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Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

**“पुराने को छोड़ नये के तरफ”**

Jawaharlal Nehru

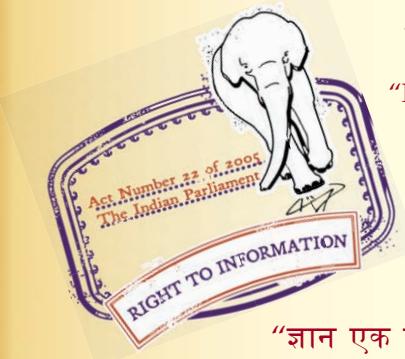
“Step Out From the Old to the New”

IS 13382 (2004): Cast Iron Specials for Mechanical and Push-on Flexible Joints for Pressure Pipe Lines for Water, Gas and Sewage [MTD 6: Pig iron and Cast Iron]

**“ज्ञान से एक नये भारत का निर्माण”**

Satyanaaranay Gangaram Pitroda

“Invent a New India Using Knowledge”



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

Bhartṛhari—Nītiśatakam

“Knowledge is such a treasure which cannot be stolen”





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भारतीय मानक

पानी, गैस और मलजल की दाब पाइप लाइनों के  
यांत्रिक और पुश-आन नम्य जोड़ों के लिये  
ढलवाँ लोहे के घटक — विशिष्टि  
( पहला पुनरीक्षण )

*Indian Standard*

CAST IRON SPECIALS FOR MECHANICAL  
AND PUSH-ON FLEXIBLE JOINTS FOR  
PRESSURE PIPE LINES FOR WATER, GAS  
AND SEWAGE — SPECIFICATION

( *First 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 (First 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 the year 1992. Since then production of ductile iron spun pipes have started in India which has increased the demand of cast iron fittings with rubber gaskets. In view of the increasing use of mechanical and push-on flexible joints for cast iron pipes and fittings the committee decided to revise this standard for cast iron fittings meant for mechanical and push-on flexible joints. As per the modern trend the short-bodied flanged fittings have also been included in this standard.

In the present revision following modifications have been made:

- a) Dimensions of spigot and socket fittings suitable for push-on joint and mechanical joints have been modified for better performance in line with changes in the socket design of cast iron and ductile iron pipes.
- b) The standard has been generally updated taking into account the modern trend in this respect in other international specifications particularly the current changes made in ISO 2531 : 1998 and EN 545 : 2002.
- c) The weights of castings depend mainly on the weight of socket which again depend on the type of joints, that is, push-on joints, mechanical joints, and restrained joints, etc. Hence as per current international practice all weights are being withdrawn from the standard.
- d) In order to minimize the number of separate patterns and core boxes for socketted and flanged fittings the modern unified design has been adopted. In this design the main body of the casting has same dimension for socketted or flanged fittings, the patterns of sockets or flanges and similarly corresponding cores are attached to the main pattern or core to produce the castings. This greatly reduces the number of component parts of foundry tackle and at the same time extend the range of fittings made available.

The working dimensions of the fittings have been adopted in accordance with the following publications:

ISO 13 : 1978	Grey iron pipes, special castings and grey iron parts for pressure main lines, issued by the International Organization for Standardization (ISO)
ISO 2531 : 1998	Ductile iron pipes, fittings and accessories for pressure pipe lines, issued by the International Organization for Standardization (ISO)
EN 545 : 2002	Ductile iron pipes, fittings and accessories and their joints for water pipe lines
BS 4622 : 1970	Specification for grey iron pipes and fittings, issued by the British Standards Institution (BSI)

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.

## Indian Standard

# CAST IRON SPECIALS FOR MECHANICAL AND PUSH-ON FLEXIBLE JOINTS FOR PRESSURE PIPE LINES FOR WATER, GAS AND SEWAGE — SPECIFICATION

*(First Revision)*

## 1 SCOPE

**1.1** This standard covers requirements for cast iron special castings to be used with cast iron and ductile iron pressure pipes for carrying water, gas and sewage for sizes from DN 80 mm up to DN 1 600 mm.

**1.2** This standard is applicable to fittings meant for mechanical joints (bolted gland), push-on joints (single rubber gasket) and flanged joints.

**1.2.1** This standard does not restrict the use of other types of joints as long as overall dimensions are maintained for reasons of safety and interchangeability.

NOTE — The terms special castings and push-on flexible joints have been referred as castings and push-on joints respectively henceforth in this standard.

## 2 REFERENCES

The following standards 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:

IS No.	Title
210 : 1993	Grey iron castings ( <i>fourth revision</i> )
1387 : 1993	General requirements for the supply of metallurgical materials ( <i>first revision</i> )
1500 : 1983	Method of Brinell hardness test for metallic materials ( <i>second revision</i> )
1536 : 2001	Centrifugally cast (spun) iron pressure pipes for water, gas and sewage ( <i>fourth revision</i> )
5382 : 1985	Rubber sealing rings for gas mains, water mains and sewers ( <i>first revision</i> )
11606 : 1986	Methods of sampling cast iron pipes and fittings
12820 : 1989	Dimensional requirements of rubber gaskets for mechanical joints and push-on joints for use with cast iron pipes and fittings for carrying water, gas and sewage

## 3 DEFINITIONS

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

**3.1 Ductile Iron,** Type of iron used for pipes, fittings and accessories in which graphite is present substantially in spheroidal form.

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

**3.3 Fitting,** Casting other than a pipe which allows pipeline deviation, change of direction or bore. In addition flanged-sockets, flanged-spigots and collars are also classified as fittings.

**3.4 Accessory,** Any item other than a pipe or fitting which is used in a pipeline, such as:

- a) Glands and bolts for mechanical flexible joints (*see 3.13*); and
- b) Glands, bolts and locking rings or segments for restrained joints (*see 3.14*).

NOTE — Valves and hydrants of all types are not covered by the term accessory.

**3.5 Flange,** Flat circular end of a pipe or fitting, extending perpendicular to its axis, with bolt holes equally spaced on a circle.

NOTE — A flange may be fixed (for example integrally cast, or threaded-on) or adjustable; and adjustable flange comprises a ring, in one or several parts bolted together, which bears on an end joint hub and can be freely rotated around the pipe axis before jointing.

**3.6 Collar; Coupling,** Connecting piece used to join together the spigots of mating pipes or fittings.

**3.7 Spigot,** Male end of a pipe or fitting.

**3.8 Socket,** Female end of a pipe fitting to make the joint with the spigot of an adjacent component.

**3.9 Gasket,** Sealing component of a joint.

**3.10 Joint,** Connection between the ends of pipes and/or fittings in which a gasket is used to effect a seal.

**3.11 Flexible Joint,** Joint which provides significant angular deflection and movement parallel and/or perpendicular to the pipe axis.

**3.12 Push-on Flexible Joint,** Flexible joint assembled by pushing the spigot through the gasket in the socket of the mating component.

**3.13 Mechanical Flexible Joint,** Flexible joint in which sealing is obtained by applying pressure to the gasket by mechanical means, for example a gland.

**3.14 Restrained Joint,** Joint wherein a means is provided to prevent separation of the assembled joint.

**3.15 Flanged Joint,** Joint between two flanged ends.

**3.16 Nominal Size, DN,** Numerical designation of size which is common to all components in a piping system. It is a convenient round number for reference purposes and is only loosely related to manufacturing dimensions.

**3.17 Nominal Pressure, PN,** A numerical designation expressed by a number which is used for reference purposes. All components of the same nominal size, DN designated by the same PN number have compatible mating dimensions.

**3.18 Diametral Stiffness of a Pipe,** Characteristic of a pipe which allows it to resist diametral deflection under loading.

**3.19 Batch,** Quantity of castings from which a certain number of samples may be taken for testing purposes during manufacture.

**3.20 Length,** Effective length of a fitting.

NOTE — For flanged fittings, the effective length is equal to the overall length and is noted  $L$  ( $l$  for branches).

**3.21 Ovality,** Out-of-roundness of a pipe section; it is equal to  $100 \times \frac{A_1 - A_2}{A_1 + A_2}$

where  $A_1$ , is the maximum axis and  $A_2$  the minimum axis of the pipe cross-section.

**3.22 Deviation,** Amount by which the design length may differ from the standardized length of a fitting.

## SECTION 1 GENERAL REQUIREMENTS

### 4 SUPPLY OF MATERIALS

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

### 5 MANUFACTURE

**5.1** The metal used for the manufacture of casting shall conform to the appropriate grade as specified in IS 210 in commensurate with the requirements laid down in the standard. It shall be prepared at the discretion of

the manufacturer in a cupola, an active mixer or other suitable furnace.

**5.2** The castings shall be stripped with all precautions to avoid warping or shrinkage defects, detrimental to their good quality. The castings shall be sound and free from surface or other defects.

**5.3** Castings showing small imperfections which result from the method of manufacture and which do not affect their use shall not be rejected on that account alone.

**5.4** Minor defects may be rectified with the consent of the purchaser. Repairing defects by soldering, plugging off leaks by caulking or by application of epoxy putty may not be done without previously securing the consent of the purchaser. Any dressing to remove imperfections shall not reduce the casting below the specified thickness.

**5.5** The castings shall be such that they could be cut, drilled or machined. The castings may be accepted provided hardness measured on the external unmachined surface does not exceed 210 HBS.

**5.6** Where castings are required to withstand pressure higher than those specified in the standard, the castings may be strengthened by means of increased wall thickness, if necessary, at the expense of the internal diameter or by suitable ribbing or as may be mutually decided by manufacturer and the purchaser, to suit the pressure specified by the purchaser.

## 6 JOINTS

### 6.1 Type of Joints

The details of push-on and mechanical joint used in the country have been included in this standard but this does not restrict the use of other types of joints or future development of other joints as long as the overall dimensions are maintained for reasons of safety and interchangeability.

**6.2** In case of push-on joints the spigot ends of pipes and fittings shall be suitably chamfered for smooth entry of pipe/fitting in the socket of the casting fitted with rubber gasket.

**6.3** In case of flange and mechanical joint castings, the flanges shall be at right angle to the axis of the joint. The bolt holes shall be cored or drilled.

**6.4** The bolt hole circles shall be concentric with the bore and shall be located off the centre line, unless otherwise specified by the purchaser. Where there are two or more flanges, the bolt holes shall be correctly aligned.

**6.5** The flanges shall be plain faced over the contact surface with a tool mark finishing having a pitch of  $1 \pm 0.3$  mm, serration's may be spiral or concentric.

## 7 RUBBER GASKETS

**7.1** Rubber gaskets for use with mechanical joints and push-on joints shall conform to IS 5382.

**7.2** The dimensions of the rubber gasket for use with mechanical joints and push-on joints whose designs are included in the specification shall conform to IS 12820. For other designs not covered in this standard, the dimensions of the gasket will as per manufacturer's recommendations as per agreement with the purchaser.

## 8 SAMPLING

Sampling criteria for checking the conformity of the castings, unless specified in this standard, shall be as laid down in IS 11606.

## 9 MECHANICAL TESTS

### 9.1 Tensile Test

Two tensile tests shall be made on bars cast from the same metal in accordance with the method specified in Annex A. The results of the tests shall show a minimum tensile strength of 150 MPa.

### 9.2 Hardness Test

For checking Brinell hardness test shall be carried out on the test bars used for the tests in 9.1. Test shall be carried out in accordance with the requirements stipulated in IS 1500. The Brinell hardness should not exceed 210 on the external unmachined surface.

### 9.3 Retests

If the pieces representing the lot fail to pass tests specified in 9.1 and 9.2 in the first instance, two additional tests shall be made on test pieces made from the same metal used for that lot. Should either of these additional test pieces fail to pass the test the lot shall be considered as not complying with this standard.

## 10 HYDROSTATIC TEST

**10.1** For hydrostatic test, the castings shall be kept under pressure for 15 s; they may be struck moderately with a 700 g hammer. They shall withstand the pressure test without showing any sign of leakage, sweating or other defect of any kind. The test shall be conducted before the application of surface coating.

**10.1.1** The castings shall withstand the hydrostatic pressure given in Table 1.

**10.1.2** When castings are required for higher test pressures, the test pressures are subject to agreement between the purchaser and the manufacturer.

**Table 1 Hydrostatic Test Pressure for Castings**  
(*Clause 10.1.1*)

Sl No.	Nominal Diameter <i>DN</i>	Test Pressure	
		Castings without Branches or with Branches not Greater than Half the Principal Diameter	Castings with Branches Greater than Half the Principal Diameter
	mm	MPa	MPa
(1)	(2)	(3)	(4)
i)	Up to and including 300	2.5	2.5
ii)	Over 300 and up to and including 600	2.0	2.0
iii)	Over 600 and up to and including 1 600	1.5	1.0

## 11 SIZES

**11.1** The range of nominal diameter *DN* of the castings covered in this standard is as follows:

80, 100, 125, 150, 200, 250, 300, 350, 400, 450, 500, 600, 700, 750, 800, 900, 1 000, 1 050, 1 100, 1 200, 1 400 and 1 600 mm.

**11.2** Dimensional and other requirements for socket/spigot of push-on joints, mechanical joints and flanges shall conform to the values as given in Section 2 (*see Tables 5 to 10*) as relevant.

**11.2.1** Dimensional and other requirements for castings for specified *DN* shall conform to the values as given in Section 3 (*see Tables 11 to 28*) as relevant.

## 12 TOLERANCES

**12.1** Tolerance on dimensions of barrel and socket for mechanical joints shall be as given in Table 2.

**Table 2 Tolerance on Dimensions of Barrel and Socket for Mechanical Joints**

(*Clause 12.1 and Table 12*)

All dimensions in millimetres.

Dimensions <i>DN</i>	Nominal Diameter	Tolerance
(1)	(2)	(3)
External diameter of barrel, <i>DE</i>	All diameters	$\pm (4.5 + 0.001 \text{ DN})$
Internal diameter of socket, <i>DI</i>	All diameters	$\pm (3 + 0.001 \text{ DN})$
Internal diameter of centering ring, <i>W</i>	All diameters	$\pm (3 + 0.001 \text{ DN})$
Outside diameter of gland collar, <i>E</i>	All diameters	$\pm (2 + 0.001 \text{ DN})$
Depth of socket, <i>P</i>	All diameters	$\pm 10$
Length of mechanical joint fittings, <i>L</i>	All diameters	$\pm 20$
Bolt hole circle of follower gland, <i>C</i>	Up to 250 mm Above 250 mm	$\pm 1.0$ $\pm 1.5$

**12.2 Tolerances on socket dimensions of push-on joint fittings shall be as given in Table 3.**

**Table 3 Tolerances on Socket Dimensions of Push-on Joint Fittings**

(Clause 12.2 and Table 12)

All dimensions in millimetres.

Nominal Diameters	Tolerances on Socket								
	DN	DI	I	J	K	P	Q	O	N
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
80 – 200	±1.50	+2.0 -1.0	+1.5 -0.5	±2.0	+5.0 -15.0	±3.0	±0.5	±1.0	±2.0
250 – 300	±1.50	+2.0 -1.25	+1.5 -1.0	±2.5	+5.0 -10.0	±3.0	±0.5	±1.0	±2.25
350 – 450	±1.50	+2.0 -1.5	+2.0 -1.0	±3.0	±10.0	±4.0	±0.5	±1.0	±2.25
500 – 600	±1.75	+2.0 -1.75	+2.0 -1.0	±3.5	±10.0	±4.0	±0.5	±1.0	±2.25
700 – 800	±2.5	+3.0 -2.0	+2.5 -1.5	±4.0	±10.0	±5.0	±0.5	±1.0	±2.75
900 – 1 600	±3.0	+4.0 -3.0	+2.5 -2.0	±5.0	±10.0	±6.0	±0.5	±1.0	±3.25

**12.3 Tolerances for various dimensions of flanges shall be as given in Table 4.**

**Table 4 Tolerances on Dimensions of Flanges**

Description	Nominal Diameter DN mm	Tolerances mm
(1)	(2)	(3)
D (as cast)	Up to 250	+3.0 -1.0
D (as cast)	Above 250	+5.0 -1.5
C	Up to 250	± 1.0
C	Above 250	± 1.5
d	Up to 300	+2.0 -0.0
d	Above 300	+3.0 -0.0

#### 12.4 Tolerances on Thickness

Tolerances on wall thickness and flange thickness of fittings are limited as follows:

Dimensions	Tolerances, mm
Wall thickness	– (2 + 0.05 e)
Flange thickness	± (3 + 0.05 b)

where

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

b = standard thickness of the flanges, in millimetres.

NOTE — No limit for the plus tolerances is specified.

#### 12.5 Tolerances on Lengths

The permissible deviations on the standard working lengths of fittings with sockets and fittings with flanges are given in below:

Type of Fitting	Length	Deviation/Tolerance mm
Flanged socket	L	DN 80 to 1 200 : $\pm 25$
Flanged spigot collar & taper		DN 1 400 to 1 600 : $\pm 35$
Bend 90°	L	$\pm (15 + 0.03 \text{ DN})$
Bend 45°	L	$\pm (10 + 0.025 \text{ DN})$
Bend 22½° and 11¼°	L	DN 80 to DN 1 000 : $\pm (10 + 0.02 \text{ DN})$ DN 1 200 to 1 600 : $\pm (10 + 0.025 \text{ DN})$
Tee	L and h	DN 80 to 1 200 : $+ 50$ $- 25$ DN 1 400 to 1 600 : $+ 75$ $- 35$

### 13 COATING

13.1 Each fitting shall be coated in accordance with 13.1.1 to 13.1.5.

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

13.1.2 Unless otherwise agreed between the purchaser and the manufacturer all fittings shall be coated externally and internally with the same material. The fittings may be coated by dipping in a tar or suitable base bath or by spraying or brush painting.

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

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

13.1.5 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 whatsoever to the potable water after sterilization and suitable washing of the mains.

13.2 Fittings with or without sockets and flanges which are imperfectly coated or where the coating does not set or conform to the required quality, specified in 13.1.1 to 13.1.5 the coating shall be removed and the fitting and accessories recoated.

### 14 CEMENT MORTAR LINING

#### 14.1 Internal Lining of Cement Mortar, General

The cement mortar lining of cast iron fittings is optional and is to be provided against specific instruction of the customer.

The cement mortar lining of cast iron fittings shall constitute a dense, homogeneous layer covering the total internal surface of the pipe fitting except at the inner surface of the socket. It shall be works-applied by a centrifugal spray head or manually, smoothing with a trowel.

Prior to application of the lining, the metal surface shall be free from loose materials and oil or grease.

The cement mortar mix shall comprise of cement, sand and water. The ratio by mass of sand to cement shall not be more than 3.5.

The sand shall have an appropriate grading and shall not contain organic impurities or fine clay particles, which may affect the lining quality. The water used in the mortar mix shall be potable water or water that has no harmful effect on the characteristics of the lining and of the conveyed water.

After application of the fresh lining, controlled curing shall be carried out so as to provide sufficient hydration to the cement.

When measured in accordance with the standard practice the compressive strength of the cement mortar after 28 days of curing shall be not less than 50 MPa.

The nominal thickness of cement mortar lining shall be as under:

DN mm	Thickness	
	Nominal mm	Tolerance mm
80 to 300	3.5	$- 1.5$
350 to 600	5.0	$- 2.0$
700 to 1 200	6.0	$- 2.5$
1 400 to 1 600	9.0	$- 3.0$

NOTE — No positive deviation on lining thickness is specified.

### 15 MARKING

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

- Indication of the source of manufacture,
- Nominal diameter,
- Last two digits of the year of manufacture, and
- Any other mark required by the purchaser.

15.1.1 Marking may be done on the barrel of castings or on the outside of the sockets.

**15.2** The fittings may also be marked with the Standard Mark.

**15.2.1** The use of the 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.

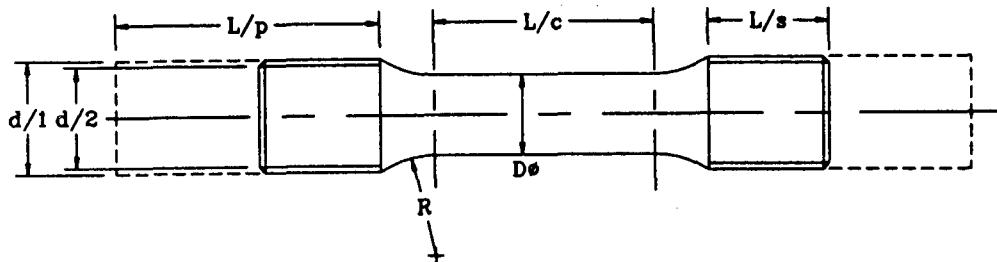
## ANNEX A

*(Clause 9.1)*

### TENSILE TEST BARS FOR FITTINGS CAST IN SAND MOULDS

**A-1** The tensile bars shall be properly moulded and shall be free from defects. These may be either unmachined or machined to give diameter of about

20 to 25 mm. The ends shall be selected by the manufacturer to fit the testing machine. Fig. 1 shows one satisfactory design.



All dimensions in millimetres.

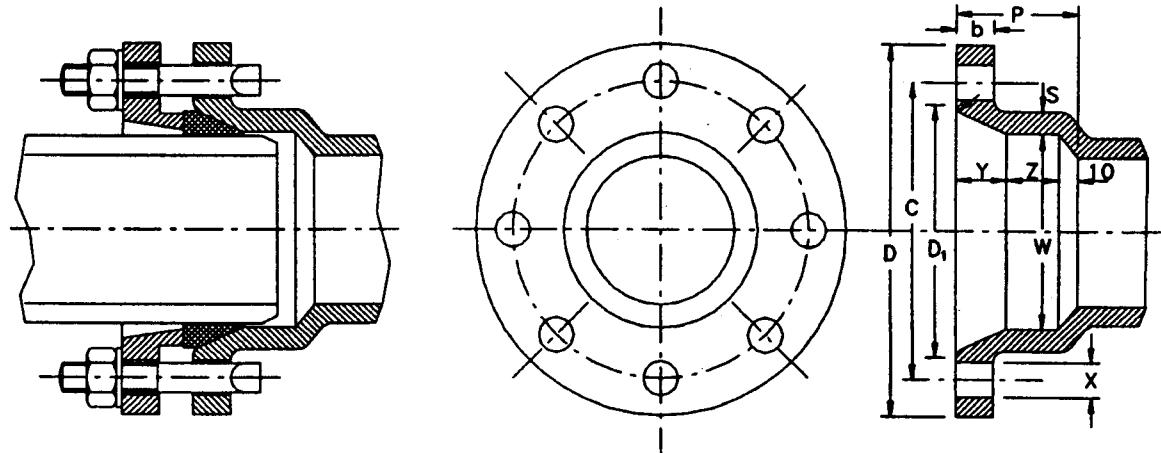
Gauge Diameter	Machining Tolerance for the Gauge Diameter	Minimum Parallel Length	Minimum Radius	Plain Ends		Screwed Ends	
				Minimum Diameter	Minimum Length	Minimum Dia at Root	Minimum Length
20	$\pm 0.5$	55	25	23	65	25	30

FIG. 1 TYPICAL TENSILE TEST SPECIMEN

**SECTION 2 DETAIL DIMENSIONS OF THE JOINTS**

**Table 5 Dimensions of Mechanical Joint — Socket**  
*(Clause 11.2)*

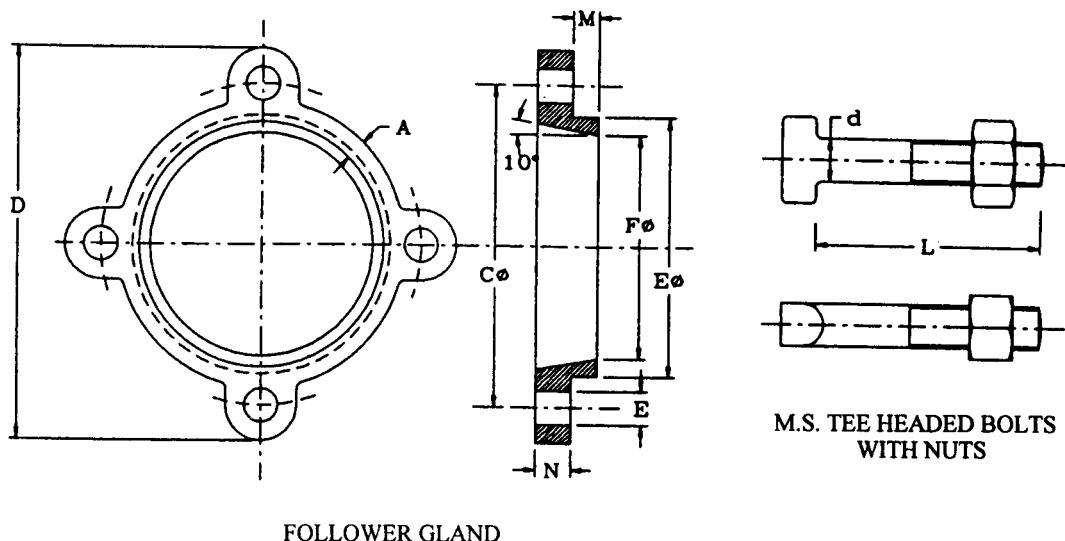
All dimensions in millimetres.



Nominal Diameter <i>DN</i>	<i>D</i>	<i>C</i>	<i>b</i>	<i>D<sub>1</sub></i>	<i>W</i>	<i>P</i>	<i>X</i>	<i>Y</i>	<i>Z</i>	<i>S</i>
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
80	210	170	20	140	105	65	19	27	28	12.0
100	230	190	20	160	125	65	19	27	28	12.5
125	260	220	20	186	151	65	19	27	28	13.0
150	295	250	20	212	177	65	23	27	28	14.0
200	350	305	20	264	229	65	23	27	28	15.0
250	405	360	25	319	282	65	23	27	28	16.5
300	455	410	25	371	334	65	23	27	28	17.5
350	515	470	25	428	386	90	23	28	52	19.0
400	585	530	28	479	437	90	28	28	52	20.0
450	635	580	28	530	488	90	28	28	52	21.0
500	690	635	28	585	540	90	28	28	52	22.5
600	800	740	30	684	645	90	31	33	47	25.0
700	920	860	30	801	748	120	31	33	77	27.5
750	975	915	30	853	800	120	31	33	77	29.0
800	1 040	970	35	903	852	120	34	38	72	30.0
900	1 145	1 075	35	1 005	955	120	34	38	72	32.5
1 000	1 260	1 185	35	1 108	1 060	120	37	38	72	35.0
1 050	1 325	1 250	38	1 175	1 125	120	37	38	75	35.0
1 100	1 385	1 310	42	1 234	1 164	140	37	50	80	35.6
1 200	1 500	1 420	45	1 337	1 267	140	40	55	75	38.0
1 400	1 710	1 625	50	1 540	1 472	140	43	58	72	42.0
1 600	1 945	1 845	50	1 749	1 677	150	49	60	80	46.0

**Table 6 Dimensions of Follower Gland for Mechanical Joint Fittings**  
*(Clause 11.2)*

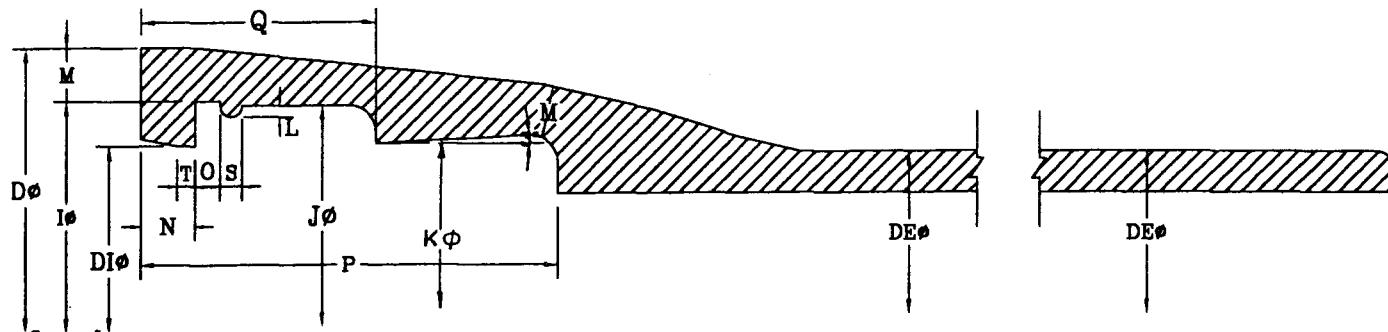
All dimensions in millimetres.



Nominal Diameter <i>DN</i>	Bolts											
	<i>D</i>	<i>C</i>	<i>E</i>	<i>F</i>	<i>X</i>	<i>N</i>	<i>M</i>	<i>A</i>	<i>d</i>	<i>L</i>	No.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
80	210	170	125	105	19	20	15	15	M 16	85	4	
100	230	190	145	125	19	20	15	15	M 16	85	4	
125	260	220	171	151	19	20	15	16	M 16	85	4	
150	295	250	197	177	23	20	15	17	M 20	90	4	
200	350	305	249	230	23	20	15	18	M 20	90	4	
250	405	360	302	282	23	25	15	20	M 20	90	6	
300	455	410	354	334	23	25	15	22	M 20	100	6	
350	515	470	411	386	23	25	20	24	M 20	100	8	
400	585	530	458	438	28	28	20	26	M 24	110	8	
450	635	580	513	489	28	28	20	28	M 24	110	10	
500	690	635	563	541	28	28	20	30	M 24	110	10	
600	800	740	668	645	31	30	20	32	M 27	120	10	
700	920	860	781	749	31	30	20	34	M 27	120	12	
750	975	915	833	800	31	30	20	36	M 27	120	12	
800	1040	970	883	850	34	35	20	38	M 30	120	12	
900	1145	1 075	983	955	34	35	20	40	M 30	130	14	
1 000	1 260	1 185	1 083	1 060	37	35	20	42	M 33	130	14	
1 050	1 325	1 250	1 150	1 125	37	35	20	42	M 33	130	14	
1 100	1 385	1 310	1 218	1 163	37	40	25	44	M 33	140	16	
1 200	1 500	1 420	1 322	1 267	40	40	25	46	M 36	150	16	
1 400	1 710	1 625	1 520	1 472	43	40	25	48	M 39	150	20	
1 600	1 945	1 845	1 729	1 677	49	45	30	50	M 45	160	20	

**Table 7 Dimensions of Sockets and Spigots of Fittings for Push-on Joints**  
**(Clause 11.2)**

All dimensions in millimetres.

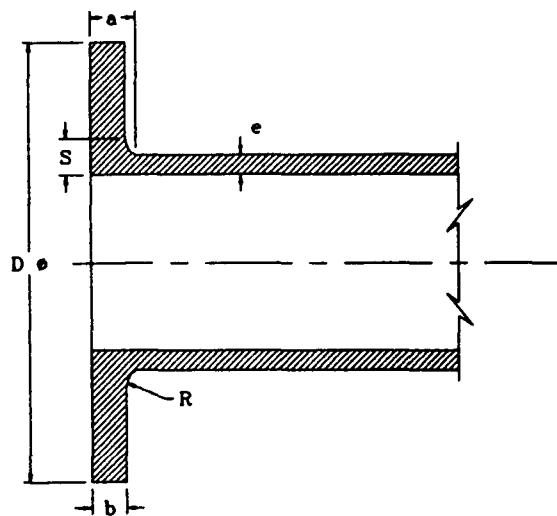


Nominal Diameter DN	Barrel				Socket									
	DE	X (Min)	DI	P	Q	I	J	K	N	O	S	T	L	M (Min)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
80	98	9	101	89	52	121.0	118.5	102	12	5.5	5	4	3.0	10.8
100	118	9	121	92	52	141.0	138.5	122	12	5.5	5	4	3.0	11.3
125	144	9	147	94	52	167.0	164.5	148	12	5.5	5	4	3.0	12.0
150	170	9	173	94	52	193.0	190.5	174	12	5.5	5	4	3.0	12.7
200	222	9	225.5	102	60	248.0	245.5	226	15	6.5	6	5	3.5	14.0
250	274	9	277.5	106	62	299.0	297.5	278.5	15	6.5	6	5	3.5	15.4
300	326	9	330	110	67	355.0	351.5	331.5	17	8.0	7	5	4.0	16.7
350	378	14	382	110	67	407.0	403.5	384	17	8.0	7	5	4.0	18.1
400	429	14	433.5	112	74	461.0	457.5	435.5	19	9.0	8	5	4.5	19.4
450	480	14	475.5	112	74	512.0	508.0	485.5	19	9.0	8	5	4.5	20.8
500	532	14	537	117	81	567.5	564.0	538	21	10.0	9	5	5.0	22.1
600	635	14	641	125	86	673.0	670.0	642	21	10.0	10	5	5.0	24.8
700	738	15	745	138	88	780.0	779.5	745	21	11.0	10	5	5.0	25.0
750	790	15	797	143	91	834.0	834.5	797	21	11.0	10	5	5.0	27.0
800	842	15	849	143	91	886.0	886.0	849	22	11.0	10	6	5.0	28.0
900	945	15	952	143	91	989.0	993.0	953	22	12.0	11	6	6.0	28.0
1 000	1 048	19	1 054	143	91	1 092.0	1 100.0	1 058	22	12.0	11	6	6.0	30.0
1 050	1 124	19	1 125	143	91	1 165.0	1 161.0	1 134	23	12.0	11	6	6.0	32.0
1 100	1 152	19	1 158	185	122	1 209.0	1 203.0	1 160	25	19.5	16	6.5	9.0	32.0
1 200	1 255	19	1 263	195	122	1 315.0	1 309.0	1 266	25	22.5	18	6.5	9.0	34.0
1 400	1 462	19	1 469	245	127	1 531.0	1 521.0	1 473	28	22.5	18	6.5	10.0	36.0
1 600	1 668	19	1 674	265	127	1 742.0	1 732.0	1 679	28	22.5	18	6.5	10.0	38.0

NOTE — Dimensions *S*, *T* and *L* are for guidance only.

**Table 8 Dimensions of Flanges of Fittings**  
*(Clause 11.2)*

All dimensions in millimetres.



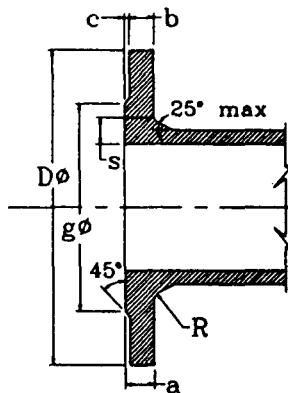
Nominal Diameter <i>DN</i>	<i>D</i>	<i>a</i>	<i>b</i>	<i>s</i>	<i>R</i>
(1)	(2)	(3)	(4)	(5)	(6)
80	200	19.0	16.0	15.0	6
100	220	19.0	16.0	15.0	6
125	250	19.0	16.0	15.0	7
150	285	19.0	16.0	15.0	8
200	340	20.0	17.0	16.0	8
250	395	22.0	19.0	17.5	10
300	445	24.5	20.5	19.5	10
350	505	24.5	20.5	19.5	10
400	565	24.5	20.5	19.5	10
450	615	25.5	21.5	20.5	12
500	670	26.5	22.5	21.0	12
600	780	30.0	25.0	24.0	12
700	895	32.5	27.5	23.0	12
750	960	34.0	29.0	24.0	12
800	1 015	35.0	30.0	24.5	12
900	1 115	37.5	32.5	26.5	12
1 000	1 230	40.0	35.0	28.0	12
1 050	1 285	42.0	36.0	28.0	12
1 100	1 340	42.5	37.5	30.0	12
1 200	1 455	45.0	40.0	31.5	12
1 400	1 675	46.0	41.0	32.0	12
1 600	1 915	49.0	44.0	34.5	12

NOTE — Thickness 'e' is equal to the thickness of fitting comprising the flange and not to exceed value of 's'.

**Table 9 Dimensions of Raised Flanges**

(Clause 11.2)

All dimensions in millimetres.

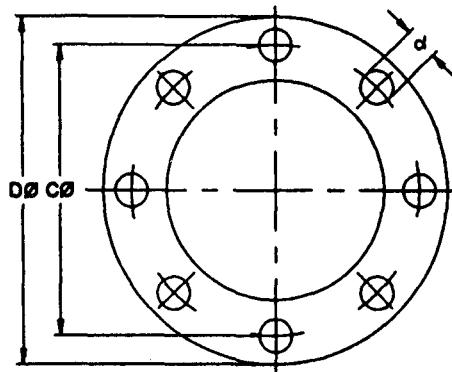


Nominal Diameter <i>DN</i>	<i>D</i>	<i>g</i>	<i>a</i>	<i>b</i>	<i>c</i>	<i>s</i>	<i>R</i>
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
80	200	132	19.0	16.0	3	15.0	6
100	220	156	19.0	16.0	3	15.0	6
125	250	183	19.0	16.0	3	15.0	7
150	285	211	19.0	16.0	3	15.0	8
200	340	266	20.0	17.0	3	16.0	8
250	395	319	22.0	19.0	3	17.5	10
300	445	370	24.5	20.5	4	19.5	10
350	505	429	24.5	20.5	4	19.5	10
400	565	480	24.5	20.5	4	19.5	10
450	615	530	25.5	21.5	4	20.5	12
500	780	582	26.5	22.5	4	21.0	12
600	780	682	30.0	25.0	5	24.0	12
700	895	794	32.5	27.5	5	23.0	12
750	950	846	34.0	29.0	5	24.0	12
800	1 015	901	35.0	30.0	5	24.5	12
900	1 115	1 001	37.5	32.5	5	26.5	12
1 000	1 230	1 112	40.0	35.0	5	28.0	12
1 050	1 285	1 165	40.0	35.0	5	28.0	12
1 100	1 340	1 218	42.5	37.5	5	30.0	12
1 200	1 455	1 328	45.0	40.0	5	31.5	12
1 400	1 675	1 530	46.0	41.0	5	32.0	12
1 600	1 915	1 750	49.0	44.0	5	34.5	12

NOTE — Thickness 'c' is equal to the thickness of fitting comprising the flange and not to exceed value of 's'.

**Table 10 Standard Flange Drilling of Flanged Fittings**  
*(Clause 11.2)*

All dimensions in millimetres.



Holes drilled offcentered unless otherwise specified

Nominal Diameter <i>DN</i>	<i>D</i>	<i>C</i>	Holes		Diameter of Bolts
			Number	Diameter ( <i>d</i> )	
(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	650	24	34	30
900	1 115	1 050	28	34	30
1 000	1 230	1 160	28	37	33
1 050	1 285	1 215	30	37	33
1 100	1 340	1 270	32	37	33
1 200	1 455	1 380	32	40	36
1 400	1 675	1 590	36	43	39
1 600	1 915	1 820	40	49	45

### SECTION 3 SPECIAL CASTINGS

#### A-2 GENERAL

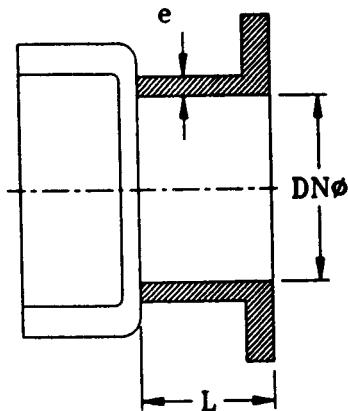
Special castings of the following types with their ends either socketted (for mechanical joints or push-on joints) or flanged shall conform to the dimensions and mass as relevant to those given in tables mentioned below against each type. Tolerances shall be as per clause 12:

Flanged sockets	: Table 11
Flanged spigot	: Table 12
Collars	: Table 13
Double socket and double flange 1/4 bends	: Table 14
Double socket and double flange 1/8 bends	: Table 15
Double socket and double flange	

1/16 bends	: Table 16
Double socket and double flange 1/32 bends	: Table 17
Double socket and double flange ¼ duckfoot bends	: Table 18
All socket and all flanged tees	: Table 19
All socket and all flanged crosses	: Table 20
Double socket and double flanged concentric tapers	: Table 21
Blank flanges	: Table 22
Caps	: Table 23
Plugs	: Table 24
All flanged radial tees	: Table 25
Flanged bellmouth	: Table 26
Hat flanged for air valve & hydrant	: Table 27
Flanged outlets for washouts	: Table 28

**Table 11 Flanged Sockets**(C<sub>l</sub>auses 11.2.1 and A-2)

All dimensions in millimetres.



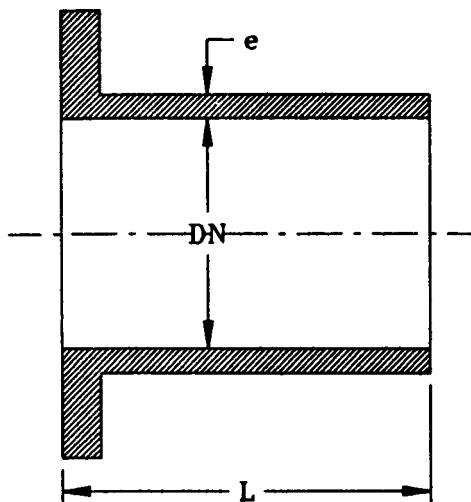
Nominal Diameter <i>DN</i>	<i>e</i>	<i>L</i>
(1)	(2)	(3)
80	10.0	130
100	10.5	130
125	11.1	130
150	11.7	135
200	12.8	140
250	14.0	145
300	15.2	150
350	16.3	155
400	17.5	160
450	18.7	165
500	19.8	170
600	22.2	180
700	24.3	190
750	25.7	195
800	26.8	200
900	29.2	210
1 000	31.5	220
1 050	32.6	225
1 100	33.8	230
1 200	36.2	240
1 400	40.9	310
1 600	45.5	330

NOTE — The castings may be supplied with a plain or raised flange.

**Table 12 Flanged Spigot**

(Claus 11.2.1 and A-2)

All dimensions in millimetres.



<b>Nominal Diameter <i>DN</i></b>	<b><i>e</i></b>	<b><i>L</i></b>
(1)	(2)	(3)
80	10.0	350
100	10.5	360
125	11.1	370
150	11.7	380
200	12.8	400
250	14.0	420
300	15.2	440
350	16.3	460
400	17.5	480
450	18.7	500
500	19.8	520
600	22.2	560
700	24.5	600
750	25.7	600
800	26.8	600
900	29.2	600
1 000	31.5	600
1 050	32.6	600
1 100	33.8	600
1 200	36.2	600
1 400	40.9	710
1 600	45.5	780

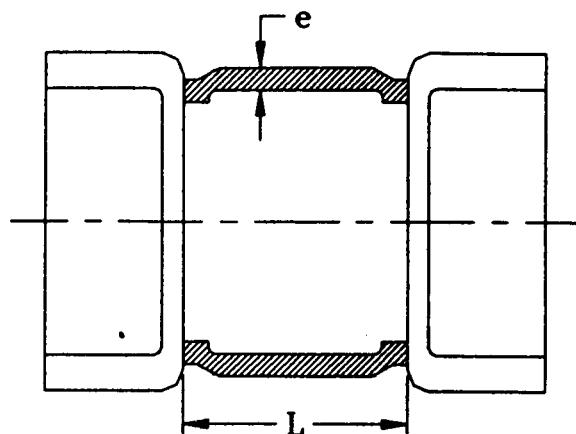
**NOTES**

1 The castings may be supplied with a plain or raised flange.

2 The tolerance of outside barrel diameter *DE* suitable for mechanical joint and push-on joint would be different and should conform to those given in Tables 2 and 3 respectively. If the spigot end is suitable for push-on joint it would be suitable for mechanical joint also.

**Table 13 Collar**  
*(Clauses 11.2.1 and A-2)*

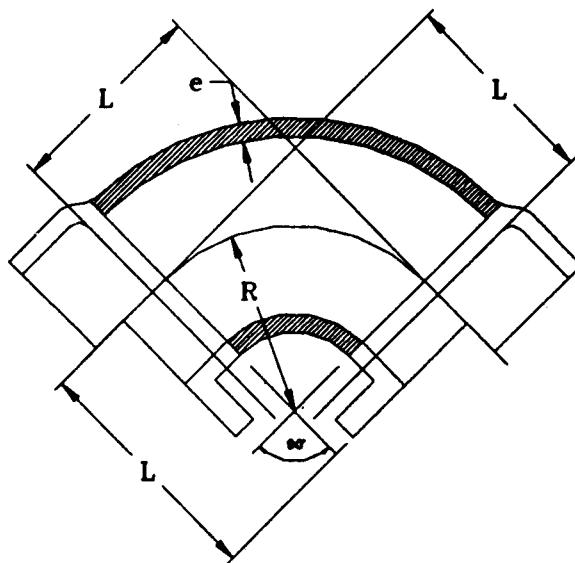
All dimensions in millimetres.



Nominal Diameter <i>DN</i>	<i>e</i>	<i>L</i>
(1)	(2)	(3)
80	10.9	325
100	11.4	325
125	12.0	325
150	12.6	330
200	13.8	340
250	15.0	355
300	16.2	360
350	17.5	380
400	18.6	400
450	19.8	410
500	21.1	425
600	23.5	450
700	25.9	470
750	27.2	475
800	28.4	480
900	30.8	520
1 000	33.2	530
1 050	34.5	550
1 100	35.6	560
1 200	38.0	570
1 400	40.0	580
1 600	45.5	600

NOTE — Collars will be available with mechanical joint only.

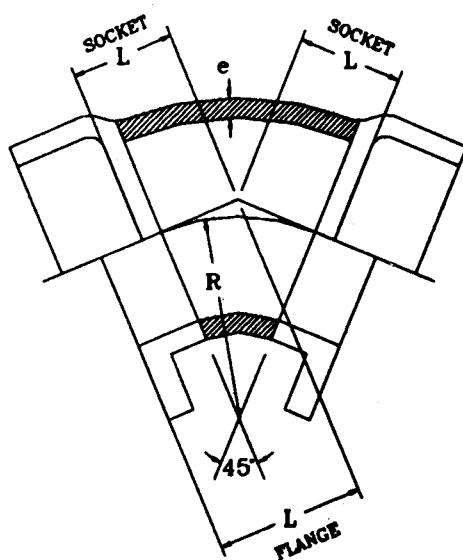
**Table 14 Double Socket and Double Flanged 90° Bends**  
*(Clauses 11.2.1 and A-2)*  
All dimensions in millimetres.



<b>Nominal Diameter</b> <i>DN</i>	<b>e</b>	<b>R</b> Approx	<b>L</b>	
			<b>Double Socket</b>	<b>Double Flanged</b>
(1)	(2)	(3)	(4)	(5)
80	10.0	85	110	155
100	10.5	105	130	175
125	11.1	130	155	205
150	11.7	155	180	230
200	12.8	205	230	280
250	14.0	255	280	335
300	15.2	300	325	385
350	16.3	350	380	440
400	17.5	400	430	495
450	18.7	445	480	545
500	19.8	495	530	600
600	22.2	590	630	705
700	24.5	685	735	810
750	25.6	735	780	865
800	26.8	780	830	915
900	29.2	875	930	1 020
1 000	31.5	975	1 035	1 130
1 050	32.6	1 025	1 080	1 180
1 100	33.8	1 070	1 130	1 235
1 200	36.2	1 165	1 230	1 340
1 400	40.9	1 345	1 430	1 550
1 600	45.5	1 545	1 630	1 765

**Table 15 Double Socket and Double Flanged 45° Bends**  
*(Clauses 11.2.1 and A-2)*

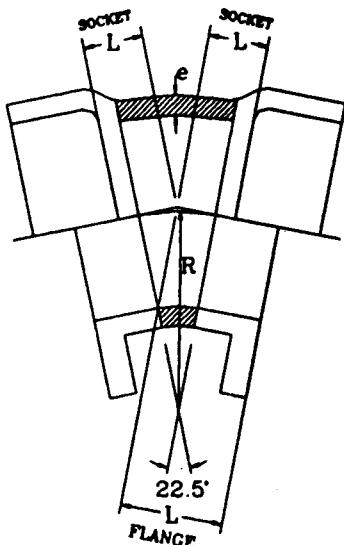
All dimensions in millimetres.



<b>Nominal Diameter</b> <i>DN</i>	<b>e</b>	<b>R</b> Approx	<b>L</b>	
			<b>Double Socket</b>	<b>Double Flanged</b>
<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>	<b>(5)</b>
80	10.0	85	60	105
100	10.5	110	70	115
125	11.1	135	80	130
150	11.7	155	90	140
200	12.8	215	115	165
250	14.0	265	135	190
300	15.2	315	155	215
350	16.3	360	180	240
400	17.5	410	200	265
450	18.7	445	220	285
500	19.8	495	240	310
600	22.2	590	285	360
700	24.5	690	335	410
750	25.6	740	355	435
800	26.8	785	375	460
900	29.2	880	420	510
1 000	31.5	980	465	560
1 050	32.6	1 030	485	585
1 100	33.8	1 075	505	610
1 200	36.2	1 170	550	660
1 400	40.9	1 330	635	755
1 600	45.5	1 535	720	855

**Table 16 Double Socket and Double Flanged 22½° Bends**  
*(Clauses 11.2.1 and A-2)*

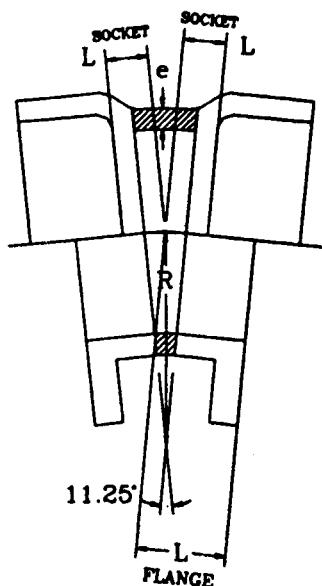
All dimensions in millimetres.



Nominal Diameter <i>DN</i> (1)	<i>e</i> (2)	<i>R</i> Approx (3)	<i>L</i>	
			Double Socket	
			(4)	(5)
80	10.0	75	40	85
100	10.5	100	45	90
125	11.1	125	50	95
150	11.7	150	55	105
200	12.8	225	70	120
250	14.0	275	80	135
300	15.2	325	90	150
350	16.3	375	105	165
400	17.5	400	120	175
450	18.7	450	125	190
500	19.8	505	135	205
600	22.2	605	160	235
700	24.5	705	190	265
750	25.6	755	200	280
800	26.8	805	210	295
900	29.2	880	230	320
1 000	31.5	980	255	350
1 050	32.6	1 030	265	365
1 100	33.8	1 080	275	380
1 200	36.2	1 180	300	410
1 400	40.9	1 305	345	465
1 600	45.5	1 535	390	525

**Table 17 Double Socket and Double Flanged 11½° Bends**  
*(Clauses 11.2.1 and A-2)*

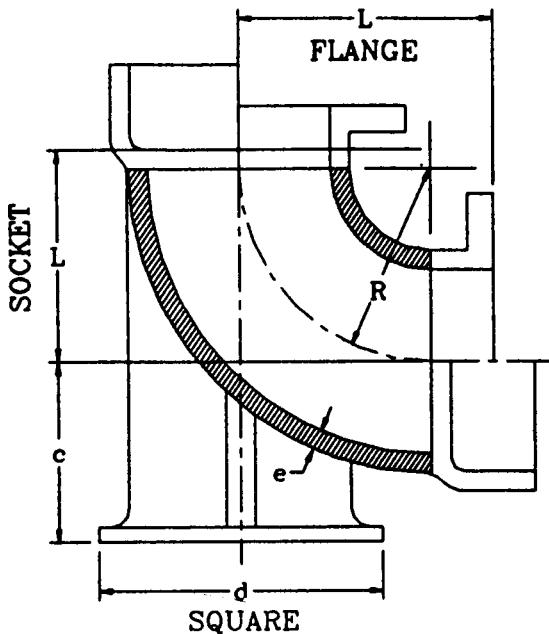
All dimensions in millimetres.



<b>Nominal Diameter</b> <i>DN</i>	<i>e</i>	<i>R</i> Approx	<i>L</i>	
			<b>Double Socket</b>	<b>Double Flanged</b>
(1)	(2)	(3)	(4)	(5)
80	10.0	50	30	75
100	10.5	100	35	80
125	11.1	125	38	85
150	11.7	150	40	90
200	12.8	255	50	100
250	14.0	305	55	110
300	15.2	355	60	120
350	16.3	405	70	130
400	17.5	455	75	140
450	18.7	455	80	145
500	19.8	510	85	155
600	22.2	610	100	175
700	24.5	710	120	195
750	25.6	760	125	210
800	26.8	810	130	215
900	29.2	915	145	235
1 000	31.5	1 015	160	255
1 050	32.6	1 065	165	265
1 100	33.8	115	170	275
1 200	36.2	1 220	185	295
1 400	40.9	1 270	210	330
1 600	45.5	1 320	215	370

**Table 18 Double Socket and Double Flanged 90° Duckfoot Bend**  
*(Clauses 11.2.1 and A-2)*

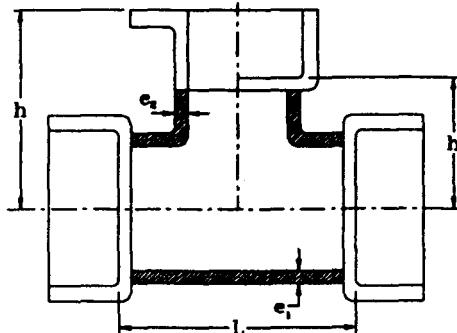
All dimensions in millimetres.



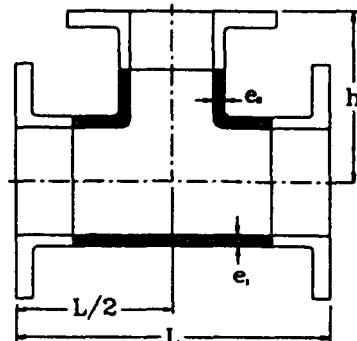
Nominal Diameter <i>DN</i>	<i>e</i>	<i>R</i> Approx	<i>L</i>		<i>c</i>	<i>d</i>
			Double Socket	Double Flanged		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
80	10.0	85	110	155	110	180
100	10.5	105	130	175	125	200
125	11.1	130	155	200	140	225
150	11.7	155	180	230	160	250
200	12.8	205	230	280	190	300
250	14.0	255	280	335	225	350
300	15.2	300	325	385	255	400
350	16.3	350	380	440	290	450
400	17.5	400	430	495	320	500
450	18.7	445	480	545	355	550
500	19.8	495	530	600	385	600
600	22.2	590	630	705	450	700
700	24.5	685	735	810	515	800
750	25.6	730	780	860	545	850
800	26.8	780	830	915	580	900
900	29.2	875	930	1 020	645	1 000
1 000	31.5	975	1 035	1 130	710	1 100
1 050	32.6	1 025	1 080	1 180	740	1 150
1 100	33.8	1 070	1 130	1 235	775	1 200
1 200	36.2	1 165	1 230	1 340	840	1 300
1 400	40.9	1 345	1 430	1 550	970	1 500
1 600	45.5	1 545	1 630	1 765	1 100	1 700

**Table 19 All Socket Tee, Double Socket Branch Flanged Tee and All Flanged Tees**  
*(Clauses 11.2.1 and A-2)*

All dimensions in millimetres.



All Socket & Double Socket Branch Flanged Tee



All Flanged Tee

Nominal Diameter Body DN	Branch dn	$e_1$	$e_2$	L			h		
				All Socket	All Flanged	Double Socket Branch Flanged	All Socket	All Flanged	Double Socket Branch Flanged
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
80	80	10.0	10.0	190	320	180	95	160	145
100	80	10.5	10.5	190	330	180	105	170	155
100	100	10.5	10.5	210	350	200	105	175	160
125	80	11.1	11.1	190	350	180	117	170	170
125	100	11.1	11.1	210	350	235	117	175	175
125	125	11.1	11.1	210	350	235	117	185	180
150	80	11.7	11.7	190	350	205	130	195	185
150	100	11.7	11.7	210	370	205	130	200	190
150	125	11.7	11.7	210	370	265	130	200	195
150	150	11.7	11.7	270	430	265	135	215	200
200	80	12.8	12.8	210	380	210	160	225	215
200	100	12.8	12.8	230	400	210	160	230	220
200	125	12.8	12.8	230	400	265	160	230	225
200	150	12.8	12.8	280	450	265	160	240	230
200	200	12.8	12.8	330	500	325	165	250	235
250	80	14.0	13.0	210	400	210	185	250	245
250	100	14.0	13.5	230	420	210	185	255	250
250	125	14.0	14.0	230	420	270	185	255	255
250	150	14.0	14.0	280	470	270	185	265	260
250	200	14.0	14.0	340	530	325	190	275	265
250	250	14.0	14.0	390	580	385	195	290	275
300	80	15.2	13.0	220	430	215	210	275	275
300	100	15.2	13.5	240	450	215	210	280	280
300	125	15.2	14.5	240	450	270	210	280	285
300	150	15.2	15.0	290	500	270	210	290	290
300	200	15.2	15.2	340	550	330	220	305	295
300	250	15.2	15.2	390	600	390	220	315	305

Table 19 (Continued)

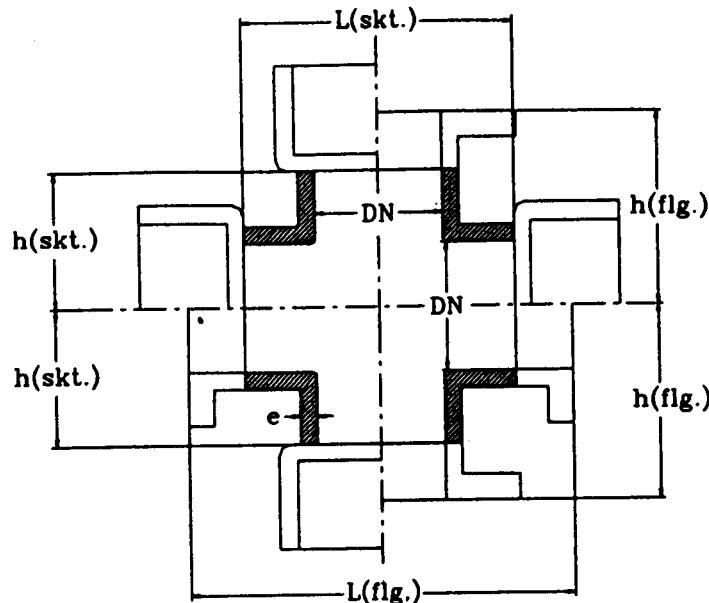
Nominal Diameter		$e_1$	$e_2$	L			$h$		
Body <i>DN</i>	Branch <i>dn</i>			All Socket	All Flanged	Double Socket Branch Flanged	All Socket	All Flanged	Double Socket Branch Flanged
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
350	100	16.3	15.0	250	470	215	235	305	310
350	150	16.3	16.0	300	520	275	240	320	320
350	250	16.3	16.3	410	630	390	245	340	335
350	350	16.3	16.3	510	730	505	255	365	350
400	100	17.5	16.0	250	490	220	260	330	340
400	200	17.5	16.5	360	600	335	270	355	355
400	300	17.5	17.5	460	700	450	275	380	370
400	400	17.5	17.5	570	810	570	285	405	385
450	100	18.7	17.0	260	510	225	290	360	370
450	150	18.7	17.5	320	570	280	290	370	380
450	250	18.7	18.0	420	670	395	300	395	395
450	350	18.7	18.7	520	770	515	310	420	410
450	450	18.7	18.7	630	880	630	315	440	425
500	100	19.8	17.5	270	530	225	315	385	400
500	200	19.8	18.0	380	640	340	325	410	415
500	300	19.8	19.0	480	740	460	325	430	430
500	400	19.8	19.8	590	850	575	335	455	445
500	500	19.8	19.8	690	950	690	345	475	460
600	100	22.2	18.0	290	570	230	365	435	460
600	150	22.2	18.5	340	620	290	370	450	470
600	250	22.2	19.0	450	730	405	375	470	485
600	350	22.2	21.0	550	830	520	385	495	500
600	450	22.2	22.2	650	930	640	395	520	515
600	600	22.2	22.2	810	1 090	810	405	545	535
700	150	24.5	19.0	350	660	295	420	500	530
700	200	24.5	20.0	400	710	355	425	510	535
700	300	24.5	20.5	510	820	470	430	535	550
700	400	24.5	22.5	610	920	585	440	560	565
700	500	24.5	24.5	710	1 020	700	450	580	580
700	700	24.5	24.5	920	1 230	935	460	615	610
750	150	25.6	20.0	290	1 400	300	425	580	555
750	250	25.6	21.5	405	1 400	415	435	600	570
750	350	25.6	22.5	520	1 400	530	450	620	585
750	450	25.6	24.5	635	1 400	645	460	640	600
750	600	25.6	25.6	810	1 400	820	475	670	625
750	750	25.6	25.6	985	1 400	995	490	700	645
800	150	26.8	21.0	370	700	300	475	555	590
800	250	26.8	23.0	470	800	420	480	575	605
800	350	26.8	24.5	580	910	535	490	600	620
800	450	26.8	25.6	680	1 010	650	495	620	635
800	600	26.8	26.8	840	1 170	825	510	650	655
800	800	26.8	26.8	1 050	1 380	1 055	525	690	685
900	200	29.2	22.5	440	790	365	530	615	655
900	300	29.2	24.5	540	890	480	535	640	670
900	400	29.2	25.6	650	1 000	600	545	665	685
900	500	29.2	26.8	750	1 100	715	555	685	700
900	700	29.2	29.2	960	1 310	945	565	720	730
900	900	29.2	29.2	1 170	1 520	1 180	585	760	760
1 000	200	31.5	24.5	440	820	370	585	670	715
1 000	250	31.5	25.6	500	880	430	585	680	725
1 000	350	31.5	26.8	600	980	545	595	705	740
1 000	450	31.5	29.2	700	1 080	660	600	725	755
1 000	600	31.5	31.5	860	1 240	835	615	755	775
1 000	800	31.5	31.5	1 070	1 450	1 070	625	790	805
1 000	1 000	31.5	31.5	1 280	1 660	1 300	640	830	835

Table 19 (Concluded)

Nominal Diameter		$e_1$	$e_2$	$L$			$h$		
Body $DN$	Branch $dn$			All Socket	All Flanged	Double Socket Branch Flanged	All Socket	All Flanged	Double Socket Branch Flanged
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1 050	200	32.6	25.0	450	850	375	600	700	750
1 050	300	32.6	26.0	550	950	460	625	700	750
1 050	400	32.6	29.0	650	1 050	575	625	750	775
1 050	500	32.6	31.0	750	1 150	700	625	750	800
1 050	700	32.6	32.0	980	1 350	900	650	800	800
1 050	900	32.6	32.6	1 200	1 500	1 125	650	825	850
1 050	1 050	32.6	32.6	1 400	1 700	1 350	675	850	875
1 100	200	33.8	25.6	470	860	380	640	725	775
1 100	300	33.8	26.8	570	960	495	645	750	790
1 100	400	33.8	29.2	670	1 060	610	650	770	805
1 100	500	33.8	31.5	780	1 170	725	660	790	820
1 100	700	33.8	32.0	990	1 380	960	675	830	850
1 100	900	33.8	33.8	1 200	1 590	1 190	690	865	880
1 100	1 100	33.8	33.8	1 410	1 800	1 420	705	900	910
1 200	200	36.2	26.8	480	880	385	690	775	835
1 200	250	36.2	29.2	530	930	440	695	790	845
1 200	350	36.2	32.6	640	1 040	560	705	815	860
1 200	450	36.2	33.8	740	1 140	675	710	835	875
1 200	600	36.2	35.0	900	1 300	850	725	865	895
1 200	800	36.2	36.2	1 110	1 510	1 080	735	900	925
1 200	1 000	36.2	36.2	1 310	1 710	1 310	750	940	955
1 200	1 200	36.2	36.2	1 530	1 930	1 545	765	965	985
1 400	250	40.8	27.0	560	980	640	800	895	940
1 400	300	40.8	29.2	610	1 030	695	805	910	945
1 400	400	40.8	32.6	710	1 130	815	810	930	960
1 400	500	40.8	33.8	820	1 240	930	820	950	975
1 400	700	40.8	35.0	1 030	1 450	1 160	835	990	1 005
1 400	900	40.8	36.2	1 240	1 660	1 395	850	1 025	1 035
1 400	1 100	40.8	40.8	1 450	1 870	1 625	865	1 060	1 065
1 400	1 400	40.8	40.8	1 770	2 190	1 975	885	1 095	1 110
1 600	250	45.5	28.0	590	1 030	650	910	1 005	1 050
1 600	350	45.5	29.2	690	1 130	765	915	1 025	1 065
1 600	450	45.5	32.6	790	1 230	885	925	1 050	1 080
1 600	600	45.5	33.8	950	1 390	1 055	935	1 075	1 100
1 600	800	45.5	35.0	1 160	1 600	1 290	950	1 115	1 130
1 600	1 000	45.5	40.8	1 370	1 810	1 520	960	1 150	1 160
1 600	1 200	45.5	45.5	1 580	2 020	1 755	980	1 180	1 190
1 600	1 600	45.5	45.5	2 010	2 450	2 215	1 005	1 225	1 250

**Table 20 Equal Crosses : All Sockets and All Flanges**  
*(Clauses 11.2.1 and A-2)*

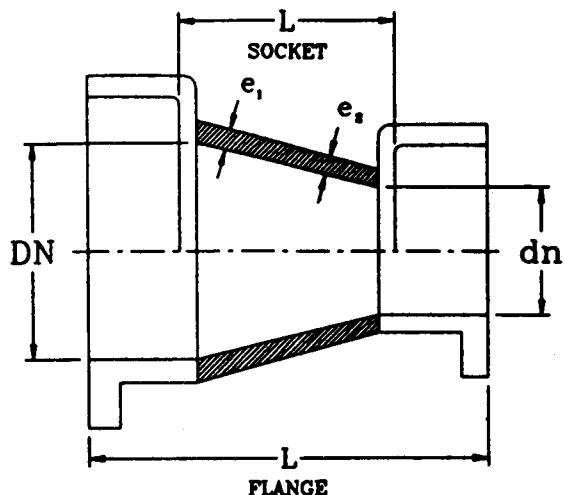
All dimensions in millimetres.



Nominal Diameter <i>DN</i>	<i>e</i>	<i>L</i>		<i>h</i>	
		All Socket (3)	All Flanged (4)	All Socket (5)	All Flanged (6)
(1)	(2)				
80	10.0	212	360	106.0	180
100	10.5	240	400	120.0	200
125	11.1	275	450	137.5	225
150	11.7	310	500	155.0	250
200	12.8	380	600	190.0	300
250	14.0	450	700	225.0	350
300	15.2	520	800	260.0	400

**Table 21 Double Socket and Double Flanged Central Tapers**  
*(Clauses 11.2.1 and A-2)*

All dimensions in millimetres.



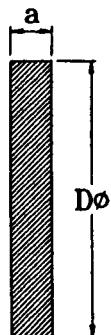
Nominal Diameter		$e_1$	$e_2$	$L$	
$DN$ (1)	$dn$ (2)	(3)	(4)	Double Socket (5)	Double Flanged (6)
100	80	10.5	10.0	95	185
150	80	11.7	10.0	180	275
150	100	11.7	10.5	150	245
200	100	12.8	10.5	235	330
200	150	12.8	11.7	155	255
250	150	14.0	11.7	235	340
250	200	14.0	12.8	160	265
300	150	15.2	11.7	320	430
300	200	15.2	12.8	240	350
300	250	15.2	14.0	160	275
350	200	16.3	12.8	330	440
350	250	16.3	14.0	245	360
350	300	16.3	15.2	165	285
400	200	17.5	12.8	410	525
400	250	17.5	14.0	330	450
400	300	17.5	15.2	245	370
400	350	17.5	16.3	170	295
450	250	18.7	14.0	415	535
450	300	18.7	15.2	335	460
450	350	18.7	16.3	255	380
450	400	18.7	17.5	175	305
500	250	19.8	14.0	500	625
500	300	19.8	15.2	415	545
500	350	19.8	16.3	340	470
500	400	19.8	17.5	255	390
500	450	19.8	18.7	180	315
600	300	22.2	15.2	585	720
600	350	22.2	16.3	510	645
600	400	22.2	17.5	425	565
600	450	22.2	18.7	350	490
600	500	22.2	19.8	265	410

Table 21 (Concluded)

Nominal Diameter		$e_1$	$e_2$	$L$	
$DN$	$dn$	(3)	(4)	Double Socket	Double Flanged
(1)	(2)	(3)	(4)	(5)	(6)
700	350	24.5	16.3	685	820
700	400	24.5	17.5	600	740
700	450	24.5	18.7	525	665
700	500	24.5	19.8	440	585
700	600	24.5	22.2	280	430
750	400	25.6	17.5	725	845
750	450	25.6	18.7	595	770
750	500	25.6	19.8	515	695
750	700	25.6	24.5	270	465
800	400	26.8	17.5	750	955
800	450	26.8	18.7	670	880
800	500	26.8	19.8	590	805
800	600	26.8	22.2	430	655
800	700	26.8	24.5	265	505
900	450	29.2	18.7	840	1 055
900	500	29.2	19.8	760	980
900	600	29.2	22.2	600	830
900	700	29.2	24.5	435	680
900	800	29.2	26.8	270	525
1 000	500	31.5	19.8	930	1 155
1 000	600	31.5	22.2	770	1 005
1 000	700	31.5	24.5	605	855
1 000	800	31.5	26.8	440	700
1 000	900	31.5	29.2	280	550
1 050	500	32.6	20	1 030	1 250
1 050	600	32.6	22.8	930	1 150
1 050	700	32.6	25.0	770	1 025
1 050	800	32.6	27.5	605	875
1 050	900	32.6	30.0	445	700
1 050	1 000	32.6	31.0	280	550
1 100	600	33.8	22.2	935	1 180
1 100	700	33.8	24.5	770	1 030
1 100	800	33.8	26.8	605	875
1 100	900	33.8	29.2	445	725
1 100	1 000	33.8	31.5	280	575
1 200	600	36.2	22.2	1 105	1 355
1 200	700	36.2	24.5	940	1 205
1 200	800	36.2	26.8	775	1 050
1 200	900	36.2	29.2	615	900
1 200	1 000	36.2	31.5	450	750
1 200	1 100	36.2	33.8	295	600
1 400	1 000	40.8	31.5	790	1 100
1 400	1 100	40.8	33.8	635	950
1 400	1 200	40.8	36.2	480	800
1 600	1 000	45.5	31.5	1 125	1 450
1 600	1 100	45.5	33.8	970	1 300
1 600	1 200	45.5	36.2	815	1 150
1 600	1 400	45.5	40.8	490	835

**Table 22 Blank Flanges**  
(*Clauses 11.2.1 and A-2*)

All dimensions in millimetres.

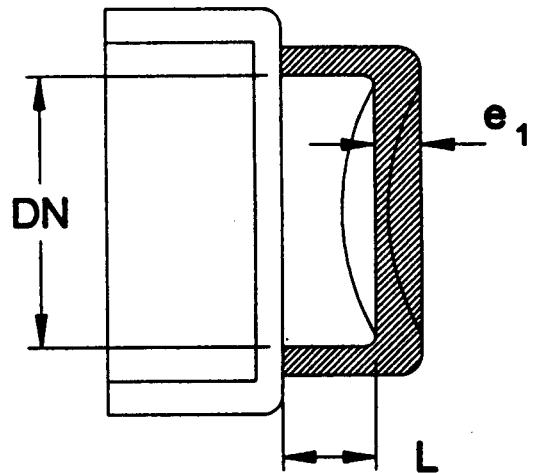


Nominal Diameter <i>DN</i>	<i>D</i>	<i>a</i>
(1)	(2)	(3)
80	200	21.0
100	220	22.0
125	250	22.5
150	285	23.0
200	340	24.5
250	395	26.0
300	445	27.5
350	505	29.0
400	565	30.0
450	615	31.5
500	670	33.0
600	780	36.0
700	895	38.5
750	960	40.0
800	1 015	41.5
900	1 115	44.0
1 000	1 230	47.0
1 050	1 285	48.0
1 100	1 340	50.0
1 200	1 455	52.5
1 400	1 675	58.2
1 600	1 915	63.8

NOTE — Beyond the Nominal Diameter 300 mm, the flanges may be ribbed and strengthened, if desired.

**Table 23 Caps**  
(*Clauses 11.2.1 and A-2*)

All dimensions in millimetres.

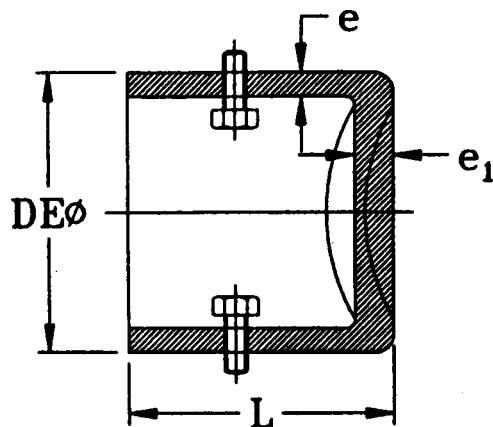


$$e_1 = 19 + 0.08 \text{ DN}$$

Nominal Diameter <i>DN</i>	<i>e</i> <sub>1</sub>	<i>L</i>
(1)	(2)	(3)
80	21.0	15
100	22.0	15
125	22.5	15
150	23.0	15
200	24.5	20
250	26.0	20
300	27.5	30
350	29.0	30
400	30.0	30
450	31.5	35
500	33.0	35
600	36.0	35
700	38.5	40
750	40.0	40
800	41.5	40
900	44.0	45
1 000	47.0	45
1 050	48.0	48
1 100	50.0	50
1 200	52.5	50
1 400	58.2	60
1 600	63.8	70

**Table 24 Plugs**  
*(Clauses 11.2.1 and A-2)*

All dimensions in millimetres.



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

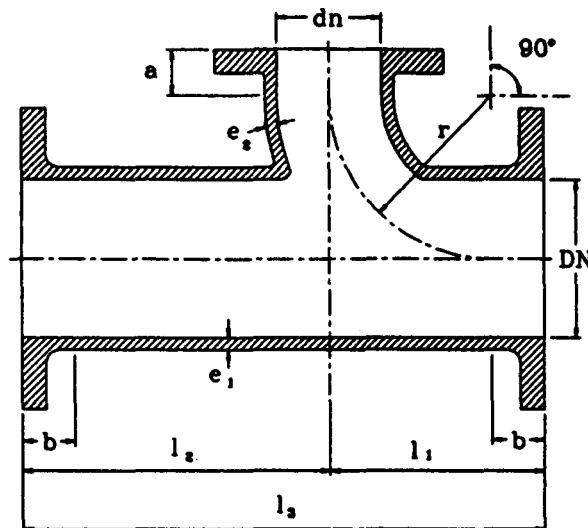
$$e_1 = 19 + 0.028 DN$$

Nominal Diameter <i>DN</i>	<i>DE</i>	<i>e</i>	<i>e<sub>1</sub></i>	<i>L</i>
(1)	(2)	(3)	(4)	(5)
80	98	10.0	21.0	125
100	118	10.5	22.0	130
125	144	11.1	22.5	135
150	170	11.7	23.0	140
200	222	12.8	24.5	150
250	274	14.0	26.0	155
300	326	15.2	27.5	160
350	378	16.3	29.0	165
400	429	17.5	30.0	170
450	480	18.7	31.5	175
500	532	19.8	33.0	180
600	635	22.2	36.0	185
700	738	24.5	38.5	195
750	790	25.6	40.0	200
800	842	26.8	41.5	205
900	945	29.2	44.0	210
1 000	1 048	31.5	47.0	215
1 050	1 124	32.6	48.4	215
1 100	1 152	33.8	50.0	220
1 200	1 256	36.2	52.5	225
1 400	1 464	40.8	58.2	235
1 600	1 672	45.5	63.8	245

Table 25 All Flanged Radial Tees

(Clauses 11.2.1 and A-2)

All dimensions in millimetres.



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

$$l_1 = r + b$$

$$I = 65 + 0.9 dn$$

$$l_3 = 200 + 2 DN \text{ (for } DN = 80 \text{ to } 300)$$

$$a = 35 + 0.1 dn$$

$$l_3 = 500 + DN \text{ (for } DN = 350 \text{ to } 1000)$$

$$b = 35 + 0.1 DN$$

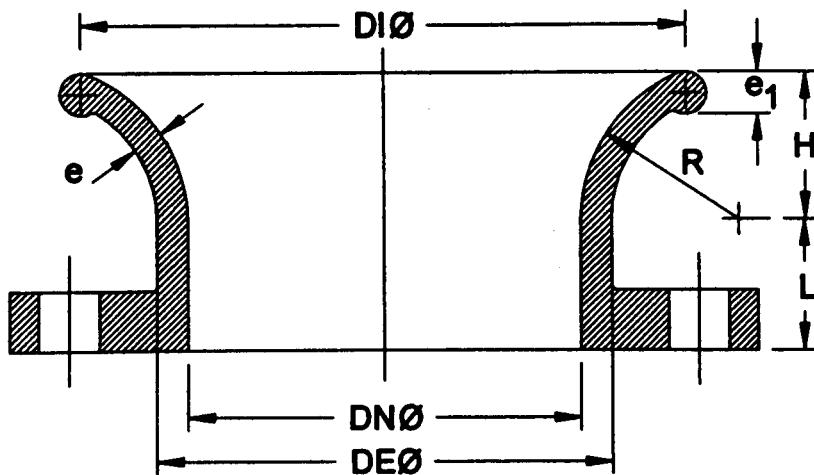
$$l_2 = l_3 - l_1$$

Nominal Diameter		$e_1$	$e_2$	$b$	$l_1$	$l_2$	$l_3$	$r$	$a$
$DN$		$dn$							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
80	80	10.0	10.0	43	180	180	360	137	43
100	80	10.5	10.5	45	182	218	400	137	43
125	100	11.1	11.1	47	202	248	450	155	45
150	100	11.7	11.7	50	205	295	500	155	45
200	100	12.8	12.8	55	210	390	600	155	45
250	150	14.0	14.0	60	260	440	700	200	50
300	150	15.2	15.0	65	265	535	800	200	50
350	200	16.3	16.3	70	315	535	850	245	55
400	200	17.5	16.5	75	320	580	900	245	55
450	300	18.7	17.5	80	415	535	950	335	65
500	400	19.8	19.8	85	510	490	1 000	425	75
600	400	22.2	22.2	95	520	580	1 100	425	75
700	500	24.5	24.5	105	620	580	1 200	515	85
750	500	25.6	25.5	110	625	625	1 250	515	85
800	600	26.8	26.8	115	720	580	1 300	605	95
900	600	29.2	28.5	125	730	670	1 400	605	95
1 000	600	31.5	28.5	135	740	760	1 500	605	95
1 050	600	32.6	29.0	140	745	805	1 550	605	95

**Table 26 Flanged Bellmouth**

(Clauses 11.2.1 and A-2)

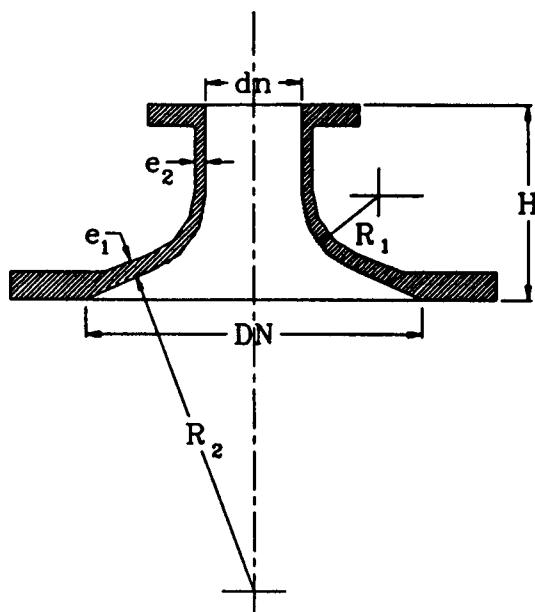
All dimensions in millimetres.

Tolerances on  $L$  and  $H$  :  $\pm 5.0$  mm

<b>Nominal Diameter</b> <i>DN</i>	<b>DE</b>	<b><math>e</math></b>	<b><math>e_1</math></b>	<b>DI</b>	<b>R</b>	<b><math>L</math></b>	<b><math>H</math></b>
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
80	98	10.0	14	125	37.3	50	30
100	118	10.5	14	150	47.3	50	40
125	144	11.1	15	175	52.2	50	50
150	170	11.7	16	230	60.1	50	56
200	222	12.8	16	300	81.5	50	75
250	274	14.0	17	375	103.7	50	95
300	326	15.2	18	450	118.4	60	110
350	378	16.3	19	530	139.2	60	130
400	429	17.5	20	600	162.8	60	150
450	480	18.7	21	680	183.6	70	170
500	532	19.8	23	750	207.6	70	190
600	635	22.2	25	900	252.4	80	230
700	738	24.5	27	1 050	281.6	80	260
750	790	25.6	29	1 125	310.5	80	275
800	842	26.8	30	1 200	326.5	100	300
900	945	29.2	32	1 350	371.3	100	340

**Table 27 Hat Flanged for Air Valve and Hydrant**  
*(Clauses 11.2.1 and A-2)*

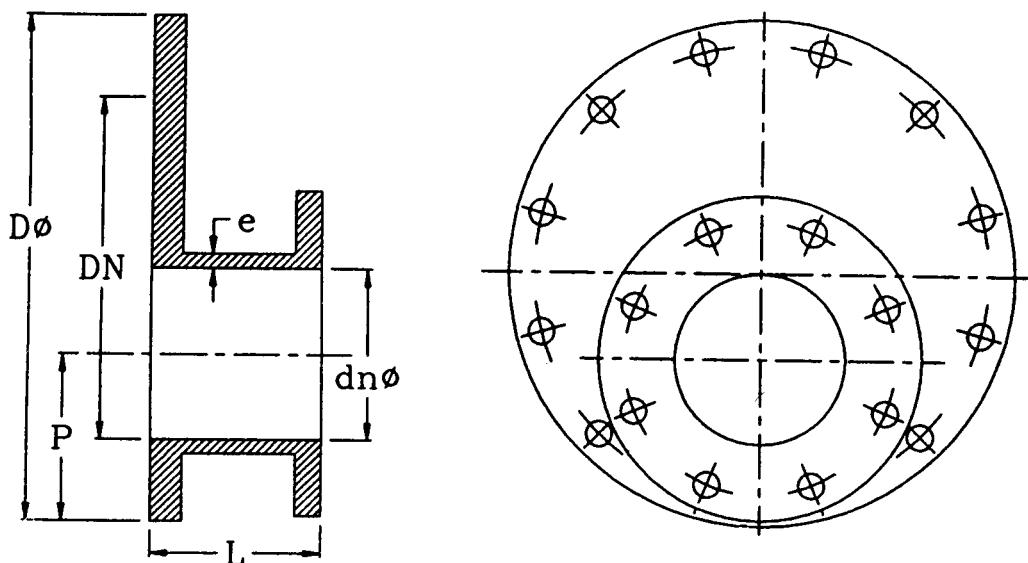
All dimensions in millimetres.



Nominal Diameter		$e_1$	$e_2$	$H$	$R_1$	$R_2$
Body, DN		Opening, dn				
(1)	(2)	(3)	(4)	(5)	(6)	(7)
350	100	16.3	11	200	80	350
400	100	17.5	11	200	80	400
450	100	18.7	11	225	80	450
450	150	18.7	14	225	100	450
500	100	19.8	11	225	80	500
500	150	19.8	14	225	100	500
600	100	22.2	11	240	80	600
600	150	22.2	14	240	100	600
700	100	24.5	11	240	80	700
700	150	24.5	14	240	100	700
750	150	25.6	14	250	100	750
800	150	26.8	14	300	100	800

**Table 28 Flanged Outlets for Washouts**  
*(Clauses 11.2.1 and A-2)*

All dimensions in millimetres.



Nominal Diameter		<i>e</i>	<i>D</i>	<i>L</i>	<i>P</i>
Body, <i>DN</i>		Branch, <i>dn</i>			
(1)	(2)	(3)	(4)	(5)	(6)
300	150	12.6	445	150	147.5
350	150	12.6	505	150	152.5
400	200	13.8	565	200	182.5
450	200	13.8	615	200	182.5
500	200	13.8	670	200	185.0
600	200	13.8	780	200	190.0
700	200	13.8	895	200	197.5
750	250	15.0	960	250	230.0
800	250	15.0	1 015	250	232.5
900	250	15.0	1 135	250	232.5
1 000	300	16.2	1 230	300	265.0
1 050	300	17.0	1 285	300	

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