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मानक

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“पुराने को छोड़ नये के तरफ”

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IS 1538 (1993): Cast iron fittings for pressure pipes for water, gas and sewage [MTD 6: Pig iron and Cast Iron]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

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“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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IS 1538 : 1993
[Superseding IS 1538 (Parts 1 to 24)]
(Reaffirmed 1999)

भारतीय मानक

पानी, गैस और मलजल के लिये ढलवां लोहे के दाब पाइपों की
फिटिंग — विशिष्टि

(तीसरा पुनरीक्षण)

Indian Standard

**CAST IRON FITTINGS FOR PRESSURE PIPES FOR
WATER, GAS AND SEWAGE — SPECIFICATION**

(Third Revision)

Second Reprint MARCH 2001

UDC 621.643.4 [669.13] : 621.643.2-786 : 628.2

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

July 1993

Price Group 12

FOREWORD

This Indian Standard (Third Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Pig Iron and Cast Iron Sectional Committee had been approved by the Metallurgical Engineering Division Council.

The Standard Specification for Cast Iron Fittings for Pressure Pipes for Water, Gas and Sewage was published in 1960 and subsequently revised in 1969 and 1976. While reviewing this standard in the light of developments taken place in India and abroad the Committee decided to have a separate Indian Standard for short bodied Cast Iron specials meant for Mechanical, Push-on and Flanged fitting which has since been published as IS 13382 : 1992 Cast iron specials for mechanical and push-on flexible joints for pressure pipe lines for water, gas and sewage.

Since a large number of patterns are available with Indian foundries conforming to the present standard (IS 1538) the Committee felt to continue the same dimensions and design for fittings suitable for lead joint and flanged joint covered in this standard.

This standard when published will supersede the following Indian standards:

IS 1538

- (Part 1) : 1976 General requirements
- (Part 2) : 1976 Specific requirements for sockets and spigots of pipes
- (Part 3) : 1976 Specific requirements for sockets of fittings
- (Part 4) : 1976 Specific requirements for nanges of pipes and fittings
- (Part 5) : 1976 Specific requirements for raised flanges
- (Part 6) : 1976 Specific requirements for standard flange drilling of flanged pipes and fittings
- (Part 7) : 1976 Specific requirements for flanged sockets
- (Part 8) : 1976 Specific requirements for flanged spigots
- (Part 9) : 1976 Specific requirements for collars
- (Part 10) : 1976 Specific requirements for double socket bends
- (Part 11) : 1976 Specific requirements for tees, all sockets
- (Part 12) : 1978 Specific requirements for double socket tee with flanged branch
- (Part 13) : 1976 Specific requirements for crosses, all sockets
- (Part 14) : 1984 Specific requirements for double socket tapers (*third revision*)
- (Part 15) : 1976 Specific requirements for caps
- (Part 16) : 1976 Specific requirements for plugs
- (Part 17) : 1976 Specific requirements for bell mouth pieces
- (Part 18) : 1976 Specific requirements for double flanged bends
- (Part 19) : 1976 Specific requirements for all flanged tees
- (Part 20) : 1976 Specific requirements for all flanged crosses
- (Part 21) : 1976 Specific requirements for double flanged tapers
- (Part 22) : 1976 Specific requirements fer split puddle or body flanges
- (Part 23) : 1976 Specific requirements for blank flanges
- (Part 24) : 1984 Specific requirements for all flanged radial tees (*second revision*)

In order to have national coordination with other International Standards assistance has been derived from ISO 13/1978 Grey Iron Pipes Special Castings and Grey Iron Parts for Pressure Main Lines published by the International Organization for Standardization.

(*Continued on third cover*)

**AMENDMENT NO. 1 APRIL 2002
TO
IS 1538 :1993 CAST IRON FITTINGS FOR PRESSURE
PIPES FOR WATER, GAS AND SEWAGE —
SPECIFICATION**

(Third Revision)

(Page 1, clause 4.3) — Substitute '230 HBS' for '210 HBS'.

(Page 1, clause 4.3) — Insert the following new clause after 4.3:

4.3.1 In case hardness is more than 230 HBS, destructive test shall be carried out for observing fracture which shall be grey without any chilling effect.'

(Page 2, Table 1) — Substitute ' kgf/cm^2 ' for ' N/mm^2 ' at both the places.

(Page 2, clause 10.4.1) — Insert the following new clauses after 10.4.1:

10.5 Tolerance on Height of Raised Face (c) in mm

<i>Height of Raised Face (c)</i>	<i>Tolerance</i>
3	+1.5 -2.0
4	+2 -3.0
5	+2.5 -4.0

Amend No. 1 to IS 1538 : 1993

10.6 Tolerances on the External Diameter 'D' in mm

<i>DN</i> Tol on <i>D</i>	80, 100, 125	150, 200, 250, 300	350, 400, 450, 500, 600
	± 4.5	+5.5 -2.5	+6.5 -3
<i>DN</i> Tol on <i>D</i>	700, 750, 800, 900, 1 000	1 050, 1 100, 1 200	1 500
	+7.5 -4	+8.5 -4	+10 -5

10.7 Tolerance on Flange Drillings in mm

<i>Dimension</i>	<u><i>Bolt Hole Diameter</i></u>	
	19 to 28	31 to 43
Bolt hole diameter, <i>d</i>	+2 -0	+3 -0
Pitch circle diameter, <i>C</i>	± 2	± 2.8
Centre to centre of adjacent bolt holes	± 2	± 2.8

NOTE — Tolerance on all other untoleranced dimensions shall be as per IS 5519 : 1979 'Deviations for untoleranced dimensions and mass of grey iron castings'.

(Page 3, clause 12.5, line 3) — Insert 'for 5 minutes' after '65°C'.

(Page 3, clause 12.5) — Insert the following new clause after 12.5:

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

(Page 3, clause 14.1) — Substitute the following for the existing:

'14.1 The dimensions and designs for fittings suitable for lead joint and flanged joints covered in this standard shall conform to Tables 3 to 6. The dimensions of socket and spigot of pipes in lead joints given in Table 2 is for reference only.'

(MTD 6)

**AMENDMENT NO. 3 JUNE 2008
TO
IS 1538 : 1993 CAST IRON FITTINGS FOR PRESSURE
PIPES FOR WATER, GAS AND SEWAGE —
SPECIFICATION**

(Third Revision)

*(Page 38, Table 27, col 10 against Nominal Diameter DN 700) —
Substitute '396' for '390'.*

(MTD 6)

Reprography Unit, BIS, New Delhi, India

AMENDMENT NO. 4 JUNE 2010
TO
IS 1538 : 1993 CAST IRON FITTINGS FOR PRESSURE
PIPES FOR WATER, GAS AND SEWAGE —
SPECIFICATION

(Third Revision)

Amendment No. 2 — Not published, null & void.

(Page 1, clause 8.1, last sentence) — Substitute the following for the existing:

‘Testing may preferably be carried out on uncoated pipes.’

(MTD 6)

Reprography Unit, BIS, New Delhi, India

Indian Standard

CAST IRON FITTINGS FOR PRESSURE PIPES FOR WATER, GAS AND SEWAGE — SPECIFICATION

(*Third Revision*)

1 SCOPE

1.1 This standard covers the general requirements for cast iron fittings for pressure pipes for water, gas and sewage.

1.2 This standard is applicable to all cast iron fittings having spigots, sockets or flanges as specified in this standard and also to fittings with other type of joints, the general dimensions of which, except those relating to the joints, conform to this standard.

2 REFERENCES

2.1 The following Indian Standards are necessary adjuncts to this standard :

<i>IS No.</i>	<i>Title</i>
210 : 1978	Grey iron castings (<i>third revision</i>)
1387 : 1993	General requirements for the supply of metallurgical materials (<i>second revision</i>)
2078 : 1979	Method for tensile testing of grey cast iron
1500 : 1983	Method for Brinell hardness test for metallic materials (<i>second revision</i>)
11606 : 1986	Method of sampling of cast iron pipes and fittings

SECTION 1 GENERAL REQUIREMENTS

3 SUPPLY OF MATERIAL

3.1 The general requirements relating to the supply of the material shall be as laid down in IS 1387 : 1993.

4 MANUFACTURE

4.1 The metal used for the manufacture of pipes shall be of a quality not less than that specified for Grade FG 150 of IS 210 : 1978.

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

4.3 The fittings shall be such that they could be cut, drilled or machined and may be accepted provided the hardness of the external unmachined surface does not exceed 210 HBS.

4.4 In the case of spigot and socket ends suitable for lead joints, the socket shall be with or without the centring ring.

4.5 In the case of flanged joints, the flanges shall be at right angles to the axis of the joint and machined in face. The bolt holes shall be drilled.

4.6 The bolt hole circle shall be concentric with the bore and bolt holes shall be located off the centre lines, unless otherwise specified by the purchaser. The two flanges of the fittings shall be correctly aligned.

5 MECHANICAL TESTS

5.0 Mechanical tests shall be carried out during manufacture. Two tests per day of casting may be adequate. The results obtained are taken to represent all the fittings of all sizes made during the day.

5.1 Tests

Two tensile tests shall be made on bars cast from the same metal in accordance with the method specified in IS 2078 : 1979. The results of the tests shall show a minimum tensile strength of 150 MPa (N/mm²).

6 BRINELL HARDNESS TESTS

6.1 For checking the Brinell hardness specified in 4.3, Brinell tests shall be carried out on the test bars used for the tests in 5.1. The test shall be carried out by applying either a load of 3 000 kg to a ball of 10 mm diameter for 15 seconds, or a load of 750 kg to a ball of 5 mm diameter for 10 seconds (see IS 1500 : 1983).

7 RETEST

If any piece representing a lot fails in the first instance two additional tests shall be made on test pieces selected from two other fittings from the same lot. If both the test results satisfy the specified requirements, the lot shall be accepted. Should either of these additional test pieces fail, the lot shall be deemed as not complying with this standard.

8 HYDROSTATIC TEST

8.1 For hydrostatic tests, the fittings shall be kept under pressure for 15 seconds; they may be struck moderately with a 700 g hammer. They shall withstand the pressure test without showing any leakage, sweating or other defect of any kind. The hydrostatic test shall be conducted before coating the fittings.

8.1.1 The fittings shall withstand the pressure in Table 1.

8.1.2 When fittings are required for higher test pressure, the test pressures are subject to special agreement between the purchaser and the manufacturer.

9 SIZES AND DIMENSIONS

9.1 The dimensions of fittings shall conform to those specified in Tables 2 to 28.

Table 1 Hydrostatic Test Pressure for Fittings
(Clause 8.1.1)

Nominal Diameter	Test Pressure	
	Fittings Without Branches or With Branches not Greater than Half the Principal Diameter	Fittings with Branches Greater Than Half the Principal Diameter
	MPa (N/mm ²)	MPa (N/mm ²)
Up to and including 300 mm	2.5 (25)	2.5 (25)
Over 300 mm and up to and including 600 mm	2.0 (20)	2.0 (20)
Over 600 mm and up to and including 1 500 mm	1.5 (15)	1.0 (10)

10 TOLERANCES

10.1 Tolerances on external diameter of the barrel, the internal diameter and the depth of the socket for lead joints shall be as follows:

Dimension	Nature of Joint	Nominal Diameter (DN)	Tolerance mm
External diameter of spigot (DE)	Lead joints	All diameters	$\pm 1/2 f$ or $\pm (4.5 + 0.0015 DN)$
Internal diameter of socket (DI)	Lead joints	All diameters	$\pm 1/3 f$ or $\pm (3 + 0.001 DN)$
Depth of socket (P)	Lead joints	Up to and including 600 mm Over 600 mm up to and including 1 000 mm Over 1 000 mm up to and including 1 500 mm	± 5 ± 10 ± 15

where *DN* is the nominal diameter of the fitting in millimetres and *f* is the cauling space of the joint in millimetres and is equal to $9.00 + 0.003 DN$.

NOTE — The jointing tolerances applicable to joints other than lead joints shall be as specified by their manufacturer and shall be within the tolerances specified above.

10.2 The maximum or minimum jointing space resulting from these tolerances is such that the jointing of the pipes and fittings is not adversely affected.

10.3 Tolerances on Thickness

The tolerances on the wall thickness and flange thickness of fittings are limited as follows:

Dimension	Tolerance, mm
Wall thickness	$-(2 + 0.05 e)$
Flange thickness	$\pm (3 + 0.05 b)$

where

e = the standard thickness of the wall in millimetres, and

b = the standard thickness of the flange in millimetres.

10.4 Tolerances on Lengths

The tolerances on lengths of fittings, normally manufactured, shall be as follows:

Type of Fitting	Nominal Dia	Tolerance mm
Socket fittings and flange and spigot pieces	Up to and including 450 mm	± 20
	Over 450 mm	+20 -30
Flanged fittings	All diameters	± 10

10.4.1 Should smaller tolerances be required, they shall be agreed to between the manufacturer and the purchaser and may not be less than ± 1 mm.

11 MASS

11.1 The masses have been calculated by taking the density of iron as 7.15 kg/dm^3 . The standard masses shall conform to those given in Tables 7 to 28.

11.1.1 The permissible tolerances on standard mass of fittings shall be ± 8 percent except for bends, fittings with more than one branch and non-standard fittings, in which case the tolerance shall be ± 12 percent.

11.1.2 Fittings of a heavier mass than the maximum

may be accepted provided they comply in every other respect with the requirement of this standard.

12 COATING

12.1 After inspection and hydrostatic test, each fitting shall be coated as follows.

12.2 Coating shall not be applied to any fitting unless its surface is clean, dry and free from rust.

12.3 Unless otherwise agreed between the purchaser and the manufacturer all fittings shall be coated externally and internally with the same material by dipping in a tar or suitable base bath. The fittings may be either preheated before dipping or the bath may be uniformly heated. Alternatively, if mutually agreed between the purchaser and the manufacturer, the fittings may be

coated by spraying or brush painting.

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

12.5 Where the coating material has 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.

12.6 When the fittings are to be used for conveying potable water, the inside coating shall not contain any constituent soluble in such water or any ingredient which could impart any taste or odour whatsoever to the potable water after sterilization and suitable washing of the mains.

12.7 In the case of fittings (wholly or partially coated) which are imperfectly coated or where the coating does not set or conform to the required quality specified the coating shall be removed and the fittings re-coated.

13 MARKING

13.1 Each fitting shall have cast, stamped or indelibly painted on it the following appropriate marks:

- a) Manufacturer's name, initials or identification mark;
- b) The nominal diameter;
- c) Mass of fitting; and
- d) The last two digits for the year of manufacture.

13.1.1 Marking may be done on the outside of the socket or on the barrel of the fitting.

13.2 Any other mark required by the purchaser may be painted on.

SECTION 2 JOINTS

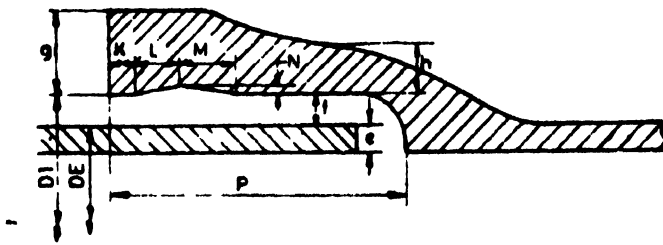
14 GENERAL

14.1 The dimensions and designs for fittings suitable for lead joint and flanged joint covered in this standard should follow the design given in Tables 2 and 3. The dimensions of socket and spigot of pipes (lead joint) given in table is for reference.

Table 2 Dimensions of Sockets and Spigots of Pipes (Lead Joint)

(Clauses 9.1 and 14.1)

All dimensions in millimetres.

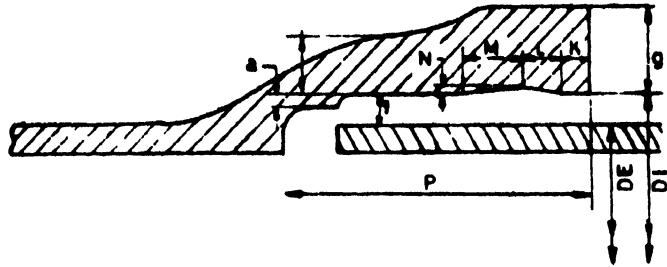


$$a = 3 + 0.001 DN$$

$$g = 20 + 0.03 DN$$

$$h = 8 + 0.025 DN$$

$$f = 9 + 0.003 DN$$

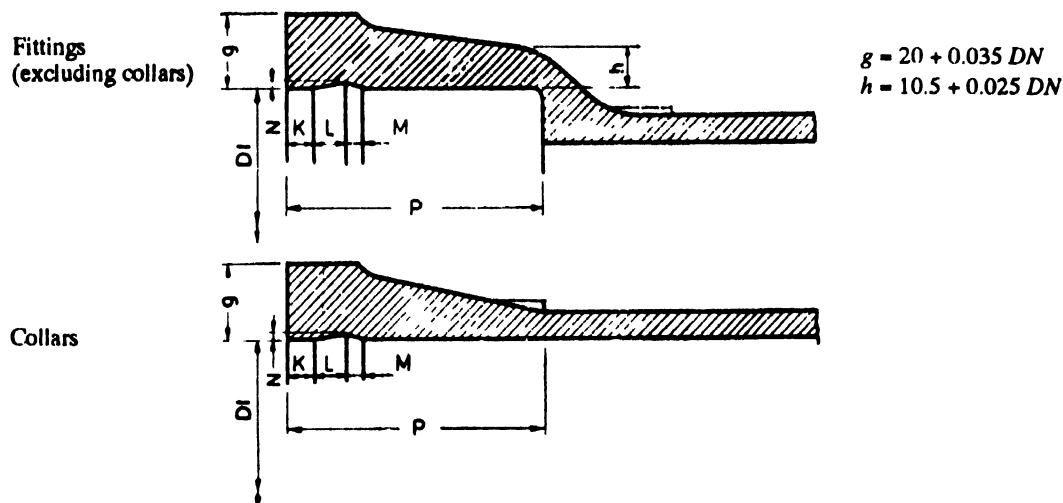


Nominal Diameter (DN)	Barrel Diameter (DE)	Socket Dimensions								Joint Thickness f
		Dl	P	g(Mm)	h(Mm)	K	L	M	N	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
80	98	116	84	22.5	10.0	8.5	9	14	3	9.0
100	118	137	88	23.0	10.5	8.5	9	14	3	9.5
125	144	163	91	24.0	11.0	8.5	9	14	3	9.5
150	170	189	94	24.5	12.0	8.5	11	16	3	9.5
200	222	241	100	26.0	13.0	8.5	12	17	3	9.5
250	274	294	103	27.5	14.5	8.5	14	18	3	10.0
300	326	346	105	29.0	15.5	8.5	14	18	3	10.0
350	378	398	107	30.5	17.0	8.5	14	19	3	10.0
400	429	449	110	32.0	18.0	8.5	15	20	3	10.0
450	480	501	112	33.5	19.0	8.5	18	22	3	10.5
500	532	553	115	35.0	20.5	8.5	20	24	3	10.5
600	635	657	120	38.0	23.0	8.5	22	25	3	11.0
700	738	760	122	41.0	25.5	8.5	24	26	3	11.0
750	790	813	123	42.5	27.0	8.5	25	28	3	11.5
800	842	865	125	44.0	28.0	8.5	25	28	3	11.5
900	945	968	128	47.0	30.5	8.5	27	30	3	11.5
1 000	1 048	1 072	130	50.0	33.0	8.5	28	32	3	12.0
1 050	1 124	1 143	130	52.0	34.0	8.5	30	34	3	12.5
1 100	1 152	1 177	135	53.0	35.5	8.5	30	34	3	12.5
1 200	1 256	1 281	140	56.0	38.0	8.5	30	34	3	12.5
1 500	1 567	1 594	150	65.0	45.5	8.5	30	34	3	13.5

Table 3 Dimensions of Sockets of Fittings (Lead Joint)

(Clauses 9.1 and 14.1)

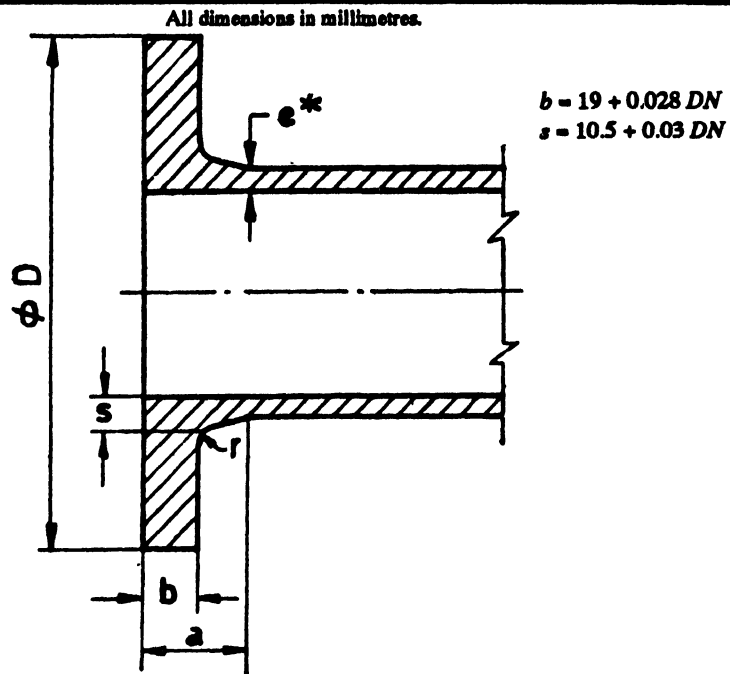
All dimensions in millimetres.



Nominal Diameter (DN)	Socket Dimensions							
	DI	P	g(Min)	h(Min)	K	L	M	N
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
80	116	84	23.0	12.0	8.5	9	14	3
100	137	88	23.5	12.5	8.5	9	14	3
125	163	91	24.5	13.0	8.5	9	14	3
150	189	94	25.5	14.0	8.5	11	16	3
200	241	100	27.0	15.0	8.5	12	17	3
250	294	103	29.0	16.5	8.5	14	18	3
300	346	105	30.5	17.5	8.5	14	18	3
350	398	107	32.5	19.0	8.5	14	19	3
400	449	110	34.0	20.0	8.5	15	20	3
450	501	112	36.0	21.0	8.5	18	22	3
500	553	115	37.5	22.5	8.5	20	24	3
600	657	120	41.0	25.0	8.5	22	25	3
700	760	122	44.5	27.5	8.5	24	26	3
750	813	123	46.0	29.0	8.5	25	28	3
800	865	125	48.0	30.0	8.5	25	28	3
900	968	128	51.5	32.5	8.5	27	30	3
1 000	1072	130	55.0	35.0	8.5	28	32	3
1 050	1 143	130	52.0	34.0	8.5	30	34	3
1 100	1 177	135	58.5	37.5	8.5	30	34	3
1 200	1 281	140	62.0	40.0	8.5	30	34	3
1 500	1 594	150	72.5	47.5	8.5	30	34	3

Table 4 Dimensions of Flanges of Pipes and Fittings

(Clause 9.1)



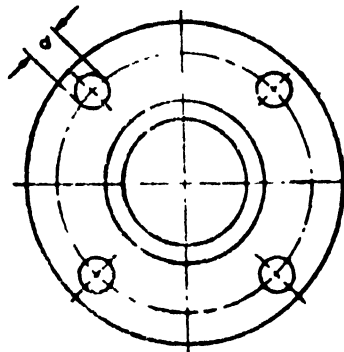
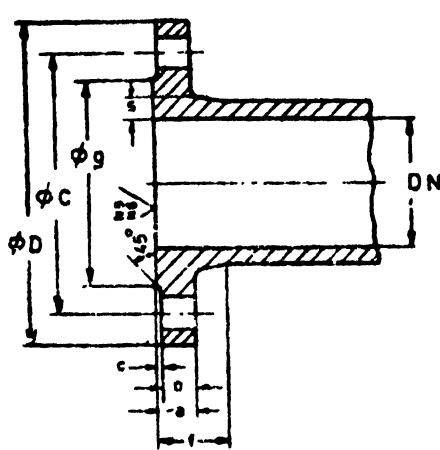
Nominal Diameter (DN)	D	a	b	s	r
(1)	(2)	(3)	(4)	(5)	(6)
80	200	40	21	13	6
100	220	42	22	13.5	6
125	250	44.5	22.5	14.5	6
150	285	47	23	15	6
200	340	52	24.5	16.5	8
250	395	57	26	18	8
300	445	61	27.5	19.5	8
350	505	66	29	21	8
400	565	71	30	22.5	10
450	615	76	31.5	24.0	10
500	670	81	33	25.5	10
600	780	90	36	28.5	10
700	895	100	38.5	31.5	10
750	960	105	40	33	12
800	1 015	110	41.5	34.5	12
900	1 115	120	44	37.5	12
1 000	1 230	130	47	40.5	12
1 050	1 258	135	48	42	12
1 100	1 340	140	50	43.5	15
1 200	1 455	150	53	46.5	15
1 500	1 800	180	61	55.5	18

*Thickness e is equal to the thickness of pipe or fitting comprising the flange. Not to exceed value of s .

Table 5 Dimensions of Raised Flanges

(Clause 9.1)

All dimensions in millimetres.



$$b = 19 + 0.28 DN$$

$$f = 35 + 0.1 DN$$

$$s = 10.5 + 0.03 DN$$

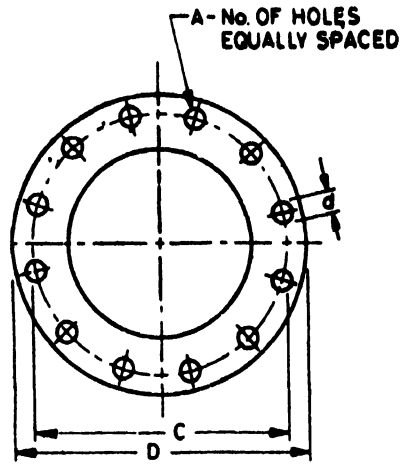
$$g = C - (d + 2c + 2)$$

HOLES DRILLED OFF CENTRES
UNLESS OTHERWISE SPECIFIED

Nominal Diameter (DN)	D	g	a	b	c	f	s	C	Holes		Dia- meter of Bolts
									No.	d	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
80	200	133	24	21	3	43	13	160	4	19	16
100	220	153	25	22	3	45	13.5	180	8	19	16
125	250	183	25.5	22.5	3	47.5	14.5	210	8	19	16
150	285	209	26.0	23	3	50	15	240	8	23	20
200	340	264	27.5	24.5	3	55	16.5	295	8	23	20
250	395	319	29	26	3	60	18	350	12	23	20
300	445	367	31.5	27.5	4	65	19.5	400	12	23	20
350	505	427	33	29	4	70	21	460	16	23	20
400	565	477	34	30	4	75	22.5	513	16	28	24
450	615	527	36	32	4	80	24	56 ^c	20	28	24
500	670	582	47	33	4	85	25.5	620	20	28	24
600	780	682	41	36	5	95	28.5	725	20	31	27
700	895	797	43.5	38.5	5	105	31.5	840	24	31	27
750	960	857	45	40	5	110	33	900	24	31	27
800	1015	904	46.5	41.5	5	115	34.5	950	24	34	30
900	1115	1004	49	44	5	125	37.5	1050	28	34	30
1000	1230	1111	52	47	5	135	40.5	1160	28	37	33
1050	1258	1145	53.5	48.5	5	140	42	1194	28	37	33
1100	1340	1221	55	50	5	145	43.5	1270	32	37	33
1200	1455	1328	58	53	5	155	46.5	1380	32	40	36
1500	1800	1745	66	61	5	185	55.5	1710	40	43	39

Table 6 Standard Flange Drilling of Flanged Pipes and Fittings
(Clause 9.1)

All dimensions in millimetres.



HOLES DRILLED OFF-CENTRES
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
800	1 015	950	24	34	30
900	1 115	1 050	28	34	30
1 000	1 230	1 160	28	37	33
1 050	1 258	1 194	28	37	33
1 100	1 340	1 270	32	37	33
1 200	1 455	1 380	32	40	36
1 500	1 800	1 710	40	43	39

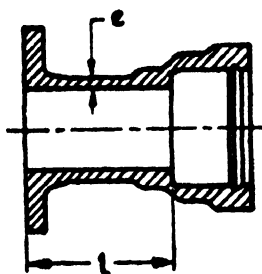
SECTION 3 SPECIAL FITTINGS**15 GENERAL**

Special fittings of the following types with their ends either socketed, spigotted (for lead joints) or flanged (for flanged joints) shall conform to the dimensions, mass and tolerances, as relevant to those given in Tables mentioned below against each type. Tolerances on mass shall be as per 11.1.1.

i) Flanged Sockets	Table 7	ix) Double Socket Tee with Flanged Branch	Table 15
ii) Flanged Spigots	Table 8	x) Crosses, All Sockets	Table 16
iii) Collars	Table 9	xi) Double Socket Tapers	Table 17
iv) Double Socket 1/4 Bends	Table 10	xii) Caps	Table 18
v) Double Socket 1/8 Bends	Table 11	xiii) Plugs	Table 19
vi) Double Socket 1/16 Bends	Table 12	xiv) Bell Mouth Pieces	Table 20
vii) Double Socket 1/32 Bends	Table 13	xv) Double Flanged 1/4 Bends	Table 21
viii) Tees, All Sockets	Table 14	xvi) Double Flanged 1/4 Duckfoot Bends	Table 22
		xvii) Double Flanged 1/8 Bends	Table 23
		xviii) All Flanged Tees	Table 24
		xix) All Flanged Cross	Table 25
		xx) Double Flanged Tapers	Table 26
		xxi) All Flanged Radial Tees	Table 27
		xxii) Blank Flanged	Table 28

Table 7 Flanged Sockets*(Clause 9.1 and 11.1)*

All dimensions in millimetres.



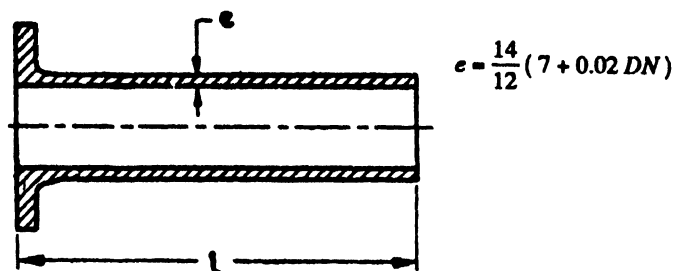
$$e = \frac{14}{12} (7 + 0.02 DN)$$

Nominal Diameter (DN)	e	l	Mass (Approx)
(1)	(2)	(3)	(4)
			kg
80	10.0	150	13
100	10.5	150	16
125	11.1	150	20
150	11.7	150	26
200	12.8	150	37
250	14.0	300	62
300	15.2	300	79
350	16.3	300	100
400	17.5	300	123
450	18.7	300	142
500	19.8	300	173
600	22.5	300	234
700	24.5	300	306
750	25.6	300	347
800	26.8	300	391
900	29.2	300	476
1 000	31.5	300	580
1 050	32.6	500	780
1 100	33.8	500	865
1 200	36.2	500	1 021
1 500	43.2	500	1 463

NOTE - The fitting may also be supplied with a raised flange. For details of the raised flange, see Table 5.

Table 8 Flanged Spigots*(Clause 9.1 and 11.1)*

All dimensions in millimetres.



Nominal Diameter (DN)	<i>e</i>	<i>l</i>	Mass (Approx)
(1)	(2)	(3)	(4)
			kg
80	10.0	400	12
100	10.5	400	14
125	11.1	400	19
150	11.7	400	23
200	12.8	500	39
250	14.0	500	53
300	15.2	500	68
350	16.3	500	85
400	17.5	500	104
450	18.7	500	123
500	19.8	500	146
600	22.2	600	227
700	24.5	600	295
750	25.6	600	334
800	26.8	600	375
900	29.2	600	455
1 000	31.5	600	552
1 050	32.6	800	745
1 100	33.8	800	818
1 200	36.2	800	967
1 500	43.2	800	1 456

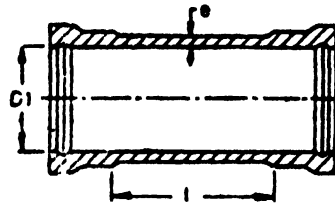
NOTES

1 For adjusting a flanged spigot to a pipe or to a socket, see Tables 2 and 3.

2 The fitting may also be supplied with a raised flange. For details of the raised flange, see Table 5.

Table 9 Collars
(Clauses 9.1 and 11.1)

All dimensions in millimetres.



$$e = \frac{14}{12} (7 + 0.02 DN)$$

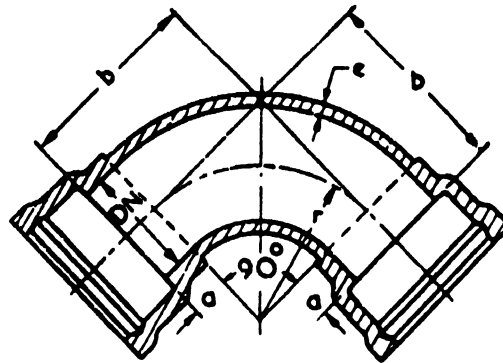
$$l = 150 + 0.1 DN$$

Nominal Diameter (DN)	e	l	Wts. (Approx)
(1)	(2)	(3)	(4)
			kg
80	10.9	158	14
100	11.4	160	17
125	12.0	163	22
150	12.6	165	28
200	13.8	170	40
250	15.0	175	55
300	16.2	180	71
350	17.5	185	90
400	18.6	190	110
450	19.8	195	133
500	21.1	200	159
600	23.5	210	216
700	25.9	220	283
750	27.2	225	320
800	28.4	230	360
900	30.8	240	448
1 000	33.2	250	547
1 050	35.0	255	601
1 100	35.6	260	655
1 200	38.0	270	779
1 500	45.4	300	1 261

NOTE — For DN values, see Table 3.

Table 10 Double Socket 1/4 Bends*(Clauses 9.1 and 11.1)*

All dimensions in millimetres.



$$r = 65 + 0.9 DN$$

$$a = 35 + 0.1 DN$$

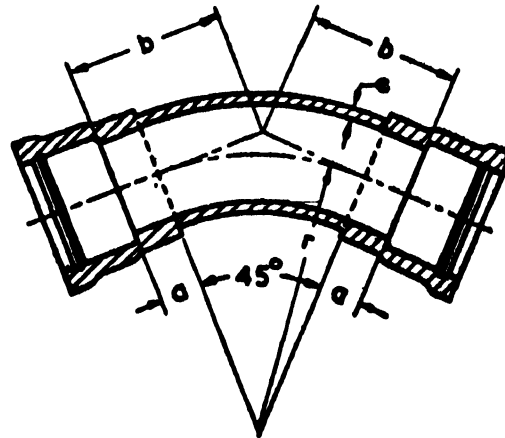
$$b = 100 + DN$$

$$e = \frac{14}{12} (7 + 0.02 DN)$$

Nominal Diameter (DN)	<i>e</i>	<i>r</i>	<i>a</i>	<i>b</i>	Mass (Approx)
(1)	(2)	(3)	(4)	(5)	(6)
					kg
80	10.0	137	43	180	18
100	10.5	152	45	200	24
125	11.1	177.5	47.5	225	33
150	11.7	200	50	250	43
200	12.8	245	55	300	67
250	14.0	290	60	350	98
300	15.2	335	65	400	135
350	16.3	380	70	450	181
400	17.5	425	75	500	234
450	18.7	470	80	550	290
500	19.8	515	85	600	370
600	22.2	605	95	700	546
700	24.5	695	105	800	770
750	25.6	740	110	850	899
800	26.8	785	115	900	1047
900	29.2	875	125	1 000	1389
1 000	31.5	965	135	1 100	1 780
1 050	32.6	1 010	140	1 150	2 012
1 100	33.8	1 055	145	1 200	2 246
1 200	36.2	1 145	155	1 300	2 792
1 500	43.2	1 415	185	1 600	4 951

Table 11 Double Socket 1/8 Bends
(Clauses 9.1 and 11.1)

All dimensions in millimetres.



$$r = 200 + DN$$

$$a = 35 + 0.1 DN$$

$$b = 117.8 + 0.514 DN$$

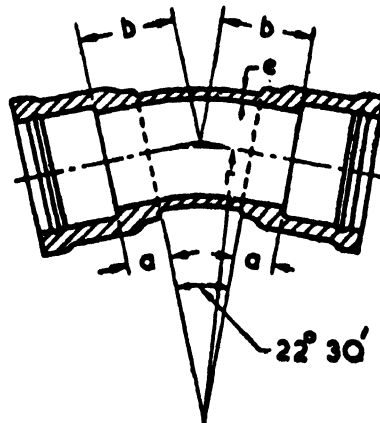
$$e = \frac{14}{12} (7 + 0.02 DN)$$

Nominal Diameter (DN)	e	r	a	b	Mass (Approx)
(1)	(2)	(3)	(4)	(5)	(6)
					kg
80	10.0	280	43	159	18
100	10.5	300	45	169	24
125	11.1	325	47.5	182	32
150	11.7	350	50	195	41
200	12.8	400	55	221	62
250	14.0	450	60	246	89
300	15.2	500	65	272	121
350	16.3	550	70	293	159
400	17.5	600	75	324	202
450	18.7	650	80	349	248
500	19.8	700	85	375	310
600	22.2	800	95	426	448
700	24.5	900	105	478	619
750	25.6	950	110	503	716
800	26.8	1 000	115	529	827
900	29.2	1 100	125	581	1 077
1 000	31.5	1 200	135	632	1 368
1 050	32.6	1 250	140	660	1 540
1 100	33.8	1 300	145	683	1 706
1 200	36.2	1 400	155	735	2 099
1 500	43.2	1 700	185	889	3 639

Table 12 Double Socket 1/16 Bends

(Clauses 9.1 and 11.1)

All dimensions in millimetres.



$$r = 200 + DN$$

$$a = 35 + 0.1 DN$$

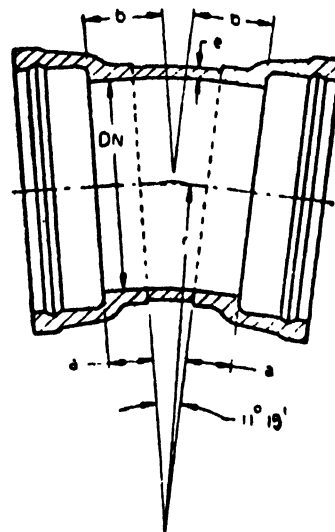
$$b = 74.78 + 0.2969 DN$$

$$e = \frac{14}{12} (7 + 0.02 DN)$$

Nominal Diameter (DN)	e	r	a	b	Mass (Approx)
(1)	(2)	(3)	(4)	(5)	(6)
					kg
80	10.0	280	43	99	16
100	10.5	300	45	105	21
125	11.1	325	47.5	112	27
150	11.7	350	50	120	35
200	12.8	400	55	135	53
250	14.0	450	60	150	75
300	15.2	500	65	164	100
350	16.3	550	70	179	130
400	17.5	600	75	194	164
450	18.7	650	80	209	197
500	19.8	700	85	224	246
600	22.2	800	95	254	351
700	24.5	900	105	284	478
750	25.6	950	110	299	551
800	26.8	1 000	115	314	632
900	29.2	1 100	125	344	813
1 000	31.5	1 200	135	374	1 024
1 050	32.6	1 250	140	386	1 145
1 100	33.8	1 300	145	404	1 267
1 200	36.2	1 400	155	433	1 547
1 500	43.2	1 700	185	523	2 652

Table 13 Double Socket 1/32 Bends
(Clauses 9.1 and 11.1)

All dimensions in millimetres.



$$r = 200 + DN$$

$$a = 35 + 0.1 DN$$

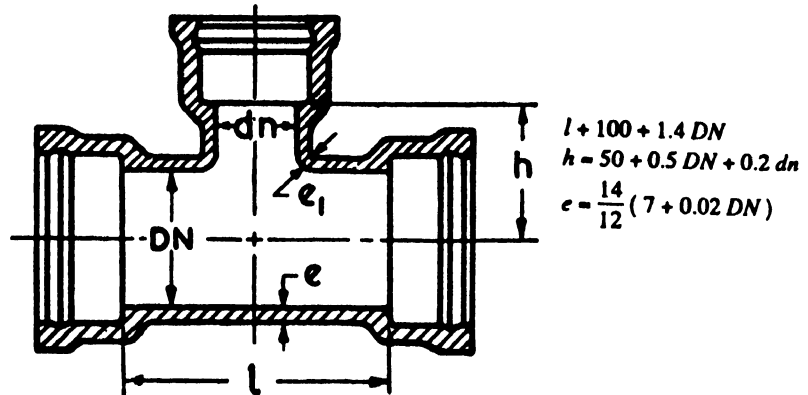
$$b = 5.169 + 0.198 DN$$

$$c = \frac{14}{12} (7 + 0.02 DN)$$

Nominal Diameter (DN)	c	r	a	b	Mass (Approx)
(1)	(2)	(3)	(4)	(5)	(6)
					kg
80	10.0	280	43	71	15
100	10.5	300	45	75	19
125	11.1	325	47.5	80	25
150	11.7	350	50	84	32
200	12.8	400	55	94	48
250	14.0	450	60	104	67
300	15.2	500	65	114	89
350	16.3	550	70	124	115
400	17.5	600	75	134	144
450	18.7	650	80	144	172
500	19.8	700	85	154	215
600	22.2	800	95	174	302
700	24.5	900	105	194	408
750	25.6	950	110	203	469
800	26.8	1 000	115	213	534
900	29.2	1 100	125	233	682
1 000	31.5	1 200	135	253	852
1 050	32.6	1 250	140	262	950
1 100	33.8	1 300	145	272	1 047
1 200	36.2	1 400	155	292	1 270
1 500	43.2	1 700	185	352	2 158

Table 14 Tees, All Sockets
(Clauses 9.1 and 11.1)

All dimensions in millimetres.



Nominal Diameter (DN)	Nominal Diameter (dn)	c	e ₁	l	h	Mass (Approx)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
						kg
80	80	10.0	10.0	212	106	23
100	80	10.5	10.5	240	116	28
	100	10.5	10.5	240	120	30
125	80	11.1	11.1	275	128.5	36
	100	11.1	11.1	275	132.5	38
	125	11.1	11.1	275	137.5	41
150	80	11.7	11.7	310	141	45
	100	11.7	11.7	310	145	47
	125	11.7	11.7	310	150	50
	150	11.7	11.7	310	155	53
200	80	12.8	12.8	380	166	67
	100	12.8	12.8	380	170	69
	125	12.8	12.8	380	175	71
	150	12.8	12.8	380	180	74
	200	12.8	12.8	380	190	81
250	80	14.0	13.0	450	191	94
	100	14.0	13.5	450	195	96
	125	14.0	14.0	450	200	99
	150	14.0	14.0	450	205	102
	200	14.0	14.0	450	215	108
	250	14.0	14.0	450	225	116

Table 14 (continued)

Nominal Diameter (DN)	Nominal Diameter (dn)	e	e ₁	l	h	Mass (Approx)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
						kg
300	80	15.2	13.0	520	216	128
	100	15.2	13.5	520	220	129
	125	15.2	14.5	520	225	132
	150	15.2	15.0	520	230	134
	200	15.2	15.2	520	240	142
	250	15.2	15.2	520	250	150
	300	15.2	15.2	520	260	159
350	200	16.3	16.3	590	265	182
	250	16.3	16.3	590	275	190
	300	16.3	16.3	590	285	199
	350	16.3	16.3	590	295	209
400	200	17.5	16.5	660	290	229
	250	17.5	17.5	660	300	237
	300	17.5	17.5	660	310	246
	350	17.5	17.5	660	320	256
	400	17.5	17.5	660	330	268
450	250	18.7	18.0	730	325	295
	300	18.7	18.7	730	335	304
	350	18.7	18.7	730	345	314
	400	18.7	18.7	730	355	324
	450	18.7	18.7	730	365	337
500	250	19.8	18.0	800	350	356
	300	19.8	19.5	800	360	365
	350	19.8	19.8	800	370	375
	400	19.8	19.8	800	380	386
	450	19.8	19.8	800	390	398
600	500	19.8	19.8	800	400	413
	300	22.2	19.5	940	410	521
	350	22.2	21.0	940	420	531
	400	22.2	22.2	940	430	543
	450	22.2	22.2	940	440	556
700	500	22.2	22.2	940	450	569
	600	22.2	22.2	940	470	602
	350	24.5	21.0	1 080	470	729
	400	24.5	22.5	1 080	480	742
	450	24.5	24.0	1 080	490	756
	500	24.5	24.5	1 080	500	769

Table 14 (continued)

Nominal Diameter (DN)	Nominal Diameter (dn)	e	e ₁	l	h	Mass (Approx)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
						kg
750	600	24.5	24.5	1 080	520	795
	700	24.5	24.5	1 080	540	832
	400	25.6	22.5	1 150	505	855
	450	25.6	24.0	1 150	515	869
	500	25.6	25.6	1 150	525	884
	600	25.6	25.6	1 150	545	911
	700	25.6	25.6	1 150	565	942
800	750	25.6	25.6	1 150	575	965
	400	26.8	22.5	1 220	530	982
	450	26.8	24.0	1 220	540	996
	500	26.8	25.5	1 220	550	1 010
	600	26.8	26.8	1 220	570	1 040
	700	26.8	26.8	1 220	590	1 072
	750	26.8	26.8	1 220	600	1 089
900	800	26.8	26.8	1 220	610	1 114
	450	29.2	24.0	1 360	590	1 288
	500	29.2	25.5	1 360	600	1 302
	600	29.2	28.5	1 360	620	1 337
	700	29.2	29.2	1 360	640	1 371
	750	29.2	29.2	1 360	650	1 388
	800	29.2	29.2	1 360	660	1 405
1 000	900	29.2	29.2	1 360	680	1 453
	500	31.5	25.5	1 500	650	1 648
	600	31.5	28.5	1 500	670	1 681
	700	31.5	31.5	1 500	690	1 723
	750	31.5	31.5	1 500	700	1 741
	800	31.5	31.5	1 500	710	1 759
	900	31.5	31.5	1 500	730	1 797
1 050	1 000	31.5	31.5	1 500	750	1 852
	600	32.6	28.5	1 570	700	1 885
	700	32.6	29.2	1 570	720	1 925
	750	25.6	29.2	1 570	725	1 950
	900	32.6	31.5	1 570	755	2 005
1 100	1050	32.6	32.6	1 570	785	2084
	600	33.8	28.5	1 640	720	2 085
	700	33.8	31.6	1 640	740	2 126
	750	33.8	33.1	1 640	750	2 149
	800	33.8	33.8	1 640	760	2 171

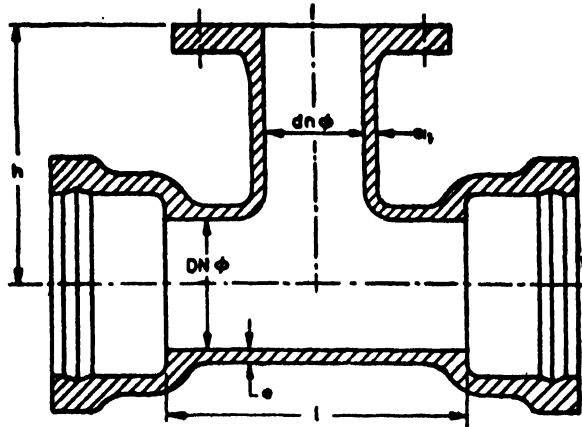
Table 14 (concluded)

Nominal Diameter (DN)	Nominal Diameter (dn)	e	e ₁	l	h	Mass (Approx)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
						kg
1 200	900	33.8	33.8	1 640	780	2 210
	1 000	33.8	33.8	1 640	800	2 253
	1 100	33.8	33.8	1 640	820	2 316
	600	36.2	28.5	1 780	770	2 559
	700	36.2	31.6	1 780	790	2 597
	750	36.2	33.1	1 780	800	2 620
	800	36.2	34.7	1 780	810	2 645
	900	36.2	36.2	1 780	830	2 693
	1 000	36.2	36.2	1 780	850	2 737
	1 100	36.2	36.2	1 780	870	2 782
1 500	1 200	36.2	36.2	1 780	890	2 854
	750	43.2	33.1	2 200	950	4 499
	800	43.2	34.7	2 200	960	4 521
	900	43.2	37.7	2 200	980	4 572
	1 000	43.2	40.7	2 200	1 000	4 634
	1 100	43.2	43.2	2 200	1 020	4 702
	1 200	43.2	43.2	2 200	1 040	4 754
	1 500	43.2	43.2	2 200	1 100	4 987

**Table 15 Double Socket Tee with Flanged Branch
(For Air Valves and Hydrant Tees)**

(Clauses 9.1 and 11.1)

All dimensions in millimetres.



$$e = \frac{14}{12} (7 + 0.02 DN)$$

$$l = 100 + 1.4 DN$$

$$h = 100 + DN \text{ (DN 80)}$$

$$h = 150 + 0.5 DN \text{ (DN 100 to 250)}$$

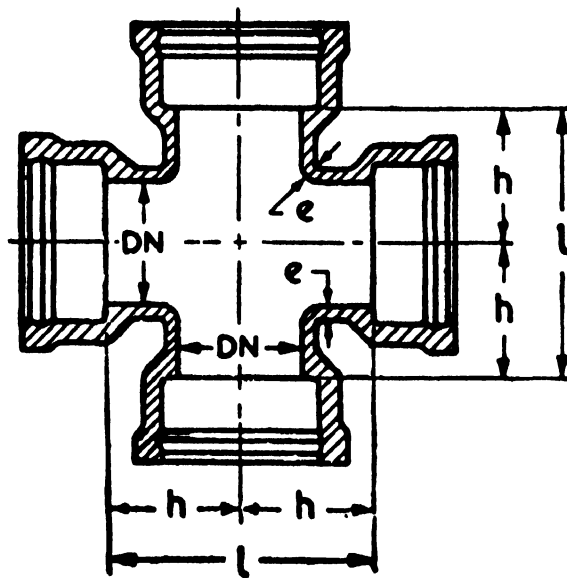
$$h = 150 + 0.5 DN \text{ (DN 300 to 1 500, dn 250)}$$

Body			Branch			Mass (Approx)
Nominal Diameter (DN)	e	l	Nominal Diameter (dn)	e ₁	k	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
						kg
80	10.0	212	80	10.0	180	22
100	10.5	240	80	10.5	200	28
125	11.1	275	80	11.1	212.5	36
150	11.7	310	80	11.7	225	45
200	12.8	380	80	12.8	250	67
250	14.0	450	80	13.0	275	94
300	15.2	520	80	13.0	300	128
300	15.2	520	100	13.5	300	129
350	16.3	590	80	13.0	325	180
350	16.3	590	100	13.5	325	198
400	17.5	660	80	13.0	350	205
400	17.5	660	100	13.5	350	220
450	18.7	730	100	13.5	350	235
500	19.8	800	150	14.0	400	280
600	22.2	940	150	15.0	550	505
700	24.5	1 090	150	15.0	600	650
750	25.6	1 150	150	15.0	625	705
800	26.8	1 220	200	16.5	650	880
900	29.2	1 360	200	16.5	700	920
1 000	31.5	1 500	200	16.5	750	1 005
1 050	32.6	1 570	200	16.5	775	1 070
1 100	33.8	1 640	250	18.0	800	2 030
1 200	36.2	1 780	250	18.0	850	2 550
1 500	43.2	2 200	250	18.0	1 000	2 850

Table 16 Crosses, All Sockets

(Clauses 9.1 and 11.1)

All dimensions in millimetres.



$$l = 100 + 1.4 DN$$

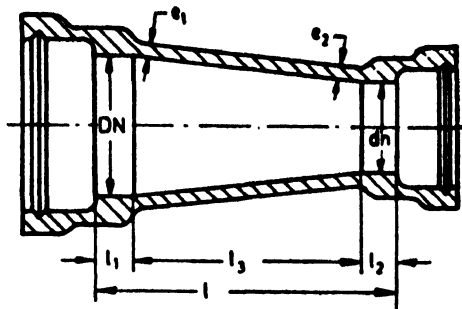
$$h = 50 + 0.7 DN$$

$$e = \frac{14}{12} (7 + 0.02 DN)$$

Nominal Diameter (DN)	e	l	h	Mass (Approx)
(1)	(2)	(3)	(4)	(5)
				kg
80	10.0	212	106	30
100	10.5	240	120	39
125	11.1	275	137.5	52
150	11.7	310	155	67
200	12.8	380	190	102
250	14.0	450	225	145
300	15.2	520	260	197

Table 17 Double Socket Tapers
(Clauses 9.1 and 11.1)

All dimensions in millimetres.



$$e_1 = \frac{14}{12} (7 + 0.02 DN)$$

$$e_2 = \frac{14}{12} (7 + 0.02 DN)$$

$$l_1 = 35 + 0.1 DN$$

$$l_2 = 35 + 0.1 dn$$

Large Diameter			Small Diameter			l	Mass	
Nominal Diameter (DN)	e ₁	l ₁	Nominal Diameter (dn)	e ₂	l ₂			l ₃
100	10.5	45	80	10.0	43	112	200	18
125	11.1	47.5	80	10.0	43	309.5	400	27
125	11.1	47.5	100	10.5	45	307.5	400	30
150	11.7	50	80	10.0	43	307	400	31
150	11.7	50	100	10.5	45	305	400	34
150	11.7	50	125	11.1	47.5	302.5	400	38
200	12.8	55	100	10.5	45	300	400	43
200	12.8	55	125	11.1	47.5	297.5	400	47
200	12.8	55	150	11.7	50	295	400	51
250	14.0	60	125	11.1	47.5	292.5	400	58
250	14.0	60	150	11.7	50	290	400	62
250	14.0	60	200	12.8	55	285	400	72
300	15.2	65	150	11.7	50	285	400	75
300	15.2	65	200	12.8	55	280	400	84
300	15.2	65	250	14.0	60	275	400	95
350	16.3	70	200	12.8	55	475	600	117
350	16.3	70	250	14.0	60	470	600	131
350	16.3	70	300	15.2	65	465	600	146
400	17.5	75	250	14.0	60	465	600	149
400	17.5	75	300	15.2	65	460	600	164
400	17.5	75	350	16.3	70	455	600	181
450	18.7	80	350	16.3	70	450	600	195

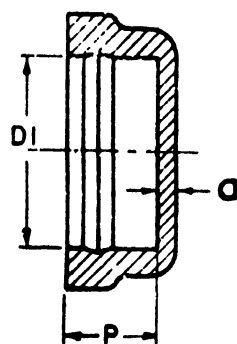
Table 17 (concluded)

Large Diameter			Small Diameter				<i>l</i>	Mass
Nominal Diameter (<i>DN</i>)	<i>e</i> ₁	<i>l</i> ₁	Nominal Diameter (<i>dn</i>)	<i>e</i> ₂	<i>l</i> ₂	<i>l</i> ₃		
450	18.7	80	400	17.5	75	445	600	kg. 213
500	19.8	85	350	16.3	70	445	600	222
500	19.8	85	400	17.5	75	440	600	241
500	19.8	85	450	18.7	80	435	435	256
600	22.2	95	400	18.7	80	425	600	310
600	22.2	95	450	18.7	80	425	600	310
600	22.2	95	500	19.8	85	420	600	332
700	24.5	105	500	19.8	85	410	600	388
700	24.5	105	600	22.2	95	400	600	437
750	25.7	110	600	22.2	95	395	600	470
750	25.7	110	700	24.5	105	395	600	522
800	26.8	115	600	22.4	95	390	600	501
800	26.8	115	700	24.5	105	380	600	557
800	26.8	115	750	25.6	110	375	600	590
900	29.2	125	700	24.5	105	370	600	629
900	29.2	125	750	25.6	110	365	600	694
900	29.2	125	800	26.8	115	360	600	692
1 000	31.5	135	800	26.8	115	350	600	772
1 000	31.5	135	900	29.2	125	340	600	843
1 050	32.6	140	800	26.8	115	345	600	860
1 050	32.6	140	1 000	31.5	135	325	600	920
1 100	33.8	145	900	29.2	125	330	600	957
1 100	33.8	145	1000	31.5	135	320	600	978
1 200	36.2	155	900	29.2	125	320	600	1 089
1 200	36.2	155	1 000	31.5	135	310	600	1 109
1200	36.2	155	1 100	33.8	145	300	600	1 134
1 500	43.2	185	1 000	31.5	135	280	600	1 379
1 500	43.2	185	1 100	33.8	145	270	600	1 477
1 500	43.2	185	1 200	36.2	155	260	600	1 567

NOTE— Dimensions for sockets shall be followed as given in Table 3 .

Table 18 Caps
(Clauses 9.1 and 11.1)

All dimensions in millimetres.



$$a = 19 + 0.028 DN$$

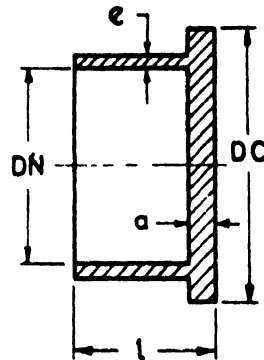
Nominal Diameter (DN)	<i>a</i>	<i>P</i>	Mass (Approx)
(1)	(2)	(3)	(4)
			kg
80	21	84	7
100	22	88	9
125	22.5	91	12
150	23	94	15
200	24.5	100	24
250	26	103	34
300	27.5	105	46
350	29	107	61
400	30	110	77
450	31.5	112	97
500	33	115	118
600	36	120	171
700	38.5	122	235
750	40	123	272
800	41.5	125	314
900	44	128	405
1 000	47	130	514
1 050	48	135	576
1 100	50	135	638
1 200	52.5	140	778
1 500	61	150	1 342

NOTES

- 1 Beyond the nominal diameter 300 mm, the caps may be ribbed and strengthened, if desired.
- 2 For *DN* values, see Table 3.

Table 19 Plugs
(Clauses 9.1 and 11.1)

All dimensions in millimetres.



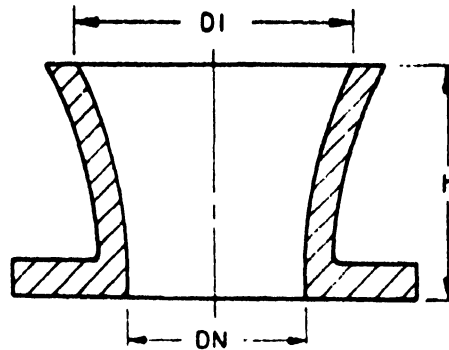
$$e = \frac{14}{12} (7 + 0.02 DN)$$

$$a = (19 + 0.028 DN)$$

Nominal Diameter (DN)	DC	e	a	l	Mass (Approx)
(1)	(2)	(3)	(4)	(5)	(6)
					kg
80	104	10.0	21	125	3
100	124	10.5	22	130	4
125	150	11.1	22.5	135	6
150	176	11.7	23	140	9
200	228	12.8	24.5	150	14
250	281	14.0	26	155	22
300	333	15.2	27.5	160	30
350	385	16.3	29	165	41
400	436	17.5	30	170	54
450	487	18.7	31.5	175	69
500	539	19.8	33	180	86
600	642	22.2	36	185	127
700	745	24.5	38.5	195	180
750	798	25.6	40	200	211
800	850	26.8	41.5	205	246
900	953	29.2	44	210	321
1 000	1 056	31.5	47	215	411
1 050	1 132	32.6	48	220	464
1 100	1 160	33.8	50	220	518
1 200	1 264	36.2	52.5	225	637
1 500	1 576	43.2	61	235	1 099

Table 20 Bell Mouth Pieces*(Clauses 9.1 and 11.1)*

All dimensions in millimetres.

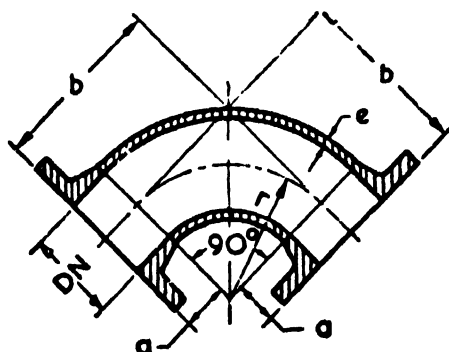


Nominal Diameter (DN)	Big End Diameter (DI)	h	Mass (Approx)
(1)	(2)	(3)	(4)
			kg
80	125	100	7
100	150	150	9
125	175	150	12
150	200	150	15
200	285	200	23
250	350	200	31
300	450	250	45
350	525	250	58
400	600	300	80
450	650	300	93
500	750	350	120
600	900	410	201
700	1 050	470	304
800	1 200	520	435
900	1 350	590	575
1 000	1 500	650	792
1 050	1 550	680	880
1 100	1 650	710	965
1 200	1 800	770	1 243
1 500	2 250	950	2 092

Table 21 Double Flanged 1/4 Bends.

(Clauses 9.1 and 11.1)

All dimensions in millimetres.



$$r = 65 + 0.9 DN$$

$$a = 35 + 0.1 DN$$

$$b = 100 + DN$$

$$e = \frac{14}{12} (7 + 0.02 DN)$$

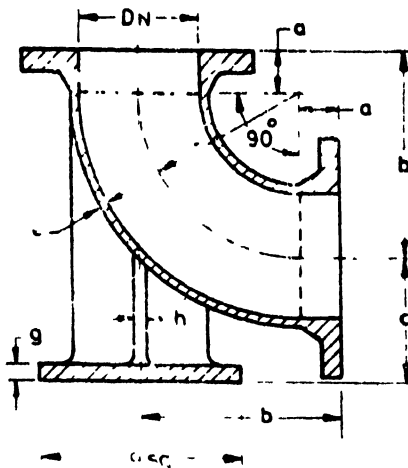
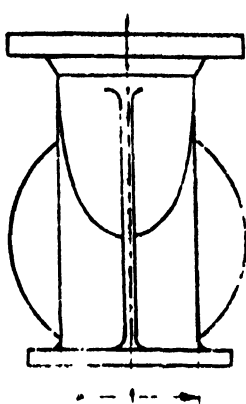
Nominal Diameter (DN)	e	r	a	b	Mass (Approx)
(1)	(2)	(3)	(4)	(5)	(6)
					kg
80	10.0	137	43	180	13
100	10.5	155	45	200	17
125	11.1	177.5	47.5	225	23
150	11.7	200	50	250	31
200	12.8	245	55	300	49
250	14.0	290	60	350	72
300	15.2	335	65	400	100
350	16.3	380	70	450	137
400	17.5	425	75	500	181
450	18.7	470	80	550	226
500	19.8	515	85	600	290
600	22.2	605	95	700	442
700	24.5	695	105	800	639
750	25.6	740	110	850	755
800	26.8	785	115	900	890
900	29.2	875	125	1 000	1 179
1 000	31.5	965	135	1 100	1 544
1 050	32.6	1 010	140	1 150	1 760
1 100	33.8	1 055	145	1 200	1 968
1 200	36.2	1 145	155	1 300	2 474
1 500	43.2	1 415	185	1 600	3 423

NOTE — The fitting may also be supplied with a raised flange. For details of the raised flange, see Table 5.

Table 22 Double Flanged 1/4 Duckfoot Bends

(Clauses 9.1 and 11.1)

All dimensions in millimetres.



$$r = 65 + 0.9 DN$$

$$a = 35 + 0.1 DN$$

$$b = 100 + DN$$

$$c = 60 + 0.6 DN$$

$$d = 100 + DN$$

$$e = \frac{14}{12} (7 + 0.02 DN)$$

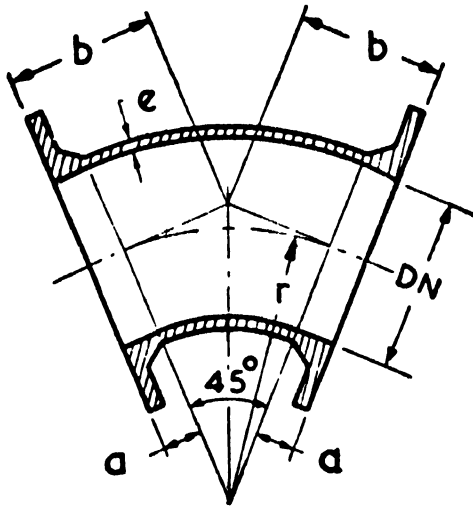
Nominal Diameter (DN)	e	r	a	b	c	a	f	g	h	Mass (Approx)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
										kg
80	10.0	137	43	180	108	180	98	19	15	21
100	10.5	155	45	200	120	200	118	20	16	26
125	11.1	177.5	47.5	225	135	225	144	22	16	36
150	11.7	200	50	250	150	250	170	22	17	47
200	12.8	245	55	300	180	300	222	25	18	74
250	14.0	290	60	350	210	350	274	26	19	111
300	15.2	335	65	400	240	400	326	26	20	156
350	16.3	380	70	450	270	450	400	28	21	214
400	17.5	425	75	500	300	500	450	30	23	281
450	18.7	470	80	550	330	550	500	30	24	350
500	19.8	515	85	600	360	600	550	31	25	446
600	22.2	605	95	700	420	700	650	35	27	677

NOTE - The fitting may also be supplied with a raised flange. For details of the raised flange, see Table 5.

Table 23 Double Flanged 1/8 Bends

(Clauses 9.1 and 11.1)

All dimensions in millimetres.



$$r \begin{cases} 80 \text{ to } 300 = 156.9 + 2.1728 DN \\ 350 \text{ to } 1500 = 200 + DN \end{cases}$$

$$a = 35 + 0.1 DN$$

$$b \begin{cases} 80 \text{ to } 300 = 100 + DN \\ 350 \text{ to } 1500 = 117.8 + 0.514 DN \end{cases}$$

$$e = \frac{14}{12} (7 + 0.02 DN)$$

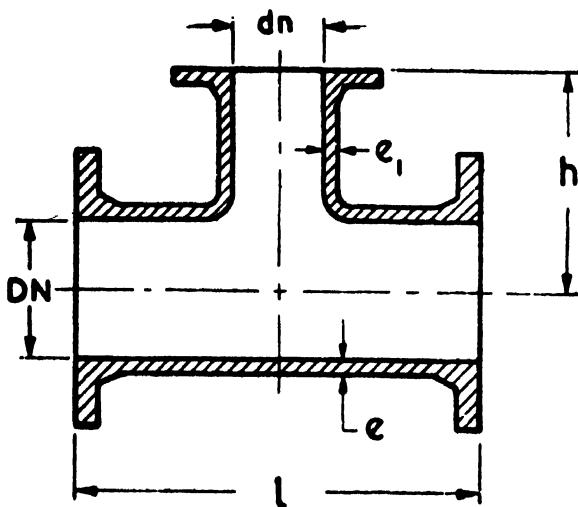
Nominal Diameter (DN)	e	r	a	l	Mass (Approx)
(1)	(2)	(3)	(4)	(5)	(6)
					kg
80	10.0	331	43	180	14
100	10.5	374	45	200	18
125	11.1	429	47.5	225	25
150	11.7	483	50	250	34
200	12.8	591	55	300	54
250	14.0	700	60	350	80
300	15.2	809	65	400	112
350	16.3	550	70	298	115
400	17.5	600	75	324	149
450	18.7	650	80	349	185
500	19.8	700	85	375	231
600	22.2	800	95	426	342
700	24.5	900	105	478	485
750	25.6	950	110	503	572
800	26.8	1000	115	529	667
900	29.2	1 100	125	581	868
1 000	31.5	1 200	135	682	1 125
1 050	32.6	1 250	140	658	1 275
1 100	33.8	1 300	145	683	1 421
1 200	36.2	1 400	155	735	1 771
1 500	43.2	1 700	185	889	2 460

NOTE — The fitting may also be supplied with a raised flange. For details of the raised flange, see Table 5.

Table 24 All Flanged Tees

(Clauses 9.1 and 11.1)

All dimensions in millimetres.



$$l = \begin{cases} DN & 80 \text{ to } 300 = 200 + 2 DN \\ DN & 350 \text{ to } 1500 = 500 + DN \end{cases}$$

$$h = \begin{cases} DN & 80 \text{ to } 300 \begin{cases} dn = DN = 100 + DN \\ dn < DN = 100 + 0.5 DN + 0.5 dn \end{cases} \\ DN & 350 \text{ to } 1000 \begin{cases} dn \leq 250 = 150 + 0.5 DN \\ dn \geq 300 = 250 + 0.5 DN \end{cases} \\ DN & 1000 \text{ to } 1500 \begin{cases} dn \leq 1000 = 250 + 0.5 DN \\ dn \geq 1100 = 50 + 0.5 DN + 0.2 dn \end{cases} \end{cases}$$

$$e = \frac{14}{12} (7 + 0.02 DN)$$

Body			Branch			Mass (Approx)
Nominal Diameter (DN)	e	l	Nominal Diameter (dn)	e ₁	h	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
						kg
80	10.0	360	80	10.0	180	21
100	10.5	400	80	10.5	190	25
	10.5	400	100	10.5	200	26
	11.1	450	80	11.1	202.5	32
125	11.1	450	100	11.1	212.5	34
	11.1	450	125	11.1	225	36
	11.7	500	80	11.7	215	41
	11.7	500	100	11.7	225	42
150	11.7	500	125	11.7	237.5	45
	11.7	500	150	11.7	250	47
	12.8	600	80	12.8	240	62
	12.8	600	100	12.8	250	63
	12.8	600	125	12.8	262.5	66
200	12.8	600	150	12.8	275	68
	12.8	600	200	12.8	300	74
	14.0	700	80	13.0	265	89
	14.0	700	100	13.5	275	90
	14.0	700	125	14.0	287.5	93
250	14.0	700	150	14.0	300	96

Table 24 (continued)

Body			Branch			Mass (Approx)
Nominal Diameter (DN)	<i>e</i>	<i>l</i>	Nominal Diameter (<i>d_n</i>)	<i>e₁</i>	<i>h</i>	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
						kg
300	14.0	700	200	14.0	325	102
	14.0	700	250	14.0	350	109
	15.2	800	80	13.0	290	122
	15.2	800	100	13.5	300	124
	15.2	800	125	14.5	312.5	126
	15.2	800	150	15.0	325	129
	15.2	800	200	15.2	350	136
350	15.2	800	250	15.2	370	143
	15.2	800	300	15.2	400	151
	16.3	850	200	16.3	325	169
	16.3	850	250	16.3	325	173
	16.3	850	300	16.3	425	188
	16.3	850	350	16.3	425	195
	17.5	900	200	16.5	350	211
400	17.5	900	250	17.5	350	215
	17.5	900	300	17.5	450	232
	17.5	900	350	17.5	450	239
	17.5	900	400	17.5	450	246
	18.7	950	250	18.0	375	260
	18.7	950	300	18.7	475	277
	18.7	950	350	18.7	475	284
450	18.7	950	400	18.7	475	290
	18.7	950	450	18.7	475	296
	19.8	1 000	250	18.0	400	315
	19.8	1 000	300	19.5	500	334
	19.8	1 000	350	19.8	500	342
	19.8	1 000	400	19.8	500	349
	19.8	1 000	450	19.8	500	356
500	19.8	1 000	500	19.8	500	363
	22.2	1 100	300	19.5	550	466
	22.2	1 100	350	21.0	550	475
	22.2	1 100	400	22.2	550	485
	22.2	1 100	450	22.2	550	492
	22.2	1 100	500	22.2	550	499
	22.2	1 100	600	22.2	550	516

Table 24 (continued)

Body			Branch			Mass (Approx)
Nominal Diameter (DN)	e	l	Nominal Diameter (dn)	e ₁	h	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
700	21.5	1 200	350	21.0	600	642
	24.5	1 200	400	22.5	600	651
	24.5	1 200	450	24.0	600	660
	24.5	1 200	500	24.5	600	669
	24.5	1 200	600	24.5	600	686
	24.5	1 200	700	24.5	600	707
750	25.6	1 250	400	22.5	625	746
	25.6	1 250	450	24.0	625	754
	25.6	1 250	500	25.6	625	766
	25.6	1 250	600	25.6	625	779
	25.6	1 250	700	25.6	625	792
	25.6	1 250	750	25.6	625	805
800	26.8	1 300	400	22.5	650	858
	26.8	1 300	450	24.0	650	867
	26.8	1 300	500	25.5	650	877
	26.8	1 300	600	26.8	650	897
	26.8	1 300	700	26.8	650	916
	26.8	1 300	750	26.8	650	928
900	29.2	1 400	450	24.0	700	1 091
	29.2	1 400	500	25.5	700	1 106
	29.2	1 400	600	28.5	700	1 128
	29.2	1 400	700	29.2	700	1 149
	29.2	1 400	750	29.2	700	1 161
	29.2	1 400	800	29.2	700	1 173
1 000	29.2	1 400	900	29.2	700	1 190
	31.5	1 500	500	25.5	750	1 396
	31.5	1 500	600	28.5	750	1 418
	29.5	1 500	700	31.5	750	1 446
	31.5	1 500	750	31.5	750	1 457
	31.5	1 500	800	31.5	750	1 468
1 050	31.5	1 500	900	31.5	750	1 484
	31.5	1 500	1 000	31.5	750	1 513
	32.6	1 550	600	28.5	775	1 490

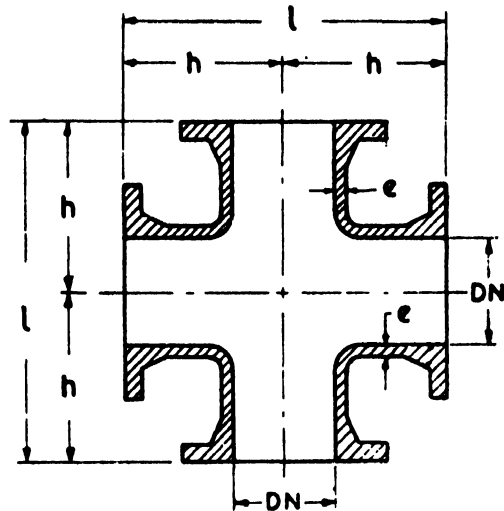
Table 24 (concluded)

Body			Branch			Mass (Approx)
Nominal Diameter (DN)	<i>e</i>	<i>l</i>	Nominal Diameter (<i>dn</i>)	<i>e</i> ₁	<i>h</i>	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
						kg
	32.6	1 550	750	32.6	775	1 545
	32.6	1 550	900	32.6	775	1 595
	32.6	1 550	1 000	32.6	775	1 630
	32.6	1 550	1 050	32.6	775	1 670
1 100	33.8	1 600	600	28.5	800	1 722
	33.8	1 600	700	31.6	800	1 747
	33.8	1 600	750	33.1	800	1 762
	33.8	1 600	800	33.8	800	1 774
	33.8	1 600	900	33.8	800	1 778
	33.8	1 600	1 000	33.8	800	1 788
1 200	33.8	1 600	1 100	33.8	820	1 822
	36.2	1 700	600	28.5	850	2 113
	36.2	1 700	700	31.6	850	2 137
	36.2	1 700	750	33.1	850	2 150
	36.2	1 700	800	34.7	850	2 166
	36.2	1 700	900	36.2	850	2 179
	36.2	1 700	1 000	36.2	850	2 190
	36.2	1 700	1 100	36.2	870	2 207
	36.2	1 700	1 200	36.2	890	2 260
1 500	43.2	2 000	750	33.1	1 000	3 606
	43.2	2 000	800	34.7	1 000	3 619
	43.2	2 000	900	37.7	1 000	3 635
	43.2	2 000	1 000	40.7	1 000	3 663
	43.2	2 000	1 100	43.2	1 020	3 703
	43.2	2 000	1 200	43.2	1 040	3 737
	43.2	2 000	1 500	43.2	1 100	3 866

NOTE - The fitting may also be supplied with a raised flange. For details of the raised flange, see Table 5.

Table 25 All Flanged Crosses*(Clauses 9.1 and 11.1)*

All dimensions in millimetres.



$$l = 200 + 2 DN$$

$$h = 100 + DN$$

$$e = \frac{14}{12} (7 + 0.02 DN)$$

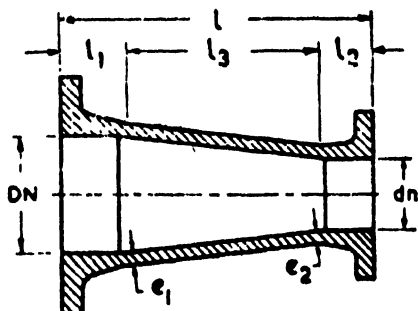
Nominal Diameter (DN)	e	l	h	Mass (Approx)
(1)	(2)	(3)	(4)	(5)
80	10.0	360	180	kg 27
100	10.5	400	200	34
125	11.1	450	225	46
150	11.7	500	250	60
200	12.8	600	300	93
250	14.0	700	350	135
300	15.2	800	400	180

NOTE— The fitting may also be supplied with a raised flange. For details of the raised flange, see Table 5.

Table 26 Double Flanged Tapers

(Clauses 9.1 and 11.1)

All dimensions in millimetres.



$$l_1 = 35 + 0.1 DN$$

$$l_2 = 35 + 0.1 DN$$

$$e_1 = \frac{14}{12} (7 + 0.02 DN)$$

$$e_2 = \frac{14}{12} (7 + 0.02 dn)$$

Large Diameter			Small Diameter			l_3	l	Mass (Approx)
Nominal Diameter (DN)	e_1	l_1	Nominal Diameter (dn)	e_2	l_2			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
100	10.5	45	80	10.0	43	112	200	12
125	11.1	47.5	80	10.0	43	309.5	400	20
	11.1	47.5	100	10.5	45	307.5	400	22
	11.7	50	80	10.0	43	307	400	23
150	11.7	50	100	10.5	45	305	400	25
	11.7	50	125	11.1	47.5	302.5	400	27
	12.8	55	100	10.5	45	300	400	31
200	12.8	55	125	11.1	47.5	297.5	400	34
	12.8	55	150	11.7	50	295	400	37
	14.0	60	125	11.1	47.5	292.5	400	41
250	14.0	60	150	11.7	50	290	400	44
	14.0	60	200	12.8	55	285	400	50
	15.2	65	150	11.7	50	285	400	51
300	15.2	65	200	12.8	55	280	400	58
	15.2	65	250	14.0	60	275	400	65
	16.3	70	200	12.8	55	475	600	87
350	16.3	70	250	14.0	60	470	600	96
	16.3	70	300	15.2	65	465	600	106

Table 26 (concluded)

Large Diameter			Small Diameter			l_3	l	Mass (Approx)
Nominal Diameter (DN)	e_1	l_1	Nominal Diameter (d_n)	e_2	l_2			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
400	17.5	75	250	14.6	60	465	600	109
	17.5	75	300	15.2	65	460	600	120
	17.5	75	350	16.3	70	455	600	132
450	18.7	80	300	15.2	65	455	600	130
	18.7	80	350	16.5	70	450	600	145
	18.7	80	400	17.5	75	445	600	158
500	19.8	85	350	16.3	70	445	600	160
	19.8	85	400	17.5	75	440	600	174
	19.8	85	450	18.7	80	435	600	186
600	22.2	95	400	17.5	75	430	600	210
	22.2	95	450	18.7	80	425	600	222
	22.2	95	500	19.8	85	420	600	239
700	24.5	105	500	19.8	85	410	600	281
	24.5	105	600	22.2	95	400	600	317
750	25.6	110	600	22.2	95	395	600	338
	25.6	110	700	24.5	105	385	600	380
800	26.8	115	600	22.2	95	390	600	368
	26.8	115	700	24.5	105	380	600	410
	26.8	115	750	25.6	110	375	600	428
900	29.2	125	700	24.5	105	370	600	458
	29.2	125	750	25.6	110	365	600	478
	29.2	125	800	26.8	115	360	600	508
1 000	31.5	135	800	26.8	115	350	600	570
	31.5	135	900	29.2	125	340	600	617
1 050	32.6	140	900	29.2	125	335	600	680
	32.6	140	1 000	31.5	135	325	600	750
1 100	33.8	145	900	29.2	125	330	600	684
	33.8	145	1 000	31.5	135	320	600	744
1 200	36.2	155	1 000	31.5	135	310	600	820
	36.2	155	1 100	33.8	145	300	600	884
1 500	43.2	185	1 100	33.8	145	270	600	1 126
	43.2	185	1 200	36.2	150	260	600	1 198

NOTE - The fitting may also be supplied with a raised flange. For details of the raised flange, see Table 5

Table 27 All Flanged Radial Tees

(Clauses 9.1 and 11.1)

$e = 14/12 (7 + 0.02 DN)$

$r = 65 + 0.9 dn$

$a = 35 + 0.1 dn$

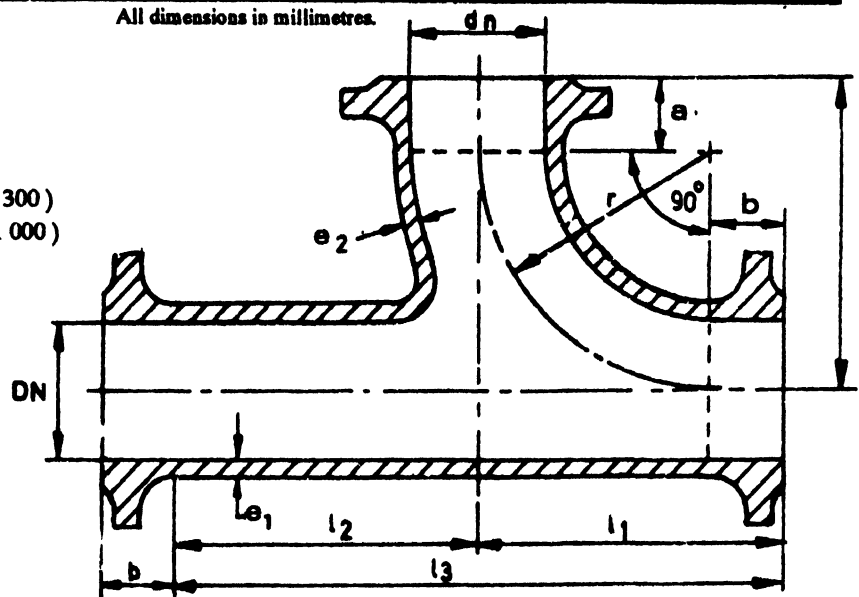
$b = 35 + 0.1 DN$

$l_1 = r + b$

$l_2 = 200 + 2 DN$ (for $DN = 80$ to 300)

$l_3 = 500 + DN$ (for $DN = 350$ to $1\ 000$)

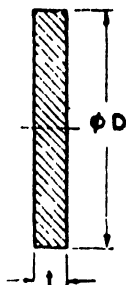
$l_2 = l_3 - l_1$



Nominal Diameters		Body				Branch				Mass
DN	dn	e_1	b	l_3	l_2	e_2	r	a	l_1	
(1)	(2)	(3)	(4)	(5)	(5)	(6)	(7)	(8)	(9)	(10)
80	80	10.0	43	360	180	10.0	137	43	180	19
100	80	10.5	45	400	218	10.5	137	43	182	21
125	100	11.1	47	450	248	11.1	155	45	202	28
150	100	11.7	50	500	295	11.7	155	45	205	34
200	100	12.8	55	600	390	12.8	155	45	210	67
250	150	14.0	60	700	440	14.0	200	50	260	73
300	150	15.2	65	800	535	15.0	200	50	265	94
350	200	16.3	70	850	535	16.3	245	55	315	128
400	200	17.5	75	900	580	16.5	245	55	320	155
450	300	18.7	80	950	535	17.5	335	65	415	230
500	400	19.8	85	1 000	490	19.8	425	75	510	309
600	400	22.2	95	1 100	580	22.2	425	75	520	390
700	500	24.5	105	1 200	580	24.5	515	85	620	390
750	500	25.6	110	1 250	625	25.5	515	85	625	571
800	600	26.8	115	1 300	580	26.8	605	95	720	690
900	600	29.2	125	1 400	670	28.5	605	95	730	807
1 000	600	31.5	135	1 500	760	28.5	605	95	740	1 128

Table 28 Blank Flanges
(Clauses 9.1 and 11.1)

All dimensions in millimetres.



Nominal Diameter (DN)	D	t	Mass (Approx)
(1)	(2)	(3)	(4)
			kg
80	200	21	5
100	220	22	6
125	250	22.5	8
150	285	23	11
200	340	24.5	16
250	395	26	23
300	445	27.5	32
350	505	29	43
400	565	30	55
450	615	31.5	67
500	670	33	85
600	780	36	126
700	895	38.5	177
750	960	40	207
800	1 015	41.5	245
900	1 115	44	313
1 000	1 230	47	406
1 050	1 258	48	455
1 100	1 340	50	504
1 200	1 455	52.5	624
1 500	1 800	61	1 110

NOTES

- 1 Beyond the nominal diameter 300 mm, the flanges may be ribbed and strengthened, if desired.
- 2 The fitting may also be supplied with a raised flange. For details of the raised flange, see Table 5.

(Continued fom second cover)

This standard differs from the ISO Recommendation in the following respects:

- a) The term 'fittings' has been used throughout the specification in preference to the term 'special castings',
- b) The Brinell hardness number has been brought down to 210 at the external unmachined surface instead of 215 at the centre of the thickness (see 4.3), and
- c) Tolerances on diameters of socket and spigot have been modified.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final values, observed or calculated, expressing the results of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. 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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