TATA STEEL

TATA DUCTURA

Happiness Guaranteed



About the Tata Group

Founded by Jamsetji Tata in 1868, the Tata Group is a global enterprise, headquartered in India, comprising over 100 independent operating companies. The group operates in more than 100 countries across six continents, with a mission 'To improve the quality of life of the communities we serve globally, through long-term stakeholder value creation based on Leadership with Trust'.



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Tata Steel Metaliks Division

Tata Steel Metaliks Division has its state-of-the-art manufacturing plant at Kharagpur, West Bengal, which produces the finest quality Pig Iron and Ductile Iron Pipes in India. With focus on Safety and Sustainability, TSMD has been consistently fulfilling its vision of Reaching Tomorrow First through innovative and superior quality products and service offerings.

Combining customer-centricity with technical efficiency, Tata Steel Metaliks Division is the supplier of choice through its end-to-end product and service offerings for customers. It is also taking significant steps in its journey of digital transformation by rapidly adopting industry 4.0 principles and becoming a 'Digital Factory' in line with its vision.

Aligned with its legacy of sustainable value creation, Tata Steel Metaliks Division is steadily working on its long-term Sustainability Strategy of becoming Net Zero by 2045. Its high-impact Corporate Social Responsibility interventions aim to uplift the lives of communities with a focus on Education, Essential Amenities and Skill Development.

TATA Ductura is the Ductile Iron Pipe brand of TSMD that promises the Tata Assurance of Quality for its technically superior products along with commitment of timely delivery, easy installation, and ethical business practices.

TSMD’s energy-efficient and environment-friendly Pig Iron, marketed as Tata eFee is a preferred raw material for manufacturing various kinds of castings by foundries due to its superior quality and customised specifications.

Ductile Iron Pipes & Properties

Ductile Iron's Superiority

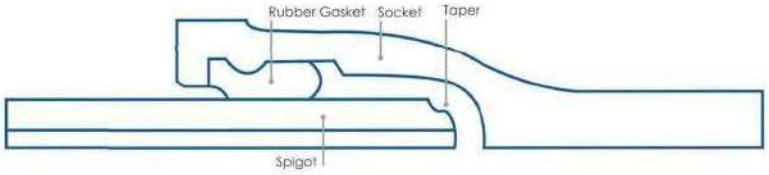
Ductile iron's superiority lies in its spheroid graphite microstructure. Since the graphite structure of grey cast iron is linear, under severe locding, stress builds up unevenly around the ends of the particles and weakens the metal. However, in ductile iron, since the graphite structure is spherical, similar stress distributes evenly, thereby maintaining strength. Yet, the basic chemical composition of ductile iron is similar to that of grey cast iron, giving it the same excellent anti-corrosive properties. Together, these features give ductile iron, excellent resistance to impact, pressure and corrosion.





Ductile Iron Pipe(DI Pipe)

Ductile Iron Pipes come with sockets and spigot ends. A rubber gasket is required as an accessory for all sockets before joining socket and spigot. Ductile Iron is known for its longevity. It is corrosion resistant and highly durable which makes it the preferred choice for pipeline networks all over the world.



Structure of DI Pipe (push-on joint)

Availability of Flexible Joints

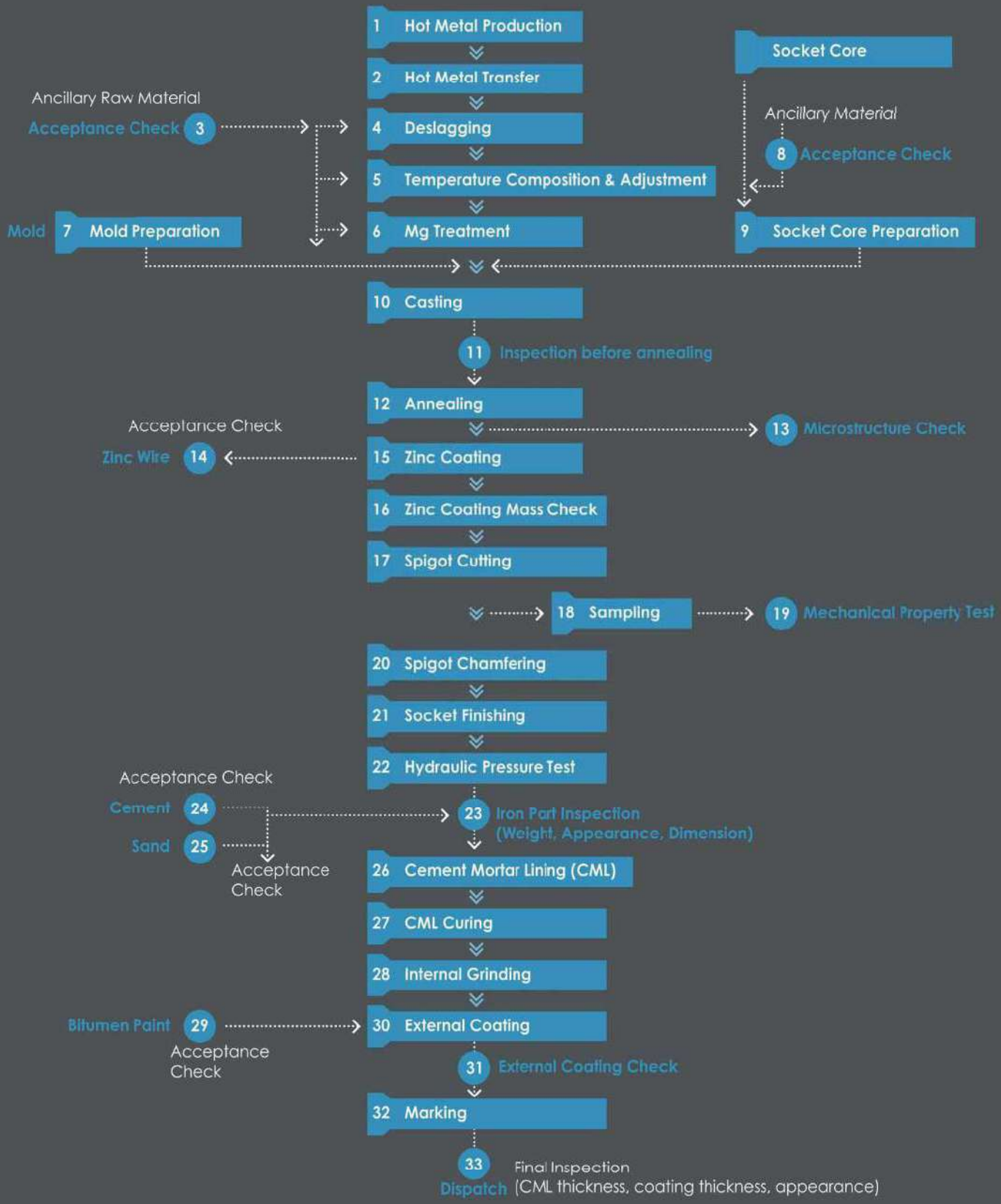
The allowable angular deflection at the joints of the DI Pipes enables them to bend at desirable angles. Flexible joints also enable the DI piplines to be adjusted as and however necessary based on ground movement, should it occur. The angle of deflection in Tata Ductura's DI Pipes is higher than DI Pipes from other brands.

Different materials of construction comparison

Sl. No.	Properties	Ductile Iron	Mild Steel	Pre-stressed Concrete
1	Tensile Strength (kg/cm^2)	4200	4100	NA
2	Modulus of Elasticity (kg/cm^2)	1.7×10^{10}	2.1×10^{10}	75×10^{10}
3	Beam Strength	High	Medium	Low
4	Minimum Elongation at Break	Over 10%	Over 18%	0
5	Weldability	Good	Good	NIL
6	Maximum Working Pressure	77 - 32 kg/cm^2	Depends upon thickness	7 kg/cm^2
7	Method of Jointing	Push on through Rubber Gasket Socket and Spigot.	Welding or Electrometrically Sealed Joints.	Rubber Gasket Socket and Spigot.
8	Structural Strength (Crushing Strength)	5000 kg/cm^2 (Approx.) Normal Backfill.	4000 kg/cm^2 (Approx.) Compaction of Backfill is essential.	500 kg/cm^2 (Approx.) Normal Backfil.
9	Resistance to Tampering	Very High	High	Medium
10	Corrosion Resistance	Corrosion rate is 0.005 inch per year & hence practically corrosion free.	Corrosion rate is 0.02 inch per year. Failure is rapid in urban areas & salty weather & water condition.	Corrosion of pre-tension wires is very common on account of attack by humic acid formed due to seepage. Corrodes fast in salty weather conditions.
11	Design Friction Coefficient	140	100 (incase of bare pipes) 110 (incase of cement lining done at site)	140
12	Flexibility of Pipe Joint Alignment	20 - 50	Joints are rigid	up to 1/2°
13	Types of Fittings Used	CI/DI	Steel (Fabricated)	Steel (Fabricated)
14	Direct Tapping Facility	Directly by ferrule. Multiple tapping possible.	Saddle Strap used.	Not recommended. Pre-stressing wire will snap.
15	Estimated Design Useful Service Life	Long service life of 50 - 70 years.	Normal service life of 25 - 30 years.	Failure due to crack, corrosion of pre-stressing wire, vulnerable joints are high. Optimistic life of 20 years.
16	Nature & Frequency of Damage	Impact failure or bursting due to crack or water hammer is extremely rare. Frequency of damage is very low.	Internal / external corrosion is main reason for failure. Frequency of damage - increases over time.	Bursting due to cracks, impact damage, joint failure, corrosion of pre-stressed wire is common. Frequency of damage is high.

uPVC	HDPE	BWSC	GRP
600 - 800 (decreases with temperature)	265 - 280 (decreases with temperature)	4100 (for Steel Cylinder)	NA
0.03 X 10^{10}	0.009 X 10^{10}	0.35 X 10^{10}	0.00005 X 10^{10}
Low	Low	Medium	Low
Fair	Good	Good	Good
NIL	Fusion Welding	Joints could be welded	NIL
12.5 kg/cm^2	16 kg/cm^2	8 kg/cm^2	15 kg/cm^2
With Chemical Glue or Rubber Gasket Socket and Spigot.	Fusion Welding.	Rubber Sealing Rings.	Socket Joint or Coupling Joint with Rubber Gasket.
100 - 150 kg/cm^2 (Approx.) Compaction of Backfill is essential.	200 - 250 kg/cm^2 (Approx.) Compaction of Backfill is essential.	1274 kg/cm^2 (Approx.) Compaction of Backfill is essential.	250 - 300 kg/cm^2 (Approx.) Compaction of Backfill is essential.
Low	Low	Medium	Medium
Non-corrosive but susceptible to decay in presence of organic contaminants.	Non-corrosive but susceptible to decay in presence of organic contaminants.	Corrosion of wrap wires is due to seepage.	Non-corrosive but susceptible to decay in presence of organic contaminants.
145	145	100	140
Flexible Pipe	Flexible Pipe	Joints are rigid	Flexible Pipe
MS/CI/DI/PVC	MS/CI/DI/HDPE	MS/DI	MS/GRP
Direct tapping not possible. Saddle Strap used.	Direct tapping not possible. Saddle Strap used.	Tapping not recommended.	Direct tapping not possible. Saddle Strap used.
Failure due to crack, impact or third party damage is high. Optimistic life of 20 years.	Failure due to impact live load or third party damage is high. Optimistic life of 20 years.	Joints are vulnerable. Expected service life of 15 - 20 years.	Failure due to impact of live load or third party damage is high. Optimistic life of 20 years.
Being notch sensitive any crack leads to premature failure. Failure due to impact and material degradation is also common. Frequency of damage is high.	Third party damage is high. Failure due to impact and material degradation is also common. Frequency of damage is medium.	Joints being vulnerable occurrence of failure is possible. Frequency of damage is medium.	Failure due to impact of water may happen. Joint failure and material degradations also common. Frequency of damage is medium.

Manufacturing Process



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DI Pipe Applications

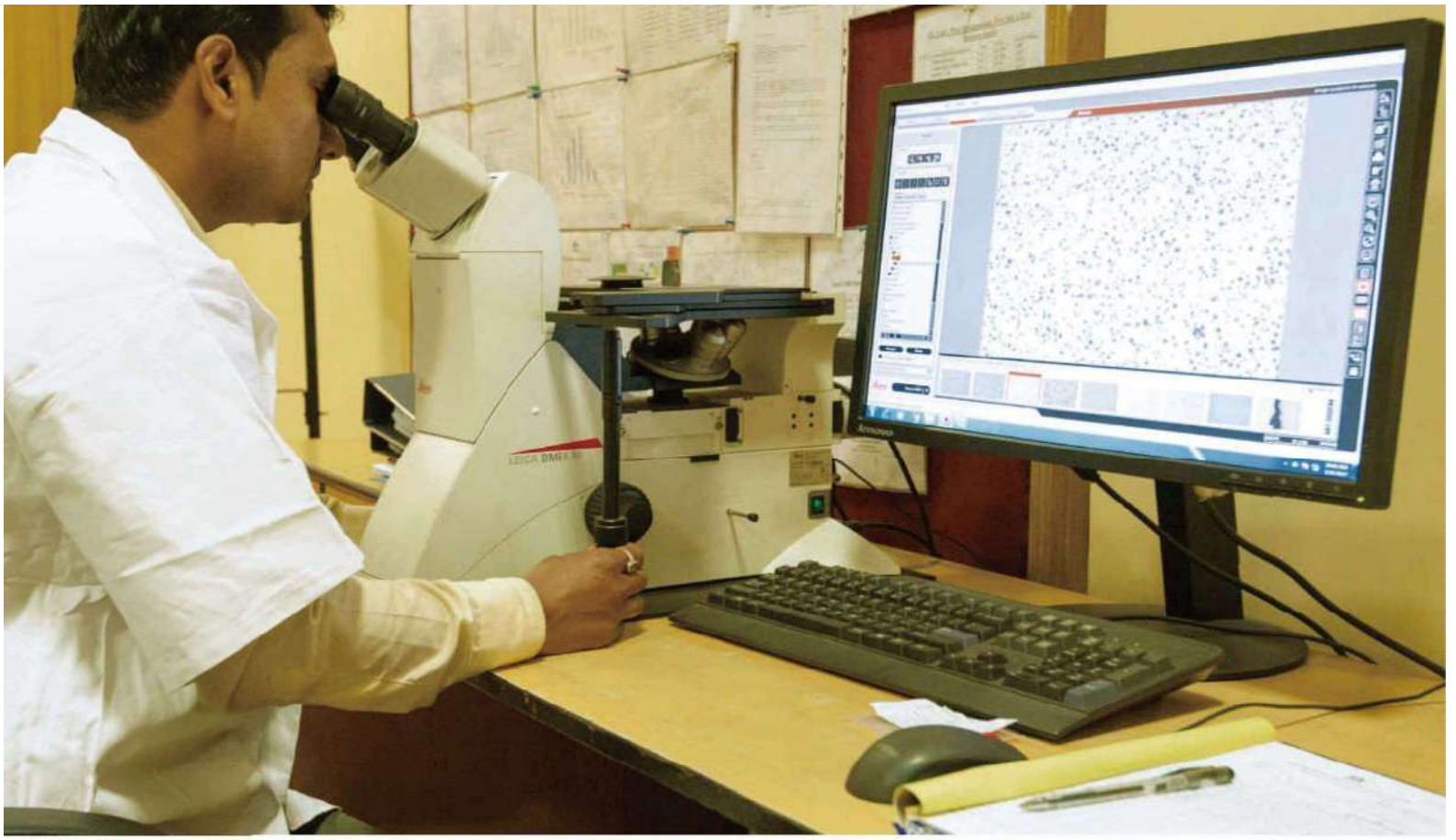
Ductile Iron Pipes' mechanical properties as well as high ductility and strength make them ideal for usage in supply of water (drinking or waste), irrigation, industrial and high pressure sewage transport.












SPECTROMETER
TMK/MACH/129/QA/0
SPECTROLAB
MGT
Hopper

WORKS PROOF AND LEAK TIGHTNESS TEST PRESSURES

The hydrostatic test for pipes and fittings is carried out prior out prior to lining and coating. The test pressure is maintained for 15 seconds to test for leak, sweat or other defects.

NOMINAL SIZE	WORKS HYDROSTATIC TEST PRESSURE FOR CENTRIFUGALLY CAST PIPE (CLASS K9 OR ABOVE)	WORKS HYDROSTATIC TEST PRESSURE FOR FITTINGS	WORKS HYDROSTATIC TEST PRESSURE FOR FLANGED PIPE
DN	Mpa	Mpa	Mpa
80 - 300	5.0	2.5	2.5
350 - 600	4.0	1.6	1.6
700 - 1000	3.0	1.0	1.0

The hydrostatic test pressure specified in this table are intended primarily to detect casing flaws and bear no relation to the safe working pressures for the pipes or fittings. The application of higher test pressures to fittings is precluded owing to the risk of distortion resulting forom the high restraining load which would have to be imposed on the fittings by the standard test apparatis.

LINING

Unless otherwise specified the standard internal lining for TATA DUCTURA Ductile Iron pipes and fittings is Cement Mortar (except some special fittings such as Blank Flanges; Collars; Cap; Plugs; Bellmouth and Pipe Block...etc that may be internally coated with Bitumen as standard).

The Cement Mortar is composed of Cement, Sand and Water. It is not only a physical barrier but also protects the iron by a oassivation process. When the Cement Mortar Lining is saturated with Water, it produces a high pH solution next to the iron wlll. In these alkaline conditions corrosion is not easy to take place.

The type of Cement used is either Sulphate Resisting Cement (SRC) or High Alumina Cement (HAC). Please note that HAC can only be used in TATA DUCTURA EN598 sewage pipes and fittings.

Subject to agreement, alternative internal linings may be supplied such as Cement Mortar Lining with Epoxy Seal Coat; Epoxy and Fusion Bonded Epoxy.

Cement Mortar Lining may be found with hairline cracks or radial displacement. They are mainly caused by storage in a hot weather (metal expansion by absorption of haet energy as a result of Cement Mortar Lining shrinkage). However, the hairline cracks will close and radial displacement will swell and re-tighten on continuous exposure of water by an Autogenous Process.

The thickness and the maximum crack width of the Cement Mortar Lining are listed as per below table.

NOMINAL SIZE OF PIPE OR FITTING	NOMINAL THICKNESS	TOLERANCE NEGATIVE ONLY GIVEN	MAXIMUM CRACK WIDTH
DN	mm	mm	mm
80 - 300	4.0	-1.5	0.4
350 - 600	5.0	-2.0	0.5
700 - 1000	6.0	-2.5	0.6

COATING

Unless otherwise specified by the purchaser, all pipes are coated externally with metalic zinc covered by a finishing paint layer.

INSPECTION

Pipe and fittings subject to a quality assurance system regularly audited by **British Standards Institution**

If the purchaser wishes to inspect the pipes, such an inspection is undertaken at the works of the manufacturer. The equip-ment and labour necessary to carry pout the inspection is provided by the manu-facturer.

The inspector may witness the sampling, preparation and testing sampling, preparation and testing of the test pieces, checking of dimensions and weights and hydrostatic testing.

Should the purchaser or his representative not be present for the implementation of these operations at the time agreed, the manufacturer is entitled to proceed with the inspection without the purchaser or his reprsentative being present.

MARKING

Each pipeline component has the following marks legibly cast, stamped or painted on.

PIPES

1. TATA DUCTURA logo
2. Nominal size
3. Class designation
4. Tear of manufacture.
5. Day cast
6. Batch number.
7. Standards reference.

FITTINGS

1. DUCTURA or D logo
2. Nominal size
3. Date of manufacture.
4. Ductile‘ or ‚DI‘
5. For bends, relevant angle.
6. Standards reference.

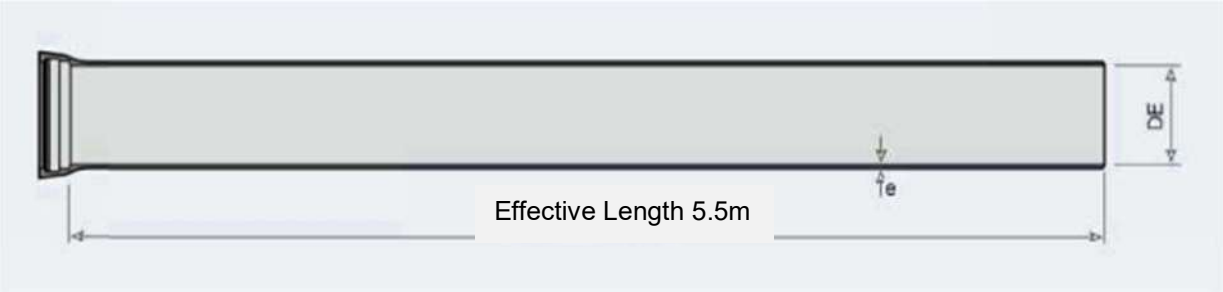
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Pipes Data

Tata Steel Metaliks Division is committed to exceed customers expectations in product quality, supply and service. The Company manufactures Ductile Iron Pipes conforming to:

- EN 545 : 2006
- EN 545 : 2010
- EN 598 : 2007+A1 : 2009
- IS 8929 : 2000
- ISO 2531 : 2009

Nominal Diameter (mm)	Class	Standard Length(mm)
80, 100, 150, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800, 900, 1000, 1100, 1200	K9, K12	5500
	C25 - C100	



The range comprises ductile iron pipes suitable for push-on joints.

DN	External Diameter DE (mm)		Minimum Wall thickness e (mm)						
	Nominal	Limit Deviations	Class 25	Class 30	Class 40	Class 50	Class 64	Class 100	K9
80	98	+1 / -2.7						4.7	4.7
100	118	+1 / -2.8						4.7	4.7
150	170	+1 / -2.9					4.0		4.7
200	222	+1 / -3.0				3.9			4.8
250	274	+1 / -3.1				4.8			5.2
300	326	+1 / -3.3			4.6				5.6
350	378	+1 / -3.4			5.3				6.1
400	429	+1 / -3.5			6.0				6.4
450	480	+1 / -3.6			6.8				6.8
500	532	+1 / -3.8		5.6					7.2
600	635	+1 / -4.0		6.7					8.0
700	738	+1 / -4.3		7.8					8.8
800	842	+1 / -4.5		8.9					9.6
900	945	+1 / -4.8		10.0					10.4
1000	1048	+1 / -5.0		11.1					11.2
1100	1152	+1 / -6.0	10.2						12.0
1200	1255	+1 / -5.8	11.1						12.8

Pipes Data

DN	External Diameter DE (mm)		Minimum Wall thickness e (mm)				
	Nominal	Limit Deviations	Class 40	Class 50	Class 64	Class 100	K12
80	98	+1 / -2.7				4.7	5.6
100	118	+1 / -2.8				4.7	5.8
150	170	+1 / -2.9				5.9	6.4
200	222	+1 / -3.0			5.0		6.9
250	274	+1 / -3.1			6.1		7.5
300	326	+1 / -3.3			7.3		8.0
350	378	+1 / -3.4			8.5		8.6
400	429	+1 / -3.5		7.5			9.1
450	480	+1 / -3.6		8.4			9.7
500	532	+1 / -3.8		9.3			10.2
600	635	+1 / -4.0		11.1			11.3
700	738	+1 / -4.3	10.4				12.4
800	842	+1 / -4.5	11.9				13.5
900	945	+1 / -4.8	13.3				14.6
1000	1048	+1 / -5.0	14.8				15.7
1100	1152	+1 / -6.0	16.2				16.8
1200	1255	+1 / -5.8	17.7				17.9

Pipe Class	Thickness Class (K9 & K12) and Pressure Class (C25 - C100)
Internal Lining	Cement mortal lining as per requirement with Ordinary Portland Cement, Sulphate Resisting Cement and Blast Furnace Slag Cement according to ISO4179 and High Alumina Cement for waste water application
External Protection	Metallic Zinc (130g/m2 or 200g/m2 or 400g/m2 as per customer requirement) complying to ISO8179 with finishing layer of Black Bitumen / Epoxy Coating (minimum thickness 70 microns) or any other special coating as per customer requirement. Zn-Al alloy coating with 400g/m2 are also offered as per requirement.
Type of Joint	Flexible joint type Tyton. Gasket in EPDM material according to EN681-1 and ISO4633



Related Products & Variations

COATINGS

INTERNAL COATINGS:

Tata Ductura DI Pipes are internally lined with cement mortar. The types of cement used are:

- Ordinary portland cement (with or without additives)
- Portland slag cement
- Blast furnace slag cement
- Sulphate-resistant cement
- High alumina content cement
- Cement mortar with seal coat

ADVANTAGES OF CEMENT MORTAR LINING:

Cement mortar protects the internal pipe wall from corrosion by alkaline reaction of cement. It also prevents pitting and tuberculation. Tata Ductura's cment. Mortar lining is smooth and helps maintain stable flow area and coefficient of friction over a long period of time. It also helps to control leaching of cement into water.



EXTERNAL COATINGS:

To protect the pipe against corrosion and increase durability the pipes are externally coated with Zinc and finished with a coat of bituminous paint or synthetic resin (Epoxy) coating. In special cases, pipes are coated with zinc alloy, which acts as sacrificial corrosion, thereby delaying the corrosion of iron-based material.



POLYETHYLENE SLEEVING:

Encasement of DI Pipes in loose polyethylene sleeves is an effective protection mechanism in corrosive environments. The dielectric capobiliy of the polyethylene sleeve works as a shield between the DI Pipes and the field.





Related Products & Variations

FITTINGS

Fittings play a major role in seamless functioning of a pipeline network. With the passage of time, various types of jointing systems have evolved – socket and spigot with lead joints mechanical joints and push-on joints, etc. DI Fittings are available mainly with three types of jointing systems:

- **Socket and spigot flexible push-on joints**
- **Mechanical flexible joints**
- **Flanged Joints**

Socket and spigot flexible – push on joints are most widely used as they can be assembled easily with the help of a rubber gasket. The heel portion inserted into the groove retains the gasket while the spigot enters into the socket and gets compressed to do the sealing. Socket and spigot push-on joints are:

- **Stronger than other fittings**
- **Compatible with DI/CI Pipes, therefore cost-effective**

Mechanical flexible joints provide sealing by application of pressure to the gasket by mechanical means. The nut and bolts exert more pressure making the joints leak-proof. Mechanical joints are:

- **Easier to assemble and dismantle**
- **Easily repairable**
- **Highly flexible and have dimensional tolerance**

Flanged Joints are self-restained rigid joints and are recommended for high pressure application.

Restrained joints are special jointing systems which can take care of axial movement in case of thrust. Pipes laid along a hilly terrain or along slopes and inclines work under high static head. This may result in misbalance of forces of hydrostatic or hydrodynamic nature which needs to be restrained adequately to arrest joint separation. Restained joints are:

- **Cost-effective since they eliminate the use of expensive concrete anchor blocks**
- **More effective where chances of soil erosion are high**

Typical diagram of Restrained Joint is given below.



FLANGED JOINTS

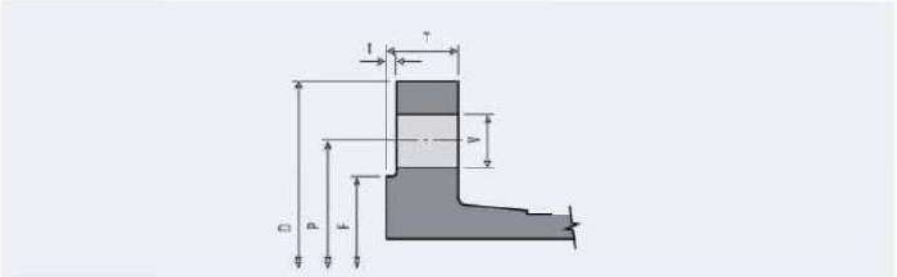
Flanged joints are completely rigid and should not be used for applications where movement of the pipeline is made to accommodate it by, for example, the inclusion of expansion joints.

A pipline totally constructed from flanged pipework is considered to be self-anchoring and therefore external anchorages are not required at changes of direction and at blank ands.

The joints is used mainly for above ground applications, e.g. pumping stations, water and sewage treatment plants and for industrial pipework. It is also used to facilitate the installa-tion and removal of valves in spigot and socket pipelines and for valve by-pass arrangements.

Particular attention should be paid to pipelines where flanged joint pipe and fittings are to be combined with push-on Flexible pipe and fittings. In this case, thrust blocks should not be omitted from flanged bends, tees, and blank ends before ensuring that there is a sufficient anchoring length of flanged joint and push-on joint sections separating at the change-over points due to the effects of internal pressure.

Flanges are attached to pipes by screwing the pipe and flange with mating threads. These are filled with a recommended epoxy resin before tightening to a predetermined torque. Machining of the flanges is carried out after tightening to ensure ends are parallel and flat. Screwed and intergrally cat flanges are available on request. Flanges on fittings are integrally cast in sand moulds with the body of the fittings.



BS EN1092-2 - PN 16 FLANGES

Nominal Size	Flange Dimensions				Bolting Details			
	Diameter	Thickness	Diameter of Raised Face	Height of Raised Face	Pitch Circle Diameter	Number of Holes	Diameter of Holes	Fastener Size and Thread
DN	D	T	F	t	P	N	V	
80	200	19.0	132	3	160	8	19	M16
100	220	19.0	156	3	180	8	19	M16
150	285	19.0	211	3	240	8	23	M20
200	340	20.0	266	3	295	12	23	M20
250	400	22.0	319	3	355	12	28	M24
300	550	24.5	370	4	410	12	28	M24
350	520	26.5	429	4	470	16	28	M24
400	580	28.0	480	4	525	16	31	M27
450	640	30.0	548	4	585	20	31	M27
500	715	31.5	609	4	650	20	34	M30
600	840	36.0	720	5	770	20	37	M33
700	910	39.5	794	5	840	24	37	M33
800	1025	43.0	901	5	950	24	41	M36
900	1125	46.5	1001	5	1050	28	41	M36
1000	1255	50.0	1112	5	1170	28	44	M39
1100	1355	53.5	1218	5	1270	32	44	M39
1200	1485	57.0	1328	5	1390	32	50	M45

BS EN1092-2 - PN 25 FLANGES

Nominal Size	Flange Dimension				Bolting Details			
	Diameter	Thickness	Diameter of Raised Face	Height of Raised Face	Pitch Circle Diameter	Number of Holes	Diameter of Holes	Fastener Size and Thread
DN	D	T	F	t	P	N	V	
80	200	19.0	132	3	160	8	19	M16
100	235	19.0	156	3	190	8	23	M20
150	300	20.0	211	3	250	8	28	M24
200	360	22.0	274	3	310	12	28	M24
250	425	24.5	330	3	370	12	31	M27
300	485	27.5	389	4	430	16	31	M27
350	555	30.0	448	4	490	16	34	M30
400	620	32.0	503	4	550	16	37	M33
450	670	34.5	548	4	600	20	37	M33
500	730	36.5	609	4	660	20	37	M33
600	845	42.0	720	5	770	20	41	M36
700	960	46.5	820	5	875	24	44	M39
800	1085	51.0	928	5	990	24	50	M45
900	1185	55.5	1028	5	1090	28	50	M45
1000	1320	60.0	1140	5	1210	28	57	M52
1100	1420	64.5	1240	5	1310	32	57	M52
1200	1530	69.0	1350	5	1420	32	57	M52

PUSH-ON FLEXIBLE JOINT PIPELINE FITTINGS

Push-on flexible pipeline fitting dimensions shown are in accordance with the Standard.

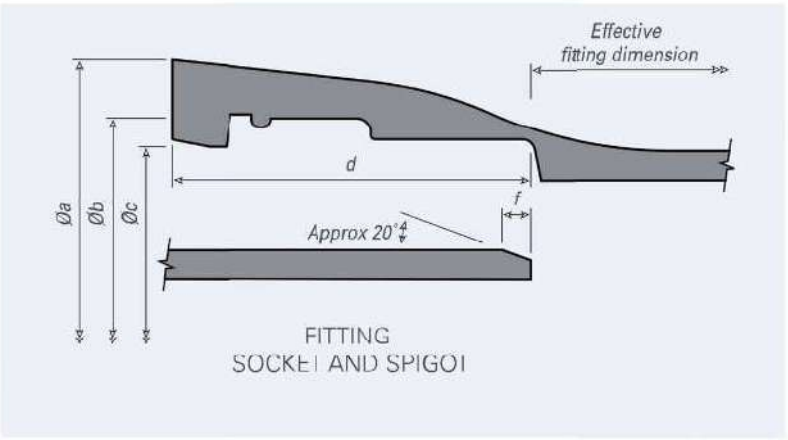
Double socketed fittings are normally used in Push-on Flexible pipelines.

Spigotted fittings may be used in some applications, although their use is mainly limited to installation after construction, where existing pipes are cut and connected to the fitting using couplings.

TEST AND OPERATING PRESSURES

Works hydrostatic leak tightness test pressures for fittings are shown on page 10.

Allowable operating pressures for socketed ductile iron fittings are the same as for Class K9 ductile spun iron pipe in the corresponding nominal sizes.



PUSH-ON FLEXIBLE JOINT FITTINGS DIMENSIONS
mm

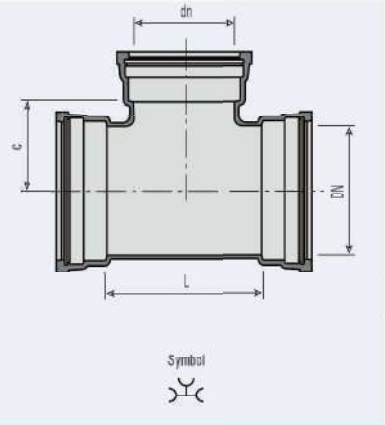
Nominal Size	Dimensions				
DN	a	b	c	d	f
80	140	123.0	100.5	85	6
100	153	143.0	120.5	88	9
150	217	195.0	172.5	94	9
200	278	250.0	224.5	100	9
250	336	301.5	276.5	105	9
300	393	356.5	328.5	110	9
350	448	408.0	380.5	110	9
400	500	462.0	431.5	110	9
450	540	514.0	482.5	120	9
500	604	568.0	534.5	120	9
600	713	673.4	637.5	120	9
700	824	788.0	740.5	150	15
800	943	894.0	844.5	160	15
900	1052	1000.0	947.5	175	15
1000	1158	1105.0	1050.5	185	15
1100	1267	1211.0	1155.0	200	15
1200	1377	1317.0	1258.0	215	15

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FITTINGS - DUCTILE IRON - FLEXIBLE JOINT

ALL SOCKET TEES

NOMINAL SIZE	DIMENSION	
dn	L	c
DN 80		
80	170	85
DN 100		
80	170	95
100	190	95
DN 150		
80	170	120
100	195	120
150	255	125
DN 200		
80	175	145
100	200	145
150	255	150
200	315	155
DN 250		
80	180	170
100	200	170
150	260	175
200	315	180
250	375	190
DN 300		
80	180	190 *
100	205	195
150	260	200
200	320	205
250	375	210
300	435	220
DN 350		
80	180	215 *
100	205	220 *
150	265	225 *
200	320	230 *
250	380	235 *
300	435	240 *
350	495	245 *

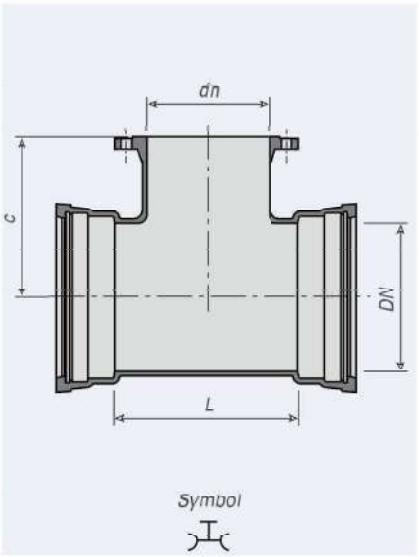


NOMINAL SIZE	DIMENSION	
dn	L	c
DN 400		
80	185	240 *
100	210	245 *
150	265	240 *
200	325	255 *
250	380	260 *
300	440	265 *
350	500	270 *
400	555	275 *

NOMINAL SIZE	DIMENSION	
dn	L	c
DN 450		
80	185	265 *
100	210	270 *
150	270	275 *
200	325	280 *
250	385	285 *
300	445	290 *
350	500	295 *
400	560	300 *
450	615	305 *
DN 500		
80	190	290 *
100	215	295 *
150	270	300 *
200	330	305 *
250	390	310 *
300	445	315 *
350	505	320 *
400	560	325 *
450	620	330 *
500	680	340 *
DN 600		
80	195	340 *
100	220	345 *
150	280	350 *
200	335	355 *
250	395	360 *
300	450	365 *
350	510	370 *
400	570	375 *
450	625	380 *
500	685	390 *
600	800	400 *

DOUBLE SOCKET TEES WITH FLANGED BRANCH

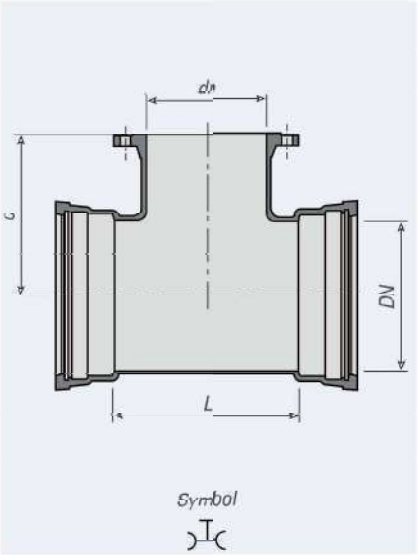
NOMINAL SIZE	DIMENSION		
dn	L	c	
DN 80			
80	170	165	
DN 100			
80	170	175	
100	190	180	
DN 150			
80	170	205	
100	195	210	
150	255	220	
DN 200			
80	175	235	
100	200	240	
150	255	250	
200	315	260	
DN 250			
80	180	265	
100	200	270	
150	260	280	
200	315	290	
250	375	300	
DN 300			
100	205	300	
150	260	310	
200	320	320	
250	375	330	
300	435	340	
DN 350			
80	185	325	*
100	205	330	
150	265	340	*
200	325	350	
250	380	360	*
300	435	370	*
350	495	380	



NOMINAL SIZE	DIMENSION		
dn	L	c	
DN 400			
80	185	355	
100	210	360	
150	270	370	
200	325	380	
250	380	390	*
300	440	400	
350	500	410	*
400	560	420	
DN 450			
100	215	390	*
150	270	400	*
200	325	410	*
250	385	420	*
300	445	430	*
350	500	440	*
400	560	450	*
450	615	460	*
DN 500			
100	215	420	
150	270	430	*
200	330	440	
250	390	450	*
300	445	460	*
350	505	470	*
400	565	480	
450	620	490	*
500	680	500	

DOUBLE SOCKET TEES WITH FLANGED BRANCH

NOMINAL SIZE	DIMENSION		
dn	L	c	
DN 600			
80	200	475	*
100	220	480	*
150	280	490	*
200	340	500	
250	395	510	*
300	450	520	*
350	510	530	*
400	570	540	
450	625	550	*
500	685	560	*
600	800	580	
DN 700			
80	225	505	*
100	230	510	*
150	285	515	*
200	345	525	
250	400	535	*
300	460	540	*
350	520	545	*
400	575	555	
450	635	560	*
500	690	570	*
600	810	585	*
700	925	600	
DN 800			
80	250	565	*
100	235	570	*
150	290	580	*
200	350	585	
250	410	590	*
300	465	600	*
350	525	610	*
400	580	615	
450	640	625	*
500	700	630	*
600	1045	645	
700	930	660	*
800	1045	675	

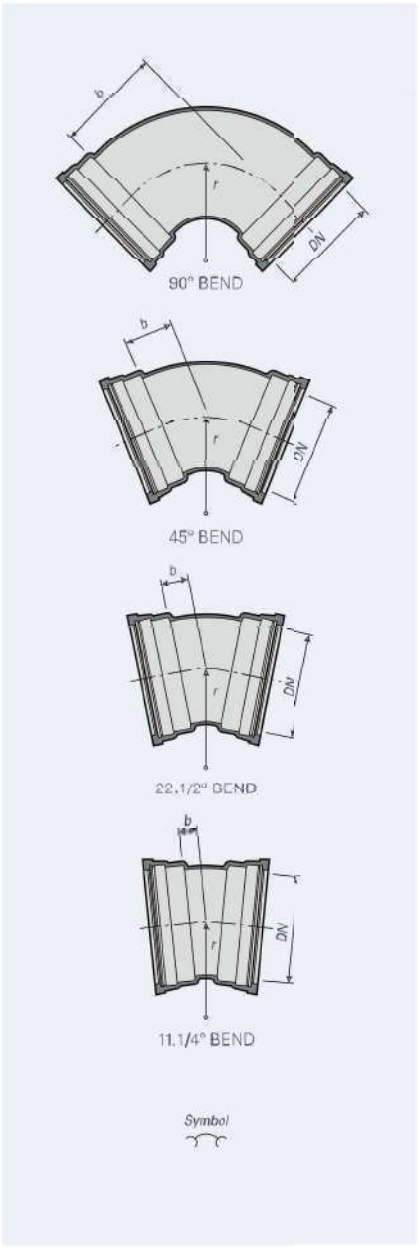


NOMINAL SIZE	DIMENSION		
dn	L	c	
DN 900			
80	225	625	*
100	240	630	*
150	300	635	*
200	355	645	
250	415	655	*
300	470	660	*
350	530	670	*
400	590	675	
450	645	685	*
500	705	690	*
600	1170	705	
700	935	720	
800	1050	735	
900	1170	750	
DN 1000			
80	260	685	*
100	245	690	*
150	305	695	*
200	360	705	
250	420	710	*
300	480	720	*
350	535	730	*
400	595	735	
450	650	745	*
500	710	750	*
600	1290	765	
700	940	780	*
800	1060	795	*
900	1175	810	*
1000	1290	825	

DOUBLE SOCKET BEND

NOMINAL SIZE	DIMENSION	
DN	b	
90° Bends		
80	100	
100	120	
150	170	
200	220	
250	270	
300	320	
350	370	*
400	420	*
450	470	*
500	520	*
600	620	*
700	720	*
800	820	*
900	920	*
1000	1020	*
1200	1220	*

NOMINAL SIZE	DIMENSION
DN	b
22$^1/_2$° Bends	
80	40
100	40
150	55
200	65
250	75
300	85
350	95
400	110
450	120
500	130
600	150
700	175
800	195
900	220
1000	240
1200	285

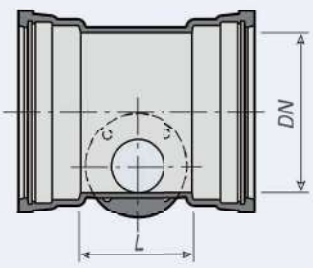


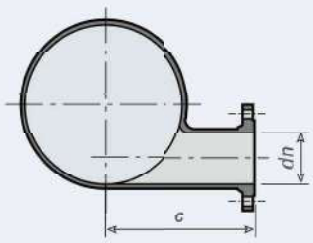
NOMINAL SIZE	DIMENSION
DN	b
45° Bends	
80	55
100	65
150	85
200	110
250	130
300	150
350	175
400	195
450	220
500	240
600	285
700	330
800	370
900	415
1000	460
1200	550

NOMINAL SIZE	DIMENSION
DN	b
11$^1/_4$° Bends	
80	30
100	30
150	35
200	40
250	50
300	55
350	60
400	65
450	70
500	75
600	85
700	95
800	110
900	120
1000	130
1200	150

DOUBLE SOCKET LEVEL INVERT TEES

NOMINAL SIZE	DIMENSION		
dn	L	c	
DN 200			
80	175	235	*
DN 250			
80	180	265	*
DN 300			
80	180	295	*
DN 350			
100	205	330	*
DN 400			
100	210	360	*
DN 450			
100	210	400	*
DN 500			
100	215	420	*
DN 600			
100	220	480	*
DN 700			
150	285	515	*
200	345	525	*
DN 800			
150	290	575	*
200	350	585	*

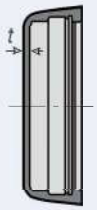




INVERT SCCUR TEE

Symbd





CAP

Symbo

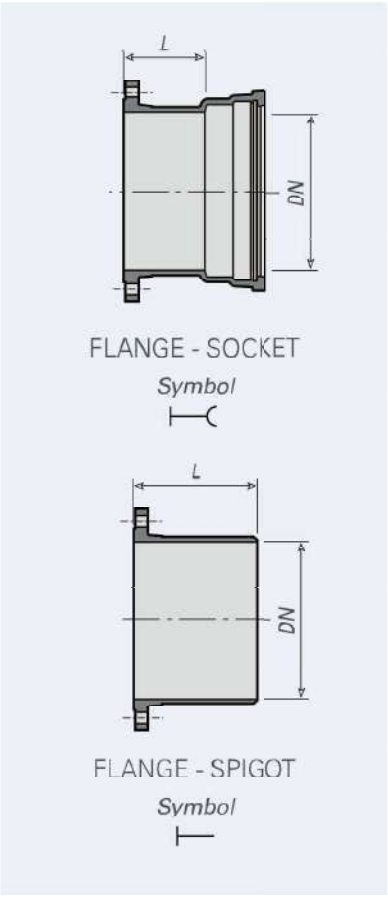


CAPS

NOMINAL SIZE	DIMENSION
DN	t
80	18
100	18
150	18
200	18
250	19.5
300	23
350	24
400	25
450	26
500	27
600	29.5
700	31
800	33
900	35
1000	37

FLANGE SOCKETS
FLANGE SPIGOTS

NOMINAL SIZE	DIMENSION
DN	L
FLANGE - SOCKET	
80	130
100	130
150	135
200	140
250	145
300	150
350	155
400	160
450	165
500	170
600	180
700	190
800	200
900	210
1000	220
1200	240



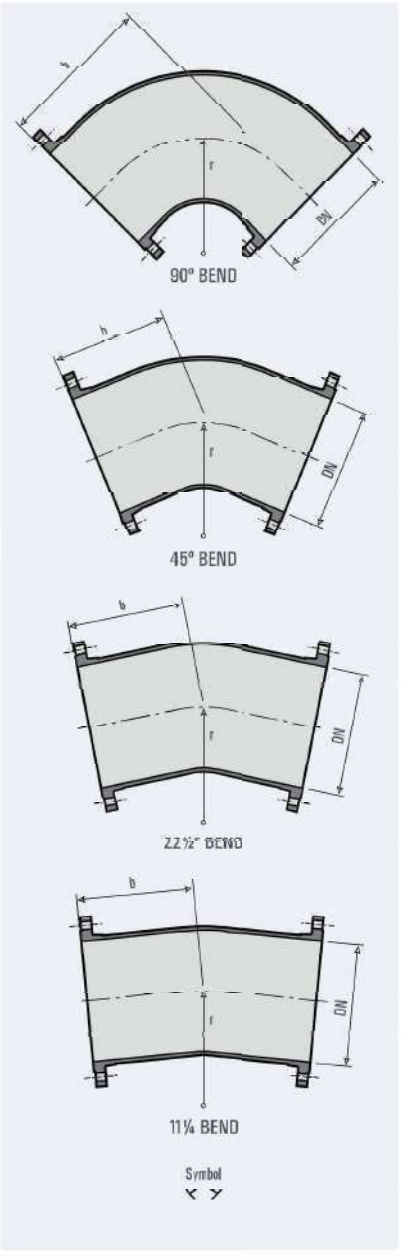
NOMINAL SIZE	DIMENSION
DN	L
FLANGE - SPIGOT	
80	350
100	360
150	380
200	400
250	420
300	440
350	460
400	480
450	500
500	520
600	560
700	600
800	600
900	600
1000	600
1200	600

FITTINGS - DUCTILE IRON - FLANGED JOINT

DOUBLE FLANGED BENDS

NOMINAL SIZE	DIMENSION
DN	b
90° Bends	
80	165
100	180
150	220
200	260
250	350
300	400
350	450
400	500
450	550
500	600
600	700
700	800
800	900
900	1000
1000	1100
1200	1300 *

NOMINAL SIZE	DIMENSION
DN	b
45° Bends	
80	130
100	140
150	160
200	180
250	350
300	400
350	298
400	324
450	350
500	375
600	426
700	478
800	529
900	581
1000	632
1200	750

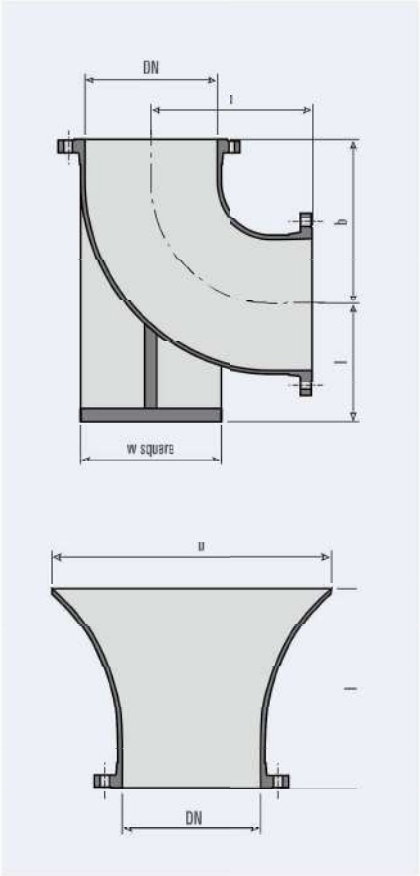


NOMINAL SIZE	DIMENSION
DN	b
$22^1/_2$° Bends	
80	105
100	110
150	109
200	131
250	190
300	210
350	210
400	239
450	180 *
500	190 *
600	220 *
700	300 *
800	330 *
900	360 *
1000	390 *
1200	450 *

NOMINAL SIZE	DIMENSION
DN	b
$11^1/_4$° Bends	
80	113
100	115
150	113
200	132
250	165
300	175
350	191
400	205
450	135 *
500	140 *
600	160 *
700	205 *
800	230 *
900	245 *
1000	265 *
1200	360 *

DOUBLE FLANGED DUCKFOOT BENDS

NOMINAL SIZE	DIMENSION			
DN	b	l	w	
80	165	110	180	
100	180	125	200	
150	220	160	250	
200	260	190	300	
250	350	225	350	
300	400	255	400	
350	450	290	450	
400	500	320	500	
450	550	355	550	
500	600	385	600	
600	700	450	700	
700	800	515	800	*
800	900	580	900	*
900	1000	645	1000	*
1000	1100	710	1100	*
1200	1300	840	1300	*

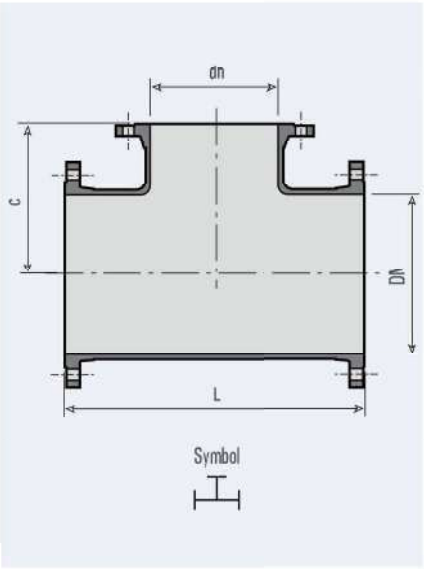


FLANGED BELLMOUTHS

NOMINAL SIZE	DIMENSION		
DN	l	b	
80	135	160	*
100	140	185	*
150	155	245	*
200	170	310	*
250	190	370	*
300	210	435	*
350	225	495	*
400	245	560	*
450	260	620	*
500	280	685	*
600	300	810	*
700	340	945	*
800	380	1055	*
900	420	1165	*
1000	440	1290	*
1200	490	1515	*

ALL FLANGED TEES

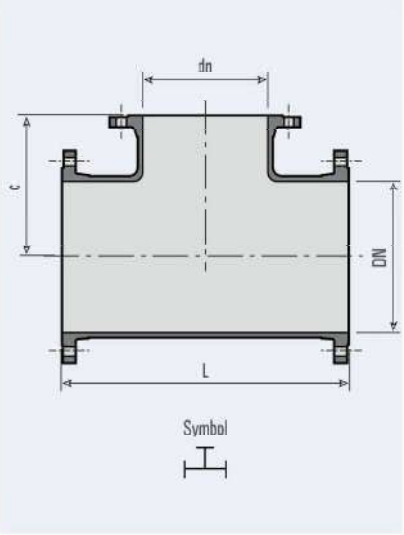
NOMINAL SIZE	DIMENSION		
dn	L	c	
DN 80			
50	330	160	*
50	310	155	*
65	330	165	*
65	310	155	*
80	330	165	
DN 100			
50	360	170	*
50	320	165	*
65	360	175	*
80	360	175	
80	330	170	*
100	360	180	
DN 150			
50	360	200	*
80	440	205	
80	360	200	#
100	440	210	
100	380	205	#
150	440	220	
DN 200			
50	520	230	*
80	520	235	
80	380	225	#
100	520	240	
100	400	230	#
150	520	250	
150	460	245	#
200	520	260	
DN 250			
80	405	265	#
100	700	275	
150	485	280	#
200	700	325	
250	700	350	
250	600	300	#



NOMINAL SIZE	DIMENSION		
dn	L	c	
DN 300			
80	425	295	#
100	800	300	
150	505	310	#
200	800	350	
250	620	330	#
300	800	400	
300	680	340	#
DN 350			
100	850	325	
150	530	340	#
200	850	325	
250	645	360	#
300	850	425	*
350	850	425	
350	760	380	#
DN 400			
100	900	350	
150	550	370	#
200	900	350	
250	665	390	#
300	725	400	#
350	900	450	*
400	900	450	
DN 450			
100	950	375	
150	570	400	#
200	950	375	
250	690	420	#
300	745	430	#
350	950	475	*
400	860	450	#
450	950	475	

ALL FLANGED TEES

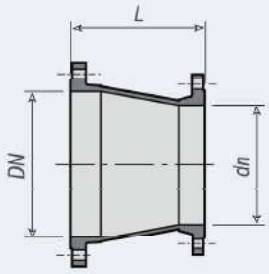
NOMINAL SIZE	DIMENSION		
dn	L	c	
DN 500			
100	1000	400	
150	1000	400	*
200	1000	400	
250	1000	400	*
300	1000	500	*
350	1000	500	*
400	1000	500	
450	1000	500	*
500	1000	500	
DN 600			
100	1100	450	*
150	1100	450	*
200	1100	450	
250	1100	450	*
300	1100	550	*
350	1100	550	*
400	1100	550	
450	1100	550	*
500	1100	550	*
600	1100	550	
DN 700			
100	540	510	*
150	595	515	*
200	650	525	
250	705	530	*
300	760	540	*
350	815	545	*
400	870	555	
450	925	560	*
500	980	570	*
600	1090	585	*
700	1200	600	
DN 800			
100	580	570	*
150	635	575	*
200	690	585	
250	745	590	*
300	800	600	*
350	855	605	*
400	910	615	
450	965	620	*
500	1020	630	*
600	1350	645	
700	1350	660	*
800	1350	675	



NOMINAL SIZE	DIMENSION		
dn	L	c	
DN 900			
100	620	630	*
150	675	635	*
200	730	645	
250	785	650	*
300	840	660	*
350	895	665	*
400	950	675	
450	1005	680	*
500	1060	690	*
600	1500	705	
700	1500	720	*
800	1500	735	*
900	1500	750	
DN 1000			
100	660	690	*
150	715	695	*
200	770	705	
250	825	710	*
300	880	720	*
350	935	725	*
400	990	735	
450	1045	740	*
500	1100	750	*
600	1650	765	
700	1650	780	*
800	1650	795	*
900	1650	810	*
1000	1650	825	
DN 1200			
100	660	810	*
150	715	815	*
200	775	825	*
250	830	830	*
300	890	840	*
350	950	845	*
400	1005	855	*
500	1120	870	*
600	1240	885	
700	1355	900	*
800	1470	915	
900	1585	930	*
1000	1700	945	
1200	1935	975	*

DOUBLE FLANGED CONCENTRIC TAPERS

NOMINAL SIZE	DIMENSION	
dn	L	
CONCENTRIC		
DN 80		
40	200	*
50	200	*
50	150	*
65	200	
DN 100		
50	200	*
65	200	*
80	200	
80	150	*
DN 150		
50	300	*
80	400	*
100	300	*
100	150	*
DN 200		
80	600	*
100	600	*
150	300	
DN 250		
100	600	*
150	600	*
200	300	
DN 300		
100	600	*
150	600	*
200	600	*
250	300	
DN 350		
100	750	*
150	700	*
200	600	*
250	600	*
300	300	
DN 400		
100	800	*
150	750	*
200	600	*
250	600	*
300	600	*
350	300	



FLANGE - FLANGE CONCENTRIC

Symbol

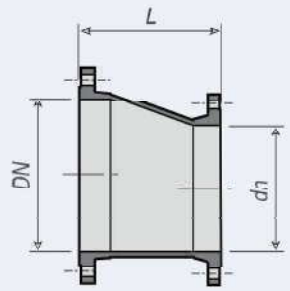


NOMINAL SIZE	DIMENSION	
dn	L	
CONCENTRIC		
DN 450		
100	900	*
150	800	*
200	750	*
250	600	*
300	600	*
350	600	*
400	300	
DN 500		
100	950	*
150	900	*
200	800	*
250	700	*
300	600	*
350	600	*
400	600	*
450	300	

NOMINAL SIZE	DIMENSION	
dn	L	
CONCENTRIC		
DN 600		
100	1050	*
150	1000	*
250	900	*
300	800	*
350	700	*
400	600	*
450	600	*
500	600	
DN 700		
200	1100	*
250	1050	*
300	1100	*
350	900	*
400	800	*
450	700	*
500	600	*
600	600	
DN 800		
400	1030	*
450	900	*
500	800	*
600	600	*
700	600	
DN 900		
400	1100	*
450	1100	*
500	1000	*
600	800	*
700	600	*
800	600	
DN 1000		
500	1200	*
600	1000	*
700	800	*
800	600	*
900	600	
DN 1200		
600	1150	*
700	1345	*
800	1160	*
900	975	*
1000	790	

DOUBLE FLANGED ECCENTRIC TAPERS

NOMINAL SIZE	DIMENSION	
dn	L	
ECCENTRIC		
DN 80		
40	200	*
50	200	*
50	150	*
65	200	
DN 100		
50	200	*
65	200	*
80	200	
80	150	*
DN 150		
50	300	*
80	400	*
100	300	*
100	150	*
DN 200		
80	600	*
100	600	*
150	300	
DN 250		
100	600	*
150	600	*
200	300	
DN 300		
100	600	*
150	600	*
200	600	*
250	300	
DN 350		
100	750	*
150	700	*
200	600	*
250	600	*
300	300	
DN 400		
100	800	*
150	750	*
200	600	*
250	600	*
300	600	*
350	300	



FLANGE - FLANGE ECCENTRIC

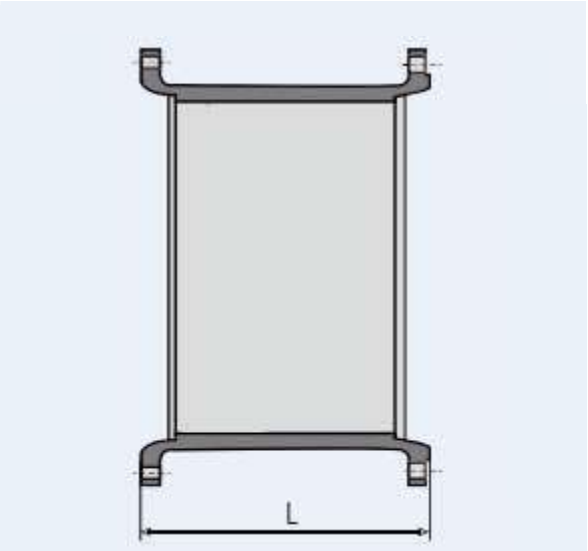
Symbol

NOMINAL SIZE	DIMENSION	
dn	L	
ECCENTRIC		
DN 450		
100	900	*
150	800	*
200	750	*
250	600	*
300	600	*
350	600	*
400	300	
DN 500		
100	950	*
150	900	*
200	800	*
250	700	*
300	600	*
350	600	*
400	600	*
450	300	

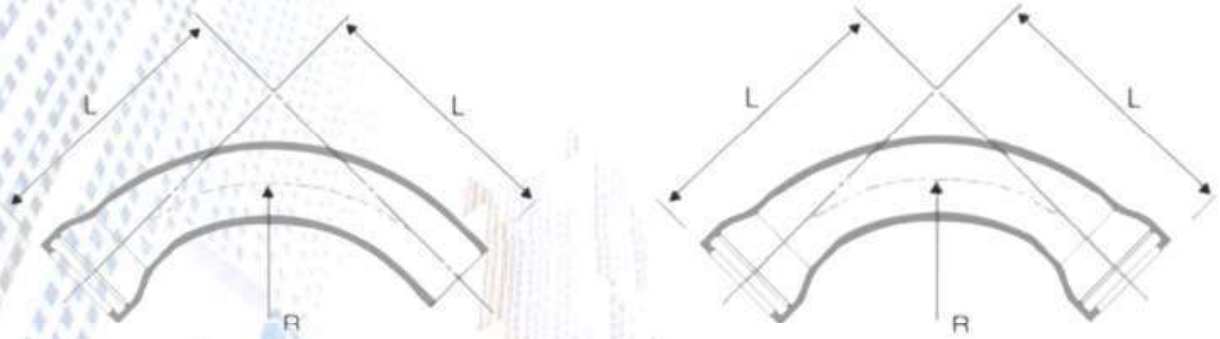
NOMINAL SIZE	DIMENSION	
dn	L	
ECCENTRIC		
DN 600		
100	1050	*
150	1000	*
250	900	*
300	800	*
350	700	*
400	600	*
450	600	*
500	600	
DN 700		
200	1100	*
250	1050	*
300	1100	*
350	900	*
400	800	*
450	700	*
500	600	*
600	600	
DN 800		
400	1030	*
450	900	*
500	800	*
600	600	*
700	600	
DN 900		
400	1100	*
450	1100	*
500	1000	*
600	800	*
700	600	*
800	600	
DN 1000		
500	1200	*
600	1000	*
700	800	*
800	600	*
900	600	
DN 1200		
600	1150	*
700	1345	*
800	1160	*
900	975	*
1000	790	

MECHANICAL JOINT COLLAR

NOMINAL SIZE	DIMENSION	
DN	L	
80	320	*
100	320	*
150	325	*
200	330	*
250	335	*
300	400	*
350	405	*
400	410	*
450	415	*
500	420	*
600	430	*
700	460	*
800	470	*
900	480	*
1000	510	*



LONG RADIUS 90 BEND

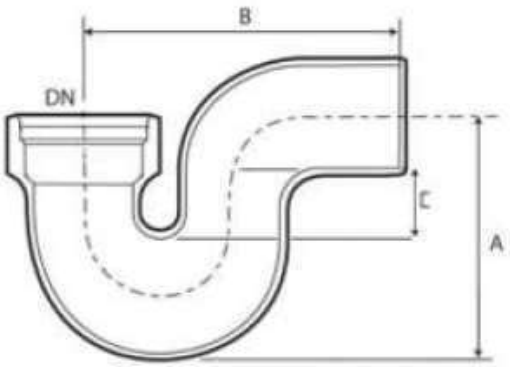


Description	Material
Standard	BS EN 598
Body	Ductile Iron
Joint	Socket and Spigot / Double Socket
Coating	Epoxy

DN	R (mm)	L (mm)
80	340	370
100	360	390
150	410	440
200	460	490
250	500	540

DN	R (mm)	L (mm)
300	550	580
350	600	630
400	650	680
450	700	730
500	740	780
600	830	880

P-TRAP



Description	Material
Standard	BS EN 598
Body	Ductile Iron
Joint	Socket and Spigot
Coating	Epoxy

DN	A (mm)	B (mm)	$C_{min.}$ (mm)
100	242	339	80
150	323	429	80
200	404	581	80
250	491	672	80
300	577	780	80
350	653	842	80
400	721	910	80
450	844	1077	80
500	925	1149	80
600	1099	1344	80

Product Portfolio

Tata Metaliksis committed to exceed customers' expectations in procuct quality, supply and service. The company manufactures ductile iron pipes conforming to widely accepted certifications:

Certification Criterion	Coverage	Certifying Authority
Procuct Certificate	Certificate of Conformity EN 545:2010; ISO 2531:2009	Bureau Veritas Certification
Procuct Certificate	Certificate of Conformity EN 598:2007 + A1:2009 ISO 7186:2011	Bureau Veritas Certification
Procuct Certificate	BIS Standard Mark: IS 8329:2000	Bureau of Indian Standards
Procuct Certificate	Kite Mark Certificate for BS EN 545	BSI Assurance UK Limited
Procuct Certificate	Kite Mark Certificate for BS ISO 2531	BSI Assurance UK Limited
Procuct Certificate	ZIK: Certificate of Constancy of Performance	Quality Superintending Company Ltd. ZAVOD ZA ISPITIVANJE KVALITETE
System Certificate	Quality Management System ISO 9001:2008	Indian Register Quality Systems
System Certificate	Environment Management System ISO 14001:2004	Indian Register Quality Systems
System Certificate	Occupational Health & Safety Assessment Series OHSAS 18001:2007	Indian Register Quality Systems
System Certificate	Certificate of Accreditation for Quality Control Laboratory in accordance with ISO/IEC17025:2005	National Accreditation Board for Testing and Laboratories Calibration (NABL)
Potability Certificate	Concrete, Cement and Mortar - Pressure Pipes	Water Regulations Advisory Scheme (WRAS) England
Potability Certificate	Coating, Paints & Lining	Water Regulations Advisory Scheme (WRAS) England
Potability Certificate	CML Water	TUV South Asia
Award for Excellence	Award for Export Excellence	Export Promotion Council

TATA STEEL

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Plant

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Production Unit (Fittings)

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No.7 Shifu Avenue Gaizhou City
Liaoning Province
P.R.C

仲賢行有限公司
CYH Limited

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