Jai Balaji Group

DUCTILE IRON PIPE

CM/L-5496181

Product Catalogue





Harnessing a combination of corporatization and entrepreneurship, Jai Balaji Group has emerged as one of the top ten largest manufacturer of Iron and Steel in the country.

Our production facilities are spread in the states of West Bengal, Chhattisgarh, Orissa and Jharkhand, manufacturing a chain of value added products including.

- DRI (Direct Reduced Iron)
- Foundry and Steel Grade Pig Iron
- Ferro Alloys
- Alloy, Carbon and Mild Steel Billets and Rounds
- Reinforcement Steel TMT Bars and Wire Rods
- Ductile Iron Pipes

We have a passion for achieving excellence in all our endeavors; where it is adding more value to our existing products or diversifying into other areas of business. Having established our might in the Iron and Steel Industry, we have been generating Green Power in our plants and started work to diversify into Mining and Cement Industries. Our endeavor has always been to generate more direct/ indirect employment and contribute to the development of community in the area where we operate.


Certificate of Registration

ISO 9001:2008


Certificate of Registration

ISO 14001:2004

WHAT IS DUCTILE IRON?

Ductile Iron is an improvement to Cast Iron that have served the water industry with distinction through the centuries. The first Ductile Iron pipe was produced experimentally in 1948. Minor but significant changes in chemistries and processing result in physical differences at the micro-structure level that result in a vastly improved fracture toughness and ductility making Ductile Iron substantially more resistant to damage from impact or concentrated loads.

Although both materials are classified as Cast Iron, in today's terminology, the older material is identified as Grey Iron and the newer material as Ductile Iron. During the solidification stage of the casting process, the carbon, sometimes called graphite, comes out of solution and collects in numerous small pools. The shape of these pools of carbon is a major factor in the mechanical properties of the material.

These photomicrographs compare the microstructures of Grey Iron and Ductile Iron.

Ductile Iron

Cast (Grey) Iron

In Grey Iron, these pools are in the form of flakes. That is, they are generally in an elongated, flat form ending in sharp points. The carbon content and flake graphite form give Grey Iron good machinability and corrosion-resistant properties. The flakes, however, break up the continuity of the metal, and the sharp points are stress concentrators at the microscopic level. Both of these characteristics limit the ductility and tensile properties of the material.

In Ductile Iron, the majority of the pools of graphite are in the form of spheroids. This distinctive shape significantly reduces the occurrence of points of stress concentration. Changing the carbon structure from flake to spheroidal form and reducing the phosphorus content results in an exceptionally strong material with good machinability, high-impact and corrosion resistance, and excellent beam strength. For these reasons, Ductile Iron is an ideal material for transporting water, wastewater, ash slurry, coal slurry etc.

Mechanical Properties of Ductile Iron Pipe

Tensile Strength	420 MPa Minimum
Elongation at Break	10% Minimum
Modulus of Elasticity	1.7x1010 kg/m²
Hardness	230 BHN Maximum
Density	7050 kg/m³
Bending / Beam Strength	Over 200 MPa
Crush Load and Impact Load	Can take up Huge Impact Load (Charpy over 0.713)
Bursting Strength (Minimum)	Factor of Safety against Bursting is 8 to 10

Advantages of Ductile Iron Pipe

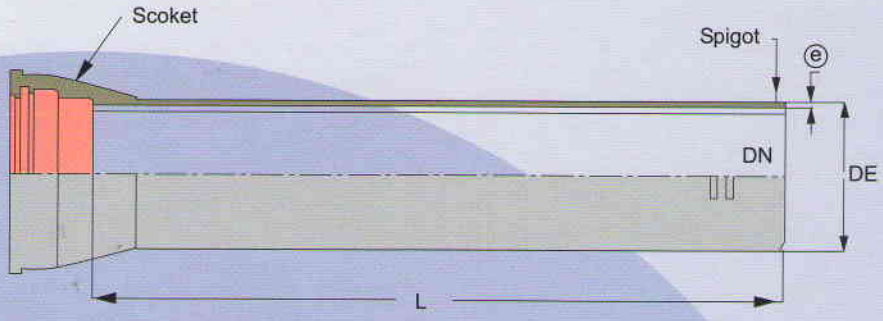
- Strongest pipe - high tensile and beam strength
- High ring stiffness - takes care of high soil and traffic load
- Withstands severe crushing load and high impact load
- Can endure high working pressure
- DI Pipe is hydrotested at 50 kg/cm² at works. Provide complete safety against surge (water hammer)
- Speedy laying / installation due to push-on jointing system
- Light weight and not brittle - easier to handle
- Welding is possible
- Centrifugally applied Cement Mortar Lining offers a smooth surface and gives a higher Hazen William's C value of 140
- Lesser friction-loss, offers impressive energy savings
- Inherently corrosion resistant - also given extra protection by applying inside cement mortar lining and outside coating of zinc with finishing layer of bitumen / epoxy

CLASSIFICATION, DIMENSIONS AND OTHER KEY TECHNICAL

Wall Thickness

Ductile Iron Pipes have been classified as K7, K8, K9, K10 etc depending on service conditions and wall thickness

Nominal Diameter, External Diameter and Wall Thickness



Nominal Diameter (DN) in mm	External Diameter (DE) in mm	Barrel Wall Thickness (e) in mm K7	K9	Tolerance on External Diameter
100	118	5.0	6.0	+1/-2.8
150	170	5.0	6.0	+1/-2.9
200	222	5.0	6.3	+1/-3.0
250	274	5.3	6.8	+1/-3.1
300	326	5.6	7.2	+1/-3.3
350	378	6.0	7.7	+1/-3.4
400	429	6.3	8.1	+1/-3.5
450	480	6.6	8.6	+1/-3.6
500	532	7.0	9.0	+1/-3.8
600	635	7.7	9.9	+1/-4.0
700	738	9.0	10.8	+1/-4.3
800	842	10.4	11.7	+1/-4.5
900	945	11.2	12.6	+1/-4.8
1000	1048	12.0	13.5	+1/-5.0

MANUFACTURING PROCESS

Raw Material

Pipe Casting | Annealing | Zinc Coating | Cement Mortar Lining

INTERNAL LINING

All Ductile Iron Pipes are supplied with inside cement mortar lining. The lining is applied by using a high - speed centrifugal process. By using this method, excellent quality control of the cement-mortar lining is maintained. The cement linings produced are dense, smooth, uniform, well bonded to the pipe wall, and offer very little frictional resistance to the flow of water. The mortar of the lining is composed of cement, sand and water.

Advantage of Cement Mortar Lining (CML):

- Provides higher Hazen William's C value. DI Pipe has a C value of 140 in comparison to 100 for bare metallic pipes and 110 for projection method cement mortar lined metallic pipes
- Higher C value reduces pumping costs
- Permanently increases water carrying capacity
- Prevents pitting and tuberculation of metallic pipes and there by stops chocking of pipe and the production of red water
- Prevents abrasion of pipe wall and thus increases life of pipe

Thickness of Cement Mortar Lining :

DN in mm	Thickness in mm	
	Nominal Value	Tolerance
100 to 300	3.0	-1.5
350 to 600	5.0	-2.0
700 to 1200	6.0	-2.5

MANUFACTURING PROCESS

Blast Furnace

Induction Furnace

Magnesium Converter

Core Making

Bitumen Coating

Finishing

Stacking

Despatch

EXTERNAL COATING

Zinc Coating

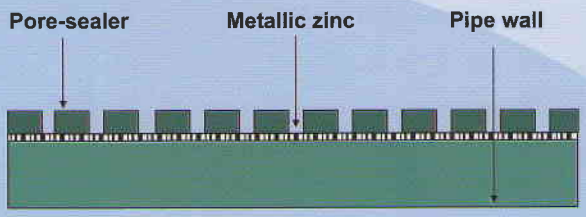
The coating materials are metallic zinc with purity of at least 99% by mass. The metallic zinc coating is applied by a spraying process in which metallic zinc material is heated to molten state and projected in small droplets by spray gun onto the pipe surface. The average mass of zinc coating is 130gm/m² minimum.

Advantage of Zinc Coating

Zinc metallization is an active protection due to the galvanic effect of the zinc/iron electrochemical couple. Its mechanism is two fold :

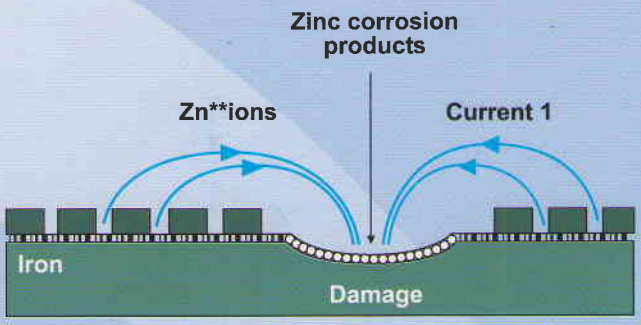
Formation of a stable protective layer:

In contact with the surrounding soil, the metallic zinc slowly transforms into a dense, adherent, impermeable and continuous zinc salts. This acts as a protective barrier. The pore sealer, whilst permitting galvanic protection and self-healing, favours the formation of a stable and insoluble layer of zinc conversion products.



Self-healing of damage:

One of the particular features of the external zinc coating is its ability to restore the continuity of the protective layer where small areas of local damage exist. The Zn++ ions migrate through the pore sealer to plug the damage and then convert into stable, insoluble zinc corrosion products.



FINISHING LAYER

After metallic zinc coating the pipe is given a finishing layer of bituminous paint or synthetic resin (epoxy) compatible with zinc coating.
The mean dry film thickness of the finishing layer is 70 µm.

QUALITY MEASURES

Analysis of Raw Material

Chemical Composition Testing by Spectrometer

Micro Structure by Inverted Metallurgical Microscope

PE SLEEVING

Polyethylene sleeving is a tubular film of low density polyethylene slipped over and snugly fitted to a pipe at the time of laying. It is used to supplement to the basic pipe coating (metallic zinc + bituminous paint / epoxy coating) in certain cases of highly corrosive soils. Advantages of polyethylene encasement include:

- Relatively inexpensive
- Easy to install
- Does not require maintenance or monitoring
- Easy to repair if damaged

JOINTING SYSTEM – PUSH ON JOINT

Clean the socket and spigot

Insert the gasket into the socket

Apply lubricant onto the inside surface of gasket

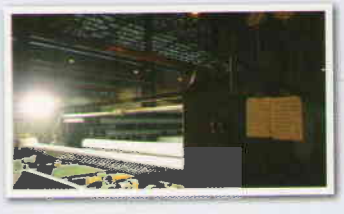
Apply lubricant to the spigot end

Maintain straight alignment

Guide the spigot into the socket & push

Tensile Strength Test by UTS Machine

Hardness Testing by Brinell Hardness Testing Machine



Hydro Testing in HPTM

Dimensional Checking

HYDRAULIC WORKING PRESSURE

DN (mm)	Allowable Operating Pressure (Excluding Surge) in MPa		Allowable Maximum Operating Pressure (Including Surge) in MPa	
	K7	K9	K7	K9
100	0.8	6.4	1.25	7.7
150	0.8	6.4	1.25	7.7
200	0.8	6.2	1.25	7.4
250	0.8	5.4	1.25	6.5
300	0.8	4.9	1.25	5.9
350	0.8	4.5	1.25	5.4
400	0.8	4.2	1.25	5.1
450	0.8	4.0	1.25	4.8
500	0.8	3.8	1.25	4.6
600	0.8	3.6	1.25	4.3
700	0.8	3.4	1.25	4.1
800	1.0	3.2	1.5	3.8
900	1.0	3.1	1.5	3.7
1000	1.0	3.0	1.5	3.6

JAI BALAJI INDUSTRIES LIMITED

Registered Office:
5, Bentinck Street, Kolkata - 700001, West Bengal, India
Phone : +91 33 2248 8173, 2248 9808, Fax : +91 33 2243 0021, 2242 6263

Marketing Office:
23, R.N. Mukherjee Road, Kolkata - 700001
West Bengal, India
Phone : +91 33 2231 3660 - 63
Fax : +91 33 2231 3683
E-mail : mkt.dip@jaibalajigroup.com

Works:
Unit - III, (DI Pipe Plant) Durgapur
Village - Banskopa, PO - Rajbandh
Dist - Burdwan, West Bengal - 713212, India
Phone : +91 343 253 2651 - 52
Fax : +91 343 253 2653

Mumbai Office:
822, 8th Floor, Corporate Avenue
Sonawala Road, Goregaon East
Mumbai - 400063, Maharashtra, India
Phone : +91 98197 40916, +91 90211 34891
E-mail : mumbai@jaibalajigroup.com

Website : www.jaibalajigroup.com

New Delhi Office :
Flat No. 1401 & 1402, Nirmal Tower
14th Floor, 26, Barakhamba Road
New Delhi -110001, India
Phone : +91 11 4362 0220 - 21
Fax : +91 11 4362 0219
E-mail : delhi@jaibalajigroup.com

Hydrabad Office:
2nd Floor, D.K Road, Ameerpet
Hyderabad - 500016, Andhra Pradesh, India
Phone : +91 90141 78075
E-mail : hydrabad@jaibalajigroup.com

Durg Office:
Borai Industries, Growth Centre, Ramsada
Durg - 491001, Chhattisgarh, India
Phone : +91 788 261 7248, +91 93037 34435
E-mail : purchase.durg@jaibalajigroup.com

Ranchi Office :
NIPL, 1st Floor, Pustak Bhawan Complex
Court Road, Ranchi - 834001, Jharkhand, India
Phone : +91 651 220 3295
E-mail : mkt.dip@jaibalajigroup.com