
International Standard



5251

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Stainless steel butt-welding fittings

Accessoires à souder bout à bout en acier inoxydable

First edition — 1981-04-15

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[ISO 5251:1981](https://standards.iteh.ai/catalog/standards/sist/b50b55ed-b361-4372-97d9-d4de8b060fa7/iso-5251-1981)

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Descriptors : piping, accessories, steel tubes, pipe fittings, welded tubes, pipe bends, designation, grade (quality), symbols, dimensions, dimensional tolerances, form tolerances, marking.

Price based on 25 pages

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 5251 was developed by Technical Committee ISO/TC 5, *Metal pipes and fittings*, and was circulated to the member bodies in November 1979.

It has been approved by the member bodies of the following countries :

Austria	Germany, F.R.	Romania
Belgium	Hungary	South Africa, Rep. of
Brazil	India	Spain
Bulgaria	Italy	Sweden
Czechoslovakia	Korea, Rep. of	Switzerland
Denmark	Netherlands	USSR
Finland	Norway	
France	Poland	

The member bodies of the following countries expressed disapproval of the document on technical grounds :

Australia
Japan
United Kingdom

Stainless steel butt-welding fittings

1 Scope and field of application

This International Standard specifies the dimensions, tolerances and generally used grades of stainless steel for butt-welding bends [type 3D (90° and 180°) with and without straight ends and type 5D (90°)], concentric and eccentric reducers, tees, caps and stub ends with quality requirements as used for piping work.

2 References

ISO 404, *Steel and steel products — General technical delivery requirements*.¹⁾

ISO 1127, *Stainless steel tubes — Dimensions, tolerances and conventional masses per unit length*.

ISO 2604/2, *Steel products for pressure purposes — Quality requirements — Part 2 : Wrought seamless tubes*.

ISO 2604/4, *Steel products for pressure purposes — Quality requirements — Part 4 : Plates*.

ISO 2604/5, *Steel products for pressure purposes — Quality requirements — Part 5 : Longitudinally welded austenitic stainless steel tubes*.

ISO 3545, *Steel tubes and tubular shaped accessories with circular cross-section — Symbols to be used in specifications for steel tubes*.²⁾

ISO 6708, *Pipe components — Definition of nominal size*.

3 Designation

Fittings shall be designated by the type (i.e. bend, reducer, cap, tee, stub end), the angle (for bends), the outside diameter(s), the thickness, and the grade of steel followed by a reference to this International Standard.

Example of designation :

Butt-welding bend 3D-90-60,3 × 2,9-TS 47 ISO 5251

4 Symbols

DN	=	Nominal size (see ISO 6708)
D	=	Major outside diameter
D_1	=	Minor outside diameter
d	=	Major inside diameter
d_1	=	Minor inside diameter
T	=	Thickness adjacent to D
T_1	=	Thickness adjacent to D_1
C	=	Centreline dimension for 180° bends
B	=	Dimension from the back to the face or the start of the straight end for 180° bends
F	=	Dimension from centreline to the face or the start of the straight end for 90° bends and from the centreline to the face d for equal and reducing tees
H	=	Dimension from centreline to face at d_1 for reducing tees
K	=	Total height of caps
L	=	Overall length of reducers and the length of straight ends of bends
R, R_1	=	Radii of curves of reducers
Q	=	Tolerance for angular alignment
U	=	Tolerance for alignment of faces of 180° bends
P	=	Tolerance for perpendicular alignment

1) At present at the stage of draft. (Revision of ISO/R 404-1964.)

2) At present at the stage of draft.

5 Materials

5.1 The grades of steel to be used are as follows :

TS46, TS47, TS53, TS57, TS58, TS60, TS61 (ISO 2604/2);

P46, P47, P58, P61 (ISO 2604/4);

TW46, TW47, TW58, TW61 (ISO 2604/5).

5.2 Other grades of steel specified in ISO 2604/2, ISO 2604/4 and ISO 2604/5 may be supplied by agreement between the purchaser and manufacturer.

5.3 The fittings shall be manufactured from :

a) seamless tubes;

b) welded tubes or welded plate material; the welds shall have been tested previously by a non-destructive method to be agreed between purchaser and manufacturer.

5.4 By agreement between the manufacturer and purchaser, an intergranular corrosion test shall be performed, for example in accordance with ISO 3651/2.

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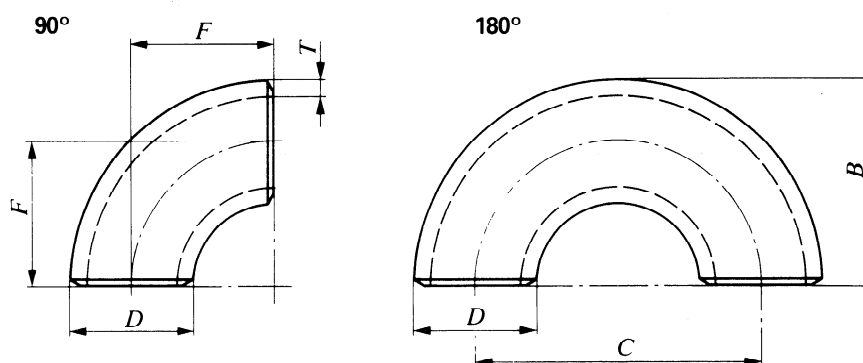
6 Dimensions and tolerances

6.1 Dimensions

The dimensions are specified in the tables of the paragraphs below.

6.1.1 Bends 3D

6.1.1.1 Without straight ends



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Figure 1 — Bends 3D without straight ends

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Table 1 — Dimensions of bends 3D without straight ends

DN	D mm	T mm	F mm	C mm	B mm	Conventional mass ¹⁾ kg ≈	
						90°	180°
15	21,3	1,6	28	56	38	0,03	0,06
		2				0,04	0,08
		3,2				0,06	0,12
		4				0,07	0,14
20	26,9	1,6	29	58	43	0,04	0,09
		2				0,06	0,11
		3,2				0,08	0,17
		4				0,10	0,20
25	33,7	1,6	38	76	55	0,07	0,14
		2				0,09	0,19
		2,3				0,11	0,21
		3,2				0,16	0,32
		4,5				0,19	0,38
32	42,4	1,6	48	96	69	0,12	0,24
		2				0,15	0,30
		2,6				0,19	0,38
		3,6				0,26	0,52
		5				0,33	0,66
40	48,3	1,6	57	114	81	0,16	0,32
		2				0,17	0,34
		2,6				0,27	0,54
		3,6				0,36	0,72
		5				0,49	0,98

1) For information only.

Table 1 (continued)

DN	D mm	T mm	F mm	C mm	B mm	Conventional mass ¹⁾ kg ≈	
						90°	180°
50	60,3	1,6	76	152	106	0,27	0,54
		2				0,34	0,68
		2,3				0,38	0,76
		2,9				0,49	0,98
		4				0,67	1,3
		5,6				0,90	1,8
65	76,1	1,6	95	190	133	0,44	0,90
		2,3				0,62	1,2
		2,6				0,70	1,4
		2,9				0,78	1,6
		5				1,3	2,6
		7,1				1,8	3,6
80	88,9	2	114	228	159	0,76	1,5
		2,3				0,90	1,8
		2,9				1,1	2,2
		3,2				1,2	2,4
		5,6				2,1	4,2
		8				2,9	5,7
100	114,3	2	152	304	209	1,3	2,6
		2,6				1,7	3,4
		2,9				1,9	3,8
		3,6				2,4	4,8
		6,3				4,0	8,0
		8,8				5,5	11
125	139,7	2	190	380	260	2,0	4,0
		2,6				2,7	5,4
		3,2				3,2	6,4
		4				4	8,0
		6,3				6,2	12
		10				9,7	19
150	168,3	2	229	458	313	2,9	5,8
		2,6				3,8	7,6
		3,2				4,7	9,4
		4,5				6,5	13
		7,1				10	20
		11				15	31
200	219,1	2	305	610	414	5,1	10
		2,6				6,7	13
		3,6				9,1	18
		6,3				16	32
		8				20	40
		12,5				31	61
250	273	2	381	762	518	8	16
		3,6				14	29
		4				16	32
		6,3				25	50
		10				39	78
300	323,9	2,6	457	914	619	15	30
		4				23	45
		4,5				26	52
		7,1				40	80
		10				56	111
350	355,6	2,6	533	1 066	711	19	38
		4				29	58
		5				36	72
		8				57	114
		11				78	156

1) For information only.

Table 1 (concluded)

DN	D mm	T mm	F mm	C mm	B mm	Conventional mass ¹⁾ kg ≈	
						90°	180°
400	406,4	2,6 4 5 8,8 12,5	610	1 220	813	25 38 47 82 117	50 76 95 164 234
450	457	3,2 4 5 10	686	1 372	914	38 48 60 119	77 96 120 238
500	508	3,2 5 5,6 11	762	1 524	1 016	48 74 83 161	95 148 166 322
600	610	3,2 5,6 6,3 12,5	914	1 828	1 219	68 120 135 264	126 240 270 528
700	711	4 7,1	1 067	2 134	1 422	116 206	233 412
800	813	4 8	1 219	2 438	1 625	152 304	304 608
900	914	4 8,8	1 372	2 744	1 829	193 323	386 646
1 000	1 016	4 10	1 524	3 048	2 032	239 593	478 1 186

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6.1.1.2 With straight ends

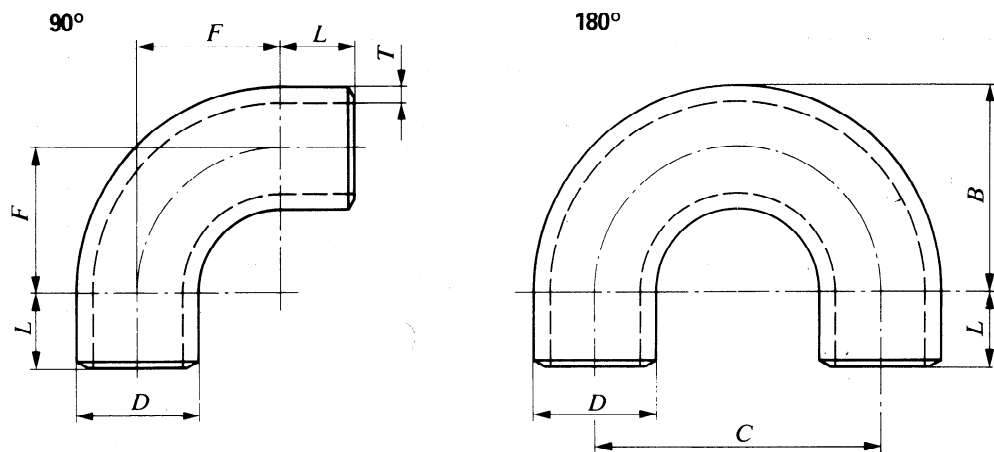


Figure 2 — Bends 3D with straight ends

Table 2 — Dimensions of bends 3D with straight ends

DN	D mm	T mm	F mm	C mm	B mm	L mm	Conventional mass ¹⁾ kg ≈	
							90°	180°
15	21,3	1,6	28	56	38	25	0,07	0,11
		2					0,09	0,13
		3,2					0,13	0,19
		4					0,16	0,21
		5					0,21	0,26
20	26,9	1,6	29	58	43	25	0,09	0,14
		2					0,12	0,18
		3,2					0,18	0,26
		4					0,21	0,31
		5					0,27	0,35
25	33,7	1,6	38	76	55	25	0,14	0,21
		2					0,17	0,27
		2,3					0,19	0,30
		3,2					0,27	0,44
		4,5					0,35	0,54
32	42,4	1,6	48	96	69	30	0,21	0,34
		2					0,27	0,42
		2,6					0,35	0,54
		3,6					0,47	0,73
		5					0,62	0,97
40	48,3	1,6	57	114	81	35	0,29	0,45
		2					0,36	0,56
		2,6					0,47	0,73
		3,6					0,63	1,1
		5					0,85	1,3
50	60,3	1,6	76	152	106	40	0,46	0,75
		2					0,57	1,0
		2,3					0,65	1,0
		2,9					0,82	1,1
		4					1,0	1,8
65	76,1	1,6	95	190	133	45	0,72	1,2
		2,3					0,94	1,5
		2,6					1,2	1,8
		2,9					1,3	2,0
		5					2,1	3,4
80	88,9	1,6	114	228	159	50	0,94	1,5
		2					1,2	2,0
		2,3					1,4	2,2
		2,9					1,7	2,8
		3,2					1,9	3,1
100	114,3	1,6	152	304	209	55	2,1	3,4
		2,3					2,9	4,7
		2,6					3,2	5,3
		2,9					4,5	7,3
		3,6					5,8	9,9
		6,3					8,0	13,4
		8,8						

1) For information only.

6.1.2 Bends 5D (90°)

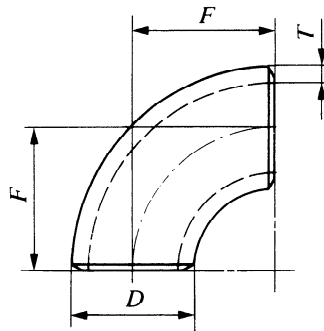


Figure 3 — Bends 5D

Table 3 — Dimensions of bends 5D

DN	D mm	T mm	F mm	Conventional mass ¹⁾ kg ≈ 90°
15	21,3	1,6 2 3,2 4	45	0,05 0,07 0,10 0,12
20	26,9	1,6 2 3,2 4	57	0,09 0,11 0,17 0,20
25	33,7	1,6 2 2,3 3,2 4,5	72	0,14 0,18 0,20 0,27 0,37
32	42,4	1,6 2 2,6 3,6 5	93	0,23 0,29 0,37 0,50 0,67
40	48,3	1,6 2 2,6 3,6 5	108	0,31 0,39 0,50 0,67 0,90
50	60,3	1,6 2 2,3 2,9 4 5,6	135	0,49 0,61 0,70 0,88 1,2 1,6
65	76,1	1,6 2,3 2,6 2,9 5 7,1	175	0,8 1,1 1,3 1,4 2,4 3,5
80	88,9	2 2,3 2,9 3,2 5,6 8	205	1,2 1,3 1,7 1,9 3,3 4,4
100	114,3	2 2,6 2,9 3,6 6,3 8,8	270	2,3 3,0 3,4 4,2 7,1 9,7

1) For information only.

6.1.3 Concentric and eccentric reducers

Recommended radii

Concentric reducers $R > 0,4 D$
 $R_1 > 0,4 D_1$

Eccentric reducers $R > 0,3 D$
 $R_1 > 0,3 D_1$

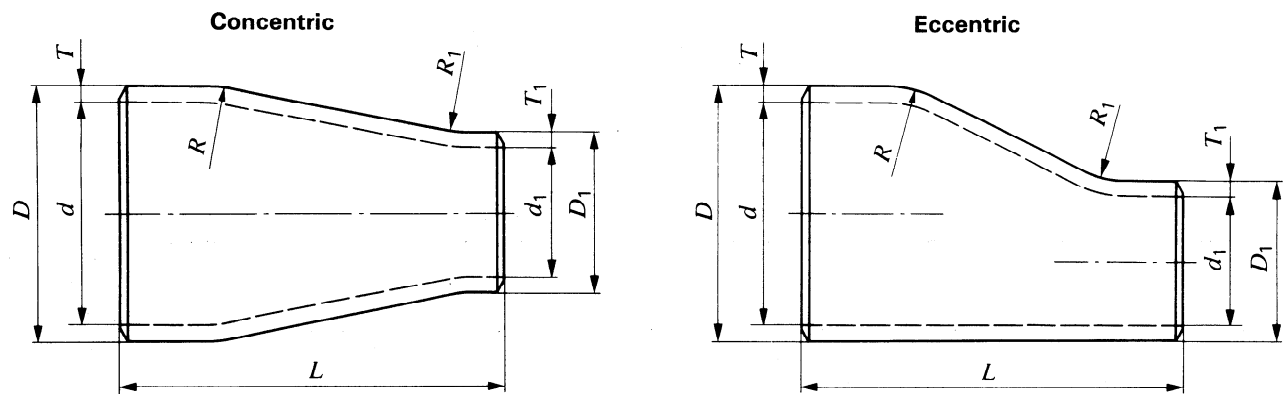


Figure 4 – Concentric and eccentric reducers
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Table 4 – Dimensions of reducers
<https://standards.iteh.ai/catalog/standards/sist/b50655ed-b361-4372-97d9-d4de8b060fa7/iso-5251-1981>

DN	Major diameter		Minor diameter		L mm	Conventional mass ¹⁾ kg ≈
	D mm	T mm	D ₁ mm	T ₁ mm		
20	26,9	1,6	21,3	1,6	38	0,04
		2		2		0,05
		3,2		3,2		0,07
		4		4		0,09
25	33,7	1,6	26,9	1,6	51	0,06
		2,3		2		0,09
		3,2		3,2		0,13
		4,5		4		0,16
		1,6	21,3	1,6		0,06
		2,3		2		0,09
		3,2		3,2		1,3
		4,5		4		1,6
32	42,4	1,6	33,7	1,6	51	0,08
		2		2		0,10
		2,6		2,3		0,13
		3,6		3,2		0,17
		5		4,5		0,23
		1,6	26,9	1,6		0,08
		2,6		2		0,13
		3,6		3,2		0,17
		5		4		0,23
		1,6	21,3	1,6		0,08
		2,6		2		0,13
		3,6		3,2		0,17
		5		4		0,23

1) For information only.

Table 4 (continued)

DN	Major diameter		Minor diameter		L mm	Conventional mass ¹⁾ kg ≈
	D mm	T mm	D ₁ mm	T ₁ mm		
40	48,3	1,6	42,4	1,6	64	0,12
		2		2		0,15
		2,6		2,6		0,19
		3,6		3,6		0,26
		5		5		0,34
		1,6	33,7	1,6		0,12
		2		2		0,15
		2,6		2,3		0,19
		3,6		3,2		0,26
50	60,3	5	26,9	4,5	76	0,34
		1,6		1,6		0,12
		2,6		2		0,19
		3,6		3,2		0,26
		5		4		0,34
		1,6	48,3	1,6		0,17
		2		2		0,22
		2,9		2,6		0,31
		4		3,6		0,41
		5,6		5		0,57
65	76,1	1,6	42,4	1,6	89	0,17
		2		2		0,22
		2,9		2,6		0,31
		4		3,6		0,41
		5,6		5		0,57
		1,6	33,7	1,6		0,17
		2		2		0,22
		2,9		2,3		0,31
		4		3,2		0,41
80	88,9	5,6	48,3	4,5	89	0,57
		1,6		1,6		0,26
		2,3		2		0,37
		2,9		2,6		0,46
		5		3,6		0,78
		7,1		5		1,1
		1,6	42,4	1,6		0,26
		2,3		2		0,37
		2,9		2,6		0,46
80	88,9	5		3,6	89	0,78
		7,1		5		1,1
		2	76,1	1,6		0,38
		2,3		2,3		0,44
		2,9		2,6		0,55
		3,2		2,9		0,60
		5,6		5		1,0
		8		7,1		1,4
		2	60,3	1,6		0,38
		2,3		2		0,44
		2,9		2,3		0,55
		3,2		2,9		0,60
		5,6		4		1,0
		8		5,6		1,4
		2	48,3	1,6		0,38
		2,3		2		0,44
		3,2		2,6		0,60
		5,6		3,6		1,0
		8		5		1,4

1) For information only.