

TEK FLO[®] PIPES

Ductile Iron
Pipe
&
Fittings



Specification
EN545 - 2006
K8 - K9



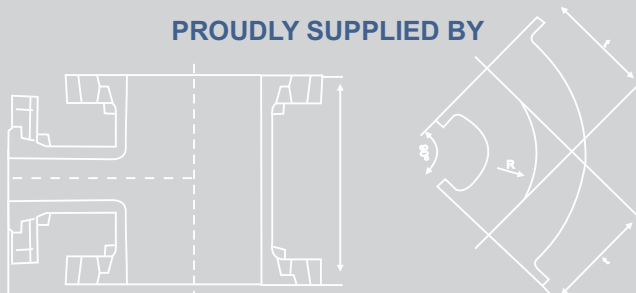
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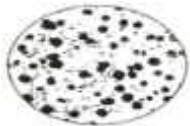
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Product Introduction

Centrifugally Cast Ductile Iron Pipe is a pipe made of spheroidal graphite cast iron by a centrifugal spinning process. The pipes, which can convey many fluids such as water, oil and petroleum, are widely used in various pipeline projects.

Possessing high strength, good toughness and better corrosion resistance than steel, ductile iron pipe is the ideal substitute for gray cast iron and steel pipe. In addition Ductile Iron pipes are produced with an even wall thickness, high dimension accuracy, smooth surface finishing and remarkable mechanical properties.

Microstructure for Ductile Iron, Steel and Gray Cast Iron:



Ductile Iron Pipe



Steel Pipe

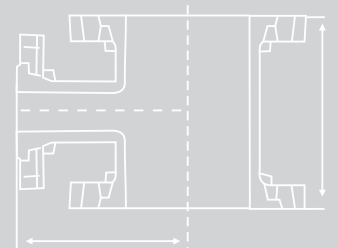
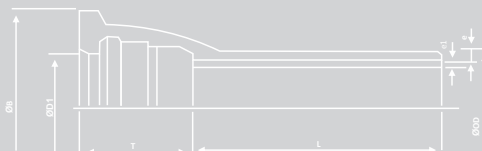
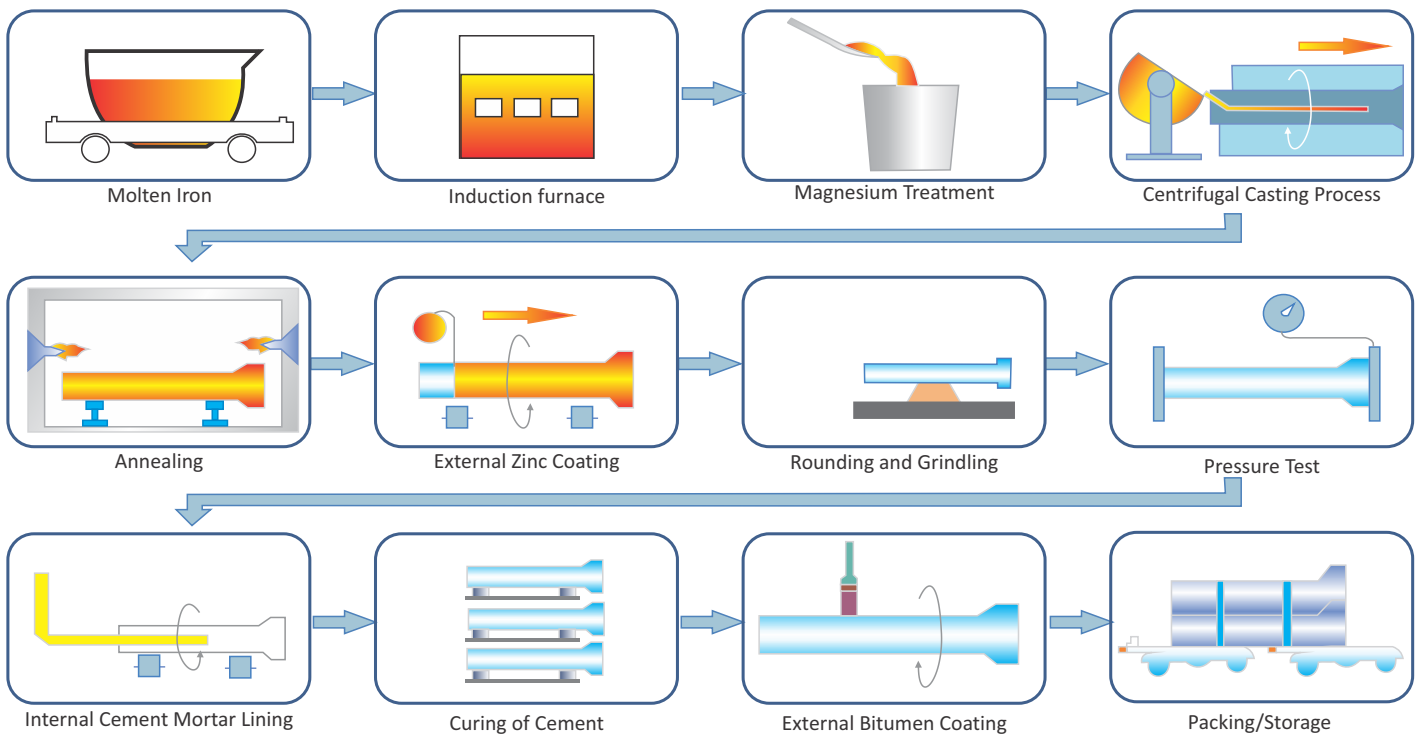


Gray Cast Iron Pipe

Type of Pipe	Mechanical Properties		
	Tensile Strength	Elongation (%)	Hardness (HB)
Ductile Iron Pipe	$\geq 420 \text{ N/mm}^2$	(DN ≤ 1000) ≥ 10 (DN > 1000) ≥ 7	≤ 230
Grey Cast Iron Pipe	150 - 260 N/mm^2	Negligible	≤ 231
Steel Pipe	$\geq 400 \text{ N/mm}^2$	≥ 18	Approx. 140

Manufacturing Process

Ductile Iron pipes are manufactured by a centrifugal method in accordance to ISO 2531 or BS EN 545 standards, with an internal cement mortar lining to increase flow coefficients. An external metallic zinc and bitumen coating is applied to further increase the lifespan of the pipes.



Internal Protection

Ductile iron pipes are lined internally as standard with cement mortar which is centrifugally applied in accordance to ISO 4179 and BS EN545. The mortar lining has a smooth surface and therefore enhances flow and reduces head loss. The roughness coefficient, Colebrook formula, for an individual pipe is $K=0.03$ OR IN THE Manning- Strickler formula is the flow coefficient 105. The lining provides a chemical barrier to the corrosion of the ductile iron wall.

Crazing (drying shrinkage), or slight cracking may occur during transport, storage or laying. This heals up due to the combined effects of two reactions:

- Swelling (rapid) of the mortar in contact with water
- Hydration (slow) of the cement constituents

A High Alumina cement mortar lining is also available for aggressive sewer applications handling a Ph between 4 & 12.

Ductile Iron pipes may on request be supplied with the following internal liners:

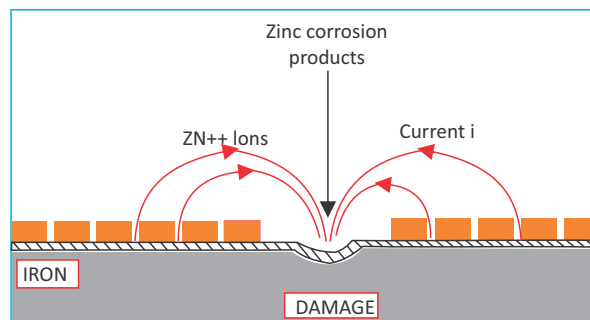
- Epoxy Lining
- Ceramic Epoxy Lining

External Protection

Ductile iron pipes are externally coated as standard with a metallic zinc (not less than 130g/m²) and a bitumen finishing layer in accordance with ISO 8179 and BSEN 545. These standard external linings are suitable for 90% of soil conditions.

With time the zinc coating transforms into a dense impermeable protective barrier that has the ability to restore the continuity of the protective layer through the migration of zinc ions in areas where damage may exist. This unique feature makes the zinc work as a Active coating, capable of restoring the protective layer at a damaged point , through Galvanic protection and then operate as a dense coherent passive coating.

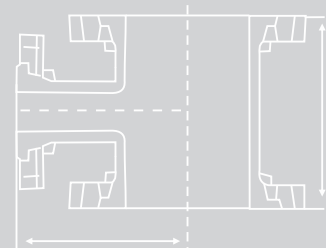
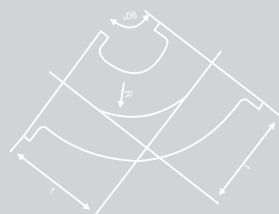
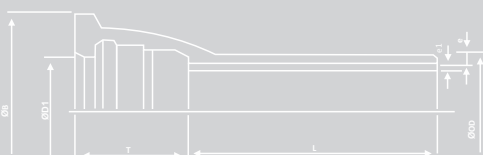
Zinc corrosion diagram



The bitumen coating provides both protection against cathodic corrosion and a suitable environment for the zinc coating to transform into a impermeable coating. Cathodic protection on Ductile iron pipes is not used nor recommended from a technical and economical point of view. Ductile iron pipes are insulated by means of rubber gaskets and insulated from each other with no continuity for current to flow.

Situations where the zinc based coating can not provide long-term protection for example acidic soils or soils contaminated by certain wastes, organic or industrial effluent the following special coatings should be considered:

- Polyethylene Sleeving
- Epoxy Coating
- Polyurethane Coating



Dimensions and Pressure Ratings

PFA – Allowable Operating Pressure

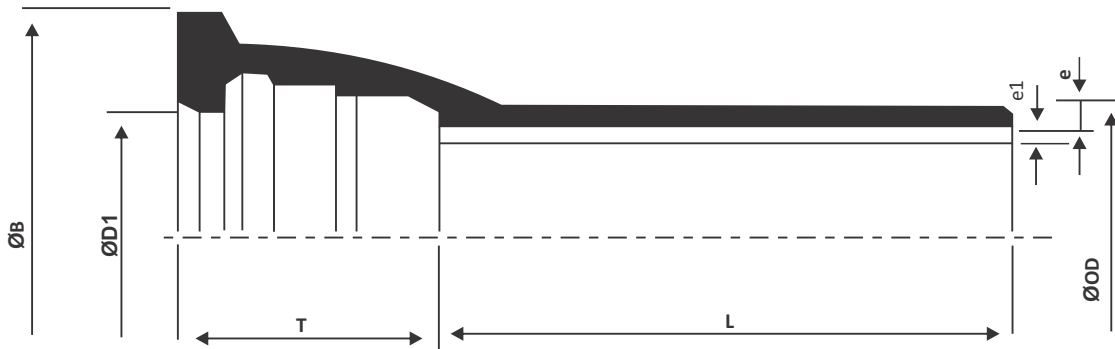
Internal pressure, excluding water hammer, that a component can safely and continuously with stand under hydraulic service

PMA – Allowable Maximum Operating Pressure

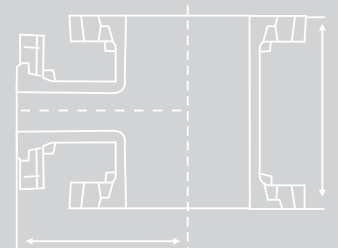
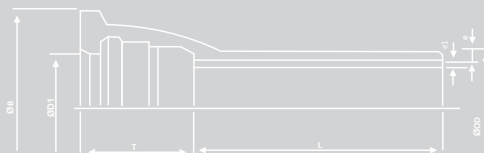
Maximum internal pressure, including water hammer, that a component can safely withstand during service

PEA – Allowable Test Pressure

Maximum hydraulic pressure that can be applied on site to a newly laid pipe component



DN	L	OD	DI	B	NC	Class K8						Class K9					
						T	e	PIPE MASS	PFA	PMA	PEA	T	e	PIPE MASS	PFA	PMA	PEA
						mm	mm	Kg/m	Bar	Bar	Bar	mm	mm	Kg/m	Bar	Bar	Bar
80	6	98	101	168	3	*	*	*	*	*	*	84	6	15	64	77	96
100	6	118	121	189	3	*	*	*	*	*	*	88	6,1	18,5	64	77	96
150	6	170	173	243	3	94	6	26	50	60	65	94	6.3	27.5	64	77	96
200	6	222	225	296	3	100	6	35	50	60	65	100	6.4	37	62	74	79
250	6	274	277	353	3	105	6	43	41	49	54	105	6.8	48	54	65	70
300	6	326	329	410	3	110	6.4	55	36	43	48	110	7,2	61	49	59	64
350	6	378	381	465	5	110	6.8	72	32	38	43	110	7,7	80.8	45	54	59
400	6	429	432	517	5	110	7.2	86	30	36	41	110	8.1	95.5	42	51	56
450	6	480	483	575	5	120	7.6	102	29	35	40	120	8.6	113	40	48	53
500	6	532	533,5	630	5	120	8	117.5	28	34	39	120	9	131	38	46	51
600	6	635	638	739	5	120	8,8	153	26	31	36	120	9,9	170	36	43	48
700	6	738	741	863	6	150	9.6	197.5	24	29	34	150	10.8	218	34	41	46
800	6	842	845	974	6	160	10.4	242.5	23	28	33	160	11.7	267	32	38	43
900	6	945	948	1082	6	175	11.2	291	23	28	33	175	12.6	320	31	37	42
1000	6	1048	1051	1191	6	185	12	343.5	22	26	31	185	13.5	378	30	36	41
1200	6	1255	1258	1412	6	215	13.6	464	21	25	30	215	15.3	506	28	34	39
1400	6	1462	1465	1592	9	-	*	*	*	*	*	239	17.1	694	28	33	38
1500	6	1565	1568	1710	9	*	*	*	*	*	*	265	18	779	27	32	37
1600	6	1668	1671	1816	9	*	*	*	*	*	*	265	18.9	898	27	32	37
1800	6	1875	1878	2032	9	*	*	*	*	*	*	275	20.7	1058	26	31	36
2000	6	2082	2085	2253	9	*	*	*	*	*	*	290	22.5	1262	26	31	36



VARIOUS JOINTING SYSTEMS



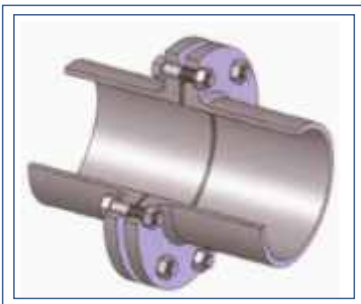
FLEXIBLE PUSH-ON JOINT

The push-on Flexible joints are most common jointing system with high reliability. Push-on flexible joints are assembled with synthetic rubber gaskets which gets compressed when the spigot is inserted into the socket. The joints becomes tighter with the increase in internal pressure of water. It is an easy to join system which allows rapid low cost laying even in wet condition.



MECHANICAL JOINT

In this kind of flexible joint, sealing is obtained by applying pressure to the gasket by mechanical means, via through a separate gland. When bolted with the pipe, the gland exerts pressure on the sealing rubber gasket and makes the joint leak proof.



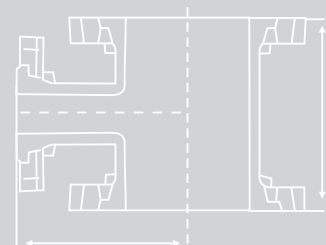
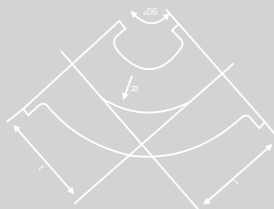
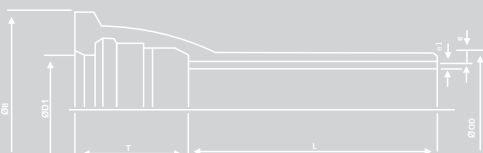
FLANGED JOINTS

In any pipeline system there are certain lengths, which are exposed and are not buried under the earth. These lengths need to be tied down to pillars to avoid movements. For this kind of application Flanged joints are used. Flanged joints are also used for vertical pipelines and inter connection of utilities



RESTRAINED JOINT



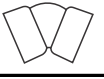





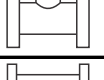
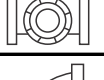





Restrained joints are special joints, which can take care of axial thrust. Flexible Restrained Joints are also used in high slope or where horizontal / vertical ground movement is anticipated. These joints are necessary on fittings and a few pipes adjacent to the fittings. Restrained joints eliminate use of concrete anchor blocks, which are costly and delay the progress of laying.



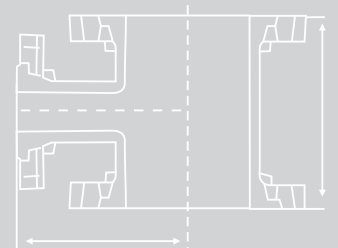
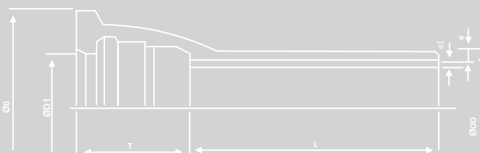
Ductile Iron Pipe Fittings

Ductile iron pipe can be supplied with a wide selection of fittings to suit most applications. Fittings without branches conform to class K12. Ductile iron fittings with branches conform to class K14.

Pressure ratings for the ductile iron socket joint fittings (PFA, PMA & PEA) are equal to that of the class of K9 pipes. Fittings are supplied as standard with an internal cement mortar lining in accordance to BSEN545 and ISO 2531

	90° SOCKETED BEND	DN80 to DN1800
	45° SOCKETED BEND	DN80 to DN1800
	22.5° SOCKETED BEND	DN80 to DN1800
	11.25° SOCKETED BEND	DN80 to DN1800
	SOCKETED TEE (EQUAL AND UNEQUAL)	DN80 to DN1800
	SOCKETED REDUCER	DN80 to DN1800
	SOCKETED TEE WITH FLANGED BRANCH	DN80 to DN1800
	SOCKETED LEVEL INVERT TEE	DN80 to DN1800
	FLANGED TEE	DN80 to DN1800
	FLANGED LEVEL INVERT TEE	DN80 to DN1800
	90° FLANGED BEND	DN80 to DN1800
	45° FLANGED BEND	DN80 to DN1800
	22.5° FLANGED BEND	DN80 to DN1800
	11.25° FLANGED BEND	DN80 to DN1800
	FLANGED REDUCER	DN80 to DN1800

Note: Flange drilling to PN10, PN16, or PN25

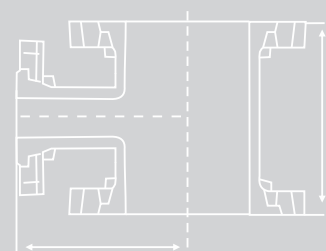
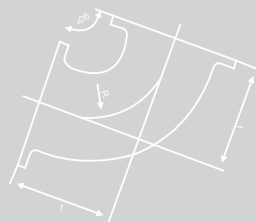
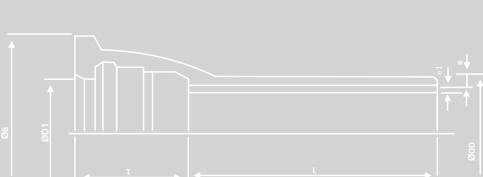


Relevant Standards

Please note that the recommendations in this catalogue only highlights the important points of the standards. Customers should study the following standards thoroughly for the selection specification, installation and testing of Ductile Iron Pipe

{ [STANDARD	DESCRIPTION
1	BS EN 545	Ductile iron pipes, fittings, accessories and their joints for water or gas applications. and test methods.
2	ISO 2531	Ductile iron pipes, fittings, accessories and their joints for water or gas applications.
3	BS EN 598	Ductile iron pipes, fittings, accessories and their joints for sewerage application requirements and test methods.
4	ISO 7186	Ductile iron products for sewerage applications.
5	BS 3416	Specification for bitumen based coatings for cold application suitable for use in contact with potable water.
6	ISO 8179	Ductile iron pipes : external zinc coating. Part 1: Metallic Zinc with finishing layer. Part 2: Zinc rich paint with finishing layer
7	ISO 4179	Ductile iron pipes for pressure and non-pressure pipelines-centrifugal cement mortar lining-general requirements
8	BS2494	Specification for elastomeric seals for joints in pipe-work and pipelines
9	ISO 4633	Rubber seals-joint rings for water supply, drainage and sewerage pipelines-specification for materials.
10	BS6076	Specification for tubular polyethylene film for use as protective sleeving for buried iron pipes and fittings.
11	ISO 3180	Ductile iron pipes-polyethylene sleeving
12	BS 8010: Sect. 2.1	Pipelines on land : design, construction and installation. Section 2.1 : Ductile Iron.
13	ISO 10802	Ductile iron pipelines-hydrostatic testing after installation
14	ISO 10803	Design method for ductile iron pipes.
15	BS EN 1092 Part 2	Flanges and their joints. Circular flanges for pipes, valves and accessories. PN designated Cast iron flanges.
16	BS EN 1514 Part 1 Part 2 Part 3 Part 4	Flanges and their joints. Dimensions of gaskets for PN-designated flanges Non-metallic flat gaskets with or without inserts. Spiral bound gaskets for use with steel flanges. Non-metallic PTFE envelope gaskets Corrugated, flat or grooved metallic and filled metallic gaskets for use with steel flanges
17	ISO 7005	Metallic flanges-cast iron flanges.

The description and illustrations contained in this catalogue are intended merely to present a general idea of the goods described therein. On account of continual improvement, we reserve the right to change, without prior notice, any of the descriptions, illustrations and data.





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