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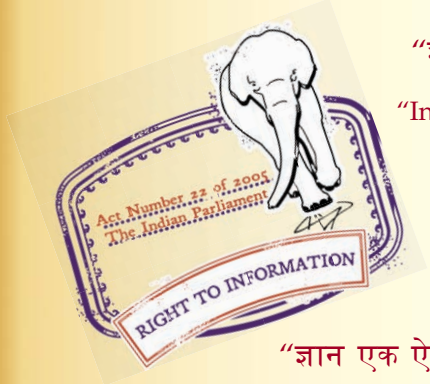
IS 7181 (1986): Horizontally cast iron double flanged pipes for water, gas and sewage [MTD 6: Pig iron and Cast Iron]



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Indian Standard

SPECIFICATION FOR HORIZONTALLY CAST IRON DOUBLE FLANGED PIPES FOR WATER, GAS AND SEWAGE

(First Revision)

Third Reprint AUGUST 1996

UDC 621.643.2 — 986 [669.13]

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 3 *March* 1987

AMENDMENT NO. 3 JUNE 2010
TO

IS 7181 : 1986 SPECIFICATION FOR HORIZONTALLY CAST IRON DOUBLE FLANGED PIPES FOR WATER, GAS AND SEWAGE

(*First Revision*)

(*Page* 5, *clause* **6.3**) **—** Substitute the following for the existing:

'Testing may preferably be carried out on uncoated pipes.'

(*Page* 5, *clause* **7.3**, *line* 1) **—** Delete 'uncoated'.

(MTD 6)

Reprography Unit, BIS, New Delhi, India

AMENDMENT NO. 2 MARCH 2002
TO
IS 7181 : 1986 SPECIFICATION FOR HORIZONTALLY CAST IRON DOUBLE FLANGED PIPES FOR WATER, GAS AND SEWAGE

(First Revision)

(*Page* 10, *clause* **9.1.4**, *line* 3) — Insert 'for 5 minutes' after the word '65°C'

(*Page* 10, *clause* **9.1.4**) — Insert the following new clause after **9.1.4**:

'**9.1.4.1** Coating test shall be conducted on a sample piece cut from the pipe having a sample area not less than 10 sq. cm.'

(MTD 6)

Reprography Unit, BIS, New Delhi, India

AMENDMENT NO. 1 MAY 1994
TO
IS 7181 : 1986 SPECIFICATION FOR HORIZONTALLY CAST IRON DOUBLE FLANGED PIPES FOR WATER, GAS AND SEWAGE

(First Revision)

(*Page* 10, *clause* 8.7) — Substitute the following for the existing clause:

'8.7 Untoleranced dimensions given in the standard are for guidance only.'

(MTD 6)

Printed at New India Printing Press, Khurja, India

Indian Standard

SPECIFICATION FOR HORIZONTALLY CAST IRON DOUBLE FLANGED PIPES FOR WATER, GAS AND SEWAGE

(*First Revision*)

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(*Continued on page* 12)

Indian Standard

SPECIFICATION FOR HORIZONTALLY CAST IRON DOUBLE FLANGED PIPES FOR WATER, GAS AND SEWAGE

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 6 August 1986, after the draft finalized by the Pig Iron and Cast Iron Sectional Committee had been approved by the Structural and Metals Division Council.

0.2 This standard was first published in 1974. As a result of demand and manufacturing in the country of horizontally cast pipes of Class B only for size above 300 mm the standard has been revised incorporating sizes upto *DN* 750, and detailing Class A pipes.

0.3 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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1. SCOPE

1.1 This standard covers the requirements for double flanged cast iron pipes of Class B only up to *DN* 750 for pressure main lines of water, gas and sewage manufactured by horizontal castings in sand moulds.

2. GENERAL REQUIREMENTS

2.1 The general requirements relating to the supply of material shall be laid down in IS : 1387-1967†.

*Rules for rounding off numerical values (*revised*)

†General requirements for the supply of metallurgical materials (*first revision*).

3. MANUFACTURE

3.1 Grey cast iron used for the manufacture of pipes shall conform to any of the appropriate grades, as specified in IS : 210-1978*.

3.2 The pipes shall be stripped with all precautions necessary to avoid warping or shrinkage defects. The pipes shall be free from defects, other than unavoidable surface imperfections which result from the method of manufacture and which do not affect the use of the pipes. By agreement between the manufacturer and the purchaser, minor defects may be rectified.

3.3 The pipes shall be capable of being cut with the tools normally used for installations. In case of dispute, they shall be considered as acceptable provided the Brinell hardness of the external unmachined surface of pipes does not exceed 230 HBS.

3.4 The flanges shall be at right angles to the axis of the pipe and machined on face. The bolt holes shall be drilled.

4. SAMPLING

4.1 Sampling criteria for the selection/frequency of various tests, unless specified in this standard, shall be as laid down in IS : 11606-1986†.

5. MECHANICAL TESTS

5.0 General — Mechanical tests shall be carried out during manufacture of pipes after every 4-hour interval. The results so obtained shall be taken to represent all the pipes of different sizes manufactured during that period.

5.1 Tensile Test — Two tensile tests shall be conducted on bars cast from the same metal in accordance with IS : 2078-1979‡. The results of the tests shall show a minimum tensile strength of 150 MPa.

5.2 Hardness Test — For checking Brinell hardness specified in **3.3**, the test shall be carried out on the test bars cut from the pipes used for test under **5.1**, in accordance with IS : 1500-1983§.

5.3 Retests — If the test piece representing the lot fails to pass the tests specified in **5.1** and **5.2**, in the first instance, two additional tests shall be made on test pieces made from the same metal used for that lot. Should either of these additional test pieces fail to pass the tests, the lot shall be considered as not complying with this standard.

---

*Specification for grey iron castings (*third revision*).
†Method of sampling of cast iron pipes and fittings.
‡Method for tensile testing of grey cast iron (*first revision*).
§Method for Brinell hardness test for metallic materials (*second revision*).

6. HYDROSTATIC TEST

6.1 Pipes shall be tested hydrostatically at a pressure specified in col 2 of Table 1. These shall not show any sign of leakage, sweating or other defects of any kind.

TABLE 1 HYDROSTATIC TEST PRESSURE FOR HORIZONTALLY CAST PIPES

Nominal Diameter, *DN*	Test Pressure	Suggested Maximum Hydraulic Working Pressure Including Surge
(1)	(2)	(3)
	MPa	MPa
Up to and including 300 mm	2·5	1·2
Over 300 mm and up to and including 600 mm	2·0	1·0
Over 600 mm	1·5	0·6

6.1.1 When pipes are required for higher test pressures, the test pressures are subject to special agreement between the purchaser and the manufacturer.

6.2 The pressure shall be applied internally and steadily maintained for a period of 15 seconds during which pipes may be struck moderately with a 700 g hammer.

6.3 Test shall be carried out before the application of surface coating.

7. SIZES AND MASS

7.1 The range of nominal diameter *DN*, of pipes and flanges followed in this standard is as follows:

80, 100, 125, 150, 200, 250, 300, 350, 400, 450, 500, 600, 700 and 750 mm

NOTE — Nominal diameter is a number used to classify pipes and corresponds approximately to their internal diameter.

7.2 Working lengths, *l*, of these pipes shall be 2·75 and 3 m.

7.2.1 Lengths other than 2·75 and 3 m may also be manufactured as per the agreement between the manufacturer and the purchaser.

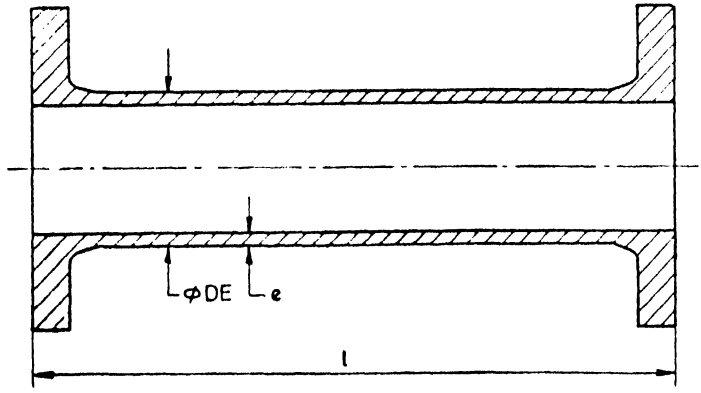
7.3 Nominal thickness, dimensions and mass of uncoated pipes and flanges are given in Table 2. Specific mass of cast iron is taken as 7·15 kg/dm^3 for the purpose of calculation.

7.3.1 The pipes of heavier mass than the maximum shall be accepted provided they comply in every other respect with the requirements of this standard.

TABLE 2 SIZES AND MASS DOUBLE FLANGED PIPES

(*Clause* 7.3)

$$e = \frac{14}{12}(7 + 0{\cdot}02\,DN)$$



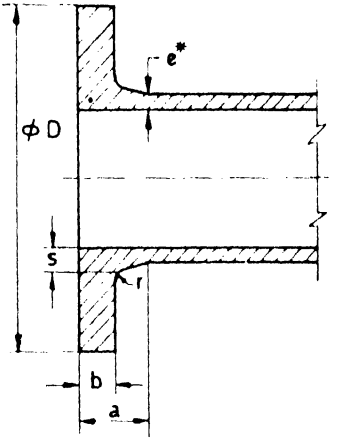
Nominal Diameter, *DN*	Barrel			Mass for One Flange (Nominal)
	DE	*e*	Mass for One Metre Length Nominal	
(1)	(2)	(3)	(4)	(5)
mm	mm	mm	kg	kg
80	98	10·0	19·8	3·7
100	118	10·5	25·4	4·2
125	144	11·1	33·1	5·3
150	170	11·7	41·6	6·7
200	222	12·8	60·1	9·3
250	274	14·0	81·8	12·0
300	326	15·2	106·1	14·8
350	378	16·3	133·5	19·0
400	429	17·5	162·6	23·4
450	480	18·7	197·0	26·5
500	532	19·8	229·3	32·1
600	635	22·2	306·5	44·0
700	738	24·5	394·3	59·9
750	790	25·6	443·8	69·7

7.4 Dimensions of flanges and flange drilling are given in Table 3 and Table 4.

TABLE 3 DIMENSIONS OF FLANGES OF PIPES AND FITTINGS

All dimensions in millimetres.

$b = 19 + 0{\cdot}028\ DN$
$s = 10{\cdot}5 + 0{\cdot}03\ DN$



Nominal Diameter, *DN*	*D*	*a*	*b*	*s*	*r*
(1)	(2)	(3)	(4)	(5)	(6)
80	200	40·0	21·0	13·0	6
100	220	42·0	22·0	13·5	6
125	250	44·5	22·5	14·5	6
150	285	47·0	23·0	15·0	6
200	340	52·0	24·5	16·5	8
250	395	57·0	26·0	18·0	8
300	445	61·0	27·5	19·5	8
350	505	66·0	29·0	21·0	10
400	565	71·0	30·0	22·5	10
450	615	76·0	31·5	24·0	10
500	670	81·0	33·0	25·5	10
600	780	90·0	36·0	28·5	10
700	895	100·0	38·5	31·5	12
750	960	105·0	40·0	33·0	12

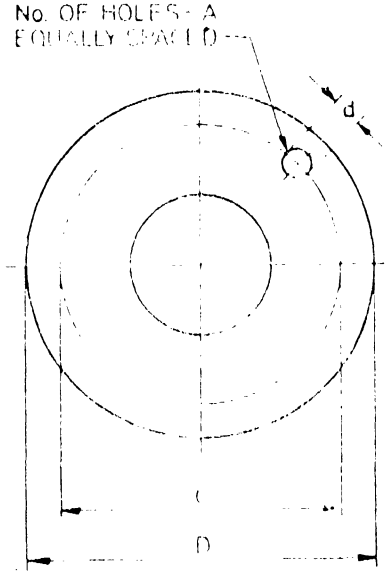
*Thickness, *e*, of pipe or fitting comprising the flange shall not exceed value, *s*.

TABLE 4 STANDARD FLANGE DRILLING OF FLANGED PIPES AND FITTINGS

(*Clause* 7.4)

All dimensions in millimetres.

Holes drilled off-centre unless otherwise specified.



Nominal Diameter, *DN*	*D*	*C*	Holes		Diameter of Bolts
			Number *A*	Diameter *d*	
(1)	(2)	(3)	(4)	(5)	(6)
80	200	160	4	19	16
100	220	180	8	19	16
125	250	210	8	19	16
150	285	240	8	23	20
200	340	295	8	23	20
250	395	350	12	23	20
300	445	400	12	23	20
350	505	460	16	23	20
400	565	515	16	28	24
450	615	565	20	28	24
500	670	620	20	28	24
600	780	725	20	31	27
700	895	840	24	31	27
750	960	900	24	31	27

8. TOLERANCES

8.1 Tolerances on External Diameter of Barrel (*DE*)

Dimension	*Nominal Diameter, DN*	*Tolerance* mm
External diameter of barrel (*DE*)	All diameters	$\pm$ (4·5 + 0·001 5 *DN*)

8.2 Tolerances on Thickness — The tolerances on the wall thickness and flange thickness of pipes shall be as follows:

Dimension	*Tolerance* mm
Wall thickness	$-$ (1 + 0·05*e*)
Flange thickness	$\pm$ (2 + 0·05*b*)

where

e = thickness of wall in mm, and
b = thickness of flange in mm.

8.3 Tolerances on Length — The tolerance on length of flanged pipes shall not exceed $\pm$ 10 mm.

8.4 Tolerance on Mass — The permissible tolerances on mass of pipes and flanges shall be $^{+8}_{-5}$ percent for *DN* up to 150 and $\pm$ 5 percent for *DN* 200 and above.

8.5 Permissible Deviation from a Straight Line — The pipes shall be straight. When rolled along two gantries separated by approximately two-thirds the lengths of the pipe to be checked, the maximum deviation *fm*, in millimetres, shall not be greater than 1·25 times the length *l*, in metres, of the pipe under test, thus $fm \leqslant 1{\cdot}25\ l$.

8.6 Tolerances for the various dimensions of flanges not specified above shall be as follows:

Description	*Size, DN* mm	*Tolerance* mm
D (as cast)	Up to 250	+ 3·0 − 1·0
	Above 250	+ 5·0 1·5
C	Up to 250	$\pm$ 1·0
	Above 250	$\pm$ 1·5
d	Up to 300	+ 2 − 0
	Above 300	+ 3 − 0

8.7 Tolerances for dimensions other than those specified above shall be as given in IS : 5519-1979*.

9. COATING

9.1 After inspection and hydraulic test, each pipe (including flanges) shall be coated in accordance with **9.1.1** to **9.1.5**.

9.1.1 Coating shall not be applied to any pipe unless its surfaces are clean, dry and free from rust.

9.1.2 Unless otherwise agreed to between the purchaser and the manufacturer, all pipes shall be coated externally and internally with the same material by dipping in a bath containing uniformly heated composition of tar or other suitable base.

9.1.3 The coating material shall set rapidly with good adherence and and shall not scale off.

9.1.4 In all cases where the coating material has a tar or similar base, it shall be smooth and tenacious and hard enough not to flow when exposed to a temperature of 65°C but not so brittle at a temperature of 0°C as to chip off when scribed lightly with a penknife.

9.1.5 When the pipes are to be used for conveying portable water, the inside coating shall not contain any constituent soluble in such water or any ingredient which could impart any taste or odour to the potable water after sterilization and suitably washing out the mains.

9.2 Pipes and flanges which are imperfectly coated or where the coating does not set or conform to the quality specified in **9.1.1** to **9.1.5**, the coating shall be removed and the pipes/flanges recoated.

10. MARKING

10.1 Each pipe shall have the trade-mark of the manufacturer, nominal diameter, class of pipe, mass and the last two digits of the year of manufacture suitably marked on it,

10.2 Marking may be either cast, stamped or indelibly painted on the barrel of the pipe.

10.3 Any other marks required by the purchaser may be painted on.

*Deviations for untoleranced dimensions and mass of grey iron castings (*first revision*).

10.3.1 The material may also be marked with the ISI Certification Mark.

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