

STAINLESS
PROCESSING, INC.
PLATE FLANGE DIVISION

**Plate Flange
Reference Guide
2012**



1255 Manor Road • Coatesville, PA 19320
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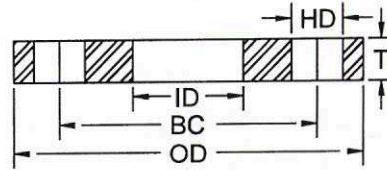
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150 lb. SLIP-ON PLATE FLANGES - FOR PIPE

- OD AND DRILLING for 1/2" through 24" pipe size's per ASME / ANSI B16.5-1996 Class 150
- OD AND DRILLING for 30" & 36" pipe size per ASME / ANSI B16.1-1989 Class 125
- Tolerances: See chart (page 14)



NOMINAL PIPE SIZE	THICKNESS (T)	OUTSIDE DIA. (OD)	INSIDE DIA. (ID)	NUMBER OF HOLES	HOLE DIA. (HD)	BOLT CIRCLE (BC)	SHIPPING WEIGHT IN POUNDS
1/2	.500	3.50	.88	4	.62	2.38	1.17
3/4	.500	3.88	1.09	4	.62	2.75	1.45
1	.500	4.25	1.36	4	.62	3.12	1.73
1 1/4	.500	4.62	1.70	4	.62	3.50	2.00
1 1/2	.500	5.00	1.95	4	.62	3.88	2.32
2	.500	6.00	2.44	4	.75	4.75	3.28
2 1/2	.500	7.00	2.94	4	.75	5.50	4.50
3	.500	7.50	3.57	4	.75	6.00	4.88
3 1/2	.500	8.50	4.07	8	.75	7.00	6.04
4	.500	9.00	4.57	8	.75	7.50	6.57
5	.500	10.00	5.66	8	.88	8.50	7.31
6	.500	11.00	6.72	8	.88	9.50	8.24
8	.500	13.50	8.72	8	.88	11.75	11.83
10	.625	16.00	10.88	12	1.00	14.25	18.39
12	.625	19.00	12.88	12	1.00	17.00	26.80
14	.625	21.00	14.14	12	1.12	18.75	33.05
16	.750	23.50	16.16	16	1.12	21.25	47.45
18	.750	25.00	18.18	16	1.25	22.75	47.21
20	1.000	27.50	20.20	20	1.25	25.00	73.76
24	1.000	32.00	24.25	20	1.38	29.50	92.64
30	1.000	38.75	30.25	28	1.38	36.00	124.16
36	1.250	46.00	36.25	32	1.62	42.75	207.40

For 38" through 48" use 1.250 for thickness • For 50" through 72" use 1.500 for thickness

Notes: This table is intended for estimating purposes only. Applications vary, confirm all dimensions with your engineering department prior to ordering. Refer to ASME B16.5-1996 and B-16.1-1989 standard for complete engineering and applications information. All dimensions are in inches unless otherwise noted. Inside diameter and thickness dimensions are application specific. Recommended bolts are 1/8" smaller in diameter than the bolt hole diameters shown.

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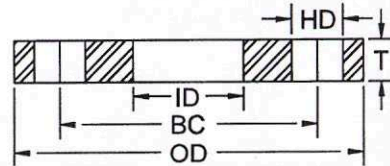
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150 lb. SLIP-ON PLATE FLANGES - FOR TUBE

- OD AND DRILLING for 1" through 24" tube size's per ASME / ANSI B16.5-1996 Class 150
- OD AND DRILLING for 30" & 36" tube size per ASME / ANSI B16.1-1989 Class 125
- Tolerances: See chart (page 14)



NOMINAL PIPE SIZE	THICKNESS (T)	OUTSIDE DIA. (OD)	INSIDE DIA. (ID)	NUMBER OF HOLES	HOLE DIA. (HD)	BOLT CIRCLE (BC)	SHIPPING WEIGHT IN POUNDS
1	.500	4.25	1.063	4	.62	3.12	1.73
1 1/4	.500	4.62	1.313	4	.62	3.50	2.00
1 1/2	.500	5.00	1.563	4	.62	3.88	2.32
2	.500	6.00	2.063	4	.75	4.75	3.28
2 1/2	.500	7.00	2.563	4	.75	5.50	4.50
3	.500	7.50	3.063	4	.75	6.00	4.88
3 1/2	.500	8.50	3.563	8	.75	7.00	6.50
4	.500	9.00	4.063	8	.75	7.50	6.57
5	.500	10.00	5.063	8	.88	8.50	7.31
6	.500	11.00	6.063	8	.88	9.50	8.24
8	.500	13.50	8.063	8	.88	11.75	11.83
10	.625	16.00	10.063	12	1.00	14.25	18.39
12	.625	19.00	12.063	12	1.00	17.00	26.80
14	.625	21.00	14.063	12	1.12	18.75	33.05
16	.750	23.50	16.063	16	1.12	21.25	47.45
18	.750	25.00	18.063	16	1.25	22.75	47.21
20	1.000	27.50	20.063	20	1.25	25.00	73.76
24	1.000	32.00	24.063	20	1.38	29.50	92.64
30	1.000	38.75	30.063	28	1.38	36.00	124.16
36	1.250	46.00	36.063	32	1.62	42.75	207.40

For 38" through 48" use 1.250 for thickness • For 50" through 72" use 1.500 for thickness

Notes: This table is intended for estimating purposes only. Applications vary, confirm all dimensions with your engineering department prior to ordering. Refer to ASME B16.5-1996 and B-16.1-1989 standard for complete engineering and applications information. All dimensions are in inches unless otherwise noted. Inside diameter and thickness dimensions are application specific. Recommended bolts are 1/8" smaller in diameter than the bolt hole diameters shown.

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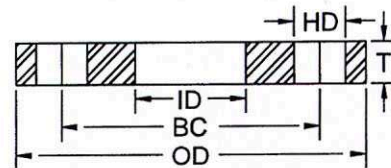
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150 lb. BACKUP PLATE FLANGES - FOR PIPE

- OD AND DRILLING for 1/2" through 24" pipe size's per ASME / ANSI B16.5-1996 Class 150
- OD AND DRILLING for 30" & 36" pipe size per ASME / ANSI B16.1-1989 Class 125
- Tolerances: See chart (page 14)



NOMINAL PIPE SIZE	STYLE	THICKNESS (T)	OUTSIDE DIA. (OD)	INSIDE DIA. (ID)	NUMBER OF HOLES	HOLE DIA. (HD)	BOLT CIRCLE (BC)
1/2	FLAT FACE RING	.500	3.50	1.00	4	.62	2.38
	ANGLE FACE RING	.500	3.50	1.25	4	.62	2.38
3/4	FFR	.500	3.88	1.18	4	.62	2.75
	AFR	.500	3.88	1.44	4	.62	2.75
1	FFR	.500	4.25	1.44	4	.62	3.12
	AFR	.500	4.25	1.69	4	.62	3.12
1 1/4	FFR	.500	4.62	1.81	4	.62	3.50
	AFR	.500	4.62	2.06	4	.62	3.50
1 1/2	FFR	.500	5.00	2.06	4	.62	3.88
	AFR	.500	5.00	2.25	4	.62	3.88
2	FFR	.500	6.00	2.63	4	.75	4.75
	AFR	.500	6.00	2.88	4	.75	4.75
2 1/2	FFR	.500	7.00	3.13	4	.75	5.50
	AFR	.500	7.00	3.38	4	.75	5.50
3	FFR	.500	7.50	3.75	4	.75	6.00
	AFR	.500	7.50	4.00	4	.75	6.00
4	FFR	.500	9.00	4.75	8	.75	7.50
	AFR	.500	9.00	5.00	8	.75	7.50
5	FFR	.500	10.00	5.75	8	.88	8.50
	AFR	.500	10.00	6.00	8	.88	8.50
6	FFR	.500	11.00	6.88	8	.88	9.50
	AFR	.500	11.00	7.13	8	.88	9.50
8	FFR	.500	13.50	8.88	8	.88	11.75
	AFR	.500	13.50	9.19	8	.88	11.75
10	FFR	.625	16.00	11.00	12	1.00	14.25
	AFR	.625	16.00	11.38	12	1.00	14.25
12	FFR	.625	19.00	13.00	12	1.00	17.00
	AFR	.625	19.00	13.63	12	1.00	17.00
14	FFR	.625	21.00	14.25	12	1.12	18.75
	AFR	.625	21.00	14.88	12	1.12	18.75
16	FFR	.625	23.50	16.25	16	1.12	21.25
	AFR	.625	23.50	16.88	16	1.12	21.25
18	FFR	.750	25.00	18.25	16	1.25	22.75
	AFR	.750	25.00	18.88	16	1.25	22.75
20	FFR	.750	27.50	20.25	20	1.25	25.00
	AFR	.750	27.50	20.88	20	1.25	25.00
24	FFR	1.000	32.00	24.25	20	1.38	29.50
	AFR	1.000	32.00	24.88	20	1.38	29.50
30	FFR	1.000	38.75	30.25	28	1.38	36.00
	AFR	1.000	38.75	30.88	28	1.38	36.00
36	FFR	1.250	46.00	36.25	32	1.62	42.75
	AFR	1.250	46.00	36.88	32	1.62	42.75

For 38" through 48" use 1.250 for thickness • For 50" through 72" use 1.500 for thickness

Notes: This table is intended for estimating purposes only. Applications vary, confirm all dimensions with your engineering department prior to ordering. Refer to ASME B16.5-1996 and B-16.1-1989 standard for complete engineering and applications information. All dimensions are in inches unless otherwise noted. Inside diameter and thickness dimensions are application specific. Recommended bolts are 1/8" smaller in diameter than the bolt hole diameters shown.

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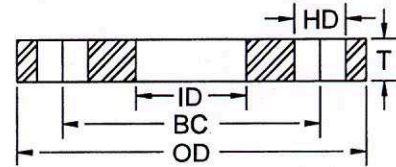
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150 lb. BACKUP PLATE FLANGES - FOR TUBE

- OD AND DRILLING for 1" through 24" tube size's per ASME / ANSI B16.5-1996 Class 150
- OD AND DRILLING for 30" & 36" tube size per ASME / ANSI B16.1-1989 Class 125
- Tolerances: See chart (page 14)



NOMINAL TUBE SIZE	STYLE	THICKNESS (T)	OUTSIDE DIA. (OD)	INSIDE DIA. (ID)	NUMBER OF HOLES	HOLE DIA. (HD)	BOLT CIRCLE (BC)
1	FLAT FACE RING	.500	4.25	1.13	4	.62	3.12
	ANGLE FACE RING	.500	4.25	1.38	4	.62	3.12
1 1/4	FFR	.500	4.62	1.38	4	.62	3.50
	AFR	.500	4.62	1.63	4	.62	3.50
1 1/2	FFR	.500	5.00	1.63	4	.62	3.88
	AFR	.500	5.00	1.88	4	.62	3.88
2	FFR	.500	6.00	2.25	4	.75	4.75
	AFR	.500	6.00	2.50	4	.75	4.75
2 1/2	FFR	.500	7.00	2.75	4	.75	5.50
	AFR	.500	7.00	3.00	4	.75	5.50
3	FFR	.500	7.50	3.25	4	.75	6.00
	AFR	.500	7.50	3.50	4	.75	6.00
4	FFR	.500	9.00	4.25	8	.75	7.50
	AFR	.500	9.00	4.50	8	.75	7.50
5	FFR	.500	10.00	5.25	8	.88	8.50
	AFR	.500	10.00	5.38	8	.88	8.50
6	FFR	.500	11.00	6.25	8	.88	9.50
	AFR	.500	11.00	6.44	8	.88	9.50
8	FFR	.500	13.50	8.25	8	.88	11.75
	AFR	.500	13.50	8.56	8	.88	11.75
10	FFR	.625	16.00	10.25	12	1.00	14.25
	AFR	.625	16.00	10.63	12	1.00	14.25
12	FFR	.625	19.00	12.25	12	1.00	17.00
	AFR	.625	19.00	12.88	12	1.00	17.00
14	FFR	.625	21.00	14.25	12	1.12	18.75
	AFR	.625	21.00	14.88	12	1.12	18.75
16	FFR	.625	23.50	16.25	16	1.12	21.25
	AFR	.625	23.50	16.88	16	1.12	21.25
18	FFR	.750	25.00	18.25	16	1.25	22.75
	AFR	.750	25.00	18.88	16	1.25	22.75
20	FFR	.750	27.50	20.25	20	1.25	25.00
	AFR	.750	27.50	20.88	20	1.25	25.00
24	FFR	1.000	32.00	24.25	20	1.38	29.50
	AFR	1.000	32.00	24.88	20	1.38	29.50
30	FFR	1.000	38.75	30.25	28	1.38	36.00
	AFR	1.000	38.75	30.88	28	1.38	36.00
36	FFR	1.250	46.00	36.25	32	1.62	42.75
	AFR	1.250	46.00	36.88	32	1.62	42.75

For 38" through 48" use 1.250 for thickness • For 50" through 72" use 1.500 for thickness

Notes: This table is intended for estimating purposes only. Applications vary, confirm all dimensions with your engineering department prior to ordering. Refer to ASME B16.5-1996 and B-16.1-1989 standard for complete engineering and applications information. All dimensions are in inches unless otherwise noted. Inside diameter and thickness dimensions are application specific. Recommended bolts are 1/8" smaller in diameter than the bolt hole diameters shown.

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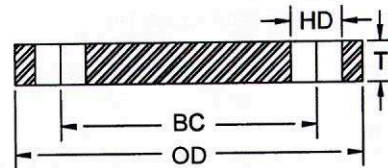
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150 lb. BLIND PLATE FLANGES

- For Pipe and Tube
- OD AND DRILLING for 1/2" through 24" pipe and tube size's per ASME / ANSI B16.5-1996 Class 150
- OD AND DRILLING for 30" & 36" pipe and tube size per ASME / ANSI B16.1-1989 Class 125
- Dimensions are given in inches



NOMINAL PIPE SIZE	THICKNESS (T)	OUTSIDE DIA. (OD)	NUMBER OF HOLES	HOLE DIA. (HD)	BOLT CIRCLE (BC)	SHIPPING WEIGHT IN POUNDS
1/2	.500	3.50	4	.62	2.38	1.26
3/4	.500	3.88	4	.62	2.75	1.59
1	.500	4.25	4	.62	3.12	1.95
1 1/4	.500	4.62	4	.62	3.50	2.34
1 1/2	.500	5.00	4	.62	3.88	2.77
2	.500	6.00	4	.75	4.75	3.99
2 1/2	.500	7.00	4	.75	5.50	5.53
3	.500	7.50	4	.75	6.00	6.38
3 1/2	.500	8.50	8	.75	7.00	8.00
4	.500	9.00	8	.75	7.50	9.04
5	.500	10.00	8	.88	8.50	11.10
6	.500	11.00	8	.88	9.50	13.58
8	.500	13.50	8	.88	11.75	20.81
10	.750	16.00	12	1.00	14.25	42.75
12	.750	19.00	12	1.00	17.00	61.15
14	.750	21.00	12	1.12	18.75	74.60
16	.750	23.50	16	1.12	21.25	93.21
18	1.000	25.00	16	1.25	22.75	139.62
20	1.000	27.50	20	1.25	25.00	168.71
24	1.000	32.00	20	1.38	29.50	229.49
30	1.250	38.75	28	1.38	36.00	418.77
36	1.500	46.00	32	1.62	42.75	701.78

For 38" through 48" use 1.500 for thickness.

Notes: This table is intended for estimating purposes only. Applications vary, confirm all dimensions with your engineering department prior to ordering. Refer to ASME B16.5-1996 and B-16.1-1989 standard for complete engineering and applications information. All dimensions are in inches unless otherwise noted. Inside diameter and thickness dimensions are application specific. Recommended bolts are 1/8" smaller in diameter than the bolt hole diameters shown.

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AWWA SECTION

American Water Works Association

ANSI / AWWA C207-07 (Revision on ANSI / AWWA C207-01)

Pages 7 - 14 incorporate information supplied through the cooperation of the American Water Works Association.

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**TABLE 2 AWWA STANDARD STAINLESS-STEEL RING FLANGE,
CLASS SA (50psi), CLASS SB (86 psi), CLASS SD (159 psi), CLASS SE (275 psi) * †**

Nominal Pipe Size <i>in.</i>	OD of Flange (A) <i>in.</i>	ID of Flange (B) <i>in.</i> †		Number of Bolts	Dia. of Bolt Circle (C) <i>in.</i>	Dia. of Bolts§ <i>in.</i>	Thickness of Flange (B) <i>in.</i>			
		Pipe	Tube				Class SA 50 psi	Class SB 86 psi	Class SD 150 psi	Class SE 275 psi
2.0	6.00	2.44	2.03	4	4.75	0.625	0.500	0.625	0.625	1.125
2.5	7.00	2.94	2.53	4	5.50	0.625	0.500	0.625	0.625	1.125
3.0	7.50	3.57	3.03	4	6.00	0.625	0.500	0.625	0.625	1.125
4.0	9.00	4.57	4.03	8	7.50	0.625	0.500	0.625	0.625	1.125
5.0	10.00	5.66	5.03	8	8.50	0.750	0.500	0.625	0.625	1.188
6.0	11.00	6.72	6.03	8	9.50	0.750	0.500	0.688	0.688	1.313
8.0	13.50	8.72	8.03	8	11.75	0.750	0.500	0.688	0.688	1.500
10.0	16.00	10.88	10.03	12	14.25	0.875	0.625	0.688	0.688	1.563
12.0	19.00	12.88	12.06	12	17.00	0.875	0.625	0.688	0.812	1.750
14.0	21.00	14.19	14.19	12	18.75	1.000	0.625	0.688	0.938	1.875
16.0	23.50	16.19	16.19	16	21.25	1.000	Use class SB	0.688	1.000	2.000
18.0	25.00	18.19	18.19	16	22.75	1.125	Use class SB	0.688	1.062	2.125
20.0	27.50	20.19	20.19	20	25.00	1.125	Use class SB	0.688	1.125	2.375
22.0	29.50	22.19	-	20	27.25	1.250	Use class SB	0.750	1.188	2.500
24.0	32.00	24.19	24.19	20	29.50	1.250	Use class SB	0.750	1.250	2.625
26.0	34.25	26.25	-	24	31.75	1.250	Use class SB	0.812	1.312	2.750
28.0	36.50	28.25	-	28	34.00	1.250	Use class SB	0.875	1.312	2.750
30.0	38.75	30.25	30.25	28	36.00	1.250	Use class SB	0.875	1.375	2.875
32.0	41.75	32.25	-	28	38.50	1.500	Use class SB	0.938	1.500	3.000
34.0	43.75	34.25	-	32	40.50	1.500	Use class SB	0.938	1.500	3.000
36.0	46.00	36.25	36.25	32	42.75	1.500	Use class SB	1.000	1.625	3.125
38.0	48.75	38.25	-	32	45.25	1.500	Use class SB	1.000	1.625	3.125
40.0	50.75	40.25	-	36	47.25	1.500	Use class SB	1.000	1.625	3.250
42.0	53.00	42.25	-	36	49.50	1.500	Use class SB	1.125	1.750	3.375
44.0	55.25	44.25	-	40	51.75	1.500	Use class SB	1.125	1.750	3.375
46.0	57.25	46.25	-	40	53.75	1.500	Use class SB	1.125	1.750	3.438
48.0	59.50	48.25	-	44	56.00	1.500	Use class SB	1.250	1.875	3.500
50.0	61.75	50.25	-	44	58.25	1.750	Use class SB	1.250	2.000	3.500
52.0	64.00	52.25	-	44	60.50	1.750	Use class SB	1.250	2.000	3.625
54.0	66.25	54.25	-	44	62.75	1.750	Use class SB	1.375	2.125	3.750
60.0	73.00	60.25	-	52	69.25	1.750	Use class SB	1.500	2.250	3.875
66.0	80.00	66.25	-	52	76.00	1.750	Use class SB	1.625	2.500	4.250
72.0	86.50	72.25	-	60	82.50	1.750	Use class SB	1.750	2.625	4.375

Notes:

1. Ring flanges may be overbored or counterbored to accommodate larger-outside-diameter pipe than shown as nominal. Wrench clearance between the pipe OD and bolt circle must be maintained as well as sufficient gasket seating area.
2. Metric conversion: nominal pipe size in. x 25 = mm; dimensions: in. x 25.4 = mm; psi x 6.895 = kPa

*Class SA flanges 50 psi; Class SB flanges 86 psi; Class SD flanges 2 in.-12 in., 175 psi; 14 in. and larger, 150 psi; Class SE flanges 275 psi. These flanges have the same diameter and drilling as AWWA D flanges and Class 125 cast iron flanges (ASME B16.1). In sizes 24 in. and smaller, they also match ASME B16.5 150 psi standard for steel flanges.

† Pressure rating at atmospheric temperature.

‡ The purchaser shall specify the ID of the flange if dimension B is required to be other than the dimension shown above.

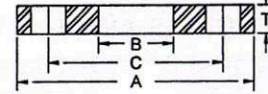
§ Bolt holes shall be drilled 1/8 in. larger in diameter of the bolt except as started in Sec. 4.2.3.

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**TABLE 2 AWWA STANDARD STEEL-RING FLANGES,
CLASS B* (86 psi) AND CLASS D† (175-150 psi)**



Nominal Pipe Size <i>in.</i>	OD of Flange (A) <i>in.</i>	ID of Flange (B‡) <i>in.</i>	Number of Bolts	Diam. of Bolt Circle (C) <i>in.</i>	Diam. of Bolts§ <i>in.</i>	Thickness of Flange -- <i>in.</i>	
						Class B (T)	Class D (T)
4	9.00	4.57	8	7.50	0.625	0.625	0.625
5	10.00	5.66	8	8.50	0.750	0.625	0.625
6	11.00	6.72	8	9.50	0.750	0.688	0.688
8	13.50	8.72	8	11.75	0.750	0.688	0.688
10	16.00	10.88	12	14.25	0.875	0.688	0.688
12	19.00	12.88	12	17.00	0.875	0.688	0.812
14	21.00	14.19	12	18.75	1.000	0.688	0.938
16	23.50	16.19	16	21.25	1.000	0.688	1.000
18	25.00	18.19	16	22.75	1.125	0.688	1.062
20	27.50	20.19	20	25.00	1.125	0.688	1.125
22	29.50	22.19	20	27.25	1.250	0.750	1.188
24	32.00	24.19	20	29.50	1.250	0.750	1.250
26	34.25		24	31.75	1.250	0.812	1.312
28	36.50		28	34.00	1.250	0.875	1.312
30	38.75		28	36.00	1.250	0.875	1.375
32	41.75		28	38.50	1.500	0.938	1.500
34	43.75		32	40.50	1.500	0.938	1.500
36	46.00		32	42.75	1.500	1.000	1.625
38	48.75		32	45.25	1.500	1.000	1.625
40	50.75		36	47.25	1.500	1.000	1.625
42	53.00		36	49.50	1.500	1.125	1.750
44	55.25		40	51.75	1.500	1.125	1.750
46	57.25		40	53.75	1.500	1.125	1.750
48	59.50		44	56.00	1.500	1.250	1.875
50	61.75		44	58.25	1.750	1.250	2.000
52	64.00		44	60.50	1.750	1.250	2.000
54	66.25		44	62.75	1.750	1.375	2.125
60	73.00		52	69.25	1.750	1.500	2.250
66	80.00		52	76.00	1.750	1.625	2.500
72	86.50		60	82.50	1.750	1.750	2.625
78	93.00		64	89.00	2.000	2.000	2.750
84	99.75		64	95.50	2.000	2.000	2.875
90	106.50		68	102.00	2.250	2.250	3.000
96	113.25		68	108.50	2.250	2.250	3.250
102	120.00		72	114.50	2.500	2.500	3.250

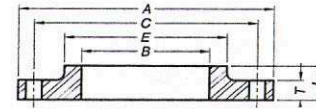
Notes:

1. Ring flanges may be overbored or counterbored to accommodate larger outside-diameter pipe than shown as nominal. This is done to allow a clear inside diameter after cement-mortar lining. Wrench clearance between the pipe OD and bolt circle must be maintained as well as sufficient gasket seating area.
 2. Metric conversion: nominal pipe size: in. x 25 = mm; dimensions: in. x 25.4 = mm; psi x 6.895 = kPa
 - * Pressure rating at atmospheric temperature is 86 psi. These flanges have the same OD and drilling as class 125 cast-iron flanges (ASME B16.1). In sizes 24 in. and smaller, they also match ASME B16.5 class 150 psi drilling for steel flanges.
 - † Pressure rating at atmospheric temperature: sizes 4-12 in. inclusive, 175 psi; sizes larger than 12 in., 150 psi. These flanges have the same diameter and drilling as class 125 cast-iron flanges (ASME B16.1). In sizes 24 in. and smaller, they also match ASME B16.5 class 150-psi standard for steel flanges.
 - ‡ The purchaser shall specify the ID of the flange, dimension B, for nominal pipe sizes 26 in. and larger. The diameter of the flange bore shall not exceed the pipe OD by more than 0.25 in.
 - § Bolt holes shall be drilled 1/8-in. larger in diameter than the nominal diameter of the bolt except as stated in Sec. 4.2.3.
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**TABLE 3 AWWA STANDARD STEEL-HUB FLANGES,
CLASS D* (175-150 psi)**



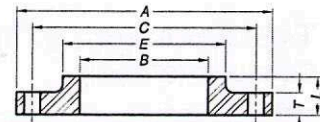
Nominal Pipe Size <i>in.</i>	OD of Flange (A) <i>in.</i>	ID of Flange (B) <i>in.</i>	Number of Bolts	Diam. of Bolt Circle (C) <i>in.</i>	Diam. of Bolts† <i>in.</i>	Flange Dimensions -- <i>in.</i>		
						(T)	(L)	(E)
4	9.00	4.57	8	7.50	0.625	0.500	0.875	5.312
5	10.00	5.66	8	8.50	0.750	0.562	1.250	6.312
6	11.00	6.72	8	9.50	0.750	0.562	1.250	7.562
8	13.50	8.72	8	11.75	0.750	0.562	1.250	9.688
10	16.00	10.88	12	14.25	0.875	0.688	1.250	12.000
12	19.00	12.88	12	17.00	0.875	0.688	1.250	14.375
14	21.00	14.19	12	18.75	1.000	0.750	1.250	15.750
16	23.50	16.19	16	21.25	1.000	0.750	1.250	18.000
18	25.00	18.19	16	22.75	1.125	0.750	1.250	19.875
20	27.50	20.19	20	25.00	1.125	0.750	1.250	22.000
22	29.50	22.19	20	27.25	1.250	1.000	1.750	24.250
24	32.00	24.19	20	29.50	1.250	1.000	1.750	26.125
26	34.25	26.19	24	31.75	1.250	1.000	1.750	28.500
28	36.50	28.19	28	34.00	1.250	1.000	1.750	30.500
30	38.75	30.19	28	36.00	1.250	1.000	1.750	32.500
32	41.75	32.19	28	38.50	1.500	1.125	1.750	34.750
34	43.75	34.19	32	40.50	1.500	1.125	1.750	36.750
36	46.00	36.19	32	42.75	1.500	1.125	1.750	38.750
38	48.75	38.19	32	45.25	1.500	1.125	1.750	40.750
40	50.75	40.19	36	47.25	1.500	1.125	1.750	43.000
42	53.00	42.19	36	49.50	1.500	1.250	1.750	45.000
44	55.25	44.19	40	51.75	1.500	1.250	2.250	47.000
46	57.25	46.19	40	53.75	1.500	1.250	2.250	49.000
48	59.50	48.19	44	56.00	1.500	1.375	2.500	51.000
50	61.75	50.19	44	58.25	1.750	1.375	2.500	53.000
52	64.00	52.19	44	60.50	1.750	1.375	2.500	55.000
54	66.25	54.19	44	62.75	1.750	1.375	2.500	57.000
60	73.00	60.19	52	69.25	1.750	1.500	2.750	63.000
66	80.00	66.19	52	76.00	1.750	1.500	2.750	69.000
72	86.50	72.19	60	82.50	1.750	1.500	2.750	75.000
78	93.00	78.19	64	89.00	2.000	1.750	3.000	81.250
84	99.75	84.19	64	95.50	2.000	1.750	3.000	87.500
90	106.50	90.19	68	102.00	2.250	2.000	3.250	93.750
96	113.25	96.19	68	108.50	2.250	2.000	3.250	100.000

Notes:

- Hub flanges are to be used on pipe that has an OD equal to the nominal pipe size in the first column and shall not be overbored.
 - Metric conversion: nominal pipe size: in. x 25 = mm; dimensions: in. x 25.4 = mm; psi x 6.895 = kPa.
- * Pressure rating at atmospheric temperature: sizes 4-12 in. inclusive, 175 psi; sizes larger than 12 in., 150 psi. These flanges have the diameter and drilling as class 125 cast-iron flanges (ASME B16.1). In sizes 24 in. and smaller, they also match ASME B16.5 class 150-psi standard for steel flanges.
- † Bolt holes shall be drilled 1/8-in. larger in diameter than the nominal diameter of the bolt as stated in Sec. 4.2.3.
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**TABLE 4 AWWA STANDARD STEEL-HUB FLANGES,
CLASS E* (275 psi)**



Nominal Pipe Size <i>in.</i>	OD of Flange (A) <i>in.</i>	ID of Flange (B†) <i>in.</i>	Number of Bolts	Diam. of Bolt Circle (C) <i>in.</i>	Diam. of Bolts‡ <i>in.</i>	Flange Dimensions -- <i>in.</i>		
						(T)§	(L)	(E)
4	9.00	4.57	8	7.50	0.625	0.938	1.312	5.312
5	10.00	5.66	8	8.50	0.750	0.938	1.438	6.438
6	11.00	6.72	8	9.50	0.750	1.000	1.562	7.562
8	13.50	8.72	8	11.75	0.750	1.125	1.750	9.688
10	16.00	10.88	12	14.25	0.875	1.188	1.938	12.000
12	19.00	12.88	12	17.00	0.875	1.250	2.188	14.375
14	21.00	14.19	12	18.75	1.000	1.375	2.250	15.750
16	23.50	16.19	16	21.25	1.000	1.438	2.500	18.000
18	25.00	18.19	16	22.75	1.125	1.562	2.688	19.875
20	27.50	20.19	20	25.00	1.125	1.688	2.875	22.000
22	29.50	22.19	20	27.25	1.250	1.812	3.125	24.000
24	32.00	24.19	20	29.50	1.250	1.875	3.250	26.125
26	34.25	26.19	24	31.75	1.250	2.000	3.375	28.500
28	36.50	28.19	28	34.00	1.250	2.062	3.438	30.750
30	38.75	30.19	28	36.00	1.250	2.125	3.500	32.750
32	41.75	32.19	28	38.50	1.500	2.250	3.625	35.000
34	43.75	34.19	32	40.50	1.500	2.312	3.688	37.000
36	46.00	36.19	32	42.75	1.500	2.375	3.750	39.250
38	48.75	38.19	32	45.25	1.500	2.375	3.750	41.750
40	50.75	40.19	36	47.25	1.500	2.500	3.875	43.750
42	53.00	42.19	36	49.50	1.500	2.625	4.000	46.000
44	55.25	44.19	40	51.75	1.500	2.625	4.000	48.000
46	57.25	46.19	40	53.75	1.500	2.688	4.062	50.000
48	59.50	48.19	44	56.00	1.500	2.750	4.125	52.250
50	61.75	50.19	44	58.25	1.750	2.750	4.125	54.250
52	64.00	52.19	44	60.50	1.750	2.875	4.250	56.500
54	66.25	54.19	44	62.75	1.750	3.000	4.375	58.750
60	73.00	60.19	52	69.25	1.750	3.125	4.500	65.250
66	80.00	66.19	52	76.00	1.750	3.375	4.875	71.500
72	86.50	72.19	60	82.50	1.750	3.500	5.000	78.500
78	93.00	78.19	64	89.00	2.000	3.875	5.375	84.500
84	99.75	84.19	64	95.50	2.000	3.875	5.375	90.500
90	106.50	90.19	68	102.00	2.250	4.250	5.750	96.750
96	113.25	96.19	68	108.50	2.250	4.250	5.750	102.750

Notes:

- Hub flanges are to be used on pipe that has an OD equal to the nominal pipe size in the first column and shall not be overbored.
- Metric conversion: nominal pipe size: in. x 25 = mm; dimensions: in. 25.4 = mm; psi x 6.895 = kPa.

* Pressure rating at atmospheric temperature is 275 psi. These flanges have the diameter and drilling as ASME B16.1 class 125 cast-iron flanges. In sizes 24 in. and smaller, they also match ASME B16.5 class 150 psi standard for steel flanges.

†Welding neck flanges may be used if desired, at the purchaser's option.

‡Bolt holes shall be drilled 1/8-in. larger in diameter than the nominal diameter of the bolt as stated in Sec. 4.2.3.

§The thickness T of the flange from which the raised face has been removed, shall be no less than dimension T minus 0.06 in.

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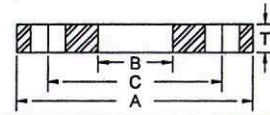
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**TABLE 5 AWWA STANDARD STEEL-RING FLANGES,
CLASS E* (275 psi)**



Nominal Pipe Size <i>in.</i>	OD of Flange (A) <i>in.</i>	ID of Flange (B†) <i>in.</i>	Number of Bolts	Diam. of Bolt Circle (C) <i>in.</i>	Diam. of Bolts‡ <i>in.</i>	Thickness of Flange (T) <i>in.</i>
4	9.00	4.57	8	7.50	0.625	1.125
5	10.00	5.66	8	8.50	0.750	1.188
6	11.00	6.72	8	9.50	0.750	1.313
8	13.50	8.72	8	11.75	0.750	1.500
10	16.00	10.88	12	14.25	0.875	1.563
12	19.00	12.88	12	17.00	0.875	1.750
14	21.00	14.19	12	18.75	1.000	1.875
16	23.50	16.19	16	21.25	1.000	2.000
18	25.00	18.19	16	22.75	1.125	2.125
20	27.50	20.19	20	25.00	1.125	2.375
22	29.50	22.19	20	27.25	1.250	2.500
24	32.00	24.19	20	29.50	1.250	2.625
26	34.25		24	31.75	1.250	2.750
28	36.50		28	34.00	1.250	2.750
30	38.75		28	36.00	1.250	2.875
32	41.75		28	38.50	1.500	3.000
34	43.75		32	40.50	1.500	3.000
36	46.00		32	42.75	1.500	3.125
38	48.75		32	45.25	1.500	3.125
40	50.75		36	47.25	1.500	3.250
42	53.00		36	49.50	1.500	3.375
44	55.25		40	51.75	1.500	3.375
46	57.25		40	53.75	1.500	3.438
48	59.50		44	56.00	1.500	3.500
50	61.75		44	58.25	1.750	3.500
52	64.00		44	60.50	1.750	3.625
54	66.25		44	62.75	1.750	3.750
60	73.00		52	69.25	1.750	3.875
66	80.00		52	76.00	1.750	4.250
72	86.50		60	82.50	1.750	4.375
78	93.00		64	89.00	2.000	4.750
84	99.75		64	95.50	2.000	4.750
90	106.50		68	102.00	2.250	5.125
96	113.25		68	108.50	2.250	5.125
102	120.00		72	114.50	2.500	5.500

Notes:

1. Ring flanges may be overbored or counterbored to accommodate larger outside diameter pipe than shown as nominal. This is done to allow a clear inside diameter after cement-mortar lining. Wrench clearance between the pipe OD and bolt circle must be maintained as well as sufficient gasket seating area.

2. Metric conversion: nominal pipe size: in. x 25 = mm; dimensions: in. x 25.4 = mm; psi x 6.895 = kPa.

*Pressure rating at atmospheric temperature is 275 psi. These flanges have the same diameter and drilling as ASME B16.1 class 125 cast-iron flanges. In sizes 24 in. and smaller, they also match ASME B16.5 class 150 psi standard for steel flanges.

† The purchaser shall specify the ID of the flange, dimension B, for nominal pipe sizes 26 in. and larger. The diameter of the flange bore shall not exceed the pipe OD by more than 0.25 in.

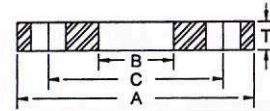
‡ Bolt holes shall be drilled 1/8-in. larger in diameter than the nominal diameter of the bolt except as stated in Sec. 4.2.3. Reprinted from AWWA Standard for Steel Pipe Flanges for Waterworks Service -- Sizes 4" through 144" -- C207 - 07, by permission. Copyright © 2007, American Water Works Association.

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**TABLE 6 AWWA STANDARD STEEL-RING FLANGES,
CLASS F* (300 psi)**



Nominal Pipe Size <i>in.</i>	OD of Flange (A) <i>in.</i>	ID of Flange (B†) <i>in.</i>	Number of Bolts	Diam. of Bolt Circle (C) <i>in.</i>	Diam. of Bolts‡ <i>in.</i>	Thickness of Flange (T) <i>in.</i>
4	10.00	4.57	8	7.88	0.750	1.13
5	11.00	5.66	8	9.25	0.750	1.21
6	12.50	6.73	12	10.62	0.750	1.31
8	15.00	8.73	12	13.00	0.875	1.31
10	17.50	10.88	16	15.25	1.000	1.50
12	20.50	12.88	16	17.75	1.125	1.63
14	23.00	14.19	20	20.25	1.125	1.94
16	25.50	16.19	20	22.50	1.250	2.14
18	28.00	18.19	24	24.75	1.250	2.25
20	30.50	20.19	24	27.00	1.250	2.33
22	33.00	22.19	24	29.25	1.250	2.50
24	36.00	24.19	24	32.00	1.500	2.69
26	38.25	†	28	34.50	1.750	3.00
28	40.75	†	28	37.00	1.750	3.13
30	43.00	†	28	39.25	1.750	3.15
32	45.25	†	28	41.50	1.750	3.25
34	47.50	†	28	43.50	1.750	3.38
36	50.00	†	32	46.00	2.000	3.46
38	52.25	†	32	48.00	2.000	3.50
40	54.25	†	36	50.25	2.000	3.63
42	57.00	†	36	52.75	2.000	3.81
44	59.25	†	36	55.00	2.000	4.00
46	61.50	†	40	57.25	2.000	4.13
48	65.00	†	40	60.75	2.000	4.50

Notes:

1. Ring flanges may be overbored or counterbored to accommodate larger outside diameter pipe than shown as nominal. This is done to allow a clear inside diameter after cement-mortar lining. Wrench clearance between the pipe OD and bolt circle must be maintained as well as sufficient gasket seating area.

2. Metric conversion: nominal pipe size: in. x 25 = mm; dimensions: in. x 25.4 = mm; psi x 6.895 = kPa.

*Pressure rating at atmospheric temperature is 300 psi. These flanges have the same diameter and drilling as ASME B16.1 class 250 cast-iron pipe and flanged fittings and ASME B16.5 class 300 for steel flanges.

† The purchaser shall specify the ID of the flange, dimension B, for nominal pipe sizes 26 in. and larger. The diameter of the flange bore shall not exceed the pipe OD by more than 0.25 in.

‡ Bolt holes shall be drilled 1/8-in. larger in diameter than the nominal diameter of the bolt except as stated in Sec. 4.2.3.

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TABLE 7 AWWA BLIND-FLANGE THICKNESS

Minimum Thickness*

Nominal Pipe Size		Mating Flange ID		Class B 86 psi (593 kPa)		Class D†		Class E 275 psi (1,896 kPa)		Class F 300 psi (2,068 kPa)	
in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)
4	(100)	4.57	(116)	0.625	(15.88)	0.625	(15.88)	1.125	(28.58)	1.130	(28.70)
5	(125)	5.66	(144)	0.625	(15.88)	0.650	(16.51)	1.188	(30.18)	1.210	(30.73)
6	(150)	6.72	(171)	0.688	(17.48)	0.693	(17.59)	1.313	(33.35)	1.310	(33.27)
8	(200)	8.72	(221)	0.688	(17.48)	0.812	(20.62)	1.500	(38.10)	1.310	(33.27)
10	(250)	10.88	(276)	0.688	(17.48)	0.953	(24.21)	1.563	(39.70)	1.500	(38.10)
12	(300)	12.88	(327)	0.719	(18.26)	1.117	(28.37)	1.750	(44.45)	1.630	(41.40)
14	(350)	14.19	(360)	0.791	(20.10)	1.133	(28.78)	1.875	(47.63)	1.940	(49.28)
16	(400)	16.19	(411)	0.892	(22.66)	1.265	(32.13)	2.000	(50.80)	2.140	(54.36)
18	(450)	18.19	(462)	0.950	(24.13)	1.331	(33.81)	2.125	(53.98)	2.250	(57.15)
20	(500)	20.19	(513)	1.040	(26.42)	1.448	(36.77)	2.375	(60.33)	2.330	(59.18)
22	(550)	22.19	(564)	1.132	(28.74)	1.568	(39.83)	2.500	(63.50)	2.500	(63.50)
24	(600)	25.50	(648)	1.216	(30.89)	1.661	(42.18)	2.625	(66.68)	2.690	(68.53)
26	(650)	27.50	(699)	1.307	(33.20)	1.786	(45.37)	2.750	(69.85)	3.000	(76.20)
28	(700)	29.50	(749)	1.398	(35.50)	1.906	(48.40)	2.750	(69.85)	3.130	(79.50)
30	(750)	31.50	(800)	1.477	(37.53)	2.008	(51.00)	2.875	(73.03)	3.166	(80.42)
32	(800)	33.50	(851)	1.581	(40.16)	2.150	(54.60)	3.000	(76.20)	3.332	(84.62)
34	(850)	35.50	(902)	1.661	(42.19)	2.252	(57.21)	3.050	(77.46)	3.475	(88.25)
36	(900)	37.63	(956)	1.751	(44.48)	2.370	(60.20)	3.209	(81.51)	3.671	(93.25)
38	(950)	39.63	(1,006)	1.853	(47.06)	2.506	(63.66)	3.394	(86.20)	3.815	(96.90)
40	(1,000)	41.63	(1,057)	1.933	(49.09)	2.609	(66.28)	3.533	(89.74)	3.982	(101.40)
42	(1,050)	43.63	(1,108)	2.023	(51.40)	2.729	(69.32)	3.695	(93.86)	4.171	(105.92)
44	(1,100)	45.63	(1,159)	2.114	(53.70)	2.849	(72.36)	3.857	(97.97)	4.338	(110.19)
46	(1,150)	47.63	(1,210)	2.194	(55.73)	2.952	(74.99)	3.997	(101.53)	4.505	(114.43)
48	(1,200)	49.63	(1,260)	2.285	(58.03)	3.072	(78.03)	4.159	(105.65)	4.781	(121.44)
50	(1,250)	51.75	(1,314)	2.377	(60.38)	3.196	(81.17)	4.327	(109.90)		
52	(1,300)	53.75	(1,365)	2.468	(62.69)	3.315	(84.21)	4.489	(114.02)		
54	(1,350)	55.75	(1,416)	2.559	(64.99)	3.435	(87.25)	4.651	(118.14)		
60	(1,500)	61.75	(1,568)	2.820	(71.63)	3.779	(95.97)	5.116	(129.95)		
66	(1,650)	67.88	(1,724)	3.092	(78.53)	4.136	(105.06)	5.601	(142.26)		
72	(1,800)	73.88	(1,876)	3.353	(85.17)	4.480	(113.80)	6.066	(154.08)		

Notes:

- All flanges are flat faced.
 - ASTM A36 steel used (allowable stress 16,000 psi).
 - ASTM A307 Grade B bolts (7,000 psi allowable stress) used for class B and D.
 - ASTM A193 Grade B7 bolts (25,000 psi allowable stress) used for class E and F.
 - For diameters over 48 in., designers should consider using dished heads welded to a standard flange.
- *Design Method: ASME Boiler & Pressure Vessel Code, Sec. VIII, Div. 1, UG-34, Eq 2, or corresponding ring-flange thickness, whichever is greater.
- †Class D flanges are rated at 175 psi (1,207 kPa) for nominal pipe sizes ≤ 12 in. (600 mm), and 150 psi (1,034 kPa) for nominal pipe sizes > 12 in. (600 mm).
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AWWA FABRICATION TOLERANCES

4.2.1 Tolerances. The dimensions listed in Tables 2 through 7 shall apply prior to attachment and are subject to the following tolerances:

- 4.2.1.1 Inside diameter of flange +1/16 in. (1.6 mm), -0
- 4.2.1.2 Outside diameter of flange $\pm 1/8$ in. (3.2mm)
- 4.2.1.3 Thickness of flanges 18 in. (450mm) and smaller + 1/8 in. (3.2 mm), -0
- 4.2.1.4 Thickness of flanges 20 in. (500mm) and larger + 3/16 in. (4.8 mm), -0
- 4.2.1.5 Length through hub 18 in. (450mm) and smaller + 1/8 in. (3.2 mm), -1/32 in. (.079 mm)
- 4.2.1.6 Length through hub 20 in. (500mm) and larger + 3/16 in. (4.8 mm), - 1/16 in. (1.6mm)
- 4.2.1.7 Bolt-circle diameter $\pm 1/16$ in. (1.6 mm)
- 4.2.1.8 Bolt-hole spacing $\pm 1/32$ in. (0.79 mm)

4.2.2 Facing. Flanges of all classes shall be flat faced--that is, without projection or raised face. Either a serrated concentric or serrated spiral finish having 24 to 55 grooves/in. (0.94 to 2.17 grooves/mm) shall be used. The cutting tool employed shall have a radius of 0.06 in. (1.52 mm) or larger. The resultant surface finish shall have a 250- to 500- μ m (6.35- to 12.7- μ m) roughness.

4.2.2.2 Flange faces shall be free of lining and coating materials except that a soluble rust preventive compound is permitted. The gasket seating surface shall not have protrusions.

4.2.3 Drilling. Drilling templates shall be in multiples of four so that fittings can be made to face any quarter. Bolt holes shall straddle the center line, except where special mating conditions exist. For flanges up to 84 in. (2,100 mm) in diameter, bolt holes shall be drilled 1/8 in. (3.2 mm) larger in diameter than the nominal diameter of the bolt. For flanges larger than 84 in. (2,100 mm) diameter, bolt holes shall be drilled 3/16 in. (4.8 mm) larger than the nominal bolt diameter. Bolt holes may be overdrilled by an additional 1/8 in. (3.2 mm) to accommodate insulators or to facilitate alignment with the mating flange.

4.2.4 Segmentation of flanges. Flanges shall be constructed by welding segments together when the OD of a flange exceeds the width of available plate material (approximately 78-in. [1,950-mm] ID and larger). The maximum number of segments in a single flange shall be four.

- 4.2.4.1 Welding of the segments shall be performed in accordance with Sec. 4.3.2 of this standard.
- 4.2.4.2 Radiographic or ultrasonic testing of all welds is required and shall be performed in accordance with the governing welding code as described in Sec 4.3.2.
- 4.2.4.3 If any specimen tested in accordance with the approved procedure fails to meet the requirements, it shall be repaired using the approved repair procedure and radiographically or ultrasonically tested for conformance. If the retest fails to conform to the requirements, the flange shall be rejected.
- 4.2.4.4 Segmented flanges shall be stress-relieved by a method acceptable to the purchaser. Stress relieving shall be done after welding and before machining.

4.2.5 Blind flanges. Blind flange thicknesses shall be as set forth in Table 7. For blind flanges over 48-in. (1,200-mm) nominal diameter, it is recommended that a combination of a ring flange and a flanged and dished head, suitable for the pressure and design conditions, be used. Blind flanges shall be machine faced to match the mating flange. The thickness shown in Table 7 is after machining.

Manufacturing Standards

Plate Flange Specifications

- | | |
|---|-------------------------------------|
| • Pipe and Tube sizes 1/2" through 24" | ASME / ANSI B16.5-1996 ¹ |
| • Pipe and Tube sizes 26" and larger | ASME / ANSI B16.1-1989 ¹ |
| • American Water Works Association
(AWWA) 4" through 102" ² | AWWA C207-07 |

Plate Flange Tolerances (ASME /ANSI B16.5-1996)³

- | | |
|-------------------------------------|------------------------|
| • Thickness of Flange | ASTM A480 ⁴ |
| • Outside Diameter of Flange | |
| 10" and under | +/-1/16 |
| 12" and over | +/-1/8 |
| • Inside Diameter of Flange | |
| 10" and under | +1/32-0 |
| 12" and over | +1/16-0 |
| • Bolt Circle Diameter | +/-1/16 |
| • Bolt Hole Spacing | +/-1/32 |
| (between any two adjacent holes) | |
| • Concentricity (Bolt circle to ID) | |
| 2-1/2" and under | +/-1/32 |
| 3" and over | +/-1/16 |

Material Specifications

- All plates used in the manufacture of Stainless Processing's flanges are certified to ASTM A240, ASME SA240.
- Plate thickness is in accordance to ASTM A480⁴.
- AMS and MIL-S are readily available.
- Original mill test reports are supplied with every shipment and invoice.

¹OD and drilling to ASME / ANSI standard. ID size is application specific.

²Sizes up to 120" available upon request.

³B16.5 tolerances apply to all but thickness. Thickness is covered by ASTM A480.

⁴complete chart available upon request.

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Material Availability

Below are some of the grades readily available at S.P.I.

T304 • T304L • T309S • T310S • T316 • T316L • T317L • T321 • T410 • 254 SMO
Duplex Stainless Steel: 2205, 2304, 2507, LDX 2101
• Aluminum 6061 T-6

Machining Options

Stainless Processing's Machining Division offers many options including:

- Raised Face
- 125 RMS or gasket surface
- ID Bevel
- ID Radius
- Drilled and Tapped bolt holes
- Counter-Bore

About Stainless Processing

Our Personnel

Our dedicated sales staff is committed to constantly improving the quality and service supplied to our customers.

Our highly qualified and expertly trained production people manufacture the finest product available.

Our Production Facilities

At Stainless Processing we continually grow with our customers needs. We are always able to handle our customers requests by consistently revamping, retooling and adding to our production areas.

ASAP Delivery, No Problem!

Machine Division

Rings, Discs and Flanges up to 120" OD. We are able to produce small or large quantities ASAP with our dedicated flange production areas.

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Custom shapes and Bar sizes through 6" thick. Our plasma and saw cutting facilities incorporate state of the art CNC machines along with proprietary programming.

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