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मानक

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“पुराने को छोड़ नये के तरफ”

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IS 15905 (2011): Hubless Centrifugally Cast (Spun) Iron Pipes, Fittings and Accessories - Spigot Series [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

हबलैस अपकेन्द्री कास्ट (स्पन) आयरन पाईप, फिटिंग एवं
एसेसरी — स्पिगट सीरीज — विशिष्टि

Indian Standard

**HUBLESS CENTRIFUGALLY CAST (SPUN) IRON
PIPES, FITTINGS AND ACCESSORIES — SPIGOT
SERIES — SPECIFICATION**

ICS 77.140.75; 91.140.80

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

FOREWORD

This Indian Standard 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.

While formulating this standard in the light of the experience gained during these years, the Committee decided to propose this standard to align with the present practices followed by the Indian construction industries and to bring it in line with the International and other overseas standard.

Hubless centrifugally cast (spun) iron pipe, fittings and accessories are widely used in drainage piping system. This standard has been formulated with a view to provide guidelines in the manufacture and use of hubless cast iron pipe fittings and accessories for soil, waste, ventilation and rainwater building drainage system.

In the formulation of this standard due consideration has been given to the manufacturing and trade practices followed in the country in this field and assistance has been derived from the following International Standards.

ISO 6594 : 2006 Cast iron drainage pipes and fittings — Spigot series

ISO 185 : 1988 Grey cast irons — Classifications

As per the current international practices, the requirements specified in this standard have been aligned with ISO 6594. Besides these, as per the national practice, following new fittings other than those specified in ISO 6594 have been incorporated in this standard:

88° Long radius bend	See Table 6
88° Long tail bend	See Table 7
Horn plain bend	See Table 8
Double bend	See Table 9
88° Double branch	See Table 12
45° Double branch	See Table 13
Offset	See Table 15
Equal and unequal parallel branch	See Table 16
P Trap	See Table 17
H Ventilation pipe	See Table 18
Y Ventilation Pipe	See Table 19
88° T Y single branch	See Table 20
Vent cowl	See Table 21

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

HUBLESS CENTRIFUGALLY CAST (SPUN) IRON PIPES, FITTINGS AND ACCESSORIES — SPIGOT SERIES — SPECIFICATION

1 SCOPE

1.1 This standard covers the requirement for hubless centrifugally cast (spun) iron soil, waste, ventilation and rain water pipes together with the details of the fittings and accessories including joints (coupling). The pipe and fittings are intended for non-pressure application, normally as gravity drainage systems.

1.2 The fittings and accessories covered in this standard are normally manufactured by sand casting method.

1.3 Cast iron pipes, fittings and accessories manufactured to this standard are of hubless (spigot type), without sockets.

1.4 The range of nominal sizes DN, of pipes and fittings followed in this standard is as follows:

50, 75, 100, 150 and 200 mm.

1.5 The corresponding joints (couplings) are normally fabricated or casted.

2 REFERENCES

The following standards contain provisions, which through references 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>
210 : 1993	Grey iron castings — Specification (<i>fourth revision</i>)
1387 : 1993	General requirements for the supply of metallurgical materials (<i>second revision</i>)
1500 : 2005/ ISO 6506 : 1999	Method for Brinell hardness test for metallic materials (<i>third revision</i>)
1570 (Part 5) : 1985	Schedules for wrought steels: Part 5 Stainless and heat resisting steels (<i>second revision</i>)
1865 : 1991	Iron castings with spheroidal or nodular graphite (<i>third revision</i>)
5382 : 1985	Specification for rubber ceiling rings for gas mains, water mains and sewers (<i>first revision</i>)
5519 : 1979	Deviations for untoleranced dimensions and mass of grey iron castings (<i>first revision</i>)

3 SUPPLY OF MATERIAL

General requirements relating to supply of material shall be as laid down in IS 1387.

4 TERMINOLOGY

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

4.1 Drainage System for Buildings — System of pipes, fittings, accessories and joints used to collect and discharge soil, waste water and rainwater from a building; it comprises discharge pipes, stack ventilation and rain water pipes, installed in order to connect the discharge system of building to a sewer or a septic tank.

4.2 Sewer — System of pipes designed to collect soil, waste water and rain water from buildings and to convey them to the point of disposal or treatment.

4.3 Cast Iron — Alloy of iron and carbon in which graphite can be present in different forms.

4.4 Pipe — Casting of uniform bore, straight in axis normally having plain ends.

4.5 Fitting — Cast iron casting, other than a pipe, which allows a deviation, a change of direction or diameter, including flanged and access components.

4.6 Accessory — Any casting other than pipe or fitting used in a pipeline.

4.7 Joint — Connection between the ends of pipes and/or fittings, including the coupling or clamping component, with sealing effected by EPDM rubber gasket(s).

4.8 Gasket — The EPDM rubber portion of the coupling.

4.9 Clamp — That portion of the coupling excluding the gasket and shield.

4.10 Shield — An external metallic protective device designed to protect the sealing gasket.

4.11 Coupling — The complete assembly.

4.12 Nominal Size (DN) — An alphanumeric designation of size for pipe, fitting and accessories, which is used for reference purposes. It comprises the

letters *DN* followed by a dimensionless whole number which is indirectly related to the physical size, in millimetres, of the bore of the end connections.

4.13 Length — Effective length of a pipe or fitting.

NOTE — For hubless pipes and fittings, the effective length is equal to the overall length.

5 MANUFACTURE

5.1 Cast iron used for the manufacture of pipes, fittings and accessories shall conform to FG 150 grade, as appropriate, specified in IS 210. Specific mass of cast iron shall be taken as 7.15 kg/dm³ for the purpose of calculation.

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

5.3 The pipes and fittings shall be capable of being cut with the tools normally used for installation or as suggested in manufacturers catalogue. The hardness of the external unmachined surface of the pipe and fittings should not exceed 230 HBS, when tested as per IS 1500.

5.4 In case the hardness is more than 230 HBW, fracture test shall be carried out and if fracture is grey (without showing any chilling effect) such pipes and fittings shall be accepted.

6 JOINTS

6.1 The pipes and fittings may be assembled using various types of joints. The joints are intrinsic components of the drainage systems, whose characteristics and tolerances shall be specified in the manufacturers catalogues.

6.2 Taking into account the different applications of cast iron pipework systems, various joint designs are permitted provided that they satisfy the requirement of this standard. The joints shall incorporate one or more EPDM rubber gasket(s) to ensure leak tightness and prevent direct contact between the ends of pipes, fittings and accessories.

6.3 In order to achieve satisfactory assembly, each end shall present a free length corresponding at least to the values of Table 1.

6.4 Materials for coupling or clamping components shall usually be made from:

- a) Ductile iron of grade 500/7 as per IS 1865, or
- b) Stainless steels in accordance with IS 1570 (Part 5) in order to ensure resistance to corrosion and a stabilization against the effect of intergranular corrosion, only the austenitic stainless steel with at least 17 percent chrome and 9 percent nickel or equivalent, or from material of comparable resistance. Some drawings along with dimensions of coupling are suggested in Annex A for guidance only.
- c) Ductile iron couplings or clamping components shall be coated as given in 12.
- d) All parts of the joints shall be free from defects likely to compromise their suitability for use.

7 VISUAL INSPECTION AND HAMMER TEST

7.1 Each pipe, fitting, and accessories shall be visually inspected internally and externally using an appropriate light source (for example against light) and tested for soundness by striking with a light hand hammer which shall emit a clear ringing sound.

8 CRUSH TESTS ON PIPE RINGS

Perform crush tests on three rings at least 60 mm long, with parallel ends, and cut square to the axis from uncoated pipes.

8.1 Crush the rings between parallel platens (without V-support) of a length greater than that of the ring.

8.2 Calculation

$$\text{Crushing strength } (\sigma) = \frac{3F(d-e)}{\pi bc^2}$$

where

- F* = load applied in N;
- d* = mean outside diameter or ring before testing, in mm;
- c* = mean thickness measured at the rupture level, in mm; and
- b* = mean length in mm.

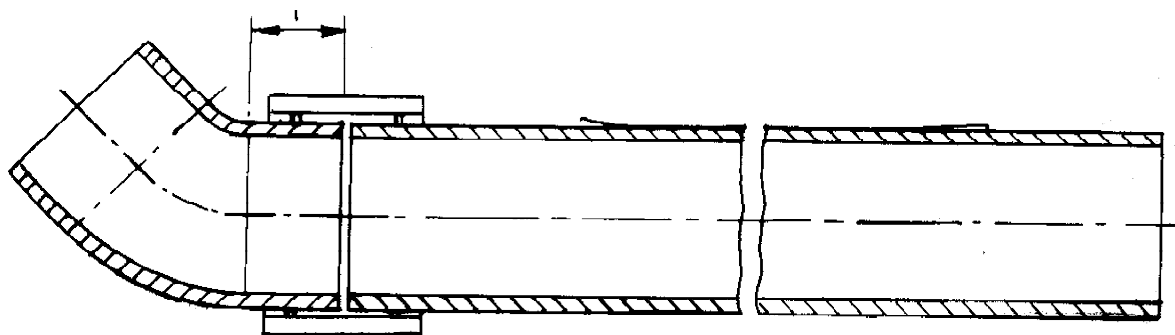
The measured strength shall be at least 300 N/mm² for an average of three sets.

9 HYDROSTATIC TEST

9.1 Each pipe and fitting shall be tested hydrostatically at a pressure of 0.07 MPa (N/mm²). This shall not show any sign of leakage, sweating or other defects of any kind.

9.2 The pressure shall be applied internally and shall be steadily maintained for a period of 15 s.

Table 1 Minimum Free Length
(Clause 6.3)



SI No.	Nominal Size DN	Minimum Free Length (<i>l</i>) mm
(1)	(2)	(3)
i)	50	25
ii)	75	30
iii)	100	35
iv)	150	45
v)	200	56

9.3 Test shall be carried out after the application of surface coating on pipes, fittings and accessories.

10 TECHNICAL SPECIFICATION

10.1 External Diameters and Tolerances

The external diameters of pipes and fittings and the tolerance applicable are given in Table 2.

Table 2 External Diameters and Tolerances

SI No.	Nominal Size DN	External Diameter DE, mm	Tolerance on External Diameter DE, mm
(1)	(2)	(3)	(4)
i)	50	58	+2 -1
ii)	75	83	+2 -1
iii)	100	110	+2 -2
iv)	150	160	+2 -2
v)	200	210	±2.5

10.2 Thickness and Tolerances

Table 3 gives the minimum and nominal thickness of pipes and fittings. Maximum thickness are not specified.

10.3 Length and Tolerances

The normal manufacturing lengths of the pipes and fittings, and their tolerances, are given in 11.

10.4 Tolerance on the angles of the fittings are fixed at $\pm 2^\circ$ through out.

10.5 Masses and Tolerances

The negative tolerance with respect to the mass, if indicated in the manufacturer's Catalogue, shall be 15 percent for pipes and fittings. No limit for positive tolerance is specified.

11 DIMENSIONS

11.1 Pipe

Tolerance on length of 3 000 mm \pm 20 mm, for all diameters (see Fig. 1).

11.2 Fittings

11.2.1 45° Bend

Tolerance on *a* is \pm 5 mm (see Table 4).

11.2.2 88° Bend

Tolerance on *a* is \pm 5 mm (see Table 5).

11.2.3 88° Long Radius Bend

Tolerance on *a*, *r* : is \pm 5 mm (see Table 6).

11.2.4 88° Long Tail Bend

Tolerance on a, b is ± 5 mm (see Table 7).

11.2.5 Horn Plain Bend

Tolerance on a, b, c, d, r is ± 5 mm (see Table 8).

11.2.6 Double Bend

Tolerance on a, b, c, r is ± 5 mm (see Table 9).

11.2.7 45° Single Branch

Tolerance on L, a, b is ± 5 mm (see Table 10).

11.2.8 88° Single Branch

Tolerance on L, a, b is ± 5 mm (see Table 11).

11.2.9 88° Double Branch

Tolerance on L, a, b is ± 5 mm (see Table 12).

11.2.10 45° Double Branch

Tolerance on L, a, b is ± 5 mm (see Table 13).

11.2.11 Diminishing Pieces

Tolerance on L is ± 5 mm (see Table 14).

11.2.12 Offset

Tolerance on L, a, b is ± 5 mm (see Table 15).

11.2.13 Equal and Unequal Parallel Branch

Tolerance on L, a, b, c, d, r is ± 5 mm (see Table 16).

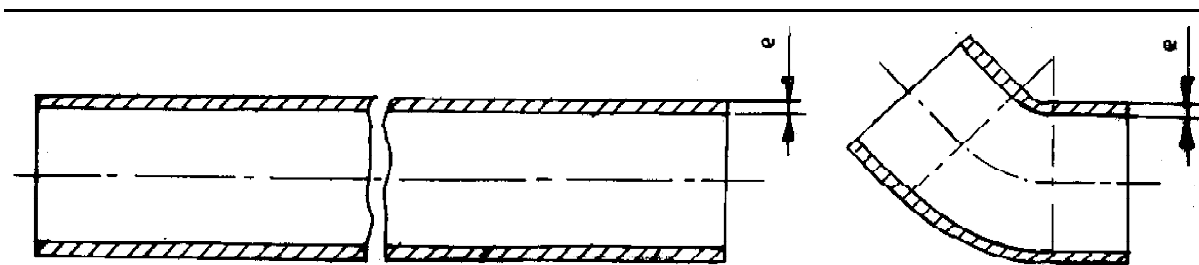
11.2.14 P Trap

Tolerance on a, b, c, r, j, k, d is ± 5 mm (see Table 17).

11.2.15 H Ventilation Pipe

Tolerance on L, a, b, c, d, e, f, g is ± 5 mm (see Table 18).

Table 3 Nominal and Minimum Thicknesses of Pipes and Fittings
(Clause 10.2)



SI No.	DN	Thickness <i>e</i> mm			
		Pipe		Fittings	
		Nom (3)	Min (4)	Nom (5)	Min (6)
i)	50	3.5	3.0	4.2	3.0
ii)	75	3.5	3.0	4.2	3.0
iii)	100	3.5	3.0	4.2	3.0
iv)	150	4.0	3.5	5.3	3.5
v)	200	5.0	4.0	6.0	4.0

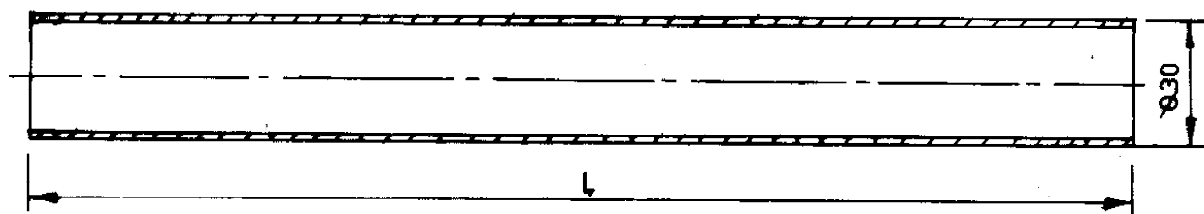
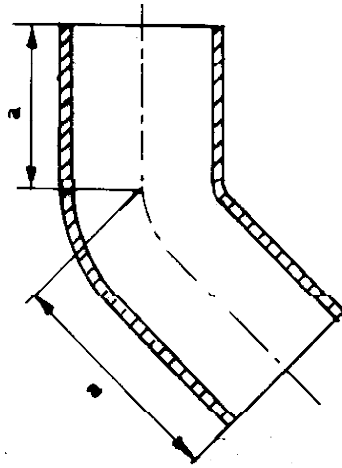


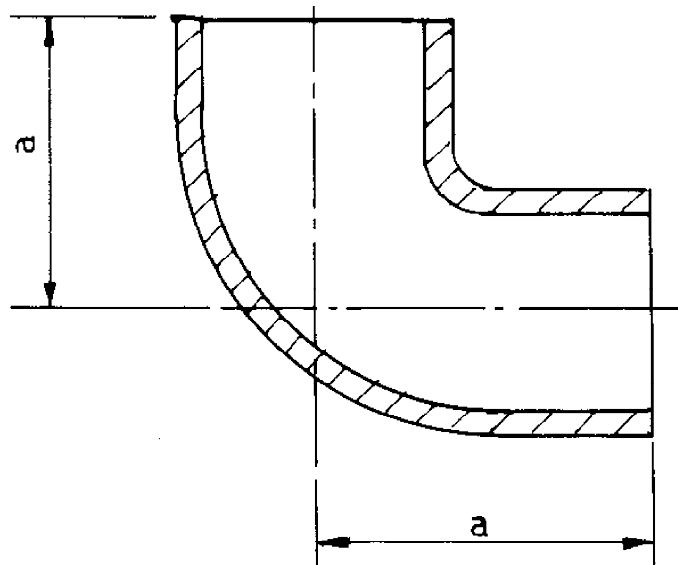
FIG. 1 PIPE LENGTH

Table 4 45° Bend
(Clause 11.2.1)



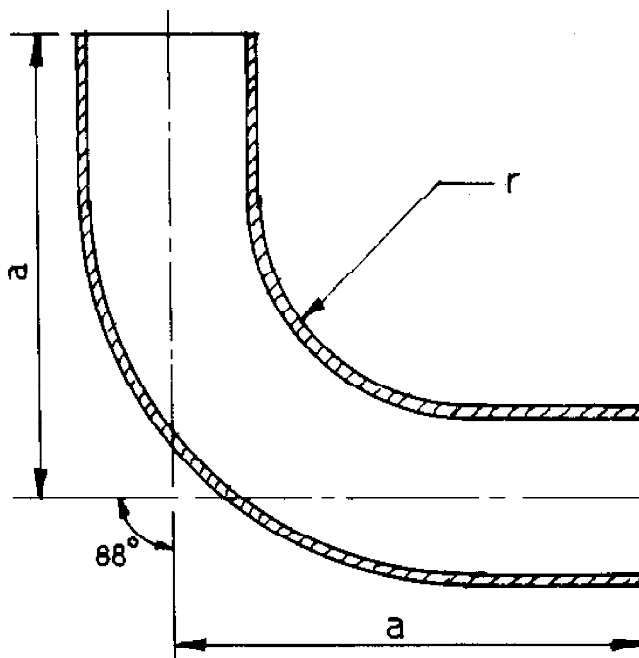
Sl No.	Nominal Size <i>DN</i>	<i>a</i> mm
(1)	(2)	(3)
i)	50	50
ii)	75	60
iii)	100	70
iv)	150	90
v)	200	110

Table 5 88° Bend
(Clause 11.2.2)



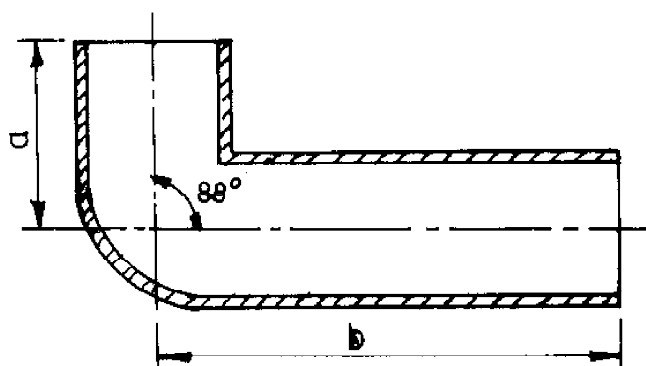
Sl No.	Nominal Size <i>DN</i>	<i>a</i> mm
(1)	(2)	(3)
i)	50	75
ii)	75	95
iii)	100	110
iv)	150	145
v)	200	180

Table 6 88° Long Radius Bend
(Foreword; and Clause 11.2.3)



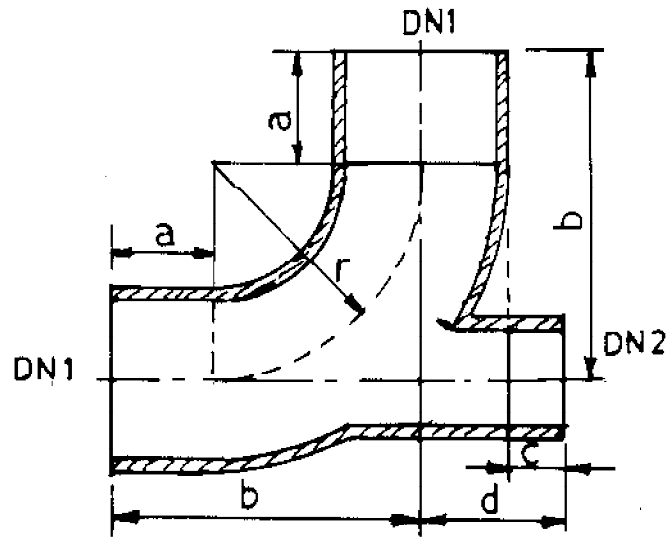
SI No.	Nominal Size DN1	<i>a</i> mm	<i>r</i> mm
(1)	(2)	(3)	(4)
i)	50	241	203
ii)	75	254	216
iii)	100	267	229
iv)	150	305	254

Table 7 88° Long Tail Bend
(Foreword; and Clause 11.2.4)



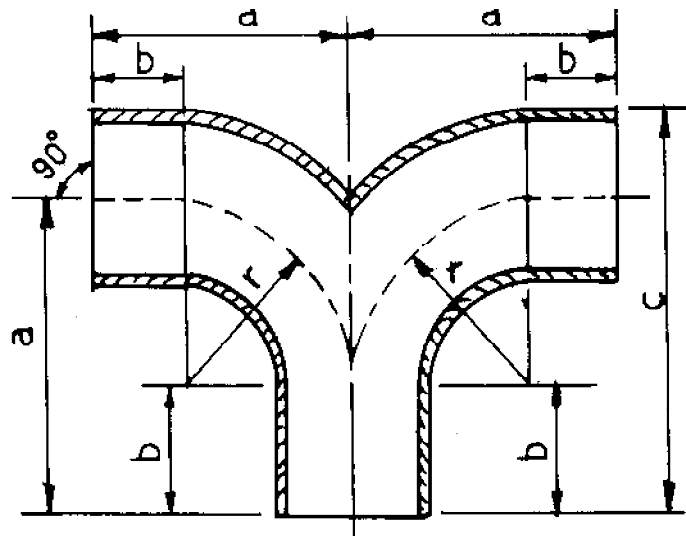
SI No.	Nominal Size DN1	<i>a</i> mm	<i>b</i> mm
(1)	(2)	(3)	(4)
i)	50	75	300
ii)	75	95	300
iii)	100	110	300
iv)	150	145	300
v)	200	180	300

Table 8 Horn Plain Bend
(Foreword; and Clause 11.2.5)



Sl No. (1)	DN1 (2)	DN2 (3)	a (4)	r (5)	b (6)	c (7)	d (8)
i)	75	50	45	89	134	40	81.5
ii)	100	50	50	102	152	40	95

Table 9 Double Bend
(Foreword; and Clause 11.2.6)



Sl No. (1)	DN (2)	a (3)	b (4)	c (5)	r (6)
i)	75	134	45	175.5	89
ii)	100	152	50	207	102

11.2.16 Y Ventilation Pipe

Tolerance on L, a, b, c, d is ± 5 mm (see Table 19).

11.2.17 88° TY Single Branch

Tolerance on L, a, b, c, d is ± 5 mm (see Table 20).

11.2.18 Vent Cowel

Tolerance on L, a, b is ± 5 mm (see Table 21).

11.2.19 Inspection Pipe (Clean-Out Pipe)

Tolerance on L, c, d is ± 5 mm (see Table 22).

12 COATING

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

12.2 Unless otherwise specified, pipes, fittings, and accessories, shall be supplied coated internally and externally.

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

12.4 In all cases the coating material shall be smooth, 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 scribbled lightly with a penknife.

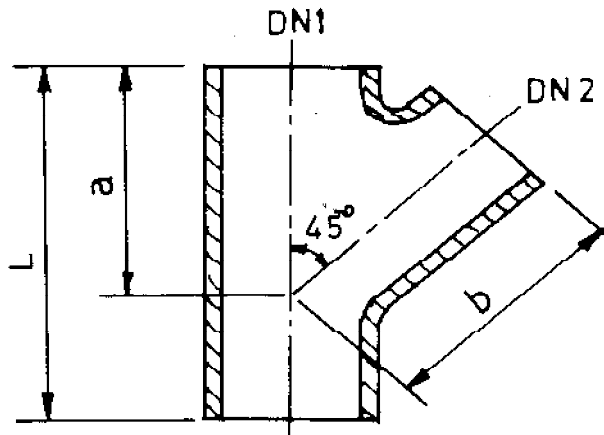
12.5 In the case of pipes, fittings and accessories, which are imperfectly coated or where coating does not set or conform to the qualities specified in 10.1 to 10.4, the coating shall be removed and the pipes, fittings, and accessories recoated.

13 MARKING

13.1 Each pipe, fitting and accessories shall have cast, stamped or indelibly painted on it the following:

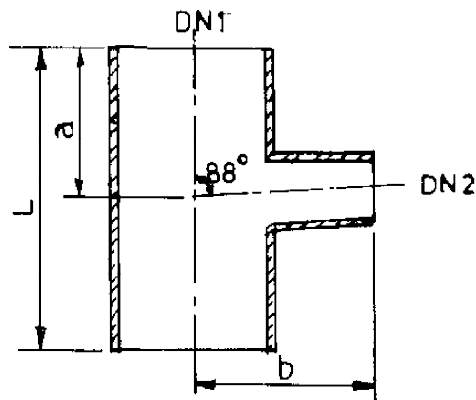
- a) Manufacturer's name, initials or identification mark;
- b) Nominal diameter;
- c) Last two digits of the year of manufacture; and
- d) Any other mark required by the purchaser.

Table 10 45° Single Branch
(Clause 11.2.7)



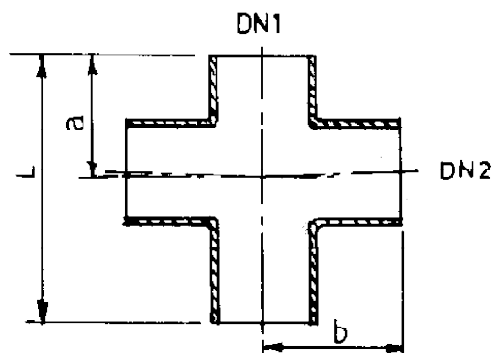
Nominal Size		L	a	b
$DN1$	$DN2$	mm	mm	mm
50	50	160	115	115
75	50	180	135	135
75	75	215	155	155
100	50	185	150	150
100	75	220	170	170
100	100	260	190	190
150	75	225	215	215
150	100	280	225	225
150	150	355	265	265
200	100	300	260	260
200	150	375	300	300
200	200	455	340	340

Table 11 88° Single Branch
(Clause 11.2.8)



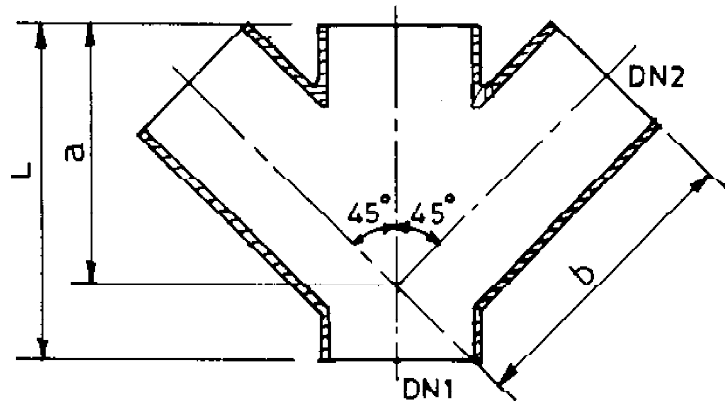
Nominal Size		<i>L</i> mm	<i>a</i> mm	<i>b</i> mm
<i>DN1</i>	<i>DN2</i>			
50	50	145	65	75
75	50	170	70	80
75	75	180	85	95
100	50	170	76	105
100	75	190	88	110
100	100	220	105	115
150	100	245	115	145
150	150	300	145	155
200	75	250	120	170
200	100	270	125	175
200	150	325	150	185
200	200	365	180	180

Table 12 88° Double Branch
(Foreword; and Clause 11.2.9)



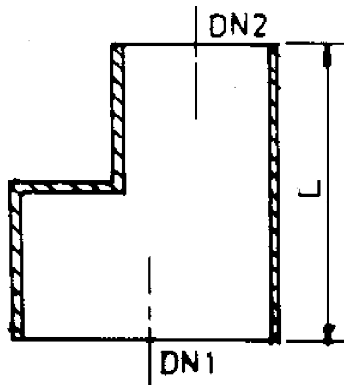
Nominal Size		<i>L</i> mm	<i>a</i> mm	<i>b</i> mm
<i>DN1</i>	<i>DN2</i>			
50	50	145	65	75
75	50	170	70	80
75	75	180	85	95
100	50	170	76	105
100	75	190	88	110
100	100	220	105	115
150	100	245	115	145
150	150	300	145	155
200	75	250	120	170
200	100	270	125	175
200	150	325	150	185
200	200	365	180	195

Table 13 45° Double Branch
(Foreword; and Clause 11.2.10)



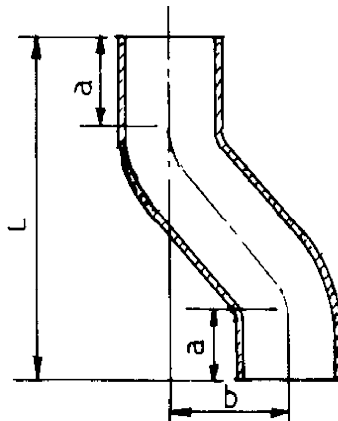
Nominal Size		<i>L</i> mm	<i>a</i> mm	<i>b</i> mm
<i>DN1</i>	<i>DN2</i>			
50	50	160	115	115
75	50	180	135	135
75	75	215	155	155
100	50	185	150	150
100	75	220	170	170
100	100	260	190	190
150	75	240	205	205
150	100	280	225	225
150	150	355	265	265
200	75	250	240	240
200	100	335	290	290
200	150	375	300	300
200	200	455	340	340

Table 14 Diminishing Pieces
(Clause 11.2.11)



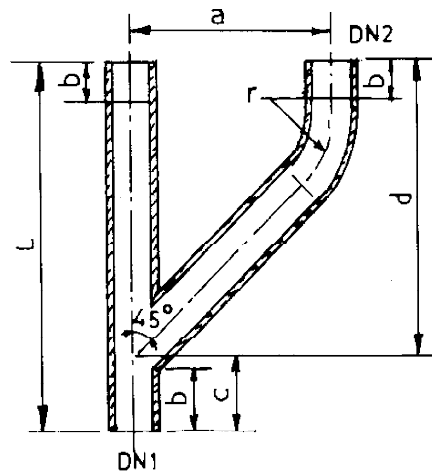
Nominal Size		<i>L</i> mm
<i>DN1</i>	<i>DN2</i>	
75	50	80
100	50	80
100	75	90
150	75	100
150	100	105
200	100	115
200	150	125

Table 15 Offset
(Foreword; and Clause 11.2.12)



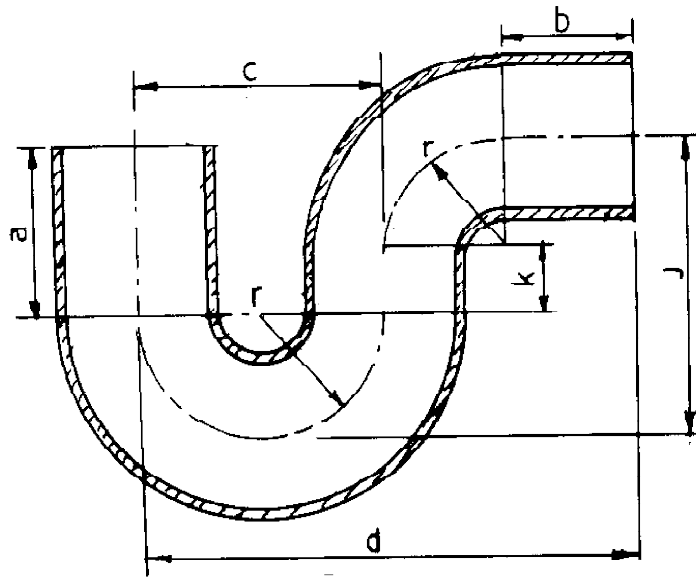
Offset	Nominal Size DN	L mm	a mm	b mm
65 mm	50	165	50	65
	75	185	60	65
	100	205	70	65
	150	245	90	65
130 mm	50	230	50	130
	75	250	60	130
	100	270	70	130
	150	310	90	130
	200	350	110	130
200 mm	50	300	50	200
	75	320	60	200
	100	340	70	200
	150	380	90	200

Table 16 Equal and Unequal Parallel Branch
(Foreword; and Clause 11.2.13)



DN1	DN2	L	a	b	c	d	r
75	50	325	178	45	64	261	89
75	75	325	178	45	64	261	89
100	50	311	178	45	50	261	89
100	75	311	178	50	50	261	89
100	100	339	178	50	72	267	102

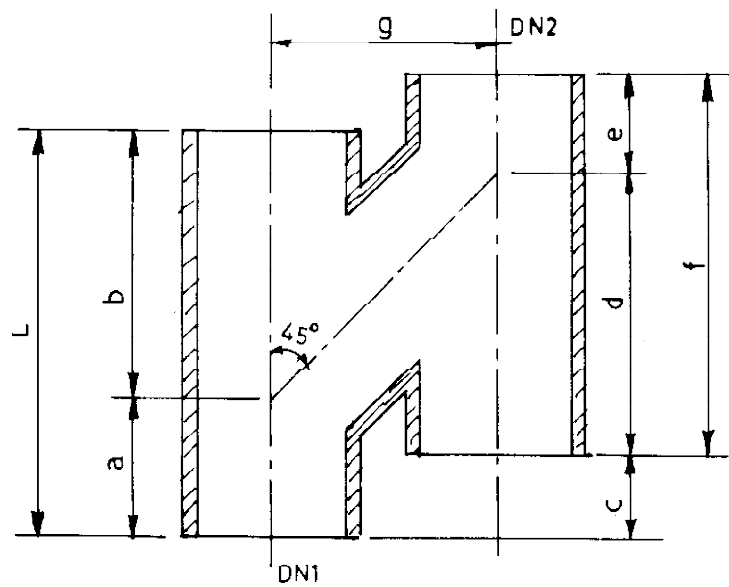
Table 17 P Trap
(Foreword; and Clause 11.2.14)



DN	a	b	c	r	j	k	d
50	51	40	102	51	102	—	193
75	83	45	127	64	140	13	236
100	102	50	152	76	165	13	278
150	152	60	203	102	216	13	365

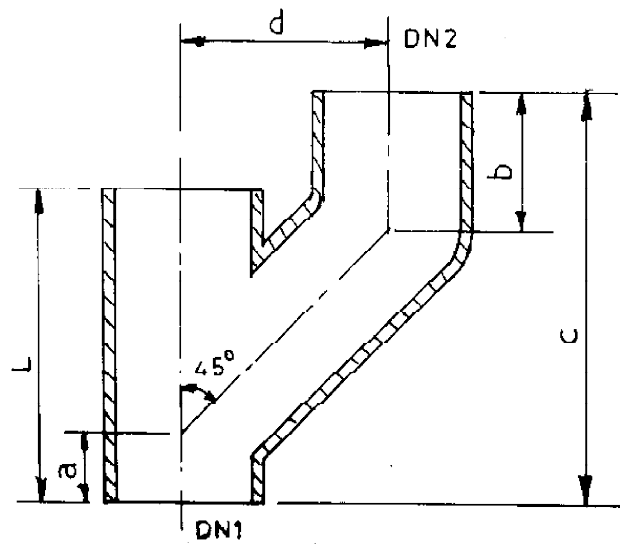
Table 18 H Ventilation Pipe
(Foreword;13

and Clause 11.2.15)



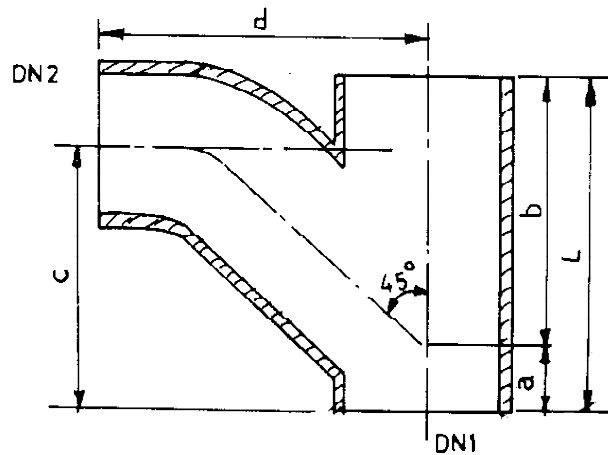
DN1	DN2	L	a	b	c	d	e	f	g
75	75	190	55	135	63	138	52	190	150
100	75	225	60	165	50	136	60	225	150
100	100	230	61	169	85	170	60	230	230
150	100	280	50	230	96	200	60	260	241

Table 19 Y Ventilation Pipe
(Foreword; and Clause 11.2.16)



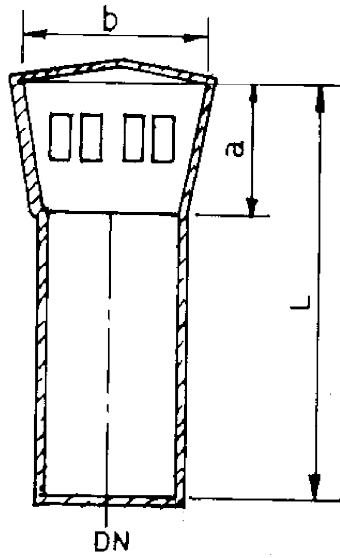
DN1	DN2	L	a	b	c	d
75	75	190	55	53	250	150
100	75	220	50	50	270	150
100	100	245	60	85	330	200
150	100	286	50	100	390	241

Table 20 88° T Y Single Branch
(Foreword; and Clause 11.2.17)



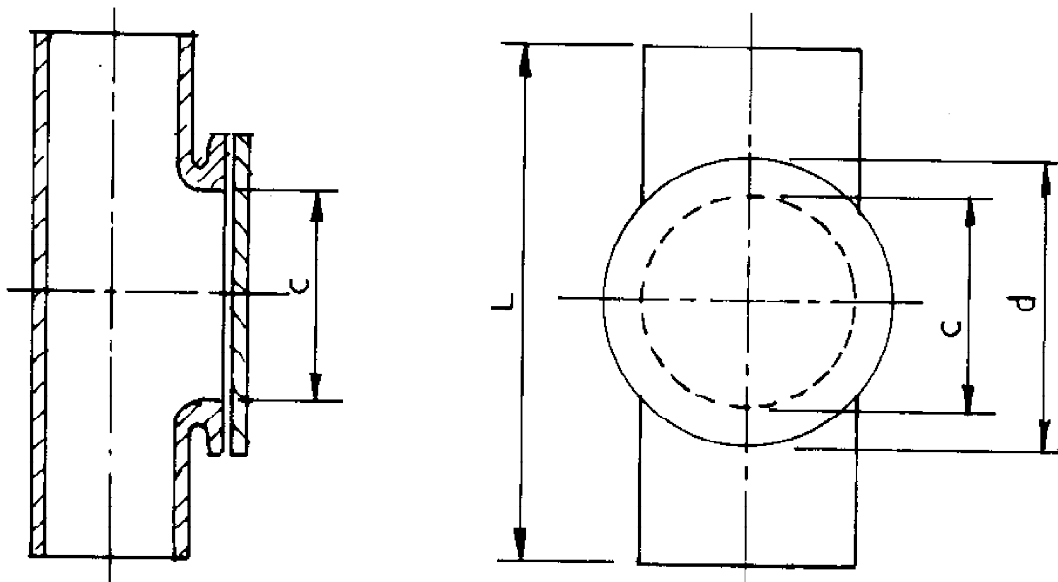
DN1	DN2	L	a	b	c	d
50	50	150	45	105	119	126
75	50	165	33	120	125	138
75	75	195	50	139	157	164
100	50	165	22	130	122	154
100	75	195	39	150	165	180
100	100	270	57	163	199	210
150	75	230	23	184	176	208
150	100	243	42	201	187	210
150	150	320	75	245	268	270
200	75	255	10	220	190	237
200	100	290	27	237	219	252
200	150	340	60	265	277	300
200	200	410	98	312	340	349

Table 21 Vent Cowel
(Foreword; and Clause 11.2.18)



DN	L	a	b
50	130	70	78
75	140	80	91
100	160	85	118
150	185	100	168
200	215	125	220

Table 22 Inspection Pipe
(Clause 11.2.19)



DN	L	c	d
50	175	53	105
75	205	75	125
100	250	104	159
150	330	155	215
200	400	205	262

13.2 BIS Certification Marking

The pipes, fittings, and accessories may be marked with the Standard Mark.

13.2.1 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 use of the Standard Mark may be granted to manufacturers of products may be obtained from the Bureau of Indian Standards.

ANNEX A
(Clause 6.4)

DRAWING AND DIMENSIONS FOR STAINLESS STEEL SHIELDED COUPLING

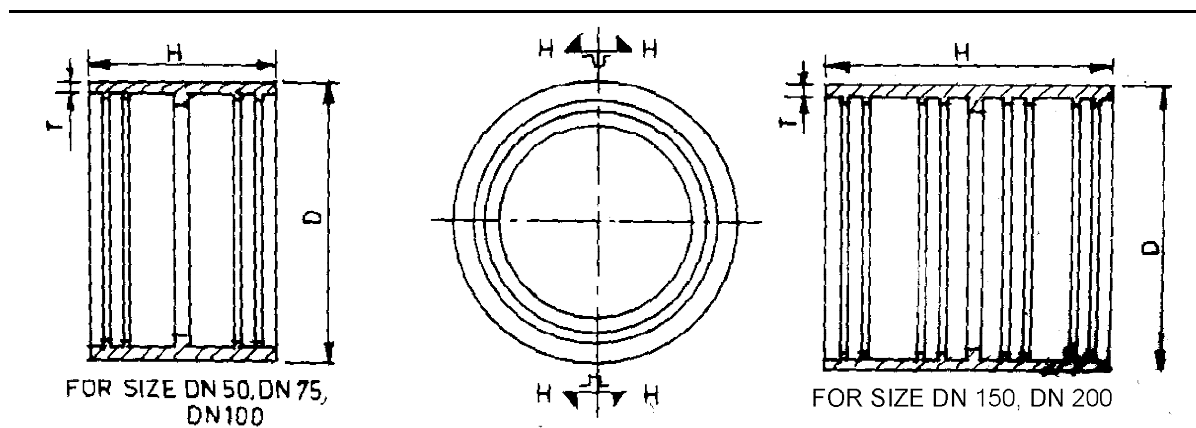
A-1 Profile of EPDM rubber gasket as given in Table 23.

A-2 Design of stainless steel shield and clamp as given in Table 24.

A-3 TYPICAL HUBLESS COUPLING JOINT — INSTALLATION (see Fig. 2)

A-3.1 Place the gasket on one end of pipe or fitting and the stainless steel clamp and shield assembly on the other end of pipe or fitting.

Table 23 EPDM Rubber Gasket
(Clause A-1)



Sl No.	DN mm	Outside Dia (D) mm	Thickness (T) mm	Height(H) mm
(1)	(2)	(3)	(4)	(5)
i)	50	59.8	2.4	54
ii)	75	84.8	2.4	54
iii)	100	111	2.5	54
iv)	150	162	3.0	76
v)	200	211	3.0	101

A-3.2 Firmly seat the pipe or fitting ends against the integrally moulded center stop inside the EPDM rubber gasket.

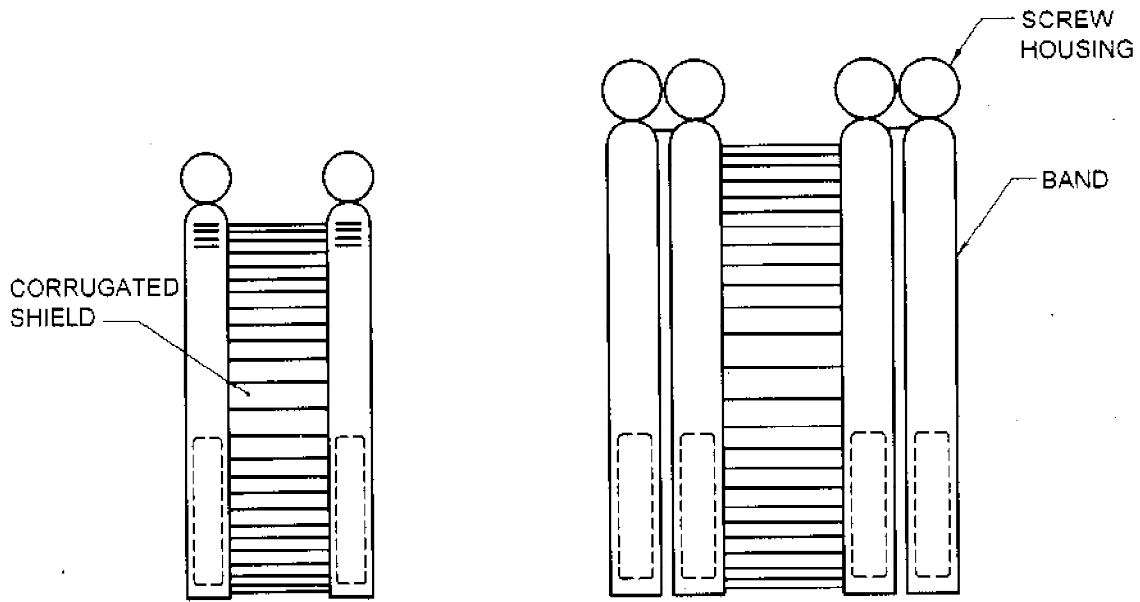
A-3.3 Slide the stainless steel shield and clamp assembly over the EPDM rubber gasket and tighten the bands. For larger diameters couplings which have

four bands, the inner bands should be tightened first and then the outer bands.

A-3.4 In all the cases, when tightening bands they should be tightened alternately to insure that the coupling shield is drawn up uniformly.

NOTE — Other types of joints can also be used at the discretion of the customer. The details given in this Annex is for guidance only.

Table 24 Stainless Steel Shield
(Clause A-2)



FOR SIZE DN50, DN75, DN100

FOR SIZE DN150, DN200

Sl No. (1)	DN mm (2)	Height (H) mm (3)
i)	50	54
ii)	75	54
iii)	100	54
iv)	150	76
v)	200	101

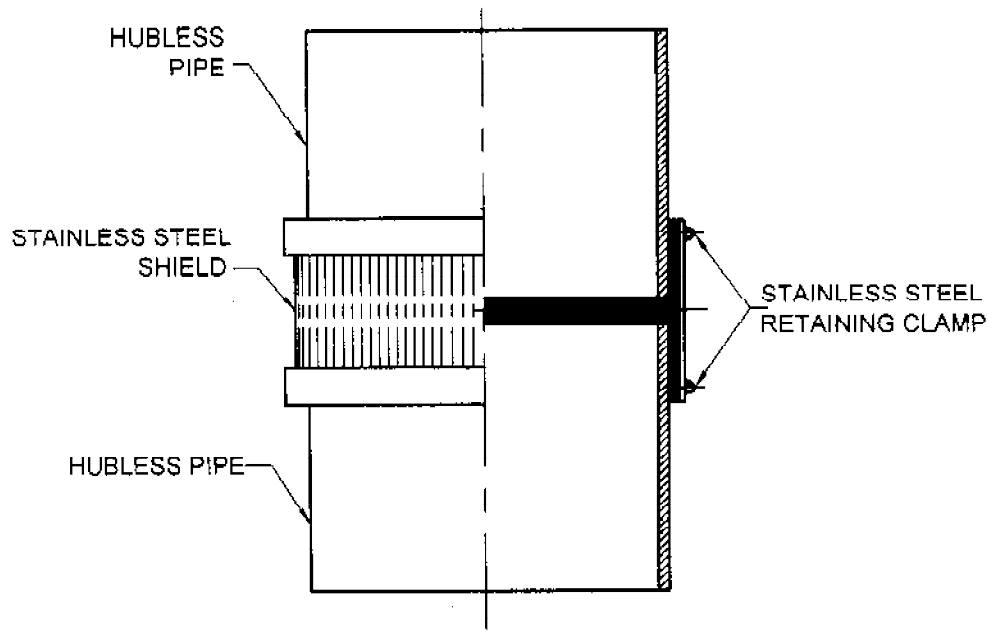


FIG. 2 TYPICAL HUBLESS COUPLING JOINT-INSTALLATION

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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