



Butt weld pipe fittings

Butt weld pipe fittings allow for changing the direction of flow, reducing pipe sizes and attaching auxiliary equipment.

A butt weld fitting is a weldable pipe fitting that allows for change of direction of flow, to branch off, reduce pipe size or attach auxiliary equipment. Forged Steel butt weld fittings are manufactured in accordance with ANSI / ASME B16.9.

Butt weld fittings are available as elbows, tees, caps, reducers and outlets (olets). These fittings are the most common type of welded pipe fittings and are specified by nominal pipe size and pipe schedule. Butt weld fittings use seamless or welded pipe as the starting material and are formed (through multiple processes) to get the shape of elbows, tees and reducers etc. Just as the pipe is sold from Schedule 10 to Schedule 160, butt weld pipe fittings are

sold the same way. Welded butt weld fittings are more common in stainless steel due to cost advantage. SCH 10 fittings are also more common in stainless steel butt weld fittings.

Common material for butt weld fittings are A234 WPB (A & C also available), High Yield Carbon Steel, Stainless Steel 304 and 316 and Nickel Alloys.

Buttweld pipe fittings comprise of long radius elbow, concentric reducer, eccentric reducers and tees. They are an important part of industrial piping systems to change direction, branch off or to mechanically join equipment to the system. Buttweld fittings are sold in nominal pipe sizes with specified pipe schedule. BW fitting's dimensions and tolerances are defined as per ASME standard B16.9.



Some of the standards that apply to butt welded fittings are listed below. Many organizations such as ASME, ASTM, ISO, MSS, etc. have very well developed standards and specifications for butt welded fittings. It is always up to the designer to ensure that they are following the applicable standard and company specification, if available, during the design process.

- **Dimension: ANSI B16.9, B16.25, B16.28, MSS SP-43, SP-48, SP-59**
- **Material Spec.: ASTM A403, A240, A312, A234 WPB**
- **Material Grades: 304, 304L, 316, 316L, CARBON STEEL**



90° ELBOW



45° ELBOW



180° ELBOW



EQUAL TEE



REDUCING TEE



CAP



CON. REDUCER



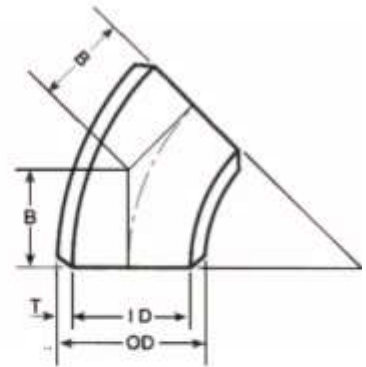
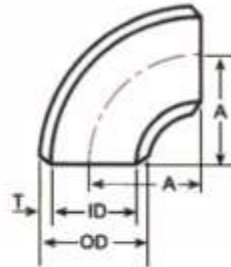
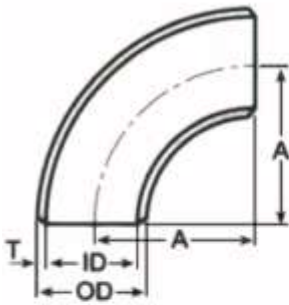
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STUB END



Long and Short Radius 45°/ 90° Elbows

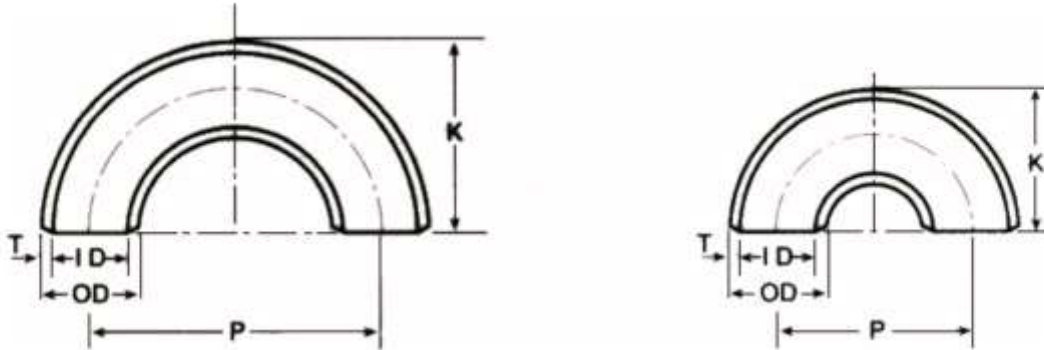


ANSI B16.9 B16.28 (in mm)
* Wellgrow's standard.

Nominal Pipe Size (NPS)	Outside Diameter at Bevel D	Center to End			
		Long Radius Elbows		Short Radius Elbows	
		90 degree. A	45 degree B	90 degree A	45 degree 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	95.2	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	336.6
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	400.0
42	1066.8	1600.2	660.4	1066.8	421.1
44	1117.6	1676.4	695.5	1117.6	442.2
46	1168.4	1752.6	726.9	-	-
48	1219.2	1828.8	759.0	1219.2	463.3
52*	1320.8	-	-	1320.8	484.4
54*	1371.6	2057.4	852.2	1371.6	505.5
56*	1422.4	2133.6	883.8	1422.4	526.6
60*	1524.0	2286.0	946.9	1524.0	547.7
66*	1676.4	2514.6	1041.6	-	-
68*	1727.0	2591	1073	1727	-
72*	1829.0	2743	1137	1829	-
76*	1930.0	2896	1199	1930	-
80	2032.0	3048	1263	2032	-



Long and Short Radius 180° Elbows

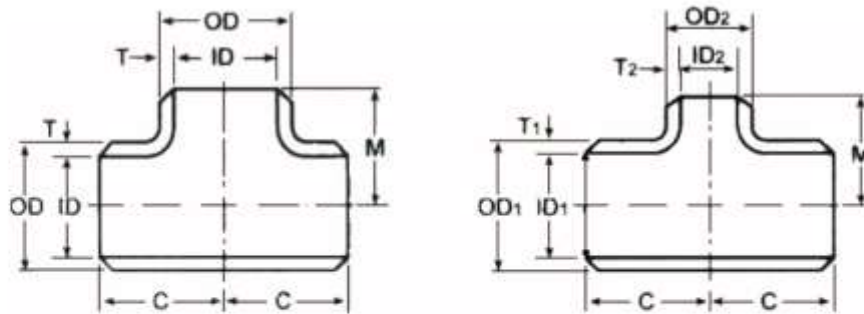


ANSI B16.9 B16.28 (in mm)

Nominal Pipe Size (NPS)	Outside Diameter at Bevel D	Long Radius Elbows		Short Radius Elbows	
		Center to Center. P	Back to Face K	Center to Center. P	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	95.2	69.8	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	109.5	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	273.1	762.0	517.7	508.0	390.7
12	323.9	914.4	619.3	609.6	466.9
14	355.6	1066.8	711.2	711.2	533.4
16	406.4	1219.2	812.8	812.8	609.6
18	457.2	1371.6	914.4	914.4	685.8
20	508.0	1524.0	1016.0	1016.0	762.0
22	558.8	1676.4	1117.6	1117.6	838.2
24	609.6	1828.8	1219.2	1219.2	914.4



Equal and Reducing Tees



MSS SP-75 ANSI B16.9 (in mm)
* Wellgrow's standard

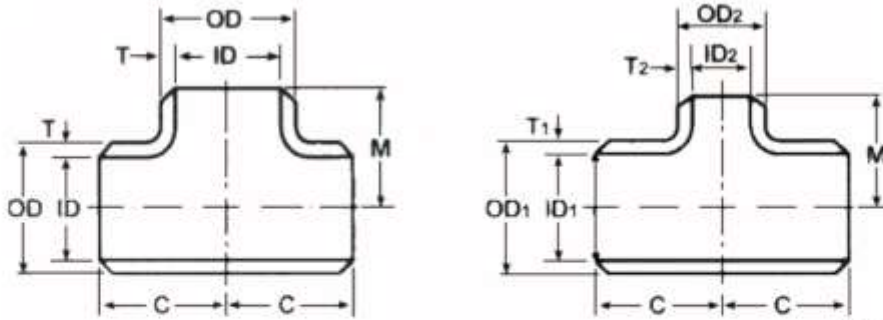
Nominal Pipe Size (NPS)	Outside Diameter At Bevel D		Center to End	
	Run	Outlet	Run C	Outlet (1) M
1/2 x 1/2	21.3	21.3	25.4	25.4
1/2 x 3/8		17.1		25.4
1/2 x 1/4		13.7		25.4
3/4 x 3/4	26.7	26.7	28.4	28.4
3/4 x 1/2		21.3		28.4
3/4 x 3/8		17.1		28.4
1 x 1	33.4	33.4	38.1	38.1
1 x 3/4		26.7		38.1
1 x 1/2		21.3		38.1
1-1/4 x 1-1/4	42.2	42.2	47.8	47.8
1-1/4 x 1		33.4		47.8
1-1/4 x 3/4		26.7		47.8
1-1/4 x 1/2		21.3		47.8
1-1/2 x 1-1/2	48.3	48.3	57.2	57.2
1-1/2 x 1-1/4		42.2		57.2
1-1/2 x 1		33.4		57.2
1-1/2 x 3/4		26.7		57.2
1-1/2 x 1/2		21.3		57.2
2 x 2	60.3	60.3	63.5	63.5
2 x 1-1/2		48.3		60.5
2 x 1-1/4		42.2		57.2
2 x 1		33.4		50.8
2 x 3/4		26.7		44.4
2 x 1/2*		21.3		
2-1/2 x 2-1/2	73.0	73.0	76.2	76.2
2-1/2 x 2		60.3		69.8
2-1/2 x 1-1/2		48.3		66.5
2-1/2 x 1-1/4		42.2		63.5
2-1/2 x 1		33.4		57.2
3 x 3	88.9	88.9	85.9	85.9
3 x 2-1/2		73.0		82.6
3 x 2		60.3		76.2
3 x 1-1/2		48.3		73.2
3 x 1-1/4		42.2		69.8
3 x 1*		33.4		
3-1/2 x 3-1/2	101.6	101.6	95.2	95.2
3-1/2 x 3		88.9		91.9
3-1/2 x 2-1/2		73.0		88.9
3-1/2 x 2		60.3		82.6
3-1/2 x 1-1/2		48.3		79.2

Nominal Pipe Size (NPS)	Outside Diameter At Bevel D		Center to End	
	Run	Outlet	Run C	Outlet (1) M
4 x 4	114.3	114.3	104.6	104.6
4 x 3-1/2		101.6		101.6
4 x 3		88.9		98.6
4 x 2-1/2		73.0		95.2
4 x 2		60.3		88.9
4 x 1-1/2		48.3		85.9
4 x 1-1/4		42.2		
4 x 1*		33.5		
5 x 5	141.3	141.3	124.0	124.0
5 x 4		114.3		117.3
5 x 3-1/2		101.6		114.3
5 x 3		88.9		111.3
5 x 2-1/2		73.0		108.0
5 x 2		60.3		104.6
5 x 1-1/2*		48.3		
6 x 6	168.3	168.3	142.7	142.7
6 x 5		141.3		136.7
6 x 4		114.3		130.0
6 x 3-1/2		101.6		127.0
6 x 3		88.9		124.0
6 x 2-1/2		73.0		120.6
6 x 2*		60.3		
8 x 8	219.1	219.1	177.8	177.8
8 x 6		168.3		168.1
8 x 5		141.3		162.1
8 x 4		114.3		155.4
8 x 3-1/2		101.6		152.4
8 x 3*		88.9		
10 x 10	273.1	273.1	215.9	215.9
10 x 8		219.1		203.2
10 x 6		168.3		193.5
10 x 5		141.3		190.5
10 x 4		114.3		184.2
12 x 12	323.9	323.9	254.0	254.0
12 x 10		273.1		241.3
12 x 8		219.1		228.6
12 x 6		168.3		218.9
12 x 5		141.3		215.9

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



Equal and Reducing Tees



MSS SP-75 ANSI B16.9 (in mm)
* Wellgrow's standard

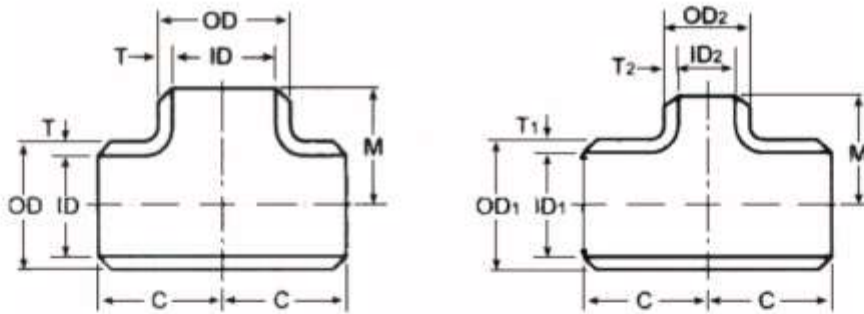
Nominal Pipe Size (NPS)	Outside Diameter At Bevel D		Center to End	
	Run	Outlet	Run C	Outlet (1) M
14 x 14	355.6	355.6	279.4	279.4
14 x 12		323.9		269.7
14 x 10		273.1		257.0
14 x 8		219.1		247.6
14 x 6		168.3		238.3
16 x 16	406.4	406.4	304.8	304.8
16 x 14		355.6		304.8
16 x 12		323.9		295.1
16 x 10		273.1		282.4
16 x 8		219.1		373.0
16 x 6		168.3		263.7
18 x 18	457.2	457.2	342.9	342.9
18 x 16		406.4		330.2
18 x 14		355.6		330.2
18 x 12		323.9		320.5
18 x 10		273.1		307.8
18 x 8		219.1		298.4
20 x 20	508.0	508.0	381.0	381.0
20 x 18		457.2		369.3
20 x 16		406.4		355.6
20 x 14		355.6		355.6
20 x 12		323.9		345.9
20 x 10		273.1		333.2
20 x 8		219.1		323.8
22 x 22	558.8	558.8	419.1	419.1
22 x 20		508.0		406.4
22 x 18		457.2		393.7
22 x 16		406.4		381.0
22 x 14		355.6		381.0
22 x 12		323.9		371.3
22 x 10		273.1		358.6
24 x 24	609.6	609.6	431.8	431.8
24 x 22		558.8		431.8
24 x 20		508.0		431.8
24 x 18		457.2		419.1
24 x 16		406.4		406.4
24 x 14		355.6		406.4
24 x 12		323.9		396.7
24 x 10		273.1		384.0
26 x 26	660.4	660.4	495.3	495.3
26 x 24		609.6		482.6

Nominal Pipe Size (NPS)	Outside Diameter At Bevel D		Center to End	
	Run	Outlet	Run C	Outlet (1) M
26 x 22		558.8		469.9
26 x 20		508.0		457.2
26 x 18		457.2		444.5
26 x 16		406.4		431.8
26 x 14		355.6		431.8
26 x 12		323.1		422.1
28 x 28	711.2	711.2	520.7	520.7
28 x 26		660.4		520.7
28 x 24		609.6		508.0
28 x 22		558.8		495.3
28 x 20		508.0		482.6
28 x 18		457.2		469.9
28 x 16		406.4		457.2
28 x 14		355.6		457.2
28 x 12		323.1		447.5
30 x 30	762.0	762.0	558.8	558.8
30 x 28		711.2		546.1
30 x 26		660.4		546.1
30 x 24		609.6		533.4
30 x 22		558.8		520.7
30 x 20		508.0		508.0
30 x 18		457.2		495.3
30 x 16		406.4		482.6
30 x 14		355.6		482.6
30 x 12		323.9		472.6
30 x 10		273.1		460.2
32 x 32	812.8	812.8	596.9	596.9
32 x 30		762.0		584.2
32 x 28		711.2		571.5
32 x 26		660.4		571.5
32 x 24		609.6		558.8
32 x 22		558.8		546.1
32 x 20		508.0		533.4
32 x 18		457.2		520.7
32 x 16		406.4		508.0
32 x 14		355.6		508.0
34 x 34	863.6	863.6	635.0	635.0
34 x 32		812.8		622.3
34 x 30		762.0		609.6
34 x 28		711.2		596.9
34 x 26		660.4		596.9

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



Equal and Reducing Tees



MSS SP-75 ANSI B16.9 (in mm)
* Wellgrow's standard

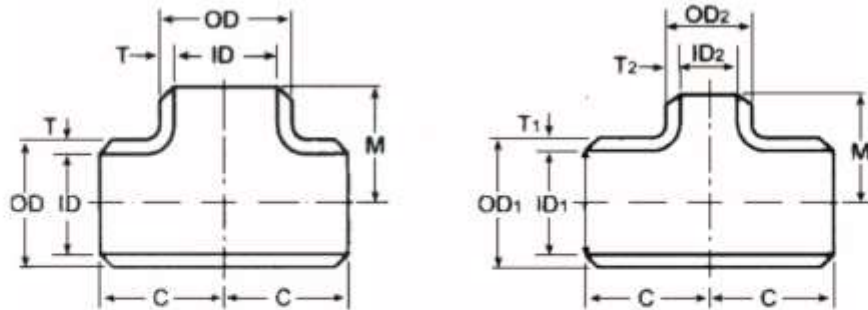
Nominal Pipe Size (NPS)	Outside Diameter At Bevel D		Center to End	
	Run	Outlet	Run C	Outlet (1) M
34 x 24		609.6		584.2
34 x 22		558.8		571.5
34 x 20		508.0		558.8
34 x 18		457.2		546.1
34 x 16		406.4		533.4
36 x 36	914.4	914.4	673.1	673.1
36 x 34		863.6		660.4
36 x 32		812.8		647.7
36 x 30		762.0		635.0
36 x 28		711.2		622.3
36 x 26		660.4		622.3
36 x 24		609.6		609.6
36 x 22		558.8		596.9
36 x 20		508.0		584.2
36 x 18		457.2		571.5
36 x 16		406.4		558.8
38 x 38	965.2	965.2	711.2	711.2
38 x 36		914.4		711.2
38 x 34		863.6		698.5
38 x 32		812.8		685.8
38 x 30		762.0		673.1
38 x 28		711.2		647.7
38 x 26		660.4		647.7
38 x 24		609.6		635.0
38 x 22		558.8		622.3
38 x 20		508.0		609.6
38 x 18		457.2		596.9
40 x 40	1016.0	1016.0	749.3	749.3
40 x 38		965.2		749.3
40 x 36		914.4		736.6
40 x 34		863.6		723.9
40 x 32		812.8		711.2
40 x 30		762.0		698.5
40 x 28		711.2		673.1
40 x 26		660.4		673.1
40 x 24		609.6		660.4
40 x 22		558.8		647.7
40 x 20		508.0		635.0
40 x 18		457.2		622.3
42 x 42	1066.8	1066.8	762.0	711.2
42 x 40		1016.0		711.2

Nominal Pipe Size (NPS)	Outside Diameter At Bevel D		Center to End	
	Run	Outlet	Run C	Outlet (1) M
42 x 38		965.2		711.2
42 x 36		914.4		711.2
42 x 34		863.6		711.2
42 x 32		812.8		711.2
42 x 30		762.0		711.2
42 x 28	1066.8	711.2	762.0	698.5
42 x 26		660.4		698.5
42 x 24		609.6		660.4
42 x 22		558.8		660.4
42 x 20		508.0		660.4
42 x 18		457.2		647.7
42 x 16		406.4		635.0
44 x 44	1117.6	1117.6	812.8	762.0
44 x 42		1066.8		762.0
44 x 40		1016.0		749.3
44 x 38		965.2		736.6
44 x 36		914.4		723.9
44 x 34		863.6		723.9
44 x 32		812.8		711.2
44 x 30		762.0		711.2
44 x 28		711.2		698.5
44 x 26		660.4		698.5
44 x 24		609.6		698.5
44 x 22		558.8		685.8
44 x 20		508.0		685.8
46 x 46	1168.4	1168.4	850.9	800.1
46 x 44		1117.6		800.1
46 x 42		1066.8		787.4
46 x 40		1016.0		774.7
46 x 38		965.2		762.0
46 x 36		914.4		762.0
46 x 34		863.6		749.3
46 x 32		812.8		749.3
46 x 30		762.0		736.6
46 x 28		711.2		736.6
46 x 26		660.4		736.6
46 x 24		609.6		723.9
46 x 20*		508.0		723.9
48 x 48	1219.2	1219.2	889.0	838.2
48 x 46		1168.4		838.2
48 x 44		1117.6		838.2

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



Equal and Reducing Tees



MSS SP-75 ANSI B16.9 (in mm)
* Wellgrow's standard.

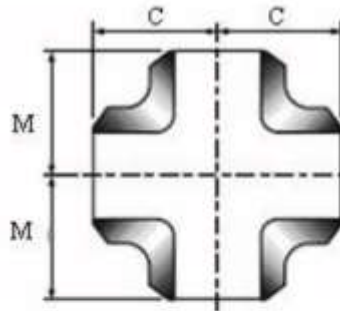
Nominal Pipe Size (NPS)	Outside Diameter At Bevel D		Center to End	
	Run	Outlet	Run C	Outlet (1) M
48 x 42		1066.8		812.8
48 x 40		1016.0		812.8
48 x 38		965.2		812.8
48 x 36		914.4		787.4
48 x 34		863.6		787.4
48 x 32	1219.2	812.8	889.0	787.4
48 x 44		1117.6		838.2
48 x 42		1066.8		812.8
48 x 40		1016.0		812.8
48 x 38		965.2		812.8
48 x 36		914.4		787.4
48 x 34		863.6		787.4
48 x 32		812.8		787.4
48 x 30		762.0		762.0
48 x 28		711.2		762.0
48 x 26		660.4		762.0
48 x 24		609.6		736.6
48 x 22		558.8		736.6
52 x 52*	1320.8	1320.8	965.2	914.4
52 x 48*		1219.2		863.6
52 x 44*		1117.6		812.8
52 x 40*		1016.0		762.0
54 x 54*	1371.6	1371.6	1003.3	952.5
54 x 52*		1320.8		914.4
54 x 48*		1219.2		863.6
54 x 44*		1117.6		863.6
54 x 40*		1016.0		812.8
54 x 28*		711.2		787.4
54 x 20*		508.0		787.4
56 x 56*	1422.4	1422.4	1041.4	965.2
56 x 52*		1320.8		914.4
56 x 48*		1219.2		863.6
56 x 44*		1117.6		812.8
56 x 40*		1016.0		812.8
56 x 28*		711.2		812.8
56 x 20*		508.0		812.8
60 x 60*	1524.0	1524.0	1117.6	1016.0
60 x 56*		1422.4		965.2
60 x 52*		1320.8		914.4
60 x 48*		1219.2		863.6

Nominal Pipe Size (NPS)	Outside Diameter At Bevel D		Center to End	
	Run	Outlet	Run C	Outlet (1) M
60 x 40*		1016.0		863.6
60 x 28*		711.2		863.6
60 x 20*		508.0		863.6
64 x 64*	1626.0	1626.0	1194.0	1092.0
64 x 60*		1524.0		1067.0
64 x 56*		1422.0		1016.0
64 x 52*		1321.0		965.0
64 x 48*		1219.0		914
66 x 66*	1676.4	1676.4	1219.2	1066.8
68 x 68*	1727.0	1727.0	1270.0	1168.0
68 x 64*		1626.0		1143.0
68 x 60*		1524.0		1118.0
68 x 56*		1422.0		1067.0
68 x 52*		1321.0		1016.0
68 x 48*		1219.0		965.0
72 x 72*	1829.0	1829.0	1320.0	1245.0
72 x 68*		1727.0		1219.0
72 x 64*		1626.0		1194.0
72 x 60*		1524.0		1168.0
72 x 56*	1829.0	1422.0	1320.0	1118.0
72 x 52*		1321.0		1067.0
72 x 48*		1219.0		1016.0
76 x 76*	1930.0	1930.0	1422.0	1320.0
76 x 72*		1829.0		1295.0
76 x 68*		1727.0		1270.0
76 x 64*		1626.0		1245.0
76 x 60*		1524.0		1219.0
76 x 56*		1422.0		1168.0
76 x 52*		1321.0		1118.0
76 x 48*		1219.0		1067.0
80 x 80*	2032.0	2032.0	1499.0	1397.0
80 x 76*		1930.0		1372.0
80 x 72*		1829.0		1346.0
80 x 68*		1727.0		1321.0
80 x 64*		1626.0		1295.0
80 x 60*		1524.0		1270.0
80 x 56*		1422.0		1219.0
80 x 52*		1321.0		1168.0
80 x 48*		1219.0		1118.0

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



Equal and Reducing Crosses



MSS SP-75 ANSI B16.9 (in mm)
* Wellgrow's standard

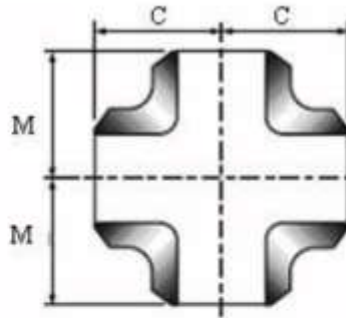
Nominal Pipe Size (NPS)	Outside Diameter At Bevel D		Center to End	
	Run	Outlet	Run C	Outlet (1) M
1/2 x 1/2	21.3	21.3	25.4	25.4
1/2 x 3/8		17.1		25.4
1/2 x 1/4		13.7		25.4
3/4 x 3/4	26.7	26.7	28.4	28.4
3/4 x 1/2		21.3		28.4
3/4 x 3/8		17.1		28.4
1 x 1	33.4	33.4	38.1	38.1
1 x 3/4		26.7		38.1
1 x 1/2		21.3		38.1
1-1/4 x 1-1/4	42.2	42.2	47.8	47.8
1-1/4 x 1		33.4		47.8
1-1/4 x 3/4		26.7		47.8
1-1/4 x 1/2		21.3		47.8
1-1/2 x 1-1/2	48.3	48.3	57.2	57.2
1-1/2 x 1-1/4		42.2		57.2
1-1/2 x 1		33.4		57.2
1-1/2 x 3/4		26.7		57.2
1-1/2 x 1/2		21.3		57.2
2 x 2	60.3	60.3	63.5	63.5
2 x 1-1/2		48.3		60.5
2 x 1-1/4		42.2		57.2
2 x 1		33.4		50.8
2 x 3/4		26.7		44.4
2 x 1/2*		21.3		
2-1/2 x 2-1/2	73.0	73.0	76.2	76.2
2-1/2 x 2		60.3		69.8
2-1/2 x 1-1/2		48.3		66.5
2-1/2 x 1-1/4		42.2		63.5
2-1/2 x 1		33.4		57.2
3 x 3	88.9	88.9	85.9	85.9
3 x 2-1/2		73.0		82.6
3 x 2		60.3		76.2
3 x 1-1/2		48.3		73.2
3 x 1-1/4		42.2		69.8
3 x 1*		33.4		
3-1/2 x 3-1/2	101.6	101.6	95.2	95.2
3-1/2 x 3		88.9		91.9
3-1/2 x 2-1/2		73.0		88.9
3-1/2 x 2		60.3		82.6
3-1/2 x 1-1/2		48.3		79.2

Nominal Pipe Size (NPS)	Outside Diameter At Bevel D		Center to End	
	Run	Outlet	Run C	Outlet (1) M
4 x 4	114.3	114.3	104.6	104.6
4 x 3-1/2		101.6		101.6
4 x 3		88.9		98.6
4 x 2-1/2		73.0		95.2
4 x 2		60.3		88.9
4 x 1-1/2		48.3		85.9
4 x 1-1/4		42.2		
4 x 1*		33.5		
5 x 5	141.3	141.3	124.0	124.0
5 x 4		114.3		117.3
5 x 3-1/2		101.6		114.3
5 x 3		88.9		111.3
5 x 2-1/2		73.0		108.0
5 x 2		60.3		104.6
5 x 1-1/2*		48.3		
6 x 6	168.3	168.3	142.7	142.7
6 x 5		141.3		136.7
6 x 4		114.3		130.0
6 x 3-1/2		101.6		127.0
6 x 3		88.9		124.0
6 x 2-1/2		73.0		120.6
6 x 2*		60.3		
8 x 8	219.1	219.1	177.8	177.8
8 x 6		168.3		168.1
8 x 5		141.3		162.1
8 x 4		114.3		155.4
8 x 3-1/2		101.6		152.4
8 x 3*		88.9		
10 x 10	273.1	273.1	215.9	215.9
10 x 8		219.1		203.2
10 x 6		168.3		193.5
10 x 5		141.3		190.5
10 x 4		114.3		184.2
12 x 12	323.9	323.9	254.0	254.0
12 x 10		273.1		241.3
12 x 8		219.1		228.6
12 x 6		168.3		218.9
12 x 5		141.3		215.9

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



Equal and Reducing Crosses



MSS SP-75 ANSI B16.9 (in mm)
• Wellgrow's standard

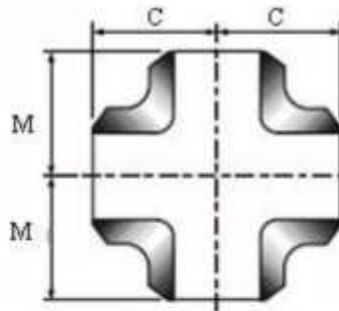
Nominal Pipe Size (NPS)	Outside Diameter At Bevel D		Center to End	
	Run	Outlet	Run C	Outlet (1) M
14 x 14	355.6	355.6	279.4	279.4
14 x 12		323.9		269.7
14 x 10		273.1		257.0
14 x 8		219.1		247.6
14 x 6		168.3		238.3
16 x 16	406.4	406.4	304.8	304.8
16 x 14		355.6		304.8
16 x 12		323.9		295.1
16 x 10		273.1		282.4
16 x 8		219.1		373.0
16 x 6		168.3		263.7
18 x 18	457.2	457.2	342.9	342.9
18 x 16		406.4		330.2
18 x 14		355.6		330.2
18 x 12		323.9		320.5
18 x 10		273.1		307.8
18 x 8		219.1		298.4
20 x 20	508.0	508.0	381.0	381.0
20 x 18		457.2		369.3
20 x 16		406.4		355.6
20 x 14		355.6		355.6
20 x 12		323.9		345.9
20 x 10		273.1		333.2
20 x 8		219.1		323.8
22 x 22	558.8	558.8	419.1	419.1
22 x 20		508.0		406.4
22 x 18		457.2		393.7
22 x 16		406.4		381.0
22 x 14		355.6		381.0
22 x 12		323.9		371.3
22 x 10		273.1		358.6
24 x 24	609.6	609.6	431.8	431.8
24 x 22		558.8		431.8
24 x 20		508.0		431.8
24 x 18		457.2		419.1
24 x 16		406.4		406.4
24 x 14		355.6		406.4
24 x 12		323.9		396.7
24 x 10		273.1		384.0
26 x 26	660.4	660.4	495.3	495.3
26 x 24		609.6		482.6

Nominal Pipe Size (NPS)	Outside Diameter At Bevel D		Center to End	
	Run	Outlet	Run C	Outlet (1) M
26 x 22		558.8		469.9
26 x 20		508.0		457.2
26 x 18		457.2		444.5
26 x 16		406.4		431.8
26 x 14		355.6		431.8
26 x 12		323.1		422.1
28 x 28	711.2	711.2	520.7	520.7
28 x 26		660.4		520.7
28 x 24		609.6		508.0
28 x 22		558.8		495.3
28 x 20		508.0		482.6
28 x 18		457.2		469.9
28 x 16		406.4		457.2
28 x 14		355.6		457.2
28 x 12		323.1		447.5
30 x 30	762.0	762.0	558.8	558.8
30 x 28		711.2		546.1
30 x 26		660.4		546.1
30 x 24		609.6		533.4
30 x 22		558.8		520.7
30 x 20		508.0		508.0
30 x 18		457.2		495.3
30 x 16		406.4		482.6
30 x 14		355.6		482.6
30 x 12		323.9		472.6
30 x 10		273.1		460.2
32 x 32	812.8	812.8	596.9	596.9
32 x 30		762.0		584.2
32 x 28		711.2		571.5
32 x 26		660.4		571.5
32 x 24		609.6		558.8
32 x 22		558.8		546.1
32 x 20		508.0		533.4
32 x 18		457.2		520.7
32 x 16		406.4		508.0
32 x 14		355.6		508.0
34 x 34	863.6	863.6	635.0	635.0
34 x 32		812.8		622.3
34 x 30		762.0		609.6
34 x 28		711.2		596.9
34 x 26		660.4		596.9

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



Equal and Reducing Crosses



MSS SP-75 ANSI B16.9 (in mm)
* Wellgrow's standard

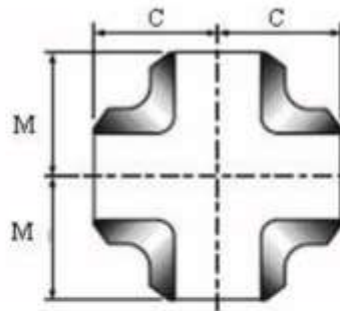
Nominal Pipe Size (NPS)	Outside Diameter At Bevel D		Center to End	
	Run	Outlet	Run C	Outlet (1) M
34 x 24		609.6		584.2
34 x 22		558.8		571.5
34 x 20		508.0		558.8
34 x 18		457.2		546.1
34 x 16		406.4		533.4
36 x 36	914.4	914.4	673.1	673.1
36 x 34		863.6		660.4
36 x 32		812.8		647.7
36 x 30		762.0		635.0
36 x 28		711.2		622.3
36 x 26		660.4		622.3
36 x 24		609.6		609.6
36 x 22		558.8		596.9
36 x 20		508.0		584.2
36 x 18		457.2		571.5
36 x 16		406.4		558.8
38 x 38	965.2	965.2	711.2	711.2
38 x 36		914.4		711.2
38 x 34		863.6		698.5
38 x 32		812.8		685.8
38 x 30		762.0		673.1
38 x 28		711.2		647.7
38 x 26		660.4		647.7
38 x 24		609.6		635.0
38 x 22		558.8		622.3
38 x 20		508.0		609.6
38 x 18		457.2		596.9
40 x 40	1016.0	1016.0	749.3	749.3
40 x 38		965.2		749.3
40 x 36		914.4		736.6
40 x 34		863.6		723.9
40 x 32		812.8		711.2
40 x 30		762.0		698.5
40 x 28		711.2		673.1
40 x 26		660.4		673.1
40 x 24		609.6		660.4
40 x 22		558.8		647.7
40 x 20		508.0		635.0
40 x 18		457.2		622.3
42 x 42	1066.8	1066.8	762.0	711.2
42 x 40		1016.0		711.2

Nominal Pipe Size (NPS)	Outside Diameter At Bevel D		Center to End	
	Run	Outlet	Run C	Outlet (1) M
42 x 38		965.2		711.2
42 x 36		914.4		711.2
42 x 34		863.6		711.2
42 x 32		812.8		711.2
42 x 30		762.0		711.2
42 x 28	1066.8	711.2	762.0	698.5
42 x 26		660.4		698.5
42 x 24		609.6		660.4
42 x 22		558.8		660.4
42 x 20		508.0		660.4
42 x 18		457.2		647.7
42 x 16		406.4		635.0
44 x 44	1117.6	1117.6	812.8	762.0
44 x 42		1066.8		762.0
44 x 40		1016.0		749.3
44 x 38		965.2		736.6
44 x 36		914.4		723.9
44 x 34		863.6		723.9
44 x 32		812.8		711.2
44 x 30		762.0		711.2
44 x 28		711.2		698.5
44 x 26		660.4		698.5
44 x 24		609.6		698.5
44 x 22		558.8		685.8
44 x 20		508.0		685.8
46 x 46	1168.4	1168.4	850.9	800.1
46 x 44		1117.6		800.1
46 x 42		1066.8		787.4
46 x 40		1016.0		774.7
46 x 38		965.2		762.0
46 x 36		914.4		762.0
46 x 34		863.6		749.3
46 x 32		812.8		749.3
46 x 30		762.0		736.6
46 x 28		711.2		736.6
46 x 26		660.4		736.6
46 x 24		609.6		723.9
46 x 20*		508.0		723.9
48 x 48	1219.2	1219.2	889.0	838.2
48 x 46		1168.4		838.2
48 x 44		1117.6		838.2

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



Equal and Reducing Crosses



MSS SP-75 ANSI B16.9 (in mm)
* Wellgrow's standard.

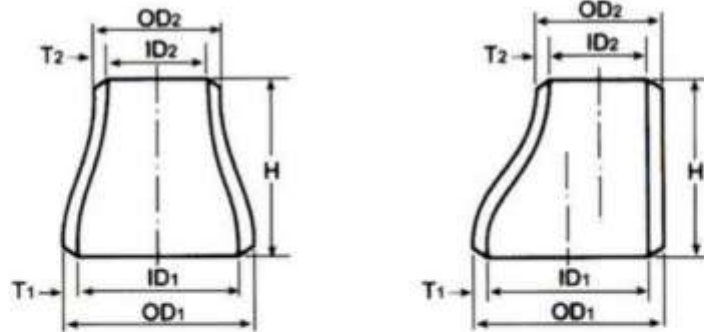
Nominal Pipe Size (NPS)	Outside Diameter At Bevel D		Center to End	
	Run	Outlet	Run C	Outlet (1) M
48 x 42		1066.8		812.8
48 x 40		1016.0		812.8
48 x 38		965.2		812.8
48 x 36		914.4		787.4
48 x 34		863.6		787.4
48 x 32	1219.2	812.8	889.0	787.4
48 x 44		1117.6		838.2
48 x 42		1066.8		812.8
48 x 40		1016.0		812.8
48 x 38		965.2		812.8
48 x 36		914.4		787.4
48 x 34		863.6		787.4
48 x 32		812.8		787.4
48 x 30		762.0		762.0
48 x 28		711.2		762.0
48 x 26		660.4		762.0
48 x 24		609.6		736.6
48 x 22		558.8		736.6
52 x 52*	1320.8	1320.8	965.2	914.4
52 x 48*		1219.2		863.6
52 x 44*		1117.6		812.8
52 x 40*		1016.0		762.0
54 x 54*	1371.6	1371.6	1003.3	952.5
54 x 52*		1320.8		914.4
54 x 48*		1219.2		863.6
54 x 44*		1117.6		863.6
54 x 40*		1016.0		812.8
54 x 28*		711.2		787.4
54 x 20*		508.0		787.4
56 x 56*	1422.4	1422.4	1041.4	965.2
56 x 52*		1320.8		914.4
56 x 48*		1219.2		863.6
56 x 44*		1117.6		812.8
56 x 40*		1016.0		812.8
56 x 28*		711.2		812.8
56 x 20*		508.0		812.8
60 x 60*	1524.0	1524.0	1117.6	1016.0
60 x 56*		1422.4		965.2
60 x 52*		1320.8		914.4
60 x 48*		1219.2		863.6

Nominal Pipe Size (NPS)	Outside Diameter At Bevel D		Center to End	
	Run	Outlet	Run C	Outlet (1) M
60 x 40*		1016.0		863.6
60 x 28*		711.2		863.6
60 x 20*		508.0		863.6
64 x 64*	1626.0	1626.0	1194.0	1092.0
64 x 60*		1524.0		1067.0
64 x 56*		1422.0		1016.0
64 x 52*		1321.0		965.0
64 x 48*		1219.0		914
66 x 66*	1676.4	1676.4	1219.2	1066.8
68 x 68*	1727.0	1727.0	1270.0	1168.0
68 x 64*		1626.0		1143.0
68 x 60*		1524.0		1118.0
68 x 56*		1422.0		1067.0
68 x 52*		1321.0		1016.0
68 x 48*		1219.0		965.0
72 x 72*	1829.0	1829.0	1320.0	1245.0
72 x 68*		1727.0		1219.0
72 x 64*		1626.0		1194.0
72 x 60*		1524.0		1168.0
72 x 56*	1829.0	1422.0	1320.0	1118.0
72 x 52*		1321.0		1067.0
72 x 48*		1219.0		1016.0
76 x 76*	1930.0	1930.0	1422.0	1320.0
76 x 72*		1829.0		1295.0
76 x 68*		1727.0		1270.0
76 x 64*		1626.0		1245.0
76 x 60*		1524.0		1219.0
76 x 56*		1422.0		1168.0
76 x 52*		1321.0		1118.0
76 x 48*		1219.0		1067.0
80 x 80*	2032.0	2032.0	1499.0	1397.0
80 x 76*		1930.0		1372.0
80 x 72*		1829.0		1346.0
80 x 68*		1727.0		1321.0
80 x 64*		1626.0		1295.0
80 x 60*		1524.0		1270.0
80 x 56*		1422.0		1219.0
80 x 52*		1321.0		1168.0
80 x 48*		1219.0		1118.0

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



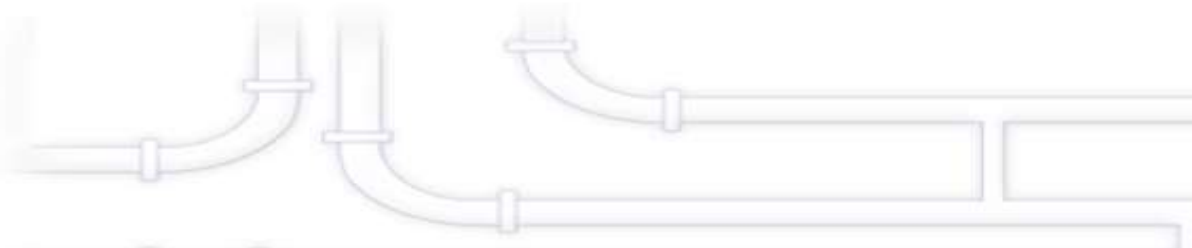
Concentric and Eccentric Reducers



MSS SP-75 ANSI B16.9 (in mm)
* Wellgrow's standard.

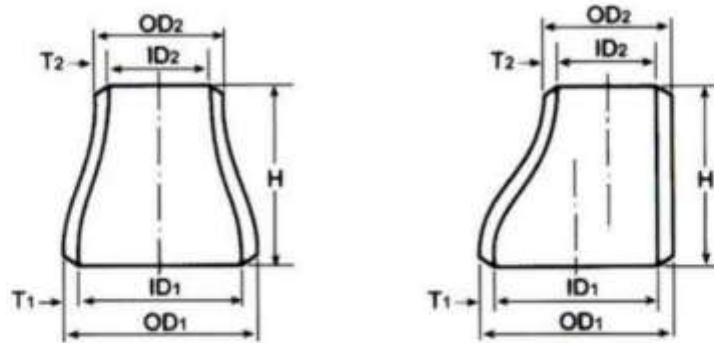
Nominal Pipe Size (NPS)	Outside Diameter at Bevel		End-to-end
	Large End	Small End	
3/4 x 1/2	26.7	21.3	38.1
3/4 x 3/8		17.3	
1 x 3/4	33.4	26.7	50.8
1 x 1/2		21.3	
1-1/4 x 1	42.2	33.4	50.8
1-1/4 x 3/4		26.7	
1-1/4 x 1/2		21.3	
1-1/2 x 1-1/4	48.3	42.2	63.5
1-1/2 x 1		33.4	
1-1/2 x 3/4		26.7	
1-1/2 x 1/2		21.3	
2 x 1-1/2	60.3	48.3	76.2
2 x 1-1/4		42.2	
2 x 1		33.4	
2 x 3/4		26.7	
2-1/2 x 2	73.0	60.3	88.9
2-1/2 x 1-1/2		48.3	
2-1/2 x 1-1/4		42.2	
2-1/2 x 1		33.4	
3 x 2-1/2	88.9	73.0	88.9
3 x 2		60.3	
3 x 1-1/2		48.3	
3 x 1-1/4		42.2	
3-1/2 x 3	101.6	88.9	101.6
3-1/2 x 2-1/2		73.0	
3-1/2 x 2		60.3	
3-1/2 x 1-1/2		48.3	
3-1/2 x 1-1/4		42.2	
4 x 3-1/2	114.3	101.6	101.6
4 x 3		88.9	
4 x 2-1/2		73.0	
4 x 2		60.3	
4 x 1-1/2		48.3	
5 x 4	141.3	114.3	127.0
5 x 3-1/2		101.6	
5 x 3		88.9	
5 x 2-1/2		73.0	
5 x 2		60.3	
6 x 5	168.3	141.3	139.7
6 x 4		114.3	
6 x 3-1/2		101.6	
6 x 3		88.9	
6 x 2-1/2		73.0	

Nominal Pipe Size (NPS)	Outside Diameter at Bevel		End-to-end
	Large End	Small End	
8 x 6	219.1	168.3	152.4
8 x 5		141.3	
8 x 4		114.3	
8 x 3-1/2		101.6	
8 x 3		88.9	
8 x 2-1/2		73.0	
10 x 8	273.1	29.1	177.8
10 x 6		168.3	
10 x 5		141.3	
10 x 4		114.3	
12 x 10	323.9	273.1	203.2
12 x 8		219.1	
12 x 6		168.3	
12 x 5		141.3	
14 x 12	355.6	323.9	330.2
14 x 10		273.1	
14 x 8		219.1	
14 x 6		168.3	
16 x 14	406.4	355.6	355.6
16 x 12		323.9	
16 x 10		273.1	
16 x 8		219.1	
18 x 16	457.2	406.4	381.0
18 x 14		355.6	
18 x 12		323.9	
18 x 10		273.1	
18 x 8		219.1	
20 x 18	508.0	457.2	508.0
20 x 16		406.4	
20 x 14		355.6	
20 x 12		323.9	
20 x 10		273.0	
22 x 20	558.8	508.0	508.0
22 x 18		457.2	
22 x 16		406.4	
22 x 14		355.6	
22 x 12		323.8	
24 x 22	609.6	558.8	508.0
24 x 20		508.0	
24 x 18		457.2	
24 x 16		406.4	
24 x 16		355.6	
24 x 16		323.8	



SCAN WHATSAPP

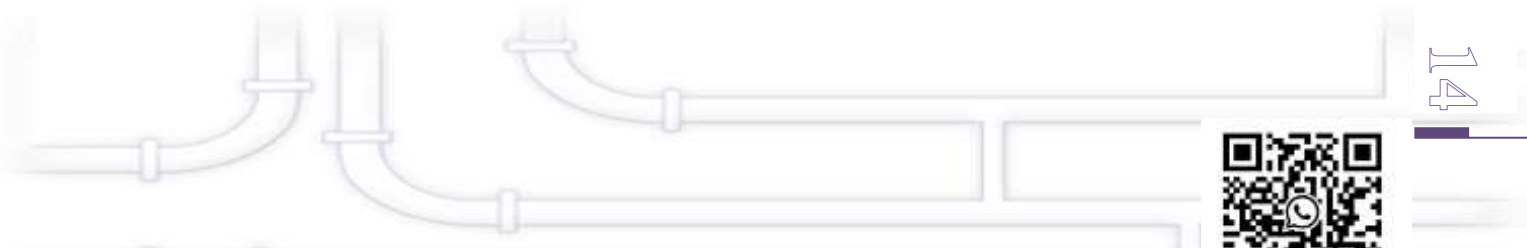
Concentric and Eccentric Reducers



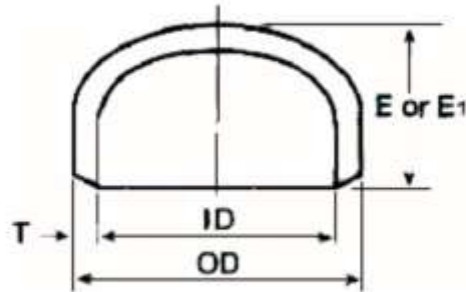
MSS SP-75 ANSI B16.9 (in mm)
* Wellgrow's standard.

Nominal Pipe Size (NPS)	Outside Diameter at Bevel		End-to-end
	Large End	Small End	
26 x 24	660.4	609.6	609.6
26 x 22		558.8	
26 x 20		508.0	
26 x 18		457.2	
26 x 16		406.4	
26 x 14		355.6	
28 x 26	711.2	660.4	609.6
28 x 24		609.6	
28 x 22		559.0	
28 x 20		508.0	
28 x 18		457.2	
28 x 16		406.4	
28 x 14		355.6	
30 x 28	762.0	711.2	609.6
30 x 26		660.4	
30 x 24		609.6	
30 x 22		559.0	
30 x 20		508.0	
30 x 18		457.0	
30 x 16		406.4	
30 x 14		355.6	
32 x 30	813.0	762.0	609.6
32 x 28		711.0	
32 x 26		660.0	
32 x 24		610.0	
32 x 22		559.0	
32 x 20		508.0	
34 x 32	863.6	812.8	609.6
34 x 30		762.0	
34 x 28		711.0	
34 x 26		711.2	
34 x 24		660.4	
34 x 22		559.0	
36 x 34	914.0	864.0	609.6
36 x 32		813.0	
36 x 30		762.0	
36 x 28		711.0	
36 x 26		660.0	
36 x 24		610.0	
36 x 22		559.0	
38 x 36	965.0	914.0	609.6
38 x 34		864.0	
38 x 32		813.0	
38 x 30		762.0	
38 x 28		711.0	
38 x 26		660.0	
38 x 24		610.0	

Nominal Pipe Size (NPS)	Outside Diameter at Bevel		End-to-end
	Large End	Small End	
40 x 38	1016.0	965.0	609.6
40 x 36		914.0	
40 x 34		864.0	
40 x 32		813.0	
40 x 30		762.0	
40 x 28		711.0	
42 x 40	1067.0	1016.0	609.6
42 x 38		965.0	
42 x 36		914.4	
42 x 34		863.6	
42 x 32		812.8	
42 x 30		762.0	
42 x 28		711.0	
44 x 42	1117.6	1066.8	609.6
44 x 40		1016.0	
44 x 38		965.2	
44 x 36		914.4	
44 x 34		864.0	
44 x 32		813.0	
46 x 44	1168.4	1117.6	711.2
46 x 42		1066.8	
46 x 40		1016.0	
46 x 38		965.2	
46 x 36		914.0	
46 x 34		864.0	
48 x 46	1219.2	1168.4	711.2
48 x 44		1117.6	
48 x 42		1066.8	
48 x 40		1016.0	
48 x 38		965.0	
48 x 36		914.0	
52 x 48	1321.0	1219.0	711.2
52 x 46		1168.0	
52 x 44		1118.0	
52 x 42		1067.0	
52 x 40		1016.0	
56 x 52	1422.0	1321.0	711.2
56 x 48		1219.0	
56 x 44		1118.0	
52 x 40		1016.0	
60 x 56	1524.0	1422.0	711.2
60 x 52		1321.0	
60 x 48		1219.0	
60 x 44		1118.0	



Pipe Caps

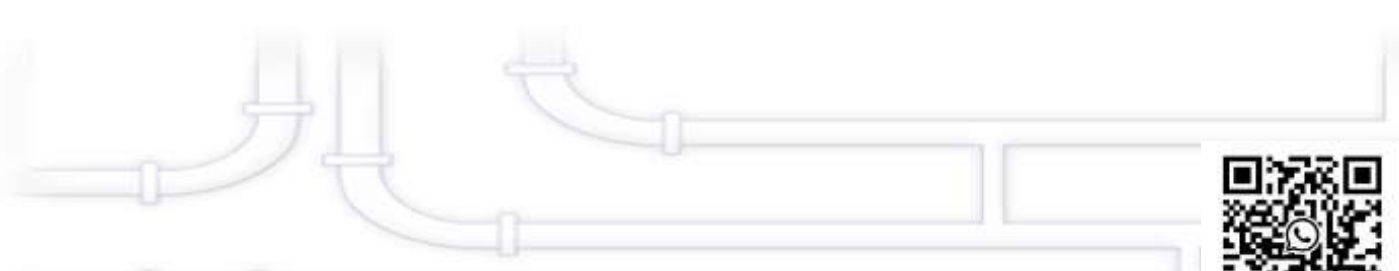


MSS SP-75 ANSI B16.9 (in mm)

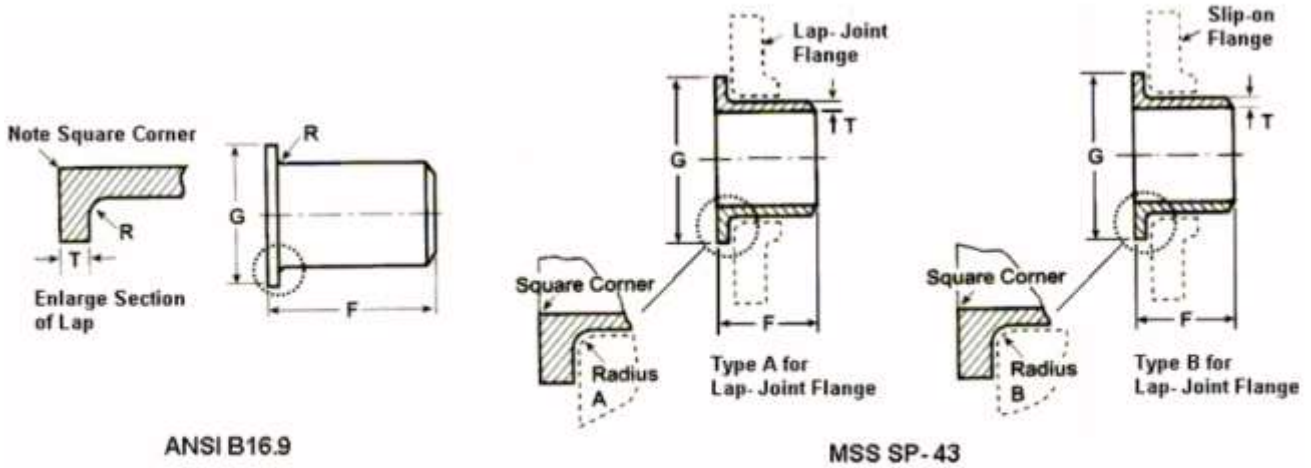
Nominal Pipe Size (NPS)	Outside Diameter at Bevel D	Length (2)	Limiting Wall Thickness for Length	Length (3)
		E	E	E1
1/2	21.3	25.4	4.6	25.4
3/4	26.7	25.4	3.8	25.4
1	33.4	38.1	4.6	38.1
1-1/4	42.2	38.1	4.8	38.1
1-1/2	48.3	38.1	5.1	38.1
2	60.3	38.1	5.6	44.4
2-1/2	73.0	38.1	7.1	50.8
3	88.9	50.8	7.6	63.5
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
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 ANSI B36.10 specifications. Caps 38" and larger conform to XS specifications for wall thickness of 36". These are Wellgrow's 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.



Stub Ends



ANSI B16.9

MSS SP-43

MSS SP-43 ANSI B16.9 (in mm)

Nominal Pipe Size (NPS)	Outside Diameter at Bevel	Outside Diameter of Barrel		Length F		Radius of Fillet R		Diameter of Lap G
		Min.	Max.	ANSI	MSS	ANSI & MSS Type A	MSS Type B	
1/2	21.3	20.55	22.76	76.2	50.8	3.0	0.8	35.0
3/4	26.7	25.88	28.09	76.2	50.8	3.0	0.8	42.9
1	33.4	32.61	34.95	101.6	50.8	3.0	0.8	50.8
1-1/4	42.2	41.38	43.59	101.6	50.8	4.8	0.8	63.5
1-1/2	48.3	47.47	49.94	101.6	50.8	6.4	0.8	73.2
2	60.3	59.54	62.38	152.4	63.5	7.9	0.8	91.9
2-1/2	73.0	72.24	75.34	152.4	63.5	7.9	0.8	104.6
3	88.9	88.11	91.34	152.4	63.5	9.7	0.8	127.0
3-1/2	101.6	100.81	104.04	152.4	76.2	9.7	0.8	139.7
4	114.3	113.51	116.66	152.4	76.2	11.2	0.8	157.2
5	141.3	140.51	144.35	203.2	76.2	11.2	1.5	185.7
6	168.3	167.49	171.27	203.2	88.9	12.7	1.5	215.9
8	219.1	218.29	222.07	203.2	101.6	12.7	1.5	269.7
10	273.1	272.26	277.19	254.0	127.0	12.7	1.5	323.9
12	323.9	323.06	327.99	254.0	152.4	12.7	1.5	381.0
14	355.6	354.81	359.92	304.8	152.4	12.7	1.5	412.8
16	406.4	405.61	410.97	304.8	152.4	12.7	1.5	469.9
18	457.2	456.41	462.03	304.8	152.4	12.7	1.5	533.4
20	508.0	507.21	514.10	304.8	152.4	12.7	1.5	584.2
22	558.8	558.01	564.90	304.8	152.4	12.7	1.5	641.4
24	609.6	608.81	615.70	304.8	152.4	12.7	1.5	692.2



Wall Thickness Schedule

 JIS G3448 JIS G3455 ANSI B36.10M
 JIS G3454 JIS G3459 ANSI B36.19M (in mm)

Nominal Pipe Size		Outside Diameter		Nominal Wall Thickness																		
A	B	JIS	ANSI	Sch 5S	Sch 10S	Sch 20S	GS	Sch 10	LG (7.9)	Sch 20	Sch 30	STD	Sch 40	Sch 60	XS	Sch 80	Sch 100	Sch 120	Sch 140	Sch 160	XXS	
8	1/4	13.8	13.7	1.2	1.65	2.0	2.3	-	-	-	-	(2.2)	2.2	2.4	(3.0)	3.0	-	-	-	-	-	
10	3/8	17.3	17.1	1.2	1.65	2.0	2.3	-	-	-	-	(2.3)	2.3	2.8	(3.2)	3.2	-	-	-	-	-	
15	1/2	21.7	21.3	1.65	2.1	2.5	2.8	-	-	-	-	(2.8)	2.8	3.2	(3.7)	3.7	-	-	-	-	4.7	7.5
20	3/4	27.2	26.7	1.65	2.1	2.5	2.8	-	-	-	-	(2.9)	2.9	3.4	(3.9)	3.9	-	-	-	-	5.5	7.8
25	1	34.0	33.4	1.65	2.8	3.0	3.2	-	-	-	-	(3.4)	3.4	3.9	(4.5)	4.5	-	-	-	-	6.4	9.1
32	1-1/4	42.7	42.2	1.65	2.8	3.0	3.5	-	-	-	-	(3.6)	3.6	4.5	(4.9)	4.9	-	-	-	-	6.4	9.7
40	1-1/2	48.6	48.3	1.65	2.8	3.0	3.5	-	-	-	-	(3.7)	3.7	4.5	(5.1)	5.1	-	-	-	-	7.1	10.2
50	2	60.5	60.3	1.65	2.8	3.5	3.8	-	-	-	-	(3.9)	3.9	4.9	(5.5)	5.5	-	-	-	-	8.7	11.1
65	2-1/2	76.3	73.0	2.1	3.0	3.5	4.2	-	-	-	-	(5.2)	5.2	6.0	(7.0)	7.0	-	-	-	-	9.5	14.0
80	3	89.1	88.9	2.1	3.0	4.0	4.2	-	-	-	-	(5.5)	5.5	6.6	(7.6)	7.6	-	-	-	-	11.1	15.2
90	3-1/2	101.6	101.6	2.1	3.0	4.0	4.2	-	-	-	-	(5.7)	5.7	7.0	(8.1)	8.1	-	-	-	-	12.7	-
100	4	114.3	114.3	2.1	3.0	4.0	4.5	-	-	-	-	(6.0)	6.0	7.1	(8.6)	8.6	-	-	11.1	-	13.5	17.1
125	5	139.8	141.3	2.8	3.4	5.0	4.5	-	-	-	-	(6.6)	6.6	8.1	(9.5)	9.5	-	-	12.7	-	15.9	19.0
150	6	165.2	168.3	2.8	3.4	5.0	5.0	-	5.0**	-	-	(7.1)	7.1	9.3	(11.0)	11.0	-	-	14.3	-	18.2	21.9
175	7	190.7	-	-	-	-	5.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
200	8	216.3	219.1	2.8	3.8	6.5	5.8	-	5.8**	6.4	7.0	(8.2)	8.2	10.3	(12.7)	12.7	15.1	18.2	20.6	23.0	22.2	-
225	9	241.8	-	-	-	-	6.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
250	10	267.4	273.1	3.4	4.2	6.5	6.6	-	6.6**	6.4	7.8	(9.3)	9.3	12.7	12.7	15.1	18.3	21.4	25.4	28.6	25.4	-
300	12	318.5	323.9	4.0	4.6	6.5	6.9	-	6.9**	6.4	8.4	9.5	10.3	14.3	12.7	17.4	21.4	25.4	28.6	33.3	25.4	-
350	14	355.6	355.6	4.0	4.8	7.9	7.9	6.4	7.9	7.9	9.5	9.5	11.1	15.1	12.7	19.0	23.8	27.8	31.8	35.7	-	-
400	16	406.4	406.4	4.2	4.8	7.9	7.9	6.4	7.9	7.9	9.5	9.5	12.7	16.7	12.7	21.4	26.2	30.9	36.5	40.5	-	-
450	18	457.2	457.2	4.2	4.8	7.9	7.9	6.4	7.9	7.9	11.1	9.5	14.3	19.0	12.7	23.8	29.4	34.9	39.7	45.2	-	-
500	20	508.0	508.0	4.8	5.5	7.9	7.9	6.4	7.9	9.5	12.7	9.5	15.1	20.6	12.7	26.2	32.5	38.1	44.4	50.0	-	-
550	22	558.8	558.8	4.8	5.5	-	-	6.4	7.9	9.5	12.7	9.5	-	22.2	12.7	28.6	34.9	41.3	47.6	54.0	-	-
600	24	609.6	609.6	5.5	6.4	-	-	6.4	7.9	9.5	14.3	9.5	17.5	24.6	12.7	31.0	38.9	46.0	52.4	59.5	-	-
650	26	660.4	660.4	-	-	-	-	7.9	7.9	12.7	-	9.5	-	-	12.7	-	-	-	-	-	-	-
700	28	711.2	711.2	-	-	-	-	7.9	7.9	12.7	15.9	9.5	-	-	12.7	-	-	-	-	-	-	-
750	30	762.0	762.0	6.4	7.9	-	-	7.9	7.9	12.7	15.9	9.5	-	-	12.7	-	-	-	-	-	-	-
800	32	812.8	812.8	-	-	-	-	7.9	7.9	12.7	15.9	9.5	17.5	-	12.7	-	-	-	-	-	-	-
850	34	863.6	863.6	-	-	-	-	7.9	7.9	12.7	15.9	9.5	17.5	-	12.7	-	-	-	-	-	-	-
900	36	914.4	914.4	-	-	-	-	7.9	7.9	12.7	15.9	9.5	19.1	-	12.7	-	-	-	-	-	-	-
950	38	965.2	965.2	-	-	-	-	7.9	12.7	-	-	9.5	-	-	12.7	-	-	-	-	-	-	-
1000	40	1016.0	1016.0	-	-	-	-	7.9	-	-	-	9.5	-	-	12.7	-	-	-	-	-	-	-
1050	42	1066.8	1066.8	-	-	-	-	7.9	-	-	-	9.5	-	-	12.7	-	-	-	-	-	-	-
1100	44	1117.6	1117.6	-	-	-	-	7.9	-	-	-	9.5	-	-	12.7	-	-	-	-	-	-	-
1150	46	1168.4	1168.4	-	-	-	-	7.9	-	-	-	9.5	-	-	12.7	-	-	-	-	-	-	-
1200	48	1219.2	1219.2	-	-	-	-	7.9	-	-	-	9.5	-	-	12.7	-	-	-	-	-	-	-
1250	50	1270.0	1270.0	-	-	-	-	7.9	-	-	-	9.5	-	-	12.7	-	-	-	-	-	-	-
1300	52	1320.8	1320.8	-	-	-	-	7.9	-	-	-	9.5	-	-	12.7	-	-	-	-	-	-	-
1350	54	1371.6	1371.6	-	-	-	-	7.9	-	-	-	9.5	-	-	12.7	-	-	-	-	-	-	-
1400	56	1422.4	1422.4	-	-	-	-	7.9	-	-	-	9.5	-	-	12.7	-	-	-	-	-	-	-
1450	58	1473.2	1473.2	-	-	-	-	7.9	-	-	-	9.5	-	-	12.7	-	-	-	-	-	-	-
1500	60	1524.0	1524.0	-	-	-	-	7.9	-	-	-	9.5	-	-	12.7	-	-	-	-	-	-	-
1600	64	1626.0																				
1700	68	1727.0																				
1800	72	1829.0																				
1900	76	1932.0																				
2000	80	2032.0																				

(1) * Wellgrow's standard.
 (2) **Applied only small end side of the tee and reducers.
 (3) The numerical values in parenthesis are the same thickness as Sch. 40 or Sch. 80.

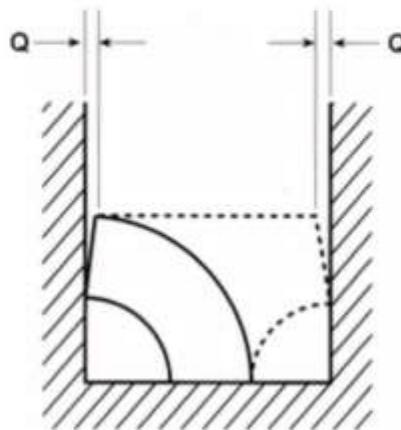
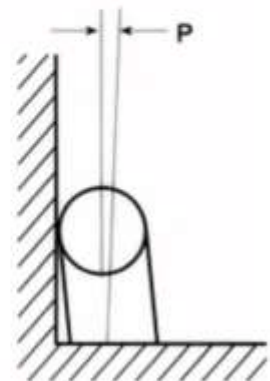


ANSI Dimensional Tolerances

 ANSI B16.9, B16.28 (in mm)
 • Wellgrow's standard

Nominal Pipe Size	All Fittings			90° and 45° Elbows	Tees	Reducers	Caps	180° Returns		
	Outside Diameter at Bevel OD	Inside Diameter at End ID	Wall Thickness T	Center-to-end Dimension A, B	Center-to-end Dimension C, M	Overall Length H	Overall Length E	Center-to-center Dimension P	Back-to-face Dimension K	Alignment of Ends U
1/2-2-1/2	+1.5 -0.7	0.7	Not less than 87.5% of nominal thickness	1.5	1.5	1.5	3.0	6.3	6.3	0.7
3-4	1.5	1.5								
5-8	+2.2 -1.5	1.5		2.2	2.2	2.2	6.3	9.6	0.7	
10-18	+4.0 -3.0	3.0								
20-24	+6.3 -4.8	4.8		3.0	3.0	4.8	9.6	-	-	-
26-30				4.8	4.8					
32-48				9.5	9.5	9.5	9.5			
*50-60	+9.5 -6.4	6.4		12.7	-	-	-	-	-	-
*62-70	+12.7 -9.5	9.5		15.9	-	-	-	-	-	-
*72-80	+15.9 -11.9	11.9								

Nominal Pipe Size	Angularity Tolerance	
	Off Angle Q	Off Plane P
1/2-4	0.7	1.5
5-8	1.5	3.0
10-12	2.2	4.8
14-16		6.3
18-24	3.0	9.6
26-30	4.8	12.7
32-42		19.0
44-48		
*50-60	6.4	
*62-70	9.5	
*72-80	11.9	


Off Angle

Off Plane


MSS Dimensional Tolerances

MSS SP-43 (in mm)

Nominal Pipe Size	All Fittings		90° Elbows 45° Elbows Tees	Reducers Lap Joint Stub Ends	Caps	180° Returns			Lap Joint Stub Ends	
	Outside (1) Diameter at Welding End	Wall Thickness	Center-to-end Dimension	Overall Length	Overall Length	Center-to-center Dimension	Back-to-face Dimension	Alignment of Ends	Fillet (2) Radius of Lap A	Outside Diameter of Lap G
			A, B, C, M	F, H	E	O	K	U		
1/2-1-1/2	0.8	Not less than 87.5% of nominal thickness	1.6	1.6	3.0	6.4	6.4	0.8	+0 -0.8	+0 -0.8
2-3-1/2	0.8		1.6	1.6	3.0	6.4	6.4	0.8	+0 -0.8	+0 -0.8
4	0.8		1.6	1.6	3.0	6.4	6.4	0.8	+0 -1.6	+0 -0.8
5-8	+1.6 -0.8		1.6	1.6	6.4	6.4	6.4	0.8	+0 -1.6	+0 -0.8
10-18	+2.3 -0.8		2.3	2.3	6.4	9.7	6.4	1.6	+0 -1.6	+0 -1.6
20-24	+3.0 -0.8		2.3	2.3	6.4	9.7	6.4	1.6	+0 -1.6	+0 -1.6

- (1) Out of roundness is the vector sum of the plus and minus tolerance.
- (2) Fillet B radius is the maximum.

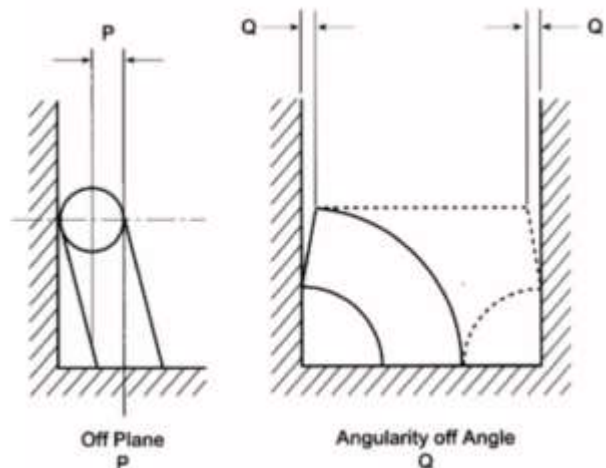
MSS Dimensional Tolerances

MSS SP-75 (in mm)

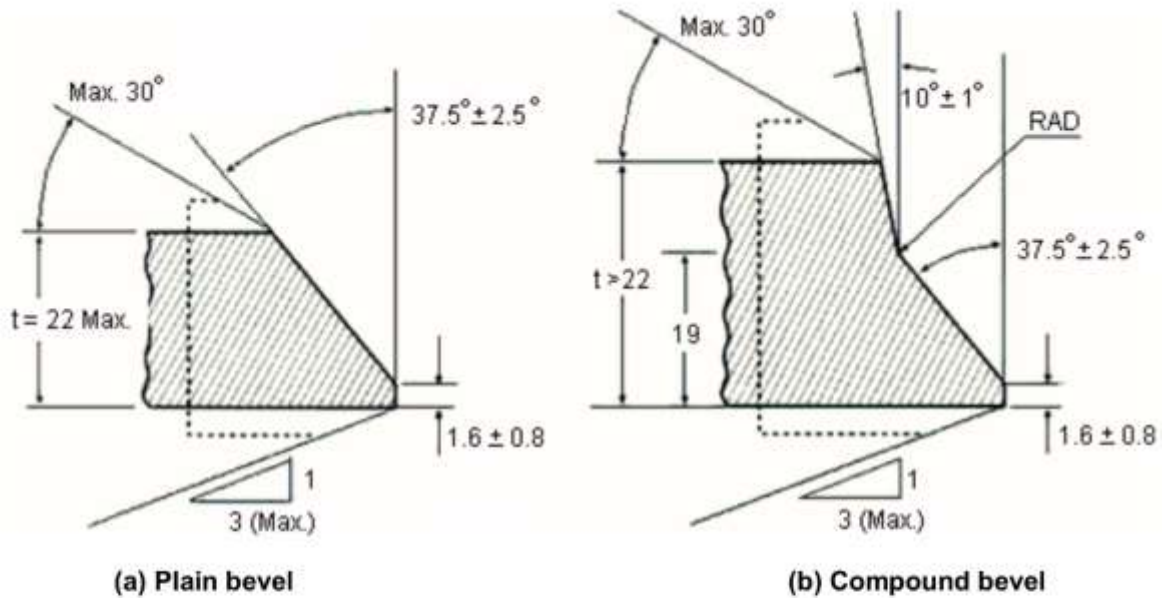
Nominal Pipe Size	Inside (1) Diameter at End	Minimum (3) Wall Thickness	Out-of-roundness (2)			90°, 60°, 45°, 30° Elbows & Tees		Reducers Overall Length	Caps Overall Length	Angularity Off Angle	Elbows Off Plane	Eccentric and Concentric Reducers Off Plane P (6)
			At Ends of fittings		Throughout (4) Body of Elbows	Center-to-end Dimension A, B, C, M						
			Elbows (5)	Other		1-1/2R & Tee	3R					
16-24	2.3	Nominal	4.8	3.0	2.5%	2.3	3.0	2.3	6.4	1.5	6.4	2.5%
26-36	2.3	-0.25	(5)	3.0	2.5%	3.0	6.4	4.8	9.6	2.3	12.7	2.5%
38-48	3.0		(5)	3.0	2.5%	4.8	9.6	9.6	9.6	3.0	19.1	2.5%

- (1) The inside diameter at end shall be determined by circumferential measurement, and the tolerance refers to variations from nominal I.D. calculation by $(OD \text{ nom}^{-2}) \text{ nom}$.
- (2) Out-of-roundness tolerances shall be the difference between the maximum and minimum diameters measured on any radial cross-section.
- (3) Minus 0.01 in. except that isolated non-continuous reductions are permitted in accordance with subsection 13.2.1. Excess thickness whether on inside or outside is to be treated in accordance with sketch given in figure 3.
- (4) When elbows are intended for field segmenting, out-of-roundness tolerance may be furnished to 1% by agreement between the manufacturer and the purchaser. It is recognized that extra thickness, if any, may be on the I.D.
- (5) Out-of-roundness tolerances at ends shall be 1% of diameter for NPS 26 and larger.
- (6) Percent of O.D.

Outside diameter may be tapered at angle up to 30° beyond weld level.



Weld End Preparation



Nominal Pipe Wall Thickness (t)	End Preparation
Less than x*	Cut square or slightly chamfer, at manufacturer's option
X* to 22 included	Plain bevel as in sketch "a" above
More than 22	Compound bevel as in sketch "b" above

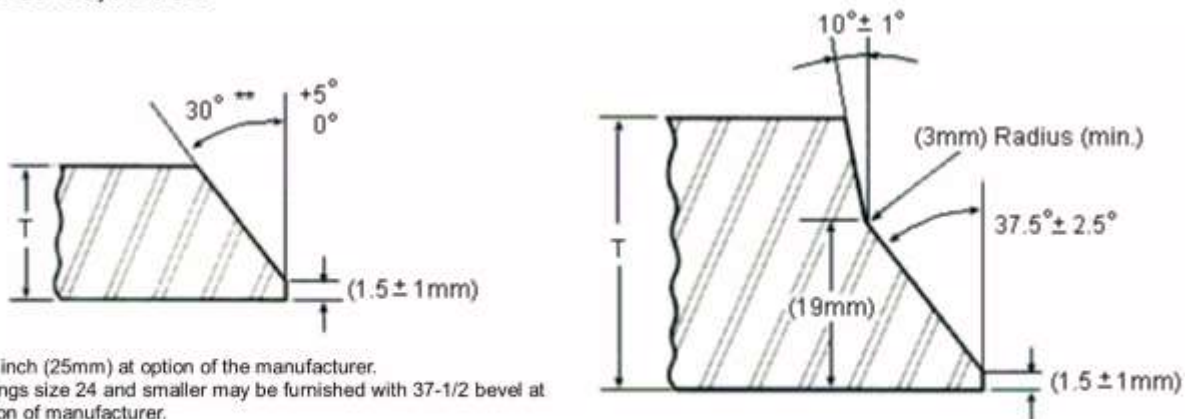
X* = 5 for carbon steel, ferritic alloy steel or wrought iron;
4 for austenitic alloy steel

(in mm)

Notes:

- (1) End preparations are in accordance with ANSI B16.25 Paragraph 4.2.
- (2) End preparations conforming to customer specifications will be specially manufactured upon consultation.

MSS SP-75, API 5L



* Or 1 inch (25mm) at option of the manufacturer.
** Fittings size 24 and smaller may be furnished with 37-1/2 bevel at option of manufacturer.

Recommended bevel for wall thickness (T) at end of fitting, 19mm* or less.

Recommended bevel for wall thickness (T) at end of fitting, greater than 19mm.





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