

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 dimensional tolerances, including cross sectional 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.

Manufacture and Test

Materials and Manufacture. AMSE/ANSI and MSS stainless steel buttwelding fittings are most commonly manufactured to ASTM A 403

ASME/ANSI Test Requirements. B16.9 and B16.28 do not require production testing of fittings although they must be capable of withstanding the rated pressure:

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

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

Dimensions for buttweld fittings specified in ASME/ANSI B16.9 and B16.28. Tolerances applicable to these fittings are given the following tables.

Wall Thicknesses. Fittings are manufactured to match the wall thicknesses of pipe.

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.

MSS SP-43 Test Requirements. MSS 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. Fittings produced to MSS SP-43 have the following ratings.

Temperature	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	165
500	recommended	150
600	for use at	130
700	these	110
750	temperatures	100

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

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

Tolerances for Specific Fittings

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

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

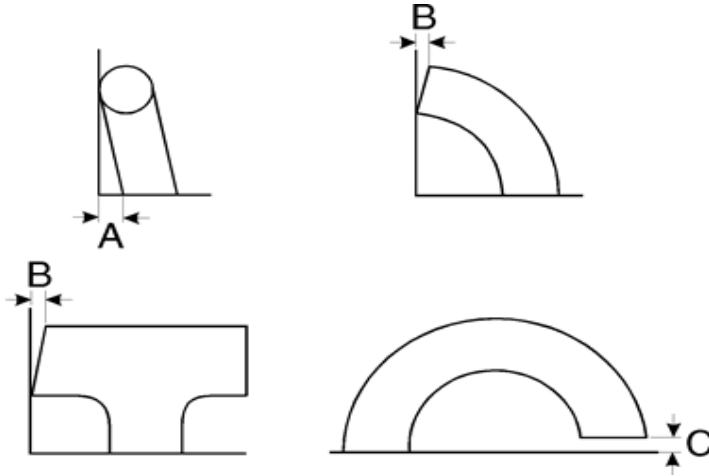
Dimensional tolerances for reducers, caps and stub ends (ASME/ANSI B16.9)

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

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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	Off Plane Tolerances, ±		Off Angle Tolerances, ±		Alignment of Ends, ±	
	A	B	B	C		
	in		in		in	
1/2 to 4	0.06	0.03	0.03	0.03	0.03	0.03
5 to 8	0.12	0.06	0.06	0.03	0.03	0.03
10 to 12	0.19	0.09	0.09	0.06	0.06	0.06
14 to 16	0.25	0.09	0.09	0.06	0.06	0.06
18 to 24	0.38	0.12	0.12	0.06	0.06	0.06
26 to 30	0.38	0.19	0.19	-	-	-
32 to 42	0.5	0.19	0.19	-	-	-
44 to 48	0.75	0.19	0.19	-	-	-

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 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

FITTINGS THROUGH 100" PIPE SIZE ARE AVAILABLE

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