INTERPLANT STANDARD - STEEL INDUSTRY		
IPSS	**SPECIFICATION FOR CENTRIFUGALLY CAST (SPUN) IRON PRESSURE PIPES FOR WATER, GAS AND SEWAGE** *(Second Revision)*	**IPSS:1-06-003-03**
	Based on IS 1536:1976	Formerly : IPSS:1-06-003-95

0. FOREWORD

0.1 This Inter Plant Standard prepared by the Standards Committee on Pipes, Fittings, Valves and Piping Layout, IPSS 1:6 with the active participation of the representatives of all the steel plants and associated organization in the field was adopted in November 2003.

0.2 This IPSS Standard was first published in year 1983 and was based on IS 1536:1976 (second revision), subsequently revised as IPSS:1-06-003-95 (first revision) in line with IS 1536:1989 (third revision). Now IPSS Standard has been revised on the basis of IS 1536:2001 (fourth revision). This specification covers the requirements of pipes with lead joints and push on joints. The pipe lengths have also been rationalised to 4.0, 4.5, 5.0, 5.5 M against 3.0, 3.5, 3.66, 4.0, 4.5, 5.0, 5.5 & 6.0 M as mentioned in IS.

0.3 This standard is generally based on IS 1536:2001 (fourth revision) for centrifugally cast (spun) iron pressure pipes for water, gas and sewage suitable for both lead joint and push on joint (Tyton) and screwed flanged pipes. For convenience of reference, the clause numbers of Indian Standard for each requirement are given in Appendix-A along with the corresponding matching clauses of this standard.

1. SCOPE

1.1 Centrifugally cast (spun) iron pressure pipes with either socket and spigot ends or flanged ends are suitable for use in steel plants for conveying industrial water, drinking water and water for fire fighting purpose, industrial sewage (excluding phenolic effluents) and uncontaminated return circulation water.

The pipes are also suitable for conveying drinking water in steel plant townships and occasionally used for the pumping mains of sewage pump houses.

1.2 For distribution system inside the plant, pipes upto 300 mm dia shall be used. For the pumpings mains inside the plant pipes upto 600 mm dia shall be used. However, there shall be no restriction of upper limits for use in the township.

2. CLASSIFICATION

2.1 Pipes for both lead joint and push on joint have been classified in this standard as LA, A & B classes according to their thickness. Class LA pipes have been taken as the basis for evolving the series of pipe classifications. Class `A' allow a 10 per cent increase in thickness over LA. `B' class allows a 20 per cent increase in thickness over LA. The characteristics of the pipes are given in Table-1. For special uses, class `C' & `D' may be derived after allowing corresponding increase of thickness of 30 and 40 percent respectively.

3. DIMENSIONS

3.1 The dimensions of the pipes (lead joint and push on joints) shall be as per IS 1536:2001. The broad dimensions for different nominal bore of pipes (lead joint) for class LA, A & B are given in Tables 2 and of pipes (push on joints) are given in Table 3 for guidance only.

3.2 The dimensions of screwed flanged pipes are given in Table-8 & 9.

4. DESIGNATION

4.1 Designation of a centrifugally cast (spun) iron pipes (lead joint) of class A with nominal bore (NB) of 500 mm and length (L) 5.0 m shall be C.I. pipe NB 500 (lead joint) A 5.0 (IPSS:1-06-003-03).

5. TESTS & INSPECTION

5.1 The following tests shall be performed in accordance with IS 1536:2001 and the manufacturer shall supply 2 test certificates of physical properties of the pipes against each batch of production:

a) Mechanical test,
b) Brinell hardness test,
c) Retest, and
d) Hydraulic test.

5.2 Mechanical tests against each batch during the manufacture (as per clause II of IS 1536:2001) shall be carried out. Each batch shall be made up of pipes cast successfully as follows :

Size range (DN)	Batch size
80-130	200 pipes
350-600	100 pipes
700-1000	50 pipes

The ring test shall be conducted on pipes for the sizes upto and including 300 mm NB to conform to the following physical test results. One representative sample test to be carried out against each batch.

Nominal diameter	Modulus of rupture Mpa (Min)
Up to and including 300 mm NB	390

For pipes above 300 mm one representative sample tensile test shall be carried out against each batch to conform to the following physical test results:

Nominal diameter	Tensile strength Mpa (Min)
Over 300 mm NB & Up to and including 600 mm NB	200
Over 600 mm NB	180

For preparation of test samples refer Annexure-B.

5.3 Brinell Hardness Test : Hardness of ring or bars cut from the pipes for each batch measured on the external un-machined surface shall not exceed 230 BHN.

5.4 Re-test : If the test sample representing a batch in the first instance fails, two additional tests shall be made on test pieces selected from two other pipes from the lot. If both the results satisfy the specified requirements the batch representing the lot shall be accepted. Should either of these additional test pieces fail, the lot shall be deemed as not complying with this standard.

In the event of the lot not found conforming to this standard, the same may be reoffered for inspection after re-heat treatment.

5.5 Hydrostatic test : Each pipe shall be tested at works at the following specified test pressure:

a) For lead joint and push on joint centrifugally cast socket and spigot pipes:

Class	Hydrostatic pressure at works, Mpa	
	Upto 600 mm NB	Above 600 mm NB
LA	3.5	1.5
A	3.5	2.0
B	3.5	2.5
C & D	3.5	2.5

b) For centrifugally cast pipes with screwed flanges:

Class	Hydrostatic pressure at works, Mpa	
	Upto 300 mm NB	350 to 600 mm NB
B	2.5	1.6

5.6 Sampling : Sampling criteria for various tests unless specified in the standard shall be as laid down in IS 11606:1986, Method for sampling of C.I. pipes and fittings.

5.7 Rubber gaskets for use with push on joint and that for flanged joints shall conform to IS 5382 and IS 638 respectively. However, the dimensions for the rubber gaskets for use with push on joint shall conform to IS 12820.

6. TOLERANCES

6.1 The tolerances on external diameter of the barrel, the internal diameter of the socket of the pipes with lead and push on joints shall be in accordance with clause 14.1 and 14.2 of IS 1536:2001respectively. (Refer Table-7 of this standard).

6.2 The tolerance on thickness of both lead joint and push on joints pipes shall be as per clause 14.3 of IS 1536:2001, which is as follows :

Dimensions	Tolerance (mm)
Wall thickness	- (1+0.05 e)*
Flange thickness	± (2+0.05 b)
e= Thickness of the pipe wall in mm. b= Thickness of the flange in mm. *= No limit for the plus tolerance is specified.	

6.3 Dimension – Tolerance on length of pipes shall be as follows :

Type of casting		Tolerance (mm)
A	Socket & spigot & plain ended pipes/barrels	± 100
B	Flanged pipes	± 10

6.4 Tolerance on ovality for push on joint shall be as follows:

In case of oval spigot ends (DE) the minor axis is permitted to be less than the minimum allowance dia by value given below :

Nominal dia	Allowable difference between the minor axis and DE (mm)
80-300	1.0
350-600	1.75
700	2.00
750-800	2.4
900-1000	3.5

6.5 Permissible deviation on straightness of the pipes shall be as follows. The pipes shall be straight. The maximum deviation from a straight line in mm shall not be greater than 1.25 times the length (L) in meters of the pipe, thus

$$f\,n < 1.25\,L$$

6.6 Mass for both lead joint and push on joint pipes shall be as per Table 4,5 & 6 for LA, A & B class respectively and tolerance on mass of both lead joint and push on joint pipes shall be as per clause 14.7 of IS 1536:2001 i.e. the permissible tolerances on standard mass of pipe shall be $\pm$ 5 per cent. The pipes of heavier mass than the maximum shall be accepted provided they comply in every other respect with the requirements of this standard.

7. COATING

7.1 Unless otherwise agreed between the purchaser and the manufacturer, all pipes duly inspected shall be coated externally and internally with the same material by dipping in a tar or suitable base bath coating shall not be applied to any pipe unless its surface are clean, dry and free from rust. The coating material shall set rapidly with good adherence and shall not scale off. The coating material when remain in contact with water intended for human consumption shall not deteriorate the quality of water or should not impart any taste or odour.

8. MARKING

8.1 Each pipe shall be stamped or indelibly marked with the following :

a) Manufacturer's name, initial or identification mark,
b) The nominal bore,
c) Class reference
d) Mass of the pipe,
e) The last two digits of the year of manufacture,
f) The number of this Inter Plant Standard, and
g) Type of joint.

9. INFORMATION TO BE FURNISHED BY THE USER DURING PROCUREMENT OF THE PIPES

a) Type of joint (Lead joint or push on joint) and class,
b) Nominal bore (NR),
c) Length of the pipe,
d) Working pressure,
e) Area of use.

10. DEFINITIONS – For the purpose of this standard the following definitions shall apply :

10.1 Pipe – Casting of uniform bore, straight in axis having either socket ad spigot or flanged ends; except for flanged sockets, flanged spigots and collars which are classified as fittings.

10.2 Flange – Flat circular end of a pipe or fitting extending perpendicular to its axis with bolt holes equally spaced on pitch circle diameter.

10.3 Socket – Female end of a pipe where the spigot end of the adjacent pipe is fitted.

10.4 Spigot – Male end of a pipe.

10.5 Gasket – Sealing component of a joint.

10.6 Push on joint – Connection between the ends of pipes in which a rubber gasket is used to effect a seal.

10.7 Flanged joint – Joint between two flanged ends.

10.8 Nominal size (NB) – Numerical designation of size which is common to all components of a piping system. It is a convenient round number for reference purpose.

10.9 Ovality – Out of roundness of a pipe section.

11. SURFACE CONDITON AND REPAIR

11.1 The pipes shall be sound and free from defects and surface imperfections which could impair their compliance with the requirements of this standard. Pipes showing small imperfections which result from the method of manufacture and which do not affect the serviceability, shall not be rejected on that account alone. Repairing of defects by cold weld or epoxy putty may be carried out to such minor defects provided that the repair pipes comply with all the other requirements. Minor defects upto 100 mm^2 area can be categorised as salvagible, thickness of pipe at section of such defects, shall however, not be less than 85 per cent of the nominal wall thickness (i.e. depth of the deformitive shall not exceed 15 per cent of the wall thickness). Such defects shall not be more than 1 No. per length of the pipe.

12. REFERENCE

12.1 The following Indian Standards contain provisions which through reference in this text, constitute provisions of this standard. All standards are subject to revisions, however, most recent editions of the standards are indicated below :

Sl No.	Indian Standard No.	TITLE
1	1387:1993	General requirements for supply of metallurgical materials (second revision)
2	1608:1995	Mechanical testing of metal – tensile testing (second revision)
3	5382:1985	Rubber sealing ring for gas mains, water mains and sewer (first revision)
4	11606:1986	Method of sampling of cast iron pipes and fittings
5	12820:1989	Dimensional requirements of rubber gaskets for mechanical joints and push on joints for use with cast iron pipes and fittings for carrying water, gas and sewage.
6	13382:1992	Cast iron special for mechanical and push on flexible joints for pressure pipelines for water, gas and sewage.

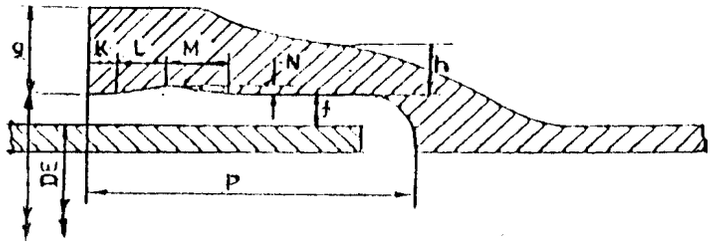
TABLE 1
CHARACTERISTICS OF C.I. PIPES
(Clause 2.1)

Hydrostatic test pressure and hydraulic working pressure for both lead and push on joint pipes & flanged pipes

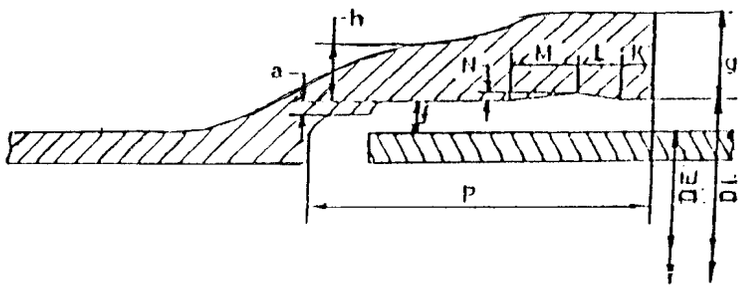
Nominal diameter (NB)	Description	Hydrostatic test pressure of works (Mpa)	Suggested max. hydrostatic pressure at site (Mpa)	Suggested max. working pressure (inclusive of surge) (Mpa)
	Spigot & socket spun pipe			
80-600	For class LA	3.5	1.6	1.0
80-600	For class A	3.5	2.0	1.25
80-600	For class B	3.5	2.5	1.6
	Spigot & socket spun pipe			
700-1050	For class LA	1.5	1.5	1.0
700-1050	For class A	2.0	2.0	1.2
700-1050	For class B	2.0	2.5	1.5

1 Mpa = 10 kg/cm^2

TABLE 2
DIMENSIONS OF SOCKETS AND SPIGOTS OF PIPES (LEAD JOINT)
(Clause 3.1)



a = 3 + 0.001 DN
g = 20 + 0.03 DN
h = 8 + 0.025 DN
f = 9 + 0.003 DN

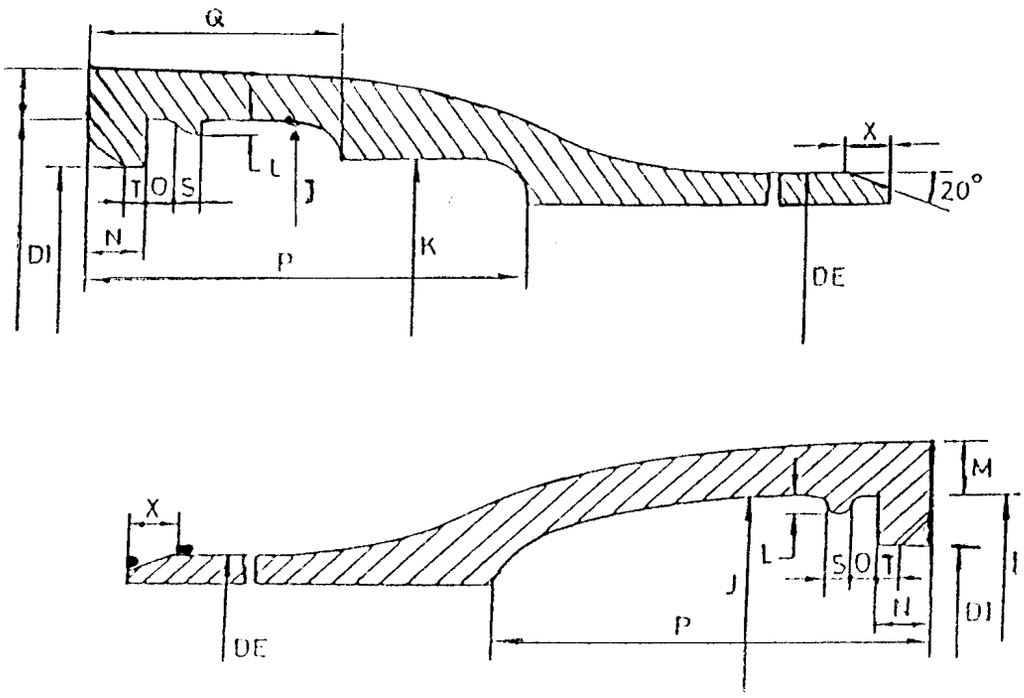


All dimensions in millimetres

Nominal diameter	Barrel	Socket dimensions									Joint thick-ness
DN mm	DE	DI	P	g Min	h Min	a (Optional)	K	L	M	N	f
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
80	98	116	84	22.5	10.0	3.0	8.5	9	14	3	9.0
100	118	137	88	23.0	10.5	3.0	8.5	9	14	3	9.5
125	144	163	91	24.0	11.0	3.0	8.5	9	14	3	9.5
150	170	189	94	24.5	12.0	3.0	8.5	11	16	3	9.5
200	222	241	100	26.0	13.0	3.0	8.5	12	17	3	9.5
250	274	294	103	27.5	14.5	3.5	8.5	14	18	3	10.0
300	326	346	105	29.0	15.5	3.5	8.5	14	18	3	10.0
350	378	398	107	30.5	17.0	3.5	8.5	14	19	3	10.0
400	429	449	110	32.0	18.0	3.5	8.5	15	20	3	10.0
450	480	501	112	33.5	19.0	3.5	8.5	18	22	3	10.5
500	532	553	115	35.0	20.5	3.5	8.5	20	24	3	10.5
600	635	657	120	38.0	23.0	3.5	8.5	22	25	3	11.0
700	738	760	122	41.0	25.5	3.5	8.5	24	26	3	11.0
750	790	813	123	42.5	27.0	4.0	8.5	25	28	3	11.5
800	842	865	125	44.0	28.0	4.0	8.5	25	28	3	11.5
900	945	968	128	47.0	30.5	4.0	8.5	27	30	3	11.5
1000	1048	1072	128	50.0	33.0	4.0	8.5	28	32	3	12.0

Notes :
1. Dimensions K, L, M and N are for guidance only.
2. Dimensions figures 'g' and 'K' do not effect interchangeability, they only indicate minimum permissible thickness.
3. For alternate design L = M.

TABLE 3
DIMENSIONS OF SOCKETS & SPIGOTS FOR PIPES FOR PUSH-ON- JOINT
(Clause 3.1)



All dimensions in millimetres

Nominal diameter	Barrel		Socket dimensions											
DN mm	DE	X Min	DI	P	Q	I	J	K	N Min	O	S	T	L	M Min
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
80	95	9	99	89	52	121	116	102	12	5.5	5	4	3	10.8
100	115	9	119	92	52	141	136	122	12	5.5	5	4	3	11.3
125	141	9	145	94	52	167	162	148	12	5.5	5	4	3	12.0
150	167	9	171	94	52	193	188	174	12	5.5	5	4	3	12.7
200	219	9	223	102	60	248	242	226	15	6.5	6	5	3.5	14.0
250	271	9	275.5	106	62	299	296	278	15	6.5	6	5	3.5	15.4
300	323	9	328	110	67	355	351	331	17	8.0	7	5	4	16.7
350	375	14	380.5	110	67	407	403	383	17	8.0	7	5	4	18.1
400	426	14	431.5	112	74	461	454	435	19	9.0	8	5	4.5	19.4
450	477	14	482.5	112	74	512	508	485	19	9.0	8	5	4.5	20.8
500	529	14	535	117	81	567	563	538	21	10.0	9	5	5	22.1
600	632	14	638	125	86	673	669	642	21	10.0	10	5	5	20.8
700	735	15	742.5	138	88	780	774	745	21	11.0	10	5	5	25.0
750	787	15	795	143	91	834	827	797	21	11.0	10	5	5	27.0
800	839	15	846.5	143	91	886	879	850	22	11.0	10	5	5	28.0
900	942	15	949.5	143	91	989	985	953	22	12.0	11	6	6	28.0
1000	1045	19	1052	143	91	1092	1088	1056	22	12.0	11	6	6	30.0

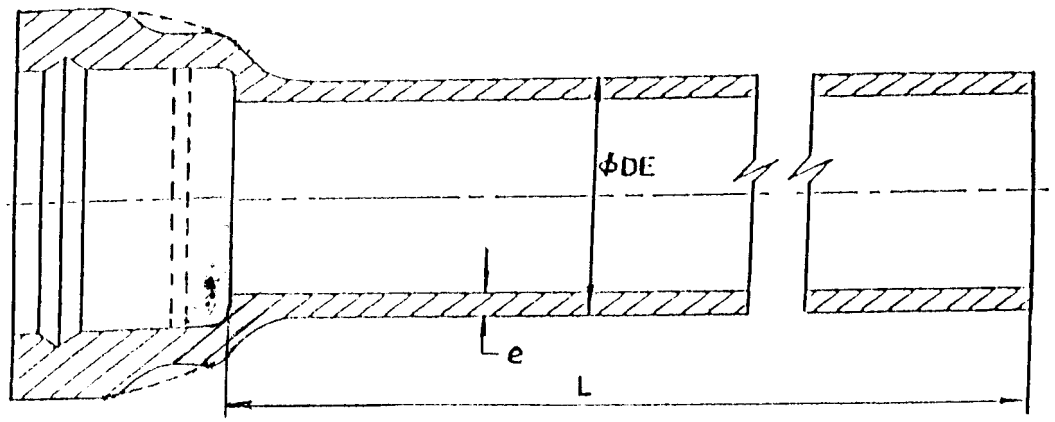
Notes :

1. Dimensions S, T and L are for guidance only.
2. For noinal diamters DN 600 and above the sockets may be without centering ring as in the alternative sketch given above.

TABLE 4

SOCKET & SPIGOT PIPES

(Clause 6.6)



e = 10/12(7 + 0.02 DN)

Nominal diameter	Barrel					Total Mass for one working length in kg			
DN mm	DE Lead joint mm	DE Push on joint mm	e mm	Mass for one meter kg	Socket mass kg	4 m	4.5 m	5 m	5.5 m
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
80	98	95	7.2	14.7	5.5	64	-	79	-
100	118	115	7.5	18.6	7.1	82	91	100	109
125	144	141	7.9	24.2	9.2	106	118	130	142
150	170	167	8.3	30.1	11.5	132	147	162	177
200	222	219	9.2	40.0	16.5	193	215	237	259
250	274	271	10.0	59.3	22.9	260	290	319	349
300	326	323	10.8	76.5	29.8	336	374	412	450
350	378	375	11.7	96.3	37.5	423	471	519	567
400	429	426	12.5	116.9	46.3	514	572	631	690
450	480	477	13.3	141.0	56.0	620	690	761	832
500	532	529	14.2	165.2	66.0	727	809	892	974
600	635	632	15.8	219.8	89.3	968	1078	1188	1298
700	738	735	17.5	283.2	116.8	1250	1391	1538	1675
750	790	787	18.3	317.2	131.7	1400	1559	1718	1876
800	842	839	19.2	354.9	147.8	1567	1745	1922	2100
900	945	942	20.8	431.8	182.6	1910	2126	2342	2558
1000	1048	1045	22.5	518.3	222.3	2295	2555	2814	3073

TABLE 5

SOCKET & SPIGOT PIPES – CLASS A

(Clause 6.6)

Nominal diameter	Barrel					Total Mass for one working length in kg			
DN mm	DE Lead joint mm	DE Push on joint mm	e mm	Mass for one meter kg	Socket mass kg	4 m	4.5 m	5 m	5.5 m
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
80	98	95	7.9	16.0	5.5	70	78	86	-
100	118	115	8.3	20.5	7.1	89	99	109	120
125	144	141	8.7	26.4	9.2	115	128	141	155
150	170	167	9.2	33.2	11.5	144	161	178	194
200	222	219	10.1	48.1	16.5	209	233	257	281
250	274	271	10.9	65.0	22.9	283	315	348	380
300	326	323	11.9	84.0	29.8	366	408	450	492
350	378	375	12.8	105.0	37.5	458	51	563	615
400	429	426	13.8	128.7	46.3	561	625	690	754
450	480	477	14.7	156.0	56.0	680	758	836	914
500	532	529	15.6	181.0	66.0	790	880	971	1061
600	635	632	17.4	241.4	89.3	1055	1176	1296	1417
700	738	735	19.3	311.6	116.8	1363	1519	1675	1830
750	790	787	20.2	348.9	131.7	1527	1702	1876	2051
800	842	839	21.1	389.1	147.8	1704	1899	2093	2288
900	945	942	22.9	474.3	182.6	2080	2317	2554	2791
1000	1048	1045	24.8	570.0	222.3	2502	2787	3072	3357

e = 11/12(7 + 0.02 DN)

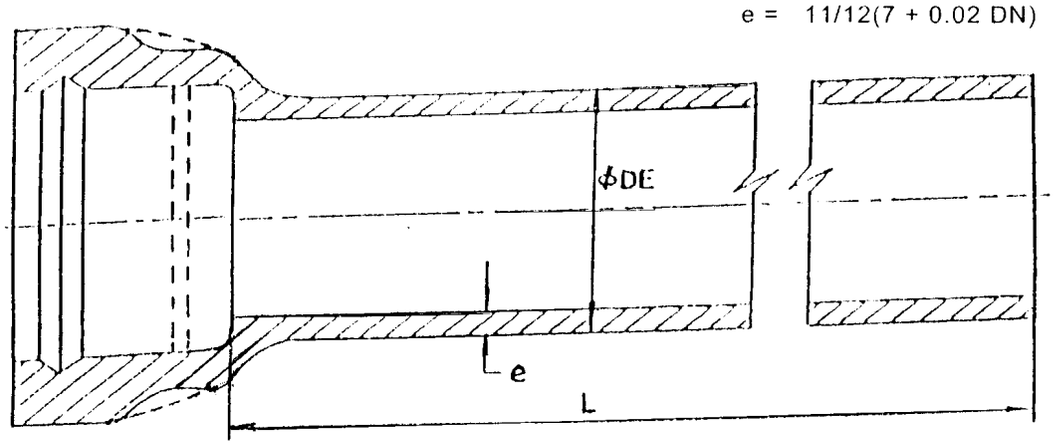


TABLE 6

SOCKET & SPIGOT PIPES – CLASS B

(Clause 6.6)

Nominal diameter	Barrel					Total Mass for one working length in kg			
DN mm	DE Lead joint mm	DE Push on joint mm	e mm	Mass for one meter kg	Socket mass kg	4 m	4.5 m	5 m	5.5 m
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
80	98	95	8.6	17.3	5.5	74	83	92	-
100	118	115	9.0	22.0	7.1	95	106	117	128
125	144	141	9.5	28.7	9.2	124	138	153	167
150	170	167	10.0	35.9	11.5	155	173	191	209
200	222	219	11.0	52.1	16.5	225	251	278	304
250	274	271	12.0	70.6	22.9	305	341	376	411
300	326	323	13.0	91.4	29.8	395	441	487	533
350	378	375	14.0	114.5	37.5	495	553	610	667
400	429	426	15.0	139.5	46.3	604	674	744	814
450	480	477	16.0	169.0	56.0	732	816	901	986
500	532	529	17.0	196.7	66.0	853	951	1049	1148
600	635	632	19.0	262.9	89.3	1141	1272	1404	1535
700	738	735	21.0	338.2	116.8	1470	1639	1808	1977
750	790	787	22.0	380.6	131.7	1644	1844	2029	2225
800	842	839	23.0	423.1	147.8	1840	2052	2263	2475
900	945	942	25.0	516.6	182.6	2249	2507	2766	3024
1000	1048	1045	27.0	619.2	222.3	2699	3009	3318	3621

e = 7 + 0.02 DN

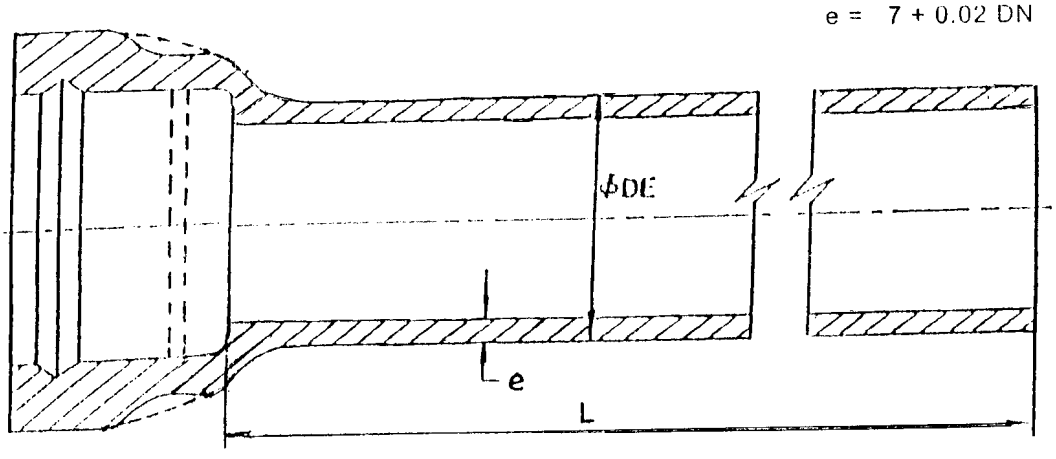


TABLE – 7
(Ref. Clause 6.1)

A : TOLERANCE ON BARREL DIAMETER AND SOCKET DIMENSIONS SUITABLE FOR LEAD JOINT PIPES

DIMENSIONS	NOMINAL DIAMETER (DN)	TOLERANCE (mm)
External diameters of barrel (DE)	All diameters	± ½ f = ± (4.5+0.0015 NB)
External diameters of barrel (DE)	All diameters	± 1/3 f = ± (3+0.001NB)
Depth of socket (P)	Up to and including 600 NB	± 5
	Over 600 NB and upto 1000 NB	± 10
NOTE: `f' is the caulking space of the joint in mm is equal to (9+0.003 NB)		

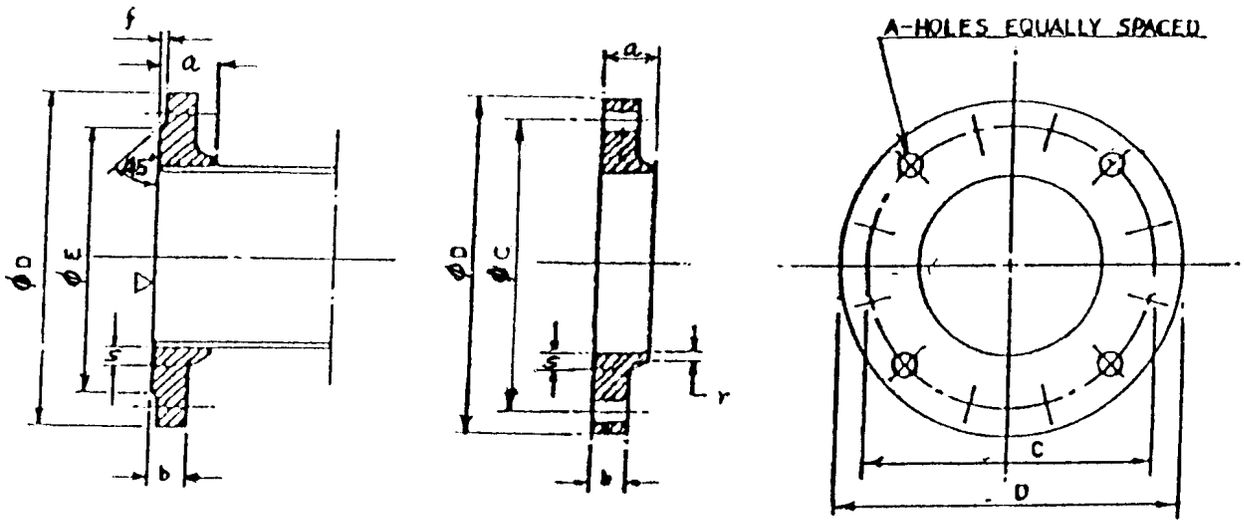
B : TOLERANCE ON BARREL DIAMETER AND SOCKET DIMENSIONS SUITABLE FOR PUSH ON JOINT PIPES

NOMINAL DIAMETER	TOLERANCES ON SOCKET DIMENSIONS (mm)								
(DN)	DI	I	J	K	P	Q	O	N	DE
80-200	±1.50	+2.0	+1.5	±2.0	+5.0	±3.0	±0.5	±1.0	±2.0
		-1.0	-0.5		-15.0				
250-300	±1.50	+2.0	+1.5	±2.5	+5.0	±3.0	±0.5	±1.0	±2.25
		-1.25	-1.0		-10.00				
350-450	±1.50	+2.0	+2.0	±3.0	±10.00	±4.0	±0.5	±1.0	±2.25
		-1.5	-1.0						
500-600	±1.75	+2.0	+2.0	±3.5	±10.00	±4.0	±0.5	±1.0	±2.25
		-1.75	-1.0						
700-800	±2.5	+3.0	+2.5	±4.0	±10.00	±5.0	±0.5	±1.0	±2.75
		-2.0	-1.5						
900-1000	±3.0	+4.0	+2.5	±5.0	±10.00	±6.0	±0.5	±1.0	±3.25
		-3.0	-2.0						

TABLE 8

DIMENSIONS OF SCREWED FLANGES OF PIPES AND STANDARD FLANGE DRILLING OF FLANGED PIPES

(Clause 3.2)

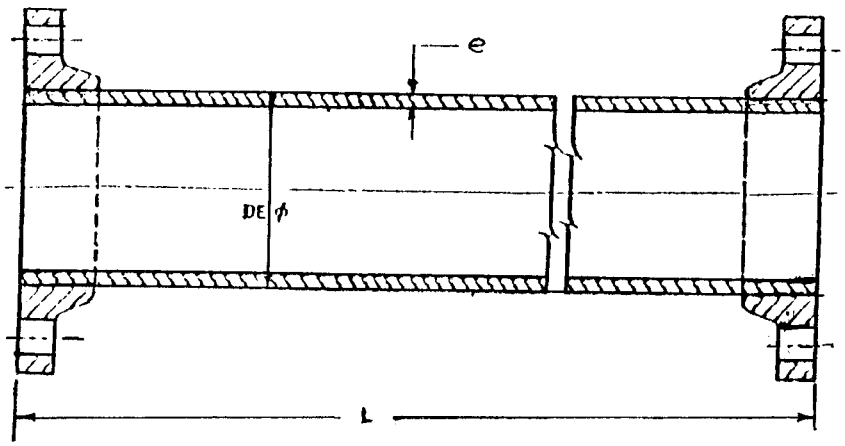


All dimensions in mm

Nominal diameter	Dimensions								Holes		
DN mm	c	D	E	b	a	r	f	s	Number	Diameter	Diameter of bolts
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
80	160	200	132	21.0	42	6	3	17	4	19	16
100	180	220	156	22.0	44	6	3	18	8	19	16
125	210	250	184	22.5	45	6	3	19	8	19	16
150	240	285	211	23.0	46	6	3	20	8	23	20
200	295	340	266	24.5	49	6	3	22	8	23	20
250	350	395	319	26.0	52	6	3	24	12	23	20
300	400	445	370	27.5	55	8	4	26	12	23	20
350	460	505	429	29.0	58	8	4	28	16	23	20
400	515	565	480	30.0	61	8	4	30	16	28	24
450	565	615	527	31.5	64	8	4	32	20	28	24
500	620	670	582	33.0	67	8	4	34	20	28	24
600	725	780	682	36.0	70	8	5	36	20	31	27

TABLE 9

FLANGED PIPES CENTRIFUGALLY CAST WITH SCREWED FLANGE – CLASS B



e = 7 + 0.02 DN

DN	DE	e	Mass for one meter	Mass for one flange	Total Mass for one working length L in kg			
mm	mm	mm	kg	Kg	4 m	4.5 m	5 m	5.5 m
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
80	98	8.6	17.3	4.3	78	86	95	104
100	118	9.0	22.0	5.0	98	109	120	131
125	144	9.5	28.7	6.6	128	142	157	171
150	170	10.0	35.9	8.2	160	178	196	214
200	222	11.0	52.1	11.4	231	257	283	309
250	274	12.0	70.6	14.7	312	347	382	418
300	326	13.0	91.4	18.6	403	448	484	540
350	378	14.0	114.5	21.2	500	558	615	672
400	429	15.0	139.5	27.3	613	682	752	822
450	480	16.0	169.0	32.6	741	826	910	983
500	532	17.0	196.7	38.1	863	961	1060	1158
600	635	19.0	262.9	52.4	1156	1288	1419	1551
700	738	21.0	338.2	71.9	1497	1666	1835	2004
750	790	22.0	380.6	84.4	1691	1882	2072	2262
800	842	23.0	423.1	96.9	1886	2098	2309	2521
900	945	25.0	516.6	113.5	2293	2552	2810	3068
1000	1048	27.0	619.2	134.0	2745	3054	3364	3674

APPENDIX – A

COMPARATIVE STUDY OF

IPSS:1-06-003-03 SPECIFICATION FOR CENTRIFUGALLY CAST (SPUN) IRON PRESSURE PIPES FOR WATER, GAS AND SEWAGE
(Second Revision)

AND

IS 1536:2001 (Fourth Revision) FOR CENTRIFUGALLY CAST (SPUN) IRON PRESSURE PIPES FOR WATER, GAS AND SEWAGE

REQUIREMENTS		Clause Ref. In IPSS	Clause Ref. In IS
Requirements which are identical between IPSS and IS	Classification	2.1	4.1
	Main dimensions	3.1 (Table 2 & 3) 3.2 (Table 8 & 9)	13.3(Table 3 & 4) 13.4(Table 5 & 9)
	Mass	6(Table 4,5 & 6)	14.7(Table 3 & 4)
	Mechanical tests	5.1, 5.2 & Annex-B	11.1, 11.2 & Annex-A
	Hardness test	5.3	11.3
	Re-test	5.4	11.4
	Hydrostatic test	5.5	12
	Tolerances	6.0 (6.1 to 6.6)	14(14.1 to 14.5)
	Coating	7.0	15
Requirements Selected for steel plant use out of choices given in IS	Classification	2.1	4.1
	Characteristics of C.I. Pipes	Table-1	Annex-B
	Main dimension	3.1(Table 2 & 3)	13.3 (Table 3 & 4)
	Making	8.0	17
Supplementary Requirements not contradicting IS	Designation	4.0	-
	Information required for user	9.0	-
Deviation from IS	–	*NIL*	*NIL*

ANNEXURE – B
(Clause 5.2)

MECHANICAL TESTS

A-1 RING TEST FOR PIPES CENTRIFUGALLY CAST IN METAL MOULDS

A.1.1 On pipes of up to and including 300 mm nominal diameter, rings of approximately 25 mm width shall be tested on a suitable machine. The rings shall be supported on two knife edges diametrically opposed and the load applied from the inside at these points (see Fig. 1)

A.1.2 The modulus of rupture of the ring shall be calculated from the breaking load by the following formula :

$$R = \frac{3P\,(D - e)}{\pi b e^2}$$

Where

R = modulus of rupture of the ring in Mpa.

P = breaking load in newtons.

D = external dia of the ring in mm.

e = wall thickness of the ring in mm, and

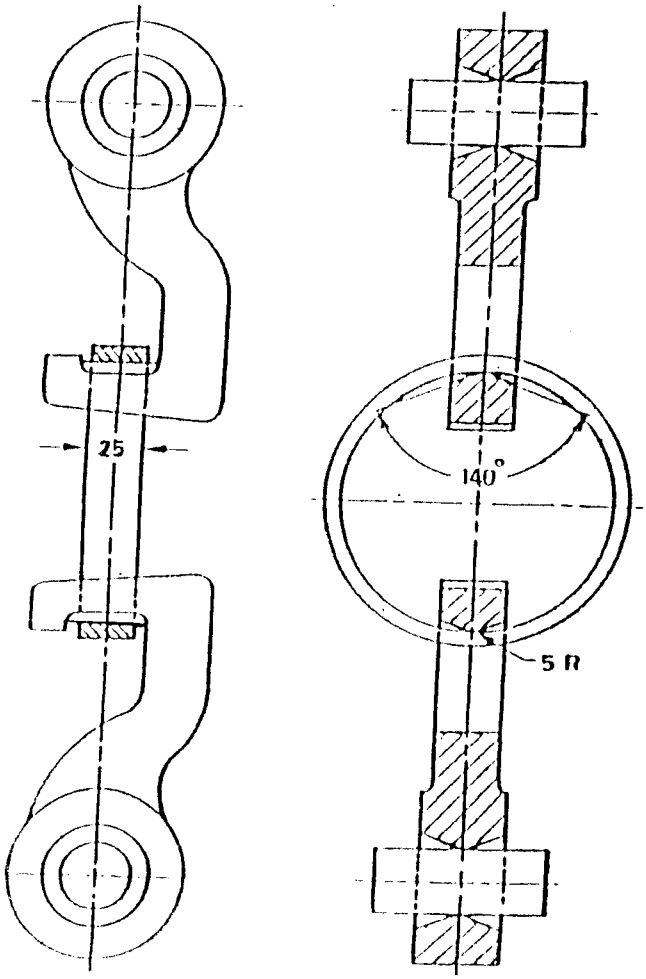
b = breadth of the ring in mm

A-2 TENSILE TESTS ON BARS FOR PIPES CENTRIFUGALLY CAST IN METAL OR RESIN SAND MOULDS

A-2.1 The tensile test bars cut from the pipes are about 90 mm long and have diameter of about 6 mm which may vary with the thickness of the pipe. The ends are prepared so as to fit the testing machine (*see Fig.2*).

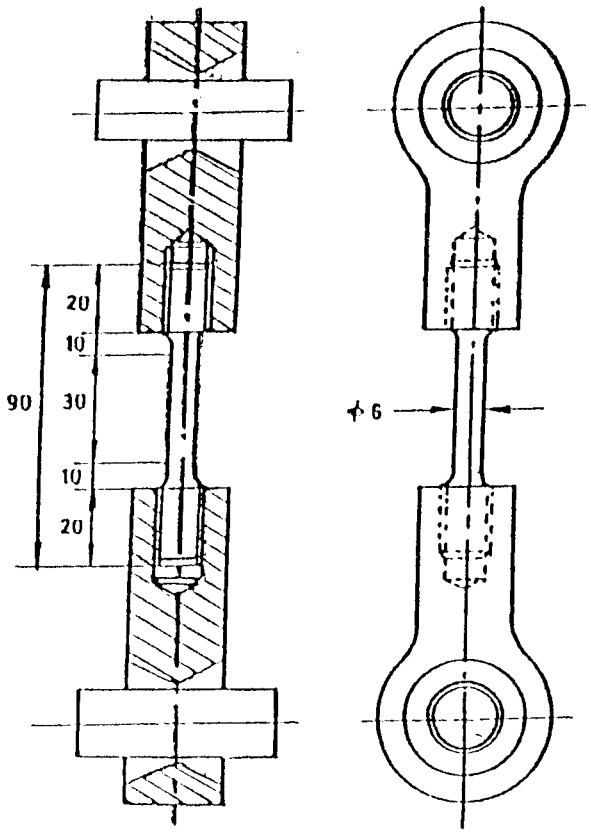
NOTE: If agreed to between the purchaser and the manufacturer the dimensions of the test bars shall be as follows :

Thickness of pipes mm	Diameter of test bar mm	Radius of curvature (Min) mm
Upto 13	9	32
Over 13 and up to 17	10	32
Over 17	14	32



All dimensions in mm

Fig. 1 RING TEST FOR PIPES CENTRIFUGALLY CAST IN METAL MOULDS



All dimensions in mm

Fig. 2 TENSILE TESTS ON BARS FOR PIPES CENTRIFUGALLY CAST IN METAL ON RESIN SAND MOULDS