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JIS G 5525 : 2000

Cast-iron drainage pipes and fittings

ICS 77.140.75; 77.140.80

Descriptors : cast-iron, soil stacks, discharge stacks, pipe fittings, fluid equipment

Reference number : JIS G 5525 : 2000 (E)

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of International Trade and Industry through deliberations at the Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law. Consequently **JIS G 5525 : 1975** is replaced with **JIS G 5525 : 2000**.

Moreover, for the purpose of assuring the safety of products more highly, concerning a part of the requirements in this Standard, the specified values and performance items in the standard before revised have been continuously adopted.

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the original JIS is to be the final authority.

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Printed in Japan

Cast-iron drainage pipes and fittings

Introduction For this Japanese Industrial Standard, there is the first edition of **ISO 6594** *Cast iron drainage pipes and fittings—Spigot series* published in 1983, as the International Standard, however, the jointing systems between **JIS** and **ISO** are quite different, and Japan is subjected to frequent earthquakes, the correspondence of production facilities is insufficient, and so on. The conformity of **JIS** to **ISO** is not carried out at the time of this revision because of such circumstances.

1 Scope This Standard specifies the cast-iron drainage pipes and fittings (hereafter referred to as “pipes”) used for the piping of gravitational soil flowing, miscellaneous drainage, rain water and ventilation.

Remarks : The International Standard corresponding to this Standard is as follows:

ISO 6594 : 1983 *Cast iron drainage pipes and fittings—Spigot series*

2 Normative references The following standards contain provisions which, through reference in this Standard, constitute provisions of this Standard. The most recent editions of the standards indicated below shall be applied.

JIS B 0202 *Parallel pipe threads*

JIS G 1201 *Iron and steel—General rules for analytical methods*

JIS G 1214 *Iron and steel—Methods for determination of phosphorus content*

JIS G 1215 *Iron and steel—Methods for determination of sulfur content*

JIS G 1253 *Iron and steel—Method for spark discharge*

JIS G 1256 *Iron and steel—Method for X-ray fluorescence spectrometric analysis*

JIS G 1257 *Iron and steel—Methods for atomic absorption spectrometric analysis*

JIS G 5501 *Grey iron castings*

JIS Z 2201 *Test pieces for tensile test for metallic materials*

JIS Z 2241 *Method of tensile test for metallic materials*

3 Definitions For the main terms used in this Standard, the definitions shall be as follows:

- a) **straight pipes** The straight pipes which are the main unit of piping and have the socket for jointing.
- b) **fittings** The joints for cast-iron drainage pipes to be used for the purposes such as jointing, changing the course, collecting, reaming, connecting to different kind of pipe and closing of end.
- c) **mechanical type jointing** The jointing form in which pipes are inserted in a socket and, the socket and thrust flange are tightened through a rubber ring by using bolt and nut.

- d) **insertion type jointing** The jointing form of pipes by inserting after coating the socket and inserting end with a sealing lubricant. The pipes using this jointing form shall be used for vertical piping (upward socket).
- e) **crushing test** The test for the judgement of the crushing strength by applying a compression load to the test piece according to the load at the time of crushing.

4 Classification and symbols

4.1 Classification by jointing form The classification and symbols of pipes shall be in accordance with Table 1. There are three types, such as mechanical type pipe class 1, mechanical type pipe class 2 and insertion type RJ pipe, according to the jointing form.

Table 1 Classification of pipes

Symbol	Jointing form	Classification of pipes		Nominal diameter
CIP	Mechanical type	Pipe class 1	Straight pipes	50-75-100-125-150-200
			Fittings	50-75-100-125-150-200
		Pipe class 2	Straight pipes	75-100-125
			Fittings	50-75-100-125
	Insertion type	RJ pipe	Straight pipes	75-100-125
			Fittings	75-100-125

4.2 Classification of fittings The classification and symbols according to shape of fittings shall be as follows:

- a) **Mechanical type pipe class 1** 90° short bent pipe (90° SB), 90° long bent pipe (90° LB), 45° bent pipe (45° B), Y pipe (Y), 90° Y pipe (TY), drainage T pipe (ST), short pipe with sweep hole (COT), coupling ring (S), reducer (R), sweep hole plug (COC-B)
- b) **Mechanical type pipe class 2** 90° short bent pipe (90° SB-N), 90° long bent pipe (90° LB-N), 45° bent pipe (45° B-N), Y pipe (Y-N), 90° Y pipe (TY-N), drainage T pipe (ST-N), short pipe with sweep hole (COT-N), coupling ring (S-N), reducer (R-N), sweep hole plug (COC-A-N)
- c) **Insertion type RJ pipe** Short pipe with sweep hole (RJ-COT), drainage T pipe (RJ-ST-M, RJ-ST-NM)

4.3 Jointing parts for cast-iron drainage pipes and fittings The jointing parts (thrust flange, bolt and nut, rubber ring or rubber seal ring) used for jointing of cast-iron drainage pipes and fittings shall be in accordance with Annex 1.

4.4 Fittings for connection of different kind of pipes The fittings having the jointing part to be used for the connection to the different kind of pipes such as lead pipe, rigid polyvinyl chloride pipe, etc. shall be in accordance with Annex 2.

5 Manufacturing method The pipes shall be cast by melting the material of good quality suitable for grey cast-iron and using sand mould or metallic mould.

6 Quality of material The quality of material for pipes shall be equal or superior to FC150 of JIS G 5501 and the mechanical property shall be in accordance with Table 2.

Table 2 Mechanical property

Symbol of classification	Tensile strength N/mm ²
FC150	150 min.

7 Chemical component The phosphorus content and sulfur content of pipes shall be not more than 0.60 % and not more than 0.10 % respectively.

8 Appearance The internal and external surfaces of pipes shall be free from defects detrimental to use such as outgrowths, flaws, casting fins, cavities, and the internal surface of pipes shall be smooth.

9 Leakage The body of pipes shall not start a leak when the hydraulic pressure of 0.35 MPa or the pneumatic pressure of 0.15 MPa is applied.

10 Crushing strength The crushing strength, when the pipes are crushed, shall be not less than 200 N/mm².

11 Shape, dimensions and tolerance

11.1 Shape and dimensions The shape and dimensions shall be as follows:

- Jointing part** That shall be in accordance with Attached Figs. 1 to 3.
- Mechanical type pipe class 1** That shall be in accordance with Attached Figs. 4 to 14.
- Mechanical type pipe class 2** That shall be in accordance with Attached Figs. 15 to 25.
- Insertion type RJ pipe** That shall be in accordance with Attached Figs. 26 to 29.

11.2 Outside diameter and tolerance The outside diameter of pipe and its tolerance shall be in accordance with Table 3.

Table 3 Outside diameter and tolerance

Unit: mm

Nominal diameter	Mechanical type					Insertion type		
	Pipe class 1		Pipe class 2		Tolerance	RJ pipe		Tolerance
	Straight pipe	Fitting	Straight pipe	Fitting		Straight pipe	Fitting	
50	58	60	—	58	+3 -1	—	—	—
75	83	85	83	83		89	89	±1
100	108	110	108	108		114	114	
125	134	136	134	134		140	140	
150	159	161	—	—		—	—	—
200	211	213	—	—		—	—	—

11.3 Thickness of pipe and tolerance The thickness of pipe and its tolerance shall be in accordance with Table 4.

Table 4 Thickness of pipe and tolerance

Unit: mm

Nominal diameter	Mechanical type					Insertion type		
	Pipe class 1		Pipe class 2		Tolerance	RJ pipe		Tolerance
	Straight pipe	Fitting	Straight pipe	Fitting		Straight pipe	Fitting	
50	4.0	5.0	—	4.0	+1.5 -0.7	—	—	—
75	4.0	5.0	4.0	4.0		4.5	4.5	+1.5 -0.7
100	4.0	5.0	4.0	4.0		4.5	4.5	
125	4.5	5.5	4.5	4.5		4.5	4.5	
150	4.5	5.5	—	—		—	—	—
200	5.5	6.5	—	—		—	—	—

11.4 Effective length and tolerance The effective length of pipe and its tolerance shall be in accordance with Table 5.

Table 5 Effective length and its tolerance

Unit: mm

Nominal diameter	Effective length		
	Straight pipe 1 000 min.	Straight pipe under 1 000	Fitting
50	±5	±4	±3
75			
100			
125			
150			
200			

11.5 Tolerance on bend The tolerance on bend for straight pipe shall be 3 mm per 1 m within the limit of 6 mm.

12 Coating

12.1 Paints The paints to be used for coating shall be as follows:

- The paints shall be free from such component detrimental to use, not be dissolved in water after drying, not generate offensive odour and shall be free from abnormality due to the seasonal changes of temperature.
- For the paints, the material, compound and characteristic shall be confirmed and, if required, the compounding recipe shall be presented.

12.2 Coating method The pipes shall be coated by the method suitable for the paint after removing the rust, scale or other extraneous matter on the internal and external surfaces completely.

12.3 Finished surfaces The finished surface of pipes after coated shall be free from a thick deposit of paint, peeling or other defects detrimental to use and shall be smooth.

13 Test

13.1 Analytical test

13.1.1 Test portion For the test portion, one piece of sample shall be taken from a foundry ladle, except for the reserve.

13.1.2 Analytical method The analytical method shall be in accordance with any one of the following:

JIS G 1201, JIS G 1214, JIS G 1215, JIS G 1253, JIS G 1256, JIS G 1257

13.2 Tensile test

13.2.1 Test piece For the sample for tensile strength, one piece of sample shall be taken from a foundry ladle, except for the reserve. For the test piece for tensile test, the No. 8 test piece in **JIS Z 2201** shall be used.

13.2.2 Test method The method of tensile test shall be in accordance with **JIS Z 2241**.

13.3 Crushing test

13.3.1 Test piece For the sample pipe for crushing test, one piece shall be sampled at random from the pipes manufactured continuously. For the test piece for crushing test, the two ring-shaped test pieces of half length of average diameter of the pipe shall be sampled from the end of the sample pipe.

13.3.2 Test method For the method of crushing test, mount a test piece on the wooden holder as shown in Fig. 1, crush it according to the method as shown in Fig. 2, and obtain the crushing strength by using the following formula.

$$f = 0.56 \times \frac{Wd}{bt^2} \times C$$

where, f : crushing strength (N/mm²)
 W : load at the time of crushing (N)
 d : average diameter of the sample pipe (mm)
 b : length of sample pipe (= $d/2$) (mm)
 t : thickness of pipe (mm)
 C : shape factor (= 1.0)

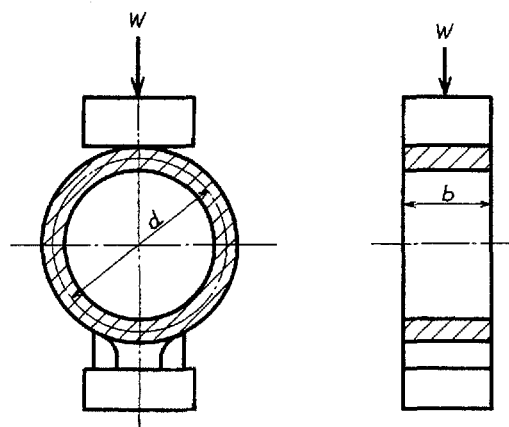
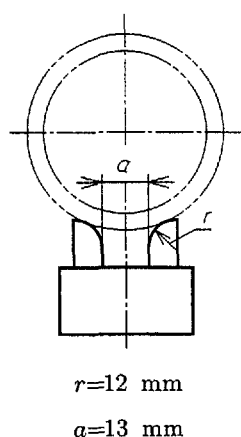


Fig. 1 Positioning of test piece

Fig. 2 Crushing method

13.4 Leakage test The leakage test shall be generally carried out on the pipe prior to coating by applying the hydraulic pressure or pneumatic pressure to the pipe to examine the existence of leakage when the pressure has reached at the specified pressure. However, when the agreement of the orderer is obtained, the leakage test may be carried out after coated.

13.5 Retest When it is judged that the flaw or cavity of test piece had influenced the test result, the test shall be made void and the retest may be carried out by using the reserve.

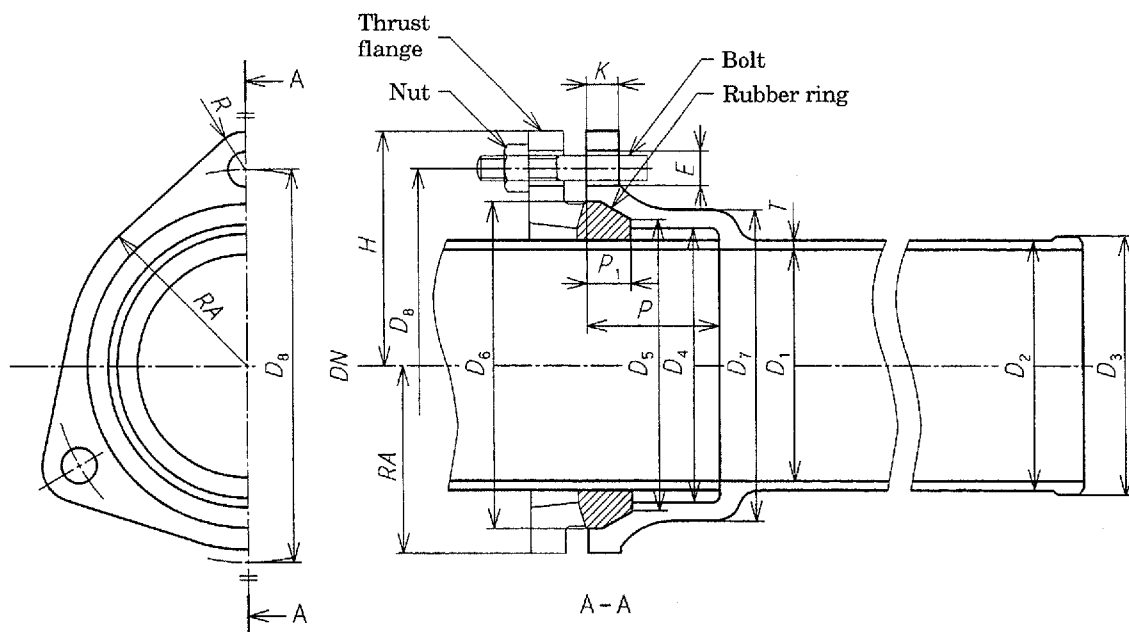
14 Inspection

- a) The quality of material shall conform to clause 6.
- b) The chemical component shall conform to clause 7.
- c) The appearance test shall be carried out visually and the result shall conform to clause 8.
- d) The leakage shall conform to clause 9.
- e) For the crushing strength, the mean value of two pieces of sample tested shall conform to clause 10.
- f) The shape and dimensions shall conform to clause 11.
- g) The inspection of the finished surface after coated shall be carried out visually, and the result shall conform to 12.3.
- h) The inspection of leakage, appearance, outside diameter and thickness of pipes shall be carried out every one piece of pipe. The inspection of chemical component, every one batch⁽¹⁾. The inspection of tensile strength and crushing strength shall be carried out when the orderer requires them.

Note ⁽¹⁾ The constitution of batch shall be in accordance with 9.2 of JIS G 5501.

15 Marking For the pipes, the following information shall be marked at the easily visible position by casting up, stenciling, etc.

- a) Month and year of manufacture (in the case of straight pipe)
- b) Name of manufacturer or its identifying brand
- c) Nominal diameter
- d) Effective length (in the case of straight pipe)
- e) Symbols of classification
 - 1) Mechanical type Pipe class 1 No symbol
 - 2) Mechanical type Pipe class 2 (N)
 - 3) Insertion type RJ pipe  or RJ

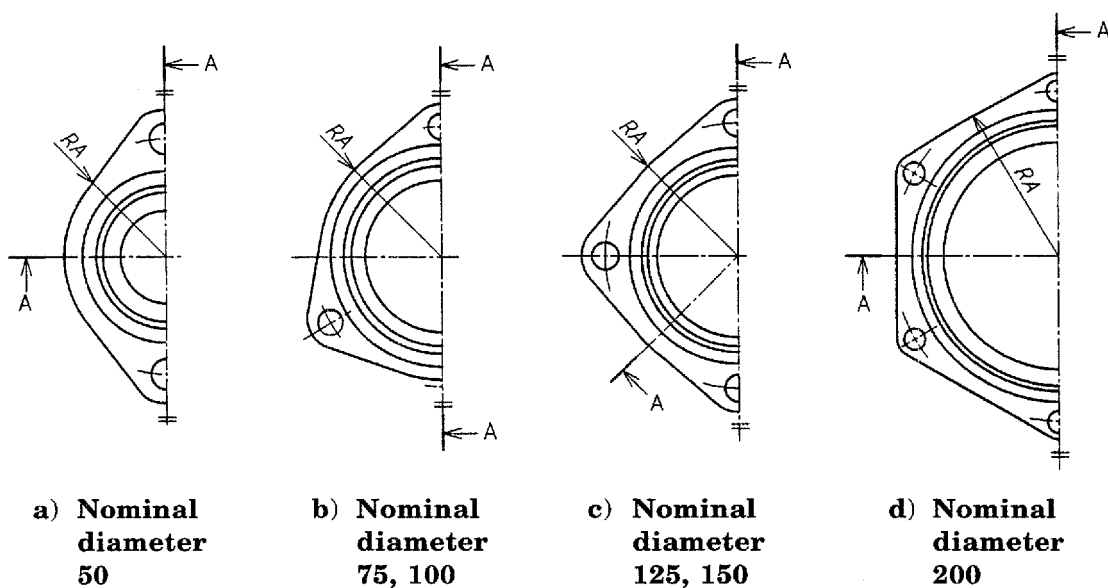


Unit: mm

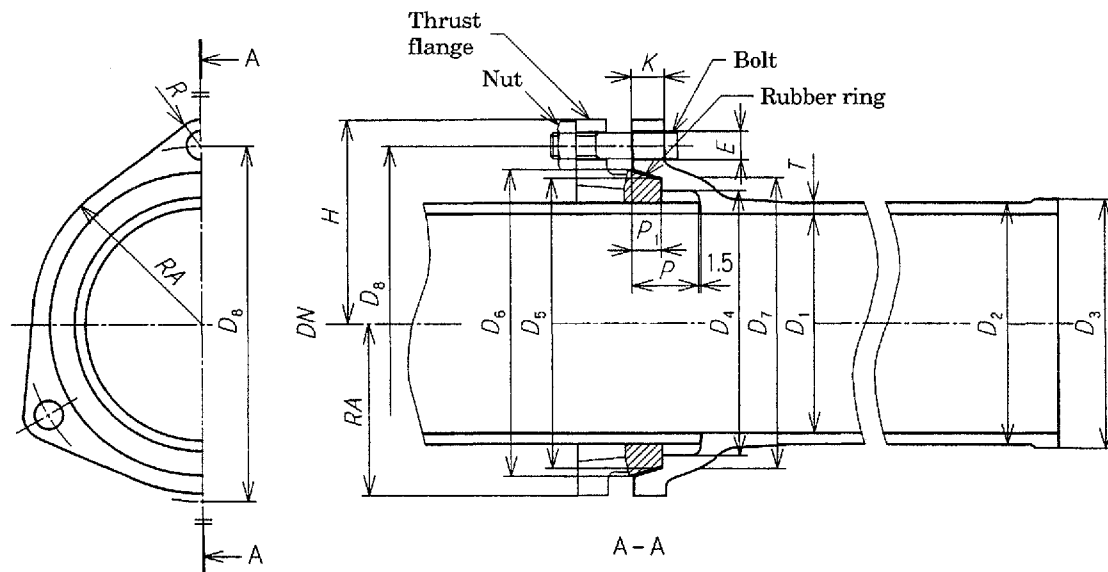
Nominal diameter <i>DN</i>	Type of pipe	Pipe thickness <i>T</i>	Inside diameter <i>D</i> ₁	Outside diameter <i>D</i> ₂	Dimensions of each part													Number of bolts used
		<i>T</i>	<i>D</i> ₁	<i>D</i> ₂	<i>D</i> ₃	<i>D</i> ₄	<i>D</i> ₅	<i>D</i> ₆	<i>D</i> ₇	<i>D</i> ₈	<i>RA</i>	<i>R</i>	<i>H</i>	<i>E</i>	<i>P</i> ₁	<i>P</i>	<i>K</i>	
50	Straight pipe	4.0	50	58	63	69	75	91	85	120	54	20	76	16	19	54	15	2
	Fitting	5.0		60														
75	Straight pipe	4.0	75	83	88	94	102	118	111	148	67	20	90	16	21	60	16	3
	Fitting	5.0		85														
100	Straight pipe	4.0	100	108	113	120	128	144	137	174	83	20	103	16	21	60	16	3
	Fitting	5.0		110														
125	Straight pipe	4.5	125	134	139	145	153	171	164	203	98	23	121	19	24	63	19	4
	Fitting	5.5		136														
150	Straight pipe	4.5	150	159	164	171	179	197	190	229	111	23	134	19	24	63	19	4
	Fitting	5.5		161														
200	Straight pipe	5.5	200	211	216	226	233	253	247	288	146	21	165	19	27	68	21	6
	Fitting	6.5		213														

- Remarks
- 1 The shape and dimensions of the thrust flange shall be in accordance with Annex 1 Attached Fig. 1.
 - 2 The shape and dimensions of the bolt and nut shall be in accordance with Annex 1 Attached Fig. 2.
 - 3 The shape and dimensions of the rubber ring shall be in accordance with Annex 1 Attached Fig. 3.
 - 4 The peripheral projection (*D*₃) of the insertion end of pipe may be removed.

Attached Fig. 1 Mechanical type Pipe class 1 Jointing part



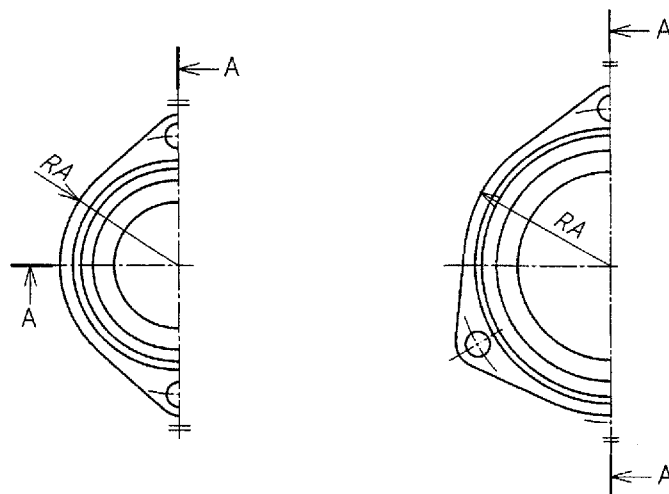
Attached Fig. 1 (concluded)



Unit: mm

Nominal diameter	Type of pipe	Pipe thickness	Inside diameter	Outside diameter	Dimensions of each part													Number of bolts used
					D_8	D_4	D_5	D_6	D_7	D_8	RA	R	H	E	P_1	P	K	
50	Fitting	4.0	50	58	—	68	78	84	80	102	48	9	60	10	11	30	12	2
75	Straight pipe	4.0	75	83	87	92	105	112	105	128	61	10	74	10	13	30	13	3
	Fitting																	
100	Straight pipe	4.0	100	108	112	117	130	137	130	157	76	11	90	12	13	30	14	3
	Fitting																	
125	Straight pipe	4.5	125	134	138	143	153	166	160	189	90	11	106	12	15	40	15	3
	Fitting																	

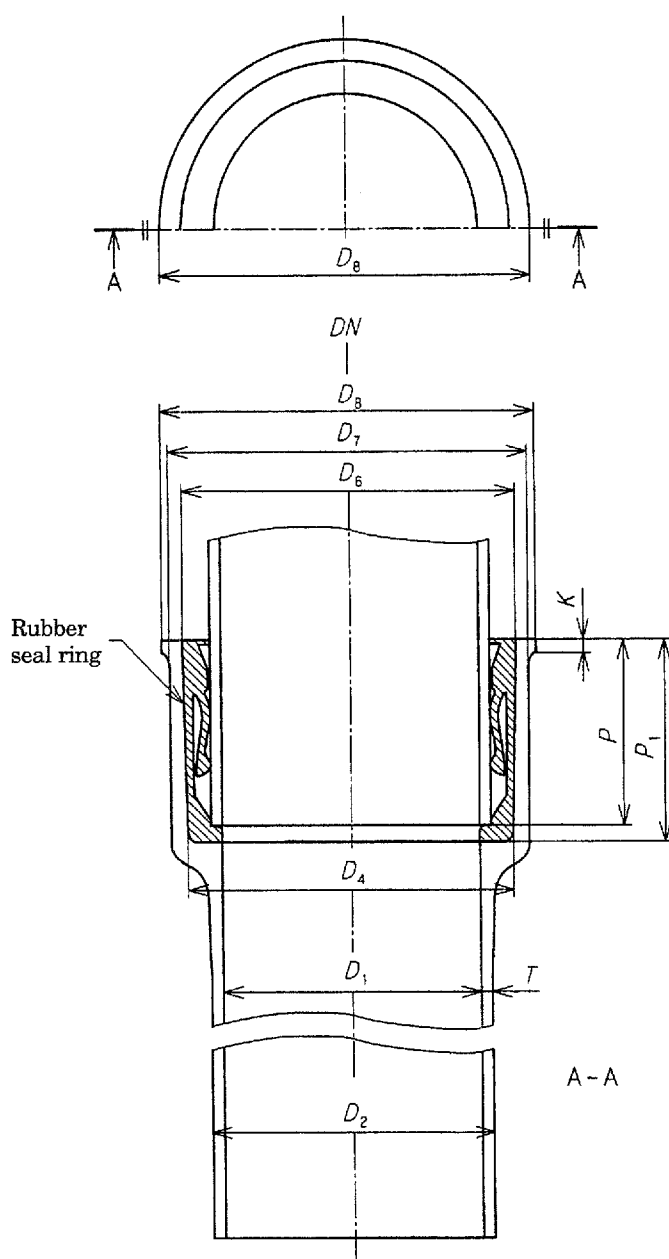
- Remarks 1 The shape and dimensions of the thrust flange shall be in accordance with Annex 1 Attached Fig. 4.
 2 The shape and dimensions of the bolt and nut shall be in accordance with Annex 1 Attached Fig. 5.
 3 The shape and dimensions of the rubber ring shall be in accordance with Annex 1 Attached Fig. 6.
 4 The peripheral projection (D_3) of the insertion end of pipe may be removed.



a) Nominal diameter 50

b) Nominal diameter 75, 100, 125

Attached Fig. 2 Mechanical type Pipe class 2 Jointing part

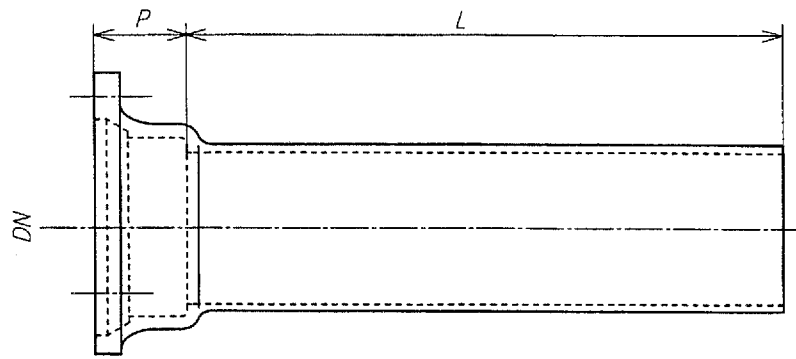


Unit: mm

Nominal diameter	Type of pipe	Pipe thick-ness	Inside diame-ter	Outside diame-ter	Dimensions of each part						
		T	D_1	D_2	D_6	D_4	D_7	D_8	P	P_1	K
75	Straight pipe	4.5	80	89	109	105	119	125	75	80	5
	Fitting										
100	Straight pipe	4.5	105	114	134	130	144	150	75	80	5
	Fitting										
125	Straight pipe	4.5	131	140	160	156	170	176	75	80	5
	Fitting										

Remarks : The shape and dimensions of the rubber seal ring shall be in accordance with Annex 1 Attached Fig. 7.

Attached Fig. 3 Insertion type RJ pipe Jointing part

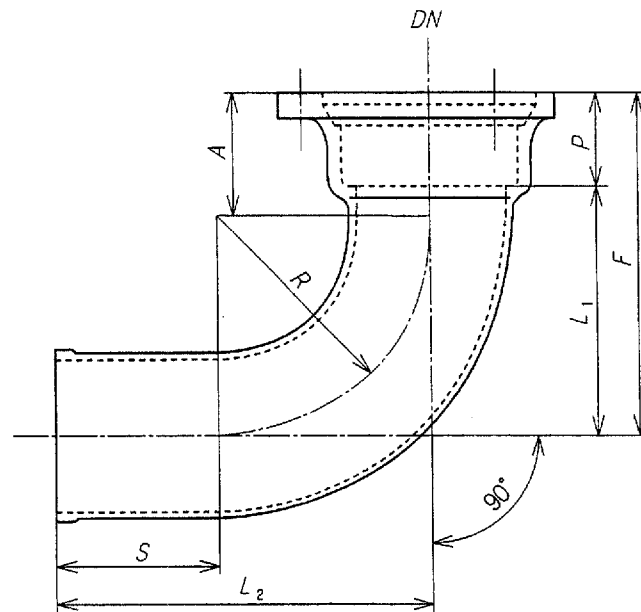


Unit: mm

Nominal diameter <i>DN</i>	<i>P</i>	Effective length						
		<i>L</i>						
50	54	—	—	—	1 600	1 000	600	400
75	60	—	2 600	2 350	1 600	1 000	600	400
100	60	4 000	2 600	2 350	1 600	1 000	600	400
125	63	4 000	2 600	2 350	1 600	1 000	600	400
150	63	4 000	2 600	2 350	1 600	1 000	600	400
200	68	—	2 600	—	1 600	1 000	600	400

Remarks : The outside diameter and the thickness of pipe for the straight pipe with 400 of effective length shall be the same as those of fitting.

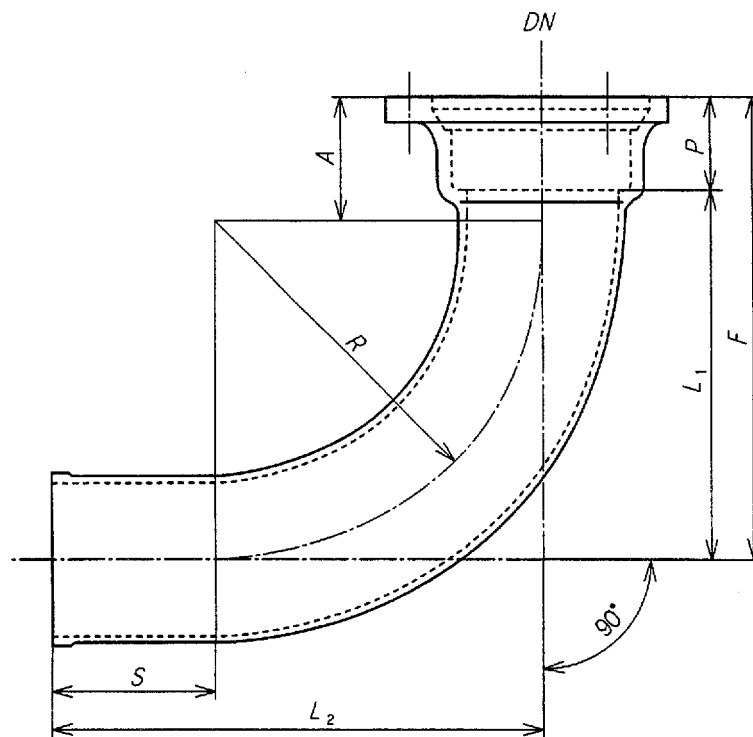
Attached Fig. 4 Effective length of straight pipe (pipe class 1)



Unit: mm

Nominal diameter <i>DN</i>	Effective length		<i>P</i>	<i>A</i>	<i>R</i>	<i>F</i>	<i>S</i>
	<i>L</i> ₁	<i>L</i> ₂					
50	140	210	54	76	118	194	92
75	155	235	60	82	133	215	102
100	165	255	60	82	143	225	112
125	180	270	63	85	158	243	112
150	190	280	63	85	168	253	112
200	210	315	68	90	188	278	127

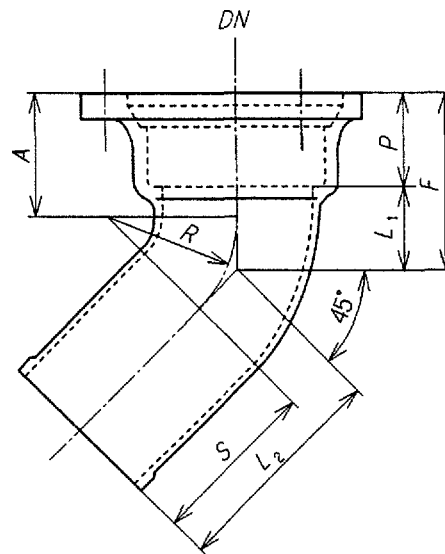
Attached Fig. 5 90° short bent pipe (pipe class 1) (90° SB)



Unit: mm

Nominal diameter <i>DN</i>	Effective length		<i>P</i>	<i>A</i>	<i>R</i>	<i>F</i>	<i>S</i>
	<i>L₁</i>	<i>L₂</i>					
75	230	305	60	82	208	290	97
100	245	330	60	82	223	305	107
125	255	340	63	85	233	318	107
150	270	355	63	85	248	333	107
200	300	400	68	90	278	368	122

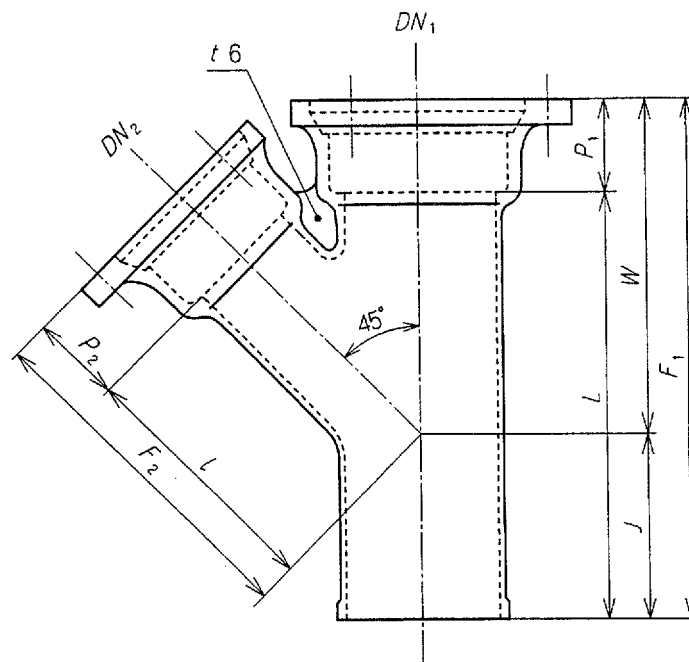
Attached Fig. 6 90° long bent pipe (pipe class 1) (90° LB)



Unit: mm

Nominal diameter	Effective length		P	A	R	F	S
	L ₁	L ₂					
DN							
50	45	115	54	76	55	99	92
75	50	130	60	82	68	110	102
100	55	150	60	82	80	115	117
125	60	155	63	85	92	123	117
150	65	160	63	85	104	128	117
200	75	185	68	90	128	143	132

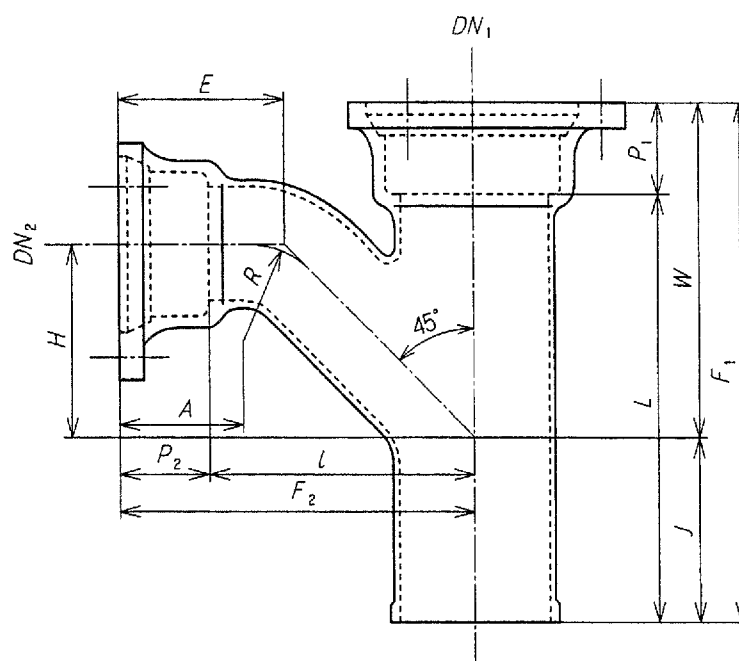
Attached Fig. 7 45° bent pipe (pipe class 1) (45° B)



Unit: mm

Nominal diameter		Effective length		P_1	P_2	J	W	F_1	F_2
DN_1	DN_2	L	l						
50	50	235	120	54	54	115	174	289	174
75	50	240	138	60	54	106	194	300	192
75	75	280	150	60	60	130	210	340	210
100	50	245	155	60	54	100	205	305	209
100	75	285	168	60	60	122	223	345	228
100	100	325	180	60	60	145	240	385	240
125	75	285	187	63	60	108	240	348	247
125	100	325	201	63	60	129	259	388	261
125	125	360	212	63	63	148	275	423	275
150	75	285	206	63	60	94	254	344	266
150	100	325	216	63	60	118	270	388	276
150	125	360	230	63	63	135	288	423	293
150	150	400	243	63	63	157	306	463	306
200	100	350	259	68	60	114	304	418	319
200	125	385	272	68	63	130	323	453	335
200	150	420	283	68	63	148	340	488	346
200	200	500	315	68	68	185	383	568	383

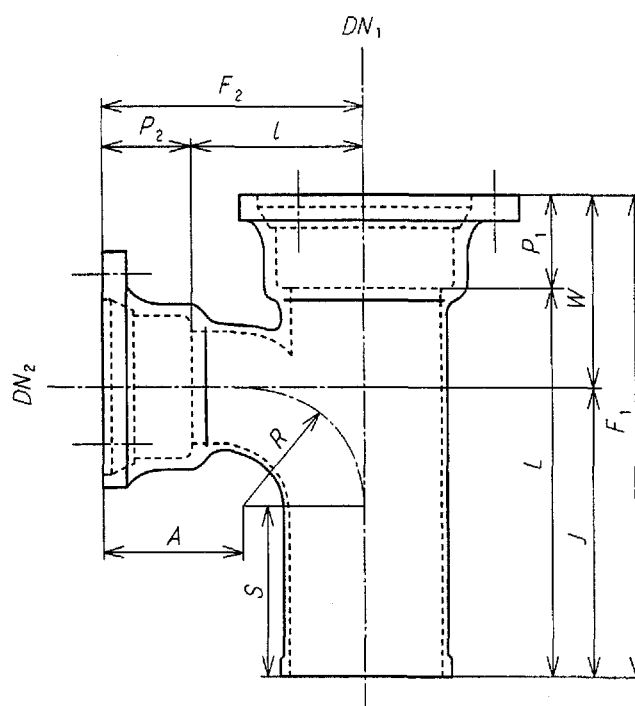
Attached Fig. 8 Y pipe (pipe class 1) (Y)



Unit: mm

Nominal diameter		Effective length		P_1	P_2	A	J	W	E	H	R	F_1	F_2
DN_1	DN_2	L	l										
50	50	235	132	54	54	76	115	174	99	87	56	289	186
75	50	240	145	60	54	76	106	194	99	100	56	300	199
75	75	280	167	60	60	82	130	210	110	117	68	340	227
100	50	245	158	60	54	76	100	205	99	113	56	305	212
100	75	285	180	60	60	82	122	223	110	130	68	345	240
100	100	325	202	60	60	82	145	240	115	147	80	385	262
125	75	285	192	63	60	82	108	240	110	142	68	348	252
125	100	325	215	63	60	82	129	259	115	160	80	388	275
125	125	360	233	63	63	85	148	275	123	173	92	423	296
150	75	285	200	63	60	82	94	254	110	150	68	348	260
150	100	325	227	63	60	82	118	270	115	172	80	388	287
150	125	360	246	63	63	85	135	288	123	186	92	423	309
150	150	400	265	63	63	85	157	306	128	200	104	463	328
200	100	350	251	68	60	82	114	304	115	196	80	418	311
200	125	385	272	68	63	85	130	323	123	212	92	453	335
200	150	420	290	68	63	85	148	340	128	225	104	488	353
200	200	500	327	68	68	90	185	383	141	254	123	568	395

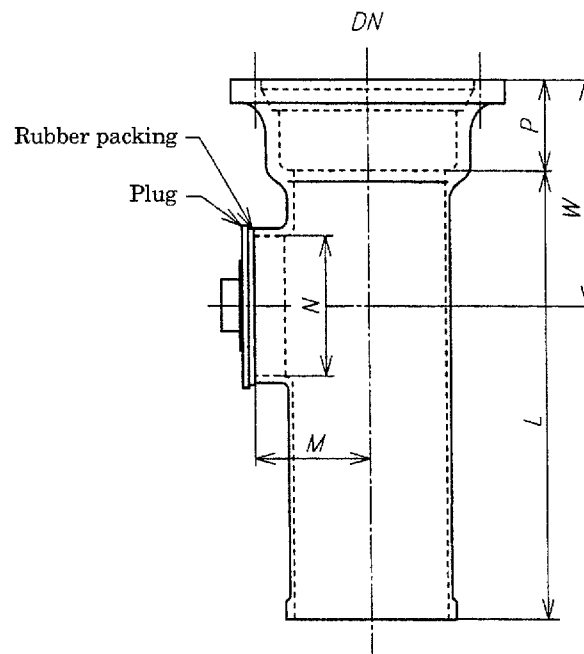
Attached Fig. 9 90° Y pipe (pipe class 1) (TY)



Unit: mm

Nominal diameter		Effective length		P_1	P_2	A	J	W	R	S	F_1	F_2
DN_1	DN_2	L	l									
50	50	215	90	54	54	76	160	109	68	92	269	144
75	50	230	105	60	54	76	173	117	70	103	290	159
75	75	255	105	60	60	82	185	130	83	102	315	165
100	50	230	115	60	54	76	176	114	68	108	290	169
100	75	260	115	60	60	82	193	127	81	112	320	175
100	100	285	120	60	60	82	205	140	98	107	345	180
125	75	265	130	63	60	82	193	135	83	110	328	190
125	100	290	130	63	60	82	208	145	96	112	353	190
125	125	310	130	63	63	85	215	158	108	107	373	193
150	75	260	140	63	60	82	193	130	81	112	323	200
150	100	290	145	63	60	82	210	143	98	112	353	205
150	125	315	145	63	63	85	223	155	110	113	378	208
150	150	335	145	63	63	85	230	168	123	107	398	208

Attached Fig. 10 Drainage T pipe (pipe class 1) (ST)

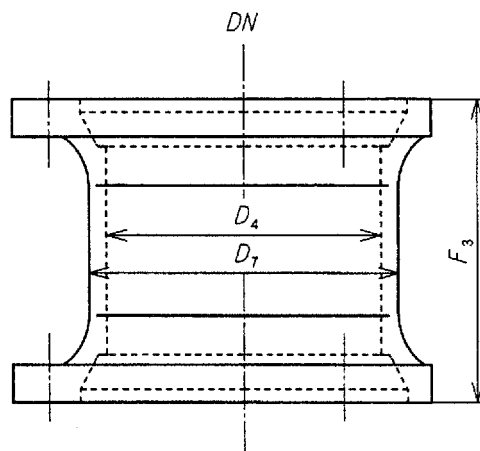


Unit: mm

Nominal diameter	Effective length			P	M	N	W
DN	L						
75	800	600	400	60	64	G2½	150
100	800	600	400	60	77	G3	150
125	800	600	400	63	90	G3	170
150	—	600	400	63	102	G3	170

- Remarks 1 The plug and the rubber packing shall be in accordance with Annex 2 Attached Fig. 15.
- 2 G2½ and G3 shall be in accordance with **JIS B 0202**.

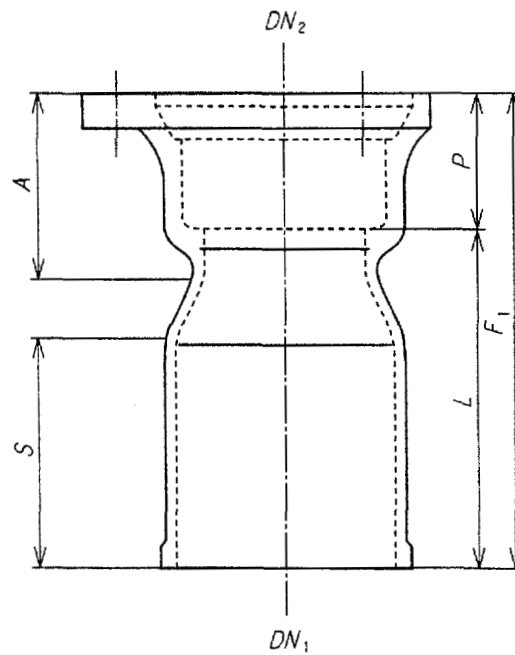
Attached Fig. 11 Short pipe with sweep hole (pipe class 1) (COT)



Unit: mm

Nominal diameter	D_4	D_7	F_3
DN			
50	69	85	120
75	94	111	134
100	120	137	134
125	145	164	140
150	171	190	140
200	226	247	150

Attached Fig. 12 Coupling ring (pipe class 1) (S)



Unit: mm

Nominal diameter		Effective length <i>L</i>	<i>P</i>	<i>A</i>	<i>S</i>	<i>F₁</i>
<i>DN₁</i>	<i>DN₂</i>					
75	50	125	54	76	92	179
100	50	150	54	76	103	204
100	75	150	60	82	103	210
125	75	150	60	82	103	210
125	100	150	60	82	103	210
150	75	150	60	82	103	210
150	100	150	60	82	103	210
150	125	150	63	85	103	213
200	100	200	60	82	125	260
200	125	200	63	85	125	263
200	150	200	63	85	125	263

Attached Fig. 13 Reducer (pipe class 1) (R)