

Butt-Welding Fittings

Wrought Steel Butt-Welding Fittings

(Carbon and Alloy Steel)



45° Elbow (Long)



Cap



90° Elbow (Long)



180° Elbow (Long)



T (Straight)



Reducer (Concentric)



90° Elbow (Short)



180° Elbow (Short)



T (Reducing)



Reducer (Eccentric)

Large Diameter Wrought Steel Butt-Welding Fittings (Carbon, Alloy and Stainless Steel)



45° Elbow (Long)



90° Elbow (Long)



T (Straight)



Reducer (Concentric)



Cap



90° Elbow (Short)



T (Reducing)



Reducer (Eccentric)

Stainless Steel Butt-Welding Fittings



90° Elbow (Long)



T (Straight)



45° Elbow (Long)



Cap



Reducer (Concentric)



Lap Joint Stub End



90° Elbow (Short)



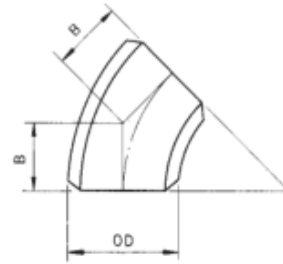
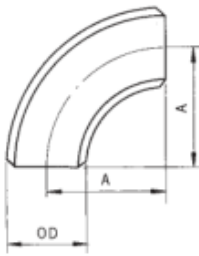
T (Reducing)



Reducer (Eccentric)

Material Items	Carbon and Alloy Steel	Stainless Steel
	Coating	Rust-resistant paint (black)
Making	Die stamping	Electrolysis etching

Long and Short Radius Elbows

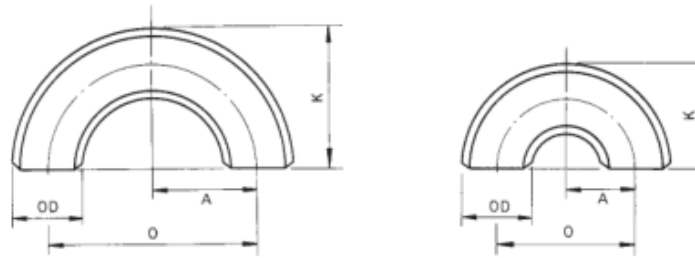


ASME B16.9 B16.28

*BENKAN's Standards (mm)

Nominal Pipe Size (NPS)	Outside Diameter at Bevel OD	Center-to-End			
		Long Radius Elbow		Short Radius Elbow	
		90 Deg. A	45 Deg. B	90 Deg. A	45 Deg.* B
1/2	21.3	38.1	15.7	—	—
3/4	26.7	38.1	19.1	—	—
1	33.4	38.1	22.4	25.4	—
1-1/4	42.2	47.8	25.4	31.8	—
1-1/2	48.3	57.2	28.4	38.1	—
2	60.3	76.2	35.1	50.8	—
2-1/2	73.0	95.3	44.5	63.5	—
3	88.9	114.3	50.8	76.2	31.6
3-1/2	101.6	133.4	57.2	88.9	36.8
4	114.3	152.4	63.5	101.6	42.1
5	141.3	190.5	79.2	127.0	52.6
6	168.3	228.6	95.3	152.4	63.4
8	219.1	304.8	127.0	203.2	84.2
10	273.0	381.0	158.8	254.0	105.2
12	323.8	457.2	190.5	304.8	126.3
14	355.6	533.4	222.3	355.6	147.3
16	406.4	609.6	254.0	406.4	168.3
18	457.2	685.8	285.8	457.2	189.4
20	508.0	762.0	317.5	508.0	210.4
22	558.8	838.2	342.9	558.8	231.5
24	609.6	914.4	381.0	609.6	252.5
26	660.4	990.6	406.4	660.4*	273.5
28	711.2	1066.8	438.2	711.2*	294.6
30	762.0	1143.0	469.9	762.0*	315.6
32	812.8	1219.2	501.7	812.8*	336.7
34	863.6	1295.4	533.4	863.6*	357.7
36	914.4	1371.6	565.2	914.4*	378.8
38	965.2	1447.8	599.9	965.2*	399.8
40	1016.0	1524.0	632.0	1016.0*	420.8
42	1066.8	1600.2	660.4	1066.8*	441.9
44	1117.6	1676.4	695.5	1117.6*	462.9
46	1168.4	1752.6	726.9	—	—
48	1219.2	1828.8	759.0	1219.2*	505.0
52*	1320.8	—	—	1320.8	547.1
54*	1371.6	2057.4	852.2	1371.6	568.1
56*	1422.4	2133.6	883.8	—	—
60*	1524.0	2286.0	946.9	1524.0	631.3
66*	1676.4	2514.6	1041.6	—	—
72*	1828.8	2743.2	1262.5	—	—
80*	2032.0	—	—	2032.0	841.7

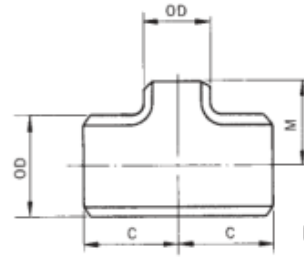
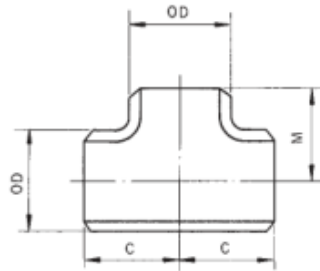
Long and Short Radius Return Elbows



ASME B16.9
ASME B16.28 (mm)

Nominal Pipe Size (NPS)	Outside Diameter at Bevel OD	Long Radius		Short Radius	
		Center-to- Center O	Back-to- Face K	Center-to- Center O	Back-to- Face K
1/2	21.3	76.2	47.8	—	—
3/4	26.7	76.2	50.8	—	—
1	33.4	76.2	55.6	50.8	41.1
1-1/4	42.2	95.3	69.9	63.5	52.3
1-1/2	48.3	114.3	82.6	76.2	62.0
2	60.3	152.4	106.4	101.6	81.0
2-1/2	73.0	190.5	131.8	127.0	100.1
3	88.9	228.6	158.8	152.4	120.7
3-1/2	101.6	266.7	184.2	177.8	139.7
4	114.3	304.8	209.6	203.2	158.8
5	141.3	381.0	261.9	254.0	196.9
6	168.3	457.2	312.7	304.8	236.5
8	219.1	609.6	414.3	406.4	312.7
10	273.0	762.0	517.6	508.0	390.7

Straight and Reducing Tees



**MSS SP-75
ASME B16.9**

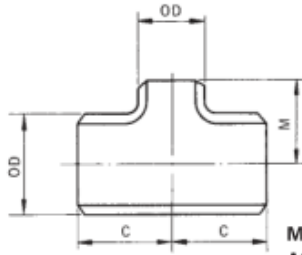
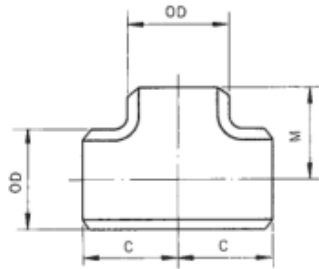
*BENKAN's Standards (mm)

Nominal Pipe Size (NPS)	Outside Diameter at Bevel OD		Center-to-End		Nominal Pipe Size (NPS)	Outside Diameter at Bevel OD		Center-to-End	
	Run	Outlet	Run C	Outlet(1)(2) M		Run	Outlet	Run C	Outlet(1)(2) M
1/2 x 1/2	21.3	21.3	25.4	25.4	5 x 5	141.3	141.3	124.0	124.0
3/8		17.3		25.4	4		114.3		117.3
1/4		13.7		25.4	3-1/2		101.6		114.3
3/4 x 3/4	26.7	26.7	28.4	28.4	3		88.9		111.3
1/2		21.3		28.4	2-1/2		73.0		108.0
3/8		17.3		28.4	2		60.3		104.6
1 x 1	33.4	33.4	38.1	38.1	1-1/2*		48.3		
3/4		26.7		38.1	6 x 6	168.3	168.3	142.7	142.7
1/2		21.3		38.1	5		141.3		136.7
1-1/4 x 1-1/4	42.2	42.2	47.8	47.8	4		114.3		130.0
1		33.4		47.8	3-1/2		101.6		127.0
3/4		26.7		47.8	3		88.9		124.0
1/2		21.3		47.8	2-1/2		73.0		120.7
1-1/2 x 1-1/2	48.3	48.3	57.2	57.2	2*		60.3		
1-1/4		42.2		57.2	8 x 8	219.1	219.1	177.8	177.8
1		33.4		57.2	6		168.3		168.1
3/4		26.7		57.2	5		141.3		162.1
1/2		21.3		57.2	4		114.3		155.5
2 x 2	60.3	60.3	63.5	63.5	3-1/2		101.6		152.4
1-1/2		48.3		60.5	3*		88.9		
1-1/4		42.2		57.2	10 x 10	273.0	273.0	215.9	215.9
1		33.4		50.8	8		219.1		203.2
3/4		26.7		44.5	6		168.3		193.5
1/2*		21.3			5		141.3		190.5
2-1/2 x 2-1/2	73.0	73.0	76.2	76.2	4		114.3		184.2
2		60.3		69.9	12 x 12	323.8	323.8	254.0	254.0
1-1/2		48.3		66.5	10		273.1		241.3
1-1/4		42.2		63.5	8		219.1		228.6
1		33.4		57.2	6		168.3		218.9
3 x 3	88.9	88.9	85.9	85.9	5		141.3		215.9
2-1/2		73.0		82.6	14 x 14	355.6	355.6	279.4	279.4
2		60.3		76.2	12		323.8		269.7
1-1/2		48.3		73.2	10		273.0		257.0
1-1/4		42.2		69.9	8		219.1		247.7
1*		33.4			6		168.3		238.3
3-1/2 x 3-1/2	101.6	101.6	95.3	95.3	16 x 16	406.4	406.4	304.8	304.8
3		88.9		91.9	14		355.6		304.8
2-1/2		73.0		88.9	12		323.8		295.1
2		60.3		82.6	10		273.0		282.4
1-1/2		48.3		79.2	8		219.1		273.1
4 x 4	114.3	114.3	104.6	104.6	6		168.3		263.7
3-1/2		101.6		101.6	18 x 18	457.2	457.2	342.9	342.9
3		88.9		98.6	16		406.4		330.2
2-1/2		73.0		95.3	14		355.6		330.2
2		60.3		88.9	12		323.8		320.5
1-1/2		48.3		85.9	10		273.0		307.8
1-1/4*		42.2			8		219.1		298.5
1*		33.5							

Note (1) Outlet dimension "M" for NPS 26 and larger is recommended but not required.

Note (2) Outlet dimension "M" for run sizes NPS 14 and larger is recommended but not required.

Straight and Reducing Tees

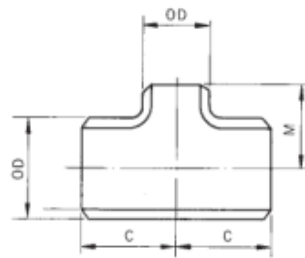
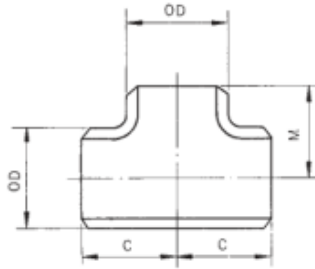


**MSS SP-75
ASME B16.9**

*BENKAN's Standards (mm)

Nominal Pipe Size (NPS)	Outside Diameter at Bevel OD		Center-to-End		Nominal Pipe Size (NPS)	Outside Diameter at Bevel OD		Center-to-End	
	Run	Outlet	Run C	Outlet(1)(2) M		Run	Outlet	Run C	Outlet(1)(2) M
20 x 20	508.0	508.0	381.0	381.0	30 x 12	762.0	323.8	558.8	472.6
18		457.2		368.3	10		273.0		460.2
16		406.4		355.6	32 x 32	812.8	812.8	596.9	596.9
14		355.6		355.6	30		762.0	584.2	
12		323.8		345.9	28		711.2	571.5	
10		273.0		333.2	26		660.4	571.5	
8		219.1		323.9	24		609.6	558.8	
22 x 22	558.8	558.8	419.1	419.1	22		558.8	546.1	546.1
20		508.0		406.4	20		508.0	533.4	
18		457.2		393.7	18	457.2	520.7		
16		406.4		381.0	16	406.4	508.0		
14		355.6		381.0	14	355.6	508.0		
12		323.8		371.3	34 x 34	863.6	863.6	635.0	635.0
10		273.0		358.6	32		812.8	622.3	
24 x 24	609.6	609.6	431.8	431.8	30		762.0	609.6	609.6
22		558.8		431.8	28		711.2	596.9	
20		508.0		431.8	26		660.4	596.9	
18		457.2		419.1	24		609.6	584.2	
16		406.4		406.4	22		558.8	571.5	
14		355.6		406.4	20	508.0	558.8		
12		323.8		396.7	18	457.2	546.1		
10	273.0	384.0	16	406.4	533.4				
26 x 26	660.4	660.4	495.3	495.3	36 x 36	914.4	914.4	673.1	673.1
24		609.6		482.6	34		863.6		660.4
22		558.8		469.9	32		812.8		647.7
20		508.0		457.2	30		762.0		635.0
18		457.2		444.5	28		711.2		622.3
16		406.4		431.8	26		660.4		622.3
14		355.6		431.8	24		609.6		609.6
12	323.8	422.1	22	558.8	596.9				
28 x 28	711.2	711.2	520.7	520.7	20	508.0	584.2	584.2	
26		660.4		520.7	18	457.2	571.5		
24		609.6		508.0	16	406.4	558.8		
22		558.8		495.3	38 x 38	965.2	965.2	711.2	711.2
20		508.0		482.6	36		914.4	711.2	
18		457.2		469.9	34		863.6	698.5	
16		406.4		457.2	32		812.8	685.8	
14	355.6	457.2	30	762.0	673.1				
12	323.8	447.5	28	711.2	647.7				
30 x 30	762.0	762.0	558.8	558.8	26		660.4	647.7	647.7
28		711.2		546.1	24	609.6	635.0		
26		660.4		546.1	22	558.8	622.3		
24		609.6		533.4	20	508.0	609.6		
22		558.8		520.7	18	457.2	596.9		
20		508.0		508.0					
18		457.2		495.3					
16	406.4	482.6							
14	355.6	482.6							

Straight and Reducing Tees

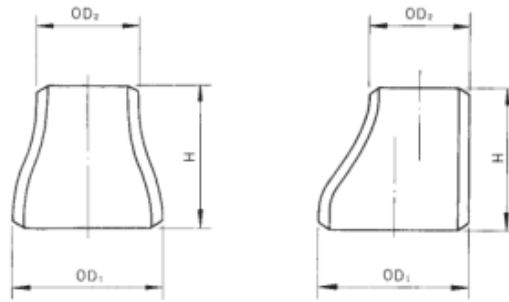


**MSS SP-75
ASME B16.9**

*BENKAN's Standards (mm)

Nominal Pipe Size (NPS)	Outside Diameter at Bevel OD		Center-to-End		Nominal Pipe Size (NPS)	Outside Diameter at Bevel OD		Center-to-End	
	Run	Outlet	Run C	Outlet(1)(2) M		Run	Outlet	Run C	Outlet(1)(2) M
40 x 40	1016.0	1016.0	749.3	749.3	46 x 26	1168.4	660.4	850.9	736.6
38		965.2		749.3	24		609.6		723.9
36		914.4		736.6	22		558.8		723.9
34		863.6		723.9	20*		508.0		723.9
32		812.8		711.2	48 x 48	1219.2	1219.2	889.0	838.2
30		762.0		698.5	46		1168.4		838.2
28		711.2		673.1	44		1117.6		838.2
26		660.4		673.1	42		1066.8		812.8
24		609.6		660.4	40		1016.0		812.8
22		558.8		647.7	38		965.2		812.8
20		508.0		635.0	36		914.4		787.4
18		457.2		622.3	34		863.6		787.4
42 x 42	1066.8	1066.8	762.0	711.2	32		812.8		787.4
40		1016.0		711.2	30		762.0		762.0
38		965.2		711.2	28		711.2		762.0
36		914.4		711.2	26		660.4		762.0
34		863.6		711.2	24		609.6		736.6
32		812.8		711.2	22		558.8		736.6
30		762.0		711.2	52 x 52*	1320.8	1320.8	965.2	914.4
28		711.2		698.5	48*		1219.2		863.6
26		660.4		698.5	44*		1117.6		812.8
24		609.6		660.4	40*		1016.0		762.0
22		558.8		660.4	54 x 54*	1371.6	1371.6	1003.3	952.5
20		508.0		660.4	52*		1320.8		914.4
18		457.2		647.7	48*		1219.2		863.6
16		406.4		635.0	44*		1117.6		863.6
44 x 44	1117.6	1117.6	812.8	762.0	40*		1016.0		812.8
42		1066.8		762.0	28*		711.2		787.4
40		1016.0		749.3	20*		508.0		787.4
38		965.2		736.6	56 x 56*	1422.4	1422.4	1041.4	965.2
36		914.4		723.9	52*		1320.8		914.4
34		863.6		723.9	48*		1219.2		863.6
32		812.8		711.2	44*		1117.6		812.8
30		762.0		711.2	40*		1016.0		812.8
28		711.2		698.5	28*		711.2		812.8
26		660.4		698.5	20*		508.0		812.8
24		609.6		698.5	60 x 60*	1524.0	1524.0	1117.6	1016.0
22		558.8		685.8	56*		1422.4		965.2
20		508.0		685.8	52*		1320.8		914.4
46 x 46	1168.4	1168.4	850.9	800.1	48*		1219.2		863.6
44		1117.6		800.1	40*		1016.0		863.6
42		1066.8		787.4	28*		711.2		863.6
40		1016.0		774.7	20*		508.0		863.6
38		965.2		762.0	66 x 66*	1676.4	1676.4	1219.2	1066.8
36		914.4		762.0					
34		863.6		749.3					
32		812.8		749.3					
30		762.0		736.6					
28		711.2		736.6					

Concentric and Eccentric Reducers



**MSS SP-75
ASME B16.9**

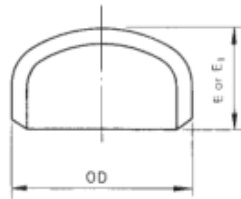
*BENKAN's Standards (mm)

Nominal Pipe Size (NPS)	Outside Diameter at Bevel		End-to-End H	Nominal Pipe Size (NPS)	Outside Diameter at Bevel		End-to-End H	Nominal Pipe Size (NPS)	Outside Diameter at Bevel		End-to-End H
	Large End OD ₁	Small End OD ₂			Large End OD ₁	Small End OD ₂			Large End OD ₁	Small End OD ₂	
3/4 x 1/2	26.7	21.3	38.1	10 x 8	273.0	219.1	177.8	34 x 32	863.6	812.8	609.6
3/8		17.3		6		168.3		30		762.0	
1 x 3/4	33.4	26.7	50.8	5		141.3		26		660.4	
1/2		21.3		4		114.3		24		609.6	
1-1/4 x 1	42.2	33.4	50.8	12 x 10	323.8	273.0	203.2	36 x 34	914.4	863.6	609.6
3/4		26.7		8		219.1		32		812.8	
1/2		21.3		6		168.3		30		762.0	
1-1/2 x 1-1/4	48.3	42.2	63.5	5		141.3		26		660.4	
1		33.4		14 x 12	355.6	323.8	330.2	24		609.6	
3/4		26.7		10		273.0		38 x 36	965.2	914.4	609.6
1/2		21.3		8		219.1		34		863.6	
2 x 1-1/2	60.3	48.3	76.2	6		168.3		32		812.8	
1-1/4		42.2		16 x 14	406.4	355.6	355.6	30		762.0	
1		33.4		12		323.8		28		711.2	
3/4		26.7		10		273.0		26		660.4	
2-1/2 x 2	73.0	60.3	88.9	8		219.1		40 x 38	1016.0	965.2	609.6
1-1/2		48.3		18 x 16	457.2	406.4	381.0	36		914.4	
1-1/4		42.2		14		355.6		34		863.6	
1		33.4		12		323.8		32		812.8	
3 x 2-1/2	88.9	73.0	88.9	10		273.0		30		762.0	
2		60.3		20 x 18	508.0	457.2	508.0	42 x 40	1066.8	1016.0	609.6
1-1/2		48.3		16		406.4		38		965.2	
1-1/4		42.2		14		355.6		36		914.4	
3-1/2 x 3	101.6	88.9	101.6	12		323.8		34		863.6	
2-1/2		73.0		22 x 20	558.8	508.0	508.0	32		812.8	
2		60.3		18		457.2		30		762.0	
1-1/2		48.3		16		406.4		44 x 42	1117.6	1066.8	609.6
1-1/4		42.2		14		355.6		40		1016.0	
4 x 3-1/2	114.3	101.6	101.6	24 x 22	609.6	558.8	508.0	38		965.2	
3		88.9		20		508.0		36		914.4	
2-1/2		73.0		18		457.2		46 x 44	1168.4	1117.6	711.2
2		60.3		16		406.4		42		1066.8	
1-1/2		48.3		26 x 24	660.4	609.6	609.6	40		1016.0	
5 x 4	141.3	114.3	127.0	22		558.8		38		965.2	
3-1/2		101.6		20		508.0		48 x 46	1219.2	1168.4	711.2
3		88.9		18		457.2		44		1117.6	
2-1/2		73.0		28 x 26	711.2	660.4	609.6	42		1066.8	
2		60.3		24		609.6		40		1016.0	
6 x 5	168.3	141.3	139.7	20		508.0					
4		114.3		18		457.2					
3-1/2		101.6		30 x 28	762.0	711.2	609.6				
3		88.9		26		660.4					
2-1/2		73.0		24		609.6					
8 x 6	219.1	168.3	152.4	20		508.0					
5		141.3		32 x 30	812.8	762.0	609.6				
4		114.3		28		711.2					
3-1/2		101.6		26		660.4					
				24		609.6					

Note (1) The shape of Reducer sizes 16" and larger may be manufactured to conical type without the tangent.

(2) 48" and larger can be manufactured. Please contact us for size capability.

Caps



MSS SP-75
ASME B16.9 (mm)

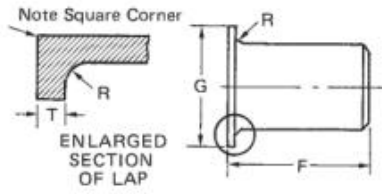
Nominal Pipe Size (NPS)	Outside Diameter at Bevel OD	Length ⁽²⁾ E	Limiting Wall Thickness for Length E	Length ⁽³⁾ E ₁
1/2	21.3	25.4	4.6	25.4
3/4	26.7	25.4	3.8	25.4
1	33.4	38.1	4.6	38.1
1-1/4	42.2	38.1	4.8	38.1
1-1/2	48.3	38.1	5.1	38.1
2	60.3	38.1	5.6	44.5
2-1/2	73.0	38.1	7.1	50.8
3	88.9	50.8	7.6	63.5
3-1/2	101.6	63.5	8.1	76.2
4	114.3	63.5	8.6	76.2
5	141.3	76.2	9.7	88.9
6	168.3	88.9	10.9	101.6
8	219.1	101.6	12.7	127.0
10	273.0	127.0	12.7	152.4
12	323.8	152.4	12.7	177.8
14	355.6	165.1	12.7	190.5
16	406.4	177.8	12.7	203.2
18	457.2	203.2	12.7	228.6
20	508.0	228.6	12.7	254.0
22	558.8	254.0	12.7	254.0
24	609.6	266.7	12.7	304.8

Nominal Pipe Size (NPS)	Outside Diameter at Bevel OD	Length E
26	660.4	266.7
28	711.2	266.7
30	762.0	266.7
32	812.8	266.7
34	863.6	266.7
36	914.4	266.7
38	965.2	304.8
40	1016.0	304.8
42	1066.8	304.8
44	1117.6	342.9
46	1168.4	342.9
48	1219.2	342.9

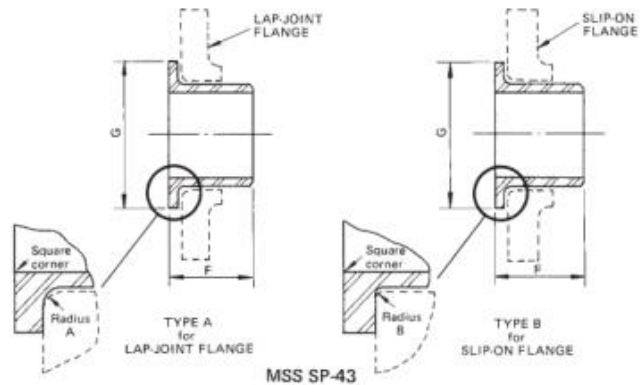
- Wall thickness for Caps up to and including 36" conform to ASME B36.10 Specifications; Caps 38" and larger conform to XS Specifications for wall thicknesses of 36". These are BENKAN Standards as no Internationally Recognized Standards have been set for such large size wall thickness.

- (1) The shape of these caps shall be ellipsoidal and shall conform to the shape requirements as given in the ASME Boiler and Pressure Vessel Code.
- (2) Length E applies for thickness not exceeding that given in column "Limiting wall Thickness for Length E".
- (3) Length E₁ applies for thickness greater than that given in column "Limiting wall Thickness" for NPS 24 and smaller. For NPS 26 and larger, Length E₁ shall be by agreement between manufacturer and purchaser.
- (4) 48" and larger can be manufactured. Please contact us for size capability.

Stainless Steel Lap Joint Stub Ends



ASME B16.9



MSS SP-43

ASME B16.9

MSS SP-43

(mm)

NPS	Outside Diameter at Bevel	Outside Diameter of Barrel		Length F		Radius of Fillet R		Diameter of Lap G
		min	max	ASME (Long)	ASME (Short)&MSS	ASME & MSS Type A	MSS Type B	
1/2	21.3	20.5	22.8	76.2	50.8	3.0	0.8	35.1
3/4	26.7	25.9	28.1	76.2	50.8	3.0	0.8	42.9
1	33.4	32.6	35.0	101.6	50.8	3.0	0.8	50.8
1-1/4	42.2	41.4	43.6	101.6	50.8	4.8	0.8	63.5
1-1/2	48.3	47.5	49.9	101.6	50.8	6.4	0.8	73.2
2	60.3	59.5	62.4	152.4	63.5	7.9	0.8	91.9
2-1/2	73.0	72.2	75.3	152.4	63.5	7.9	0.8	104.6
3	88.9	88.1	91.3	152.4	63.5	9.7	0.8	127.0
3-1/2	101.6	100.8	104.0	152.4	76.2	9.7	0.8	139.7
4	114.3	113.5	116.7	152.4	76.2	11.2	0.8	157.2
5	141.3	140.5	144.3	203.2	76.2	11.2	1.5	185.7
6	168.3	167.5	171.3	203.2	88.9	12.7	1.5	215.9
8	219.1	218.3	222.1	203.2	101.6	12.7	1.5	269.7
10	273.0	272.3	277.2	254.0	127.0	12.7	1.5	323.9
12	323.8	323.1	328.0	254.0	152.4	12.7	1.5	381.0
14	355.6	354.8	359.9	304.8	152.4	12.7	1.5	412.8
16	406.4	405.6	411.0	304.8	152.4	12.7	1.5	469.9
18	457.2	456.4	462.0	304.8	152.4	12.7	1.5	533.4
20	508.0	507.2	514.1	304.8	152.4	12.7	1.5	584.2
22	558.8	558.0	564.9	304.8	152.4	12.7	1.5	641.4
24	609.6	608.8	615.7	304.8	152.4	12.7	1.5	692.2