

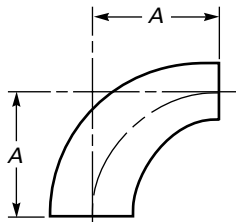
**TABLE 3 DIMENSIONS OF LONG RADIUS ELBOWS**

Nominal Pipe Size (NPS)	DN	Outside Diameter at Bevel	Center-to-End	
			90 Deg Elbows, A	45 Deg Elbows, B
1/2	15	21.3	38	16
3/4	20 [Note (1)]	26.7	38	19
1	25	33.4	38	22
1 1/4	32	42.2	48	25
1 1/2	40	48.3	57	29
2	50	60.3	76	35
2 1/2	65	73.0	95	44
3	80	88.9	114	51
3 1/2	90	101.6	133	57
4	100	114.3	152	64
5	125	141.3	190	79
6	150	168.3	229	95
8	200	219.1	305	127
10	250	273.0	381	159
12	300	323.8	457	190
14	350	355.6	533	222
16	400	406.4	610	254
18	450	457	686	286
20	500	508	762	318
22	550	559	838	343
24	600	610	914	381
26	650	660	991	405
28	700	711	1067	438
30	750	762	1143	470
32	800	813	1219	502
34	850	864	1295	533
36	900	914	1372	565
38	950	965	1448	600
40	1000	1016	1524	632
42	1050	1067	1600	660
44	1100	1118	1676	695
46	1150	1168	1753	727
48	1200	1219	1829	759

GENERAL NOTE: All dimensions are in millimeters.

NOTE:

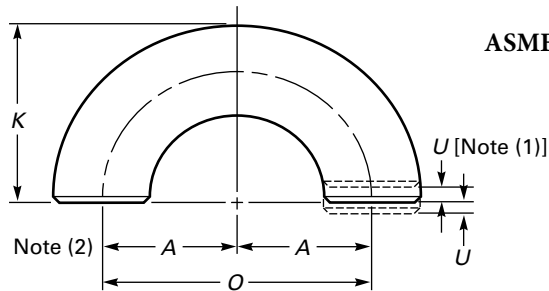
(1) A and B dimensions of 29 mm and 11 mm, respectively, may be furnished for NPS 3/4 (DN20) at the manufacturer's option.



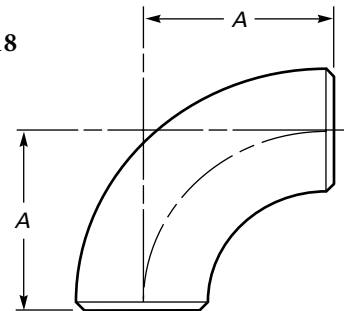
**TABLE 4 DIMENSIONS OF LONG RADIUS-REDUCING ELBOWS**

Nominal Pipe Size (NPS)	DN	Outside Diameter at Bevel		Center-to-End, A	Nominal Pipe Size (NPS)	DN	Outside Diameter at Bevel		Center-to-End, A
		Large End	Small End				Large End	Small End	
2 × 1½	50 × 40	60.3	48.3	76	10 × 8	250 × 200	273.0	219.1	381
2 × 1¼	50 × 32	60.3	42.2	76	10 × 6	250 × 150	273.0	168.3	381
2 × 1	50 × 25	60.3	33.4	76	10 × 5	250 × 125	273.0	141.3	381
2½ × 2	65 × 50	73.0	60.3	95	12 × 10	300 × 250	323.8	273.0	457
2½ × 1½	65 × 40	73.0	48.3	95	12 × 8	300 × 200	323.8	219.1	457
2½ × 1¼	65 × 32	73.0	42.2	95	12 × 6	300 × 150	323.8	168.3	457
3 × 2½	80 × 65	88.9	73.0	114	14 × 12	350 × 300	355.6	323.8	533
3 × 2	80 × 50	88.9	60.3	114	14 × 10	350 × 250	355.6	273.0	533
3 × 1½	80 × 40	88.9	48.3	114	14 × 8	350 × 200	355.6	219.1	533
3½ × 3	90 × 80	101.6	88.9	133	16 × 14	400 × 350	406.4	355.6	610
3½ × 2½	90 × 65	101.6	73.0	133	16 × 12	400 × 300	406.4	323.8	610
3½ × 2	90 × 50	101.6	60.3	133	16 × 10	400 × 250	406.4	273.0	610
4 × 3½	100 × 90	114.3	101.6	152	18 × 16	450 × 400	457	406.4	686
4 × 3	100 × 80	114.3	88.9	152	18 × 14	450 × 350	457	355.6	686
4 × 2½	100 × 65	114.3	73.0	152	18 × 12	450 × 300	457	323.8	686
4 × 2	100 × 50	114.3	60.3	152	18 × 10	450 × 250	457	273.0	686
5 × 4	125 × 100	141.3	114.3	190	20 × 18	500 × 450	508	457	762
5 × 3½	125 × 90	141.3	101.6	190	20 × 16	500 × 400	508	406.4	762
5 × 3	125 × 80	141.3	88.9	190	20 × 14	500 × 350	508	355.6	762
5 × 2½	125 × 65	141.3	73.0	190	20 × 12	500 × 300	508	323.8	762
6 × 5	150 × 125	168.3	141.3	229	20 × 10	500 × 250	610	273.0	762
6 × 4	150 × 100	168.3	114.3	229	24 × 22	600 × 550	610	559	914
6 × 3½	150 × 90	168.3	101.6	229	24 × 20	600 × 500	610	508	914
6 × 3	150 × 80	168.3	88.9	229	24 × 18	600 × 450	610	457	914
8 × 6	200 × 150	219.1	168.3	305	24 × 16	600 × 400	610	406.4	914
8 × 5	200 × 125	219.1	141.3	305	24 × 14	600 × 350	610	355.6	914
8 × 4	200 × 100	219.1	114.3	305	24 × 12	600 × 300	610	323.8	914

GENERAL NOTE: All dimensions are in millimeters.



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**TABLE 5 DIMENSIONS OF LONG RADIUS RETURNS**

Nominal Pipe Size (NPS)	DN	Outside Diameter at Bevel	Center-to-Center, D	Back-to-Face, K
1/2	15	21.3	76	48
3/4	20 [Note (3)]	26.7	76	51
1	25	33.4	76	56
1 1/4	32	42.2	95	70
1 1/2	40	48.3	114	83
2	50	60.3	152	106
2 1/2	65	73.0	190	132
3	80	88.9	229	159
3 1/2	90	101.6	267	184
4	100	114.3	305	210
5	125	141.3	381	262
6	150	168.3	457	313
8	200	219.1	610	414
10	250	273.0	762	518
12	300	323.8	914	619
14	350	355.6	1067	711
16	400	406.4	1219	813
18	450	457	1372	914
20	500	508	1524	1016
22	550	559	1676	1118
24	600	610	1829	1219

**TABLE 6 DIMENSIONS OF SHORT RADIUS ELBOWS**

Nominal Pipe Size (NPS)	DN	Outside Diameter at Bevel	Center-to-End, A
1	25	33.4	25
1 1/4	32	42.2	32
1 1/2	40	48.3	38
2	50	60.3	51
2 1/2	65	73.0	64
3	80	88.9	76
3 1/2	90	101.6	89
4	100	114.3	102
5	125	141.3	127
6	150	168.3	152
8	200	219.1	203
10	250	273.0	254
12	300	323.8	305
14	350	355.6	356
16	400	406.4	406
18	450	457	457
20	500	508	508
22	550	559	559
24	600	610	610

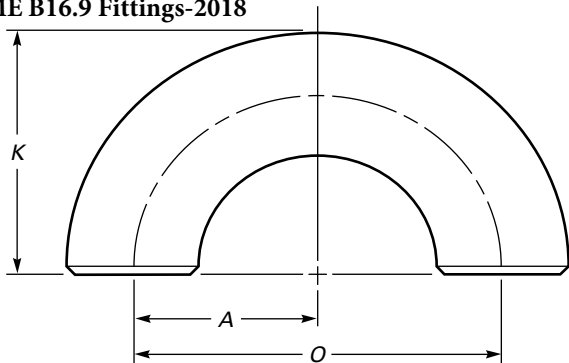
GENERAL NOTE: All dimensions are in millimeters.

GENERAL NOTE: All dimensions are in millimeters.

NOTES:

- (1) See Table 2 for tolerance for alignment of ends *U*.
- (2) Dimension *A* is equal to one-half of dimension *O*.
- (3) *O* and *K* dimensions of 57 mm and 43 mm, respectively, may be furnished for NPS 3/4 (DN 20) at the manufacturer's option.

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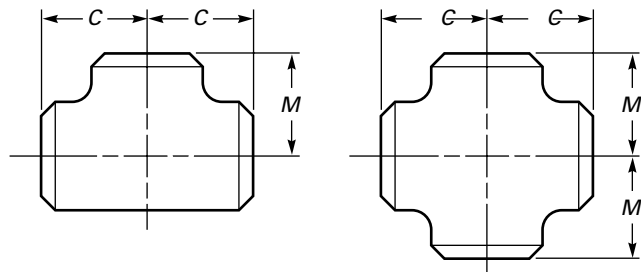


**TABLE 7 DIMENSIONS OF SHORT RADIUS 180 deg RETURNS**

Nominal Pipe Size (NPS)	DN	Outside Diameter at Bevel	Center-to-Center, O	Back-to-Face, K
1	25	33.4	51	41
1¼	32	42.2	64	52
1½	40	48.3	76	62
2	50	60.3	102	81
2½	65	73.0	127	100
3	80	88.9	152	121
3½	90	101.6	178	140
4	100	114.3	203	159
5	125	141.3	254	197
6	150	168.3	305	237
8	200	219.1	406	313
10	250	273.0	508	391
12	300	323.8	610	467
14	350	355.6	711	533
16	400	406.4	813	610
18	450	457	914	686
20	500	508	1016	762
22	550	559	1118	838
24	600	610	1219	914

GENERAL NOTES:

- (a) All dimensions are in millimeters.
- (b) Dimension A is equal to one-half of dimension O.



**TABLE 8 DIMENSIONS OF STRAIGHT TEES AND CROSSES**

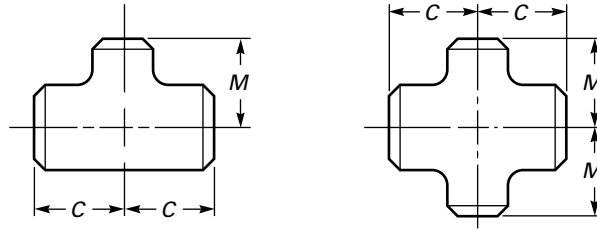
Nominal Pipe Size (NPS)	DN	Outside Diameter at Bevel	Center-to-End	
			Run, C	Outlet, M [Notes (1) and (2)]
½	15	21.3	25	25
¾	20	26.7	29	29
1	25	33.4	38	38
1¼	32	42.2	48	48
1½	40	48.3	57	57
2	50	60.3	64	64
2½	65	73.0	76	76
3	80	88.9	86	86
3½	90	101.6	95	95
4	100	114.3	105	105
5	125	141.3	124	124
6	150	168.3	143	143
8	200	219.1	178	178
10	250	273.0	216	216
12	300	323.8	254	254
14	350	355.6	279	279
16	400	406.4	305	305
18	450	457	343	343
20	500	508	381	381
22	550	559	419	419
24	600	610	432	432
26	650	660	495	495
28	700	711	521	521
30	750	762	559	559
32	800	813	597	597
34	850	864	635	635
36	900	914	673	673
38	950	965	711	711
40	1000	1016	749	749
42	1050	1067	762	711
44	1100	1118	813	762
46	1150	1168	851	800
48	1200	1219	889	838

GENERAL NOTE: All dimensions are in millimeters.

NOTES:

- (1) Outlet dimension M for NPS 26 (DN 650) and larger is recommended but not required.
- (2) Dimensions applicable to crosses NPS 24 (DN 600) and smaller.

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**TABLE 9 DIMENSIONS OF REDUCING OUTLET TEES AND REDUCING OUTLET CROSSES**

Nominal Pipe Size (NPS)	DN	Outside Diameter at Bevel		Center-to-End	
		Run	Outlet	Run, C	Outlet, M [Note (1)]
$\frac{1}{2} \times \frac{1}{2} \times \frac{3}{8}$	15 x 15 x 10	21.3	17.3	25	25
$\frac{1}{2} \times \frac{1}{2} \times \frac{1}{4}$	15 x 15 x 8	21.3	13.7	25	25
$\frac{3}{4} \times \frac{3}{4} \times \frac{1}{2}$	20 x 20 x 15	26.7	21.3	29	29
$\frac{3}{4} \times \frac{3}{4} \times \frac{3}{8}$	20 x 20 x 10	26.7	17.3	29	29
$1 \times 1 \times \frac{3}{4}$	25 x 25 x 20	33.4	26.7	38	38
$1 \times 1 \times \frac{1}{2}$	25 x 25 x 15	33.4	21.3	38	38
$1\frac{1}{4} \times 1\frac{1}{4} \times 1$	32 x 32 x 25	42.2	33.4	48	48
$1\frac{1}{4} \times 1\frac{1}{4} \times \frac{3}{4}$	32 x 32 x 20	42.2	26.7	48	48
$1\frac{1}{4} \times 1\frac{1}{4} \times \frac{1}{2}$	32 x 32 x 15	42.2	21.3	48	48
$1\frac{1}{2} \times 1\frac{1}{2} \times 1\frac{1}{4}$	40 x 40 x 32	48.3	42.2	57	57
$1\frac{1}{2} \times 1\frac{1}{2} \times 1$	40 x 40 x 25	48.3	33.4	57	57
$1\frac{1}{2} \times 1\frac{1}{2} \times \frac{3}{4}$	40 x 40 x 20	48.3	26.7	57	57
$1\frac{1}{2} \times 1\frac{1}{2} \times \frac{1}{2}$	40 x 40 x 15	48.3	21.3	57	57
$2 \times 2 \times 1\frac{1}{2}$	50 x 50 x 40	60.3	48.3	64	60
$2 \times 2 \times 1\frac{1}{4}$	50 x 50 x 32	60.3	42.2	64	57
$2 \times 2 \times 1$	50 x 50 x 25	60.3	33.4	64	51
$2 \times 2 \times \frac{3}{4}$	50 x 50 x 20	60.3	26.7	64	44
$2\frac{1}{2} \times 2\frac{1}{2} \times 2$	65 x 65 x 50	73.0	60.3	76	70
$2\frac{1}{2} \times 2\frac{1}{2} \times 1\frac{1}{2}$	65 x 65 x 40	73.0	48.3	76	67
$2\frac{1}{2} \times 2\frac{1}{2} \times 1\frac{1}{4}$	65 x 65 x 32	73.0	42.2	76	64
$2\frac{1}{2} \times 2\frac{1}{2} \times 1$	65 x 65 x 25	73.0	33.4	76	57
$3 \times 3 \times 2\frac{1}{2}$	80 x 80 x 65	88.9	73.0	86	83
$3 \times 3 \times 2$	80 x 80 x 50	88.9	60.3	86	76
$3 \times 3 \times 1\frac{1}{2}$	80 x 80 x 40	88.9	48.3	86	73
$3 \times 3 \times 1\frac{1}{4}$	80 x 80 x 32	88.9	42.2	86	70
$3\frac{1}{2} \times 3\frac{1}{2} \times 3$	90 x 90 x 80	101.6	88.9	95	92
$3\frac{1}{2} \times 3\frac{1}{2} \times 2\frac{1}{2}$	90 x 90 x 65	101.6	73.0	95	89
$3\frac{1}{2} \times 3\frac{1}{2} \times 2$	90 x 90 x 50	101.6	60.3	95	83
$3\frac{1}{2} \times 3\frac{1}{2} \times 1\frac{1}{2}$	90 x 90 x 40	101.6	48.3	95	79
$4 \times 4 \times 3\frac{1}{2}$	100 x 100 x 90	114.3	101.6	105	102
$4 \times 4 \times 3$	100 x 100 x 80	114.3	88.9	105	98
$4 \times 4 \times 2\frac{1}{2}$	100 x 100 x 65	113.3	73.0	105	95
$4 \times 4 \times 2$	100 x 100 x 50	114.3	60.3	105	89
$4 \times 4 \times 1\frac{1}{2}$	100 x 100 x 40	114.3	48.3	105	86
$5 \times 5 \times 4$	125 x 125 x 100	141.3	114.3	125	117
$5 \times 5 \times 3\frac{1}{2}$	125 x 125 x 90	141.3	101.6	124	114
$5 \times 5 \times 3$	125 x 125 x 80	141.3	88.9	124	111
$5 \times 5 \times 2\frac{1}{2}$	125 x 125 x 65	141.3	73.0	124	108
$5 \times 5 \times 2$	125 x 125 x 50	141.3	60.3	124	105

(continued)

**TABLE 9 DIMENSIONS OF REDUCING OUTLET TEES AND REDUCING OUTLET CROSSES  
(CONT'D)**

Nominal Pipe Size (NPS)	DN	Outside Diameter at Bevel		Center-to-End	
		Run	Outlet	Run, C	Outlet, <i>M</i> [Note (1)]
6 × 6 × 5	150 × 150 × 125	168.3	141.3	143	137
6 × 6 × 4	150 × 150 × 100	168.3	114.3	143	130
6 × 6 × 3½	150 × 150 × 90	168.3	101.6	143	127
6 × 6 × 3	150 × 150 × 80	168.3	88.9	143	124
6 × 6 × 2½	150 × 150 × 65	168.3	73.0	143	121
8 × 8 × 6	200 × 200 × 150	219.1	168.3	178	168
8 × 8 × 5	200 × 200 × 125	219.1	141.3	178	162
8 × 8 × 4	200 × 200 × 100	219.1	114.3	178	156
8 × 8 × 3½	200 × 200 × 90	219.1	101.6	178	152
10 × 10 × 8	250 × 250 × 200	273.0	219.1	216	203
10 × 10 × 6	250 × 250 × 150	273.0	168.3	216	194
10 × 10 × 5	250 × 250 × 125	273.0	141.3	216	191
10 × 10 × 4	250 × 250 × 100	273.0	114.3	216	184
12 × 12 × 10	300 × 300 × 250	323.8	273.0	254	241
12 × 12 × 8	300 × 300 × 200	323.8	219.1	254	229
12 × 12 × 6	300 × 300 × 150	323.8	168.3	254	219
12 × 12 × 5	300 × 300 × 125	323.8	141.3	254	216
14 × 14 × 12	350 × 350 × 300	355.6	323.8	279	270
14 × 14 × 10	350 × 350 × 250	355.6	273.0	279	257
14 × 14 × 8	350 × 350 × 200	355.6	219.1	279	248
14 × 14 × 6	350 × 350 × 150	355.6	168.3	279	238
16 × 16 × 14	400 × 400 × 350	406.4	355.6	305	305
16 × 16 × 12	400 × 400 × 300	406.4	323.8	305	295
16 × 16 × 10	400 × 400 × 250	406.4	273.0	305	283
16 × 16 × 8	400 × 400 × 200	406.4	219.1	305	273
16 × 16 × 6	400 × 400 × 150	406.4	168.3	305	264
18 × 18 × 16	450 × 450 × 400	457	406.4	343	330
18 × 18 × 14	450 × 450 × 350	457	355.6	343	330
18 × 18 × 12	450 × 450 × 300	457	323.8	343	321
18 × 18 × 10	450 × 450 × 250	457	273.0	343	308
18 × 18 × 8	450 × 450 × 200	457	219.1	343	298
20 × 20 × 18	500 × 500 × 450	508	457	381	368
20 × 20 × 16	500 × 500 × 400	508	406.4	381	356
20 × 20 × 14	500 × 500 × 350	508	355.6	381	356
20 × 20 × 12	500 × 500 × 300	508	323.8	381	346
20 × 20 × 10	500 × 500 × 250	508	273.0	381	333
20 × 20 × 8	500 × 500 × 200	508	219.1	381	324
22 × 22 × 20	550 × 550 × 500	559	508	419	406
22 × 22 × 18	550 × 550 × 450	559	457	419	394
22 × 22 × 16	550 × 550 × 400	559	406.4	419	381
22 × 22 × 14	550 × 550 × 350	559	355.6	419	381
22 × 22 × 12	550 × 550 × 300	559	323.8	419	371
22 × 22 × 10	550 × 550 × 250	559	273.0	419	359

(continued)

**TABLE 9 DIMENSIONS OF REDUCING OUTLET TEES AND REDUCING OUTLET CROSSES (CONT'D)**

Nominal Pipe Size (NPS)	DN	Outside Diameter at Bevel		Center-to-End	
		Run	Outlet	Run, C	Outlet, M [Note (1)]
24 × 24 × 22	600 × 600 × 550	610	559	432	432
24 × 24 × 20	600 × 600 × 500	610	508	432	432
24 × 24 × 18	600 × 600 × 450	610	457	432	419
24 × 24 × 16	600 × 600 × 400	610	406.4	432	406
24 × 24 × 14	600 × 600 × 350	610	355.6	432	406
24 × 24 × 12	600 × 600 × 300	610	323.8	432	397
24 × 24 × 10	600 × 600 × 250	610	273.0	432	384
26 × 26 × 24	650 × 650 × 600	660	610	495	483
26 × 26 × 22	650 × 650 × 550	660	559	495	470
26 × 26 × 20	650 × 650 × 500	660	508	495	457
26 × 26 × 18	650 × 650 × 450	660	457	495	444
26 × 26 × 16	650 × 650 × 400	660	406.4	495	432
26 × 26 × 14	650 × 650 × 350	660	355.6	495	432
26 × 26 × 12	650 × 650 × 300	660	323.8	495	422
28 × 28 × 26	700 × 700 × 650	711	660	521	521
28 × 28 × 24	700 × 700 × 600	711	610	521	508
28 × 28 × 22	700 × 700 × 550	711	559	521	495
28 × 28 × 20	700 × 700 × 500	711	508	521	483
28 × 28 × 18	700 × 700 × 450	711	457	521	470
28 × 28 × 16	700 × 700 × 400	711	406.4	521	457
28 × 28 × 14	700 × 700 × 350	711	355.6	521	457
28 × 28 × 12	700 × 700 × 300	711	323.8	521	448
30 × 30 × 28	750 × 750 × 700	762	711	559	546
30 × 30 × 26	750 × 750 × 650	762	660	559	546
30 × 30 × 24	750 × 750 × 600	762	610	559	533
30 × 30 × 22	750 × 750 × 550	762	559	559	521
30 × 30 × 20	750 × 750 × 500	762	508	559	508
30 × 30 × 18	750 × 750 × 450	762	457	559	495
30 × 30 × 16	750 × 750 × 400	762	406.4	559	483
30 × 30 × 14	750 × 750 × 350	762	355.6	559	483
30 × 30 × 12	750 × 750 × 300	762	323.8	559	473
30 × 30 × 10	750 × 750 × 250	762	273.0	559	460
32 × 32 × 30	800 × 800 × 750	813	762	597	584
32 × 32 × 28	800 × 800 × 700	813	711	597	572
32 × 32 × 26	800 × 800 × 650	813	660	597	572
32 × 32 × 24	800 × 800 × 600	813	610	597	559
32 × 32 × 22	800 × 800 × 550	813	559	597	546
32 × 32 × 20	800 × 800 × 500	813	508	597	533
32 × 32 × 18	800 × 800 × 450	813	457	597	521
32 × 32 × 16	800 × 800 × 400	813	406.4	597	508
32 × 32 × 14	800 × 800 × 350	813	355.6	597	508
34 × 34 × 32	850 × 850 × 800	864	813	635	622
34 × 34 × 30	850 × 850 × 750	864	762	635	610
34 × 34 × 28	850 × 850 × 700	864	711	635	597
34 × 34 × 26	850 × 850 × 650	864	600	635	597
34 × 34 × 24	850 × 850 × 600	864	610	635	584
34 × 34 × 22	850 × 850 × 550	864	559	635	572
34 × 34 × 20	850 × 850 × 500	864	508	635	559

(continued)

**TABLE 9 DIMENSIONS OF REDUCING OUTLET TEES AND REDUCING OUTLET CROSSES  
(CONT'D)**

Nominal Pipe Size (NPS)	DN	Outside Diameter at Bevel		Center-to-End	
		Run	Outlet	Run, C	Outlet, M [Note (1)]
34 × 34 × 18	850 × 850 × 450	864	457	635	546
34 × 34 × 16	850 × 850 × 400	864	406.4	635	533
36 × 36 × 34	900 × 900 × 850	914	864	673	660
36 × 36 × 32	900 × 900 × 800	914	813	673	648
36 × 36 × 30	900 × 900 × 750	914	762	673	635
36 × 36 × 28	900 × 900 × 700	914	711	673	622
36 × 36 × 26	900 × 900 × 650	914	660	673	622
36 × 36 × 24	900 × 900 × 600	914	610	673	610
36 × 36 × 22	900 × 900 × 550	914	559	673	597
36 × 36 × 20	900 × 900 × 500	914	508	673	584
36 × 36 × 18	900 × 900 × 450	914	457	673	572
36 × 36 × 16	900 × 900 × 400	914	406.4	673	559
38 × 38 × 36	950 × 950 × 900	965	914	711	711
38 × 38 × 34	950 × 950 × 850	965	864	711	698
38 × 38 × 32	950 × 950 × 800	965	813	711	686
38 × 38 × 30	950 × 950 × 750	965	762	711	673
38 × 38 × 28	950 × 950 × 700	965	711	711	648
38 × 38 × 26	950 × 950 × 650	965	660	711	648
38 × 38 × 24	950 × 950 × 600	965	610	711	635
38 × 38 × 22	950 × 950 × 550	965	559	711	622
38 × 38 × 20	950 × 950 × 500	965	508	711	610
38 × 38 × 18	950 × 950 × 450	965	457	711	597
40 × 40 × 38	1000 × 1000 × 950	1016	965	749	749
40 × 40 × 36	1000 × 1000 × 900	1016	914	749	737
40 × 40 × 34	1000 × 1000 × 850	1016	864	749	724
40 × 40 × 32	1000 × 1000 × 800	1016	813	749	711
40 × 40 × 30	1000 × 1000 × 750	1016	762	749	698
40 × 40 × 28	1000 × 1000 × 700	1016	711	749	673
40 × 40 × 26	1000 × 1000 × 650	1016	560	749	673
40 × 40 × 24	1000 × 1000 × 600	1016	610	749	660
40 × 40 × 22	1000 × 1000 × 550	1016	559	749	648
40 × 40 × 20	1000 × 1000 × 500	1016	508	749	635
40 × 40 × 18	1000 × 1000 × 450	1016	457	749	622
42 × 42 × 40	1050 × 1050 × 1000	1067	1016	762	711
42 × 42 × 38	1050 × 1050 × 950	1067	968	762	711
42 × 42 × 36	1050 × 1050 × 900	1067	914	762	711
42 × 42 × 34	1050 × 1050 × 850	1067	864	762	711
42 × 42 × 32	1050 × 1050 × 800	1067	813	762	711
42 × 42 × 30	1050 × 1050 × 750	1067	762	762	711
42 × 42 × 28	1050 × 1050 × 700	1067	711	762	698
42 × 42 × 26	1050 × 1050 × 650	1067	660	762	698
42 × 42 × 24	1050 × 1050 × 600	1067	610	762	660
42 × 42 × 22	1050 × 1050 × 550	1067	559	762	660
42 × 42 × 20	1050 × 1050 × 500	1067	508	762	660
42 × 42 × 18	1050 × 1050 × 450	1067	457	762	648
42 × 42 × 16	1050 × 1050 × 400	1067	406.4	762	635
44 × 44 × 42	1100 × 1100 × 1050	1118	1067	813	762
44 × 44 × 40	1100 × 1100 × 1000	1118	1016	813	749

(continued)



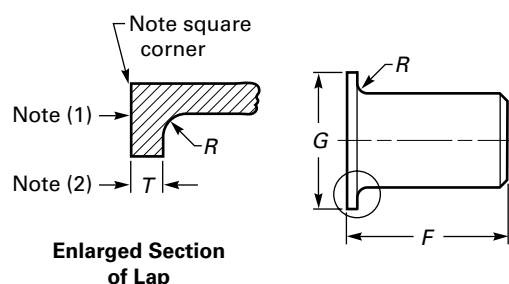
**TABLE 9 DIMENSIONS OF REDUCING OUTLET TEES AND REDUCING OUTLET CROSSES (CONT'D)**

Nominal Pipe Size (NPS)	DN	Outside Diameter at Bevel		Center-to-End	
		Run	Outlet	Run, C	Outlet, M [Note (1)]
44 x 44 x 38	1100 x 1100 x 950	1118	965	813	737
44 x 44 x 36	1100 x 1100 x 900	1118	914	813	724
44 x 44 x 34	1100 x 1100 x 850	1118	864	813	724
44 x 44 x 32	1100 x 1100 x 800	1118	813	813	711
44 x 44 x 30	1100 x 1100 x 750	1118	762	813	711
44 x 44 x 28	1100 x 1100 x 700	1118	711	813	698
44 x 44 x 26	1100 x 1100 x 650	1118	660	813	698
44 x 44 x 24	1100 x 1100 x 600	1118	610	813	698
44 x 44 x 22	1100 x 1100 x 550	1118	559	813	686
44 x 44 x 20	1100 x 1100 x 500	1118	508	813	686
46 x 46 x 44	1150 x 1150 x 1100	1168	1118	851	800
46 x 46 x 42	1150 x 1150 x 1050	1168	1067	851	787
46 x 46 x 40	1150 x 1150 x 1000	1168	1016	851	775
46 x 46 x 38	1150 x 1150 x 950	1168	965	851	762
46 x 46 x 36	1150 x 1150 x 900	1168	914	851	762
46 x 46 x 34	1150 x 1150 x 850	1168	864	851	749
46 x 46 x 32	1150 x 1150 x 800	1168	813	851	749
46 x 46 x 30	1150 x 1150 x 750	1168	762	851	737
46 x 46 x 28	1150 x 1150 x 700	1168	711	851	737
46 x 46 x 26	1150 x 1150 x 650	1168	660	851	737
46 x 46 x 24	1150 x 1150 x 600	1168	610	851	724
46 x 46 x 22	1150 x 1150 x 550	1168	559	851	724
48 x 48 x 46	1200 x 1200 x 1150	1219	1168	889	838
48 x 48 x 44	1200 x 1200 x 1100	1219	1118	889	838
48 x 48 x 42	1200 x 1200 x 1050	1219	1067	889	813
48 x 48 x 40	1200 x 1200 x 1000	1219	1016	889	813
48 x 48 x 38	1200 x 1200 x 950	1219	965	889	813
48 x 48 x 36	1200 x 1200 x 900	1219	914	889	787
48 x 48 x 34	1200 x 1200 x 850	1219	864	889	787
48 x 48 x 32	1200 x 1200 x 800	1219	813	889	787
48 x 48 x 30	1200 x 1200 x 750	1219	762	889	762
48 x 48 x 28	1200 x 1200 x 700	1219	711	889	762
48 x 48 x 26	1200 x 1200 x 650	1219	660	889	762
48 x 48 x 24	1200 x 1200 x 600	1219	610	889	737
48 x 48 x 22	1200 x 1200 x 550	1219	559	889	737

GENERAL NOTE: All dimensions are in millimeters.

NOTE:

(1) Outlet dimension *M* for run sizes NPS 14 (DN 350) and larger is recommended but not required.


**TABLE 10 DIMENSIONS OF LAP JOINT STUB ENDS**

Nominal Pipe Size (NPS)	DN	Outside Diameter of Barrel		Long Pattern Length, $F$ [Notes (3), (4)]	Short Pattern Length, $F$ [Notes (3), (4)]	Radius of Fillet, $R$ [Note (5)]	Diameter of Lap, $G$ [Note (6)]
		Max.	Min.				
1/2	15	22.8	20.5	76	51	3	35
3/4	20	28.1	25.9	76	51	3	43
1	25	35.0	32.6	102	51	3	51
1 1/4	32	43.6	41.4	102	51	5	64
1 1/2	40	49.9	47.5	102	51	6	73
2	50	62.4	59.5	152	64	8	92
2 1/2	65	75.3	72.2	152	64	8	106
3	80	91.3	88.1	152	64	10	127
3 1/2	90	104.0	100.8	152	76	10	140
4	100	116.7	113.5	152	76	11	157
5	125	144.3	140.5	203	76	11	185
6	150	171.3	167.5	203	89	13	218
8	200	222.1	218.3	203	102	13	270
10	250	277.2	272.3	254	127	13	324
12	300	328.0	323.1	254	152	13	381
14	350	359.9	354.8	305	152	13	413
16	400	411.0	405.6	305	152	13	470
18	450	462	456	305	152	13	533
20	500	514	507	305	152	13	584
22	550	565	558	305	152	13	641
24	600	616	609	305	152	13	692

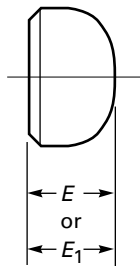
**GENERAL NOTES:**

- All dimensions are in millimeters.
- See Table 2 for tolerances.
- Service conditions and joint construction often dictate stub end length requirements. Therefore, the purchaser must specify long or short pattern fitting when ordering.

**NOTES:**

- Gasket face finish shall be in accordance with ASME B16.5 for raised face flanges.
- The lap thickness  $T$  shall not be less than nominal pipe wall thickness. See Table 2 for maximum tolerance.
- When short pattern stub ends are used with larger flanges in Classes 300 and 600, (PN50 & PN110) and with most sizes in Classes 900 (PN150) and higher, and when long pattern stub ends are used with larger flanges in Classes 1500 and 2500, (PN260 AND PN420) it may be necessary to increase the length of the stub ends in order to avoid covering the weld with the flange. Such increases in length shall be a matter of agreement between the manufacturer and purchaser.
- When special facings such as tongue and groove, male and female, etc., are employed, additional lap thickness must be provided and such additional thickness shall be in addition to (not included in) the basic length  $F$ .
- These dimensions conform to the radius established for lap joint flanges in ASME B16.5, Pipe Flanges and Flanged Fittings.
- This dimension conforms to standard machined facings shown in ASME B16.5. The back face of the lap shall be machined to conform to the surface on which it seats. Where ring joint facings are to be applied, use dimension  $K$  as given in ASME B16.5.

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**TABLE 11 DIMENSIONS OF CAPS**

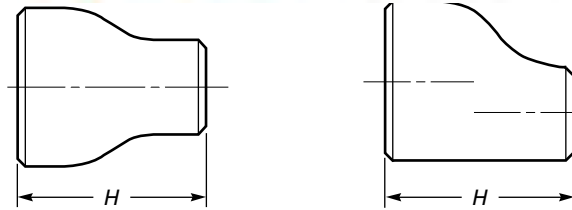
Nominal Pipe Size (NPS)	DN	Outside Diameter at Bevel	Length, $E$ [Note (1)]	Limiting Wall Thickness for Length, $E$	Length, $E$ [Note (2)]
1/2	15	21.3	25	4.57	25
3/4	20	26.7	25	3.81	25
1	25	33.4	38	4.57	38
1 1/4	32	42.2	38	4.83	38
1 1/2	40	48.3	38	5.08	38
2	50	60.3	38	5.59	44
2 1/2	65	73.0	38	7.11	51
3	80	88.9	51	7.62	64
3 1/2	90	101.6	64	8.13	76
4	100	114.3	64	8.64	76
5	125	141.3	76	9.65	89
6	150	168.3	89	10.92	102
8	200	219.1	102	12.70	127
10	250	273.0	127	12.70	152
12	300	323.8	152	12.70	178
14	350	355.6	165	12.70	191
16	400	406.4	178	12.70	203
18	450	457	203	12.70	229
20	500	508	229	12.70	254
22	550	559	254	12.70	254
24	600	610	267	12.70	305
26	650	660	267	...	...
28	700	711	267	...	...
30	750	762	267	...	...
32	800	813	267	...	...
34	850	864	267	...	...
36	900	914	267	...	...
38	950	965	305	...	...
40	1000	1016	305	...	...
42	1050	1067	305	...	...
44	1100	1118	343	...	...
46	1150	1168	343	...	...
48	1200	1219	343	...	...

**GENERAL NOTES:**

- (a) All dimensions are in millimeters.
- (b) 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.

**NOTES:**

- (1) Length  $E$  applies for thickness not exceeding that given in column "Limiting Wall Thickness for Length  $E$ ."
- (2) Length  $E_1$  applies for thickness greater than that given in column "Limiting Wall Thickness" for NPS 24 (DN 600) and smaller. For NPS 26 (DN 65) and larger, length  $E_1$  shall be by agreement between manufacturer and purchaser.



Note (1)

**TABLE 12 DIMENSIONS OF REDUCERS**

Nominal Pipe Size (NPS)	DN	Outside Diameter at Bevel			End-to-End, H	Nominal Pipe Size (NPS)	DN	Outside Diameter at Bevel		
		Large End	Small End	End-to-End, H				Large End	Small End	End-to-End, H
$\frac{3}{4} \times \frac{1}{2}$	20 × 15	26.7	21.3	38	5 × 4	125 × 100	141.3	114.3	127	
$\frac{3}{4} \times \frac{3}{8}$	20 × 10	26.7	17.3	38	5 × $3\frac{1}{2}$	125 × 90	141.3	101.6	127	
1 × $\frac{3}{4}$	25 × 20	33.4	26.7	51	5 × 3	125 × 80	141.3	88.9	127	
1 × $\frac{1}{2}$	25 × 15	33.4	21.3	51	5 × $2\frac{1}{2}$	125 × 65	141.3	73.0	127	
					5 × 2	125 × 50	141.3	60.3	127	
$1\frac{1}{4} \times 1$	32 × 25	42.2	33.4	51	6 × 5	150 × 125	168.3	141.3	140	
$1\frac{1}{4} \times \frac{3}{4}$	32 × 20	42.2	26.7	51	6 × 4	150 × 100	168.3	114.3	140	
$1\frac{1}{4} \times \frac{1}{2}$	32 × 15	42.2	21.3	51	6 × $3\frac{1}{2}$	150 × 90	168.3	101.6	140	
$1\frac{1}{2} \times 1\frac{1}{4}$	40 × 32	48.3	42.2	64	6 × 3	150 × 80	168.3	88.9	140	
$1\frac{1}{2} \times 1$	40 × 25	48.3	33.4	64	6 × $2\frac{1}{2}$	150 × 65	168.3	73.0	140	
$1\frac{1}{2} \times \frac{3}{4}$	40 × 20	48.3	26.7	64						
$1\frac{1}{2} \times \frac{1}{2}$	40 × 15	48.3	21.3	64	8 × 6	200 × 150	219.1	168.3	152	
					8 × 5	200 × 125	219.1	141.3	152	
2 × $1\frac{1}{2}$	50 × 40	60.3	48.3	76	8 × 4	200 × 100	219.1	114.3	152	
2 × $1\frac{1}{4}$	50 × 32	60.3	42.2	76	8 × $3\frac{1}{2}$	200 × 90	219.1	101.6	152	
2 × 1	50 × 25	60.3	33.4	76						
2 × $\frac{3}{4}$	50 × 20	60.3	26.7	76	10 × 8	250 × 200	273.0	219.1	178	
					10 × 6	250 × 150	273.0	168.3	178	
$2\frac{1}{2} \times 2$	65 × 50	73.0	60.3	89	10 × 5	250 × 125	273.0	141.3	178	
$2\frac{1}{2} \times 1\frac{1}{2}$	65 × 40	73.0	48.3	89	10 × 4	250 × 100	273.0	114.3	178	
$2\frac{1}{2} \times 1\frac{1}{4}$	65 × 32	73.0	42.2	89						
$2\frac{1}{2} \times 1$	65 × 25	73.0	33.4	89	12 × 10	300 × 250	323.8	273.0	203	
					12 × 8	300 × 200	323.8	219.1	203	
3 × $2\frac{1}{2}$	80 × 65	88.9	73.0	89	12 × 6	300 × 150	323.8	168.3	203	
3 × 2	80 × 50	88.9	60.3	89	12 × 5	300 × 125	323.8	141.3	203	
3 × $1\frac{1}{2}$	80 × 40	88.9	48.3	89						
3 × $1\frac{1}{4}$	80 × 32	88.9	42.2	89	14 × 12	350 × 300	355.6	323.8	330	
					14 × 10	350 × 250	355.6	273.0	330	
$3\frac{1}{2} \times 3$	90 × 80	101.6	88.9	102	14 × 8	350 × 200	355.6	219.1	330	
$3\frac{1}{2} \times 2\frac{1}{2}$	90 × 65	101.6	73.0	102	14 × 6	350 × 150	355.6	168.3	330	
$3\frac{1}{2} \times 2$	90 × 50	101.6	60.3	102						
$3\frac{1}{2} \times 1\frac{1}{2}$	90 × 40	101.6	48.3	102	16 × 14	400 × 350	406.4	355.6	356	
$3\frac{1}{2} \times 1\frac{1}{4}$	90 × 32	101.6	42.2	102	16 × 12	400 × 300	406.4	323.8	356	
					16 × 10	400 × 250	406.4	273.0	356	
4 × $3\frac{1}{2}$	100 × 90	114.3	101.6	102	16 × 8	400 × 200	406.4	219.1	356	
4 × 3	100 × 80	114.3	88.9	102						
4 × $2\frac{1}{2}$	100 × 65	114.3	73.0	102	18 × 16	450 × 400	457	406.4	381	
4 × 2	100 × 50	114.3	60.3	102	18 × 14	450 × 350	457	355.6	381	
4 × $1\frac{1}{2}$	100 × 40	114.3	48.3	102	18 × 12	450 × 300	457	323.8	381	
					18 × 10	450 × 250	457	273.0	381	

(continued)

**DIMENSIONS OF REDUCERS (CONT'D)**

Nominal Pipe Size (NPS)	DN	Outside Diameter at Bevel		End-to-End, H	Nominal Pipe Size (NPS)	DN	Outside Diameter at Bevel		End-to-End, H
		Large End	Small End				Large End	Small End	
20 × 18	500 × 450	508	457	508	36 × 34	900 × 850	914	864	610
20 × 16	500 × 400	508	406.4	508	36 × 32	900 × 800	914	813	610
20 × 14	500 × 350	508	355.6	508	36 × 30	900 × 750	914	762	610
20 × 12	500 × 300	508	323.8	508	36 × 28	900 × 700	914	660	610
					36 × 26	900 × 650	914	610	610
22 × 20	550 × 500	559	508	508					
22 × 18	550 × 450	559	457	508	38 × 36	950 × 900	965	914	610
22 × 16	550 × 400	559	406.4	508	38 × 34	950 × 850	965	864	610
22 × 14	550 × 350	559	355.4	508	38 × 32	950 × 800	965	813	610
					38 × 30	950 × 750	965	762	610
24 × 22	600 × 550	610	559	508	38 × 28	950 × 700	965	711	610
24 × 20	600 × 500	610	508	508	38 × 26	950 × 650	965	660	610
24 × 18	600 × 450	610	457	508					
24 × 16	600 × 400	610	406.4	508	40 × 38	1000 × 950	1016	965	610
					40 × 36	1000 × 900	1016	914	610
26 × 24	650 × 600	660	610	610	40 × 34	1000 × 850	1016	864	610
26 × 22	650 × 550	660	559	610	40 × 32	1000 × 800	1016	813	610
26 × 20	650 × 500	660	508	610	40 × 30	1000 × 750	1016	762	610
26 × 18	650 × 450	660	457	610					
					42 × 40	1050 × 1000	1067	1016	610
28 × 26	700 × 650	711	660	610	42 × 38	1050 × 950	1067	965	610
28 × 24	700 × 600	711	610	610	42 × 36	1050 × 900	1067	914	610
28 × 22	700 × 550	711	508	610	42 × 34	1050 × 850	1067	864	610
28 × 20	700 × 500	711	457	610	42 × 32	1050 × 800	1067	813	610
					42 × 30	1050 × 750	1067	762	610
30 × 28	750 × 700	762	711	610					
30 × 26	750 × 650	762	660	610	44 × 42	1100 × 1050	1118	1067	610
30 × 24	750 × 600	762	610	610	44 × 40	1100 × 1000	1118	1016	610
30 × 22	750 × 550	762	508	610	44 × 38	1100 × 950	1118	965	610
					44 × 36	1100 × 900	1118	914	610
32 × 30	800 × 750	813	762	610					
32 × 28	800 × 700	813	711	610	46 × 44	1150 × 1100	1168	1118	711
32 × 26	800 × 650	813	660	610	46 × 42	1150 × 1050	1168	1067	711
32 × 24	800 × 600	813	610	610	46 × 40	1150 × 1000	1168	1016	711
					46 × 38	1150 × 950	1168	965	711
34 × 32	850 × 800	864	813	610					
34 × 30	850 × 750	864	762	610	48 × 46	1200 × 1150	1219	1168	711
34 × 28	850 × 700	864	660	610	48 × 44	1200 × 1100	1219	1118	711
34 × 26	850 × 650	864	610	610	48 × 42	1200 × 1050	1219	1067	711
					48 × 40	1200 × 1000	1219	1016	711

GENERAL NOTE: All dimensions are in millimeters.

NOTE:

(1) While the figure illustrates a “bell shaped” reducer, the use of conical reducer is not prohibited.