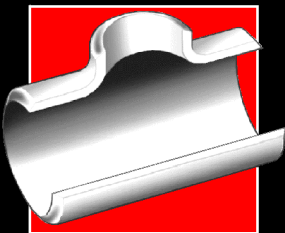


Section 6

Buttweld Fittings



This Section contains dimension and tolerance information extracted from selected ANSI/ASME, MSS and ISO specifications for buttweld fitting.

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American Buttweld Fittings - General

This subsection summarises buttweld fitting dimensions and tolerances as defined in the relevant ASME/ANSI and MSS specifications. Wall thicknesses and weights are not defined in these specifications since the fittings must comply with the wall thicknesses of the pipes with which they are used. Dimensional tolerances, including cross sectional tolerances, are defined however, and are reproduced in the following pages.

Applicable Specifications

Specifications applicable to buttwelding fittings are as follows:

- **ASME/ANSI B16.9-1993** - Factory-made wrought steel buttwelding fittings.
- **ASME/ANSI B16.28-1994** - Wrought steel buttwelding short radius elbows and returns.
- **MSS SP-43 1991**, Reaffirmed 1996 - Wrought stainless steel buttwelding fittings. This applies to 5S, 10S, and 40S wall thicknesses only.
- **ASME/ANSI B16.25-1992** - Buttwelding ends. This defines various weld bevel designs and dimensions, beyond the scope of this manual.
- **Wall Thicknesses**. Fittings are manufactured to match the wall thicknesses of pipe (see page 6-6).
- **Weights** quoted in the fitting tables are based on manufacturers' data and are approximate. Actual weights may vary from those quoted depending on the type of construction. For austenitic and duplex stainless steel, multiply the quoted weight by 1.014. For ferritic and martensitic stainless steel, multiply the quoted weight by 0.985.

Manufacture and Test

- **Materials and Manufacture**. AMSE/ANSI and MSS stainless steel buttwelding fittings are most commonly manufactured to ASTM A 403 (see page 4-12).
- **Production Testing**. Test requirements are defined in ASTM A 430 (see page 4-12).
- **ASME/ANSI Test Requirements**. B19.9 and B16.28 do not require production testing of fittings although they must be capable of withstanding the rated pressure:
- **MSS SP-43 Test Requirements**. SP-43 does not require hydrostatic testing of fittings although they must be capable of withstanding 1.5 times the pressure ratings at 100 °F:

Pressure Ratings. The rated pressure is as for straight seamless pipe of equivalent NPS, wall thickness and material.

Proof testing to qualify the fitting design comprises a bursting strength test. The fitting is required to withstand, without rupture, 105% of the pressure P given by: $P = (2St) / D$ where

S = Actual ultimate tensile strength of a specimen from a representative fitting.

t = Nominal wall thickness

D = Outside diameter

Pressure Ratings. Fittings produced to MSS SP-43 have the following ratings.

Temperature °F	Pressure, psi	
	Schedule 5S	Schedule 10S
100	225	275
150	215	255
200	200	240
250	190	225
300	175	210
350	165	195
400	150	180
450	Not recommended for use at these temperatures	165
500		150
600		130
700		110
750		100

Dimensions and Tolerances - ASME/ANSI B16.9 and B16.28

Dimensions for buttweld fittings specified in ASME/ANSI B16.9 and B16.28 are presented on pages 6-7 to 6-19. Tolerances applicable to these fittings are given the following tables.

American Buttweld Fittings - General

Cross-sectional tolerances for all buttwelding fittings (ASME/ANSI B16.9 and B16.28)

Nominal Pipe Size (NPS)	All Fittings				Wall Thickness (t)
	OD at Bevel		ID at Bevel, ±		
	in	mm	in	mm	
1/2 to 2 1/2	+0.06, -0.03	±1	0.03	0.8	Not less than 87.5% of nominal wall thickness
3 to 3 1/2	±0.06	±1	0.06	1.6	
4	0.06	+2, -1	0.06	1.6	
5 to 6	+0.09, -0.06	+3, -1	0.06	1.6	
8	+0.09, -0.06	±2	0.06	1.6	
10	+0.16, -0.12	+4, -3	0.12	3.2	
12 to 18	+0.16, -0.12	+4, -3	0.12	3.2	
20 to 24	+0.25, -0.19	+6, -5	0.19	4.8	
26 to 30	+0.25, -0.19	+7, -5	0.19	4.8	
32 to 48	+0.25, -0.19	+7, -5	0.19	4.8	

Tolerances for Specific Fittings

Dimensional tolerances for elbows and returns (ASME/ANSI B16.9 and B16.28)

Nominal Pipe Size (NPS)	90° and 45° Long Radius Elbows (page 6-7), 90° Short Radius Elbows (page 6-9) and Tees (pages 6-10 and 6-11)		180° Returns (page 6-8 and 6-9)			
	Centre-to-End Dimension, ± A,B		Centre-to-Centre Dimension, ± B (=2 x A)		Back-to-face Dimension, ± C	
	in	mm	in	mm	in	mm
1/2 to 2 1/2	0.06	2	0.25	7	0.25	7
3 to 3 1/2	0.06	2	0.25	7	0.25	7
4	0.06	2	0.25	7	0.25	7
5 to 6	0.06	2	0.25	7	0.25	7
8	0.06	2	0.25	7	0.25	7
10	0.09	2	0.38	10	0.25	7
12 to 18	0.09	3	0.38	10	0.25	7
20 to 24	0.09	3	0.38	10	0.25	7
26 to 30	0.12	3	-	-	-	-
32 to 48	0.19	5	-	-	-	-

Dimensional tolerances for reducers, caps and stub ends (ASME/ANSI B16.9)

Nominal Pipe Size (NPS)	Reducers (page 6-15) and Lap Joint Stub Ends (page 6-19)		Caps (page 6-18)		Lap Joint Stub Ends (page 6-19)				
	Overall Length, ± A		Overall Length, ± A		OD of Lap B		Fillet Radius of Lap R		OD of Barrel
	in	mm	in	mm	in	mm	in	mm	
1/2 to 2 1/2	0.06	2	0.12	4	+0, -0.03	+0, -1	+0, -0.03	+0, -1	See Lap Joint Stub Ends table for limiting dimension (pages 6-19)
3 to 3 1/2	0.06	2	0.12	4	+0, -0.03	+0, -1	+0, -0.03	+0, -1	
4	0.06	2	0.12	4	+0, -0.03	+0, -1	+0, -0.06	+0, -2	
5 to 6	0.06	2	0.25	7	+0, -0.03	+0, -1	+0, -0.06	+0, -2	
8	0.06	2	0.25	7	+0, -0.03	+0, -1	+0, -0.06	+0, -2	
10	0.09	2	0.25	7	+0, -0.06	+0, -2	+0, -0.06	+0, -2	
12 to 18	0.09	3	0.25	7	+0, -0.06	+0, -2	+0, -0.06	+0, -2	
20 to 24	0.09	3	0.25	7	+0, -0.06	+0, -2	+0, -0.06	+0, -2	
26 to 30	0.19	3	0.38	10	-	-	-	-	
32 to 48	0.19	5	0.38	10	-	-	-	-	

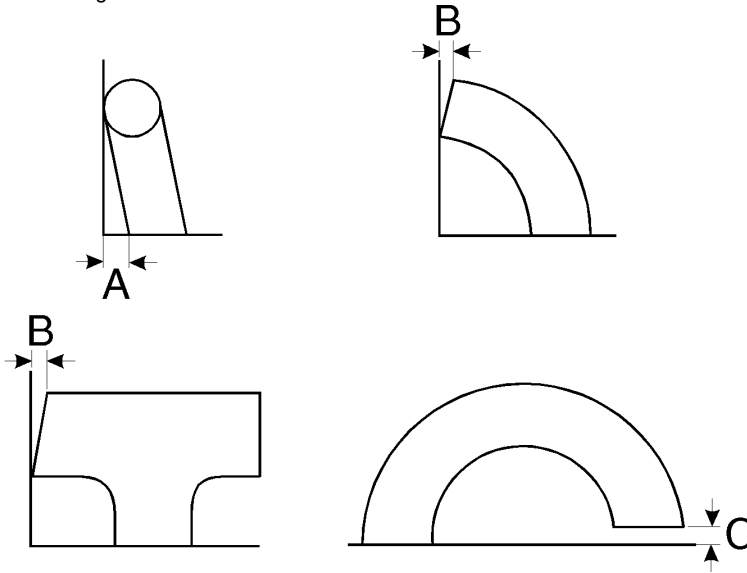
Note

- Page number references in the tables above indicate the location of associated dimension and weight tables.

American Buttweld Fittings - General

Alignment Tolerances

Alignment tolerances are concerned with the way that the ends of a fitting are cut. Exaggerated distortions are shown for clarity in the diagram below.



Alignment tolerances (ASME/ANSI B16.9 and B16.28)

Nominal Pipe Size (NPS)	Off Plane Tolerances, ±		Off Angle Tolerances, ±		Alignment of Ends, ±	
	A		B		C	
	in	mm	in	mm	in	mm
1/2 to 4	0.06	2	0.03	1	0.03	1
5 to 8	0.12	4	0.06	2	0.03	1
10 to 12	0.19	5	0.09	3	0.06	2
14 to 16	0.25	7	0.09	3	0.06	2
18 to 24	0.38	10	0.12	4	0.06	2
26 to 30	0.38	10	0.19	5	-	-
32 to 42	0.50	13	0.19	5	-	-
44 to 48	0.75	20	0.19	5	-	-

Dimensional tolerances for reducers, caps and stub ends (ASME/ANSI B16.9)

Dimensions and Tolerances - MSS SP-43

MSS SP-43 only covers buttweld fittings made for use with Schedule 5S and 10S pipe as defined in ANSI/ASME B36.19M (plus short pattern stub ends suitable for use with Schedule 40S pipe). The dimensions and tolerances defined in MSS SP-43 are substantially the same as those in ASME/ANSI specifications (1/2 to 24 in).

- Notes on MSS SP-43 buttweld fitting dimensions are included on pages 6-7 to 6-19 where appropriate,
- MSS SP-43 tolerances (including alignment tolerance) are the same as for ASME/ANSI B16.9 and B16.28 except with regard to the outside diameter at the bevel:

Tolerance of OD at Bevel =
 ± 0.03 in for NPS 1/2 to 4
 +0.06, -0.03 in for NPS 5 to 8
 +0.09, -0.03 in for NPS 10 to 18
 +0.12, to -0.03 in for NPS 20 to 24

American Butt Weld Fittings - General

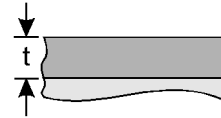
Bevelled Ends

The ends of all fittings are to be cut square (within the alignment tolerances). Fittings and pipes with wall thicknesses exceeding 0.12 in (4 mm) for austenitic stainless steel, or 0.19 in (5 mm) for ferritic stainless steel, are bevelled as illustrated below, the shape of the bevel depending upon the actual wall thickness as shown. Alternative bevel shapes are defined in ANSI/ASME B16.25-1992 (these are not included in this manual).

Welding bevels and root face (ASME/ANSI B16.9 and B16.28)

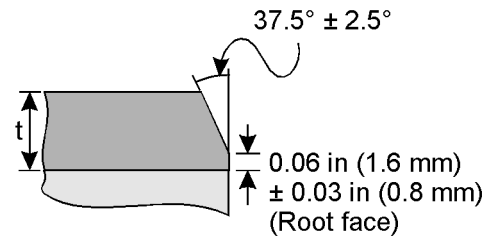
Cut square or slight chamfer

Wall Thickness (t)
 ≤ 0.12 in (4 mm) for austenitic
 stainless steel
 ≤ 0.19 in (5 mm) for ferritic
 stainless steel



Plain bevel

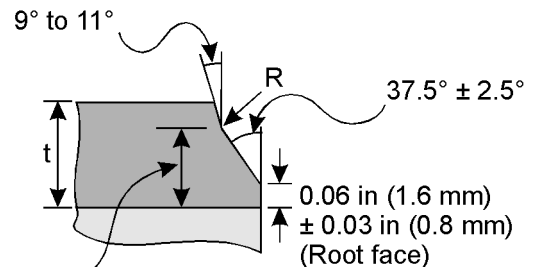
Wall Thickness (t)
 greater than above
 and ≤ 0.88 in (22 mm)



Compound bevel

Wall Thickness (t)
 > 0.88 in (22 mm)

0.75 in (19 mm) \pm 0.06 in (2 mm)



Note

- Radius R is not defined

American Buttweld Fittings - General

Buttweld Fitting Weights

As mentioned previously, the ANSI/ASME and MSS buttweld fitting specifications do not specify wall thicknesses and weights for fittings. Weights quoted in the dimension and weight tables on the following pages are therefore based on manufacturers' information and should be considered as approximate and provided as a guide only (fitting weights can vary considerably between manufacturers due to differences in construction).

The example weights quoted on the following pages are for 40S or Standard (STD) wall thicknesses only. It is possible to calculate the approximate weight at any other wall thicknesses using the factors provided in the table below. These factors are calculated from the ANSI/ASME B36.19M and B36.10M pipe weights (see page 5-2 and following) and are based on the proportional relationship of the pipe weights (kg/m) to the weights of 40S and STD wall thickness pipe at each NPS.

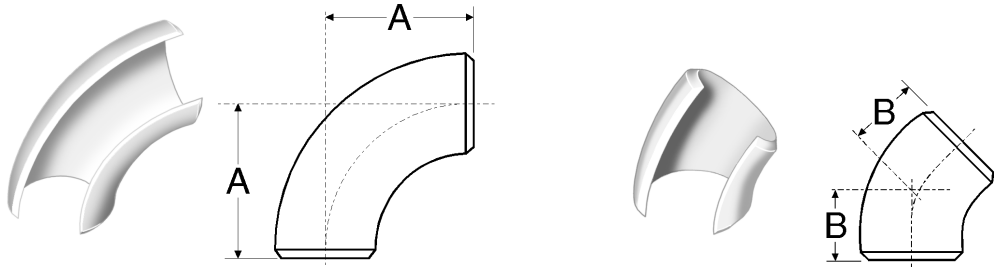
ASME/ANSI pipe sizes and weight multiplication factors for use in obtaining approximate fitting weights. For use with the example (40S/STD) weights provided in the ANSI/ASME tables of this section

NPS	Multiplication Factors = Proportional relationship of pipe weights to 40S or STD pipe at each NPS ¹ . Multiply the example 40S/STD fitting weights (at the required NPS) by the factors below (at the same NPS) to give approximate weights at different wall thicknesses.																
	5S	10S	40S	80S	10	20	30	40	STD	60	XS	80	100	120	140	160	XXS
1/8	-	0.76	1.00	1.27	-	-	0.86	1.00	1.00	-	1.27	1.27	-	-	-	-	-
1/4	-	0.78	1.00	1.27	-	-	0.86	1.00	1.00	-	1.27	1.27	-	-	-	-	-
3/8	-	0.75	1.00	1.31	-	-	0.83	1.00	1.00	-	1.31	1.31	-	-	-	-	-
1/2	0.64	0.79	1.00	1.28	-	-	0.88	1.00	1.00	-	1.28	1.28	-	-	-	1.54	2.01
3/4	0.61	0.76	1.00	1.30	-	-	0.85	1.00	1.00	-	1.30	1.30	-	-	-	1.72	2.15
1	0.52	0.84	1.00	1.30	-	-	0.87	1.00	1.00	-	1.30	1.30	-	-	-	1.70	2.18
1 1/4	0.49	0.80	1.00	1.32	-	-	0.85	1.00	1.00	-	1.32	1.32	-	-	-	1.65	2.29
1 1/2	0.47	0.77	1.00	1.34	-	-	0.87	1.00	1.00	-	1.34	1.34	-	-	-	1.79	2.36
2	0.44	0.72	1.00	1.38	-	-	0.82	1.00	1.00	-	1.38	1.38	-	-	-	2.04	2.47
2 1/2	0.43	0.61	1.00	1.32	-	-	0.93	1.00	1.00	-	1.32	1.32	-	-	-	1.73	2.36
3	0.40	0.57	1.00	1.35	-	-	0.88	1.00	1.00	-	1.35	1.35	-	-	-	1.89	2.45
3 1/2	0.38	0.55	1.00	1.37	-	-	0.84	1.00	1.00	-	1.37	1.37	-	-	-	-	-
4	0.36	0.52	1.00	1.39	-	-	0.80	1.00	1.00	-	1.39	1.39	-	1.76	-	2.09	2.55
5	0.44	0.53	1.00	1.42	-	-	-	1.00	1.00	-	1.42	1.42	-	1.85	-	2.26	2.64
6	0.40	0.49	1.00	1.51	-	-	-	1.00	1.00	-	1.51	1.51	-	1.92	-	2.39	2.80
8	0.35	0.47	1.00	1.52	-	0.78	0.87	1.00	1.00	1.25	1.52	1.52	1.78	2.13	2.37	2.62	2.54
10	0.38	0.46	1.00	1.59	-	0.69	0.85	1.00	1.00	1.35	1.59	1.59	1.90	2.21	2.57	2.86	2.57
12	0.42	0.49	1.00	1.79	-	0.67	0.88	1.08	1.00	1.47	1.32	1.79	2.16	2.53	2.82	3.23	2.53
14	0.42	0.51	-	-	0.67	0.83	1.00	1.16	1.00	1.56	1.32	1.94	2.40	2.76	3.12	3.46	-
16	0.45	0.51	-	-	0.67	0.83	1.00	1.32	1.00	1.72	1.32	2.18	2.73	3.07	3.57	3.92	-
18	0.45	0.51	-	-	0.67	0.83	1.16	1.48	1.00	1.96	1.32	2.42	2.94	3.46	3.88	4.37	-
20	0.51	0.59	-	-	0.67	1.00	1.32	1.57	1.00	2.12	1.32	2.66	3.26	0.38	4.34	4.82	-
22	0.51	0.58	-	-	0.67	1.00	1.32	-	1.00	2.28	1.32	2.89	3.50	4.08	4.65	5.21	-
24	0.58	0.67	-	-	0.67	1.00	1.49	1.81	1.00	2.52	1.33	3.13	3.88	4.54	5.10	5.73	-
26	-	-	-	-	0.83	1.33	-	-	1.00	-	1.33	-	-	-	-	-	-
28	-	-	-	-	0.83	1.33	1.65	-	1.00	-	1.33	-	-	-	-	-	-
30	0.67	0.83	-	-	0.83	1.33	1.65	-	1.00	-	1.33	-	-	-	-	-	-
32	-	-	-	-	0.83	1.33	1.65	1.82	1.00	-	1.33	-	-	-	-	-	-
34	-	-	-	-	0.83	1.33	1.66	1.82	1.00	-	1.33	-	-	-	-	-	-
36	-	-	-	-	0.83	1.33	1.65	1.98	1.00	-	1.33	-	-	-	-	-	-
38	-	-	-	-	-	-	-	-	1.00	-	1.33	-	-	-	-	-	-
40	-	-	-	-	-	-	-	-	1.00	-	1.33	-	-	-	-	-	-
42	-	-	-	-	-	-	-	-	1.00	-	1.33	-	-	-	-	-	-
44	-	-	-	-	-	-	-	-	1.00	-	1.33	-	-	-	-	-	-
46	-	-	-	-	-	-	-	-	1.00	-	1.29	-	-	-	-	-	-
48	-	-	-	-	-	-	-	-	1.00	-	1.33	-	-	-	-	-	-






Note

¹ The relationship between pipe weights at each NPS can strictly only be applied to fittings where the same proportional relationship is maintained in the fitting. Less accurate results will therefore be obtained for reducing tees, for example, than for elbows, equal tees, etc. The type of fitting construction may also make the factors inaccurate.

90° and 45° Long Radius Elbows - ANSI B16.9



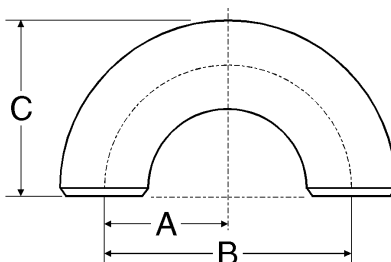
Dimensions (based on ASME/ANSI B16.9) and example weights for long radius elbows

Nominal Pipe Size	Common		90° Elbow			45° Elbow		
	OD at Bevel 		Dimension A 		40S/STD ¹ 	Dimension B 		40S/STD ¹ 
	in	mm	in	mm	kg/piece	in	mm	kg/piece
1/2	0.84	21	1.50	38	0.08	0.62	16	0.04
3/4	1.05	27	1.50	38	0.10	0.75	19	0.05
1	1.32	33	1.50	38	0.15	0.88	22	0.07
1 1/4	1.66	42	1.88	48	0.25	1.00	25	0.12
1 1/2	1.90	48	2.25	57	0.36	1.12	29	0.18
2	2.38	60	3.00	76	0.65	1.38	35	0.32
2 1/2	2.88	73	3.75	95	1.29	1.75	44	0.64
3	3.50	89	4.50	114	2.02	2.00	51	1.01
3 1/2	4.00	102	5.25	133	2.83	2.25	57	1.41
4	4.50	114	6.00	152	3.84	2.50	64	1.92
5	5.56	141	7.50	190	6.51	3.12	79	3.25
6	6.62	168	9.00	229	10.1	3.75	95	5.05
8	8.62	219	12.00	305	20.3	5.00	127	10.15
10	10.75	273	15.00	381	36.0	6.25	159	18.0
12	12.75	324	18.00	457	53.0	7.50	190	26.5
14	14.00	356	21.00	533	68.0	8.75	222	34.0
16	16.00	406	24.00	610	89.2	10.00	254	44.6
18	18.00	457	27.00	686	113.0	11.25	286	56.5
20	20.00	508	30.00	762	140.0	12.50	318	70.0
22	22.00	559	33.00	838	170.0	13.50	343	85.0
24	24.00	610	36.00	914	202.0	15.00	381	101.0
26	26.00	660	39.00	991	241.4	16.00	406	120.5
28	28.00	711	42.00	1067	279.9	17.25	438	140.0
30	30.00	762	45.00	1143	321.3	18.50	470	160.5
32	32.00	813	48.00	1219	365.6	19.75	502	183.0
34	34.00	864	51.00	1295	-	21.00	533	-
36	36.00	914	54.00	1372	462.7	22.25	565	231.0
38	38.00	965	57.00	1448	-	23.62	600	-
40	40.00	1016	60.00	1524	571.3	24.88	632	285.5
42	42.00	1067	63.00	1600	629.8	26.00	660	315.0
44	44.00	1118	66.00	1676	-	27.38	695	-
46	46.00	1168	69.00	1753	-	28.62	727	-
48	48.00	1219	72.00	1829	-	29.88	759	-

Notes

- Dimensions quoted in mm are 'Nominal' values from B16.9 (i.e. rounded equivalents of the inch dimensions). Refer to ASME/ANSI B16.9 for additional 'Max' and 'Min' metric dimensions.
- For tolerances see page 6-2.
- 1 Weights are approximate and based on manufacturers' data (where available) for Schedule 40S/Standard fittings. See page 6-6 for further information.

180° Long Radius Returns - ANSI B16.9



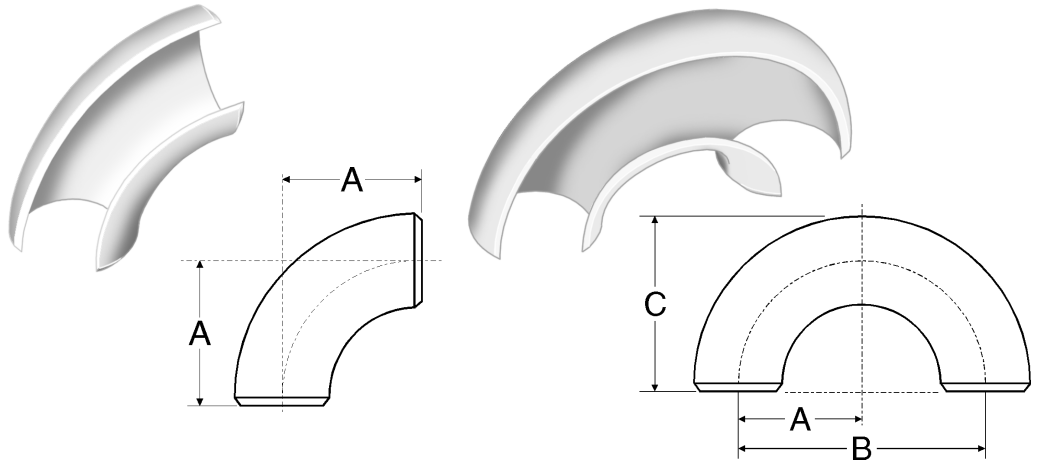
Dimensions (based on ASME/ANSI B16.9) and example weights for long radius returns

Nominal Pipe Size	Common		180° Return				40S/STD ¹
	OD at Bevel		Dimension B		Dimension C		
	in	mm	in	mm	in	mm	kg/piece
1/2	0.84	21	3.00	76	1.88	48	0.16
3/4 ¹	1.05	27	3.00	76	2.00	51	0.20
1	1.32	33	3.00	76	2.19	56	0.30
1 1/4	1.66	42	3.75	95	2.75	70	0.50
1 1/2	1.90	48	4.50	114	3.25	83	0.72
2	2.38	60	6.00	152	4.19	106	1.30
2 1/2	2.88	73	7.50	191	5.19	132	2.58
3	3.50	89	9.00	229	6.25	159	4.04
3 1/2	4.00	102	10.50	267	7.25	184	5.66
4	4.50	114	12.00	305	8.25	210	7.68
5	5.56	141	15.00	381	10.31	262	13.02
6	6.62	168	18.00	457	12.31	313	20.02
8	8.62	219	24.00	610	16.31	414	40.6
10	10.75	273	30.00	762	20.38	518	72.0
12	12.75	324	36.00	914	24.38	619	106.0
14	14.00	356	42.00	1067	28.00	711	136.0
16	16.00	406	48.00	1219	32.00	813	178.4
18	18.00	457	54.00	1372	36.00	914	226.0
20	20.00	508	60.00	1524	40.00	1016	280.0
22	22.00	559	66.00	1676	44.00	1118	340.0
24	24.00	610	72.00	1829	48.00	1219	404.0
26-48	Long radius returns are not specified for these pipe sizes						

Notes

- For NPS 3/4 the fitting may be furnished with the following dimensions:
 B = 2.25 in (57 mm nominal)
 C = 1.69 in (43 mm nominal)
- Dimension A = One half of dimension B
- Dimensions quoted in mm are 'Nominal' values from B16.9 (i.e. rounded equivalents of the inch dimensions). Refer to B16.9 for additional 'Max' and 'Min' metric dimensions.
- For tolerances see page 6-2.
- 1 Weights are approximate and based on manufacturers' data (where available) for Schedule 40S/Standard fittings. See page 6-6 for further information.

Short Radius Elbows and Returns - ANSI B16.28



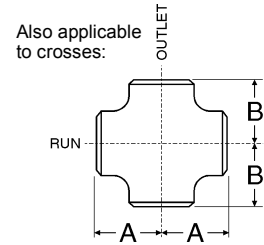
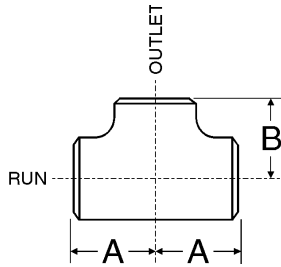
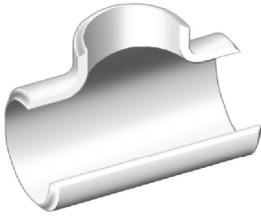
Dimensions (based on ASME/ANSI B16.28) and example weights for short radius elbows and returns

Nominal Pipe Size	Common		90° Elbow			180° Return				
	OD		Dimension A		40S/STD ¹	Dimension B		Dimension C		40S/STD ¹
	in	mm	in	mm	kg/piece	in	mm	in	mm	kg/piece
1	1.32	33	1.00	25	0.12	2.00	51	1.62	41	0.24
1 ¹ / ₄	1.66	42	1.25	32	0.20	2.50	64	2.06	52	0.40
1 ¹ / ₂	1.90	48	1.50	38	0.29	3.00	76	2.44	62	0.48
2	2.38	60	2.00	51	0.51	4.00	102	3.19	81	1.02
2 ¹ / ₂	2.88	73	2.50	64	1.02	5.00	127	3.94	100	2.04
3	3.50	89	3.00	76	1.50	6.00	152	4.75	121	3.00
3 ¹ / ₂	4.00	102	3.50	89	2.06	7.00	178	5.50	140	4.12
4	4.50	114	4.00	102	3.12	8.00	203	6.25	159	6.24
5	5.56	141	5.00	127	5.28	10.00	254	7.75	197	10.6
6	6.62	168	6.00	152	7.94	12.00	305	9.31	237	15.9
8	8.62	219	8.00	203	17.1	16.00	406	12.31	313	35.5
10	10.75	273	10.00	254	28.6	20.00	508	15.38	391	57.2
12	12.75	324	12.00	305	36.3	24.00	610	18.38	467	72.6
14	14.00	356	14.00	356	45.8	28.00	711	21.00	533	91.6
16	16.00	406	16.00	406	59.4	32.00	813	24.00	610	118.8
18	18.00	457	18.00	457	79.4	36.00	914	27.00	686	158.8
20	20.00	508	20.00	508	97.5	40.00	1016	30.00	762	195
22	22.00	559	22.00	559	-	44.00	1118	33.00	838	-
24	24.00	610	24.00	610	137	48.00	1219	36.00	914	274
26 - 48	Short radius returns are not specified for these pipe sizes									

Notes

- Dimension A = One half of dimension B
- Dimensions quoted in mm are 'Nominal' values from B16.28 (i.e. rounded equivalents of the inch dimensions). Refer to B16.28 for additional 'Max' and 'Min' metric dimensions.
- For tolerances see page 6-2.
- 1 Weights are approximate and based on manufacturers' data (where available) for Schedule 40S/Standard fittings. See page 6-6 for further information.

Equal Tees - ANSI B16.9



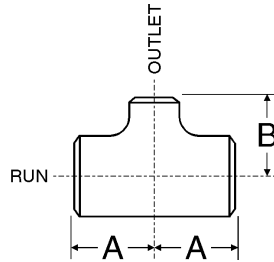
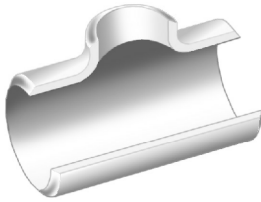
Dimensions (based on ASME/ANSI B16.9) and example weights for equal tees

Nominal Pipe Size	OD at Bevelled		Run		Outlet		Weight (Tees only)
	OD		Dimension A		Dimension B		40S/STD ¹
	in	mm	in	mm	in	mm	kg/piece
1/2	0.84	21	1.00	25	1.00	25	0.08
3/4	1.05	27	1.12	29	1.12	29	0.11
1	1.32	33	1.50	38	1.50	38	0.24
1 1/4	1.66	42	1.88	48	1.88	48	0.41
1 1/2	1.90	48	2.25	57	2.25	57	0.60
2	2.38	60	2.50	64	2.50	64	0.87
2 1/2	2.88	73	3.00	76	3.00	76	1.66
3	3.50	89	3.38	86	3.38	86	1.90
3 1/2	4.00	102	3.75	95	3.75	95	-
4	4.50	114	4.12	105	4.12	105	4.13
5	5.56	141	4.88	124	4.88	124	6.55
6	6.62	168	5.62	143	5.62	143	9.73
8	8.62	219	7.00	178	7.00	178	18.0
10	10.75	273	8.50	216	8.50	216	30.8
12	12.75	324	10.00	254	10.00	254	44.3
14	14.00	356	11.00	279	11.00	279	53.7
16	16.00	406	12.00	305	12.00	305	66.3
18	18.00	457	13.50	343	13.50	343	84.1
20	20.00	508	15.00	381	15.00	381	104
22	22.00	559	16.50	419	16.50	419	126
24	24.00	610	17.00	432	17.00	432	140
26	26.00	660	19.50	495	19.50	495	158
28	28.00	711	20.50	521	20.50	521	176
30	30.00	762	22.00	559	22.00	559	203
32	32.00	813	23.50	597	23.50	597	231
34	34.00	864	25.00	635	25.00	635	-
36	36.00	914	26.50	673	26.50	673	294
38	38.00	965	28.00	711	28.00	711	-
40	40.00	1016	29.50	749	29.50	749	363
42	42.00	1067	30.00	762	28.00	711	382
44	44.00	1118	32.00	813	30.00	762	-
46	46.00	1168	33.50	851	31.50	800	-
48	48.00	1219	35.00	889	33.00	838	-

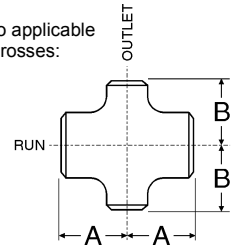
Notes

- For NPS 26 and larger: Dimensions are not applicable to crosses. Also, dimension B is recommended but not required.
- Dimensions quoted in mm are 'Nominal' values from B16.9 (i.e. rounded equivalents of the inch dimensions). Refer to B16.9 for additional 'Max' and 'Min' metric dimensions.
- For tolerances see page 6-2.
- 1 Weights are approximate and based on manufacturers' data (where available) for Schedule 40S/Standard fittings. See page 6-6 for further information.

Reducing Tees - ANSI B16.9








Also applicable to crosses:








Nominal Pipe Size	Run OD		Outlet OD		Run Dimension		Outlet Dimension		Weight
	OD at Bevel		OD at Bevel		A		B		40S/STD ¹
	in	mm	in	mm	in	mm	in	mm	kg/piece
1/2↔3/8	0.84	21	0.68	17	1.00	25	1.00	25	-
1/2↔1/4	0.84	21	0.54	14	1.00	25	1.00	25	-
3/4↔1/2	1.05	27	0.84	21	1.12	29	1.12	29	0.12
3/4↔3/8	1.05	27	0.68	17	1.12	29	1.12	29	-
1↔3/4	1.32	33	1.05	27	1.50	38	1.50	38	0.23
1↔1/2	1.32	33	0.84	21	1.50	38	1.50	38	0.22
1 1/4↔1	1.66	42	1.32	33	1.88	48	1.88	48	0.39
1 1/4↔3/4	1.66	42	1.05	27	1.88	48	1.88	48	0.37
1 1/4↔1/2	1.66	42	0.84	21	1.88	48	1.88	48	-
1 1/2↔1 1/4	1.90	48	1.66	42	2.25	57	2.25	57	0.57
1 1/2↔1	1.90	48	1.32	33	2.25	57	2.25	57	0.55
1 1/2↔3/4	1.90	48	1.05	27	2.25	57	2.25	57	0.52
1 1/2↔1/2	1.90	48	0.84	21	2.25	57	2.25	57	0.51
2↔1 1/2	2.38	60	1.90	48	2.50	64	2.38	60	0.83
2↔1 1/4	2.38	60	1.66	42	2.50	64	2.25	57	0.80
2↔1	2.38	60	1.32	33	2.50	64	2.00	51	0.74
2↔3/4	2.38	60	1.05	27	2.50	64	1.75	44	-
2 1/2↔2	2.88	73	2.38	60	3.00	76	2.75	70	1.53
2 1/2↔1 1/2	2.88	73	1.90	48	3.00	76	2.62	67	1.49
2 1/2↔1 1/4	2.88	73	1.66	42	3.00	76	2.50	64	1.38
2 1/2↔1	2.88	73	1.32	33	3.00	76	2.25	57	-
3↔2 1/2	3.50	89	2.88	73	3.38	86	3.25	83	2.29
3↔2	3.50	89	2.38	60	3.38	86	3.00	76	2.16
3↔1 1/2	3.50	89	1.90	48	3.38	86	2.88	73	2.05
3↔1 1/4	3.50	89	1.66	42	3.38	86	2.75	70	-
3 1/2↔3	4.00	102	3.50	89	3.75	95	3.62	92	-
3 1/2↔2 1/2	4.00	102	2.88	73	3.75	95	3.50	89	-
3 1/2↔2	4.00	102	2.38	60	3.75	95	3.25	83	-
3 1/2↔1 1/2	4.00	102	1.90	48	3.75	95	3.12	79	-
4↔3 1/2	4.50	114	4.00	102	4.12	105	4.00	102	-
4↔3	4.50	114	3.50	89	4.12	105	3.88	98	3.83
4↔2 1/2	4.50	114	2.88	73	4.12	105	3.75	95	3.70
4↔2	4.50	114	2.38	60	4.12	105	3.50	89	3.52
4↔1 1/2	4.50	114	1.90	48	4.12	105	3.38	86	3.41
5↔4	5.56	141	4.50	114	4.88	124	4.62	117	6.14
5↔3 1/2	5.56	141	4.00	102	4.88	124	4.50	114	-

Reducing Tees - ANSI B16.9

Nominal Pipe Size	Run OD		Outlet OD		Run		Outlet		Weight
	OD at Bevel		OD at Bevel		Dimension		Dimension		40S/STD ¹
									
	in	mm	in	mm	in	mm	in	mm	kg/piece
5⇒3	5.56	141	3.50	89	4.88	124	4.38	111	5.85
5⇒2½	5.56	141	2.88	73	4.88	124	4.25	108	5.71
5⇒2	5.56	141	2.38	60	4.88	124	4.12	105	-
6⇒5	6.62	168	5.56	141	5.62	143	5.38	137	9.21
6⇒4	6.62	168	4.50	114	5.62	143	5.12	130	8.81
6⇒3½	6.62	168	4.00	102	5.62	143	5.00	127	-
6⇒3	6.62	168	3.50	89	5.62	143	4.88	124	8.52
6⇒2½	6.62	168	2.88	73	5.62	143	4.75	121	-
8⇒6	8.62	219	6.62	168	7.00	178	6.62	168	16.8
8⇒5	8.62	219	5.56	141	7.00	178	6.38	162	16.3
8⇒4	8.62	219	4.50	114	7.00	178	6.12	156	15.9
8⇒3½	8.62	219	4.00	102	7.00	178	6.00	152	-
10⇒8	10.75	273	8.62	219	8.50	216	8.00	203	28.9
10⇒6	10.75	273	6.62	168	8.50	216	7.62	194	27.6
10⇒5	10.75	273	5.56	141	8.50	216	7.50	191	27.1
10⇒4	10.75	273	4.50	114	8.50	216	7.25	184	-
12⇒10	12.75	324	10.75	273	10.00	254	9.50	241	42.3
12⇒8	12.75	324	8.62	219	10.00	254	9.00	229	40.3
12⇒6	12.75	324	6.62	168	10.00	254	8.62	219	39.1
12⇒5	12.75	324	5.56	140	10.00	254	8.50	216	-
14⇒12	14.00	356	12.75	324	11.00	279	10.62	270	52.2
14⇒10	14.00	356	10.75	273	11.00	279	10.12	257	50.2
14⇒8	14.00	356	8.625	219	11.00	279	9.75	248	48.4
14⇒6	14.00	356	6.62	168	11.00	279	9.38	238	-
16⇒14	16.00	406	14.00	356	12.00	305	12.00	305	65.1
16⇒12	16.00	406	12.75	324	12.00	305	11.62	295	63.6
16⇒10	16.00	406	10.75	273	12.00	305	11.12	283	61.6
16⇒8	16.00	406	8.62	219	12.00	305	10.75	273	-
16⇒6	16.00	406	6.62	168	12.00	305	10.38	264	-
18⇒16	18.00	457	16.00	406	13.50	343	13.00	330	81.5
18⇒14	18.00	457	14.00	356	13.50	343	13.00	330	80.3
18⇒12	18.00	457	12.75	324	13.50	343	12.62	321	78.9
18⇒10	18.00	457	10.75	273	13.50	343	12.12	308	-
18⇒8	18.00	457	8.62	219	13.50	343	11.75	298	-
20⇒18	20.00	508	18.00	457	15.00	381	14.50	368	101
20⇒16	20.00	508	16.00	406	15.00	381	14.00	356	98.6
20⇒14	20.00	508	14.00	356	15.00	381	14.00	356	97.4
20⇒12	20.00	508	12.75	321	15.00	381	13.62	346	-
20⇒10	20.00	508	10.75	273	15.00	381	13.12	333	-
20⇒8	20.00	508	8.62	219	15.00	381	12.75	324	-
22⇒20	22.00	559	20.00	508	16.50	419	16.00	406	123
22⇒18	22.00	559	18.00	457	16.50	419	15.50	394	120
22⇒16	22.00	559	16.00	406	16.50	419	15.00	381	118
22⇒14	22.00	559	14.00	356	16.50	419	15.00	381	-
22⇒12	22.00	559	12.75	324	16.50	419	14.62	371	-
22⇒10	22.00	559	10.75	273	16.50	419	14.12	359	-
24⇒22	24.00	610	22.00	559	17.00	432	17.00	432	138
24⇒20	24.00	610	20.00	508	17.00	432	17.00	432	137
24⇒18	24.00	610	18.00	457	17.00	432	16.50	419	134
24⇒16	24.00	610	16.00	406	17.00	432	16.00	406	-

Reducing Tees - ANSI B16.9

Nominal Pipe Size	Run OD		Outlet OD		Run		Outlet		Weight
	OD at Bevel		OD at Bevel		Dimension		Dimension		40S/STD ¹
									
	in	mm	in	mm	in	mm	in	mm	kg/piece
24⇒14	24.00	610	14.00	356	17.00	432	16.00	406	-
24⇒12	24.00	610	12.75	324	17.00	432	15.62	397	-
24⇒10	24.00	610	10.75	273	17.00	432	15.12	384	-
26⇒24	26.00	660	24.00	610	19.50	495	19.00	483	-
26⇒22	26.00	660	22.00	559	19.50	495	18.50	470	-
26⇒20	26.00	660	20.00	508	19.50	495	18.00	457	-
26⇒18	26.00	660	18.00	457	19.50	495	17.50	444	-
Reducing tees 26⇒16, ⇒14 and ⇒12 are also available									
28⇒26	28.00	711	26.00	660	20.50	521	20.50	521	-
28⇒24	28.00	711	24.00	610	20.50	521	20.00	508	-
28⇒22	28.00	711	22.00	559	20.50	521	19.50	495	-
28⇒20	28.00	711	20.00	508	20.50	521	19.00	483	-
28⇒18	28.00	711	18.00	457	20.50	521	18.50	470	-
Reducing tees 28⇒16, ⇒14 and ⇒12 are also available									
30⇒28	30.00	762	28.00	711	22.00	559	21.50	546	-
30⇒26	30.00	762	26.00	660	22.00	559	21.50	546	-
30⇒24	30.00	762	24.00	610	22.00	559	21.00	533	-
30⇒22	30.00	762	22.00	559	22.00	559	20.50	521	-
30⇒20	30.00	762	20.00	508	22.00	559	20.00	508	-
Reducing tees 30⇒18, ⇒16, ⇒14, ⇒12 and ⇒10 are also available									
32⇒30	32.00	813	30.00	762	23.50	597	23.00	584	-
32⇒28	32.00	813	28.00	711	23.50	597	22.50	572	-
32⇒26	32.00	813	26.00	660	23.50	597	22.50	572	-
32⇒24	32.00	813	24.00	610	23.50	597	22.00	559	-
Reducing tees 32⇒22, ⇒20, ⇒18, ⇒16 and ⇒14 are also available									
34⇒32	34.00	864	32.00	813	25.00	635	24.50	622	-
34⇒30	34.00	864	30.00	762	25.00	635	24.00	610	-
34⇒28	34.00	864	28.00	711	25.00	635	23.50	597	-
34⇒26	34.00	864	26.00	660	25.00	635	23.50	597	-
34⇒24	34.00	864	24.00	610	25.00	635	23.00	584	-
Reducing tees 34⇒22, ⇒20, ⇒18, and ⇒16 are also available									
36⇒34	36.00	914	34.00	864	26.50	673	26.00	660	-
36⇒32	36.00	914	32.00	813	26.50	673	25.50	648	-
36⇒30	36.00	914	30.00	762	26.50	673	25.00	635	-
36⇒28	36.00	914	28.00	711	26.50	673	24.50	622	-
36⇒26	36.00	914	26.00	660	26.50	673	24.50	622	-
36⇒24	36.00	914	24.00	610	26.50	673	24.00	610	-
Reducing tees 36⇒22, ⇒20, ⇒18, and ⇒16 are also available									
38⇒36	38.00	965	36.00	914	28.00	711	28.00	711	-
38⇒34	38.00	965	34.00	864	28.00	711	27.50	698	-
38⇒32	38.00	965	32.00	813	28.00	711	27.00	686	-
38⇒30	38.00	965	30.00	762	28.00	711	26.50	673	-
38⇒28	38.00	965	28.00	711	28.00	711	25.50	648	-
38⇒26	38.00	965	26.00	660	28.00	711	25.50	648	-
Reducing tees 38⇒24, ⇒22, ⇒20, and ⇒18 are also available									
40⇒38	40.00	1016	38.00	965	29.50	749	29.50	749	-
40⇒36	40.00	1016	36.00	914	29.50	749	29.00	737	-
40⇒34	40.00	1016	34.00	864	29.50	749	28.50	724	-
40⇒32	40.00	1016	32.00	813	29.50	749	28.00	711	-
40⇒30	40.00	1016	30.00	762	29.50	749	27.50	698	-

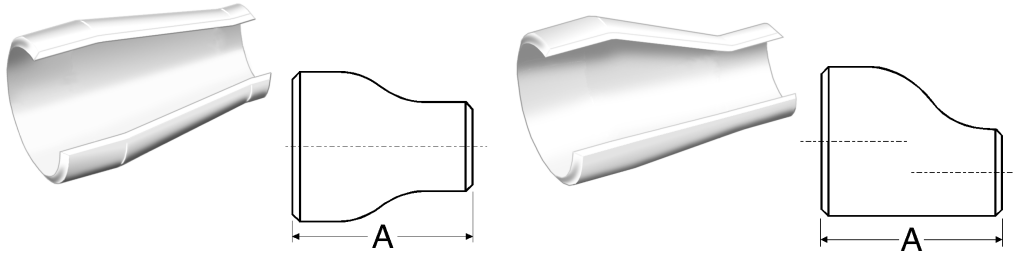
Reducing Tees - ANSI B16.9

Nominal Pipe Size	Run OD		Outlet OD		Run		Outlet		Weight
	OD at Bevel		OD at Bevel		Dimension		Dimension		40S/STD ¹
	in	mm	in	mm	in	mm	in	mm	kg/piece
Reducing tees 40↔28, ↔26, ↔24, ↔22, ↔20, and ↔18 are also available									
42↔40	42.00	1067	40.00	1016	30.00	762	28.00	711	-
42↔38	42.00	1067	38.00	968	30.00	762	28.00	711	-
42↔36	42.00	1067	36.00	914	30.00	762	28.00	711	-
42↔34	42.00	1067	34.00	864	30.00	762	28.00	711	-
42↔32	42.00	1067	32.00	813	30.00	762	28.00	711	-
42↔30	42.00	1067	30.00	762	30.00	762	28.00	711	-
Reducing tees 42↔28, ↔26, ↔24, ↔22, ↔20, ↔18, and ↔16 are also available									
44↔42	44.00	1118	42.00	1067	32.00	813	30.00	762	-
44↔40	44.00	1118	40.00	1016	32.00	813	29.50	749	-
44↔38	44.00	1118	38.00	965	32.00	813	29.00	737	-
44↔36	44.00	1118	36.00	914	32.00	813	28.50	724	-
Reducing tees 44↔34, ↔32, ↔30, ↔28, ↔26, ↔24, ↔22, and ↔20 are also available									
46↔44	46.00	1168	44.00	1118	33.50	851	31.50	800	-
46↔42	46.00	1168	42.00	1067	33.50	851	31.00	787	-
46↔40	46.00	1168	40.00	1016	33.50	851	30.50	775	-
46↔38	46.00	1168	38.00	965	33.50	851	30.00	762	-
Reducing tees 46↔36, ↔34, ↔32, ↔30, ↔28, ↔26, ↔24, and ↔22 are also available									
48↔46	48.00	1219	46.00	1168	35.00	889	33.00	838	-
48↔44	48.00	1219	44.00	1118	35.00	889	33.00	838	-
48↔42	48.00	1219	42.00	1067	35.00	889	32.00	813	-
48↔40	48.00	1219	40.00	1016	35.00	889	32.00	813	-
Reducing tees 48↔38, ↔36, ↔34, ↔32, ↔30, ↔28, ↔26, ↔24, and ↔22 are also available									

Notes

- For run size NPS 14 and larger, outlet dimension B is recommended but not required.
- Dimensions quoted in mm are 'Nominal' values from B16.9 (i.e. rounded equivalents of the inch dimensions). Refer to B16.9 for additional 'Max' and 'Min' metric dimensions.
- The run and outlet NPS sizes are as shown in the left hand column. The corresponding size designation for a reducing tee is, for example, for the tee shown as 4↔3 : 4 x 4 x 3, and for the tee shown as 44↔36 : 44 x 44 x 36.
- For tolerances see page 6-2.
- 1 Weights are approximate and based on manufacturers' data (where available) for Schedule 40S/Standard fittings. See page 6-6 for further information.

Concentric and Eccentric Reducers - ANSI B16.9







Dimensions (based on ASME/ANSI B16.9) and example weights for reducers

Nominal Pipe Size	Large End		Small End		End to End Dimension		Weight
	OD at Bevel		OD at Bevel		A		40S/STD ¹
	in	mm	in	mm	in	mm	kg/piece
3/4⇔1/2	1.05	27	0.84	21	1.50	38	0.06
3/4⇔3/8	1.05	27	0.68	17	1.50	38	-
1⇔3/4	1.32	33	1.05	27	2.00	51	0.12
1⇔1/2	1.32	32	0.84	21	2.00	51	0.11
1 1/4⇔1	1.66	42	1.32	33	2.00	51	0.16
1 1/4⇔3/4	1.66	42	1.05	27	2.00	51	0.14
1 1/4⇔1/2	1.66	42	0.84	21	2.00	51	0.13
1 1/2⇔1 1/4	1.90	48	1.66	42	2.50	64	0.24
1 1/2⇔1	1.90	48	1.32	33	2.50	64	0.22
1 1/2⇔3/4	1.90	48	1.05	27	2.50	64	0.20
1 1/2⇔1/2	1.90	48	0.84	21	2.50	64	0.18
2⇔1 1/2	2.38	60	1.90	48	3.00	76	0.37
2⇔1 1/4	2.38	60	1.66	42	3.00	76	0.35
2⇔1	2.38	60	1.32	33	3.00	76	0.32
2⇔3/4	2.38	60	1.05	27	3.00	76	0.30
2 1/2⇔2	2.88	73	2.38	60	3.50	89	0.72
2 1/2⇔1 1/2	2.88	73	1.90	48	3.50	89	0.66
2 1/2⇔1 1/4	2.88	73	1.66	42	3.50	89	0.63
2 1/2⇔1	2.88	73	1.32	33	3.50	89	-
3⇔2 1/2	3.50	89	2.88	73	3.50	89	0.93
3⇔2	3.50	89	2.38	60	3.50	89	0.85
3⇔1 1/2	3.50	89	1.90	48	3.50	89	0.78
3⇔1 1/4	3.50	89	1.66	42	3.50	89	0.75
3 1/2⇔3	4.00	102	3.50	89	4.00	102	-
3 1/2⇔2 1/2	4.00	102	2.88	73	4.00	102	-
3 1/2⇔2	4.00	102	2.38	60	4.00	102	-
3 1/2⇔1 1/2	4.00	102	1.90	48	4.00	102	-
Reducers 3 1/2⇔1 1/4, and 4, 5, 6, & 8⇔3 1/2 are also available							
4⇔3 1/2	4.50	114	4.00	102	4.00	102	-
4⇔3	4.50	114	3.50	89	4.00	102	1.45
4⇔2 1/2	4.50	114	2.88	73	4.00	102	1.37
4⇔2	4.50	114	2.38	60	4.00	102	1.27
4⇔1 1/2	4.50	114	1.90	48	4.00	102	1.18
5⇔4	5.56	141	4.50	114	5.00	127	2.50
5⇔3	5.56	141	3.50	89	5.00	127	2.27





Concentric and Eccentric Reducers - ANSI B16.9

Dimensions (based on ASME/ANSI B16.9) and example weights for reducers (Continued)

Nominal Pipe Size	Large End		Small End		End to End		Weight
	OD at Bevel		OD at Bevel		Dimension		40S/STD ¹
							
	in	mm	in	mm	in	mm	kg/piece
5⇒2½	5.56	141	2.88	73	5.00	127	2.16
6⇒5	6.62	168	5.56	141	5.50	140	3.57
6⇒4	6.62	168	4.50	114	5.50	140	3.30
6⇒3	6.62	168	3.50	89	5.50	140	3.04
8⇒6	8.62	219	6.62	168	6.00	152	5.71
8⇒5	8.62	219	5.56	141	6.00	152	5.40
8⇒4	8.62	219	4.50	114	6.00	152	5.10
10⇒8	10.75	273	8.62	219	7.00	178	9.58
10⇒6	10.75	273	6.62	168	7.00	178	8.78
10⇒5	10.75	273	5.56	141	7.00	178	8.42
12⇒10	12.75	324	10.75	273	8.00	203	13.6
12⇒8	12.75	324	8.62	219	8.00	203	12.7
12⇒6	12.75	324	6.62	168	8.00	203	11.8
14⇒12	14.00	356	12.75	324	13.00	330	25.4
14⇒10	14.00	356	10.75	273	13.00	330	23.6
14⇒8	14.00	356	8.62	219	13.00	330	21.8
16⇒14	16.00	406	14.00	356	14.00	356	31.0
16⇒12	16.00	406	12.75	324	14.00	356	29.6
16⇒10	16.00	406	10.75	273	14.00	356	27.8
18⇒16	18.00	457	16.00	406	15.00	381	37.8
18⇒14	18.00	457	14.00	356	15.00	381	35.7
18⇒12	18.00	457	12.75	324	15.00	381	34.3
20⇒18	20.00	508	18.00	457	20.00	508	56.4
20⇒16	20.00	508	16.00	406	20.00	508	53.5
20⇒14	20.00	508	14.00	356	20.00	508	50.8
22⇒20	22.00	559	20.00	508	20.00	508	62.6
22⇒18	22.00	559	18.00	457	20.00	508	59.7
22⇒16	22.00	559	16.00	406	20.00	508	57.1
24⇒22	24.00	610	22.00	559	20.00	508	68.6
24⇒20	24.00	610	20.00	508	20.00	508	65.7
24⇒18	24.00	610	18.00	457	20.00	508	63.0
26⇒24	26.00	600	24.00	610	24.00	610	-
26⇒22	26.00	600	22.00	559	24.00	610	-
26⇒20	26.00	600	20.00	508	24.00	610	-
26⇒18	26.00	600	18.00	457	24.00	610	-
28⇒26	28.00	711	26.00	660	24.00	610	-
28⇒24	28.00	711	24.00	610	24.00	610	-
28⇒20	28.00	711	20.00	508	24.00	610	-
28⇒18	28.00	711	18.00	457	24.00	610	-
30⇒28	30.00	762	28.00	711	24.00	610	-
30⇒26	30.00	762	26.00	660	24.00	610	-
30⇒24	30.00	762	24.00	610	24.00	610	-
30⇒20	30.00	762	20.00	508	24.00	610	-
32⇒30	32.00	813	30.00	762	24.00	610	-
32⇒28	32.00	813	28.00	711	24.00	610	-

Concentric and Eccentric Reducers - ANSI B16.9

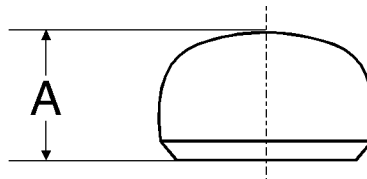
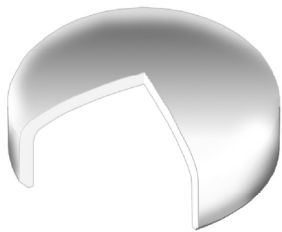
Dimensions (based on ASME/ANSI B16.9) and example weights for reducers (Continued)

Nominal Pipe Size	Large End		Small End		End to End		Weight
	OD at Bevel		OD at Bevel		Dimension		40S/STD ¹
							
	in	mm	in	mm	in	mm	kg/piece
32↔26	32.00	813	26.00	660	24.00	610	-
32↔24	32.00	813	24.00	610	24.00	610	-
34↔32	34.00	864	32.00	813	24.00	610	-
34↔30	34.00	864	30.00	762	24.00	610	-
34↔26	34.00	864	26.00	660	24.00	610	-
34↔24	34.00	864	24.00	610	24.00	610	-
36↔34	36.00	914	34.00	864	24.00	610	-
36↔32	36.00	914	32.00	813	24.00	610	-
36↔30	36.00	914	30.00	762	24.00	610	-
36↔26	36.00	914	26.00	660	24.00	610	-
36↔24	36.00	914	24.00	610	24.00	610	-
38↔36	38.00	965	36.00	914	24.00	610	-
38↔34	38.00	965	34.00	864	24.00	610	-
38↔32	38.00	965	32.00	813	24.00	610	-
38↔30	38.00	965	30.00	762	24.00	610	-
38↔28	38.00	965	28.00	711	24.00	610	-
38↔26	38.00	965	26.00	660	24.00	610	-
40↔38	40.00	1016	38.00	965	24.00	610	-
40↔36	40.00	1016	36.00	914	24.00	610	-
40↔34	40.00	1016	34.00	864	24.00	610	-
40↔32	40.00	1016	32.00	813	24.00	610	-
40↔30	40.00	1016	30.00	762	24.00	610	-
42↔40	42.00	1067	40.00	1016	24.00	610	-
42↔38	42.00	1067	38.00	965	24.00	610	-
42↔36	42.00	1067	36.00	914	24.00	610	-
42↔34	42.00	1067	34.00	864	24.00	610	-
42↔32	42.00	1067	32.00	813	24.00	610	-
42↔30	42.00	1067	30.00	762	24.00	610	-
44↔42	44.00	1118	42.00	1067	24.00	610	-
44↔40	44.00	1118	40.00	1016	24.00	610	-
44↔38	44.00	1118	38.00	965	24.00	610	-
44↔36	44.00	1118	36.00	914	24.00	610	-
46↔44	46.00	1168	44.00	1118	28.00	711	-
46↔42	46.00	1168	42.00	1067	28.00	711	-
46↔40	46.00	1168	40.00	1016	28.00	711	-
46↔38	46.00	1168	38.00	965	28.00	711	-
48↔46	48.00	1219	46.00	1168	28.00	711	-
48↔44	48.00	1219	44.00	1118	28.00	711	-
48↔42	48.00	1219	42.00	1067	28.00	711	-
48↔40	48.00	1219	40.00	1016	28.00	711	-

Notes

- Dimensions quoted in mm are 'Nominal' values from B16.9 (i.e. rounded equivalents of the inch dimensions). Refer to B16.9 for additional 'Max' and 'Min' metric dimensions.
- For tolerances see page 6-2.
- Other sizes listed in B16.9 are 5↔2, 6↔2¹/₂, 10↔4, 12↔5, 14↔6, 16↔8, 18↔10, 20↔12, 22↔14 and 24↔16.
- 1 Weights are approximate and based on manufacturers' data (where available) for Schedule 40S/Standard fittings. See page 6-6 for further information.

End Caps - ANSI B16.9



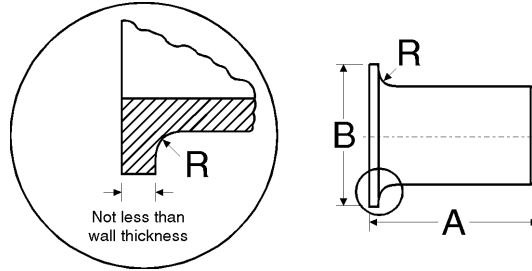
Dimensions (based on ASME/ANSI B16.9) and example weights

Nominal Pipe Size	Common		Limiting Wall Thickness		Length				Weight
	OD at Bevel		T		Dimension A				40S/STD ¹
	in	mm	in	mm	For wall ≤ T		For wall > T		kg/piece
1/2	0.84	21	0.18	3.73	1.00	25	1.00	25	0.04
3/4	1.05	27	0.15	3.91	1.00	25	1.00	25	0.05
1	1.32	33	0.18	4.55	1.50	38	1.50	38	0.11
1 1/4	1.66	42	0.19	4.85	1.50	38	1.50	38	0.14
1 1/2	1.90	48	0.20	5.08	1.50	38	1.50	38	0.17
2	2.38	60	0.22	5.54	1.50	38	1.75	44	0.23
2 1/2	2.88	73	0.28	7.01	1.50	38	2.00	51	0.39
3	3.50	89	0.30	7.62	2.00	51	2.50	64	0.66
3 1/2	4.00	102	0.32	8.08	2.50	64	3.00	76	-
4	4.50	114	0.34	8.56	2.50	64	3.00	76	1.17
5	5.56	141	0.38	9.53	3.00	76	3.50	89	1.91
6	6.62	168	0.43	10.97	3.50	89	4.00	102	2.90
8	8.62	219	0.50	12.70	4.00	102	5.00	127	5.19
10	10.75	273	0.50	12.70	5.00	127	6.00	152	9.15
12	12.75	324	0.50	12.70	6.00	152	7.00	178	13.3
14	14.00	356	0.50	12.70	6.50	165	7.50	191	15.9
16	16.00	406	0.50	12.70	7.00	178	8.00	203	20.0
18	18.00	457	0.50	12.70	8.00	203	9.00	229	25.6
20	20.00	508	0.50	12.70	9.00	229	10.00	254	31.9
22	22.00	559	0.50	12.70	10.00	254	10.00	254	38.8
24	24.00	610	0.50	12.70	10.50	267	12.00	305	45.1
26	26.00	660	-	-	10.50	267	Subject to agreement with purchaser	53.8	
28	28.00	711	-	-	10.50	267		62.4	
30	30.00	762	-	-	10.50	267		71.7	
32	32.00	813	-	-	10.50	267		81.6	
34	34.00	864	-	-	10.50	267		-	
36	36.00	914	-	-	10.50	267		103	
38	38.00	965	-	-	12.00	305		-	
40	40.00	1016	-	-	12.00	305		127	
42	42.00	1067	-	-	12.00	305		140	
44	44.00	1118	-	-	13.50	343		-	
46	46.00	1168	-	-	13.50	343		-	
48	48.00	1219	-	-	13.50	343		-	








Notes

- Dimensions quoted in mm (except T) are 'Nominal' values from B16.9 (rounded equivalents of the inch dimensions). Refer to B16.9 for additional 'Max' and 'Min' metric dimensions.
- The shape of caps shall be ellipsoidal and conform to shape requirements in the ASME Boiler and Pressure Code.
- For tolerances see page 6-2.
- 1 Weights are approximate and based on manufacturers' data (where available) for Schedule 40S/Standard fittings. See page 6-6 for further information.

Lap Joint Stub Ends - ANSI B16.9



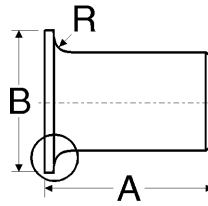
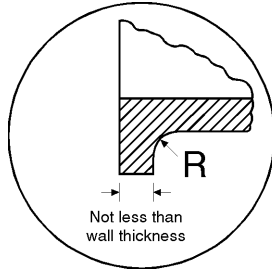
Dimensions (based on ASME/ANSI B16.9) and example weights

Nominal Pipe Size	Common		Long Pattern		Short Pattern		Diameter of Lap		Radius of Fillet		OD of Barrel				Weight
	OD at Bevel 		Dimension A 		Dimension A 		Dimension B 		Dimension R 		OD 				40S/STD ¹ 
	in	mm	in	mm	in	mm	in	mm	in	mm	max		min		kg/piece
1/2	0.84	21	3.00	76	2.00	51	1.38	35	0.12	3	0.90	23	0.81	21	0.14
3/4	1.05	27	3.00	76	2.00	51	1.69	43	0.12	3	1.11	28	1.02	26	0.18
1	1.32	33	4.00	102	2.00	51	2.00	51	0.12	3	1.38	35	1.28	33	0.30
1 1/4	1.66	42	4.00	102	2.00	51	2.50	64	0.19	5	1.72	44	1.63	41	0.41
1 1/2	1.90	48	4.00	102	2.00	51	2.88	73	0.25	6	1.97	50	1.87	47	0.55
2	2.38	60	6.00	152	2.50	64	3.62	92	0.31	8	2.46	62	2.34	60	1.00
2 1/2	2.88	73	6.00	152	2.50	64	4.12	105	0.31	8	2.97	75	2.84	72	1.56
3	3.50	89	6.00	152	2.50	64	5.00	127	0.38	10	3.60	91	3.47	88	2.15
3 1/2	4.00	102	6.00	152	3.00	76	5.50	140	0.38	10	4.10	104	3.97	101	-
4	4.50	114	6.00	152	3.00	76	6.19	157	0.44	11	4.59	117	4.47	114	3.05
5	5.56	141	8.00	203	3.00	76	7.31	186	0.44	11	5.68	144	5.53	141	5.30
6	6.62	168	8.00	203	3.50	89	8.50	216	0.50	13	6.74	171	6.59	168	6.90
8	8.62	219	8.00	203	4.00	102	10.62	270	0.50	13	8.74	222	8.59	218	10.45
10	10.75	273	10.00	254	5.00	127	12.75	324	0.50	13	10.91	277	10.72	272	18.15
12	12.75	324	10.00	254	6.00	152	15.00	381	0.50	13	12.91	328	12.72	323	22.25
14	14.00	356	12.00	305	6.00	152	16.25	413	0.50	13	14.17	360	13.97	355	29.05
16	16.00	406	12.00	305	6.00	152	18.50	470	0.50	13	16.18	411	15.97	406	32.69
18	18.00	457	12.00	305	6.00	152	21.00	533	0.50	13	18.19	462	17.97	456	38.60
20	20.00	508	12.00	305	6.00	152	23.00	584	0.50	13	20.24	514	19.97	507	42.68
22	22.00	559	12.00	305	6.00	152	25.25	641	0.50	13	22.24	565	21.97	558	-
24	24.00	610	12.00	305	6.00	152	27.25	692	0.50	13	24.24	616	23.97	609	51.30

Notes





- Dimensions quoted in mm are 'Nominal' values from B16.9 (rounded equivalents of the inch dimensions). Refer to B16.9 for additional 'Max' and 'Min' metric dimensions.
- OD of barrel max and min dimensions (in and mm) are rounded. Refer to B16.9 for the exact values.
- Long pattern stub ends are standard. Purchaser should specify if short pattern is required. Long pattern stub ends are also known as ASA Stub Ends. Short pattern stub ends are used with larger flanges in Classes 300 and 600, and with most sizes in Class 900 and higher. When long pattern stub ends are used with flanges in Classes 1500 and 2500, it may be necessary to increase the length A.
- Additional lap thickness must be provided for special facings (e.g. tongue and groove); this is within length A.
- Dimension B conforms to ASME/ANSI B16.5, Pipe Flanges and Forged Fittings.
- Gasket face finish shall be accordance with ASME/ANSI B16.5 for raised face flanges.
- For tolerances see page 6-2.
- 1 Long pattern weights are listed (short pattern weights are similar to MSS SP-43 lap joint stub ends, page 6-20). Weights are approximate and based on manufacturers' data (where available) for Schedule 40S/Standard fittings. See page 6-6 for further information.

Lap Joint Stub Ends - MSS SP-43



Note:
Type A is shown.
Type B has a square corner, as indicated by the maximum dimension R in the table below.

Dimensions (based on MSS SP-43)

Nominal Pipe Size	Common		Length		Diameter of Lap		Radius of Fillet				Weight	
	OD at Bevel		Dimension		Dimension		Dimension				40S/STD ¹	
									Type A for Lap Joint Flange, max			Type B for Slip-on Flange, max
in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	kg/piece
1/2	0.84	21	2.00	50.8	1.38	35	0.12	3.05	0.03	0.76	0.09	
3/4	1.05	27	2.00	50.8	1.69	43	0.12	3.05	0.03	0.76	0.12	
1	1.32	33	2.00	50.8	2.00	51	0.12	3.05	0.03	0.76	0.15	
1 1/4	1.66	42	2.00	50.8	2.50	64	0.19	4.83	0.03	0.76	0.20	
1 1/2	1.90	48	2.00	50.8	2.88	73	0.25	6.35	0.03	0.76	0.28	
2	2.38	60	2.50	63.5	3.62	92	0.31	7.87	0.03	0.76	0.41	
2 1/2	2.88	73	2.50	63.5	4.12	105	0.31	7.87	0.03	0.76	0.66	
3	3.50	89	2.50	63.5	5.00	127	0.38	9.65	0.03	0.76	0.89	
3 1/2	4.00	102	3.00	76.2	5.50	140	0.38	9.65	0.03	0.76	-	
4	4.50	114	3.00	76.2	6.19	157	0.44	11.18	0.03	0.76	1.51	
5	5.56	141	3.00	76.2	7.31	186	0.44	11.18	0.06	1.52	2.66	
6	6.62	168	3.50	88.9	8.50	216	0.50	12.70	0.06	1.52	3.02	
8	8.62	219	4.00	101.6	10.62	270	0.50	12.70	0.06	1.52	5.22	
10	10.75	273	5.00	127.0	12.75	324	0.50	12.70	0.06	1.52	9.08	
12	12.75	324	6.00	152.4	15.00	381	0.50	12.70	0.06	1.52	13.35	
14	14.00	356	6.00	152.4	16.25	413	0.50	12.70	0.06	1.52	14.53	
16	16.00	406	6.00	152.4	18.50	470	0.50	12.70	0.06	1.52	16.34	
18	18.00	457	6.00	152.4	21.00	533	0.50	12.70	0.06	1.52	19.30	
20	20.00	508	6.00	152.4	23.00	584	0.50	12.70	0.06	1.52	21.34	
24	24.00	610	6.00	152.4	27.25	692	0.50	12.70	0.06	1.52	25.65	

Notes

- Dimensions quoted in mm are equivalents of the inch dimensions (i.e. 25.4 x in). Metric dimensions are not specified in MSS SP-43.
- Length A and Radius R are applicable for Schedule 40S or thinner.
- Contact faces of stub ends shall have a modified spiral or concentric serration.
- For tolerances see page 6-4.
- 1 Weights are approximate and based on manufacturers' data (where available) for Schedule 40S/Standard fittings. See page 6-6 for further information.

ISO Buttweld Fittings - General

This subsection summarises stainless steel buttweld fitting dimensions and tolerances as defined in the relevant ISO specification: ISO 5251-1981 (E). Unlike the ANSI/ASME buttweld fitting specifications, wall thicknesses and weights *are* listed in this specification together with preferred grades of stainless steel. Dimensional tolerances and bevel details are also defined and are reproduced in the following pages.

ISO Specifications

- **ISO 5251-1981 (E) Stainless Steel Butt-Welding Fittings** - This International Standard specifies the dimensions, tolerances and generally used grades of stainless steel for butt-welding bends, concentric and eccentric reducers, tees, caps and stub ends with quality requirements as used for piping work.
- **Other Relevant Specifications** include:
 - ISO 404, Steel and steel products - General technical delivery requirements (see Section 10).
 - ISO 1127, Stainless steel tubes (see Section 5)
 - ISO 2604 Steel products for pressure purposes - Quality requirements, Parts 2, 4 and 5 (see Materials below).

Manufacture and Test

The manufacturing and testing requirements of ISO 5251 are as follows:

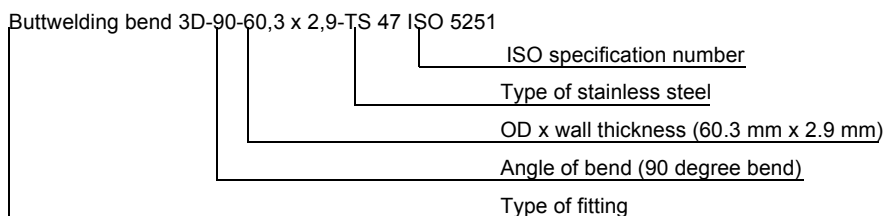
- **Materials.** The grades of stainless steel to be used are as follows (see Section 1 pages 1-20 and 1-8 for chemical composition details):
 - ISO 2604/2: TS 46, TS 47, TS 53, TS 57, TS 58, TS 60, TS 61.
 - ISO 2604/4: P 46, P 47, P 58, P 61.
 - ISO 2604/5: TW 46, TW 47, TW 58, TW 61.
 - Other grades may be specified with purchaser agreement.
- **Manufacture.** Fittings may be manufactured from seamless tubes, welded tubes or welded plate material. Welds shall have been previously NDT tested as agreed with the purchaser. Also, an intergranular corrosion test may be requested, for example, in accordance with ISO 3651-1 & -2 (see page 10-4).
- **Heat Treatment.** As agreed with the purchaser, for example, in accordance with ISO 2604/2 or ISO 2604/5.
- **Acceptance Tests of the Fittings.** Not normally required, except as agreed with the purchaser and specified in the order.
- **Marking.** All fittings shall be marked with the manufacturer's trade mark or name, outside diameter, thickness, grade of steel and this International Standard (see Designation below).
- **Certification.** When specified by purchaser this should state compliance with this International Standard. Certification requirements in ISO 404 also apply (see Section 10).

Designation

Fittings compliant with ISO 5251 are designated using the following parameter:

- **Type of Fitting.** Bend, reducer, cap, tee, or stub end, plus angle for bends.
- **Grade of Steel.** Selected from materials listed below.
- **Outside Diameter(s) and Wall Thickness.**
- **ISO number** - ISO 5251.



For example:



ISO Buttweld Fittings - General


Tolerances

Common cross-sectional tolerances (ISO 5251-1981 (E))


Outside Diameter 	Wall Thickness 	Outside Diameter Tolerance		Inside Diameter Tolerance		Wall Thickness Tolerance	
		Under	Over	Under	Over	Under	Over
mm	mm	mm	mm	mm	mm		
≤60.3	≤2.9	0.8	0.8	NS	NS	12.5%	No limit specified
	>2.9	0.8	1.6	0.8	0.8		
76.1 to 114.3	≤3.2	0.8	0.8	NS	NS		
	>3.2	1.6	1.6	1.6	1.6		
139.7	≤3.2	0.8	1.6	NS	NS		
	>3.2	0.8	1.6	1.6	1.6		
168.3 to 219.1	≤4	0.8	1.6	NS	NS		
	>4	1.6	2.4	1.6	1.6		
273 to 457	≤5	0.8	2.4	NS	NS		
	>5	3.2	4.0	3.2	3.2		
508	≤5	0.8	3.2	NS	NS		
	>5	4.8	3.2	4.8	4.8		
610	≤6.3	0.8	3.2	NS	NS		
	>6.3	4.8	3.2	4.8	4.8		
711 to 1016	≤6.3	0.8	4.8	NS	NS		
	>6.3	4.8	3.2	4.8	4.8		

Tolerances for Specific Fittings

Dimensional tolerances for ISO elbows and returns (ISO 5251-1981 (E))

Outside Diameter 	3D & 5D 90° Bends without straight ends (page 6-25 and 6-28)	3D 180° Bends without straight ends (page 6-25)			3D 90° Bends with straight ends (page 6-27)		3D 180° with straight ends (page 6-27)			
	A	A	B	C	A	B	A	B	C	D
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
≤114.3	1.6	1.6	6.3	6.3	1.6	1.6	1.6	1.6	6.3	6.3
139.7 to 219.1	1.6	1.6	6.3	6.3	1.6	1.6	1.6	1.6	6.3	6.3
273 to 610	2.4	2.4	9.5	6.3	2.4	2.4	2.4	2.4	9.5	6.3
711 to 1016	4.8	4.8	9.5	6.3	4.8	4.8	4.8	4.8	9.5	6.3

Dimensional tolerances for ISO Tees (equal and reducing), reducers and end caps (ISO 5251-1981 (E))

Outside Diameter 	Tees (equal and reducing) (page 6-29)		Reducers (page 6-32)	End caps (page 6-35)
	A	B	A	A
mm	mm	mm	mm	mm
≤114.3	1.6	1.6	1.6	3.2
139.7 to 219.1	1.6	1.6	1.6	6.3
273 to 610	2.4	2.4	2.4	6.3
711 to 1016	4.8	4.8	4.8	9.5

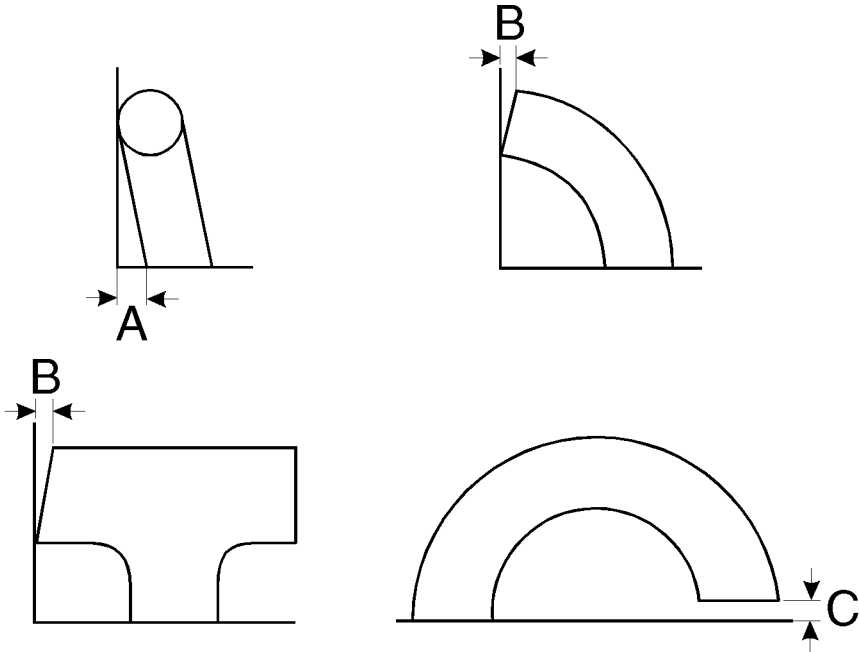
Note

- Page number references in the tables above indicate the location of associated dimension and weight tables.


ISO Butt Weld Fittings - General

Alignment Tolerances

Alignment tolerances are concerned with the way that the ends of a fitting are cut. Exaggerated distortions are shown for clarity



Alignment tolerances (ISO 5251-1981(E))

Outside Diameter 	Off Plane Tolerance, \pm		Off Angle Tolerance, \pm	Alignment of Ends, \pm
	A		B	C
mm	5D Bends mm	Others mm	mm	mm
≤ 114.3	2.4	1.6	0.8	0.8
139.7 to 219.1	-	3.2	1.6	0.8
273 to 323.9	-	4.8	2.4	1.6
355.6 to 406.4	-	6.3	2.4	1.6
457 to 610	-	9.5	3.2	1.6
711	-	9.5	4.8	1.6
Larger than 711	-	12.7	4.8	1.6

ISO Buttweld Fittings - General

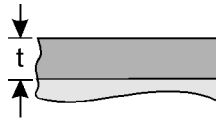
Bevelled Ends

The ends of all fittings are to be cut square (within the alignment tolerances). Those with wall thicknesses greater than or equal to 3.6 mm are bevelled as illustrated below, the shape of the bevel depending upon the actual wall thickness as shown.

Welding bevels and root face (ISO 5251-1981(E))

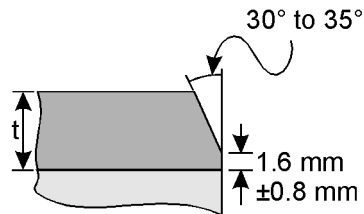
No bevel

Wall Thickness (t)
 ≤ 3.6 mm or less



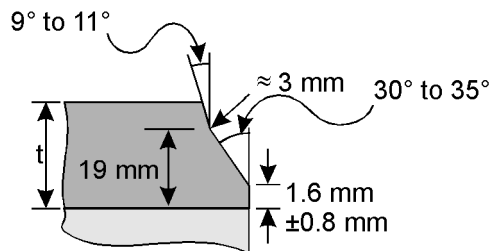
Simple bevel

Wall Thickness (t)
 > 3.6 mm
 and ≤ 20 mm



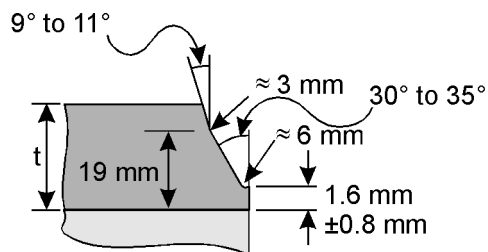
Two stage bevel

Wall Thickness (t)
 > 20 mm



Bevel with curves

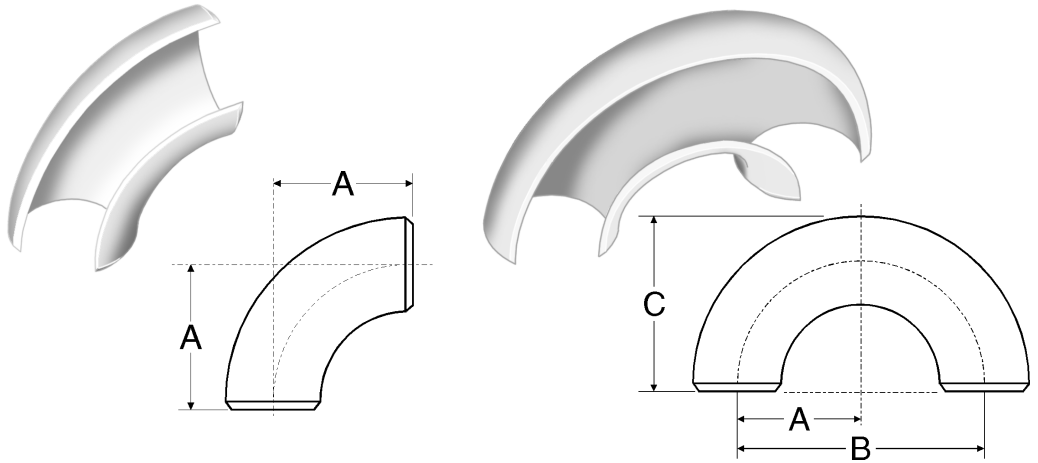
Wall Thickness (t)
 > 20 mm
 Alternate section







Note

- The general bevel angle, 30° to 35° is not the same as the general bevel angle in ASTM specifications of 35° to 40°, although an angle of exactly 35° will fulfil both specifications.

ISO 3D Bends without Straight Ends







Dimensions and weights of 3D bends without straight ends (ISO 5251-1981(E))

DN	 mm	 mm	90°		180°		
			A mm	 kg/piece	B mm	C mm	 kg/piece
15	21.3	1.6	28	0.03	56	38	0.06
		2		0.04			0.08
		3.2		0.06			0.12
		4		0.07			0.14
20	26.9	1.6	29	0.04	58	43	0.09
		2		0.06			0.11
		3.2		0.08			0.17
		4		0.10			0.20
25	33.7	1.6	38	0.07	76	55	0.14
		2		0.09			0.19
		2.3		0.11			0.21
		3.2		0.16			0.32
32	42.4	4.5	48	0.19	96	69	0.38
		1.6		0.12			0.24
		2		0.15			0.30
		2.6		0.19			0.38
40	48.3	3.6	57	0.26	114	81	0.52
		5		0.33			0.66
		1.6		0.16			0.32
		2		0.17			0.34
50	60.3	2.6	76	0.27	152	106	0.54
		3.6		0.36			0.72
		5		0.49			0.98
		1.6		0.27			0.54
65	76.1	2	95	0.34	190	133	0.68
		2.3		0.38			0.76
		2.9		0.49			0.98
		4		0.67			1.3
80	88.9	5.6	114	0.90	228	159	1.8
		1.6		0.44			0.90
		2.3		0.62			1.2
		2.6		0.70			1.4
100	114.3	2.9	152	0.78	304	209	1.6
		5		1.3			2.6
		7.1		1.8			3.6
		2		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
		2		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

ISO 3D Bends without Straight Ends

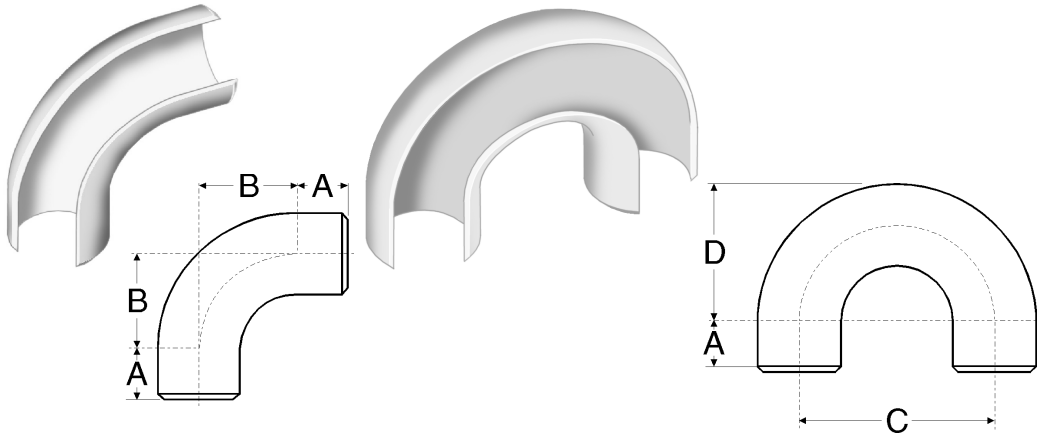
Dimensions and weights of 3D bends without straight ends (ISO 5251-1981(E)) (Continued)

DN	 mm	 mm	90°		180°		
			A mm	 kg/piece	B mm	C mm	 kg/piece
125	139.7	2	190	2.0	380	260	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	2.9	458	313	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	5.1	610	414	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	8	762	518	16
		3.6		14			29
		4		16			32
		6.3		25			50
		10		39			78
		15		59			119
300	323.9	2.6	457	15	914	619	30
		4		23			45
		4.5		26			52
		7.1		40			80
		10		56			111
		15		83			166
350	355.6	2.6	533	19	1066	711	38
		4		29			58
		5		36			72
		8		57			114
		11		78			156
		12.5		117			234
400	406.4	2.6	610	25	1220	813	50
		4		38			76
		5		47			95
		8.8		82			164
		12.5		117			234
		15		161			322
450	457	3.2	686	38	1372	914	77
		4		48			96
		5		60			120
		10		119			238
		15		178			356
		20		264			528
500	508	3.2	762	48	1524	1016	95
		5		74			148
		5.6		83			166
		11		161			322
		15		239			478
		20		357			711
600	610	3.2	914	68	1828	1219	126
		5.6		120			240
		6.3		135			270
		12.5		264			528
		15		393			792
		20		564			1134
700	711	4	1067	116	2134	1422	233
		7.1		206			412
		10		304			608
800	813	4	1219	152	2438	1625	304
		8		304			608
		10		393			792
900	914	4	1372	193	2744	1829	386
		8.8		323			646
		10		412			824
1000	1016	4	1524	239	3048	2032	478
		10		593			1186
		15		890			1779

Note

- For tolerances see page 6-22.
- Weights (where available) are as provided in ISO 5251. It is stated in ISO 5251 that the weights are 'For information only'.

ISO 3D Bends with Straight Ends



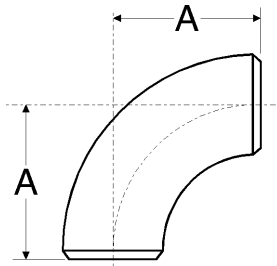
Dimensions and weights of 3D bends with straight ends (ISO 5251-1981(E))

DN	mm	A mm	mm	90°		180°		
				B mm	kg/piece	C mm	D mm	kg/piece
15	21.3	25	1.6	28	0.07	56	38	0.11
			2		0.09			0.13
			3.2		0.13			0.19
			4		0.16			0.21
20	26.9	25	1.6	29	0.09	58	43	0.14
			2		0.12			0.18
			3.2		0.18			0.26
			4		0.21			0.31
25	33.7	25	1.6	38	0.14	76	55	0.21
			2		0.17			0.27
			2.3		0.19			0.30
			3.2		0.27			0.44
32	42.4	30	4.5	48	0.35	96	69	0.54
			1.6		0.21			0.34
			2		0.27			0.42
			2.6		0.35			0.54
40	48.3	35	3.6	57	0.47	114	81	0.73
			5		0.62			0.97
			1.6		0.29			0.45
			2		0.36			0.56
50	60.3	40	2.6	76	0.47	152	106	0.73
			3.6		0.63			1.1
			5		0.85			1.3
			1.6		0.46			0.75
65	76.1	45	2	95	0.57	190	133	1.0
			2.3		0.65			1.0
			2.6		0.94			1.5
			2.9		1.2			1.8
80	88.9	50	2.9	114	1.3	228	159	2.0
			5		2.1			3.4
			7.1		2.9			4.7
			2		1.2			2.0
100	114.3	55	2.3	152	1.4	304	209	2.2
			2.9		1.7			2.8
			3.2		1.9			3.1
			5.6		3.2			5.3
			8		4.5			7.3
			2		1.9			3.2
			2.6		2.5			4.2
			2.9		2.8			4.7
			3.6		3.4			5.8
			6.3		5.8			9.9
			8.8		8.0			13.4




Note

- For tolerances see page 6-22.
- Weights (where available) are as provided in ISO 5251. It is stated in ISO 5251 that the weights are 'For information only'.

ISO 5D Bends without Straight Ends



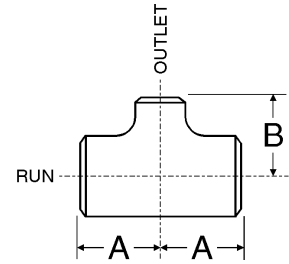
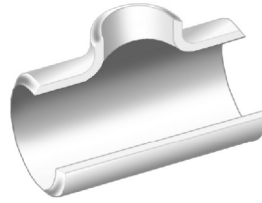
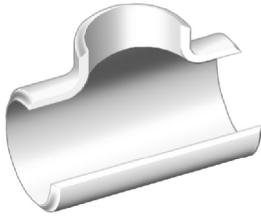
Dimensions and weights of ISO 5D bends without straight ends (ISO 5251-1981(E))

DN	 mm	 mm	A mm	 kg/piece
15	21.3	1.6	45	0.05
		2		0.07
		3.2		0.10
		4		0.12
20	26.9	1.6	57	0.09
		2		0.11
		3.2		0.17
		4		0.20
25	33.7	1.6	72	0.14
		2		0.18
		2.3		0.20
		3.2		0.27
32	42.4	4.5	93	0.37
		1.6		0.23
		2		0.29
		2.6		0.37
40	48.3	3.6	108	0.50
		5		0.67
		1.6		0.31
		2		0.39
50	60.3	2.6	135	0.50
		3.6		0.67
		5		0.90
		1.6		0.49
65	76.1	2	175	0.61
		2.3		0.70
		2.9		0.88
		4		1.2
80	88.9	5.6	205	1.6
		1.6		0.8
		2.3		1.1
		2.6		1.3
100	114.3	2.9	270	1.4
		5		2.4
		7.1		3.5
		2		1.2
		2.3		1.3
		2.9		1.7
		3.2		1.9
		5.6		3.3
		8		4.4
		2		2.3
		2.6		3.0
		2.9		3.4
		3.6		4.2
		6.3		7.1
		8.8		9.7

Note

- For tolerances see page 6-22.
- Weights (where available) are as provided in ISO 5251. It is stated in ISO 5251 that the weights are 'For information only'.

ISO Tees, Equal and Reducing



Dimensions and weights for ISO tees, equal and reducing (ISO 5251-1981 (E))





DN	Run			Outlet			kg/ piece			
	A mm			B mm						
15	25	21.3	1.6	25	21.3	1.6	0.15			
			2			2	0.19			
			3.2			3.2	0.30			
			4			4	0.38			
20	29	26.9	1.6	29	26.9	1.6	0.18			
			2			2	0.23			
			3.2			3.2	0.37			
			4			4	0.46			
			1.6	29	21.3	1.6	0.21			
			2			2	0.26			
			3.2			3.2	0.42			
			4			4	0.52			
25	38	33.7	1.6	38	33.7	1.6	0.27			
			2			2	0.34			
			2.3			2.3	0.40			
			3.2			3.2	0.64			
			4.5	4.5	0.80					
			1.6	38	26.9	1.6	0.17			
			2			2	0.25			
			3.2			3.2	0.35			
			4.5			4	0.40			
			1.6	38	21.3	1.6	0.17			
			2			2	0.25			
			3.2			3.2	0.35			
			4.5			4	0.40			
			32	48	42.4	1.6	48	42.4	1.6	0.44
						2			2	0.60
						2.6			2.6	0.79
3.6	3.6	1.1								
5	5	1.5								
1.6	48	33.7				1.6	0.49			
2						2	0.60			
2.6						2.3	0.79			
3.6						3.2	1.1			
5	4.5	1.5								
1.6	48	26.9				1.6	0.49			
2.6						2	0.79			
3.6						3.2	1.1			
5						4	1.5			
1.6	48	21.3				1.6	0.49			
2.6						2	0.79			
3.6			3.2	1.1						
5			4	1.5						
40	57	48.3	1.6	57	48.3	1.6	0.64			
			2			2	0.80			
			2.6			2.6	1.0			
			3.6			3.6	1.4			
			5			5	2.0			
			1.6			57	42.4	1.6	0.64	
		2	2	0.80						
		2.6	2.6	1.0						
		3.6	3.6	1.4						
		5	5	2.0						
		5	5	2.0						

Dimensions and weights for ISO tees, equal and reducing (ISO 5251-1981 (E)) (Continued)





DN	Run			Outlet			kg/ piece
	A mm			B mm			
40	57	48.3	1.6	57	33.7	1.6	0.64
			2			2	0.80
			2.6			2.3	1.0
			3.6			3.2	1.4
			5	4.5	2.0		
			1.6	57	26.9	1.6	0.64
			2			2	1.0
			2.6			2	1.0
			3.6			3.2	1.4
			5			4	2.0
5	4	2.0					
50	64	60.3	1.6	64	60.3	1.6	0.88
			2			2	1.1
			2.3			2.3	1.2
			2.9			2.9	1.5
			4	4	2.2		
			5.6	5.6	3.0		
			1.6	60	48.3	1.6	0.88
			2			2	1.1
			2.9			2.6	1.5
			4			3.6	2.2
			5	5	3.0		
			1.6	51	42.4	1.6	0.88
			2			2	1.1
			2.9			2.6	1.5
			4			3.6	2.2
			5.6	5	3.0		
1.6	51	33.7	1.6	0.88			
2			2	1.1			
2.9			2.3	1.5			
4			3.2	2.2			
5.6	4.5	3.0					
65	76	76.1	1.6	76	76.1	1.6	1.8
			2.3			2.3	2.5
			2.6			2.6	2.9
			2.9			2.9	3.2
			5	5	5.5		
			7.1	7.1	7.9		
			1.6	70	60.3	1.6	1.8
			2.3			2	2.5
			2.6			2.3	2.9
			2.9			2.9	3.2
			5	4	5.5		
			7.1	5.6	7.9		
			1.6	67	48.3	1.6	1.8
			2.3			2	2.5
			2.9			2.6	3.2
			5			3.6	5.5
7.1	5	7.9					
1.6	64	42.4	1.6	1.8			
2.3			2	2.5			
2.9			2.6	3.2			
5			3.6	5.5			
7.1	5	7.9					

ISO Tees, Equal and Reducing

Dimensions and weights for ISO tees, equal and reducing (ISO 5251-1981 (E)) (Continued)





DN	Run			Outlet			kg/ piece		
	A mm			B mm					
80	86	88.9	2	86	88.9	2	1.6		
			2.3			2.3	1.8		
			2.9			2.9	2.8		
			3.2			3.2	2.5		
			5.6			5.6	4.5		
			8			8	6.2		
			2			83	76.1	1.6	1.6
			2.3					2.3	1.8
			2.9					2.6	2.8
			3.2					2.9	2.5
			5.6					5	4.5
			8					7.1	6.2
			2	76	60.3	1.6	1.4		
			2.3			2	1.6		
			2.9			2.3	2.0		
			3.2			2.9	2.2		
			5.6			4	4.0		
			8			5.6	5.5		
			2	73	48.3	1.6	1.4		
			2.3			2	1.6		
			3.2			2.6	2.2		
			5.6			3.6	4.0		
			8			5	5.5		
			2			2	2.5		
100	105	114.3	2.6	105	114.3	2.6	3.2		
			2.9			2.9	3.6		
			3.6			3.6	4.5		
			6.3			6.3	7.8		
			8.8			8.8	10		
			2			2	2.5		
			2.6			98	88.9	2.3	3.2
			2.9					2.9	3.6
			3.6					3.2	4.5
			6.3					5.6	7.8
			8.8					8	10
			2					1.6	2.5
			2.6	95	76.1	2.3	3.2		
			2.9			2.6	3.6		
			3.6			2.9	4.5		
			6.3			5	7.8		
			8.8			7.1	10		
			2			1.6	2.2		
			2.6	89	60.3	2	2.8		
			2.9			2.3	3.4		
			3.5			2.9	3.8		
			6.3			4	6.7		
			8.8			5.6	10		
			2			2	1.6		
125	124	139.7	2.6	124	139.7	2.6	2.2		
			3.2			3.2	2.7		
			4			4	3.4		
			6.3			6.3	5.3		
			10			10	16		
			2			2	1.6		
			2.6			117	114.3	2.6	2.2
			3.2					2.9	2.7
			4					3.6	3.4
			6.3					6.3	5.3
			10					8.8	16
			2					2	1.6
			2.6	111	88.9	2.3	2.2		
			3.2			2.9	2.7		
			4			3.2	3.4		
			6.3			5.6	5.3		
			10			8	16		
			2			1.6	1.6		
			2.6	108	76.1	2.3	2.2		
			3.2			2.6	2.7		
			4			2.9	3.4		
			6.3			5	5.3		
			10			7.1	16		

Dimensions and weights for ISO tees, equal and reducing (ISO 5251-1981 (E)) (Continued)





DN	Run			Outlet			kg/ piece			
	A mm			B mm						
150	143	168.3	2	143	168.3	2	4.2			
			2.6			2.6	5.5			
			3.2			3.2	6.7			
			4.5			4.5	9.4			
			7.1			7.1	16			
			11			11	23			
			2			137	139.7	2	4.2	
			2.6					2.6	5.5	
			3.2					3.2	6.7	
			4.5					4	9.4	
			7.1					6.3	16	
			11					10	23	
			2	130	114.3	2	4.2			
			2.6			2.6	5.5			
			3.2			2.9	6.7			
			4.5			3.6	9.4			
			7.1			6.3	16			
			11			8.8	23			
			2	124	88.9	2	4.2			
			2.6			2.3	5.5			
			3.2			2.9	6.7			
			4.5			3.2	9.4			
			7.1			5.6	16			
			11			8	23			
200	178	219.1	2	178	219.1	2	7.4			
			2.6			2.6	9.7			
			3.6			3.6	13			
			6.3			6.3	23			
			8			8	29			
			12.5			12.5	44			
			2			168	168.3	2	5.0	
			2.6					2.6	6.5	
			3.6					3.2	9.0	
			6.3					4.5	16	
			8					7.1	20	
			12.5					11	43	
			2	162	139.7	2	5.0			
			2.6			2.6	6.5			
			3.6			3.2	9.0			
			6.3			4	16			
			8			6.3	20			
			12.5			10	43			
			2	156	114.3	2	-			
			2.6			2.6	-			
			3.6			2.9	-			
			6.3			3.6	-			
			8			6.3	-			
			12.5			8.8	-			
250	216	273	2	216	273	2	10			
			3.6			3.6	19			
			4			4	21			
			6.3			6.3	33			
			10			10	52			
			2			2	10			
			3.6			203	219.1	3.6	2.6	19
			4					3.6	21	
			6.3					6.3	33	
			10					8	52	
			2					2	10	
			3.6					194	168.3	3.6
			4	3.2	21					
			6.3	4.5	33					
			10	7.1	52					
			2	2	10					
			3.6	191	139.7	3.6	2.6			19
			4			3.2	21			
			6.3			4	33			
			10			6.3	52			

ISO Tees, Equal and Reducing

Dimensions and weights for ISO tees, equal and reducing (ISO 5251-1981 (E)) (Continued)

DN	Run			Outlet			kg/ piece
	A mm			B mm			
300	254	323.9	2.6	254	323.9	2.6	19
			4			4	30
			4.5			4.5	34
			7.1			7.1	54
			10			10	76
			2.6	241	273	2	12
			4			3.6	30
			4.5			4	34
			7.1			6.3	54
			10			10	77
			2.6			2	17
			4	229	219.1	2.6	26
			4.5			3.6	30
			7.1			6.3	47
			10			8	66
2.6	219	168.3	2	17			
4			2.6	26			
4.5			3.2	30			
7.1			4.5	47			
10			7.1	66			
350	279	355.6	2.6	279	355.6	2.6	22
			4			4	34
			5			5	43
			8			8	58
			11			11	94
			2.6	270	323.9	2.6	-
			4			4	-
			5			4.5	-
			8			7.1	-
			11			10	-
			2.6			257	273
			4	3.6	-		
			5	4	-		
			8	6.3	-		
			11	10	-		
2.6	248	219.1	2.6	-			
4			2.6	-			
5			3.6	-			
8			6.3	-			
11			8	-			
400	305	406.4	2.6	305	406.4	2.6	29
			4			4	44
			5			5	56
			8.8			8.8	88
			12.5			12.5	131
			2.6	305	355.6	2.6	-
			4			4	-
			5			5	-
			8.8			8	-
			12.5			11	-
			2.6			295	323.9
			4	4	-		
			5	4.5	-		
			8.8	7.1	-		
			12.5	10	-		
2.6	283	273	2	-			
4			3.6	-			
5			4	-			
8.8			6.3	-			
12.5			10	-			

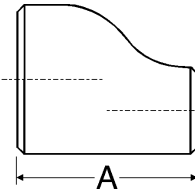
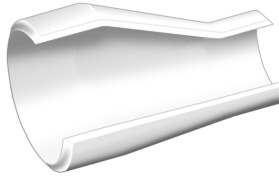
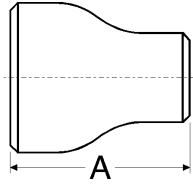
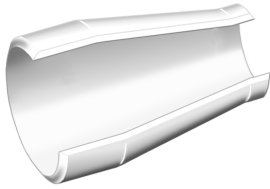
Dimensions and weights for ISO tees, equal and reducing (ISO 5251-1981 (E)) (Continued)

DN	Run			Outlet			kg/ piece
	A mm			B mm			
450	343	457	3.2	343	457	3.2	-
			4			4	-
			5			5	-
			10			10	-
			3.2	330	406.4	2.6	-
			4			4	-
			5			5	-
			10			8.8	-
			3.2	330	355.6	2.6	-
			4			4	-
5	5	-					
10	8	-					
3.2	321	323.9	2.6			-	
4			4	-			
5			4.5	-			
10			7.1	-			
500	381	508	3.2	381	508	3.2	-
			5			5	-
			5.6			5.6	-
			11			11	-
			3.2	368	457	3.2	-
			5			4	-
			5.6			5	-
			11			10	-
			3.2	356	406.4	2.6	-
			5			4	-
5.6	5	-					
11	8.8	-					
3.2	356	355.6	2.6			-	
5			4	-			
5.6			5	-			
11			8	-			
600	432	610	3.2	432	610	3.2	-
			5.6			5.6	-
			6.3			6.3	-
			12.5			12.5	-
			3.2	432	508	3.2	-
			5.6			5	-
			6.3			5.6	-
			12.5			11	-
			3.2	419	457	3.2	-
			5.6			4	-
6.3	5	-					
12.5	10	-					
3.2	406	406.4	2.6			-	
5.6			4	-			
6.3			5	-			
12.5			8.8	-			

Note

- For some larger tees no weight per piece is quoted in the ISO table. These have been left blank in the table above.
- For tolerances see page 6-22.
- Weights (where available) are as provided in ISO 5251. It is stated in ISO 5251 that the weights are 'For information only'.

ISO Reducers, Concentric and Eccentric



Dimensions and weights for ISO reducers (ISO 5251-1981 (E))

















DN	A mm	Major diameter		Minor diameter		kg/ piece			
20	38	26.9		21.3		1.6 0.04			
						2 0.05			
						3.2 0.07			
						4 0.09			
25	51	33.7		26.9		1.6 0.06			
						2 0.09			
						3.2 0.13			
						4 0.16			
				21.3			1.6 0.06		
						2 0.09			
						3.2 1.3			
						4 1.6			
32	51	42.4		33.7		1.6 0.08			
						2 0.10			
						2.3 0.13			
						3.2 0.17			
				26.9			4.5 0.23		
						1.6 0.08			
						2 0.13			
						3.2 0.17			
				21.3			4 0.23		
						1.6 0.08			
						2 0.13			
						3.2 0.17			
				40	64	48.3	42.4		1.6 0.12
									2 0.15
		2.6 0.19							
		3.6 0.26							
	33.7						5 0.34		
			1.6 0.12						
			2 0.15						
			2.3 0.19						
	26.9						3.2 0.26		
			4.5 0.34						
			1.6 0.12						
			2 0.19						
			3.2 0.26						
			4 0.34						

Dimensions and weights for ISO reducers (ISO 5251-1981 (E)) (Continued)

















DN	A mm	Major diameter		Minor diameter		kg/ piece	
50	76	60.3		48.3		1.6 0.17	
						2 0.22	
						2.6 0.31	
						3.6 0.41	
						5 0.57	
				42.4			1.6 0.17
						2 0.22	
						2.6 0.31	
						3.6 0.41	
						5 0.57	
65	89	76.1		33.7		1.6 0.17	
						2 0.22	
						2.3 0.31	
						3.2 0.41	
				60.3			4.5 0.57
						1.6 0.26	
						2 0.37	
						2.3 0.42	
				48.3			2.9 0.46
						4 0.78	
						5.6 1.1	
						1.6 0.26	
						2 0.37	
						2.6 0.46	
	42.4			3.6 0.78			
			5 1.1				
			1.6 0.26				
			2 0.37				
				2.6 0.46			
				3.6 0.78			

ISO Reducers, Concentric and Eccentric

Dimensions and weights for ISO reducers
(ISO 5251-1981 (E)) (Continued)





DN	A mm	Major diameter		Minor diameter		kg/ piece			
		 mm	 mm	 mm	 mm				
80	89	88.9					2	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	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	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							
100	102	114.3					2	2	0.56
							2.6	2.3	0.73
							2.9	2.9	0.82
							3.6	3.2	1.0
							6.3	5.6	1.6
							8.8	8	2.3
							2	1.6	0.56
							2.6	2.3	0.73
							2.9	2.6	0.82
							3.6	2.9	1.0
							6.3	5	1.6
							8.8	7.1	2.3
							2	1.6	0.56
							2.6	2	0.73
							2.9	2.3	0.82
3.6	2.9	1.0							
6.3	4	1.6							
8.8	5.6	2.3							
125	127	139.7					2	2	0.86
							2.6	2.6	1.1
							3.2	2.9	1.4
							4	3.6	1.7
							6.3	6.3	2.6
							10	8.8	4.1
							2	2	0.86
							2.6	2.3	1.1
							3.2	2.9	1.4
							4	3.2	1.7
							6.3	5.6	2.6
							10	8	4.1
							2	1.6	0.86
							2.6	2.3	1.1
							3.2	2.6	1.4
4	2.9	1.7							
6.3	5	2.6							
10	7.1	4.1							

Dimensions and weights for ISO reducers
(ISO 5251-1981 (E)) (Continued)





DN	A mm	Major diameter		Minor diameter		kg/ piece			
		 mm	 mm	 mm	 mm				
150	140	168.3					2	2	1.1
							2.6	2.6	1.5
							3.2	3.2	1.8
							4.5	4	2.4
							7.1	6.3	4.0
							11	10	6.0
							2	2	1.1
							2.6	2.6	1.5
							3.2	2.9	1.8
							4.5	3.6	2.4
							7.1	6.3	4.0
							11	8.8	6.0
							2	2	1.1
							2.6	2.3	1.5
							3.2	2.9	1.8
4.5	3.2	2.4							
7.1	5.6	4.0							
11	8	6.0							
200	152	219.1					2	2	1.6
							2.6	2.6	2.1
							3.6	3.2	2.9
							6.3	4.5	5.1
							8	7.1	6.5
							12.5	11	9.9
							2	2	1.6
							2.6	2.6	2.1
							3.6	3.2	2.9
							6.3	4	5.1
							8	6.3	6.5
							12.5	10	9.9
							2	2	1.6
							2.6	2.6	2.1
							3.6	2.9	2.9
6.3	3.6	5.1							
8	6.3	6.5							
12.5	8.8	9.9							
250	178	273					2	2	2.4
							3.6	2.6	4.2
							4	3.6	4.7
							6.3	6.3	7.4
							10	8	11
							2	2	2.4
							3.6	2.6	4.2
							4	3.2	4.7
							6.3	4.5	7.4
							10	7.1	11
							2	2	2.4
							3.6	2.6	4.2
							4	3.2	4.7
							6.3	4	7.4
							10	6.3	11

ISO Reducers, Concentric and Eccentric

Dimensions and weights for ISO reducers
(ISO 5251-1981 (E)) (Continued)

DN	A mm	Major diameter		Minor diameter		kg/ piece
						
300	203	323.9	2.6	273	2	4.2
			4		3.6	6.4
			4.5		4	7.2
			7.1		6.3	11
			10		10	16
			2.6	219.1	2	4.2
			4		2.6	6.4
			4.5		3.6	7.2
			7.1		6.3	11
			10		8	16
			2.6	168.3	2	4.2
			4		2.6	6.4
			4.5		3.2	7.2
			7.1		4.5	11
			10		7.1	16
350	330	355.6	2.6	323.9	2.6	7.5
			4		4	11
			5		4.5	14
			8		7.1	23
			11		10	31
			2.6	273	2	7.5
			4		3.6	11
			5		4	14
			8		6.3	23
			11		10	31
			2.6	219.1	2	7.5
			4		2.6	11
			5		3.6	14
			8		6.3	23
			11		8	31
400	356	406.4	2.6	355.6	2.6	9.2
			4		4	14
			5		5	18
			8.8		8	28
			12.5		11	43
			2.6	323.9	2.6	9.2
			4		4	14
			5		4.5	18
			8.8		7.1	28
			12.5		10	43
			2.6	273	2	9.2
			4		3.6	14
			5		4	18
			8.8		6.3	28
			12.5		10	43
450	381	457	3.2	406.4	2.6	14
			4		4	17
			5		5	21
			10		8.8	42
			3.2		2.6	14
			4	355.6	4	17
			5		5	21
			10		8	42
			3.2		2.6	14
			4		323.9	4
5	4.5	21				
10	7.1	42				

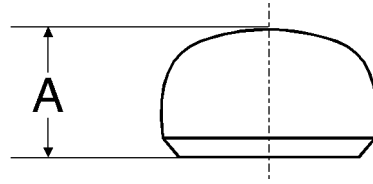
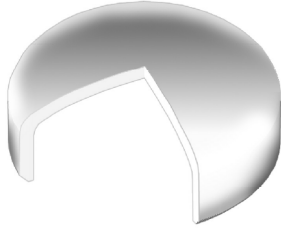
Dimensions and weights for ISO reducers
(ISO 5251-1981 (E)) (Continued)

DN	A mm	Major diameter		Minor diameter		kg/ piece
						
500	508	508	3.2	457	3.2	20
			5		4	31
			5.6		5	35
			11		10	69
			3.2		406.4	2.6
			5	4		31
			5.6	5		35
			11	8.8		69
			3.2	355.6		2.6
			5		4	31
			5.6		5	35
			11		8	69
			3.2		508	3.2
			5.6	5		42
			6.3	5.6		48
12.5	11	93				
3.2	457	3.2	24			
5.6		4	42			
6.3		5	48			
12.5		10	93			
3.2		406.4	2.6	24		
5.6	4		42			
6.3	5		48			
12.5	8.8		93			



Notes

- For tolerances see page 6-22.
- The external radius of curvature at each transition point in the lateral direction, is defined as follows:
For concentric reducers:
 $\geq 0.4 \times OD$ at the larger bevel end
 $\geq 0.4 \times OD$ at the smaller bevel end
 For eccentric reducers:
 $\geq 0.3 \times OD$ at the larger bevel end
 $\geq 0.3 \times OD$ at the smaller bevel end
- Weights quoted are as provided in ISO 5251. It is stated in ISO 5251 that the weights are 'For information only'.



ISO End Caps



**Dimensions for ISO reducers
(ISO 5251-1981 (E))**

DN	 mm	 mm	A mm
15	21.3	1.6	25
		2	
		3.2	
		4	
20	26.9	1.6	25
		2	
		3.2	
		4	
25	33.7	1.6	38
		2	
		2.3	
		3.2	
		4.5	
32	42.4	1.6	38
		2	
		2.6	
		3.6	
		5	
40	48.3	1.6	38
		2	
		2.6	
		3.6	
		5	
50	60.3	1.6	38
		2	
		2.3	
		2.9	
		4	
65	76.1	1.6	38
		2.3	
		2.6	
		2.9	
		5	
80	88.9	2	51
		2.3	
		2.9	
		3.2	
		5.6	
		8	
100	114.3	2	64
		2.6	
		2.9	
		3.6	
		6.3	
125	139.7	2	76
		2.6	
		3.2	
		4	
		6.3	
10			

**Dimensions for ISO reducers
(ISO 5251-1981 (E)) (Continued)**

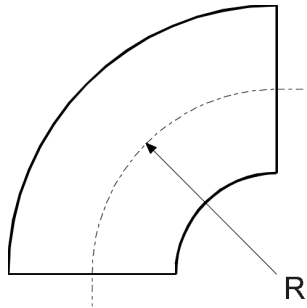
DN	 mm	 mm	A mm
150	168.3	2	89
		2.6	
		3.2	
		4.5	
		7.1	
		11	
200	219.1	2	102
		2.6	
		3.6	
		6.3	
		8	
		12.5	
250	273	2	127
		3.6	
		4	
		6.3	
		10	
		2.6	
300	323.9	4	152
		4.5	
		7.1	
		10	
		2.6	
350	355.6	4	165
		5	
		8	
		11	
		2.6	
400	406.4	4	178
		5	
		8.8	
		12.5	
450	457	3.2	203
		4	
		5	
		10	
500	508	3.2	229
		5	
		5.6	
		11	
		3.2	
600	610	5.6	267
		6.3	
		12.5	
700	711	4	267
800	813	7.1	267
		4	
900	914	8	267
		4	
1000	1016	8.8	305
		4	
		10	

- Note
- Caps are semi-ellipsoid in shape, with the height of ellipsoid portion ≥ 0.25 internal diameter. A straight section is added to make up length A.
 - For tolerances see page 6-22.
 - No weights are provided in ISO 5251 for this fitting.

Metric / Inside Diameter Fittings

Metric tube specified using fixed inside diameters is available with wall thicknesses of 1.0 mm and greater (see page 5-18). Fittings manufactured for use with these tube sizes are detailed in the following pages. The tables list commonly available sizes, but the fittings are not restricted to these sizes.

90° Bends (ID + 100, 1.5 x ID, 3 x ID)



90° Bends (Radius = ID + 100)

ID mm	 mm	R mm	 kg/piece
10	2.0	50	0.04
15	2.0	50	0.07
20	2.0	50	0.08
25	2.0	125	0.3
32	2.0	132	0.4
40	2.0	140	0.5
50	2.0	150	0.6
	3.0		1.01
65	2.0	165	0.9
80	2.0	180	1.2
	3.0		1.9
100	2.0	200	1.6
	3.0		2.4
	4.0		3.3
125	2.0	225	2.2
	3.0		3.4
150	2.0	250	3.0
	2.5		3.7
	3.0		4.5
	4.0		6.1
	5.0		7.6
200	2.0	300	4.8
	2.5		6.0
	3.0		7.2
	4.0		9.7
	5.0		12.5
250	2.0	350	7.0
	2.5		8.7
	3.0		10
	4.0		14.0
	5.0		17.5
300	2.5	400	12
	3.0		14
	4.0		19
	5.0		23.9




ID mm	 mm	R mm	 kg/piece
350	3.0	450	19
	4.0		25
	5.0		32
	6.0		38
400	3.0	500	24
	4.0		32
	5.0		40
	6.0		48
450	3.0	550	30
	4.0		40
	5.0		49
	6.0		59
500	3.0	600	35
	4.0		48
	5.0		60
	6.0		72
600	3.0	700	49
	4.0		66
	5.0		83
	6.0		100
	7.0		110
700	3.0	800	67
	4.0		89
	5.0		110
	6.0		130
800	4.0	900	110
	5.0		140
	6.0		170
900	4.0	1000	115
	5.0		180
	6.0		200
	7.0		220
1000	5.0	1100	260
	6.0		310
	7.0		370
1200	5.0	1200	310
	6.0		370
	7.0		440




Notes

- Tables are based on manufacturers' information.
- Weights are approximate.
- Fittings with larger wall thicknesses are available.

Metric / Inside Diameter Fittings

90° Bends (Radius = 1.5 x ID)




ID  mm	 mm	R mm	 kg/piece
15	2.0	22	0.02
16	2.0	23	0.04
20	2.0	30	0.05
21	2.0	33	0.06
25	2.0	38	0.07
26	2.0	38	0.10
32	2.0	50	0.12
34	2.0	50	0.20
35	1.5	50	0.10
40	2.0	60	0.20
50	2.0	73	0.30
51	3.0	78	0.50
65	2.0	95	0.50
75	2.0	113	0.70
80	2.0	123	0.77
	3.0		1.4
100	2.0	150	1.2
	3.0		1.8
125	2.0	188	2.0
	3.0		3.0
150	2.0	225	2.6
	3.0		3.9
200	2.0	300	4.8
	2.5		6.0
	3.0		7.3
250	2.0	375	7.4
	2.5		9.2
	3.0		11.0
300	2.0	450	10.7
	3.0		16.5
	4.0		22.0
350	3.0	525	22.5
	4.0		30.0
	5.0		37.9




ID  mm	 mm	R mm	 kg/piece
400	3.0	600	29
	4.0		38
	5.0		48
450	3.0	675	37
	4.0		49
	5.0		61
500	3.0	750	45
	4.0		60
	5.0		75
600	3.0	900	66
	4.0		88
	5.0		110
700	4.0	1050	117
	5.0		147
	6.0		177
800	4.0	1200	152
	5.0		190
	6.0		228
900	4.0	1350	190
	5.0		238
	6.0		286
1000	4.0	1500	238
	5.0		298
	6.0		357
1100	5.0	1650	360
	6.0		432
	8.0		577

Notes

- Tables are based on manufacturers' information.
- Weights are approximate.
- Fittings with larger wall thicknesses are available.

90° Bends (Radius = 3 x ID)

ID  mm	 mm	R mm	 kg/piece
80	2.0	240	1.6
	3.0		2.4
100	2.0	300	2.4
	3.0		3.7
125	2.0	375	3.8
	3.0		5.7
150	2.0	450	5.4
	3.0		8.2
200	2.0	600	9.6
	3.0		14.5
	4.0		19.5
250	3.0	750	22.5
	4.0		30.5
	5.0		37.8
300	3.0	900	32.5
	4.0		43.2
	5.0		54.0
350	3.0	1050	44.0
	4.0		58.7
	5.0		73.5
400	3.0	1200	58
	4.0		77
	5.0		97

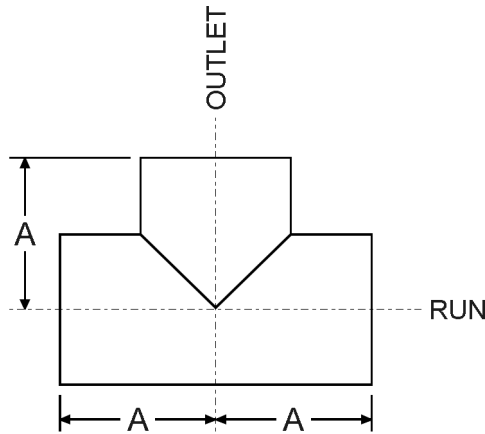
ID  mm	 mm	R mm	 kg/piece
450	3.0	1350	72
	4.0		97
	5.0		122
500	3.0	1500	90
	4.0		119
	5.0		152
600	3.0	1800	128
	4.0		169
	5.0		215
700	5.0	2100	292
	6.0		351
	8.0		470
800	4.0	2400	304
	5.0		381
	6.0		458
900	5.0	2700	482
	6.0		579
	8.0		774
1000	5.0	3000	595
	6.0		715




Notes




- Tables are based on manufacturers' information.
- Weights are approximate.
- Fittings with larger wall thicknesses are available.

Metric / Inside Diameter Fittings

Equal Tees - Type A



ID  mm	 mm	A mm	 kg/piece
32	2.0	90	0.33
40	2.0	100	0.48
50	2.0	125	0.9
	2.5		1.1
65	3.0	140	1.4
	2.0		1.3
	2.5		1.6
80	3.0	150	1.9
	2.0		1.6
	2.5		2.1
100	3.0	160	2.5
	2.0		2.1
	2.5		2.7
	3.0		3.2
125	4.0	180	4.3
	2.0		2.9
	2.5		3.7
	3.0		4.4
	4.0		6.0
150	2.0	200	3.9
	2.5		4.8
	3.0		5.8
	4.0		7.8
200	2.0	250	6.3
	2.5		7.9
	3.0		9.5
	4.0		13
250	2.0	300	9.4
	2.5		12
	3.0		14
	4.0		19
	5.0		24
300	2.0	330	12
	2.5		15
	3.0		18
	4.0		24
	5.0		31

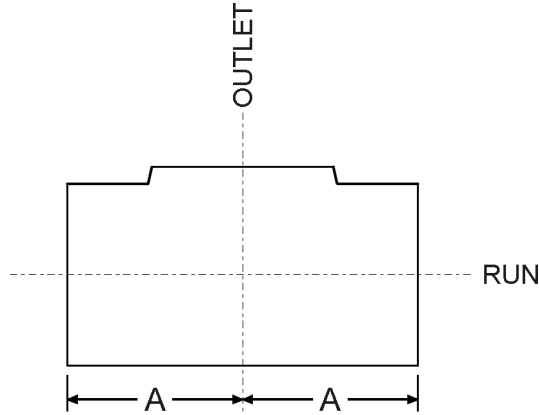
ID  mm	 mm	A mm	 kg/piece
350	2.5	360	15
	3.0		23
	4.0		31
	5.0		38
400	2.5	400	19
	3.0		29
	4.0		38
	5.0		48
	2.5		24
500	3.0	500	45
	4.0		60
	5.0		75
	6.0		90
	3.0		64
600	4.0	600	86
	5.0		110
	6.0		130
	4.0		120
700	5.0	700	150
	6.0		180
	4.0		150
800	5.0	800	190
	6.0		230
	4.0		190
900	5.0	900	240
	6.0		290
	4.0		240
1000	5.0	1000	300
	6.0		360
	4.0		340
1200	5.0	1200	430
	6.0		520
	4.0		340

Notes

- Tables are based on manufacturers' information.
- Weights are approximate.

Metric / Inside Diameter Fittings

Pulled Tees - Type C



Run ID mm	Outlet ID mm	mm	A mm	kg/piece
32	25	2.0	32	0.09
	32			0.08
40	25	2.0	40	0.16
	32			0.15
	40			0.14
50	25	2.0	50	0.26
	32			0.25
	40			0.23
	50			0.22
65	32	2.0	65	0.42
	40			0.41
	50			0.39
	65			0.38
80	40	2.0	80	0.63
	50			0.61
	65			0.59
	80			0.57
100	50	2.0	100	0.99
	65			0.96
	80			0.94
	100	0.90		
	50	2.5		1.24
65	1.21			
80	1.18			
125	100	2.0	125	1.12
	65			1.54
	80			1.50
	100			1.46
	125	1.39		
	65	2.5		1.93
	80			1.87
	100			1.82
	125	3.0		1.75
	65			2.32
80	2.27			
100	2.21			
125				2.11

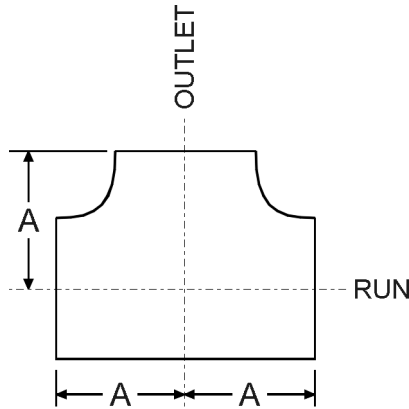
Run ID mm	Outlet ID mm	mm	A mm	kg/piece
	80	2.0		2.19
	100			2.13
	125			2.09
	150			2.00
	150			2.77
150	80	2.5	150	2.69
	100			2.60
	125			2.50
	150			3.35
	150			3.24
	80	3.0		3.14
	100			3.14
	125			3.03
	150			4.95
	150			4.87
200	100	2.5	200	4.77
	125			4.52
	150			5.96
	200	5.87		
	100	3.0		5.73
	125			5.45
150	5.45			
250	125	3.0	250	9.20
	150			8.90
	200			8.70
	250			8.30



Notes



- Tables are based on manufacturers' information.
- Weights are approximate.
- Fittings with larger wall thicknesses are available.

Metric / Inside Diameter Fittings

Pressed Tees - Type B



ID mm	 mm	A mm	 kg/piece
15	2.0	23	0.07
20	2.0	33	0.11
25	2.0	38	0.15
32	2.5	50	0.26
40	2.0	60	0.35
50	2.0	73	0.50
51	3.0	78	0.90
65	2.0	80	0.80
75	2.0	80	0.80
80	2.0	80	0.79
100	2.5	90	1.70
125	2.5	115	2.80
150	2.5	150	4.20
200	3.0	200	7.60

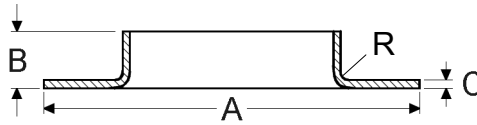
ID mm	 mm	A mm	 kg/piece
250	3.0	250	11.3
300	3.0	254	13.0
350	3.0	279	23.0
400	3.0	305	28.0
500	4.0	381	55.0
600	4.0	432	72.0

Notes

- Tables are based on manufacturers' information.
- Weights are approximate.
- Fittings with larger wall thicknesses are available.
- Pressed tees are also known as Type P.

Metric / Inside Diameter Fittings

Pressed Collars



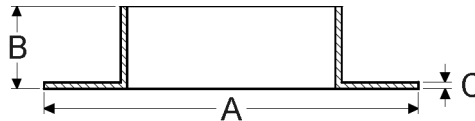
ID mm	mm	A mm	B mm	C mm	R mm	kg/ piece
10	2.0	40	9	3.0	3.0	0.02
15	2.0	45	9	3.0	3.0	0.03
20	2.0	58	12	3.0	3.0	0.05
25	2.0	68	15	3.0	4.0	0.08
32	2.5	78	15	3.5	4.0	0.12
40	2.5	88	17	3.5	4.0	0.16
50	2.5	102	23	3.5	5.0	0.23
65	2.5	122	23	3.5	5.0	0.30
80	3.0	138	23	4.0	5.0	0.39
100	3.0	158	28	4.0	5.0	0.48
125	3.0	188	30	4.0	5.0	0.65

ID mm	mm	A mm	B mm	C mm	R mm	kg/ piece
150	3.0	212	30	4.0	5.0	0.76
200	3.0	260	30	3.0	5.0	0.86
	4.0			4.0		1.2
250	3.0	310	30	3.0	5.0	1.1
	4.0			4.0		0.71
300	3.0	360	30	3.0	5.0	1.3
	4.0			4.0		1.8
350	3.0	410	30	3.0	6.0	1.6
	4.0			4.0		2.1
400	3.0	460	40	3.0	6.0	2.1
	4.0			4.0		2.8

Notes

- Tables are based on manufacturers' information.
- Weights are approximate.
- Fittings with larger wall thicknesses are available.

Angle Collars



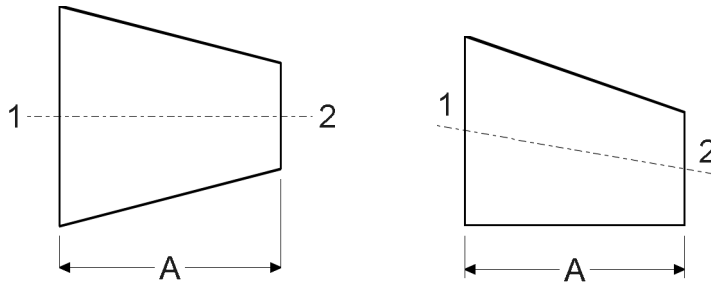
ID mm	mm	A mm	B mm	C mm	kg/piece
200	4.0	260	30	4.0	0.9
250	4.0	310	30	4.0	1.1
300	4.0	360	30	4.0	1.4
350	4.0	428	40	4.0	2.8
400	4.0	478	40	4.0	3.2
	4.0	580	40	4.0	4.0
500	5.0	598	50	5.0	6.3
	4.0	682	40	4.0	4.8
600	5.0	700	50	5.0	7.5
	4.0	783	40	4.0	5.5
700	5.0	800	50	5.0	8.6
	4.0	885	40	4.0	6.3
800	5.0	900	50	5.0	9.8
	5.0	1000	50	5.0	12
1000	5.0	1100	50	5.0	14

Notes

- Tables are based on manufacturers' information.
- Weights are approximate.
- Fittings with larger wall thicknesses are available.

Metric / Inside Diameter Fittings

Concentric and Eccentric Reducers



ID 1 mm	ID 2 mm	mm	A mm	kg/ piece				
20	15	2.0	15	0.01				
		2.5		0.02				
25	15	2.0	30	0.03				
		2.5		0.04				
	20	15		2.0	0.02			
				2.5	0.02			
30	20	36	2.0	0.05				
			2.5	0.06				
	25		2.0	0.03				
40	25	45	2.5	0.04				
			2.0	0.07				
	32		2.5	0.09				
50	32	54	2.0	0.11				
			2.5	0.14				
	40		30	3.0	0.17			
				2.0	0.07			
65	40	75	2.5	0.09				
			3.0	0.10				
	50		45	2.0	0.20			
				2.5	0.25			
	80		65	3.0	0.30			
				2.0	0.13			
100	65	105	2.5	0.16				
			3.0	0.20				
			2.0	0.30				
	80		75	2.5	0.25			
				3.0	0.30			
				2.0	0.17			
	125		80	135	2.5	0.21		
					3.0	0.25		
			100		75	4.0	0.44	
						2.5	0.55	
			150		100	150	3.0	0.66
							4.0	0.88
2.0	0.28							
125	75	2.5		0.34				
		3.0		0.41				
		4.0		0.55				
200	125	225	2.0	0.71				
			2.5	0.88				
			3.0	1.1				
			4.0	1.4				
	150		100	2.0	0.43			
				2.5	0.54			
				3.0	0.64			
				4.0	0.86			
250	150	300	2.0	0.96				
			2.5	1.2				
			3.0	1.4				
			4.0	1.9				
	200		125	2.0	0.53			
				2.5	0.66			
				3.0	0.79			
				4.0	1.1			

ID 1 mm	ID 2 mm	mm	mm	kg/ piece			
200	125	2.0	225	1.9			
		2.5		2.3			
		3.0		2.8			
		4.0		3.7			
		150		150	2.0	1.3	
					2.5	1.7	
3.0	2.0						
4.0	2.7						
250	150	300	2.0	3.1			
			2.5	3.8			
			3.0	4.6			
			4.0	6.1			
			300	200	150	2.0	1.7
						2.5	2.1
3.0	2.6						
4.0	3.4						
350	200	300	2.0	3.8			
			2.5	4.8			
			3.0	5.7			
			4.0	7.6			
			400	250	150	2.0	2.1
						2.5	2.6
3.0	3.2						
4.0	4.2						
450	250	300	2.0	4.6			
			2.5	5.7			
			3.0	6.9			
			4.0	9.2			
			500	300	150	2.0	2.5
						2.5	3.1
3.0	3.7						
4.0	5.0						
600	300	450	2.5	6.7			
			3.0	8.0			
			4.0	11.0			
			2.5	3.6			
			3.0	4.3			
			4.0	5.7			
700	300	600	2.5	12			
			3.0	15			
			4.0	19			
			5.0	24			
			6.0	31			
			8.0	38			
800	400	300	3.0	23			
			4.0	31			
			5.0	38			
			6.0	46			
			8.0	60			
			10.0	77			
900	400	300	3.0	17			
			4.0	21			
			5.0	25			
			6.0	31			
			8.0	41			
			10.0	52			
1000	500	300	3.0	14			
			4.0	17			
			5.0	21			
			6.0	25			
			8.0	33			
			10.0	42			
1100	500	300	3.0	14			
			4.0	17			
			5.0	21			
			6.0	25			
			8.0	33			
			10.0	42			
1200	600	300	3.0	14			
			4.0	17			
			5.0	21			
			6.0	25			
			8.0	33			
			10.0	42			

ID 1 mm	ID 2 mm	mm	A mm	kg/ piece		
700	500	600	3.0	28		
			4.0	37		
			5.0	46		
			6.0	55		
			600	300	3.0	16
					4.0	21
5.0	26					
6.0	31					
800	600	600	3.0	32		
			4.0	43		
			5.0	53		
			6.0	64		
			700	300	3.0	17
					4.0	23
5.0	29					
6.0	34					
900	700	600	3.0	37		
			4.0	49		
			5.0	61		
			6.0	73		
			800	300	3.0	19
					4.0	26
5.0	32					
6.0	39					
1000	800	600	3.0	41		
			4.0	55		
			5.0	69		
			6.0	83		
			900	300	3.0	22
					4.0	29
5.0	36					
6.0	44					
1100	900	900	3.0	72		
			4.0	96		
			5.0	120		
			6.0	144		
			1000	600	3.0	50
					4.0	67
5.0	84					
6.0	100					

Notes

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- Weights are approximate.
- Fittings with larger wall thicknesses are available.