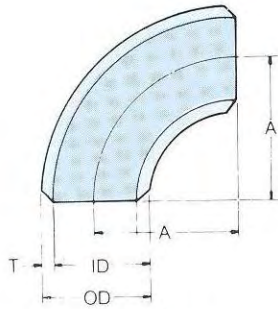
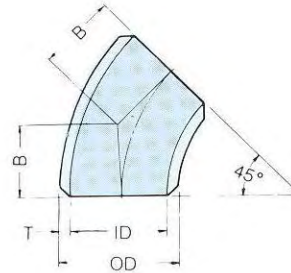




# Long and short Radius Elbows



90° Elbow



45° Elbow

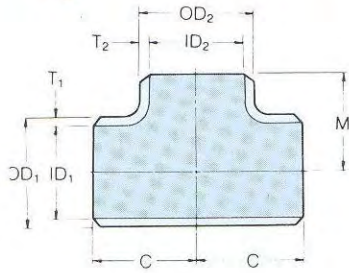
ANSI B16.9 B16.28

(in mm)

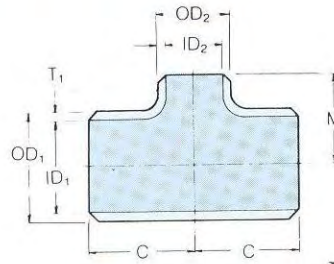
Nominal Pipe Size (NPS)	Outside Diameter at Bevel D	Center-to-End			
		Long Radius Elbow		Short Radius Elbow	
		90 Deg. A	45 Deg. B	90 Deg. A	45 Deg. B
1/2	21.3	38.1	15.7	-	-
3/4	26.7	28.4	11.2	-	-
1	33.4	38.1	22.4	25.4	-
1-1/4	42.2	47.8	25.4	31.8	-
1-1/2	48.3	57.2	28.4	38.1	-
2	60.3	76.2	35.1	50.8	-
2-1/2	73.0	95.2	44.4	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	95.2	152.4	63.4
8	219.1	304.8	127.0	203.2	84.2
10	273.1	381.0	158.8	254.0	105.2
12	323.9	457.2	190.5	304.8	126.3
14	355.6	533.4	222.2	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	501.6	812.8	378.1
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	-	-
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
54	1371.6	2057.4	852.2	1371.6	568.1
52	1320.8	-	-	1320.8	547.1
56	1422.4	2133.6	883.8	1422.4	589.2
60	1524.0	2286.0	946.9	1524.0	631.3
66	1676.4	2514.6	1041.6	-	-



# Straight and Reducing Tees



Straight



Reducing

MSS SP-75  
ANSI B16.9

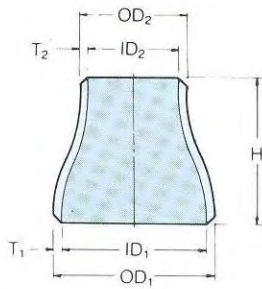
(in mm)

Nominal Pipe Size (NPS)	Outside Diameter at Bevel D		Center-to-End		Nominal Pipe Size (NPS)	Outside Diameter at Bevel D		Center-to-End	
	Run	Outlet	Run C	Outlet <sup>(1)</sup> M		Run	Outlet	Run C	Outlet <sup>(1)</sup> 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		17.1		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		17.1		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		120.6
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		155.4
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		60.5	10 x 10	273.1	273.1	215.9	215.9
1		33.4		57.2	8		219.1		203.2
3/4		26.7		50.8	6		168.3		193.5
1/2*		21.3		44.4	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		69.8	12 x 12	323.9	323.9	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		323.9		269.7
1-1/2		48.3		73.2	10		273.1		257.0
1-1/4		42.2		69.8	8		219.1		247.6
1*		33.4			6		168.3		238.3
3-1/2 x 3-1/2	101.6	101.6	95.2	95.2	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		323.9		295.1
2		60.3		82.6	10		273.1		282.4
1-1/2		48.3		79.2	8		*219.1		373.0
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		95.2	14		355.6		330.2
2		60.3		88.9	12		323.9		320.5
1-1/2		48.3		85.9	10		273.1		307.8
1-1/4*		42.2			8		219.1		298.4
1*		33.5							

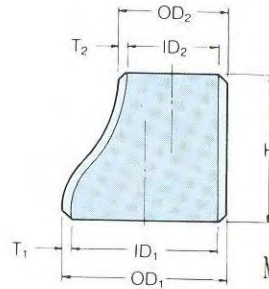
Note(1) Outlet dimension "M" for run sizes 14 and larger is recommended but not mandatory.



# Concentric and Eccentric Reducers



**Concentric**



**Eccentric**

MSS SP-75

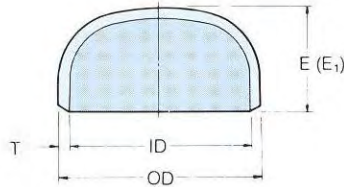
ANSI B16.9

(in mm)

Nominal Pipe Size (NPS)	Outside Diameter at Bevel		End-to-End	Nominal Pipe Size (NPS)	Outside Diameter at Bevel		End-to-End	Nominal Pipe Size (NPS)	Outside Diameter at Bevel		End-to-End
	Large End	Small End			Large End	Small End			Large End	Small End	
3/4x1/2 3/8	26.7	21.3 17.3	38.1	10 x 8 6 5 4	273.1 219.1 168.3 141.3 114.3	177.8	34 x 32 30 26 24	863.6 812.8 762.0 711.2 660.4	609.6		
1x3/4 1/2	33.4	26.7 21.3	50.8	12 x 10 8 6 5	323.9 273.1 219.1 168.3 141.3	203.2	36 x 34 32 30 26 24	914.4 863.6 812.8 762.0 711.2 660.4	609.6		
1-1/4x1 3/4 1/2	42.2	33.4 26.7 21.3	50.8	14 x 12 10 8 6	355.6 323.9 273.1 219.1 168.3	330.2	38 x 36 34 32 30 28 26	965.2 914.4 863.6 812.8 762.0 711.2 660.4	609.6		
1-1/2x1-1/4 1 3/4 1/2	48.3	42.2 33.4 26.7 21.3	63.5	16 x 14 12 10 8 6	406.4 355.6 323.9 273.1 219.1	355.6	40 x 38 36 34 32 30 28 26	1016.0 965.2 914.4 863.6 812.8 762.0 711.2 660.4	609.6		
2x1-1/2 1-1/4 1 3/4	60.3	48.3 42.2 33.4 26.7	76.2	18 x 16 14 12 10	457.2 406.4 355.6 323.9 273.1	381.0	42 x 40 38 36 34 32 30	1066.8 1016.0 965.2 914.4 863.6 812.8 762.0	609.6		
2-1/2x2 1-1/2 1-1/4 1	73.0	60.3 48.3 42.2 33.4	88.9	20 x 18 16 14 12	508.0 457.2 406.4 355.6 323.9	508.0	44 x 42 40 38 36 34 32 30	1117.6 1066.8 1016.0 965.2 914.4 863.6 812.8 762.0	609.6		
3x2-1/2 2 1-1/2 1-1/4	88.9	73.0 60.3 48.3 42.2	88.9	22 x 20 18 16 14	558.8 508.0 457.2 406.4 355.6	508.0	46 x 44 42 40 38	1168.4 1117.6 1066.8 1016.0 965.2	711.2		
3-1/2x3 2-1/2 2 1-1/2 1-1/4	101.6	88.9 73.0 60.3 48.3 42.0	101.6	24 x 22 20 18 16	609.6 558.8 508.0 457.2 406.4	508.0	48 x 46 44 42 40	1219.2 1168.4 1117.6 1066.8 1016.0	711.2		
4x3-1/2 3 2-1/2 2 1-1/2	114.3	101.6 88.9 73.0 60.3 48.3	101.6	26 x 24 22 20 18	660.4 609.6 558.8 508.0 457.2	609.6	30 x 28 26 24 20	762.0 711.2 660.4 609.6 508.0	609.6		
5x 4 3-1/2 3 2-1/2 2	141.3	114.3 101.6 88.9 73.0 60.3	127.0	28 x 26 24 20 18	711.2 660.4 609.6 508.0 457.2	609.6	32 x 30 28 26 24	812.8 762.0 711.2 660.4 609.6	609.6		
6x 5 4 3-1/2 3 2-1/2	168.3	141.3 114.3 101.6 88.9 73.0	139.7	32 x 30 28 26 24	812.8 762.0 711.2 660.4 609.6	609.6					
8x 6 5 4 3-1/2	219.1	168.3 141.3 114.3 101.6 88.9 73.0	152.4								



CAPS



Cap

MSS SP-75  
ANSI B16.9  
(in mm)

Nominal Pipe Size (NPS)	Outside Diameter at Bevel D	Length(2) E	Limiting Wall Thickness for Length E	Length(3) E <sub>1</sub>
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	44.4
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	273.1	127.0	12.7	152.4
12	323.9	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 D	Length(2) 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 thicknesses for Caps up to and including 36" conform to ANSI B36.10 Specifications; Caps 38" and larger conform to XS specifications for wall thicknesses of 36".

- (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 E applies for thickness greater than that given in column "Limiting Wall Thickness" for NPS 24 and smaller. For NPS 26 and larger, Length E shall be by agreement between manufacturer and purchaser.