4	360	8.4	180	21	21	22.5
125	80	8.8	400	8.1	190	23	23	24.5
	100	8.8	400	8.4	195	24	24	26
	125	8.8	400	8.8	200	25.5	25.5	31.5
150	80	9.1	440	8.1	205	31	31	33
	100	9.1	440	8.4	210	32.5	32.5	35
	125	9.1	440	8.8	215	33.5	33.5	37
	150	9.1	440	9.1	220	35.5	35.5	38.5
200	80	9.8	520	8.1	235	46	45.5	50
	100	9.8	520	8.4	240	47	46.5	51.5
	125	9.8	520	8.8	245	48	48	52
	150	9.8	520	9.1	250	50	49.5	55
	200	9.8	520	9.8	260	54.5	54	60
250	80	10.5	700	8.1	270	70	70	75
	100	10.5	700	8.4	275	74	73	81.5
	150	10.5	700	9.1	280	78	77	86
	200	10.5	700	9.8	325	86	85	95
	250	10.5	700	10.5	350	89	88	99.5
300	80	11.2	800	8.1	295	90	89	100
	100	11.2	800	8.4	300	95	94	106

* Fitting with mentioned PN, can be supplied on request.

All Flanged Tee

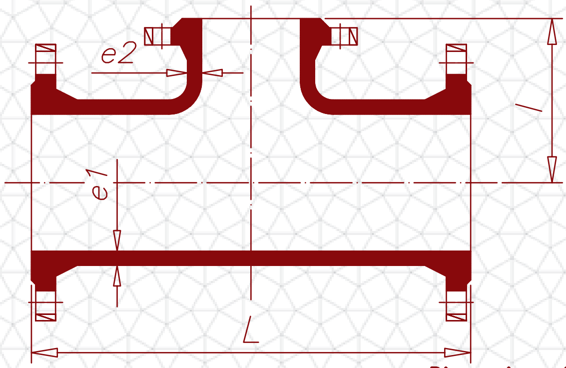


Dimensions in mm
Weights in kg
K=14

DN	dn	e1	L	e2	l	Mass		
						PN10	PN16	PN25*
300	150	11.2	800	9.1	310	99	98.5	110
	200	11.2	800	9.8	350	103	102	115.5
	250	11.2	800	10.5	330	–	–	–
	300	11.2	800	11.2	400	130	129	145.5
350	80	11.9	850	8.1	325	–	–	–
	100	11.9	850	8.4	325	134	140	157.5
	150	11.9	850	9.1	325	120	126	143
	200	11.9	850	9.8	325	140	146	164.5
	250	11.9	850	10.5	325	–	–	–
	300	11.9	850	11.2	425	140	145	166
	350	11.9	850	11.9	425	163	172.5	197
400	80	12.6	900	8.1	350	–	–	–
	100	12.6	900	8.4	350	164	175	198.5
	150	12.6	900	9.1	350	–	–	–
	200	12.6	900	9.8	350	169	180	204.5
	250	12.6	900	10.5	350	–	–	–
	300	12.6	900	11.2	450	–	–	–
	400	12.6	900	12.6	450	208	225	258.5
450	100	13.3	950	8.4	375	175	193	215
	150	13.3	950	9.1	375	180	196	219
	200	13.3	950	9.8	375	183	199	222
	250	13.3	950	10.5	420	–	–	–

* Fitting with mentioned PN, can be supplied on request.

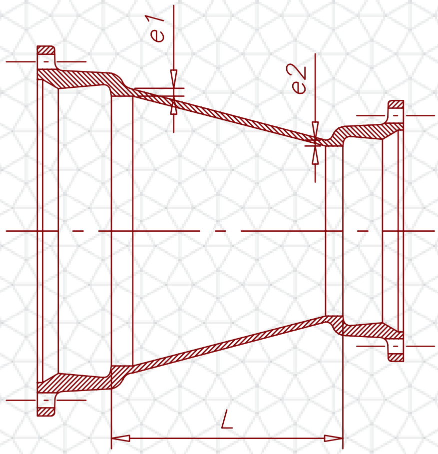
All Flanged Tee



Dimensions in mm
Weights in kg
K=14

DN	dn	e1	L	e2	l	Mass PN10	Mass PN16	Mass PN25*
450	300	13.3	950	11.2	430	199	215	242
	400	13.3	950	12.6	450	210	230	263
	450	13.3	950	13.3	475	216	240	272
500	100	14	1000	8.4	400	249.5	280	304
	200	14	1000	9.8	400	259.5	290	315.5
	300	14	1000	11.2	500	237.5	267.5	296.5
	350	14	1000	11.9	500	244.5	–	–
	400	14	1000	12.6	500	277.5	308.5	343.5
	500	14	1000	14	500	281.5	327	362
600	200	15.4	1100	9.8	450	328	381	411.5
	300	15.4	1100	11.2	550	312	364.5	398.5
	400	15.4	1100	12.6	550	358	416.5	456.5
	500	15.4	1100	14	550	–	455	–
	600	15.4	1100	15.4	550	397.5	477	519.5
700	200	16.8	650	9.8	525	298	328	–
	300	16.8	760	11.2	540	319	342	–
	350	16.8	820	11.9	550	370	403	481
	400	16.8	870	12.6	555	384	422.5	–
	500	16.8	1050	14	570	–	484	–
	600	16.8	1200	15.4	585	493.5	550	633.5
	700	16.8	1200	16.8	600	529.5	574	–

Double Socket Taper

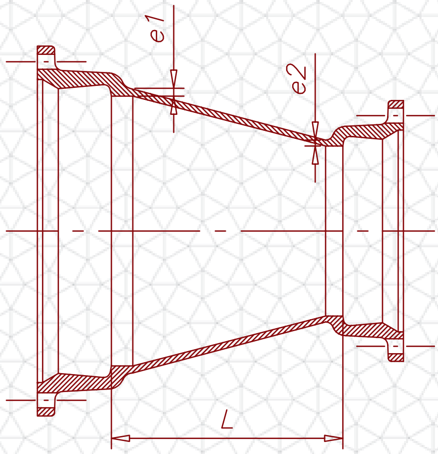


Dimensions in mm
Weights in kg

K=12

DN	dn	e1	e2	L	Mass
100	80	7.2	7	90	12
125	80	7.5	7	140	15
	100	7.5	7.2	100	18
150	80	7.8	7	190	20
	100	7.8	7.2	150	23
	125	7.8	7.5	100	25
200	100	8.4	7.2	250	27
	125	8.4	7.5	200	29
	150	8.4	7.8	150	31
250	125	9	7.5	300	35
	150	9	7.8	250	39
	200	9	8.4	150	40
300	150	9.6	7.8	350	75
	200	9.6	8.4	250	63
	250	9.6	9	150	59
350	200	10.2	8.4	360	75
	250	10.2	9	260	56
	300	10.2	9.6	160	76

Double Socket Taper

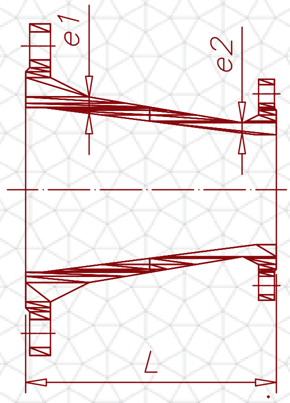


Dimensions in mm
Weights in kg

K=12

DN	dn	e1	e2	L	Mass
400	250	10.8	9	360	90
	300	10.8	9.6	260	95
	350	10.8	10.2	160	93
450	350	11.4	10.2	260	135
	400	11.4	10.8	160	115
500	300	12	9.6	460	143
	350	12	10.2	360	131
	400	12	10.8	260	120
600	350	13.2	10.2	560	196
	400	13.2	10.8	460	178
	500	13.2	12	260	163
700	350	14.4	10.2	780	264
	500	14.4	12	480	243
	600	14.4	13.2	280	227

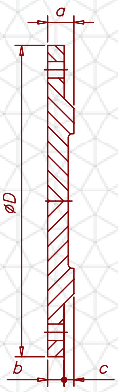
Double Flanged Taper



Dimensions in mm
Weights in kg
K=12

DN	dn	e1	e2	L	Mass		
					PN10	PN16	PN25*
80	60	7	7	200	7.5	7.5	7.4
	65	7	7	200	7.9	7.9	7.8
100	80	7.2	7	200	10.5	10.5	11
125	100	7.5	7.2	200	11.3	11.3	12.5
150	100	7.8	7.2	200	12.8	12.8	14.3
	125	7.8	7.5	200	14.1	14.1	15.8
200	80	8.4	7	670	18.1	17.7	19.7
	100	8.4	7.2	600	25	–	–
	150	8.4	7.8	300	25	25	28
250	200	9	8.4	300	33	32.5	38.5
300	250	9.6	9	300	48	47	57
350	300	10.2	9.6	300	56	59	72.5
400	350	10.8	10.2	300	62	70.5	90.5
450	400	11.4	10.8	300	70.5	83	105
500	400	12	10.8	600	120	140.5	163.5
600	350	13.2	10.2	600	130.5	–	–
	400	13.2	10.8	700	150	192.5	201
	500	13.2	12	600	153.5	195	221
700	350	14.4	10.2	850	211	–	–
	400	14.4	10.8	800	–	236.5	–
	500	14.4	12	700	–	240	–
	600	14.4	13.2	600	213.5	255	–

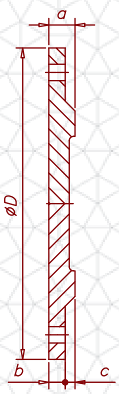
Blank Flange PN10



Dimensions in mm
Weights in kg

DN	D	a	b	c	Mass
80	200	19	16	3	4.5
100	220	19	16	3	4.7
125	250	19	16	3	6.0
150	285	19	16	3	7.9
200	340	20	17	3	12
250	400	22	19	3	18.6
300	455	24.5	20.5	4	26.5
350	505	24.5	20.5	4	32.5
400	565	24.5	20.5	4	40
450	615	25.5	21.5	4	50
500	670	26.5	22.5	4	61.6
600	780	30	25	5	93.5
700	895	32.5	27.5	5	135.3

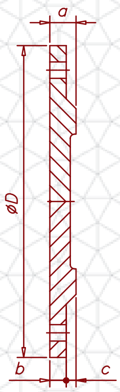
Blank Flange PN16



Dimensions in mm
Weights in kg

DN	D	a	b	c	Mass
80	200	19	16	3	4.5
100	220	19	16	3	4.7
125	250	19	16	3	6.0
150	285	19	16	3	7.9
200	340	20	17	3	12
250	400	22	19	3	18.6
300	455	24.5	20.5	4	25.8
350	520	26.5	22.5	4	36.8
400	580	28	24	4	48.9
450	640	30	26	4	65
500	715	31.5	27.5	4	84.7
600	840	36	31	5	133.1
700	910	39.5	34.5	5	171.6

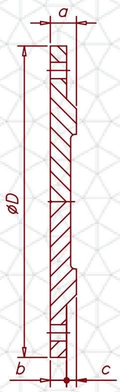
Blank Flange PN25



Dimensions in mm
Weights in kg

DN	D	a	b	c	Mass
80	200	19	16	3	4.5
100	235	19	16	3	5.3
125	270	19	16	3	6.5
150	300	20	17	3	9.1
200	360	22	19	3	14.6
250	425	24.5	21.5	3	23.1
300	485	27.5	23.5	4	33
350	555	30	26	4	47.8
400	620	32	28	4	63.8
450	670	34.5	30.5	4	85.0
500	730	36.5	32.5	4	103.4
600	845	42	37	5	158

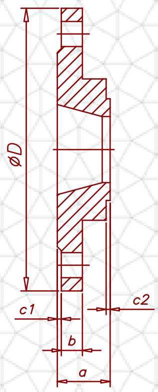
Blank Flange PN40



Dimensions in mm
Weights in kg

DN	D	a	b	c	Mass
80	200	19	16	3	4.5
100	235	19	16	3	5.3
125	270	23.5	20.5	3	8.0
150	300	26	23	3	11.5
200	375	30	27	3	21
250	450	34.5	31.5	3	35
300	515	39.5	35.5	4	51

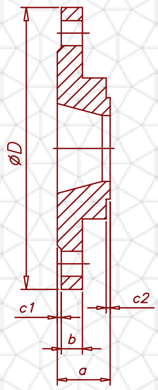
Reducing Flange PN10



Dimensions in mm
Weights in kg

DN	dn	D	a	b	c1	c2	Mass
200	80	340	40	17	3	3	13.3
	100	340	40	17	3	3	13.2
	125	340	40	17	3	3	13.5
350	250	505	48	20.5	4	3	32
400	250	565	49	20.5	4	3	39
	300	565	49	20.5	4	4	38
700	500	895	56	27.5	5	4	102

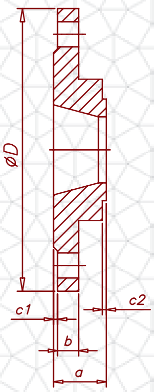
Reducing Flange PN16



Dimensions in mm
Weights in kg

DN	dn	D	a	b	c1	c2	Mass
200	80	340	40	17	3	3	13
	100	340	40	17	3	3	13
	125	340	40	17	3	3	13.5
350	250	520	54	20.5	4	3	36.5
400	250	580	54	24	4	3	46
	300	580	55	24	4	4	44.5
700	500	910	67	34.5	5	4	134

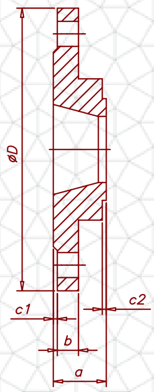
Reducing Flange PN25



Dimensions in mm
Weights in kg

DN	dn	D	a	b	c1	c2	Mass
200	80	360	40	19	3	3	15
	100	360	47	19	3	3	16.8
	125	360	53	19	3	3	18.8
350	250	555	60	26	4	3	48.5
400	250	620	60	28	4	3	61
	300	620	61	28	4	4	60

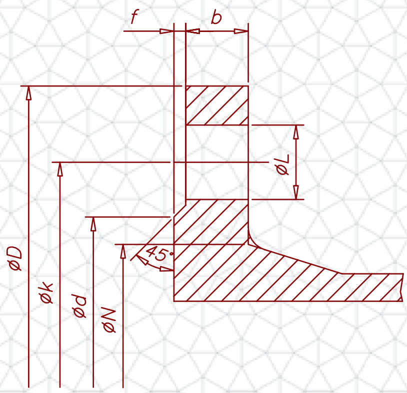
Reducing Flange PN40



Dimensions in mm
Weights in kg

DN	dn	D	a	b	c1	c2	Mass
200	80	375	40	27	3	3	20.5
	100	375	47	27	3	3	21.5
	125	375	53	27	3	3	22.5

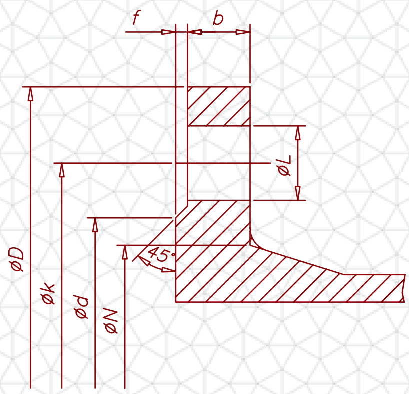
Flange PN10



Dimensions in mm
Weights in kg

DN	d	D	b	f	k	N	Bolt&Holes Size	Bolt&Holes L	Bolt&Holes NO.	Mass
80	132	200	16	3	160	120	M16	19	8	2.9
100	156	220	16	3	180	140	M16	19	8	3.3
125	184	250	16	3	210	170	M16	19	8	4
150	211	285	16	3	240	190	M20	23	8	4.9
200	266	340	17	3	295	246	M20	23	8	6.8
250	319	400	19	3	350	298	M20	23	12	9.6
300	370	455	20.5	4	400	348	M20	23	12	12.8
350	429	505	20.5	4	460	408	M20	23	16	14.1
400	480	565	20.5	4	515	456	M24	28	16	16.3
450	530	615	21.5	4	565	502	M24	28	20	20.2
500	582	670	22.5	4	620	559	M24	28	20	21.8
600	682	780	25	5	725	658	M27	31	20	30.8
700	794	895	27.5	5	840	772	M27	31	24	40.5

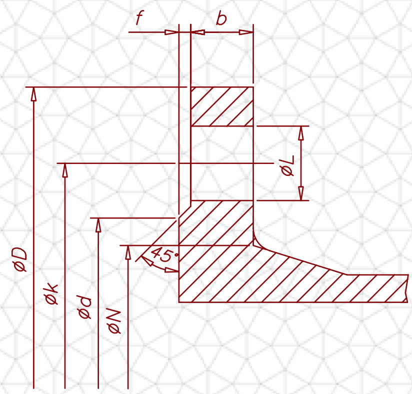
Flange PN16



Dimensions in mm
Weights in kg

DN	d	D	b	f	k	N	Bolt&Holes Size	L	NO.	Mass
80	132	200	16	3	160	120	M16	19	8	2.9
100	156	220	16	3	180	140	M16	19	8	3.3
125	184	250	16	3	210	170	M16	19	8	4
150	211	285	16	3	240	190	M20	23	8	4.9
200	266	340	17	3	295	246	M20	23	12	6.6
250	319	400	19	3	355	296	M24	28	12	9.2
300	370	455	20.5	4	410	350	M24	28	12	12.4
350	429	520	22.5	4	470	410	M24	28	16	17.2
400	480	580	24	4	525	458	M27	31	16	21.9
450	548	640	26	4	585	516	M27	31	20	28.1
500	609	715	27.5	4	650	576	M30	34	20	37
600	720	840	31	5	770	690	M33	37	20	57.3
700	794	910	34.5	5	840	760	M33	37	24	55.6

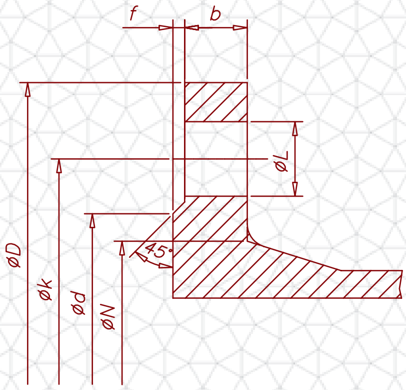
Flange PN25



Dimensions in mm
Weights in kg

DN	d	D	b	f	k	N	Bolt&Holes Size	L	NO.	Mass
80	132	200	16	3	160	120	M16	19	8	2.9
100	156	235	16	3	180	142	M20	23	8	3.8
125	184	270	16	3	210	162	M24	28	8	4.6
150	211	300	16	3	240	192	M24	28	8	5.9
200	274	360	17	3	295	252	M24	28	8	7.8
250	330	425	19	3	350	304	M27	31	12	13.1
300	389	485	20.5	4	400	364	M27	31	12	18
350	448	555	20.5	4	460	418	M30	34	16	25.5
400	503	620	20.5	4	515	472	M30	34	16	33.2
450	548	670	21.5	4	565	520	M33	37	20	39
500	609	730	22.5	4	620	580	M33	37	20	48.7
600	720	845	25	5	725	684	M36	41	20	71.5
700	820	960	27.5	5	840	780	M39	44	24	90.3

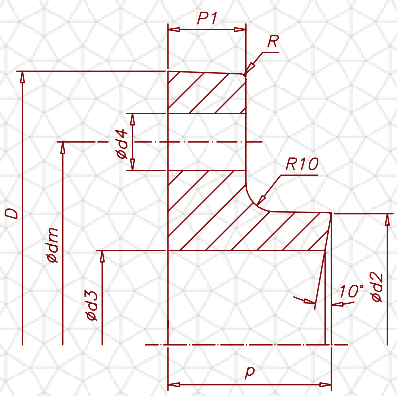
Flange PN40



Dimensions in mm
Weights in kg

DN	d	D	b	f	k	N	Bolt&Holes Size	Bolt&Holes L	Bolt&Holes NO.	Mass
80	132	200	16	3	160	120	M16	19	8	2.9
100	156	235	16	3	190	142	M20	23	8	3.8
125	184	270	20.5	3	220	162	M24	28	8	5.9
150	211	300	23	3	250	192	M24	28	8	8
200	284	375	27	3	320	254	M27	31	12	14
250	345	450	31.5	3	385	312	M30	34	12	23.2
300	409	515	35.5	4	450	378	M30	34	16	33.5
350	465	580	40	4	510	432	M33	37	16	46.7
400	535	660	44	4	585	498	M36	41	16	66.9
450	560	685	45	4	610	522	M36	41	20	102.3
500	615	755	48	4	670	576	M39	44	20	82.3
600	735	890	53	5	795	686	M45	50	20	124.1
700	–	–	–	–	–	–	–	–	–	–

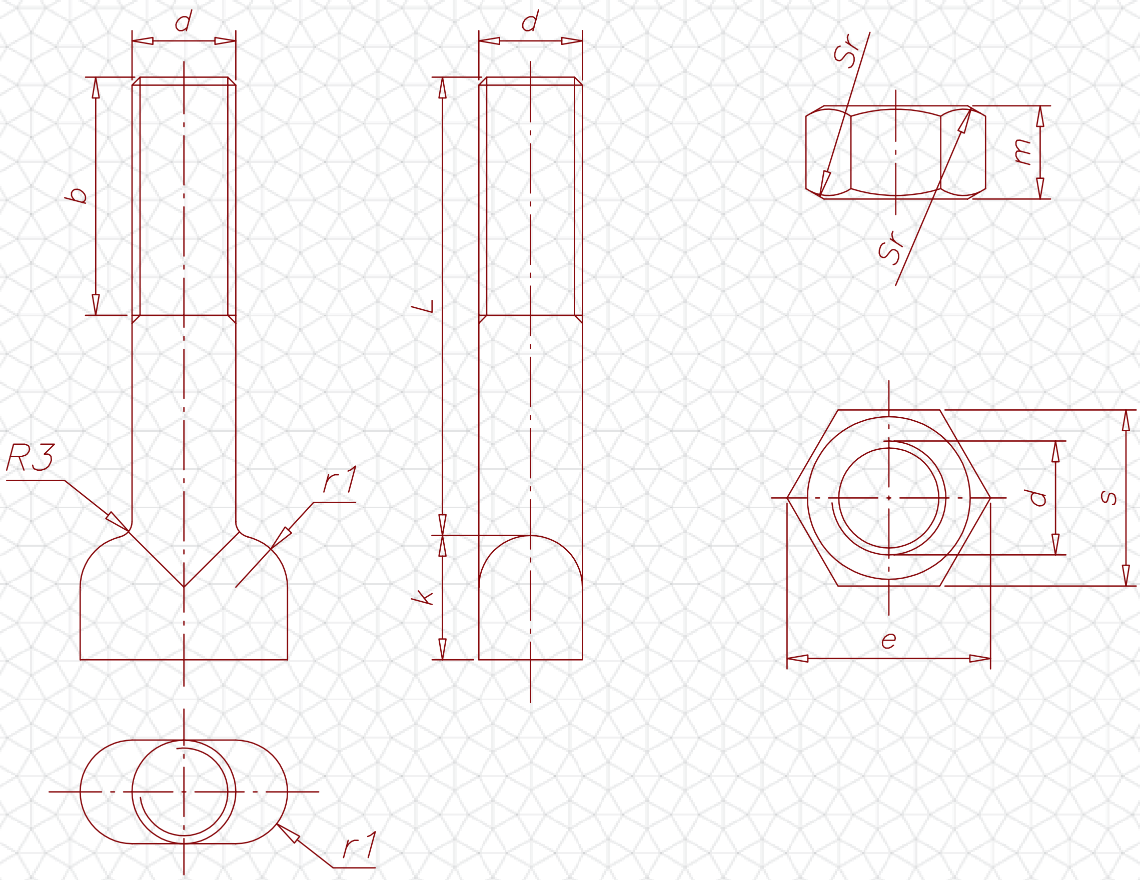
Gland



Dimensions in mm
Weights in kg

DN	D	dm	d2	d3	d4	p	p1	R	No. Of Hole	Mass
80	210	167	128	105	23	36	20	5	4	4
100	232	189	147	125	23	37	20	5	4	4.5
150	287	243	199	177	23	39	21	5	6	7.5
200	343	298	251	229	23	41	22	5	6	9
250	399	353	303	281	23	42	23	5	8	10.5
300	456	409	357	334	23	44	24	5	8	15
350	513	466	409	386	23	46	25	5	12	18
400	570	520	459	436	23	48	26	5	12	24
500	680	630	567	537	23	51	28	7	16	32
600	790	740	672	640	23	54	30	7	16	42.5
700	900	850	777	742	23	56	31	7	20	51.5

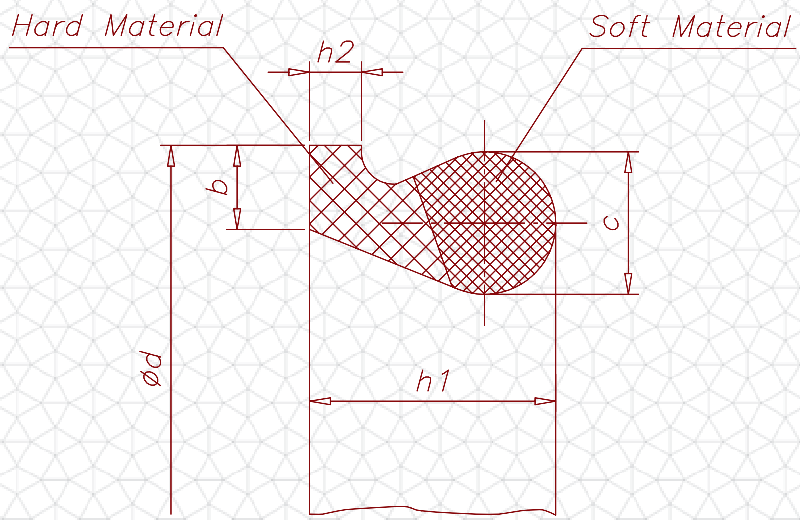
Bolts & Nuts



Dimensions in mm
Weights in kg

DN	Bolt						Nut				Mass	
	d	l	b	k	q	r1	e_{min}	m	sr	s^{0}_{-1}	Bolt	Nut
80–400	M20	90	50	24	40	10	39.55	24	80	36	0.31	0.12
500	M20	100	50	24	40	10	39.55	24	80	36	0.33	0.12
600	M20	100	60	24	40	10	39.55	24	80	36	0.33	0.12
700	M20	110	60	24	40	10	39.55	24	80	36	0.33	0.12

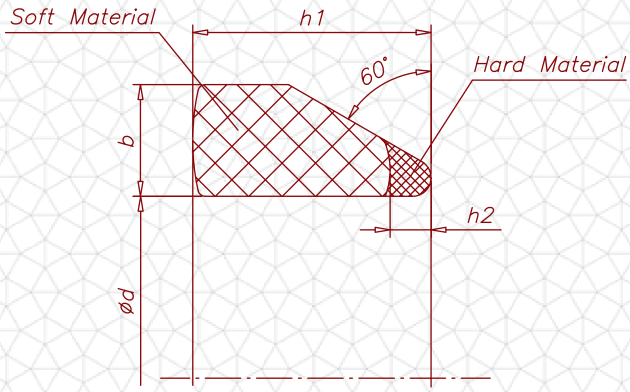
Rubber Gasket
For Push-On Joint (Tyton)



Dimensions in mm
Weights in kg

DN	d	b	h1	h2	c	Mass
80	126	10	26	5	16	0.15
100	146	10	26	5	16	0.18
125	173	10	26	5	16	0.18
150	200	10	26	5	16	0.22
200	256	11	30	6	18	0.39
250	310	11	32	6	18	0.55
300	366	12	34	7	20	0.7
350	420	12	34	7	20	0.8
400	475	13	38	8	22	1.1
450	530	14	40	8.5	23.5	1.5
500	583	14	42.5	9	25	1.7
600	692	15	46.5	10	27	2.3
700	809	20	56.2	16	33.5	4.5

Rubber Gasket
For Mechanical Joint (Bolted Gland)



Dimensions in mm
Weights in kg

DN	d	b	h1	h2	Mass
80	97	15	32	4	0.15
100	116	15	32	4.5	0.19
125	142	15	32	4.5	0.22
150	168	15	32	5	0.25
200	220	15	32	5.5	0.38
250	272	15	32	6	0.41
300	324	16	32	6.5	0.5
350	376	17	32	7	0.6
400	427	17	34	7.5	0.7
450	478	18	34	8	0.8
500	527	18	36	8	1.1
600	629	19	38	8.5	1.4
700	731	20	40	9	1.9

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