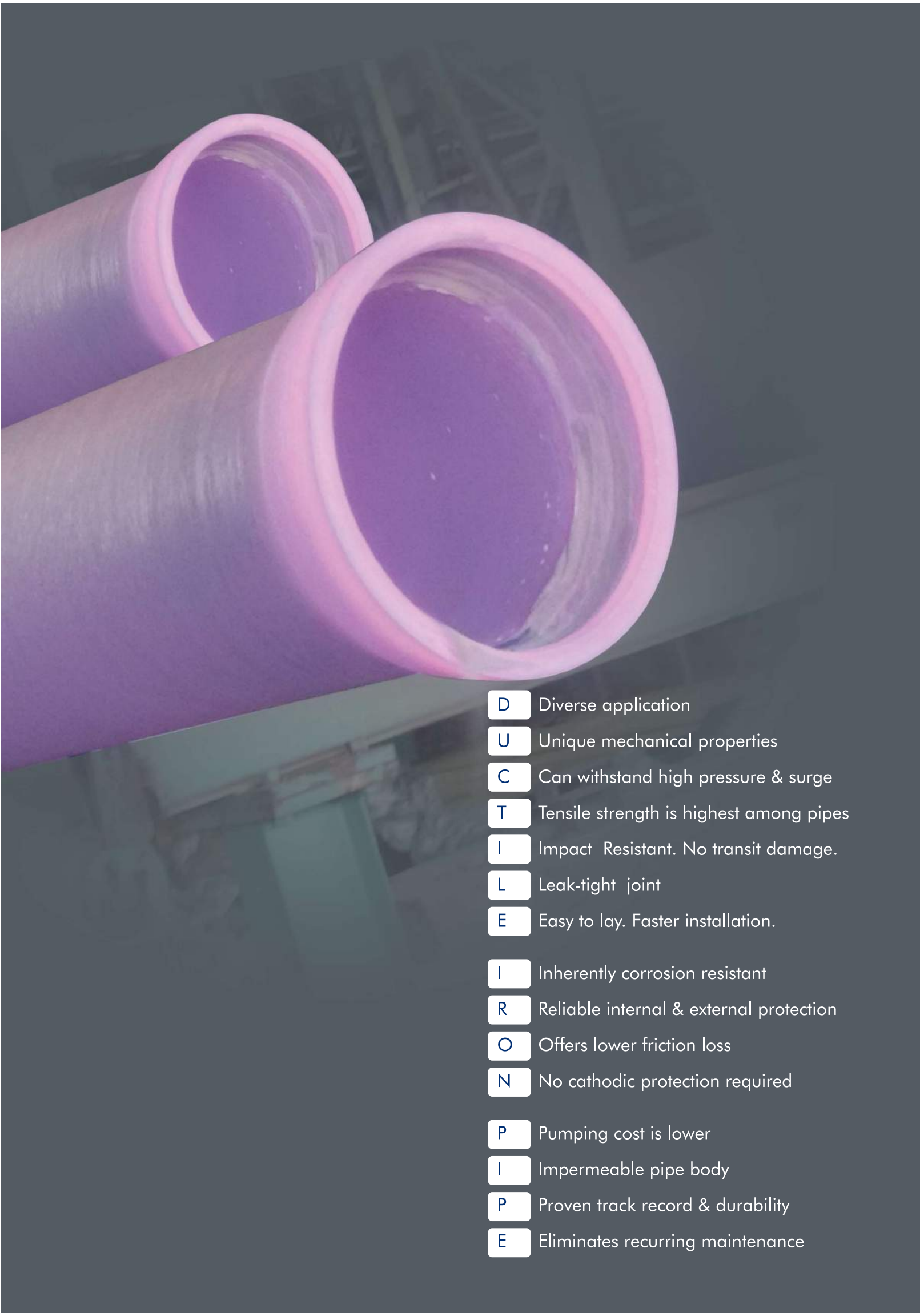




**ELECTROSTEEL
CASTINGS LTD.**

DUCTILE IRON PIPES AND FITTINGS



- D** Diverse application
- U** Unique mechanical properties
- C** Can withstand high pressure & surge
- T** Tensile strength is highest among pipes
- I** Impact Resistant. No transit damage.
- L** Leak-tight joint
- E** Easy to lay. Faster installation.
- I** Inherently corrosion resistant
- R** Reliable internal & external protection
- O** Offers lower friction loss
- N** No cathodic protection required
- P** Pumping cost is lower
- I** Impermeable pipe body
- P** Proven track record & durability
- E** Eliminates recurring maintenance

INTRODUCTION

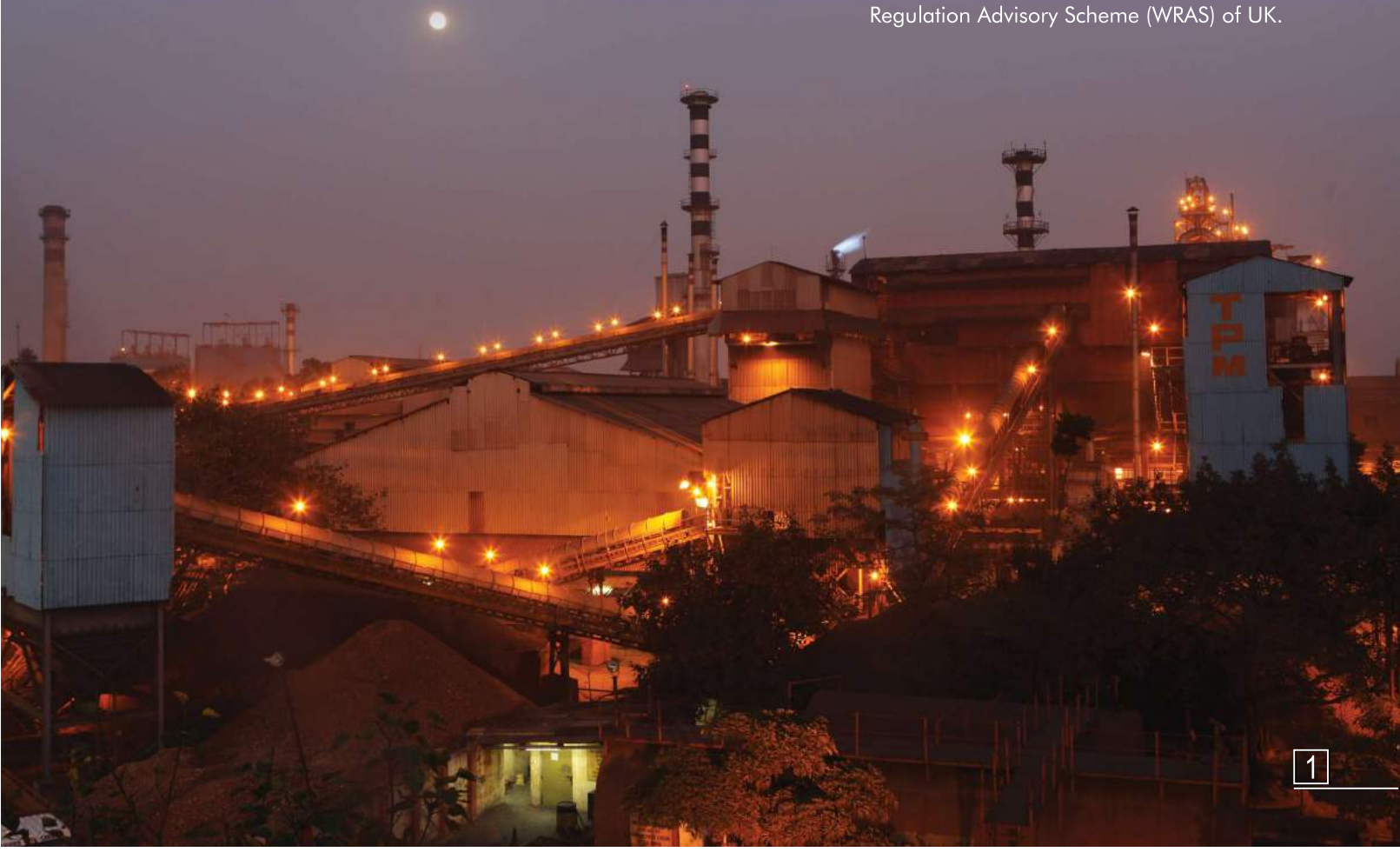
Electrosteel is India's market leader in ductile iron pipeline systems with one overriding aim: to be the First Choice. Electrosteel is the pioneer to set up a Ductile Iron Spun Pipe Plant in India for the first time in 1994 and since then, Water Engineers in India have shown distinct preference for Ductile Iron Pipes and Fittings due to its high reliability and durability. Electrosteel has maintained its leadership by continuous evolution of unrivalled product range, regularly updating the manufacturing processes, extensive research for product development, a vigilant quality system and user friendly services to its customers.

With a global ambition Electrosteel has now spread its wings in more than 55 countries across five continents exporting Ductile Iron pipes and fittings as per the International Benchmark. Apart from the growing Indian demand, it caters to a large customer base spread over the Indian subcontinent, South East Asia, Middle East, Europe, USA, South America and Africa. A large marketing network spearheaded by a dedicated work force serves a diverse customer base spread around the globe.

Electrosteel has a most modern Ductile Iron Pipe Plant at Khardah, near Kolkata, in West Bengal for manufacturing Ductile Iron Pipes having a production capacity of 3,00,000 MT per annum having its own Blast Furnace and captive power plant. This facility also includes a modern in-house Ductile Iron Fittings plant using the latest 'Lost Foam' process.

Electrosteel has achieved complete process integration, having its own coal and iron ore mines. In a supporting industrial unit at Haldia in West Bengal, it has a coke oven, a sponge iron plant and a 12 MW power plant which help to lower the input cost to remain competitive.

Electrosteel employs latest state-of the art technology and management concepts to achieve "Quality right the first Time". Apart from having ISO 9001 and ISO 14001 certification, company's quality system and products are also approved by agencies like DVGW (Germany), KITEMARK (BSI,UK), and various quality approvals in Middle East. New feathers have been added by way of NSF, UL and FM approvals from USA and NF Approval from France. ECL products are also certified by Drinking water Inspectorate (DWI) and Water Regulation Advisory Scheme (WRAS) of UK.



DUCTILE IRON PIPE

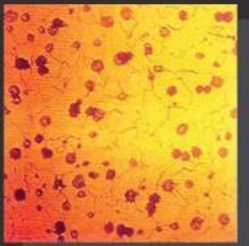
AN OVERVIEW

Ductile Iron (also known as Spheroidal graphite iron or Nodular Cast Iron) was invented in 1949. Ductile Iron retains the corrosion resistance of cast iron but has more than double the tensile strength [Cast Iron- 180 MPa (min), Ductile Iron - 420 MPa (min)]. The essential differences between Ductile and Cast Iron lies in the shape of the graphite in the microstructure of the metal. In Cast Iron, the graphite is present in plate-like flakes, which makes Cast Iron brittle. But in Ductile iron, the shape of the graphite becomes a spheroidal nodule, which increases tensile strength and makes Ductile Iron sturdy and shock-proof.

Ductile Iron pipe is considered as the most preferred pipe material for water supply and pressure sewerage application all over the world. It offers higher Tensile Strength and diametral stiffness than Mild Steel and retains the inherent corrosion resistance of cast iron. Pipes made from Ductile Cast Iron, provides substantial benefits in terms of pressure bearing ability, impact resistance and capacity to sustain external static/ dynamic loading.



Photomicrograph showing graphite form in gray iron.

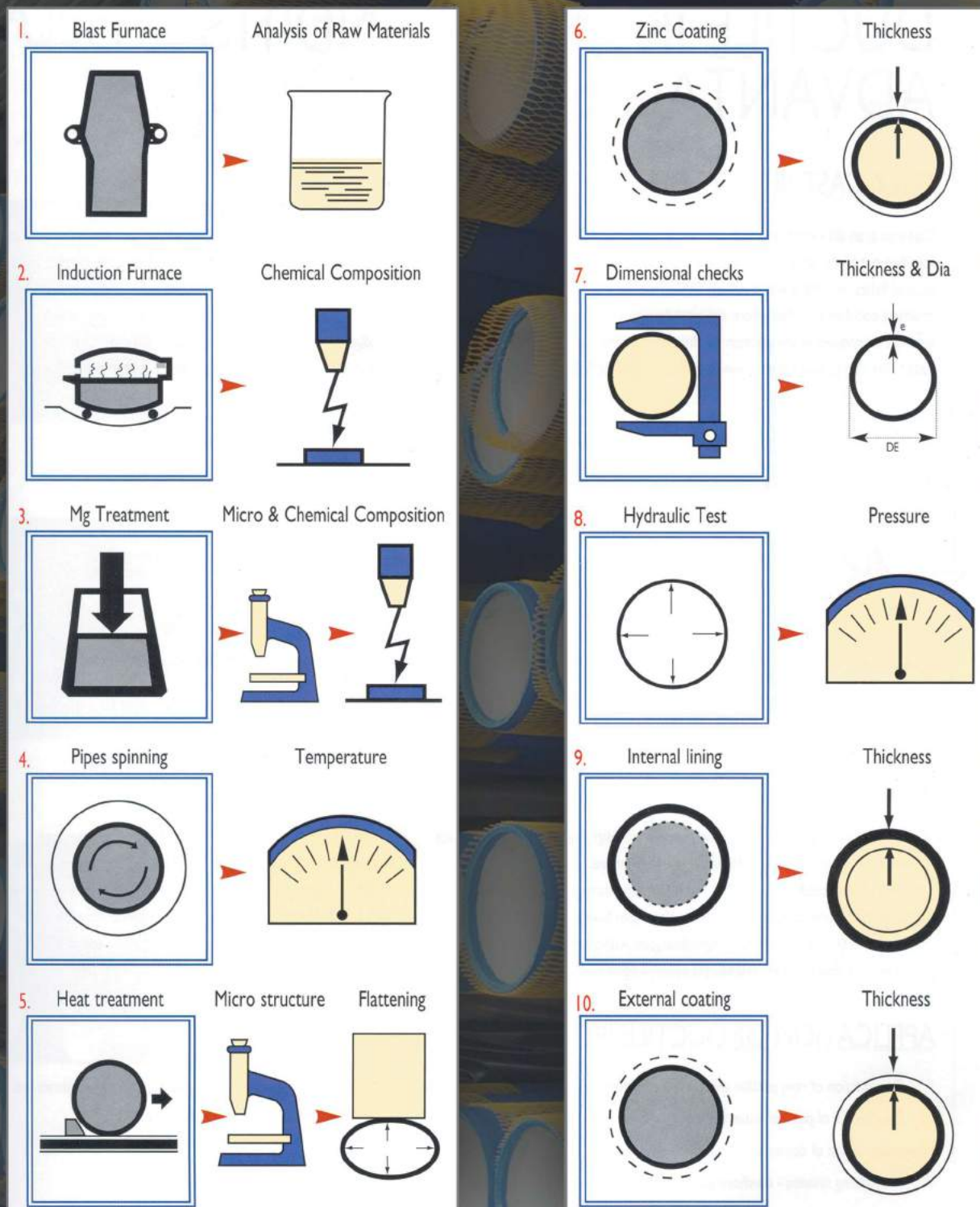


Photomicrograph showing graphite form in ductile iron.

PROPERTIES

Properties	Ductile Iron Pipe
Tensile strength	Min. 420 MPa
Elongation (min) at break	10 %
Elastic Coefficient	1.7×10^4 Kg/mm ²
Modulus of Elasticity	1.7×10^{10} Kg/M ²
Hardness	Max. 230 BHN
Density	7050 Kg/M ³
Bending/ Beam Strength	Over 50 Kg/M ³
Crush load and impact load	Can take up huge impact load (Charpy over 0.713).
Bursting Strength (min)	Factor of Safety against bursting is 8 to 10.

PIPE MANUFACTURING PROCESS



APPLICATION OF DUCTILE IRON PIPE



- Raw and clear water transmission (pumping and gravity main)
- Distribution network of potable water
- Irrigation (lift & gravity irrigation)



- Water supply for industrial /process plant application
- Ash-Slurry Handling & Disposal system
- Fire-fighting systems-on-shore and off-shore
- Desalination Plants



- Sewerage and waste water force main
- Gravity sewerage collection and disposal system
- Storm water drainage piping
- Effluent disposal system for domestic and industrial application
- Recycling system



- Piping work inside water and sewage treatment plants
- Vertical connection to utilities and reservoirs



- Piling for ground stabilization
- Protective piping under major carriage-ways



Range of Fittings

- A. All Socketed Ductile Iron Fittings with Push-on joints.
- B. All Flanged Ductile Iron Fittings.
- C. Ductile Iron Fittings with push-on type restrained joint.
- D. Ductile Iron Mechanical Joint Fittings with Rubber Gasket & follower gland.
- E. Fabricated and custom made Ductile Iron fittings.

PRODUCT RANGE

Electrosteel produces Ductile Iron Spun Pipes and Fittings from DN 80 - DN 1000 mm.:

- As per IS:8329/IS:9523
- As per EN:598/ISO:7186 (for sewerage)
- As per ISO:2531 (for water)
- As per BS EN:545 (for water)

Normally pipes are manufactured with inside cement mortar lining and external Zinc coating with a bitumen finishing layer. Various other linings and coatings are possible as per customers request.

Range of Pipes

- A. Ductile Iron Socket and Spigot pipes with push-on joints
- B. Ductile Iron plain ended barrel pipes
- C. Ductile Iron Socket and Spigot Restrained joint pipes with push-on Rubber Gasket Joint.
- D. Ductile Iron Flanged pipes of standard and customized length. Flanged Pipes of the following types are available:
 - Flanges as cast (short lengths upto 1m)
 - Welded on Flanged pipes
 - Screwed on Flanged pipes



JOINTING SYSTEMS

The recommended Type Tests as per BS EN 545/598, ISO: 2531 are:

- 1. Leak Tightness of Joints to Positive, Negative and Dynamic Internal Pressure
- 2. Leak Tightness of Joints to Positive External Pressure
- 3. Leak tightness and Mechanical Resistance of Flanged Joints
- 4. Test for Abrasion Resistance
- 5. Test for Chemical Resistance to Effluents.

The British Standard Institute (BSI) has supervised the type tests and accordingly the 'KITEMARK' Licenses have been issued.

Electrosteel D.I. Pipes and Fittings are available with following types of jointing systems:

- Socket & Spigot Flexible Push-on Joints
- Restrained Joint Push-on Type
- Mechanical Flexible Joints (only fittings)
- Flanged Joint

Socket & Spigot Flexible Push-on Joints

Socket and Spigot Flexible Joints are assembled with synthetic (EPDM/SBR) rubber gaskets of special shape. The gasket has a hard 'Heel' and a soft 'Bulb'. In Push-on joint the soft bulb of the rubber gasket is compressed when the spigot is inserted into the socket. The 'Heel' locks the position of the gasket and does not allow the gasket to get displaced when the spigot is pushed in. The joint becomes tighter with the increase in internal pressure of water. The rubber is confined in a place and cannot blow out.

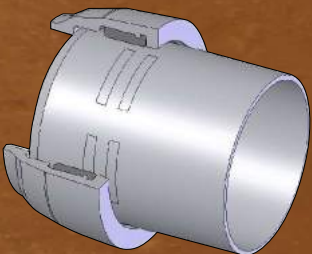
Permissible Deflection at Socket and Spigot Joints

Where it is necessary to deflect the pipeline from a straight line, either in the vertical or horizontal plane, to avoid obstructions etc., deflection at joint should not exceed the following:

Push on Joint	Min. Deviation Angle
80 – 300 mm	3°30'
350 – 600 mm	2°30'
700 – 1000 mm	1°30'

Electrosteel Ductile Iron Pipe joints are type tested

Electrosteel's design of the socket and the rubber gasket ensures guaranteed leak-tight joint through Type Test as per BSEN:545 and ISO:2531. Type Test is testing the pipe and pipe joint at extreme working conditions (the product and use) to ensure satisfactory performance for a long time.



Procedure



Step 1 : Clean the socket grooves and outside spigot end.



Step 2 : Hold the gasket as shown and place inside the socket



Step 3 : Apply lubricant on the gasket. Do not use petroleum based lubricant.



Step 4 : Apply lubricant on the spigot also. Please check that the spigot end is properly chamfered.



Step 5 : Properly align both the pipes.



Step 6 : Gently push the spigot into the socket with suitable mechanical means.

Rubber Gasket

The absence of sunlight and oxygen, presence of moisture/water, relatively lower and uniform surrounding temperature in buried conditions help in preservation of rubber gaskets. Thus this type of joint is expected to last for more than 100 years.

- Good quality Synthetic rubber gaskets made either of SBR (Styrene Butadyne Rubber) or EPDM (Ethylene Propylene Dimethyle Monomer) conforming to IS:5382 are used with Ductile Iron push-on joint pipes.
- Gasket should be stored in a cool & dry place. Direct exposure to sunlight should be avoided.
- It is advised that the users should obtain gaskets through Electrosteel only.

Jointing Tips

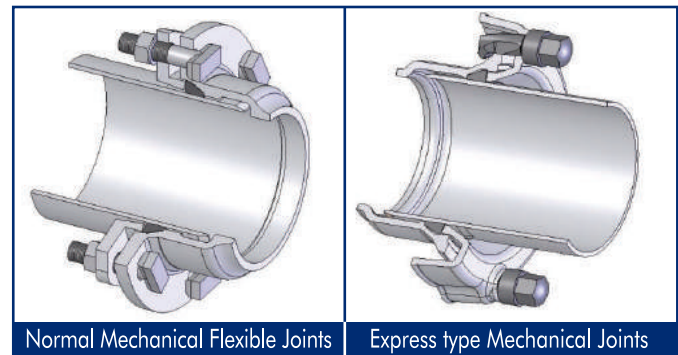
- The sockets should face uphill while pipeline is laid on a slope.
- The direction of flow has nothing to do with direction of the socket.
- Never use petroleum based lubricant during jointing. It damages the gasket. Liquid soap solution or organic grease may be used.
- All Fittings should be suitably anchored against displacement as recommended in the laying specification.
- Spigots should be inserted into the socket upto the white insertion mark to ensure proper jointing.
- The joint deflection should not be more than the recommended deflection.





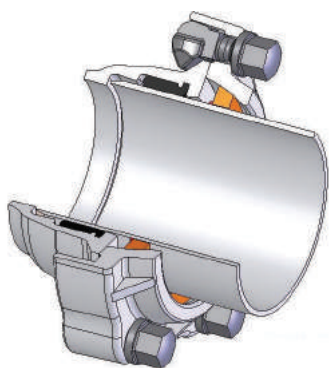
Mechanical Flexible Joints

In mechanical joint, sealing is achieved by applying pressure on the gasket by a separate gland. When bolted with the pipe, the gland exerts pressure on the sealing rubber gasket and makes the joint leak proof.



Restrained Joint Push-on Type for Buried Pipes

Restrained Joints are special jointing system, which can take care of axial movement in case of thrust. Hydraulic thrust forces occur in pressurized mains, when there is any change in direction (bends, tees) or any change of diameter (tapers, valves) or any pipeline end (blank flanges or caps). These special joints are necessary on fittings and a few pipes adjacent to the fittings. Restrained Joints eliminate use of concrete anchor blocks, which are costly and delay the progress of laying operation.



Mechanical Joints are popular due to the following advantages:

- ✓ Easier to assemble and dismantle without any special tool.
- ✓ Needs only a spanner.
- ✓ The leaking joint can be repaired very easily.
- ✓ Offers high flexibility and wider dimensional tolerance of the socket and spigot.

Jointing Procedure

- ✓ Clean the jointing socket and spigot of the pipe thoroughly.
- ✓ Insert the follower gland and the gasket on the spigot.
- ✓ Put the spigot into the M/J socket and align the pipes. Next slide the gland and gasket in position.
- ✓ Insert the nut-bolts and tighten diametrically opposite bolts.
- ✓ Ensure that the follower gland presses the rubber gasket properly.
- ✓ In case of any leakage the bolts may be tightened further.
- ✓ Joints to be assembled completely and then give required deflection.

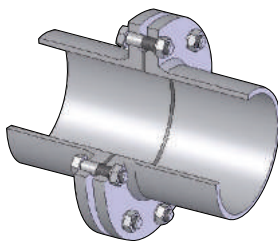
Flanged Joints

Over ground and specialized applications require restrained joints where Flanged pipes are used. Flanged Pipes have the following advantages:

- 1) Acts as self-restrained Joint reducing the requirement of thrust blocks.
- 2) Ideal for over-ground and Exposed Installations
- 3) Flanged Pipes are ideal for Vertical pipelines.
- 4) Used for Temporary Installations (over pillars) where pipelines need to be disengaged or displaced.
- 5) Widely used for interconnection in Pump House and Treatment Plant.

Jointing Procedure

- ✓ Properly align the pipes
- ✓ Clean flange faces and remove rust and dirt
- ✓ Position the gasket. Use 3 mm. thick moulded rubber gaskets with quality conforming to IS 5382.
- ✓ Lubricate bolt threads, all mating surface and flanges
- ✓ Use automotive grade oil / grease
- ✓ Insert the nut-bolts one by one. Tighten diametrically opposite bolts to the recommended torque
- ✓ If necessary, re-tighten bolts before pressure testing

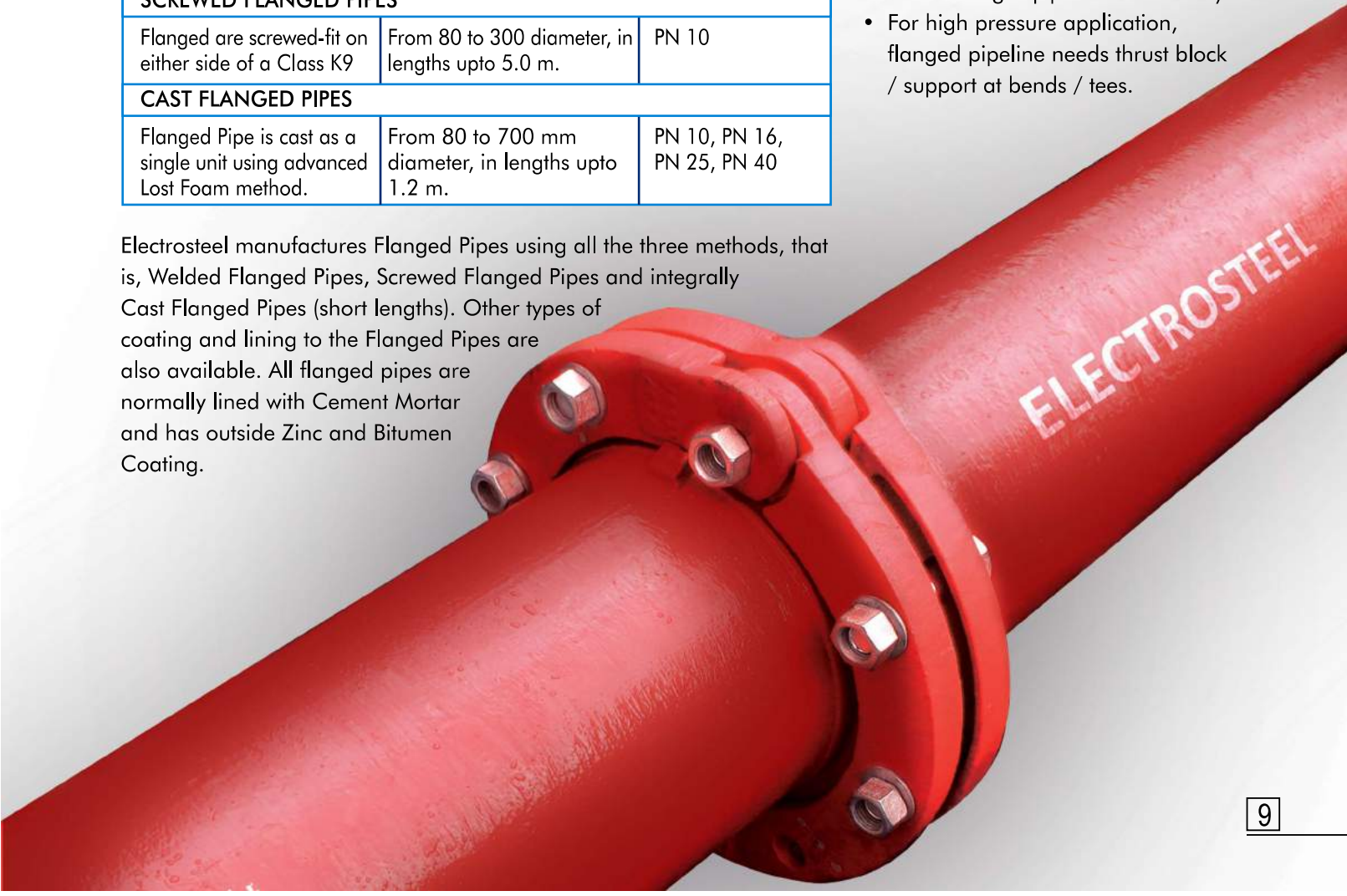


Remember...

- Buried installation of flanged pipe is not recommended.
- Flanged joint being a rigid joint, perfect alignment of the flange faces during jointing and bolt tightening is absolutely vital.
- Use of duckfoot bend at bottom of vertical flanged pipe line is necessary.
- For high pressure application, flanged pipeline needs thrust block / support at bends / tees.

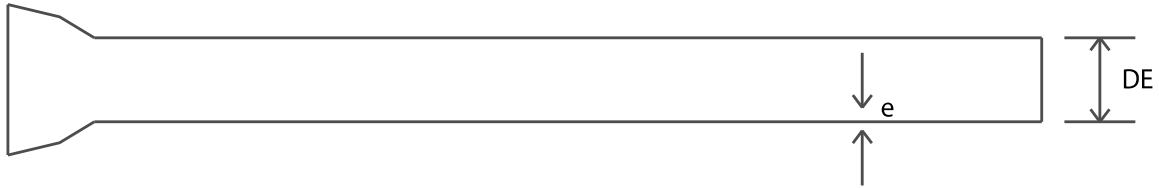
Flanged Pipe type	Diameter Range and lengths	Available PN Ratings
WELDED FLANGED PIPES		
Flanges are welded on either side of a Class K9 barrel	From 80 to 1000 mm diameter, in lengths upto 5.5	PN 10, PN 16, PN 25, PN 40
SCREWED FLANGED PIPES		
Flanged are screwed-fit on either side of a Class K9	From 80 to 300 diameter, in lengths upto 5.0 m.	PN 10
CAST FLANGED PIPES		
Flanged Pipe is cast as a single unit using advanced Lost Foam method.	From 80 to 700 mm diameter, in lengths upto 1.2 m.	PN 10, PN 16, PN 25, PN 40

Electrosteel manufactures Flanged Pipes using all the three methods, that is, Welded Flanged Pipes, Screwed Flanged Pipes and integrally Cast Flanged Pipes (short lengths). Other types of coating and lining to the Flanged Pipes are also available. All flanged pipes are normally lined with Cement Mortar and has outside Zinc and Bitumen Coating.



PIPE

DIMENSION

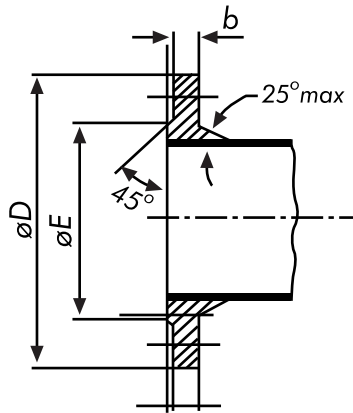


Key

e = Nominal wall thickness in mm,

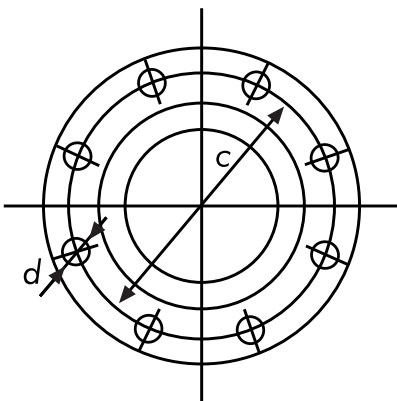
DE = Nominal external diameter of Spigot in mm

Basic Dimensions of Pipes Class K7 & K9



Nominal Dia. DN (mm)	External Dia. DE (mm)	Tol. on DE (mm)	Nominal Thickness K7 (mm)	ECL Works Test Pressure K7 (Kg/cm ²)	Nominal Thickness K9 (mm)	ECL Works Test Pressure K9 (Kg/cm ²)
80	98	+1/-2.8	5.0	40	6.0	60
100	118	+1/-2.8	5.0	40	6.0	60
125	144	+1/-2.8	5.0	40	6.0	60
150	170	+1/-2.9	5.0	40	6.0	60
200	222	+1/-3	5.0	40	6.3	60
250	274	+1/-3.1	5.3	40	6.8	60
300	326	+1/-3.3	5.6	40	7.2	60
350	378	+1/-3.4	6.0	32	7.7	50
400	429	+1/-3.5	6.3	32	8.1	50
450	480	+1/-3.6	6.6	32	8.6	50
500	532	+1/-3.8	7.0	32	9.0	50
600	635	+1/-4	7.7	32	9.9	50
700	738	+1/-4.3	9.0	25	10.8	42
750	790	+1/-4.4	9.7	25	11.3	42
800	842	+1/-4.5	10.4	25	11.7	42
900	945	+1/-4.8	11.2	25	12.6	42
1000	1048	+1/-5	12.0	25	13.5	42

Dimensions of Flange



DN	PN-10							PN-16						
	D	E	C	b	n	Dia (d)	Metric	D	E	C	b	n	Dia (d)	Metric
Nom. Dia.	Out side Dia.	Dia. of raised Face	Pitch Circle Dia.	Flange Width	No. of Bolts	Bolt Hole Dia.	Bolt size	Out side Dia.	Dia. of raised Face	Pitch Circle Dia.	Flange Width	No. of Bolts	Bolt Hole Dia.	Bolt size
80	200	132	160	16.0	8	19	M16	200	132	160	16.0	8	19	M16
100	220	156	180	16.0	8	19	M16	220	156	180	16.0	8	19	M16
125	250	184	210	16.0	8	19	M16	250	184	210	16.0	8	19	M16
150	285	211	240	16.0	8	23	M20	285	211	240	16.0	8	23	M20
200	340	266	295	17.0	12	23	M20	340	266	295	17.0	12	23	M20
250	395	319	350	19.0	12	23	M20	400	319	355	19.0	12	28	M24
300	445	370	400	20.5	12	23	M20	455	370	410	20.5	12	28	M24
350	505	429	460	20.5	16	23	M20	520	429	470	22.5	16	28	M24
400	565	480	515	20.5	16	28	M24	580	480	525	24.0	16	31	M27
450	615	530	565	21.0	20	28	M24	640	548	585	26.0	20	31	M27
500	670	582	620	22.5	20	28	M24	715	609	650	27.5	20	34	M30
600	780	682	725	25.0	20	31	M27	840	720	770	31.0	20	37	M33
700	895	794	840	27.5	24	31	M27	910	794	840	34.5	24	37	M33
750	960	857	900	29.0	24	31	M27	970	857	900	36.0	24	37	M33
800	1015	901	950	30.0	24	34	M30	1025	901	950	38.0	24	40	M36
900	1115	1001	1050	32.5	28	34	M30	1125	1001	1050	41.0	28	40	M36
1000	1230	1112	1160	35.0	28	37	M33	1255	1112	1170	45.0	28	43	M39

Note : All dimensions are in millimeter.

DUCTILE IRON

FITTINGS



Manufacturing Procedure

The 'Lost foam' process used for manufacturing of DI fittings, is a much advanced technique and it scores over other conventional process.

Lost Foam Casting Technique

- ✓ First an exact replica of the fitting is made with "Styro-foam" popularly known as Thermo-cole.
- ✓ This replica, moulded in special machines, acts as a pattern for the casting. The patterns are then kept in mechanized moulding box and then packed with sand.
- ✓ When hot metal is poured, the Styrofoam pattern vapourises (a vacuum pump removes the gases) and the metal takes the shape of the fitting by filling up the cavity.
- ✓ After cooling, castings are taken out, shot blasted, fettled and cleaned.
- ✓ After thorough inspection, the castings (Fittings) are subjected to hydrostatic testing.
- ✓ Tested fittings are then cement mortar lined and Zinc coated and a bituminous finishing coat is applied from outside. Fittings with Fusion Bonded epoxy coating and lining are also available.

Advantages of Lost Foam Technique

- Casting process is much faster, leading to quicker delivery.
- No need of core setting. So no question of core displacement resulting in uneven thickness.
- Much lower chances of having pinhole, slag inclusion or blowhole.
- Maintains high dimensional tolerance, which is so vital for proper fitment and leak tightness. The castings have excellent finish.
- In flanged fitting no drilling hole is necessary as all the holes are cored.

Hydrostatic Testing

D.I. fittings are tested at works at the following test pressure as specified in IS : 9523

Diameter (mm)	Works Test Pressure (Kg/cm ²)
80-300	25
350-600	16
700-800	10
900-1200	10

It may appear that test pressures of Fittings are low, compared to the allowable working pressures in pipes. But fittings with K-12 thickness of Ductile Iron have higher factor of safety and do not burst at allowable working pressure.

Electrosteel has set up a new DI fittings plant at Haldia, employing high pressure casting system. This results in accurate dimension and faster production. At Haldia, DI fittings upto 1200 mm dia are produced.

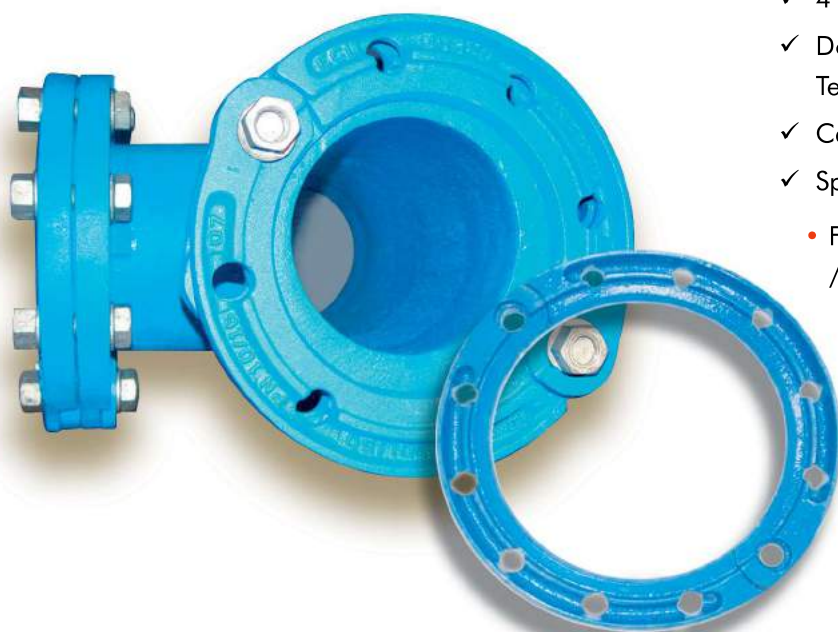




DUCTILE IRON SPECIAL FITTINGS

Apart from push-on joint and mechanical joint fittings we also manufacture some special fittings, which are extremely useful for practical applications. These have same wall thickness, material and quality tests of standard fittings. Few of these are mentioned below:

- ✓ 4 way Crosses
- ✓ Double Socket Branch Flange level Invert Tee (Scour Tee)
- ✓ Caps/Plugs /Puddle Flange
- ✓ Special variation of conventional Fittings such as:
 - Fittings with one side Flange & one side plain-ended /socketed of a particular length.
 - Tees and Reducers with other non standard DN x dn combinations.
 - Due to immense flexibility of our manufacturing process by Lost Foam method, virtually any combination of socket/flange/plain-end is possible.



Loose Flange Fittings

Electrosteel has also introduced fittings with Adjustable Flange or Loose Flange. Unlike 'As cast' Flanged fitting, in this case, separately cast loose Flanges are mounted on the fittings. A loose Flanged Fittings is comprised of a Flange ring, (in one or more parts bolted together) which can be fixed on the fittings end. This loose Flange can be freely rotated around the axis of the fittings.

Advantages of Loose Flange Fittings

- Since the flange can be freely rotated, bolt hole alignment with the mating Flange becomes easier.
- As it can be fixed and removed easily, dismantling of adjoining accessories becomes easier. Angles can be adjusted.
- The PN rating of the Fittings can be changed at will, just by changing the loose flange.



Ductile Iron Fabricated Fittings

Electrosteel manufactures DI fabricated fittings, by welding together sections of DI Pipes and Castings to form a basic pipe connecting piece, similar in function to some fittings. One such regularly manufactured product is Air Valve Tee. As an example a 100 mm dia, Flanged outlet can be fixed on a 500 mm pipe or larger dia, which serves the purpose of a 500x500x100 Double Socket Branch Flange (DSBF) Tee, ideal for air valve installation. It saves the cost of a DSBF Tee and provides considerable cost economy. These products are made and tested as per the provision of IS:9523.

INTERNAL PROTECTION

Cement Mortar Lining

Normally all pipes are supplied with centrifugally applied cement mortar lining. Fittings are supplied with manually applied cement mortar lining. The mortar of the lining is composed of cement, sand and water.

Recommendations

Type of cement can be chosen as per the type of water/ effluent.

Water Characteristics	Portland Cement	Sulfate Resisting Cements (incl. Blast furnace slag cement)	High Alumina Cement
Min value of pH	6	5.5	4
Max content (mg/L) of			
- CO ₂	7	15	no limit
- Sulphates (SO ₄)	400	3000	no limit
- Magnesium (Mg++)	100	500	no limit
- Ammonium (NH ₄ +)	30	30	no limit

Advantages

- ✓ Centrifugally applied CML provides higher Hazen William’s C value of 140 compared to 100 for bare metallic pipes.
- ✓ Reduces frictional head loss and pumping cost.
- ✓ CML passivates the pipe wall against corrosion by the alkaline reaction of cement.
- ✓ CML prevents pitting and tuberculation of pipes and stops the production of red water.
- ✓ CML helps to maintain same flow area and co-efficient of friction over a long period of time.



Thickness of the Lining

The normal thickness of the lining and the minimum permissible values are given in the table below

DN (mm)	Thickness (mm)	
	Normal Value	Tolerance
100 - 300	3.5	-1.5
350 - 600	5.0	-2.0
700 - 1000	6.0	-2.5

On contraction of the lining, the formation of minor cracks cannot be avoided. These cracks together with other isolated cracks, which may develop during transportation are acceptable in the standard specifications upto a width of 0.8 mm. These cracks heal up due to formation of new crystals when the pipe surface comes in contact with water.

Seal Coat on Cement Mortar Lining

When specified or prescribed by the customer the cement mortar lining is given a seal coat of asphaltic material. On specific requirement of customer we provide Epoxy Seal Coat over Cement Lining. The purpose of the seal coat is to control leaching of cement into Water.

PU Lining

A new production line has been introduced producing Polyurethane lining in pipe inside following EN 15655. This lining offers excellent chemical and abrasion resistance.

EXTERNAL

PROTECTION

For DI Pipes

Epoxy Coating

Compared to normal bitumen coated pipes it offers :

- More resistance to external galvanic/ soil corrosion in aggressive soil.
- More resistance to external chemical (acid, alkali, organic) attack
- Better adherence to metal surface, hence more durable coating
- Higher scratch resistance and does not peel off in impact
- Good resistance to coating damage during transportation/ handling/laying
- Comes in attractive blue (for water) or red (for sewerage) colour.
- Hence offers much better look and aesthetics

PU Coating

Electrosteel DI pipes are now available with Polyurethane external coating applied as per EN 15189. It offers a holiday free coating systems with excellent impact, chemical corrosion and abrasion resistance.

Zinc/Zinc Aluminium Alloy Coating

The Zinc / Zinc Aluminium alloy coating consists of a metallic Zinc/ Zinc Aluminium alloy layer applied by metallization on the pipe surface. This layer is obtained by the juxtaposition of small droplets of molten Zinc/ Zinc Aluminium alloy on the pipe surface, which is a patented process.

The metallic Zinc or Zinc Aluminium Alloy covered by a finishing layer of a bituminous product or synthetic resin compatible with Zinc. Both layers are applied at the works.

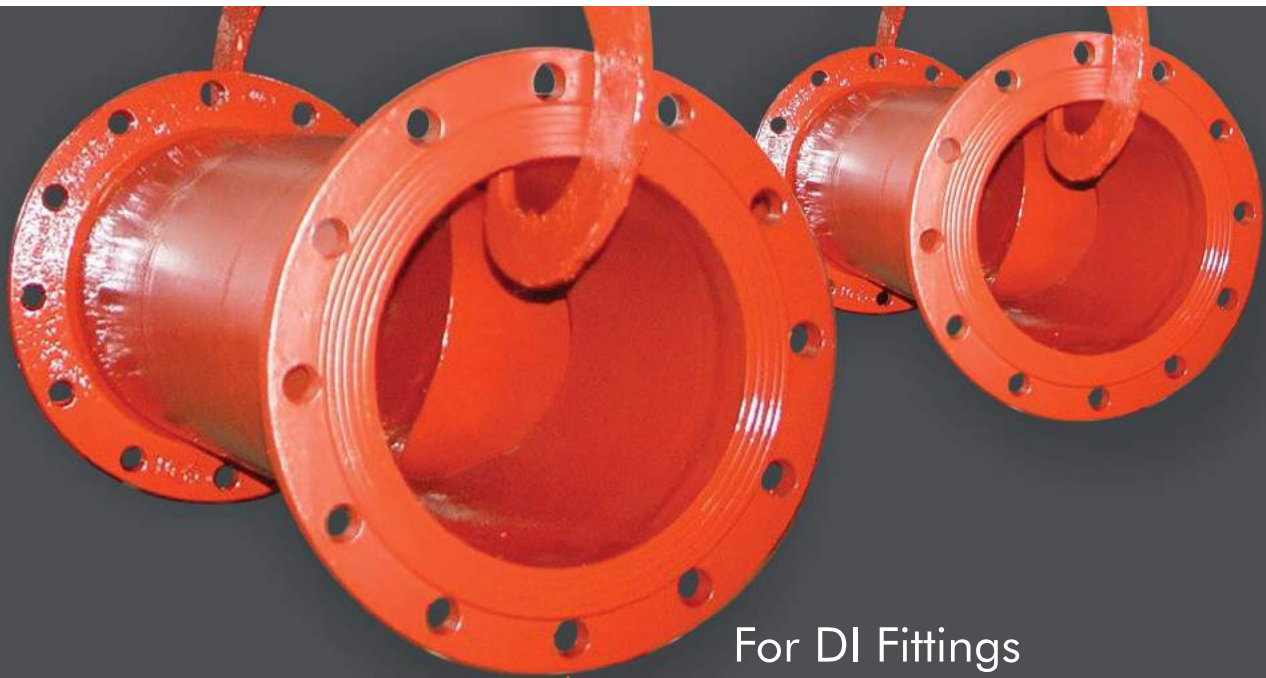
An improved chemical and mechanical stability of the coating is provided by the Zinc Aluminium alloy coating.

The International Standard IS: 8329 / ISO 8179 establishes the main features of Zinc coating as well as suitable methods for checking them.

- Standard 130 gm/m² and Bituminous or Epoxy finishing layer of 70 microns
- As per customer requirement 200 gm/m² of Zinc coating and Bitumen or Epoxy finishing layer of 70 micron
- As per customer requirement 400 gm/m² Zinc Aluminium Alloy (for very corrosive soil) coating with a finishing layer of Bitumen or Epoxy

In case of fittings normally Zinc rich paint coating is applied instead of metallic Zinc coating





For DI Fittings

Polyethylene Sleeving

Loose polyethylene encasement is found to be very effective for protection of Ductile Iron Pipes and Fittings in corrosive environments and widely practiced in USA, Europe and Australia, instead of Zinc coating. Investigation of many field installations, where loose polyethylene encasement has been used as protection for Cast Iron and Ductile Iron pipelines indicates that polyethylene encasement provides, for even highly corrosive test sites, a high degree of protection. The dielectric capability of polyethylene provides shielding for Ductile Iron Pipes and Fittings from stray direct current encountered in the field. When Ductile Iron Pipes are layed with P.E. sleeving, the fittings are also covered with P.E. Sleeving.

Normally Fittings are coated with zinc rich paint covered with a finishing layer of bitumen or epoxy.

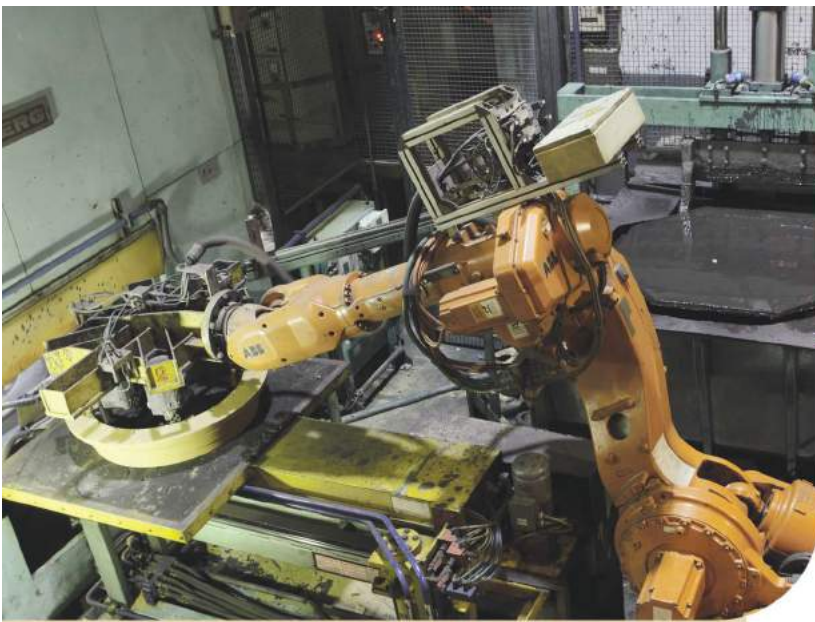
Fusion Bonded Epoxy Coating (FBE)

This is special coating with added advantage. A state-of-the-art automated facility has been created to coat DI Fittings with powdered epoxy by fusion bonding process. This inert coating in attractive colour is suited for aggressive soil condition.

Advantages

1. Gives high gloss and smooth coatings with excellent adhesion.
2. Difficult shapes can be coated evenly.
3. Provides enhanced corrosion resistant properties.
4. A choice of Blue or Red colours for water or sewage applications is available.
5. Film thickness between 200 – 250 micron, can be specified as per the requirement.
6. High film thickness (>250 micron) can also be applied as per customer requirement.





QUALITY

CERTIFICATION



QUALITY

POLICY

- Electrosteel is committed to providing goods and services which meet customers expectations and needs.
- The aim is to achieve "Quality right at the first Time".
- Electrosteel is committed to complying with the requirements and to continually improve the effectiveness of quality management system through teamwork, training and motivation.
- Electrosteel shall formulate Quality objectives for all functions and involve employees in fulfillment of the same.
- The quality policy and the quality objectives will be reviewed for continuing suitability.

Electrosteel has the 'ISI' licenses for Ductile Iron Pipe and Fittings which are now mandatory under Quality order of 2009. Quality consciousness supported by stringent control is a hallmark of Electrosteel's manufacturing process. The quality system is assessed and approved by agencies of International reputation and Quality approvals have been received from various National and International Bodies.



ELECTROSTEEL - TOWARDS A GREENER TOMORROW

- Electrosteel is effectively maintaining the Environmental Management System Standard ISO: 14001 since 2004.
- Electrosteel has established a 12 MW Power Plant at Haldia as a Clean Development Mechanism (CDM) Project. In this project the sensible heat in the waste gas emissions from the Coke Oven Plant and Sponge Iron Plant is utilized for power generation saving appx. 78,000 MT of Carbon Dioxide emissions to atmosphere every year.
- Haldia project is registered as a CDM project with UNFCCC (United Nations Framework Convention for Climate Change) under Kyoto Protocol.
- 92% of the waste water at our plant is recycled and reused.
- Vehicular emission testing machine has been installed at Khardah Works to ensure emission compliance by all incoming heavy vehicles.
- Plantation is a regular activity in all our premises.

SA 8000 Certification

We have the coveted SA 8000 certification for social accountability, which ensures the following:

- Child labour -No engagement of child labour.
- Forced labour - No engagement in forced labour. No lodging of identity papers upon employment.
- Health and Safety – Ensuring Safe and healthy working environment.
- Freedom of association and the right to collective bargaining and right to form and join trade unions.
- Discrimination - No discrimination in hiring, compensation, promotion etc. No sexual harassment.
- Disciplinary practices - No corporal punishment, mental or physical coercion and verbal abuse.
- Working hour-Max.48 hours per week with 1 day-off every 7 days.
- Compensation - Wages shall be at least at the legal minimum requirement or at industry standard.

CORPORATE SOCIAL RESPONSIBILITY

The Company regards social, economic and environmental responsibilities as integral parts of the business. As part of its policy for corporate social responsibility, the Company undertakes a range of activities to improve living conditions of people in the neighborhood of all its plants. Few examples are :

- a) Development, repair, renovation and extension of classrooms of local Institutes.
- b) Rewarding good & bright students.
- c) Financial assistance to local organizations to pursue their sports activities.
- d) Health care of local inhabitants through charitable dispensary and donation for treatment.
- e) Organize sports activities involving local schools and clubs at District level with an aim to promote sports activities in the District.
- f) Giving opportunity to local un-employed youth to develop entrepreneurship by allowing local supply, through small contracts.
- g) Organizing Cultural Programmes involving local residents.



ESTABLISHMENTS

Head Office

Electrosteel Castings Limited
GK Tower, 19 Camac Street
Kolkata - 700 017, India
Phone : +91-33-2283-9990/7103-4400
Fax : +91-33-2289/4337-40, 2290-2565/2882

Production Units

KHARDAH (WEST BENGAL)
30, B. T. Road, Khardah, P.O. Sukchar
Dist. 24 Parganas (N)
Pin : 700 115, West Bengal, India
Phone : +91-33-7101-4300/4450
Fax : +91-33-7101-4504, 2553-1893

ELAVUR (TAMIL NADU)
Gummidipoondi Taluk, P.O. Elavur,
Dist. Chengai MGR
Pin : 601 211, Tamil Nadu, India
Phone : +91-4121-22255/22803

HALDIA (WEST BENGAL)
Vill Kasberia, P.O. Shibramnagar
Haldia, Dist. Purba Medinipur
Pin : 721 635, West Bengal, India
Phone : +91-3224-277394/721
Fax : +91-3224-278107

www.electrosteel.com