

ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION R 49

MALLEABLE CAST IRON PIPE FITTINGS
SCREWED IN ACCORDANCE WITH ISO RECOMMENDATION R 7

- 1st EDITION -

July 1957

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BRIEF HISTORY

This ISO Recommendation R 49, *Malleable Cast Iron Pipe Fittings, Screwed in accordance with ISO Recommendation R 7*, was prepared by Technical Committee ISO/TC 5, *Pipes and Fittings*, the Secretariat of which is held by the Association Suisse de Normalisation (SNV).

At its plenary meeting held in Milan, in April 1952, the Technical Committee assigned the study of the standardization of these fittings to its Sub-Committee ISO/TC 5/SC 5, *Fittings (other than Cast Iron)*.

It was a question, in the first place, of making a choice among more than two thousand types and sizes of fittings covered by national standards, the proposals of the Member Bodies and the drafts of the former International Federation of the National Standardizing Associations (ISA) and of retaining those required for ordinary needs and manufactured in large quantity. During its meetings of 1952, in London, and 1953, in Paris, the Sub-Committee drew up a list of 638 types and sizes of fittings.

The Sub-Committee thereafter studied the "centre-to-face", "face-to-face" and "centre-to-centre" dimensions, comparing these with the dimensions specified by the national standards of various countries and by the ISA drafts. During its 1954 meetings, in Brussels and Zurich, it defined these dimensions and their tolerances.

On the basis of the proposals of the Sub-Committee, the ISO/TC 5 Secretariat put forward a first draft proposal which the Technical Committee examined during its 1955 plenary meeting, in Stockholm. After having decided upon the principle of corresponding and equally acceptable values for the inch and metric systems, provided that these values, in each case, permit practicable interchangeability, the Technical Committee adopted the draft proposal as a Draft ISO Recommendation.

The sizes of threads of Union nuts (see last column of table 4.21, page 31) have been included because the dimensions of the gaskets are dependent on those threads. As these threads are not intended to make pressure-tight joints on the threads and have not yet been standardized, they have therefore been included, for the time being, for guidance only.

Submitted on 31 December 1955 to all the ISO Member Bodies, this Draft ISO Recommendation was approved, subject to some amendments, by the following 27 Member Bodies (out of a total of 37):

*Austria	*Greece	Portugal
Belgium	Hungary	Romania
Bulgaria	*Ireland	Spain
Chile	Israel	Sweden
Czechoslovakia	Italy	Switzerland
Denmark	Japan	Turkey
Finland	Mexico	United Kingdom
France	Netherlands	U.S.S.R.
Germany	Poland	Yugoslavia

No Member Body opposed the approval of the Draft.

At its meeting in July 1957, the ISO Council decided to accept the Draft ISO Recommendation as an ISO RECOMMENDATION.

* These Member Bodies stated that they had no objection to the Draft being approved.

MALLEABLE CAST IRON PIPE FITTINGS

SCREWED IN ACCORDANCE WITH ISO RECOMMENDATION R 7

1. SCOPE

This Recommendation covers 638 malleable cast iron pipe fittings which are considered necessary for general use and which are being mass produced. It defines the types of fittings covered and specifies the dimensions which are necessary for interchangeability (centre-to-face, face-to-face and centre-to-centre dimensions) as well as their tolerances.

2. GENERAL

2.1 ILLUSTRATIONS

Illustrations used throughout this document are diagrammatical, e.g. the form of reinforcement and the design of the female ends shown have been arbitrarily chosen without prejudice.

2.2 REINFORCEMENT

The fittings may be either plain or reinforced.

Two typical forms of reinforcement are shown in figure 1.

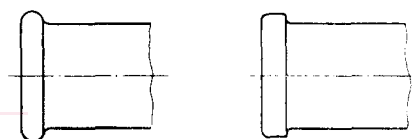


FIGURE 1

2.3 FEMALES ENDS

Two typical forms of female ends are shown in figure 2. Either form may be used for fitting code numbers D1, D4, E1, E2, G1, G1/45°, G4, G4/45° and Kb1.

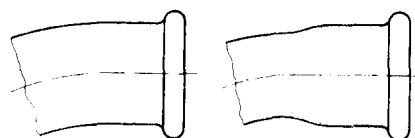


FIGURE 2

2.4 THREADS

The outlets are threaded to the dimensions specified in ISO Recommendation R 7, *Pipe Threads for Gas List Tubes and Screwed Fittings, where Pressure-Tight Joints are made on the Threads (1/8 inch to 6 inches)*.

2.5 DIMENSIONS

All the dimensions recommended enable the fittings to be assembled with tubes screwed in accordance with ISO Recommendation R 7.

The dimensions in inches and in millimetres given in the tables are considered to be "Corresponding values", although some of them are not exact equivalents. In all cases, however, the dimensions ensure practicable interchangeability.

The differences between these corresponding values do not exceed:

- 0.04 inch (corresponding value: 1 millimetre)
- or 50 per cent of the tolerances indicated in clause 2.6.1.

2.6 TOLERANCES

2.6.1 Where maximum or minimum dimensions are not specified, the tolerances for *centre-to-face**, *face-to-face*** and *centre-to-centre**** dimensions are as follows:

above		Dimensions up to and including		Tolerances	
mm	in	mm	in	mm	in
—	—	30	1 ¹ / ₄	± 1.5	± 0.06
30	1 ¹ / ₄	50	2	± 2.0	± 0.08
50	2	75	3	± 2.5	± 0.10
75	3	100	4	± 3.0	± 0.12
100	4	150	6	± 3.5	± 0.14
150	6	200	8	± 4.0	± 0.16
200	8	—	—	± 5.0	± 0.20

* *Centre-to-face* dimensions apply to elbows, bends, tees, crosses, etc.
 ** *Face-to-face* dimensions apply to sockets, nipples, etc.
 *** *Centre-to-centre* dimensions apply to return bends.

2.6.2 As regards the tolerance for the alignment of threads, the axes of the screw threads are coincident with the theoretical axes of the fittings within $\frac{1}{2}^\circ$ on the run and on the branches.

2.6.3 Thread tolerances are in accordance with those specified in ISO Recommendation R 7.

2.7 DESIGNATION OF FITTINGS

To facilitate easy translations into the languages of the various countries, the fittings covered by this Recommendation are designated by the following particulars and in the sequence shown:

- (a) Type of fitting see clause 2.7.1
- (b) Size see clause 2.7.2
- (c) Right- and left-hand thread, where applicable see clause 2.7.3
- (d) Code number see clause 2.7.4

2.7.1 Type of fitting (elbow, bend, tee, cross, etc.).

It should be noted that the following terms are omitted when reference is made to type of fitting:

- the indication "90°" for elbows, bends and tees of 90°;
- the word "equal" for fittings with all outlets of the same size;
- the word "female" for fittings with female-threaded outlets only;
- the word "male", where it is obvious that the fittings have only male thread.

The type of fitting is therefore denoted by "elbow", "bend", "tee", "cross", etc.

2.7.2 **Size.** This is determined by the nominal sizes of the pipe thread at the outlets.

EQUAL FITTINGS, where all outlets are of the same size, are referred to by that one size, irrespective of the number of outlets.

UNEQUAL FITTINGS are referred to by the size of each outlet, the sequence of specifying being dependent upon the number of outlets as follows:

Unequal fittings having two outlets are specified by their outlets given in decreasing order (large outlet — small outlet). See figure 3:

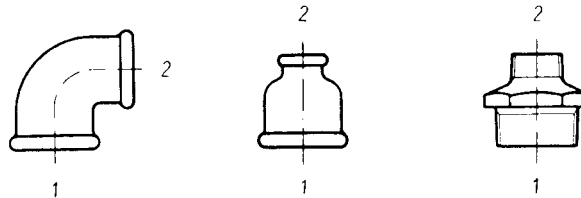


FIGURE 3

Unequal fittings (reducing or increasing) having more than two outlets are specified by either of the two methods shown respectively in figures 4 and 5:

Method "a" of specifying outlets

used in most countries where the **metric system** is applied

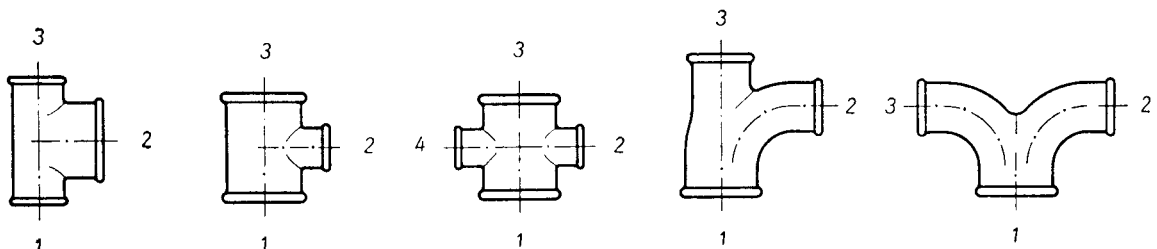


FIGURE 4

Method "b" of specifying outlets

used in most countries where the **inch system** is applied

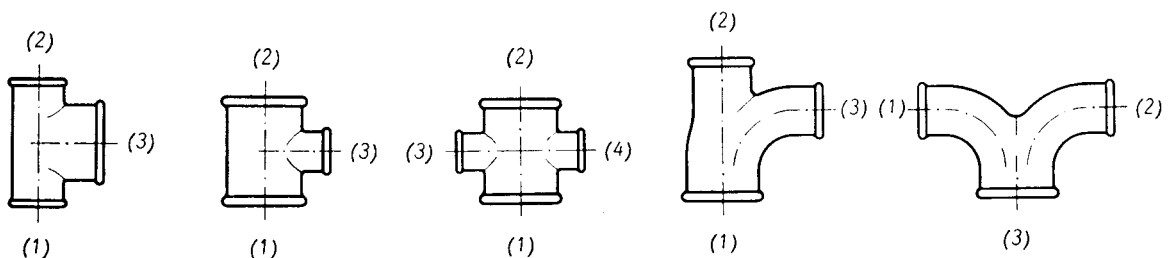








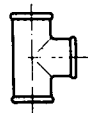
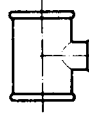
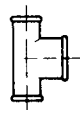
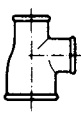
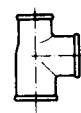
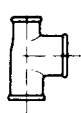
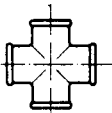
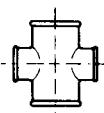


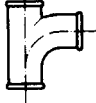
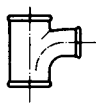
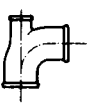
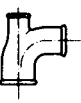
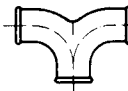
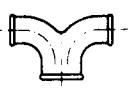
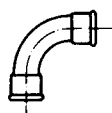

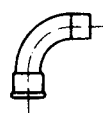


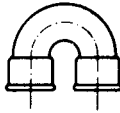
FIGURE 5



















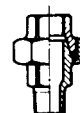





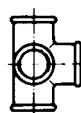
2.7.3 Right- and left-hand thread. For sockets and hexagon nipples, with right- and left-hand thread, the letters "R-L" (Right-Left) are added after the size of the fitting.

2.7.4 Code number. See Indexes, pages 6, 7 and 8.

2.7.5 Examples of designations :

- | | |
|----------------------------------------------------------------------------------------------------|---------------------|
| 2 inch equal female elbow | = Elbow 2, A1 |
| 1½ inch equal male and female bend | = Bend 1½, D4 |
| 1 inch equal socket, threaded right- and left-hand | = Socket 1 R-L, M2 |
| Reducing female tee, in which the sizes on the run are 1 inch and ½ inch and the outlet is ¾ inch: | |
| Method "a" of specifying outlets | = Tee 1 × ¾ × ½, B1 |
| Method "b" of specifying outlets | = Tee 1 × ½ × ¾, B1 |

3. INDEX OF CODE NUMBERS						
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	Page 9	Page 12	Page 12	Page 14	Page 14	Page 14
C Crosses	C1					
						
	Page 9	Page 16				
D Bends	D1	D4				
						
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E Pitcher Tees Twin Elbows	E1				E2	
						
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G Long Sweep Bends	G1	G1/45°	G4	G4/45°	G8	
						
	Page 20	Page 21	Page 20	Page 21	Page 20	
Kb Return Bends	Kb 1					
						
	Page 22					

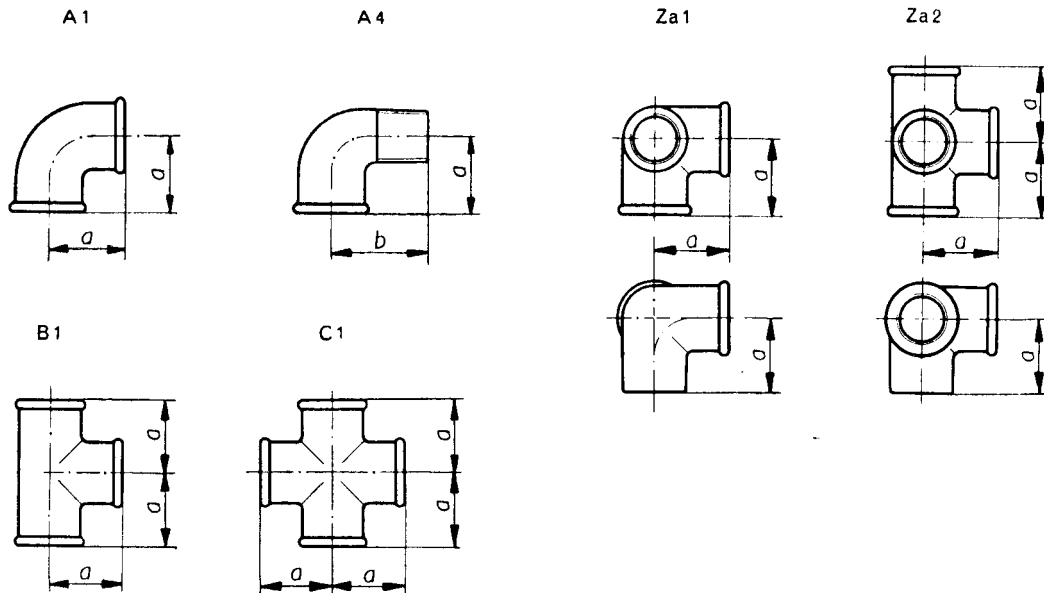
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N Bushings Hexagon Nipples	N4  Page 25			N8  Page 25		
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P Backnuts	P4  Page 27					
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4.1 ELBOWS **A1** MALE AND FEMALE ELBOWS **A4** SIDE OUTLET ELBOWS **Za1**
 TEES **B1** CROSSES **C1** SIDE OUTLET TEES **Za2**

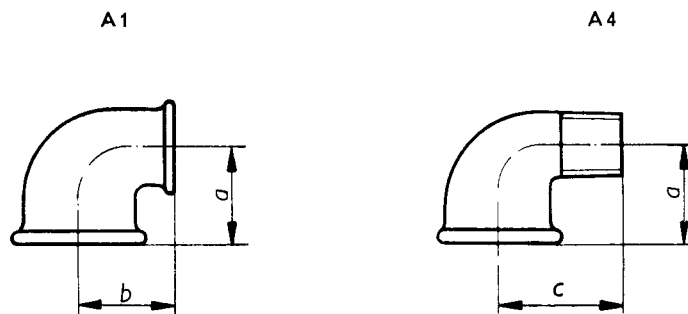


Sizes						Dimensions (Corresponding values)			
inches						millimetres		inches	
A1	A4	B1	C1	Za1	Za2	a	b	a	b
1/8	1/8	1/8	—	—	—	19	25	0.75	1.00
1/4	1/4	1/4	1/4	—	—	21	28	0.81	1.14
3/8	3/8	3/8	3/8	3/8	3/8	25	32	0.95	1.30
1/2	1/2	1/2	1/2	1/2	1/2	28	37	1.12	1.50
3/4	3/4	3/4	3/4	3/4	3/4	33	43	1.31	1.73
1	1	1	1	1	1	38	52	1.50	2.10
1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	45	60	1.75	2.41
1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	50	65	1.94	2.61
2	2	2	2	2	2	58	74	2.25	2.96
2 1/2	2 1/2	2 1/2	2 1/2	—	—	69	88	2.70	3.52
3	3	3	3	—	—	78	98	3.08	3.92
3 1/2	3 1/2	3 1/2	—	—	—	87	108	3.42	4.32
4	4	4	4	—	—	96	118	3.79	4.72
5	—	5	—	—	—	115	—	4.50	—
6	—	6	—	—	—	131	—	5.13	—

Dimensions which are not specified are left to the discretion of the manufacturer.
 Tolerances: see clause 2.6.
 Thread: in accordance with ISO Recommendation R 7.

4.2

ELBOWS, REDUCING A1
 MALE AND FEMALE ELBOWS, REDUCING A4



Sizes Inches		Dimensions (Corresponding values)					
		millimetres			inches		
A1	A4	<i>a</i>	<i>b</i>	<i>c</i>	<i>a</i>	<i>b</i>	<i>c</i>
$\frac{3}{8} \times \frac{1}{4}$	—	23	23	—	0.88	0.90	—
$\frac{1}{2} \times \frac{3}{8}$	$\frac{1}{2} \times \frac{3}{8}$	26	26	33	1.04	1.03	1.34
$\frac{3}{4} \times \frac{3}{8}$	—	28	28	—	1.12	1.13	—
$\frac{3}{4} \times \frac{1}{2}$	$\frac{3}{4} \times \frac{1}{2}$	30	31	40	1.20	1.22	1.61
$1 \times \frac{1}{2}$	—	32	34	—	1.26	1.36	—
$1 \times \frac{3}{4}$	$1 \times \frac{3}{4}$	35	36	46	1.37	1.45	1.85
$1 \frac{1}{4} \times \frac{3}{4}$	—	36	41	—	1.45	1.62	—
$1 \frac{1}{4} \times 1$	$1 \frac{1}{4} \times 1$	40	42	56	1.58	1.67	2.25
$1 \frac{1}{2} \times 1$	—	42	46	—	1.65	1.80	—
$1 \frac{1}{2} \times 1 \frac{1}{4}$	—	46	48	—	1.82	1.88	—
$2 \times 1 \frac{1}{2}$	—	52	55	—	2.02	2.16	—
$2 \frac{1}{2} \times 2$	—	61	66	—	2.39	2.60	—

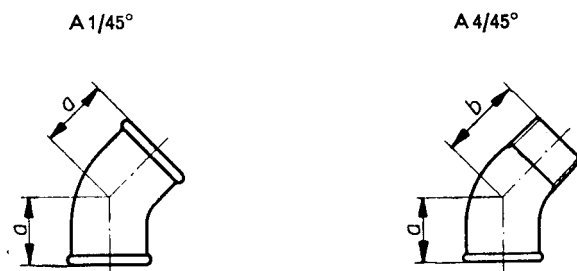
Dimensions which are not specified are left to the discretion of the manufacturer.

Tolerances: see clause 2.6.

Thread: in accordance with ISO Recommendation R 7.

4.3

45° ELBOWS A1/45°
45° MALE AND FEMALE ELBOWS A4/45°



Sizes inches		Dimensions (Corresponding values)			
		millimetres		inches	
A 1/45°	A 4/45°	a	b	a	b
3/8	3/8	20	25	0.80	1.00
1/2	1/2	22	28	0.88	1.12
3/4	3/4	25	32	0.98	1.26
1	1	28	37	1.12	1.45
1 1/4	1 1/4	33	43	1.29	1.67
1 1/2	1 1/2	36	46	1.43	1.81
2	2	43	55	1.68	2.14

Dimensions which are not specified are left to the discretion of the manufacturer.

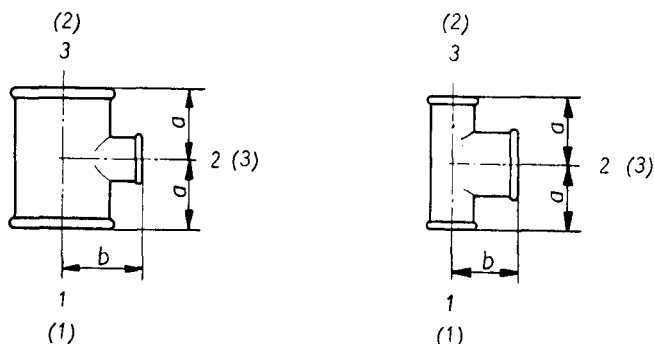
Tolerances: see clause 2.6.

Thread: in accordance with ISO Recommendation R 7.

4.4

TEES, REDUCING OR INCREASING ON THE BRANCH B1

B1



Sizes Inches						Dimensions (Corresponding values) millimetres inches				
Method "a"			Method "b"			a	b	a	b	
1	2	3	(1)	(2)	(3)					
3/8	×	1/4	×	3/8	×	1/4	23	23	0.88	0.90
3/8	×	1/2	×	3/8	×	1/2	26	26	1.03	1.04
1/2	×	1/4	×	1/2	×	1/4	24	24	0.97	0.98
1/2	×	3/8	×	1/2	×	3/8	26	26	1.04	1.03
1/2	×	3/4	×	1/2	×	3/4	31	30	1.22	1.20
1/2	×	1	×	1/2	×	1	34	32	1.36	1.26
3/4	×	1/4	×	3/4	×	1/4	26	27	1.05	1.08
3/4	×	3/8	×	3/4	×	3/8	28	28	1.12	1.13
3/4	×	1/2	×	3/4	×	1/2	30	31	1.20	1.22
3/4	×	1	×	3/4	×	1	36	35	1.45	1.37
3/4	×	1 1/4	×	3/4	×	1 1/4	41	36	1.62	1.45
1	×	1/4	×	1	×	1/4	28	31	1.11	1.22
1	×	3/8	×	1	×	3/8	30	32	1.18	1.27
1	×	1/2	×	1	×	1/2	32	34	1.26	1.36
1	×	3/4	×	1	×	3/4	35	36	1.37	1.45
1	×	1 1/4	×	1	×	1 1/4	42	40	1.67	1.58
1	×	1 1/2	×	1	×	1 1/2	46	42	1.80	1.65

Dimensions which are not specified are left to the discretion of the manufacturer.
 Tolerances: see clause 2.6.
 Thread: in accordance with ISO Recommendation R 7.
 Method of specifying outlets: see clause 2.7.2.