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मानक

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“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 1879 (2010): Malleable cast iron pipe fittings _
Specification [MTD 6: Pig iron and Cast Iron]



“ज्ञान से एक नये भारत का निर्माण”

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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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भारतीय मानक
धातवर्ध्य ढलवां लोहा पाइप फिटिंग — विशिष्टि
(तीसरा पुनरीक्षण)

Indian Standard
MALLEABLE CAST IRON PIPE FITTINGS —
SPECIFICATION
(*Third Revision*)

ICS 23.040.10; 23.040.40

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

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.

This standard was first published in 1961 and subsequently revised in 1975 and 1987. While reviewing the standard in the light of the experience gained during these years the Committee decided that the standard may be further revised.

In this standard all amendments issued earlier have been incorporated.

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 '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.

AMENDMENT NO. 1 NOVEMBER 2011
TO
IS 1879 : 2010 MALLEABLE CAST IRON PIPE
FITTINGS — SPECIFICATION
(Third Revision)

(Page 13, Table 11) — Insert the following new sizes at the appropriate rows of the table:

Size Designation	Dimensions, mm		Nominal Mass (kg/100 Pieces)
B1	<i>a</i>	<i>b</i>	
(1)	(2)	(3)	(4)
$3 \times \frac{1}{2} \times 3$	45	64	—
$4 \times \frac{1}{2} \times 4$	50	78	—
$4 \times \frac{3}{4} \times 4$	56	80	—
$4 \times 1 \times 4$	58	81	—
$4 \times 1\frac{1}{4} \times 4$	58	82	—
$4 \times 1\frac{1}{2} \times 4$	64	85	—
$4 \times 2\frac{1}{2} \times 4$	76	90	—
$8 \times 4 \times 8$	106	125	—

(MTD 6)

Indian Standard

MALLEABLE CAST IRON PIPE FITTINGS — SPECIFICATION (*Third Revision*)

1 SCOPE

1.1 This standard covers requirements for following types of malleable cast iron pipe fittings threaded in accordance with IS 554 for general purposes for the transmission of fluid and gas up to the limit of pressure and temperature specified in **1.3**. These are indicated in following sections:

Section 1	General
Section 2	Elbows, including twin elbows, union elbows and side outlet elbows
Section 3	Tees including pitcher tees and side outlet tees
Section 4	Crosses
Section 5	Bends including long sweep bends and return bends
Section 6	Sockets
Section 7	Bushing and hexagon nipples
Section 8	Backnuts
Section 9	Caps and plugs and
Section 10	Unions

1.2 Dimensions which are not included in the standard are left to the discretion of the manufacturer depending on the end use of the fittings.

1.3 These fittings shall be suitable for working pressure of up to 1.4 MPa in the case of water and up to 0.7 MPa in the case of steam, air, gas and oil at a temperature not exceeding 100°C.

2 REFERENCES

The standards listed below contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

<i>IS No.</i>	<i>Title</i>
554 : 1999/ ISO 7-1 : 1994	Pipe threads where pressure tight joints are made on the threads — Dimensions, tolerances and designation (<i>fourth revision</i>)

IS No.

Title

1387 : 1993	General requirements for the supply of metallurgical materials (<i>second revision</i>)
4759 : 1996	Hot dip zinc coatings as structural steel and other allied products (<i>third revision</i>)
4905 : 1968	Methods for random sampling
8999 : 2003/ ISO 7-2 : 2000	Pipe threads where pressure-tight joints are made on the threads — Verification by means of limit gauges (<i>first revision</i>)
14329 : 1995	Malleable iron castings

3 TERMINOLOGY

For the purpose of this standard the following definitions shall apply.

3.1 Fittings — The connecting pieces connecting one or more parts.

3.1.1 Equal Fittings — Where all outlets are of the same size.

3.1.2 Unequal Fittings — When two or more outlets are of different size irrespective of the number of outlets.

3.1.3 Male Fittings — Fittings having only male threads.

3.1.4 Female Fittings — Fittings having female threads on the outlet.

3.1.5 Male-Female Fittings — Fittings having male and female threads at the outlets.

3.2 Size Designation — It denotes the size of threads of the threaded outlet of the pipe fitting and is determined by the nominal size (in inch) of threads as specified in IS 554.

NOTE — A relationship between nominal size (in inch) of the thread at the outlet of the fitting and the corresponding nominal diameter *DN*, a numerical designation of size which is common to all piping system other than the components designated by outside diameter and corresponds approximately to the internal diameter, in mm, is given in Annex A.

3.3 Reinforcement — An additional material at the

outside diameter of an internally threaded fitting in the form of band or bead (*see* Fig. 1).

3.4 Rib — Locally or axially aligned additional material on the outside or inside of a fitting for assistance in the assembly or manufacturing.

3.5 Outlet — Internally or externally threaded end of fitting which connects with a pipe fitting or other component, threaded in accordance with IS 554.

3.6 Run — Two principal axially aligned outlets of a tee or cross.

3.7 Branch — Side outlet(s) of a tee or cross.

3.8 Chamber — Removal of a conical portion at the entrance of a thread to assist assembly and prevent damage to the start of the thread.

3.9 Face-to-Face Dimension — Distance between two parallel faces of axially aligned outlet of a fitting.

3.10 Face-to-Centre Dimension — Distance from the face of an outlet to the central axis of angularly disposed outlet.

3.11 Centre-to-Centre Dimension — Distance between the two parallel central axis of the outlet of a fitting.

SECTION 1 GENERAL

4 SUPPLY OF MATERIAL

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

5 DESIGNATION

5.1 Malleable cast iron fittings shall be designated giving the following particulars in the sequence shown:

- Type of fitting (*see* 4.1.1),
- Size designation (*see* 4.1.2),
- Right-and left-hand thread where applicable (*see* 4.1.3), and
- Code number (*see* 4.1.4).

5.1.1 Type of Fittings

It is denoted as elbow, bend, tee, cross, etc. The

diagrammatic representation of the various types of fittings is given in Table 1.

NOTE — It may be noted that the following terms are omitted when reference is made to the type of fittings:

- Indication 90° for elbows, bends and tees of 90°,
- Word 'equal' for equal fittings,
- Word 'female' for female fittings, and
- Word 'male' for male fittings.

5.1.2 Size Designation

It is denoted by the nominal size (in inch) of the thread at the outlet of the fitting, threaded in accordance with IS 554, Size designations for various types of fittings are given in sections 2 to 10, as applicable.

5.1.2.1 Equal fittings

Where all outlets are of the same size, the fitting shall be referred to by that one size, irrespective of the number of outlets.

5.1.2.2 Unequal fittings

They are referred to by the size of each outlet, the sequence of specifying being dependent on the number of outlets as indicated in Fig. 2 and Fig. 3.

5.1.3 Right and Left Hand Thread

For sockets and hexagon nipples with right and left-hand thread, the letter R-L (right left) shall be added after the nominal size of the fitting.

5.1.4 Code Number

Code number for various types of fitting are given in Table 1.

Example for designation:

- Equal female elbow Size 1 = Elbow 1, A 1;
- Equal male or female bend 1 Size 1½ = Bend 1½ D4;
- Equal socket, threaded right- and left-hand Size 2 = Socket 2 R-L, M2; and
- Reducing female tee, in which the sizes on the run are 1 and ½ and the outlet is ¾ size = Tee 1 × ¾ × ½ B1.

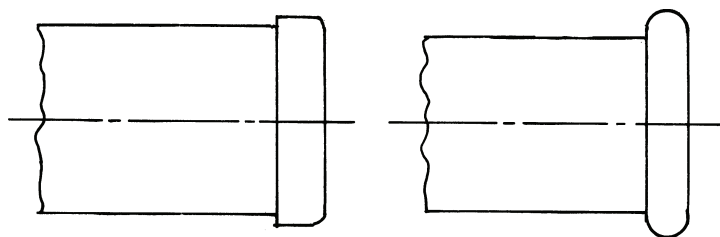


FIG. 1 REINFORCEMENT OF FITTINGS

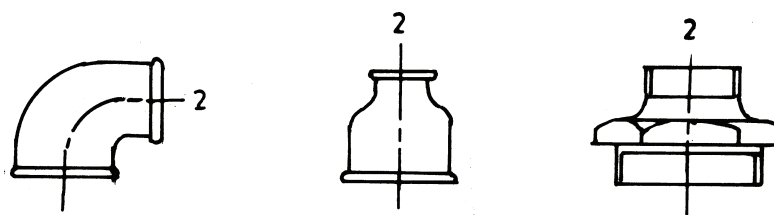


FIG. 2 METHODS FOR SPECIFYING OUTLETS OF UNEQUAL FITTINGS HAVING TWO OUTLETS

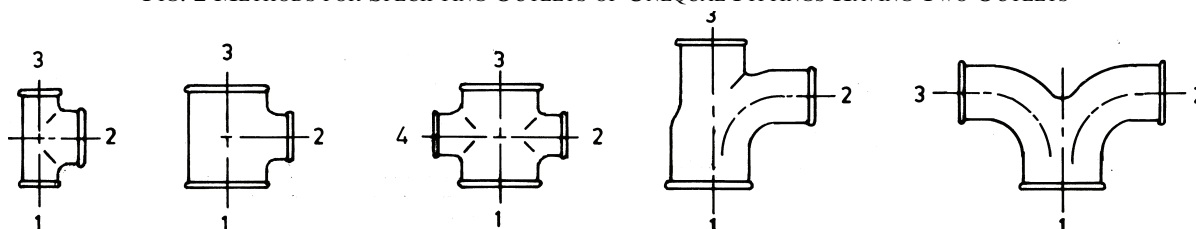


FIG. 3 METHODS FOR SPECIFYING OUTLETS OF UNEQUAL FITTINGS HAVING MORE THAN TWO OUTLETS

6 MATERIAL

6.1 The material used for the manufacture of malleable cast iron fittings shall conform to any of the grade specified in IS 14329 as agreed to between the manufacturer and the purchaser.

6.2 Any other ferrous materials which give mechanical properties at least equivalent to those grades of malleable cast iron specified in 5.1 are allowed for fittings not larger than size 3/8 of the straight type, but excluding unions.

7 DIMENSIONS AND DIMENSIONAL TOLERANCES

7.1 Dimensions of various types of fittings shall be as specified in Tables 2 to 28 in Sections 2 to 10, as applicable.

NOTE — All the dimensions given in these sections enable the fittings to be assembled with pipes threaded in accordance with IS 554.

7.1.1 Fittings of sizes and dimensions other than those specified in Sections 2 to 10 may be supplied subject to agreement between the purchaser and the manufacturer provided all other requirements as stipulated in this specification are fulfilled.

7.2 Wall thickness of fittings and tolerances on them shall be as given in Table 2.

7.3 In case of reducing fittings, the dimensions at each outlet shall be those appropriate to the nominal size of that outlet.

7.4 Where maximum or minimum dimensions are not specified, the tolerances for centre-to-face, face-to-face and centre-to-centre dimensions shall be as specified in Table 3.

7.5 Elbows, tees, crosses, sockets and caps may be either plain or reinforced. Bends, pitcher, tees, twin elbows and long sweep fittings shall be reinforced. The form of the reinforcement may be bend or bead and shall conform to the minimum dimensions given in col 5 and col 6 of Table 2.

7.6 The incorporation of a rib on any fitting is at the option of the manufacturer but the projection of the rib shall not exceed the projection of the reinforcement.

7.7 Two typical forms of female ends are shown in Fig. 4. Either form may be used for code numbers D1, D4, E1, E2, G1, G1/45°, G4, G4/45° and K_b1.

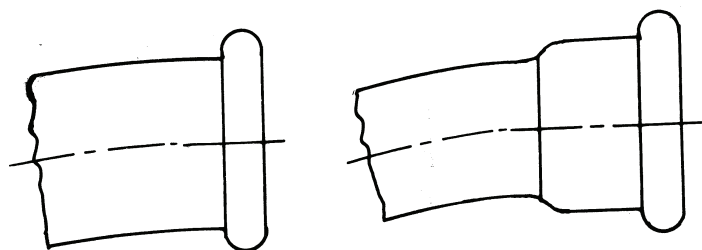


FIG. 4 FORMS OF FEMALE ENDS

Table 1 Type of Fittings and Code Number
(Clauses 5.1.1 and 5.1.4)








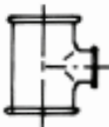
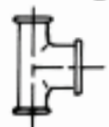

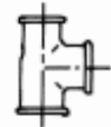

















A Elbows	 A1 	 A1 / 45°	 A4 	 A4 / 45°	
B Tees	  B1    				
C Crosses	  C1				
D Bends	 D1	 D4			
E Pitcher Tees Twin Elbows	  E1  				E2  
G Long Sweep Bends	 G1	 G1 / 45°	 G4	 G4 / 45°	 G8
Kb1 Return Bends	 Kb1				

Table 1 (Concluded)






















M SOCKETS	M 2 		M 3 	M 4 	
N BUSHINGS HEXAGON NIPPLES	N 4 			N 8 	
P BACK NUTS	P 4 				
T CAPS PLUGS	T 1 	T 2 	T 8 	T 9 	T 11 
U UNIONS	U 1 	U 2 	U 11 	U 12 	
UA UNION ELBOWS	UA 1 	UA 2 	UA 11 	UA 12 	
ZC SIDE OUTLET ELBOWS AND TEES	Za 1 	Za 2 			

Table 2 Details of Wall Thickness and Reinforcement of Fittings
(Clauses 7.2 and 7.5)

SI No.	Size Designation	Wall Thickness		Reinforcement	
		Basic Size (3)	Tolerances ¹⁾ (4)	Projection (5)	Width (6)
(1)	(2)	(3)	(4)	(5)	(6)
i)	½	2.0	−0.5	1.0	3.0
ii)	¼	2.5	−0.5	1.3	3.6
iii)	•	2.5	−0.5	1.3	4.0
iv)	½	2.5	−0.5	1.5	4.6
v)	¾	3.0	−0.7	1.5	4.6
vi)	1	3.0	−0.7	1.8	5.1
vii)	1 ¼	3.5	−0.7	1.8	5.1
viii)	1 ½	3.5	−0.7	2.0	5.6
ix)	2	4.0	−1.7	2.3	6.1
x)	2 ½	4.5	−1.0	2.5	6.1
xi)	3	5.0	−1.0	2.8	6.1
xii)	4	6.0	−1.0	3.3	7.1
xiii)	5	6.5	−1.0	4	8.1
xiv)	6	7.5	−1.0	4.6	8.9

¹⁾ No limit for plus tolerance.

Table 3 Tolerances
(Clause 7.4)

SI No.	Designations		Tolerances
	Above mm (2)	Up to and Including mm (3)	
(1)	(2)	(3)	(4)
i)	—	30	± 1.5
	30	50	± 2.0
ii)	50	75	± 2.5
iii)	75	100	± 3.0
iv)	100	150	± 3.5
v)	150	200	± 4.0
vi)	200	—	± 5.0

NOTES

1 Centre-to-face dimensions apply to elbows, bends, tees, crosses, etc.

2 Face-to-face dimensions apply to sockets nipples, etc.

3 Centre-to-centre dimensions apply to return bends.

8 THREADS

8.1 Outlets of fittings shall be threaded to dimensions and the tolerances as specified in IS 554.

8.1.1 For checking conformity of threads, gauging practice in accordance with IS 8999 shall be followed.

8.2 Alignment of Threads

8.2.1 Tolerances for Alignment of Threads

The axes of the threads shall be coincident with the theoretical axes of fitting within a tolerance of $\pm 1/2^\circ$ on the run and on the branches.

8.3 Chamfering

The outlet of the fittings shall have a chamfer. The chamfer shall preferably have an included angle of $90^\circ \pm 5^\circ$ for internal threads and $70^\circ \pm 10^\circ$ for external threads. This, however, is for the purpose of guidance only.

8.3.1 Chamfering allowance should be provided while checking the threads with taper plug gauges. It shall be minimum one pitch length.

9 FREEDOM FROM DEFECTS

On visual examination, the inside and outside surfaces of fittings shall be smooth and free from any defects such as cracks, injurious flaws, fin sand depth, etc.

10 GALVANIZING

Fittings shall be galvanized to meet the requirements of IS 4759.

NOTE — For fittings supplied in other ferrous materials (see 6.2) an alternate to zinc coating may be provided by agreement with the purchaser.

11 PRESSURE TEST

11.1 The fittings before they leave the works, shall be subjected to either of the two following pressure tests, as mutually agreed between the purchaser and the manufacturer:

- The application of an internal hydraulic pressure of not less than 2.1 MPa, or
- The application of an internal air pressure of 1.05 MPa whilst the fitting is completely immersed in water or light oil.

11.1.1 The ends of fittings, when subjected to the required pressure, the ends of fitting after having been made up wrench tight with the prior application of lubricant or sealant or by any other appropriate method shall not show any leakage. The test shall be carried out after the fittings have been screwed and before any protecting coating other than galvanizing has been applied.

11.1.2 The sample size and the acceptance criteria for the pressure test shall be the same as for the repeat pressure test (see B-2.4 and Table 30).

11.2 Repeat Test

The purchaser or his representative shall have the right to call for and be present at a repeat test at the manufacturer's works. The sample size and acceptance criteria for this test shall be as given in Annex B.

12 COMPRESSION TEST

12.1 This test shall be conducted to judge the malleability of the pipe fittings and shall be carried out as follows:

A ring to the dimensions given below shall be cut from the end of the unfinished fittings after the heat treatment to form a test piece. The outside diameter of the test piece is measured over the points 45° off the mould joints. The test piece shall be placed on the equipment as shown in Fig. 5 (a hand vice may be used in place), and shall be compressed gradually at the rate of 17 to 20 mm/min until the amount of compression reaches 5 percent of the original outside diameter for fittings of size designation 2 and below and 3 percent of the original diameter for fittings above size designation 2. The test shall not show any crack on any part of the test piece.

Size designation	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	1¼	1½
Width of test piece, mm	7	7	7	8	9	10	10	11
Size designation	2	2½	3	3½	4	5	6	
Width of test piece, mm	12	13	15	16	17	18	20	

12.1.1 Three samples of pie fitting for each of the following categories of designation shall be taken for conducting compression test from each heat treatment batch:

- Category 1, includes pipe fittings of size designation upto 1;
- Category 2, includes pipe fittings of size designation from 1¼ to 2; and
- Category 3, includes pipe fittings of size designation over 2.

13 SAMPLING

The requirements for sampling and criteria for conformity shall be as given in Annex B.

14 MARKING

14.1 Each fitting shall be marked with the manufacturer's name or trade-mark, and the size designation.

14.2 Each packing containing fittings shall carry the following, stamped or written in indelible ink:

- Manufacturer's name or trade-mark,
- Designation of fittings, and
- Lot number or any other mark for tracing the manufacturing details.

14.3 BIS Certification Marking

Each fitting may also be marked with the Standard Mark.

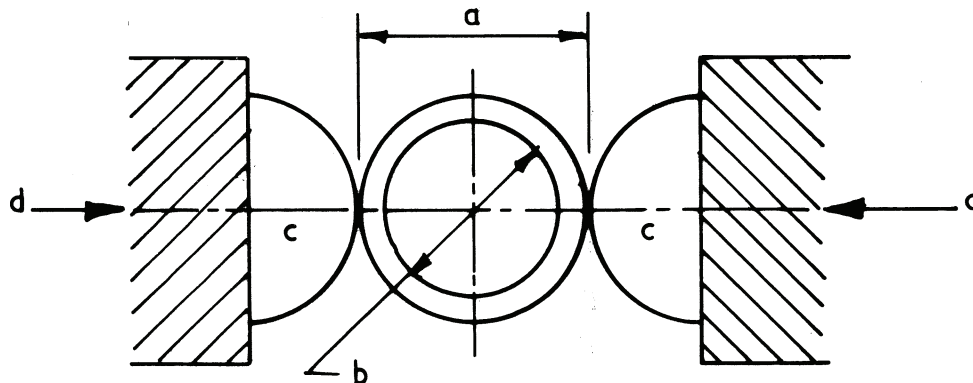


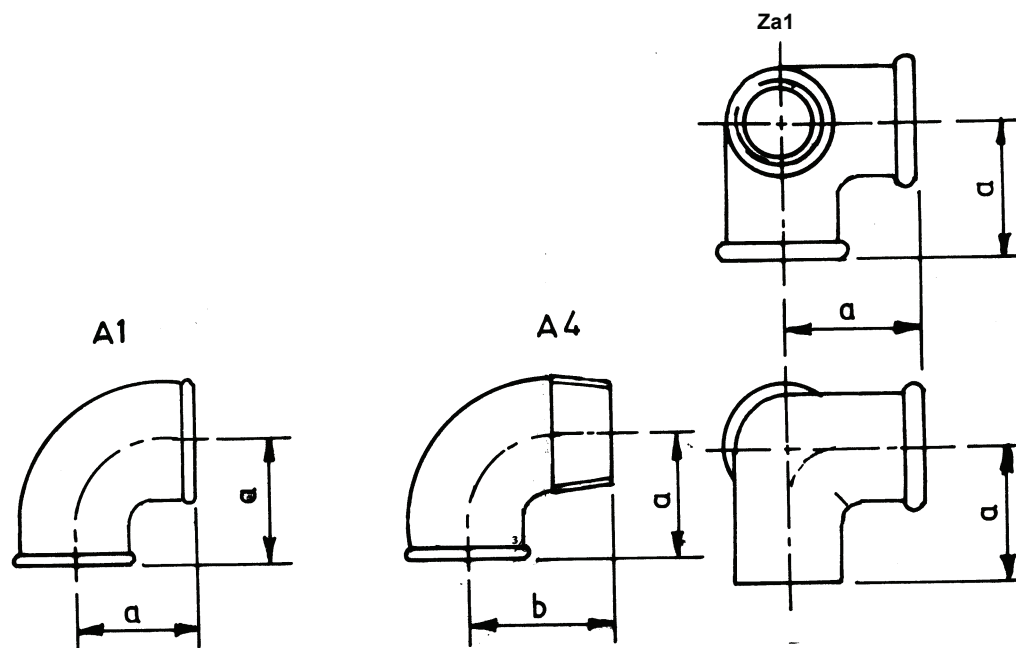
FIG. 5 EQUIPMENT FOR COMPRESSION TEST

14.3.1 The use of Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The details of

conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

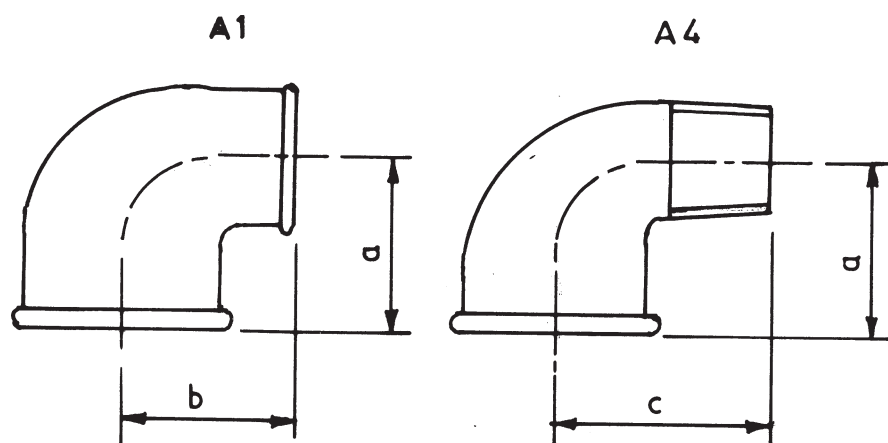
SECTION 2 ELBOWS

Table 4 Size Designation, Dimensions and Mass of Elbows A1, Male and Female Elbows A4, and Side Outlet Elbows Za1
(Clause 7.1)



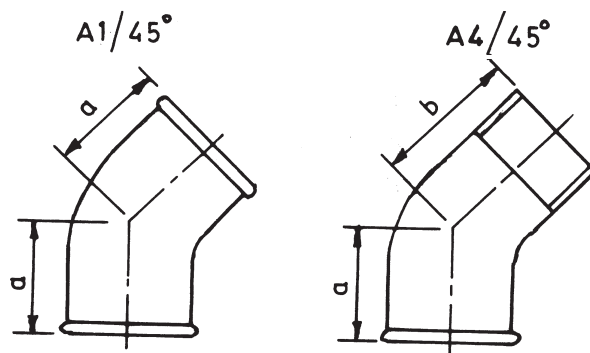
Size Designation			Dimensions		Nominal Mass (kg/100 Pieces)		
A1 (1)	A4 (2)	Za1 (3)	a (4)	b (5)	A1 (6)	A4 (7)	Za1 (8)
1/8	—	—	19	25	3.0	2.5	—
1/4	1/4	—	21	28	4.5	4.0	—
—	—	—	25	32	6.1	5.9	—
1/2	1/2	1/2	28	37	9.1	9.4	—
3/4	3/4	3/4	33	43	13.7	14.5	—
1	1	1	38	52	20.9	22.8	—
1 1/4	1 1/4	1 1/4	45	60	33.2	35.8	—
1 1/2	1 1/2	1 1/2	50	65	42.7	46.3	—
2	2	2	58	74	65.2	70.7	—
2 1/2	2 1/2	—	69	88	117.0	124.0	—
3	3	—	78	98	153.0	165.0	—
4	4	—	96	118	270.0	305.0	—
5	—	—	115	—	480.0	—	—
6	1/2	—	131	—	660.0	—	—

**Table 5 Size Designation, Dimensions and Weights of Elbows, Reducing A1,
and Male and Female Elbows, Reducing A4**
(Clause 7.1)



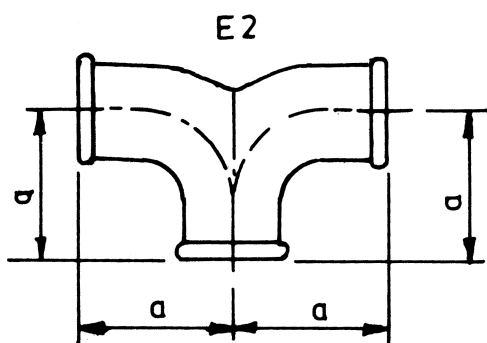
Size Designation		Dimensions			Nominal Mass (kg/100 Pieces)	
A1 (1)	A4 (2)	<i>a</i> (3)	<i>b</i> (4)	<i>c</i> (5)	A1 (6)	A4 (7)
• × ¼	—	23	23	—	6.0	—
½ × •	½ × •	26	26	33	8.0	7.5
¾ × •	—	28	28	—	11.0	—
¾ × ½	¾ × ½	30	31	40	11.9	12.4
1 × ½	—	32	34	—	15.7	—
1 × ¾	1 × ¾	35	36	46	18.0	17.3
1¼ × •	—	34	39	—	22.0	—
1¼ × ¾	—	36	41	—	22.5	—
1¼ × 1	1¼ × 1	40	42	56	28.0	30.0
1½ × ½	—	36	42	—	25.0	—
1½ × ¾	—	39	44	—	30.0	—
1½ × 1	—	42	46	—	32.0	—
1½ × 1¼	—	46	48	—	38.0	—
2 × ½	—	38	48	—	42.0	—
2 × ¾	—	41	50	—	47.0	—
2 × 1	—	44	51	—	52.0	—
2 × 1¼	—	48	53	—	55.0	—
2 × 1½	—	52	55	—	52.0	—
2½ × 2	—	61	66	—	100.0	—
2½ × 1	—	47	60	—	—	—
3 × 1¼	—	55	70	—	—	—
3 × 1	—	51	67	—	—	—
4 × 3	—	85	93	—	—	—

**Table 6 Size Designation, Dimensions and Mass of 45° Elbows A1/45° and 45°
Male and Female Elbows A4/45°**
(Clause 7.1)



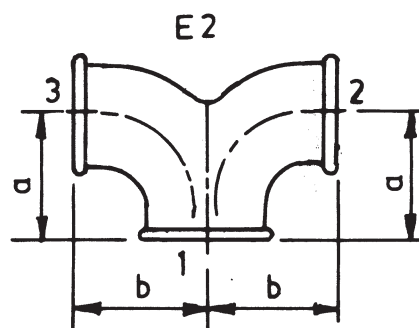
Size Designation		Dimensions		Nominal Mass (kg/100 Pieces)	
A1/45° (1)	A4/45° (2)	<i>a</i> (3)	<i>b</i> (4)	A1/45° (5)	A4/45° (6)
3/8	•	20	25	5.3	5.4
1/2	1/2	22	28	6.9	7.8
3/4	3/4	25	32	11.5	12.2
1	1	28	37	15.5	18.0
1 1/4	1 1/4	33	43	26.0	29.0
1 1/2	1 1/2	36	46	34.0	35.0
2	2	43	55	48.0	50.0

**Table 7 Size Designation, Dimensions and Weights
of Twin Elbows E2**
(Clause 7.1)



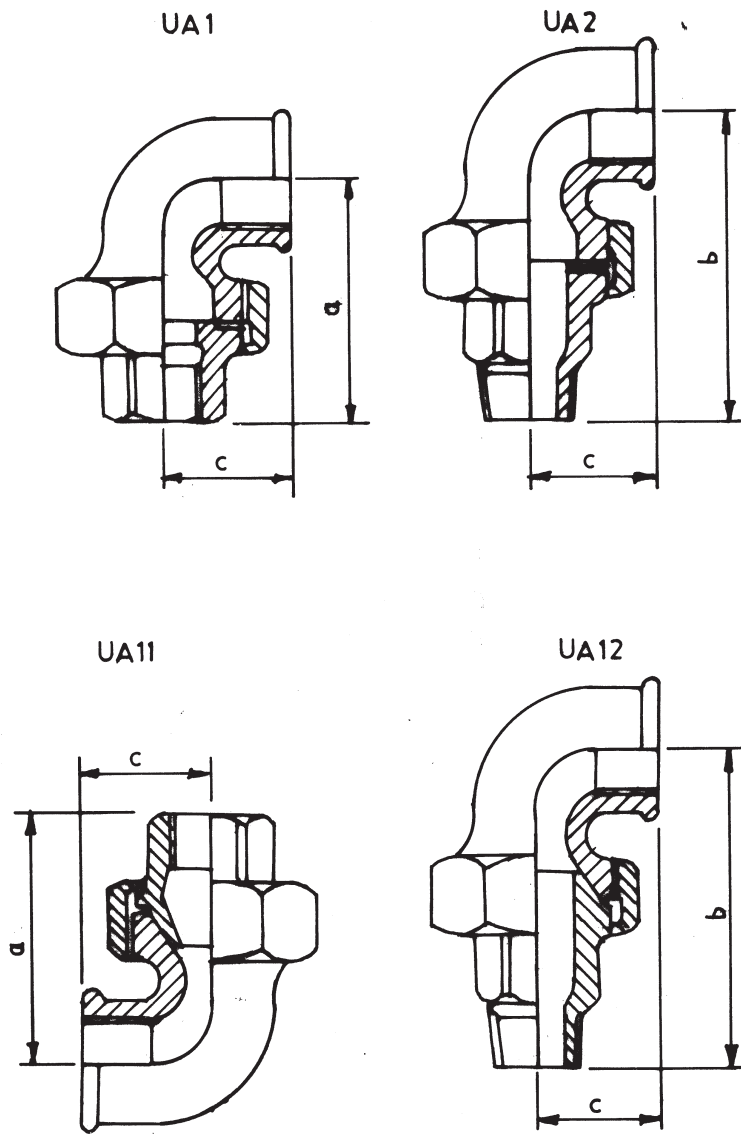
Size Designation E2 (1)	Dimensions <i>a</i> mm (2)	Nominal Mass (kg/100 Pieces) (3)
•	36	12.7
1/2	45	18.9
3/4	50	27.3
1	63	41.0
1 1/4	76	64.8
1 1/2	85	90.3
2	102	140.0

**Table 8 Size Designation, Dimensions and Weights
of Twin Elbows, Reducing E2**
(Clause 7.1)



Size Designation E2 (1)	Dimensions <i>a</i> mm (2) <i>b</i> mm (3)		Nominal Mass (kg/100 Pieces) (4)
3/4 × 1/2 × •	47	48	19.2
1 × 1/2 × 1/2	49	51	25.0
1 × 3/4 × 3/4	53	54	33.8
1 1/4 × 3/4 × 3/4	55	58	42.0
1 1/4 × 1 × 1	66	68	42.9
1 1/2 × 1 × 1	66	71	68.0
1 1/2 × 1 1/4 × 1 1/4	77	79	84.4
2 × 1 1/4 × •	80	85	101.0
2 × 1 1/2 × 1 1/2	91	94	112.0

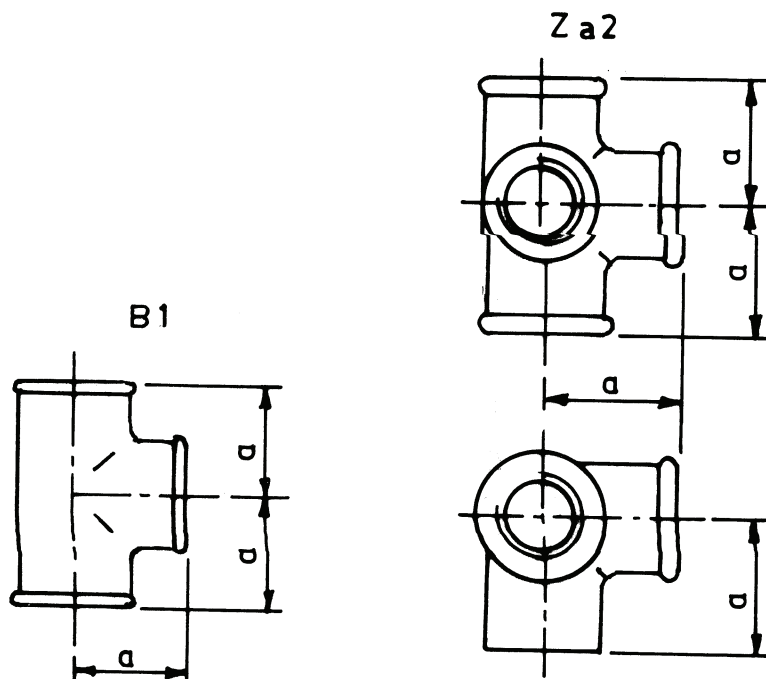
Table 9 Size Designation, Dimensions and Mass of Union Elbows, Flat Seat UA1, Male and Female Union Elbows, Flat Seat UA2, Union Elbows, Taper Seat UA11, and Male and Female Union Elbows, Taper Seat UA12
(Clause 7.1)



Size Designation				Dimensions			Nominal Mass (kg/100 Pieces)			
UA1	UA2	UA11	UA12	<i>a</i>	<i>b</i>	<i>c</i>	UA1	UA2	UA11	UA12
(1)	mm (2)	mm (3)	mm (4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
—	—	¼	¼	48	61	21	—	—	10.1	11.3
3/8	3/8	3/8	3/8	52	65	25	13.6	15.2	13.7	15.8
½	½	½	½	58	76	28	22.6	25.2	23.3	26.5
¾	¾	¾	¾	62	82	33	35.0	39.2	36.5	40.4
1	1	1	1	72	94	38	48.6	55.0	49.7	53.5
1¼	1¼	1 ¼	1¼	82	107	45	78.7	88.4	82.0	92.6
1½	1½	1½	1½	90	115	50	97.0	109.0	100.0	115.0
2	2	2	2	100	128	58	150.0	167.0	155.0	172.0

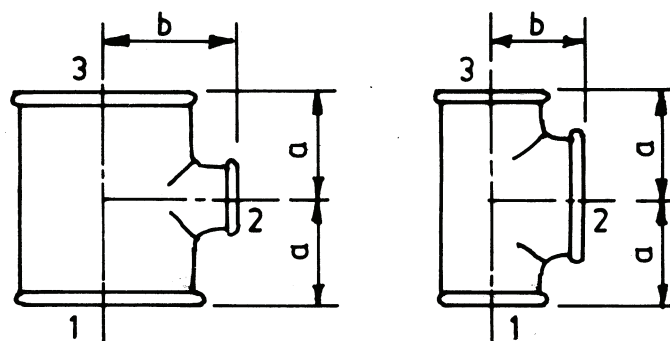
SECTION 3 TEES

Table 10 Size Designation, Dimensions and Mass of Tees B1, and Side Outlet Tees Za2
(Clause 7.1)



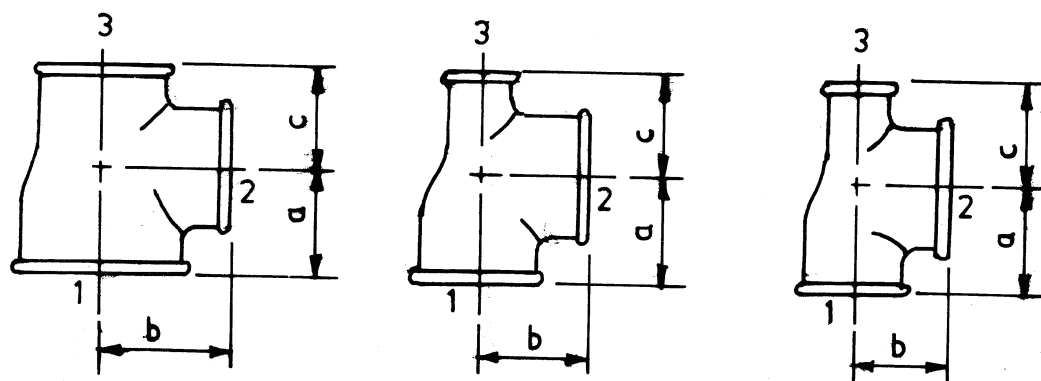
Size Designation		Dimensions	Nominal Mass (kg/100 Pieces)	
B1	Za2	<i>a</i> mm	B1	Za2
(1)	(2)	(3)	(4)	(5)
1/8	—	19	4.2	—
1/4	—	21	6.5	—
3/8	3/8	25	8.5	10.4
1/2	1/2	28	13.0	14.7
3/4	3/4	33	18.7	23.4
1	1	38	28.2	32.6
1 1/4	1 1/4	45	43.5	51.3
1 1/2	1 1/2	50	57.0	66.0
2	2	58	88.0	99.0
2 1/2	—	69	155.0	—
3	—	78	210.0	—
4	—	96	345.0	—
5	—	115	640.0	—
6	—	131	780.0	—

Table 11 Size Designation, Dimensions and Mass of Tees — Reducing or Increasing on the Branch B1
(Clause 7.1)



Size Designation	Dimensions		Nominal Mass (kg/100 Pieces)	Size Designation	Dimensions		Nominal Mass (kg/100 Pieces)
B1	<i>a</i>	<i>b</i>		B1	<i>a</i>	<i>b</i>	
(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
$\frac{3}{4} \times \frac{1}{2} \times \frac{3}{4}$	23	23	7.5	$1\frac{1}{2} \times \frac{3}{4} \times 1\frac{1}{2}$	38	44	39.0
$\frac{3}{8} \times \frac{1}{2} \times \frac{3}{8}$	26	26	9.5	$1\frac{1}{2} \times 1 \times 1\frac{1}{2}$	42	46	42.6
$\frac{1}{2} \times \frac{1}{4} \times \frac{1}{2}$	24	24	9.7	$1\frac{1}{2} \times 1\frac{1}{4} \times 1\frac{1}{2}$	46	48	49.5
$\frac{1}{2} \times \frac{3}{8} \times \frac{1}{2}$	26	26	10.9	$1\frac{1}{2} \times 2 \times 1\frac{1}{2}$	55	52	64.5
$\frac{1}{2} \times \frac{3}{4} \times \frac{1}{2}$	31	30	14.5	$2 \times \frac{1}{2} \times 2$	38	48	51.0
$\frac{1}{2} \times 1 \times \frac{1}{2}$	34	32	19.0	$2 \times \frac{3}{4} \times 2$	40	50	55.0
$\frac{3}{4} \times \frac{1}{4} \times \frac{3}{4}$	26	27	13.1	$2 \times 1 \times 2$	44	52	60.0
$\frac{3}{4} \times \frac{3}{8} \times \frac{3}{4}$	28	28	14.5	$2 \times 1\frac{1}{4} \times 2$	48	54	68.0
$\frac{3}{4} \times \frac{1}{2} \times \frac{3}{4}$	30	31	16.2	$2 \times 1\frac{1}{2} \times 2$	52	55	72.0
$\frac{3}{4} \times 1 \times \frac{3}{4}$	36	35	22.2	$2\frac{1}{2} \times \frac{1}{2} \times 2\frac{1}{2}$	41	57	85.0
$\frac{3}{4} \times 1\frac{1}{4} \times \frac{3}{4}$	41	36	28.9	$2\frac{1}{2} \times \frac{3}{4} \times 2\frac{1}{2}$	44	59	90.0
$1 \times \frac{1}{4} \times 1$	28	31	18.3	$2\frac{1}{2} \times 1 \times 2\frac{1}{2}$	47	60	92.0
$1 \times \frac{3}{8} \times 1$	30	32	20.2	$2\frac{1}{2} \times 1\frac{1}{4} \times 2\frac{1}{2}$	52	62	100.0
$1 \times \frac{1}{2} \times 1$	32	34	22.6	$2\frac{1}{2} \times 1\frac{1}{2} \times 2\frac{1}{2}$	55	63	112.0
$1 \times \frac{3}{4} \times 1$	35	36	24.2	$2\frac{1}{2} \times 2 \times 2\frac{1}{2}$	61	66	122.0
$1 \times 1\frac{1}{4} \times 1$	42	40	32.3	$3 \times \frac{3}{4} \times 3$	47	66	120.0
$1 \times 1\frac{1}{2} \times 1$	46	42	39.3	$3 \times 1 \times 3$	51	67	124.0
$1\frac{1}{4} \times \frac{3}{8} \times 1\frac{1}{4}$	32	36	28.4	$3 \times 1\frac{1}{4} \times 3$	55	70	134.0
$1\frac{1}{4} \times \frac{1}{2} \times 1\frac{1}{4}$	34	38	31.4	$3 \times 1\frac{1}{2} \times 3$	58	71	140.0
$1\frac{1}{4} \times \frac{3}{4} \times 1\frac{1}{4}$	36	41	32.3	$3 \times 2 \times 3$	64	73	158.0
$1\frac{1}{4} \times 1 \times 1\frac{1}{4}$	40	42	36.8	$3 \times 2\frac{1}{2} \times 3$	72	76	183.0
$1\frac{1}{4} \times 1\frac{1}{2} \times 1\frac{1}{4}$	48	46	47.0	$4 \times 2 \times 4$	70	86	230.0
$1\frac{1}{4} \times 2 \times 1\frac{1}{4}$	54	48	57.0	$4 \times 3 \times 4$	84	92	280.0
$1\frac{1}{2} \times \frac{1}{2} \times 1\frac{1}{2}$	36	42	36.8				

Table 12 Size Designation, Dimensions and Mass of Tees — Reducing on the Run, Reducing, Equal to or Increasing on the Branch B1
(Clause 7.1)



Size Designation	Dimensions			Nominal Mass (kg/100 Pieces)	Size Designation	Dimensions			Nominal Mass (kg/100 Pieces)
B1 (1)	a (2)	b (3)	c (4)	(5)	B1 (1)	a (2)	b (3)	c (4)	(5)
$\frac{1}{2} \times \frac{3}{8} \times \frac{3}{8}$	26	26	25	9.7	$1\frac{1}{4} \times 1\frac{1}{4} \times \frac{1}{2}$	45	45	38	35.9
$\frac{1}{2} \times \frac{1}{2} \times \frac{3}{8}$	28	28	26	10.9	$1\frac{1}{4} \times 1\frac{1}{4} \times \frac{3}{4}$	45	45	41	36.1
$\frac{3}{4} \times \frac{3}{8} \times \frac{3}{8}$	28	28	25	12.3	$1\frac{1}{4} \times 1\frac{1}{4} \times 1$	45	45	42	38.4
$\frac{3}{4} \times \frac{3}{8} \times \frac{1}{2}$	28	28	26	12.8	$1\frac{1}{4} \times 1\frac{1}{2} \times 1$	48	46	46	42.5
$\frac{3}{4} \times \frac{1}{2} \times \frac{3}{8}$	30	31	26	13.9	$1\frac{1}{2} \times \frac{1}{2} \times 1\frac{1}{4}$	36	46	34	33.0
$\frac{3}{4} \times \frac{1}{2} \times \frac{1}{2}$	30	31	28	14.9	$1\frac{1}{2} \times \frac{3}{4} \times 1\frac{1}{4}$	38	44	36	36.3
$\frac{3}{4} \times \frac{3}{4} \times \frac{3}{8}$	33	33	28	16.6	$1\frac{1}{2} \times 1 \times 1$	42	46	38	37.9
$\frac{3}{4} \times \frac{3}{4} \times \frac{1}{2}$	33	33	31	17.2	$1\frac{1}{2} \times 1 \times 1\frac{1}{4}$	42	46	40	40.5
$\frac{3}{4} \times 1 \times \frac{1}{2}$	36	35	34	21.1	$1\frac{1}{2} \times 1\frac{1}{4} \times \frac{3}{4}$	46	48	41	43.5
$1 \times \frac{3}{8} \times \frac{3}{4}$	30	32	28	17.7	$1\frac{1}{2} \times 1\frac{1}{4} \times 1$	46	48	42	42.5
$1 \times \frac{1}{2} \times \frac{1}{2}$	32	34	28	18.6	$1\frac{1}{2} \times 1\frac{1}{4} \times 1\frac{1}{4}$	46	48	45	47.3
$1 \times \frac{1}{2} \times \frac{3}{4}$	32	34	30	20.4	$1\frac{1}{2} \times 1\frac{1}{2} \times \frac{1}{2}$	50	50	42	43.2
$1 \times \frac{3}{4} \times \frac{3}{8}$	35	36	26	21.7	$1\frac{1}{2} \times 1\frac{1}{2} \times \frac{3}{4}$	50	50	44	47.2
$1 \times \frac{3}{4} \times \frac{1}{2}$	35	36	31	20.4	$1\frac{1}{2} \times 1\frac{1}{2} \times 1$	50	50	46	47.6
$1 \times \frac{3}{4} \times \frac{3}{4}$	35	36	33	22.3	$1\frac{1}{2} \times 1\frac{1}{2} \times 1\frac{1}{4}$	50	50	48	51.3
$1 \times 1 \times \frac{3}{8}$	38	38	32	23.9	$2 \times \frac{3}{4} \times 1\frac{1}{2}$	40	50	38	46.7
$1 \times 1 \times \frac{1}{2}$	38	38	34	24.0	$2 \times 1 \times 1\frac{1}{2}$	44	52	42	51.4
$1 \times 1 \times \frac{3}{4}$	38	38	36	25.4	$2 \times 1\frac{1}{4} \times 1\frac{1}{4}$	48	54	45	56.9
$1 \times 1\frac{1}{4} \times \frac{3}{4}$	42	40	41	31.4	$2 \times 1\frac{1}{4} \times 1\frac{1}{2}$	48	54	46	57.7
$1\frac{1}{4} \times \frac{1}{2} \times 1$	34	38	32	26.0	$2 \times 1\frac{1}{2} \times 1\frac{1}{4}$	52	55	48	61.9
$1\frac{1}{4} \times \frac{3}{4} \times \frac{3}{4}$	36	41	33	27.3	$2 \times 1\frac{1}{2} \times 1\frac{1}{2}$	52	55	50	61.7
$1\frac{1}{4} \times \frac{3}{4} \times 1$	36	41	35	29.0	$2 \times 2 \times \frac{3}{4}$	58	58	50	67.8
$1\frac{1}{4} \times 1 \times \frac{1}{2}$	40	42	34	29.3	$2 \times 2 \times 1$	58	58	52	68.2
$1\frac{1}{4} \times 1 \times \frac{3}{4}$	40	42	36	31.4	$2 \times 2 \times 1\frac{1}{4}$	58	58	54	74.0
$1\frac{1}{4} \times 1 \times 1$	40	42	38	32.7	$2 \times 2 \times 1\frac{1}{2}$	58	58	55	75.8

Table 13 Size Designation, Dimensions and Mass of Pitcher Tees E1
(Clause 7.1)

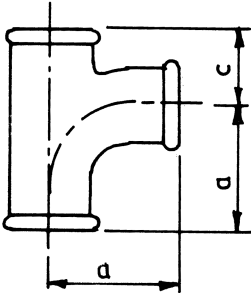
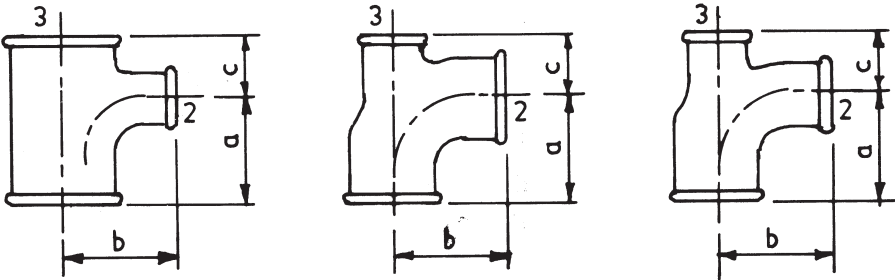
E1			
			
Size Designation E1	Dimensions		Nominal Mass (kg/100 Pieces)
(1)	a mm (2)	c mm (3)	(4)
$\frac{3}{8}$	36	19	11.6
$\frac{1}{2}$	45	24	17.8
$\frac{3}{4}$	50	28	25.2
1	63	33	38.0
$1\frac{1}{4}$	76	40	60.7
$1\frac{1}{2}$	85	43	83.4
2	102	53	129.0

Table 14 Size Designation, Dimensions and Mass of Pitcher Tees — Reducing on the Branch, Reducing on the Run and Reducing on Branch and Run E1
(Clause 7.1)

E1									
									
Size Designation E1	Dimensions			Nominal Mass (kg/100 Pieces)	Size Designation E1	Dimensions			Nominal Mass (kg/100 Pieces)
(1)	a (2)	b (3)	c (4)	(5)	(1)	a (2)	b (3)	c (4)	(5)
$\frac{3}{4} \times \frac{1}{2} \times \frac{1}{2}$	47	48	24	19.6	$1\frac{1}{4} \times 1 \times 1\frac{1}{4}$	66	68	36	50.3
$\frac{3}{4} \times \frac{1}{2} \times \frac{3}{4}$	47	48	25	21.1	$1\frac{1}{4} \times 1\frac{1}{4} \times 1$	76	76	38	57.0
$\frac{3}{4} \times \frac{3}{4} \times \frac{1}{2}$	50	50	27	24.2	$1\frac{1}{2} \times \frac{3}{4} \times 1\frac{1}{2}$	55	61	33	53.4
$1 \times \frac{1}{2} \times \frac{3}{4}$	49	51	25	26.6	$1\frac{1}{2} \times 1 \times 1\frac{1}{4}$	66	71	36	60.8
$1 \times \frac{1}{2} \times 1$	49	51	28	27.9	$1\frac{1}{2} \times 1 \times 1\frac{1}{2}$	66	71	36	60.0
$1 \times \frac{3}{4} \times \frac{1}{2}$	53	54	27	30.7	$1\frac{1}{2} \times 1\frac{1}{4} \times 1$	77	79	38	68.6
$1 \times \frac{3}{4} \times \frac{3}{4}$	53	54	28	31.6	$1\frac{1}{2} \times 1\frac{1}{4} \times 1\frac{1}{4}$	77	79	40	74.4
$1 \times \frac{3}{4} \times 1$	53	54	30	32.4	$1\frac{1}{2} \times 1\frac{1}{4} \times 1\frac{1}{2}$	77	79	41	75.1
$1 \times 1 \times \frac{3}{4}$	63	63	31	40.0	$2 \times 1 \times 2$	70	77	40	82.1
$1\frac{1}{4} \times \frac{1}{2} \times 1\frac{1}{4}$	51	56	30	38.3	$2 \times 1\frac{1}{4} \times 1\frac{1}{2}$	80	85	41	86.8
$1\frac{1}{4} \times \frac{3}{4} \times 1$	55	58	30	41.7	$2 \times 1\frac{1}{4} \times 2$	80	85	45	94.9
$1\frac{1}{4} \times \frac{3}{4} \times 1\frac{1}{4}$	55	58	33	44.9	$2 \times 1\frac{1}{2} \times 1\frac{1}{4}$	91	94	43	95.0
$1\frac{1}{4} \times 1 \times \frac{3}{4}$	66	68	31	47.2	$2 \times 1\frac{1}{2} \times 1\frac{1}{2}$	91	94	43	102.0
$1\frac{1}{4} \times 1 \times 1$	66	68	33	45.5	$2 \times 1\frac{1}{2} \times 2$	91	94	48	104.0

SECTION 4 CROSSES

Table 15 Size Designation, Dimensions and Mass of Crosses C1
(Clause 7.1)

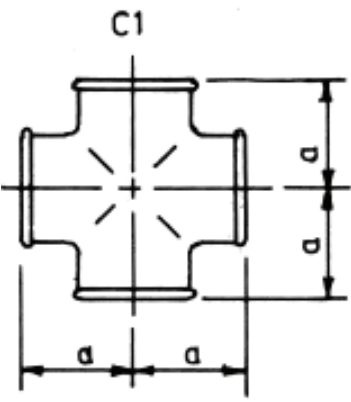
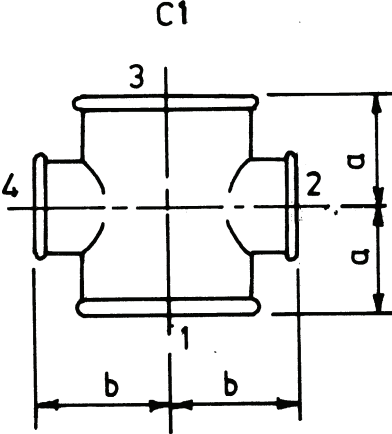
Size Designation C1	Dimensions <i>a</i>	Nominal Mass (kg/100 Pieces)
(1)	(2)	(3)
		
$\frac{1}{4}$	21	8.8
$\frac{3}{8}$	25	10.2
$\frac{1}{2}$	28	14.5
$\frac{3}{4}$	33	22.4
1	38	32.8
$1\frac{1}{4}$	45	51.0
$1\frac{1}{2}$	50	62.0
2	58	100.0
$2\frac{1}{2}$	69	170.0
3	78	240.0
4	96	380.0

Table 16 Size Designation, Dimensions and Mass of Crosses, Reducing C1
(Clause 7.1)

Size Designation C1	Dimensions		Nominal Mass (kg/100 Pieces)
(1)	<i>a</i> mm (2)	<i>b</i> mm (3)	(4)
			
$\frac{1}{3} \times \frac{3}{8} \times \frac{1}{2} \times \frac{3}{8}$	26	26	12.3
$\frac{3}{4} \times \frac{3}{8} \times \frac{3}{4} \times \frac{3}{8}$	28	26	16.5
$\frac{3}{4} \times \frac{1}{2} \times \frac{3}{4} \times \frac{1}{2}$	30	31	18.2
$1 \times \frac{3}{8} \times 1 \times \frac{3}{8}$	30	32	20.6
$1 \times \frac{1}{2} \times 1 \times \frac{1}{2}$	32	34	22.6
$1 \times \frac{3}{4} \times 1 \times \frac{3}{4}$	35	36	27.7
$1\frac{1}{4} \times \frac{1}{2} \times 1\frac{1}{4} \times \frac{1}{2}$	34	38	32.5
$1\frac{1}{4} \times \frac{3}{4} \times 1\frac{1}{4} \times \frac{3}{4}$	36	41	35.4
$1\frac{1}{4} \times 1 \times 1\frac{1}{4} \times 1$	40	42	42.3
$1\frac{1}{3} \times \frac{3}{4} \times 1\frac{1}{3} \times \frac{3}{4}$	38	44	42.2
$1\frac{1}{2} \times 1 \times 1\frac{1}{2} \times 1$	42	46	46.6
$1\frac{1}{2} \times 1\frac{1}{4} \times 1\frac{1}{2} \times 1\frac{1}{4}$	46	38	55.3
$2 \times 1 \times 2 \times 1$	44	52	64.1
$2 \times 1\frac{1}{4} \times 2 \times 1\frac{1}{4}$	48	54	68.5
$2 \times 1\frac{1}{2} \times 2 \times 1\frac{1}{2}$	52	55	78.5

SECTION 5 BENDS

Table 17 Size Designation, Dimensions and Mass of Bends D1, and Male and Female Bends D4
(Clause 7.1)

Size Designation		Dimensions	Nominal Mass	
		(kg/100 Pieces)		
D1	D4	<i>a</i>	D1	D4
(1)	(2)	(3)	(4)	(5)
1/4	1/4	30	5.3	4.2
3/8	3/8	36	7.9	6.6
1/2	1/2	45	12.8	11.3
3/4	3/4	50	18.9	16.9
1	1	63	29.5	27.9
1 1/4	1 1/4	76	48.5	45.5
1 1/2	1 1/2	85	62.4	56.9
2	2	102	99.3	96.0

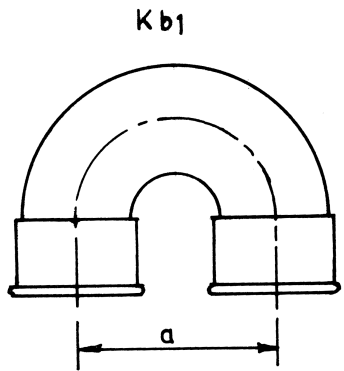
Table 18 Size Designation, Dimensions and Mass of Long Weep Bend G1, Male and Female Long Sweep Bends G4 and Male Long Sweep Bends G8
(Clause 7.1)

Size Designation			Dimensions		Nominal Mass (kg/100 Pieces)		
			<i>a</i>	<i>b</i>			
G1	G4	G8	<i>a</i>	<i>b</i>	G1	G4	G8
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
?	?	—	35	32	3.8	3.3	—
1/4	1/4	—	40	36	6.0	5.1	—
?	?	?	48	42	10.0	8.0	6.5
1/2	1/2	1/2	55	48	14.8	12.3	10.3
3/4	3/4	3/4	69	60	24.6	21.3	17.6
1	1	1	85	75	39.9	36.1	30.3
1 1/4	1 1/4	1 1/4	105	95	64.2	57.7	50.3
1 1/2	1 1/2	1 1/2	116	105	88.1	77.5	67.3
2	2	2	140	130	148.0	131.1	114.0
2 1/2	2 1/2	—	176	165	232.0	221.0	—
3	3	—	205	190	352.0	322.0	—
4	4	—	260	245	545.0	565.0	—

Table 19 Size Designation, Dimensions and Mass of 45° Long Sweep Bends G1/45° and Male and Female Long Weep Bends G4/45°
(Clause 7.1)

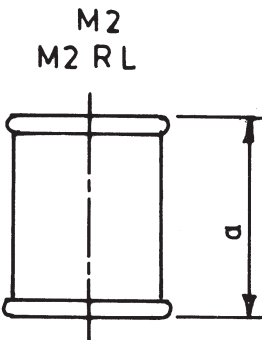
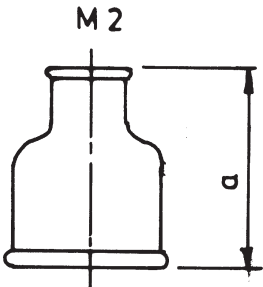
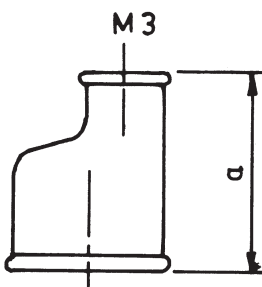
Size Designation		Dimensions		Nominal Mass (kg/100 Pieces)	
G1/45°	G4/45°	<i>a</i>	<i>b</i>	G1/45°	G4/45°
(1)	(2)	(3)	(4)	(5)	(6)
1/4	1/4	26	21	4.9	3.7
3/8	3/8	30	24	7.6	5.9
1/2	1/2	36	30	11.7	9.2
3/4	3/4	43	36	18.1	14.8
1	1	51	42	29.5	24.1
1 1/4	1 1/4	64	54	48.5	39.8
1 1/2	1 1/2	68	58	61.2	50.9
2	2	81	70	97.2	81.8
2*	2*	99	86	154.0	137.0
3	3	113	100	211.0	194.0

Table 20 Size Designation, Dimensions and Mass of Return Bends Kb1
(Clause 7.1)

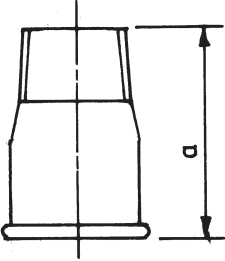
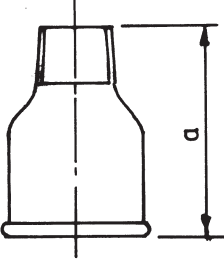
		
Size Designation	Dimensions	Nominal Mass (kg/100 Pieces)
(1)	<i>a</i> mm (2)	(3)
1/2	38	17.7
3/4	50	26.6
1	64	42.1
1 1/4	76	69.0
1 1/2	89	97.7
2	102	141.0

SECTION 6 SOCKETS

Table 21 Size Designation, Dimensions and Mass of Sockets M2, Sockets, Right and Left-Hand Thread M2 R-L, Sockets, Reducing M2, and Eccentric Sockets Reducing M3
(Clause 7.1)

							
Equal Socket Size Designation		Reducing Size Designation		Dimension	Nominal Mass (kg/100 Pieces)		
					Equal Socket M2 and M2 R-L	Reducing Socket	
M2	M2 R-L	M2	M3			M2	M3
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1/8	—	—	—	25	2.2	—	—
1/4	1/4	1/4 × 1/8	—	27	3.0	2.9	—
3/8	3/8	3/8 × 1/8	—	30	4.1	3.7	—
		3/8 × 1/4	—		—	3.9	—
1/2	1/2	1/2 × 1/4	—	36	6.1	5.4	—
		1/2 × 3/8	—		—	5.6	—
3/4	3/4	3/4 × 1/4	—	39	9.3	8.2	—
		3/4 × 3/8	—		—	8.6	—
		3/4 × 1/2	3/4 × 1/2	45	—	8.9	9.2
1	1	1 × 3/8	—		13.3	12.5	—
		1 × 1/2	1 × 1/2		—	12.8	13.4
		1 × 3/4	1 × 3/4	50	—	13.2	13.7
1 1/4	1 1/4	1 1/4 × 3/4	—		20.6	18.5	—
		1 1/4 × 1/2	1 1/4 × 1/2		—	18.9	19.6
		1 1/4 × 3/4	1 1/4 × 3/4		—	19.1	20.2
		1 1/4 × 1	1 1/4 × 1		—	21.2	22.0
		1 1/2 × 1/2	1 1/2 × 1/2	55	26.8	23.6	25.8
1 1/2	1 1/2	1 1/2 × 3/4	1 1/2 × 3/4		—	24.0	26.2
		1 1/2 × 1	1 1/2 × 1		—	24.8	26.5
		1 1/2 × 1 1/4	1 1/2 × 1 1/4		—	25.4	26.8
		2 × 1/2	—		44.1	38.0	—
2	2	2 × 3/4	2 × 3/4	65	—	37.4	39.9
		2 × 1	2 × 1		—	37.3	40.2
		2 × 1 1/4	2 × 1 1/4		—	38.2	41.9
		2 × 1 1/2	2 × 1 1/2		—	38.5	42.4
		2 1/2 × 1 1/2	—		—	61	—
2 1/2	2 1/2	2 1/2 × 3/4	—	71	—	61	—
		2 1/2 × 1	—	74	—	65	—
		2 1/2 × 1 1/4	—	74	73.5	63.8	—
		2 1/2 × 1 1/2	—	74	—	63.6	—
		2 1/2 × 2	—	74	—	63.4	—
3	3	3 × 1/2	—	78	—	81	—
		3 × 3/4	—	78	—	82	—
		3 × 1	—	78	—	85	—
		3 × 1 1/4	—	78	—	89	—
		3 × 1 1/2	—	80	103.0	89.5	—
		3 × 2	—	80	—	88.7	—
		3 × 2 1/2	—	80	—	89.4	—
4	—	4 × 2	—	94	153.0	140.0	—
		4 × 2 1/2	—		—	141.0	—
—	—	4 × 3	—	—	—	142.0	—
—	5	—	—	109	—	—	—
5	—	—	—	109	241.0	—	—
6	—	—	—	120	340.0	—	—

**Table 22 Size Designation, Dimensions and Mass of Male and Female Sockets M4 and
Male and Female Sockets, Reducing M4**
(Clause 7.1)

M 4			
			
Equal Socket Size Designation M4 (1)	Reducing Socket Size Designation M4 (2)	Dimension <i>a</i> (3) mm	Nominal Mass (kg/100 pieces) (4)
$\frac{3}{8}$	—	35	3.8
—	$\frac{3}{8} \times \frac{1}{4}$	35	3.5
$\frac{1}{2}$	—	43	6.3
—	$\frac{1}{2} \times \frac{1}{4}$	43	5.3
—	$\frac{1}{2} \times \frac{3}{8}$	43	5.8
$\frac{3}{4}$	—	48	9.9
—	$\frac{3}{4} \times \frac{3}{8}$	48	8.5
—	$\frac{3}{4} \times \frac{1}{2}$	48	9.1
1	—	55	14.9
—	$1 \times \frac{1}{2}$	55	13.5
—	$1 \times \frac{3}{4}$	55	14.0
$1\frac{1}{4}$	—	60	23.2
—	$1\frac{1}{4} \times \frac{3}{4}$	60	19.1
—	$1\frac{1}{4} \times 1$	60	20.5
—	$1\frac{1}{2} \times 1$	63	24.5
—	$1\frac{1}{2} \times 1\frac{1}{4}$	63	26.3
—	$2 \times 1\frac{1}{4}$	70	38.6
—	$2 \times 1\frac{1}{2}$	70	40.0

SECTION 7 BUSHING AND HEXAGON NIPPLES

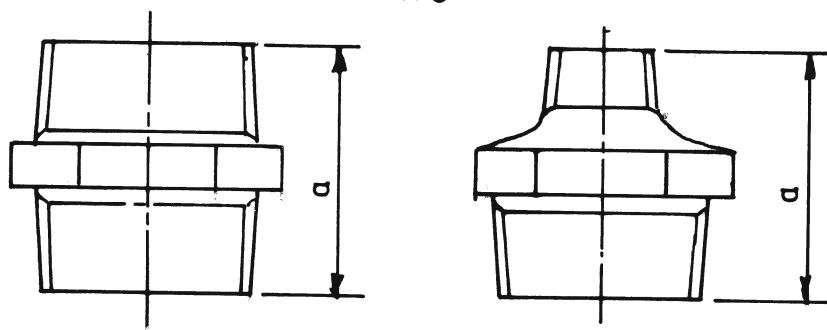
Table 23 Size Designation, Dimensions and Mass of Bushing N4

(Clause 7.1)

N 4				
				
Size Designation	Pattern	Dimensions		Nominal Mass (kg/100 Pieces)
N4	mm	<i>a</i> mm	<i>b</i>	
(1)	(2)	(3)	(4)	(5)
$\frac{1}{4} \times \frac{1}{8}$	I	20	—	1.2
$\frac{3}{8} \times \frac{1}{8}$	II	20	—	2.1
$\frac{3}{8} \times \frac{1}{4}$	I	20	—	1.4
$\frac{1}{2} \times \frac{1}{8}$	II	24	—	3.5
$\frac{1}{2} \times \frac{1}{4}$	II	24	—	3.2
$\frac{1}{2} \times \frac{3}{8}$	I	24	—	2.4
$\frac{3}{4} \times \frac{1}{4}$	II	26	—	6.2
$\frac{3}{4} \times \frac{3}{8}$	II	26	—	5.8
$\frac{3}{4} \times \frac{1}{2}$	I	26	—	4.7
$1 \times \frac{1}{4}$	II	29	—	10.6
$1 \times \frac{3}{8}$	II	29	—	10.5
$1 \times \frac{1}{2}$	II	29	—	9.4
$1 \times \frac{3}{4}$	I	29	—	7.5
$1\frac{1}{4} \times \frac{1}{8}$	II	31	—	17.4
$1\frac{1}{4} \times \frac{1}{2}$	II	31	—	17.8
$1\frac{1}{4} \times \frac{3}{4}$	II	31	—	16.0
$1\frac{1}{4} \times 1$	I	31	—	12.0
$1\frac{1}{2} \times \frac{3}{8}$	II	31	—	22.4
$1\frac{1}{2} \times \frac{1}{2}$	II	31	—	24.6
$1\frac{1}{2} \times \frac{3}{4}$	II	31	—	22.0
$1\frac{1}{2} \times 1$	II	31	—	18.7
$1\frac{1}{2} \times 1\frac{1}{4}$	I	31	—	10.5
$2 \times \frac{1}{2}$	III	35	48	34.8
$2 \times \frac{3}{4}$	III	35	48	36.9
2×1	II	35	—	40.0
$2 \times 1\frac{1}{4}$	II	35	—	34.6
$2 \times 1\frac{1}{2}$	II	35	—	27.3
$2\frac{1}{2} \times 1$	III	40	54	59.3
$2\frac{1}{2} \times 1\frac{1}{4}$	III	40	54	59.5
$2\frac{1}{2} \times 1\frac{1}{2}$	II	40	—	61.0
$2\frac{1}{2} \times 2$	II	40	—	46.3
3×1	III	44	59	97.6
$3 \times 1\frac{1}{4}$	III	44	59	94.9
$3 \times 1\frac{1}{2}$	III	44	59	90.3
3×2	II	44	59	88.3
$3 \times 2\frac{1}{2}$	II	44	—	56.4
$3\frac{1}{2} \times 3$	II	46	—	—
4×2	III	51	69	164.0
$4 \times 2\frac{1}{2}$	III	51	69	150.0
4×3	II	51	—	132.0
$4 \times 3\frac{1}{2}$	II	51	—	—

Table 24 Size Designation, Dimensions and Mass of Hexagon Nipples N8, Hexagon Nipples, Right-and Left-Hand Thread N8 R-L, and Hexagon Nipples, Reducing N8
(Clause 7.1)

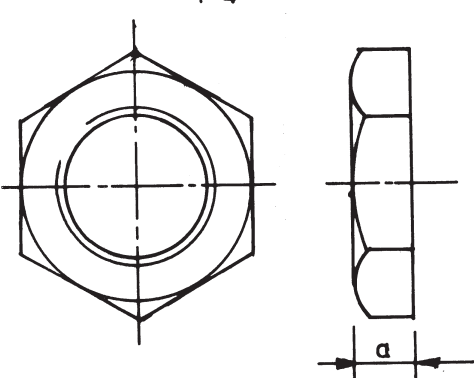
N 8



Equal Nipple Size Designation		Reducing Nipple Size Designation	Dimension	Nominal Mass (kg/100 Pieces)	
N8	N8 R-L	N8	<i>a</i>	N8	N8 Reducing
(1)	(2)	(3)	(4)	(5)	(6)
$\frac{1}{8}$	—	—	29	1.8	—
$\frac{1}{4}$	—	—	36	2.9	—
$\frac{3}{8}$	$\frac{3}{8}$	—	38	4.0	—
—	—	$\frac{3}{8} \times \frac{1}{4}$	38	—	3.2
$\frac{1}{2}$	$\frac{1}{2}$	—	44	6.0	—
—	—	$\frac{1}{8} \times \frac{1}{4}$	44	—	4.3
—	—	$\frac{1}{3} \times \frac{3}{8}$	—	—	4.6
$\frac{3}{4}$	$\frac{3}{4}$	—	47	8.7	—
—	—	$\frac{3}{4} \times \frac{3}{8}$	—	—	7.4
—	—	$\frac{3}{8} \times \frac{1}{3}$	47	—	7.6
—	—	—	—	14.0	—
1	—	—	53	—	11.4
—	—	—	—	—	10.9
—	—	$\frac{1}{3} \times \frac{3}{4}$	—	22.3	—
$1\frac{1}{4}$	$1\frac{1}{4}$	$\frac{1}{3} \times \frac{3}{8}$	57	—	17.2
—	—	—	—	—	18.3
—	—	$1 \times \frac{3}{8}$	57	—	18.5
$1\frac{1}{3}$	$1\frac{1}{3}$	$1 \times \frac{3}{4}$	—	26.4	—
—	—	—	59	—	20.9
—	—	$1\frac{1}{4} \times \frac{1}{2}$	—	—	21.5
—	—	$1\frac{1}{4} \times \frac{3}{4}$	59	—	22.8
—	—	$1\frac{1}{4} \times 1$	—	—	25.2
2	2	—	68	40.3	—
—	—	$2 \times \frac{1}{3}$	—	—	32.5
—	—	$2 \times \frac{3}{4}$	68	—	33.7
—	—	2×1	—	—	36.7
—	—	$2 \times 1\frac{1}{4}$	68	—	36.6
—	—	$2 \times 1\frac{1}{3}$	—	—	34.4
$2\frac{1}{3}$	—	—	75	61.4	—
—	—	$2\frac{1}{2} \times 1\frac{1}{2}$	—	—	58.3
—	—	$2\frac{1}{2} \times 2$	75	—	57.7
3	—	—	—	90.5	—
—	—	3×2	83	—	81.3
—	—	$3 \times 2\frac{1}{2}$	—	—	83.3
$3\frac{1}{2}$	—	—	86	120.0	—
4	—	—	95	148.0	—
8	—	—	116	—	—

SECTION 8 BACKNUTS

Table 25 Size Designation, Dimensions and Mass of Backnuts P4¹⁾

P 4		Size Designation P4	Dimension <i>a</i> Min mm	Nominal Mass (kg/100 Pieces)
		(1)	(2)	(3)
		1/4	6	1.3
		3/8	7	2.0
		1/3	8	3.4
		3/4	9	4.3
		1	10	8.3
		1 1/4	11	11.9
		1 1/2	12	13.2
		2	13	22.6
		2 1/2	16	41.8
		3	19	53.0

¹⁾ Backnuts may be plain recessed, and one face may be machined.

SECTION 9 CAPS AND PLUGS

Table 26 Size Designation, Dimensions and Mass of Hexagon Caps T1; Round Caps T2; Plain Plugs T8; Beaded Plugs; T9, and Countersunk Plugs T11
(Clause 7.1)


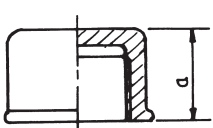
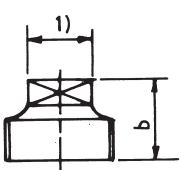
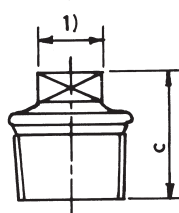
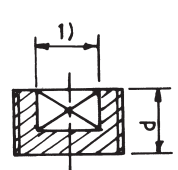
T1

T2

T8

T9

T11

Size Desingnation					Dimensions, <i>Min</i>				Nominal, <i>Max</i> (kg/100 Pieces)				
T1	T2	T8	T9	T11	<i>a</i> mm	<i>b</i> mm	<i>c</i> mm	<i>d</i> mm	T1	T2	T8	T9	T11 ¹⁾
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
—	1/8	1/8	1/8	—	13	11	20	—	—	1.4	—	1.2	—
1/4	1/4	1/4	1/4	—	15	14	22	—	2.1	2.1	—	2.0	—
3/8	3/8	3/8	3/8	3/8	17	15	24	11	2.9	2.9	—	2.6	—
1/2	1/2	1/2	1/2	1/2	19	18	26	15	4.3	4.3	—	3.8	—
3/4	3/4	3/4	3/4	3/4	22	20	32	16	7.0	7.0	—	7.2	—
1	1	1	1	1	24	23	36	19	10.2	10.2	—	10.6	—
1¼	1¼	1¼	1¼	—	27	29	39	—	16.4	16.4	—	17.0	—
1½	1½	1½	1½	—	27	30	41	—	21.3	21.3	—	21.2	—
2	2	2	2	—	32	36	48	—	32.0	32.0	—	34.3	—
2½	—	2½	2½	—	35	39	54	—	53.5	—	—	57.6	—
3	—	3	3	—	38	44	60	—	80.5	—	—	77.6	—
—	—	—	3½	—	—	—	67	—	—	—	—	100.0	—
4	—	4	4	—	45	58	70	—	132.0	—	—	124.0	—

NOTE — Plugs with size designation 1/8, 1/4, 3/8 are supplied in solid type only. Plugs with size designation 1/2 and above may be either solid or hollow but manufacturers normally supply hollow unless otherwise specified.

¹⁾ The weight will be included later on.

SECTION 10 UNIONS

Table 27 Size Designation, Dimensions and Mass of Unions, Flat Seat U1; Male and Female Unions, Flat Seat U2; Unions, Taper Seat U11 and Male and Female Unions Taper Seat U12
(Clause 7.1)

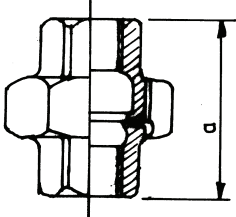
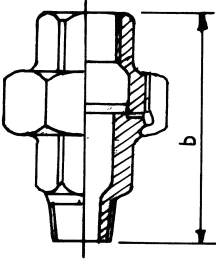
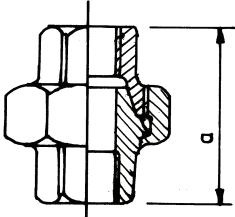
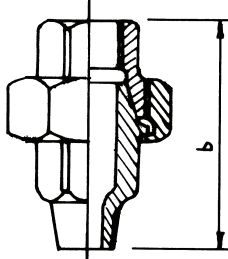
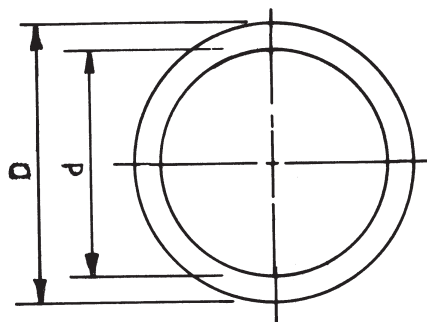
U1		U2		U11		U12			
									
Size Designation				Dimensions		Nominal Mass (kg/100 Pieces)			
U1	U2	U11	U12	<i>a</i> mm	<i>b</i> mm	U1	U2	U11	U12
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1/8	—	1/8	—	38	—	6.2	—	6.8	—
1/4	1/4	1/4	1/4	42	55	8.1	8.3	8.4	9.4
3/8	3/8	3/8	3/8	45	58	11.4	11.9	12.1	12.1
1/2	1/2	1/2	1/2	48	66	19.1	20.0	19.4	25.0
3/4	3/4	3/4	3/4	52	72	26.7	30.3	27.1	31.0
1	1	1	1	58	80	34.8	40.1	35.1	40.0
1¼	1¼	1¼	1¼	65	90	58.2	67.7	60.1	70.5
1½	1½	1½	1½	70	95	73.3	85.5	73.5	89.0
2	2	2	2	78	106	109.0	126.0	115.0	128.0
2½	—	2½	2½	85	118	176.0	—	176.0	209.0
3	—	3	3	95	130	244.0	—	250.0	286.0
4	—	4	—	110	—	390.0	—	400	—
5	—	—	—	135	—	795.0	—	—	—
6	—	—	—	150	—	1 100.0	—	—	—

Table 28 Gasket for Unions, Flat Set U1, U2, UA1 and UA2
(Clause 7.1)



Fitness Sizes of Unions (1)	Diameters of Gasket, mm		Thread Sizes or Union Nuts (for Guidance Only) (4)
	<i>d</i> (2)	<i>D</i> (3)	
$\frac{1}{8}$	—	—	G $\frac{1}{2}$
$\frac{1}{4}$	13	20	G $\frac{1}{2}$
	17	24	G $\frac{1}{2}$
$\frac{3}{8}$	17	24	G $\frac{1}{2}$
	19	27	G $\frac{1}{2}$
$\frac{1}{2}$	21	30	G 1
	24	34	G $1\frac{1}{2}$
$\frac{3}{4}$	27	38	G $1\frac{1}{2}$
1	32	44	G $1\frac{1}{2}$
$1\frac{1}{4}$	42	55	G 2
$1\frac{1}{2}$	46	62	G $2\frac{1}{2}$
2	60	78	G $2\frac{1}{2}$
$2\frac{1}{2}$	75	97	G $3\frac{1}{2}$
3	88	110	G 4
4	113	135	G 5
	120	148	G $5\frac{1}{2}$

NOTE — Material and thickness of gasket to be specified when ordering, depending on the application.

ANNEX A

(Clause 3.2)

NOMINAL SIZES OF PIPE THREADS AND CORRESPONDING NOMINAL DIAMETER, DN

Nominal Size of Pipe Threads (Size Designation)	Corresponding Nominal Bore mm
$\frac{1}{8}$	6
$\frac{1}{4}$	8
$\frac{3}{8}$	10
$\frac{1}{2}$	15
$\frac{3}{4}$	20
1	25
$1\frac{1}{4}$	32
$1\frac{1}{2}$	40
2	50
$2\frac{1}{2}$	65
3	80
4	100
5	125
6	150

ANNEX B*(Clauses 11.1.2, 11.2 and 13)***SAMPLING OF MALLEABLE CAST IRON PIPE FITTINGS****B-1 LOT**

All the malleable cast iron pipe fittings of the same type and manufactured from the same cast of metal shall be grouped together to form a lot.

B-2 SELECTION OF SAMPLES**B-2.1 Sample Size of Visual and Dimensional Characteristics**

Those cast iron fittings which are complicated in design shall be individually examined for visual characteristics, such as reinforcement, threads and finish. For other cast iron fittings, the visual examination shall be done on sample pieces. The visual examination shall include verification for material, freedom from surface defects, finish and spanner sizes (wherever applicable). After completing the visual examination, the fittings shall be inspected for dimensions including tolerances, short dimensions and mass for 100 pieces. The sample sizes and criteria for acceptance of the lot for these characteristics are given in Table 29.

B-2.2 Scale of Sampling for Repeat Pressure Tests

If the lot has been successfully tested for visual and dimensional characteristics, sample fittings from each lot shall be selected at random for conducting repeat pressure test. The sample sizes and criteria for

acceptance of lot in respect of these characteristics are given in Table 30.

B-2.3 Whenever the sample tubes are selected from lot, the selection shall be done by using a random number table. For this purpose, guidance may be had from IS 4905.

B-2.4 Criteria for Acceptance of the Lot

In respect of visual and dimensional characteristics, the number of defective fittings in the sample shall not exceed the corresponding acceptance number given in col 3 and 5 of Table 29, respectively. If the number of defective pieces exceeds the acceptance number, the lot shall be rejected and if agreed upon may be resubmitted after necessary reprocessing of the material. In respect of tests for repeat pressure, the lot shall be accepted if the number of defective fittings in the first sample is less than or equal to acceptance number for the first stage and shall be rejected if the number of defective fittings is equal to or greater than the rejection number. If the number lies between acceptance and rejection number of the first sample, a second sample shall be tested and the combined total number of defectives in both the samples shall be compared with the acceptance number for the second stage. The lot shall be accepted at the second stage, if the cumulative number of defectives does not exceed the corresponding acceptance number.

Table 29 Scale of Sampling and Acceptance Criteria for Visual and Dimensional Characteristics
(Clauses B-2.1 and B-2.4)

Number of Fittings in the Lot (1)	Visual Examination		Dimensional Test	
	Sample Size (2)	Acceptance No. (3)	Sample Size (4)	Acceptance No. (5)
Up to 500	13	1	8	0
501-1 000	20	2	13	1
1 001-3 000	32	3	20	1
3 001-5 000	50	5	32	2
5 001-10 000	80	7	50	3
10 001-15 000	125	10	80	5
15 001 and above	200	14	125	7

Table 30 Scale of Sampling and Acceptance Criteria for Repeat Pressure Test
(Clause B-2.2)

Lot Size	Stage	Sample Size	Cumulative Sample Size	Acceptance Number	Rejection Number
(1)	(2)	(3)	(4)	(5)	(6)
Up to 1 000	First	13	13	0	2
	Second	13	26	1	2
1 001-3 000	First	20	20	0	2
	Second	20	40	1	2
3 001-5 000	First	32	32	0	3
	Second	32	64	3	4
5 001-10 000	First	50	50	1	4
	Second	50	100	4	5
10 001 and above	First	80	80	2	5
	Second	80	160	6	7

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