TATA

TATA DUCTURA

Happiness Guaranteed

DELIVERING PROGRESS WITH PROFICIENCY

Tata Metaliks Limited

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'.

Tata Metaliks

Tata Metaliks, a subsidiary of Tata Steel Limited, is one of India's largest manufacturers of foundry-grade pig iron which is used as raw material in industrial castings. The company was established in 1990 and became operational in 1994 with a state-of-the-art manufacturing facility in Kharagpur, West Bengal, India. In 2007, with an objective to manufacture and sell superior quality Ductile Iron Pipes in a process-oriented manner with the help of experienced and engaged professionals, Tata Metaliks entered into a joint venture with Kubota Corporation, Japan and Metal One Corporation, Japan. Tata Ductura, the DI Pipe brand from Tata Metaliks, thus began its journey in 2009 from its manufacturing plant in Kharagpur with an installed capacity of 110,000 tonnes per annum. The company became a 100% subsidiary of Tata Metaliks in 2013 and was renamed Tata Metaliks DI Pipes Limited (TMDIPL). The plant's capacity has been scaled up to 205,000 tonnes per annum.

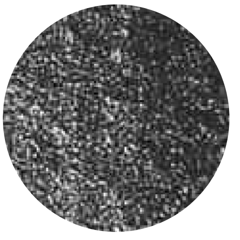
TMDIPL has been amalgamated with its parent company Tata Metaliks in 2016. Inspired by the rich heritage of the Tata Group, Tata Metaliks is committed to deliver superior quality DI Pipes. The result is obtained via several levels of quality checks and assurances, ethical business practices and minimal impact to the environment – vouched by the plethora of certifications Tata Ductura has to its name. As of date, Tata Ductura's export footprint is present in several countries like Turkey, Bahrain, Nepal, Sri Lanka, Philippines, Morocco, South Africa and France.

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 loading, 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.

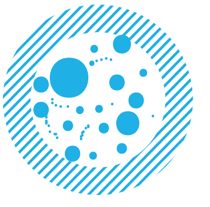
Grey Cast Iron (CI)



Ductile Iron (DI)

(Comparison photo of CI and DI)

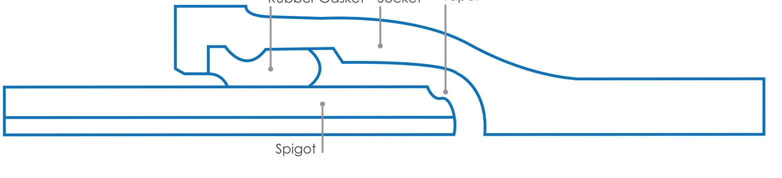
Flaky Carbon



Spheroid Carbon

Ductile Iron Pipe (DI Pipe)

Ductile Iron Pipes come with socket 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

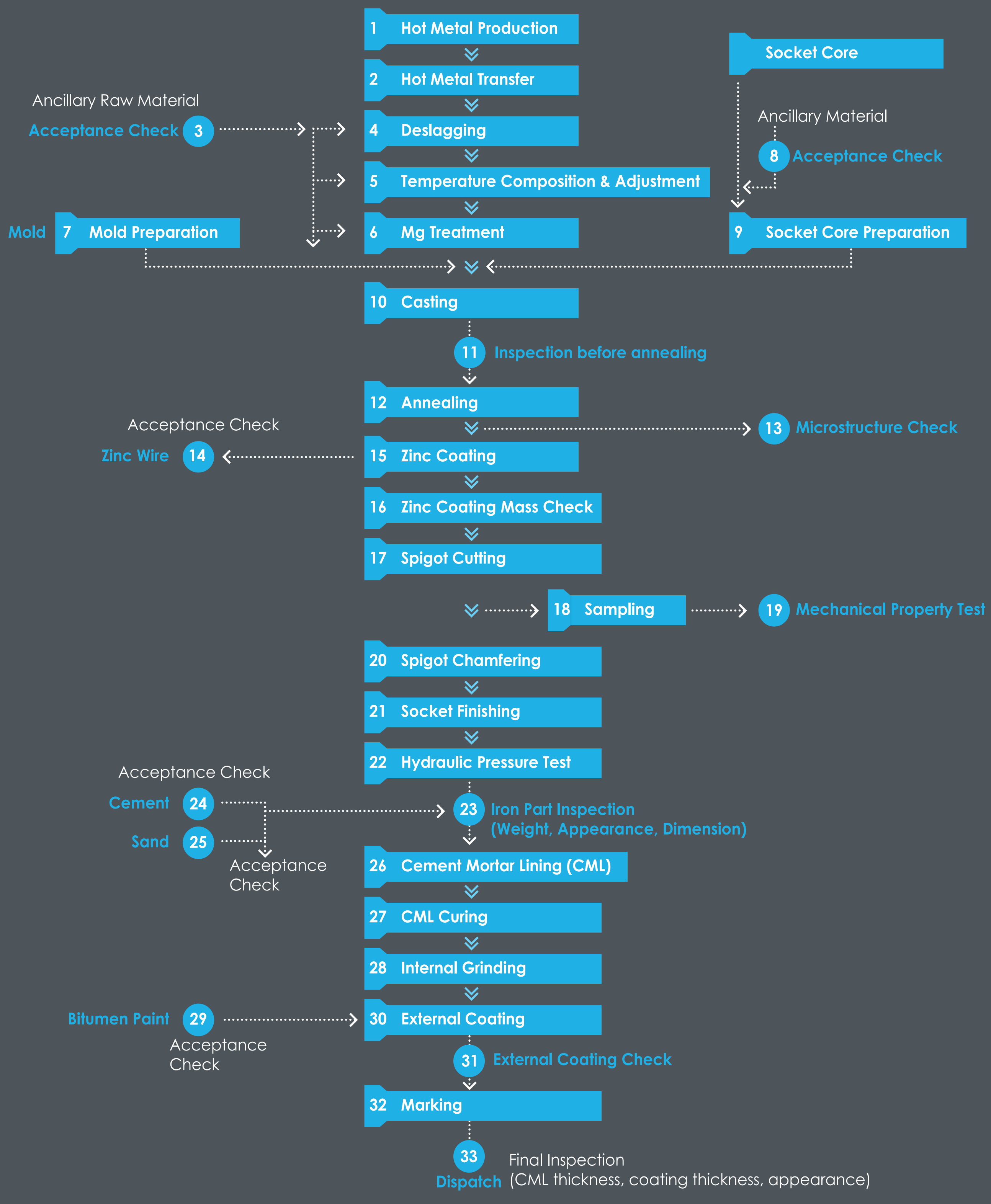
The allowable angular deflection at the joints of the DI Pipes enables them to bend at desirable angles. Flexible joints also enable the DI pipelines to be adjusted as and however necessary based on ground movement, should it occur. The angle of deflection in Tata Ductura's DI Pipes is higher than DI 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 X 10^{10}	2.1 X 10^{10}	75 X 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 Backfill.
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.

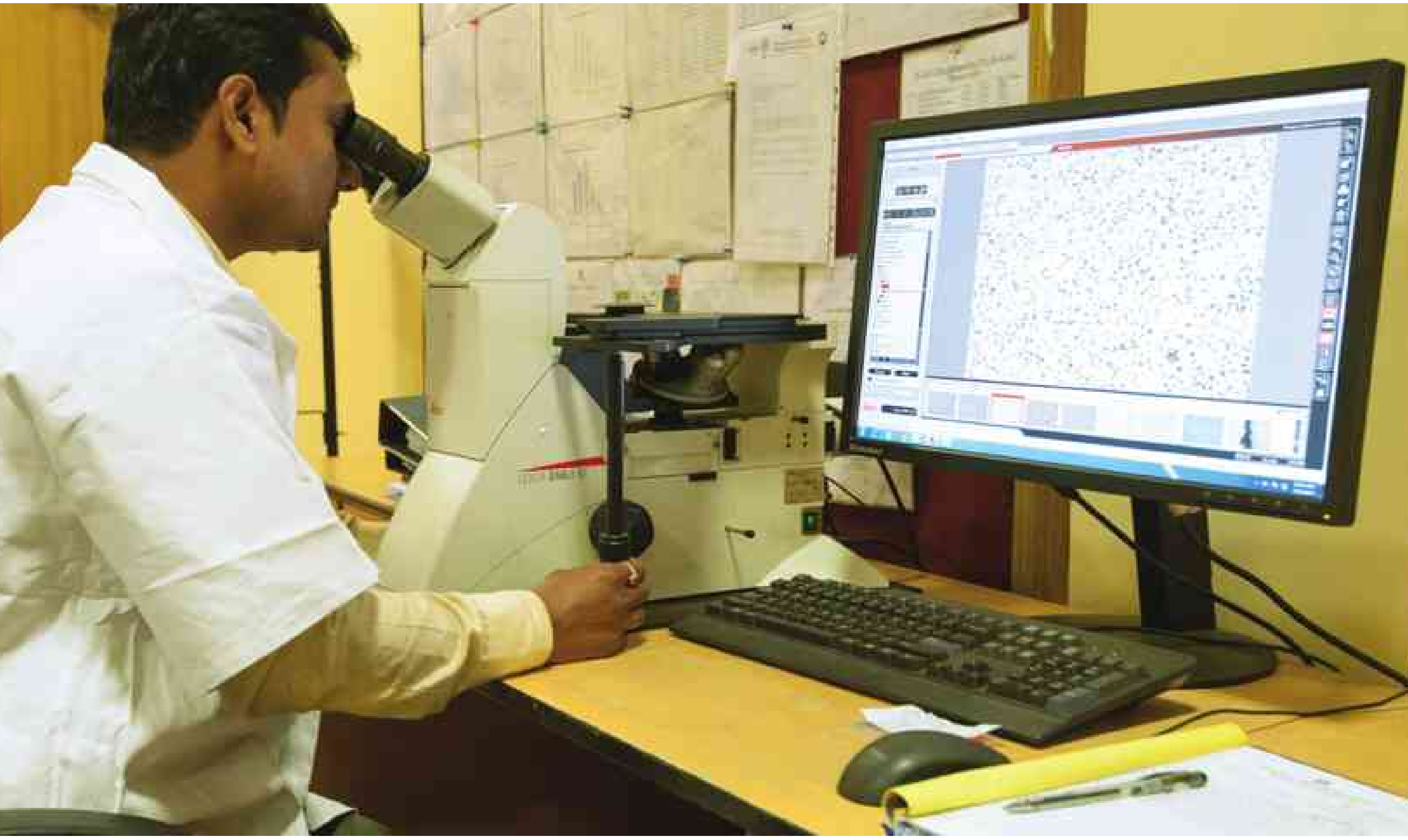
uPVC	HDPE	BWSC	GRP
600 - 800 (decreases with temperature)	265 - 280 (decreases with temperature)	4100 (for Steel Cylinder)	NA
0.03 X 10^{10}	0.009 X 10^{10}	0.35 X 10^{10}	0.00005 X 10^{10}
Low	Low	Medium	Low
Fair	Good	Good	Good
NIL	Fusion Welding	Joints could be welded	NIL
12.5 kg/cm^2	16 kg/cm^2	8 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



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

Product Portfolio

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

Certification Criterion	Coverage	Certifying Authority
Product Certificate	Certificate of Conformity EN 545:2010; ISO 2531:2009	Bureau Veritas Certification
Product Certificate	Certificate of Conformity EN 598:2007 + A1:2009 ISO 7186:2011	Bureau Veritas Certification
Product Certificate	BIS Standard Mark: IS 8329:2000	Bureau of Indian Standards
Product Certificate	Kite Mark Certificate for BS EN 545	BSI Assurance UK Limited
Product Certificate	Kite Mark Certificate for BS ISO 2531	BSI Assurance UK Limited
Product 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

Table below showing pressure test, thickness class etc.

Thickness Class					Pressure Class		
DN (mm)	Nominal Wall Thickness (e) in mm	Allowable Maximum Operating Pressure including Surge (MOP) in MPa	Nominal Wall Thickness (e) in mm	Allowable Maximum Operating Pressure including Surge (MOP) in MPa	Preferred Class	Nominal Wall Thickness (e) in mm	Allowable Operating Pressure in MPa
	K7		K9		C Class		
80	5.0	1.25	6.0	1.75	C40	4.4	4.0
100	5.0	1.25	6.0	1.75	C40	4.4	4.0
125	5.0	1.25	6.0	1.75	C40	4.5	4.0
150	5.0	1.25	6.0	1.75	C40	4.5	4.0
200	5.0	1.25	6.3	1.75	C40	4.7	4.0
250	5.3	1.25	6.8	1.75	C40	5.5	4.0
300	5.6	1.25	7.2	1.75	C40	6.2	3.0
350	6.0	1.25	7.7	1.75	C30	6.3	3.0
400	6.3	1.25	8.1	1.75	C30	6.5	3.0
450	6.6	1.25	8.6	1.75	C30	6.9	3.0
500	7.0	1.25	9.0	1.75	C30	7.5	3.0
600	7.7	1.25	9.9	1.75	C30	8.7	3.0
700	9.0	1.25	10.8	1.75	C25	8.8	2.5
750	9.7	1.25	11.3	1.75	-	-	-
800	10.4	1.50	11.7	2.0	C25	9.6	2.5

Table below showing nominal diameter, class and standard length

Nominal Diameter	Class	Standard Length (m)
80, 100, 125, 150, 200, 250, 300, 350, 400, 450, 500, 600, 700, 750, 800	K7, K9 C40/30/25	5.5, 5, 4

Thickness Chart

Rule - Follow this chart for inspection of thickness

	Thickness requirements per IS 8329				EN598:2007+A1: 2009		Thickness (mm) requirements per ISO 2531:2009 & EN 545:2010													
	Thickness K9		Thickness K7		Thickness		Note: 1) Table 17 of EN545:2010 shows the minimum wall thickness. Nominal thickness is not given. (2) Table C.1 of ISO2534:2009 shows the Nominal wall thickness. Minimum wall thickness is shown in Table D.1~D.7. (3) Wherever there is a difference, the thickness of EN545:2010 is shown within brackets.													
	Nom.	Min.	Nom.	Min.	Min.	Nom.	C20		C25		C30		C40		C50		C64		C100	
(mm)	(mm)		(mm)		(mm)		Nom.	Min.	Nom.	Min.	Nom.	Min.	Nom.	Min.	Nom.	Min.	Nom.	Min.	Nom.	Min.
80	6.0	4.7	5.0	3.7	3.5	4.8	--	--	--	--	--	--	4.4	3.0	4.4	3.0 (3.5)	4.4	3.0 (4.0)	4.8	3.4 (4.7)
100	6.0	4.7	5.0	3.7	3.5	4.8	--	--	--	--	--	--	4.4	3.0	4.4	3.0 (3.5)	4.4	3.0 (4.0)	5.5	4.1 (4.7)
125	6.0	4.7	5.0	3.7	--	--	--	--	--	--	--	--	4.5	3.0	--	--	--	--	--	--
150	6.0	4.7	5.0	3.7	3.5	4.8	--	--	--	--	--	--	4.5	3.0	4.5	3.0 (3.5)	5.3	3.8 (4.0)	7.4	5.9
200	6.3	4.8	5.0	3.7	3.6	4.9	--	--	--	--	--	--	4.7	3.2 (3.1)	5.4	3.9	6.5	5.0	9.2	7.7
250	6.8	5.3	5.3	4.0	3.7	5.3	--	--	--	--	--	--	5.5	3.9	6.4	4.8	7.8	6.2 (6.1)	11.1	9.5
300	7.2	5.6	5.6	4.3	4.0	5.6	--	--	--	--	5.1	3.5	6.2	4.6	7.4	5.8 (5.7)	8.9	7.3	12.9	11.3 (11.2)
350	7.7	6.1	6.0	4.7	4.3	6.0	--	--	5.1	3.4	6.3	4.6 (4.7)	7.1	5.4 (5.3)	8.4	6.7 (6.6)	10.2	8.5	14.8	13.1 (13.0)
400	8.1	6.4	6.3	4.6	4.6	6.3	--	--	5.5	3.8	6.5	4.8	7.8	6.1 (6.0)	9.3	7.6 (7.5)	11.3	9.6	16.5	14.8
450	8.6	6.9	6.6	4.9	4.9	6.7	--	--	6.1	4.3	6.9	5.1	8.6	6.8	10.3	8.5 (8.4)	12.6	10.8 (10.7)	18.4	16.6
500	9.0	7.2	7.0	5.2	5.2	7.0	--	--	6.5	4.7	7.5	5.7 (5.6)	9.3	7.5	11.2	9.4 (9.3)	13.7	11.9	20.2	18.4 (18.3)
600	9.9	8.0	7.7	5.8	5.8	7.7	--	--	7.6	5.7	8.7	6.8 (6.7)	10.9	9.0 (8.9)	13.1	11.2 (11.1)	16.1	14.2	23.8	21.9
700	10.8	8.8	9.0	7.0	7.6	9.6	7.3	5.3	8.8	6.8	9.9	7.9 (7.8)	12.4	10.4	15.0	13.0	18.5	16.5	28	26
750	11.3	9.3	9.7	7.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
800	11.7	9.6	10.4	8.3	8.3	10.4	8.1	6.0	9.6	7.5	11.1	9.0 (8.9)	14.0	11.9	16.9	14.8	21.0	18.9 (18.8)	--	--

Preferred Class:

DN 80 to 300 : Class 40

DN 350 to 600 : Class 30

DN 700 to 800 : Class 25

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-restrained 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. Restrained 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.

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:

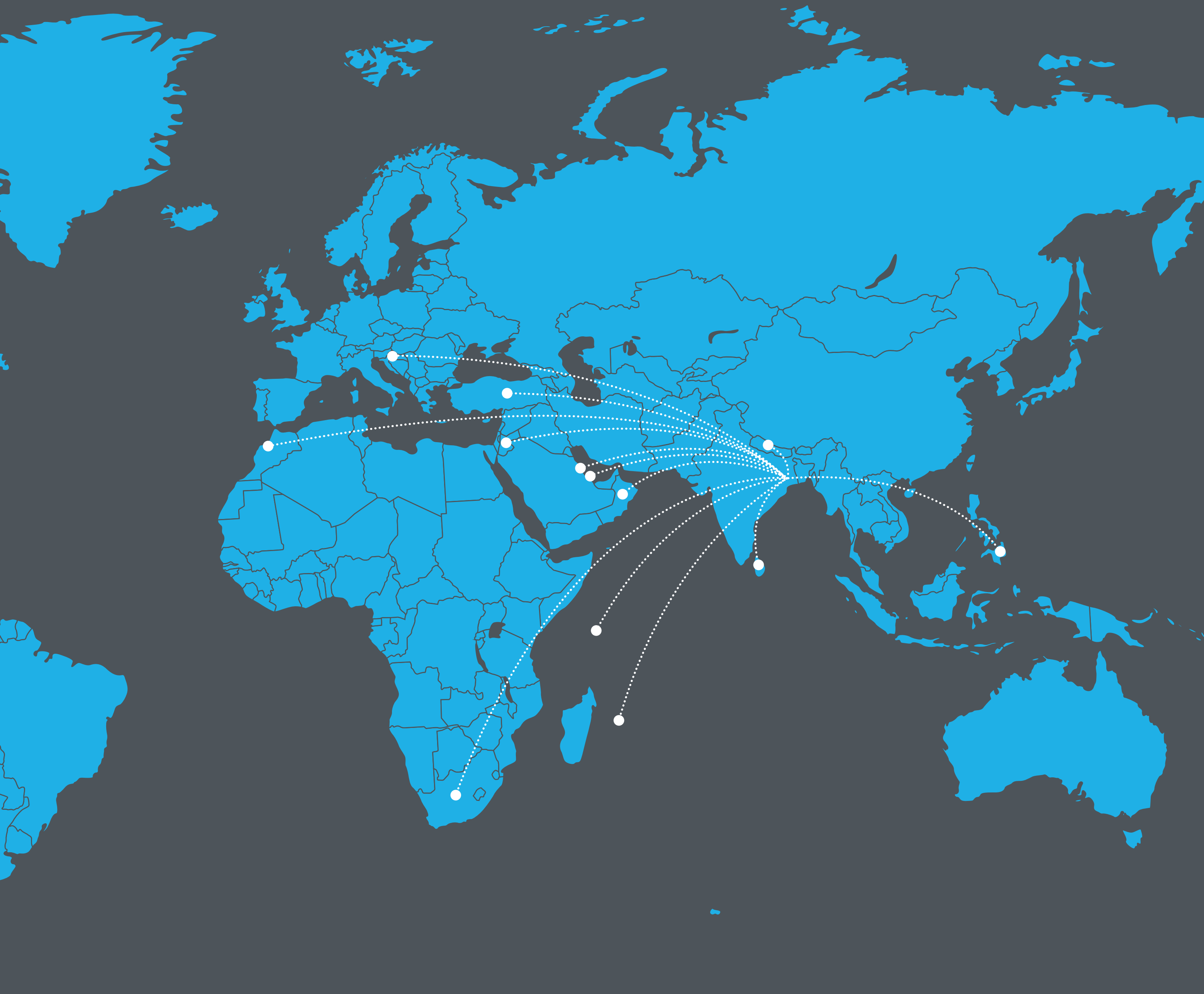
Cement mortar protects the internal pipe wall from corrosion by alkaline reaction of cement. It also prevents pitting and tuberculation. Tata Ductura's cement mortar lining is smooth and helps maintain stable flow area and coefficient of friction over a long period of time. It also helps to control leaching 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 capability of the polyethylene sleeve works as a shield between the DI Pipes and the field.



International Footprint

S. No.	Country	End User / Customer
1	Nepal	Kathmandu Upatyaka Khanepani Limited (KUKL)
2	Sri Lanka	National Water Supply and Drainage Board (NWSDB)
3	Bahrain	Electricity and Water Authority (EWA)
4	Oman	Public Authority for Electricity and Water (PAEW)
5	Mauritius	Central Water Authority (CWA)
6	Seychelles	Public Utilities Corporation (PUC)
7	Morocco	ONEP
8	Turkey	Koski Water Authority & DSI
9	Philippines	CEBU Water Authority
10	Jordan	Water Authority of Jordan (WAJ)
11	South Africa	Breede Valley Municipality
12	Croatia	ZIK
13	Qatar	Kahramaa

Domestic Customers

1. Public Health Engineering Departments – State Authorities
2. Development Authorities
3. Urban Local Bodies : Municipal Corporations
4. Water Resources Departments
5. Housing and Real Estate
6. Major EPC companies executing water and waste water infrastructure projects
7. Non-conventional and industrial usage of water utility for industrial establishments like power plants etc.

TATA

TATA METALIKS

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