

ENGINEERING DATA

PRESSURE-TEMPERATURE RATINGS

CAST CARBON STEEL – ASTM A216 GR WCB

GATE, GLOBE, AND CHECK VALVES FLANGED AND BUTTWELDING ENDS

STANDARD CLASS PRESSURE-TEMPERATURE RATINGS ANSI B16.34 – 1977

TEMPERATURE IN °F	MAXIMUM ALLOWABLE NON-SHOCK WORKING PRESSURE IN psig BY CLASSES						
	150	300	400	600	900	1500	2500
-20 to 100	285	740	990	1480	2220	3705	6170
200	260	675	900	1350	2025	3375	5625
300	230	655	875	1315	1970	3280	5470
400	200	635	845	1270	1900	3170	5280
500	170	600	800	1200	1795	2995	4990
600	140	550	730	1095	1640	2735	4560
650	125	535	715	1075	1610	2685	4475
700	110	535	710	1065	1600	2665	4440
750	95	505	670	1010	1510	2520	4200
800	80	410	550	825	1235	2060	3430
850	65	270	355	535	805	1340	2230
900	50	170	230	345	515	860	1430
950	35	105	140	205	310	515	860
1000	20	50	70	105	155	260	430

CAST 1¼CR-½Mo STEEL – ASTM A217 GR WC6

GATE, GLOBE, AND CHECK VALVES FLANGED AND BUTTWELDING ENDS

STANDARD CLASS PRESSURE-TEMPERATURE RATINGS ANSI B16.34 – 1977

TEMPERATURE IN °F	MAXIMUM ALLOWABLE NON-SHOCK WORKING PRESSURE IN psig BY CLASSES						
	150	300	400	600	900	1500	2500
-20 to 100	290	750	1000	1500	2250	3750	6250
200	260	710	950	1425	2135	3560	5930
300	230	675	895	1345	2020	3365	5605
400	200	660	880	1315	1975	3290	5485
500	170	640	855	1285	1925	3210	5350
600	140	605	805	1210	1815	3025	5040
650	125	590	785	1175	1765	2940	4905
700	110	570	755	1135	1705	2840	4730
750	95	530	710	1065	1595	2660	4430
800	80	510	675	1015	1525	2540	4230
850	65	485	650	975	1460	2435	4060
900	50	450	600	900	1350	2245	3745
950	35	380	505	755	1130	1885	3145
1000	20	225	300	445	670	1115	1860
1050	20*	140	185	275	410	685	1145
1100	20*	95	130	190	290	480	800

*For Welding end valves only. Flanged end ratings terminate at 1000°F.

For pressure-temperature ratings of other materials, see ANSI B16.34

Product used under the jurisdiction of the ASME Boiler and Vessel Code or of the ANSI Code for Pressure Piping is subject to any limitation of that code, including any maximum temperature limitation for a material, or a code rule governing the use of a material at low temperature.

Where welded construction is used, consideration should be given to the possibility of graphite formation in carbon-molybdenum steel above 875F.

Allowable pressure may be interpolated between the temperatures.

The temperature shown on the corresponding pressure rating shall be the material temperature of the pressure retaining structure, assumed to be the temperature of the contained fluid. Use of a pressure rating at a material temperature other than that of the contained fluid is the responsibility of the user, and subject to the requirements of any applicable code.

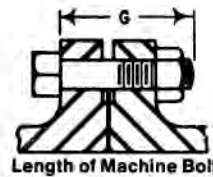
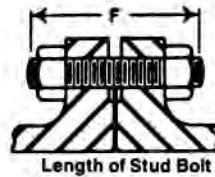
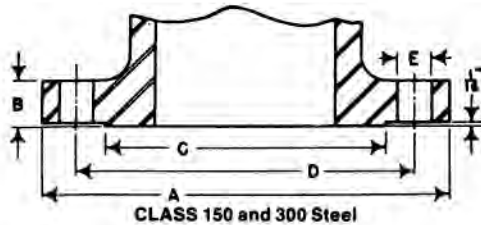
The use of these pressure ratings requires that the gasket of a flanged joint conform to the requirements of ANSI B16.5. The user is responsible for selection of gasket dimensions and materials to withstand the required bolt loading without injurious crushing, and also the suitability for the service conditions.

ENGINEERING DATA

END DIMENSIONS

STEEL FLANGE DIMENSIONS AND DRILLING TEMPLATES

CLASS 150 AND 300 - ANSI B16.5



1/16-Inch Raised Face Joint

Class 150 Steel Flanges

Dimensions in Inches

Nominal Pipe Size	Flange Diameter A	Flange Thickness Companion Flange B	Valve Flange B	Diameter of Raised Face C	Diameter of Bolt Circle D	Diameter of Bolt Holes E	Number of Bolts	Diameter of Bolts	Length of Stud Bolts with 2 Nuts F	Length of Machine Bolts G
1/2	3 1/2	7/16	—	1 3/8	2 3/8	5/8	4	1/2	2 1/4	1 3/4
3/4	3 7/8	1/2	—	1 11/16	2 3/4	5/8	4	1/2	2 1/4	2
1	4 1/4	9/16	7/16	2	3 1/8	5/8	4	1/2	2 1/2	2
1 1/4	4 5/8	5/8	1/2	2 1/2	3 1/2	5/8	4	1/2	2 1/2	2 1/4
1 1/2	5	11/16	9/16	2 7/8	3 3/8	5/8	4	1/2	2 3/4	2 1/4
2	6	3/4	5/8	3 5/8	4 3/4	3/4	4	5/8	3	2 3/4
2 1/2	7	7/8	11/16	4 1/8	5 1/2	3/4	4	5/8	3 1/4	3
3	7 1/2	15/16	3/4	5	6	3/4	4	5/8	3 1/2	3
3 1/2	8 1/2	15/16	13/16	5 1/2	7	3/4	8	5/8	3 1/2	3
4	9	15/16	13/16	6 3/16	7 1/2	3/4	8	5/8	3 1/2	3
5	10	15/16	13/16	7 5/16	8 1/2	7/8	8	3/4	3 3/4	3 1/4
6	11	1	13/16	8 1/2	9 1/2	7/8	8	3/4	3 3/4	3 1/4
8	13 1/2	1 1/8	13/16	10 5/8	11 3/4	7/8	8	3/4	4	3 1/2
10	16	1 3/16	13/16	12 3/4	14 1/4	1	12	7/8	4 1/2	3 3/4
12	19	1 1/4	13/16	15	17	1	12	7/8	4 1/2	4
14	21	1 3/8	13/16	16 1/4	18 3/4	1 1/8	12	1	5	4 1/4
16	23 1/2	1 7/16	13/16	18 1/2	21 1/4	1 1/8	16	1	5 1/4	4 1/2
18	25	1 9/16	13/16	21	22 3/4	1 1/4	16	1 1/8	5 3/4	4 3/4
20	27 1/2	1 11/16	13/16	23	25	1 1/4	20	1 1/8	6	5 1/4
24	32	1 7/8	13/16	27 1/4	29 1/2	1 3/8	20	1 1/2	6 3/4	5 3/4

Class 300 Steel Flanges

Dimensions in Inches

Nominal Pipe Size	Flange Diameter A	Flange Thickness B	Diameter of Raised Face C	Diameter of Bolt Circle D	Diameter of Bolt Holes E	Number of Bolts	Diameter of Bolts	Length of Stud Bolts with 2 Nuts F	Length of Machine Bolts G
1/2	3 3/4	9/16	1 3/8	2 5/8	5/8	4	1/2	2 1/2	2
3/4	4 5/8	5/8	1 11/16	3 1/4	3/4	4	5/8	2 3/4	2 1/2
1	4 7/8	11/16	2	3 1/2	3/4	4	5/8	3	2 1/2
1 1/4	5 1/4	3/4	2 1/2	3 7/8	3/4	4	5/8	3	2 3/4
1 1/2	6 1/8	13/16	2 7/8	4 1/2	7/8	4	3/4	3 1/2	3
2	6 1/2	7/8	3 5/8	5	3/4	8	5/8	3 1/4	3
2 1/2	7 1/2	1	4 1/8	5 7/8	7/8	8	3/4	3 3/4	3 1/4
3	8 1/4	1 1/8	5	6 5/8	7/8	8	3/4	4	3 1/2
3 1/2	9	1 3/16	5 1/2	7 1/4	7/8	8	3/4	4 1/4	3 3/4
4	10	1 1/4	6 3/16	7 7/8	7/8	8	3/4	4 1/4	3 3/4
5	11	1 3/8	7 5/16	9 1/4	7/8	8	3/4	4 1/2	4
6	12 1/2	1 7/16	8 1/2	10 5/8	7/8	12	3/4	4 3/4	4 1/4
8	15	1 5/8	10 5/8	13	1	12	7/8	5 1/4	4 3/4
10	17 1/2	1 7/8	12 3/4	15 1/4	1 1/8	16	1	6	5 1/4
12	20 1/2	2	15	17 3/4	1 1/4	16	1 1/8	6 1/2	5 3/4
14	23	2 1/8	16 1/4	20 1/4	1 1/4	20	1 1/8	6 3/4	6
16	25 1/2	2 1/4	18 1/2	22 1/2	1 3/8	20	1 1/4	7 1/4	6 1/2
18	28	2 3/8	21	24 3/4	1 3/8	24	1 1/4	7 1/2	6 3/4
20	30 1/2	2 1/2	23	27	1 3/8	24	1 1/4	8	7
24	36	2 3/4	27 1/4	32	1 5/8	24	1 1/2	9	7 3/4

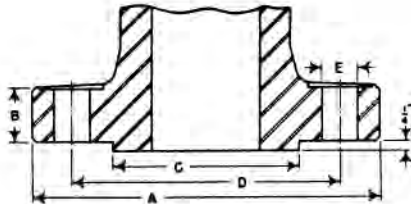
The regular 1/16-inch raised face of Class 150 and 300 flanges is included in the minimum flange thickness given above, but other raised faces must be added thereto.

ENGINEERING DATA

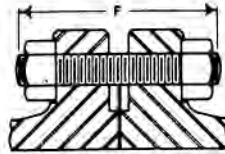
END DIMENSIONS

STEEL FLANGE DIMENSIONS AND DRILLING TEMPLATES

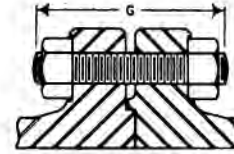
CLASS 400 AND 600 – ANSI B16.5



Class 400 and 600 Steel



Male to Male
Flanged Joint



Male to Female
Flanged Joint

Stud bolt length "G" also applies for tongue to groove flanged joint.

Class 400 Steel Flanges Dimensions in Inches

Nominal Pipe Size	Flange Diameter A	Flange Thickness B	Diameter of Raised Face C	Diameter of Bolt Circle D	Diameter of Bolt Holes E	Number of Stud Bolts	Diameter of Stud Bolts	Length of Stud Bolts with 2 Nuts	
								F	G
4*	10	1 $\frac{3}{8}$	6 $\frac{3}{16}$	7 $\frac{7}{8}$	1	8	$\frac{7}{8}$	5 $\frac{1}{4}$	5
5	11	1 $\frac{1}{2}$	7 $\frac{9}{16}$	9 $\frac{1}{4}$	1	8	$\frac{7}{8}$	5 $\frac{1}{2}$	5 $\frac{1}{4}$
6	12 $\frac{1}{2}$	1 $\frac{5}{8}$	8 $\frac{1}{2}$	10 $\frac{5}{8}$	1	12	$\frac{7}{8}$	5 $\frac{3}{4}$	5 $\frac{1}{2}$
8	15	1 $\frac{7}{8}$	10 $\frac{5}{8}$	13	1 $\frac{1}{8}$	12	1	6 $\frac{1}{2}$	6 $\frac{1}{4}$
10	17 $\frac{1}{2}$	2 $\frac{1}{8}$	12 $\frac{3}{4}$	15 $\frac{1}{4}$	1 $\frac{1}{4}$	16	1 $\frac{1}{8}$	7 $\frac{1}{4}$	7
12	20 $\frac{1}{2}$	2 $\frac{1}{4}$	15	17 $\frac{3}{4}$	1 $\frac{3}{8}$	16	1 $\frac{1}{4}$	7 $\frac{3}{4}$	7 $\frac{1}{2}$
14	23	2 $\frac{3}{8}$	16 $\frac{1}{4}$	20 $\frac{1}{4}$	1 $\frac{3}{8}$	20	1 $\frac{1}{4}$	8	7 $\frac{3}{4}$
16	25 $\frac{1}{2}$	2 $\frac{1}{2}$	18 $\frac{1}{2}$	22 $\frac{1}{2}$	1 $\frac{1}{2}$	20	1 $\frac{3}{8}$	8 $\frac{1}{2}$	8 $\frac{1}{4}$
18	28	2 $\frac{5}{8}$	21	24 $\frac{3}{4}$	1 $\frac{1}{2}$	24	1 $\frac{3}{8}$	8 $\frac{3}{4}$	8 $\frac{1}{2}$
20	30 $\frac{1}{2}$	2 $\frac{3}{4}$	23	27	1 $\frac{5}{8}$	24	1 $\frac{1}{2}$	9 $\frac{1}{2}$	9 $\frac{1}{4}$
24	36	3	27 $\frac{1}{4}$	32	1 $\frac{7}{8}$	24	1 $\frac{3}{4}$	10 $\frac{1}{2}$	10 $\frac{1}{4}$

*Use Class 600 dimensions in sizes smaller than 4-inch.

Class 600 Steel Flanges Dimensions in Inches

Nominal Pipe Size	Flange Diameter A	Flange Thickness B	Diameter of Raised Face C	Diameter of Bolt Circle D	Diameter of Bolt Holes E	Number of Stud Bolts	Diameter of Stud Bolts	Length of Stud Bolts with 2 Nuts	
								F	G
$\frac{1}{2}$	3 $\frac{3}{4}$	$\frac{9}{16}$	1 $\frac{3}{8}$	2 $\frac{5}{8}$	$\frac{5}{8}$	4	$\frac{1}{2}$	3	2 $\frac{3}{4}$
$\frac{3}{4}$	4 $\frac{5}{8}$	$\frac{5}{8}$	1 $\frac{11}{16}$	3 $\frac{1}{4}$	$\frac{3}{4}$	4	$\frac{5}{8}$	3 $\frac{1}{4}$	3
1	4 $\frac{7}{8}$	1 $\frac{1}{16}$	2	3 $\frac{1}{2}$	$\frac{3}{4}$	4	$\frac{5}{8}$	3 $\frac{1}{2}$	3 $\frac{1}{4}$
1 $\frac{1}{4}$	5 $\frac{1}{4}$	1 $\frac{3}{16}$	2 $\frac{1}{2}$	3 $\frac{7}{8}$	$\frac{3}{4}$	4	$\frac{5}{8}$	3 $\frac{3}{4}$	3 $\frac{1}{2}$
1 $\frac{1}{2}$	6 $\frac{1}{8}$	$\frac{7}{8}$	2 $\frac{7}{8}$	4 $\frac{1}{2}$	$\frac{7}{8}$	4	$\frac{3}{4}$	4	3 $\frac{3}{4}$
2	6 $\frac{1}{2}$	1	3 $\frac{5}{8}$	5	$\frac{3}{4}$	8	$\frac{5}{8}$	4	3 $\frac{3}{4}$
2 $\frac{1}{2}$	7 $\frac{1}{2}$	1 $\frac{1}{8}$	4 $\frac{1}{8}$	5 $\frac{7}{8}$	$\frac{7}{8}$	8	$\frac{3}{4}$	4 $\frac{1}{2}$	4 $\frac{1}{4}$
3	8 $\frac{1}{4}$	1 $\frac{1}{4}$	5	6 $\frac{5}{8}$	$\frac{7}{8}$	8	$\frac{3}{4}$	4 $\frac{3}{4}$	4 $\frac{1}{2}$
3 $\frac{1}{2}$	9	1 $\frac{3}{8}$	5 $\frac{1}{2}$	7 $\frac{1}{4}$	1	8	$\frac{7}{8}$	5	5
4	10 $\frac{3}{4}$	1 $\frac{1}{2}$	6 $\frac{3}{16}$	8 $\frac{1}{2}$	1	8	$\frac{7}{8}$	5 $\frac{1}{2}$	5 $\frac{1}{4}$
5	13	1 $\frac{3}{4}$	7 $\frac{9}{16}$	10 $\frac{1}{2}$	1 $\frac{1}{8}$	8	1	6 $\frac{1}{4}$	6
6	14	1 $\frac{7}{8}$	8 $\frac{1}{2}$	11 $\frac{1}{2}$	1 $\frac{1}{8}$	12	1	6 $\frac{1}{2}$	6 $\frac{1}{4}$
8	16 $\frac{1}{2}$	2 $\frac{3}{16}$	10 $\frac{5}{8}$	13 $\frac{3}{4}$	1 $\frac{1}{4}$	12	1 $\frac{1}{8}$	7 $\frac{1}{2}$	7 $\frac{1}{4}$
10	20	2 $\frac{1}{2}$	12 $\frac{3}{4}$	17	1 $\frac{3}{8}$	16	1 $\frac{1}{4}$	8 $\frac{1}{4}$	8
12	22	2 $\frac{5}{8}$	15	19 $\frac{1}{4}$	1 $\frac{3}{8}$	20	1 $\frac{1}{4}$	8 $\frac{1}{2}$	8 $\frac{1}{4}$
14	23 $\frac{3}{4}$	2 $\frac{3}{4}$	16 $\frac{1}{4}$	20 $\frac{3}{4}$	1 $\frac{1}{2}$	20	1 $\frac{3}{8}$	9	8 $\frac{3}{4}$
16	27	3	18 $\frac{1}{2}$	23 $\frac{3}{4}$	1 $\frac{5}{8}$	20	1 $\frac{1}{2}$	9 $\frac{3}{4}$	9 $\frac{1}{2}$
18	29 $\frac{1}{4}$	3 $\frac{1}{4}$	21	25 $\frac{3}{4}$	1 $\frac{3}{4}$	20	1 $\frac{5}{8}$	10 $\frac{1}{2}$	10 $\frac{1}{4}$
20	32	3 $\frac{1}{2}$	23	28 $\frac{1}{2}$	1 $\frac{3}{4}$	24	1 $\frac{5}{8}$	11 $\frac{1}{4}$	11
24	37	4	27 $\frac{1}{4}$	33	2	24	1 $\frac{7}{8}$	12 $\frac{3}{4}$	12 $\frac{1}{2}$

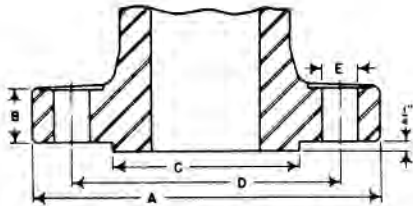
The regular $\frac{1}{4}$ -inch raised face of Class 400 and 600 flanges is not included in the minimum flange thickness given above. The addition of any facing is beyond the outside edge of the flange.

ENGINEERING DATA

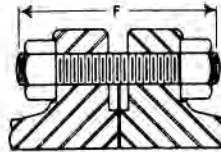
END DIMENSIONS

STEEL FLANGE DIMENSIONS AND DRILLING TEMPLATES

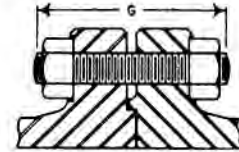
CLASS 900 AND 1500- ANSI B16.5



Class 900 and 1500 Steel



Male to Male
Flanged Joint



Male to Female
Flanged Joint

Stud Bolt length "G" also applies
for tongue to groove flanged joint.

Class 900 Steel Flanges Dimensions in Inches

Nominal Pipe Size	Flange Diameter A	Flange Thickness B	Diameter of Raised Face C	Diameter of Bolt Circle D	Diameter of Bolt Holes E	Number of Stud Bolts	Diameter of Stud Bolts	Length of Stud Bolts with 2 Nuts	
								F	G
3*	9½	1½	5	7½	1	8	7/8	5½	5¼
4	11½	1¾	6 ⁹ / ₁₆	9¼	1¼	8	1½	6½	6¼
5	13¾	2	7 ⁵ / ₁₆	11	1 ³ / ₈	8	1¼	7¼	7
6	15	2 ³ / ₁₆	8½	12½	1¼	12	1½	7½	7¼
8	18½	2½	10 ⁵ / ₈	15½	1½	12	1 ³ / ₈	8½	8¼
10	21½	2¾	12¾	18½	1½	16	1 ³ / ₈	9	8¾
12	24	3¼	15	21	1½	20	1 ³ / ₈	9¾	9½
14	25¼	3 ³ / ₈	16¼	22	1 ⁵ / ₈	20	1½	10½	10¼
16	27¾	3½	18½	24¼	1¾	20	1 ⁵ / ₈	11	10¾
18	31	4	21	27	2	20	1 ⁷ / ₈	12¾	12½
20	33¾	4¼	23	29½	2 ¹ / ₈	20	2	13½	13¼
24	41	5½	27¼	35½	2 ⁵ / ₈	20	2½	17	16¾

*Use Class 1500 dimensions in sizes smaller than 3-inch.

Class 1500 Dimensions in Inches

Nominal Pipe Size	Flange Diameter A	Flange Thickness B	Diameter of Raised Face C	Diameter of Bolt Circle D	Diameter of Bolt Holes E	Number of Stud Bolts	Diameter of Stud Bolts	Length of Stud Bolts with 2 Nuts	
								F	G
½	4¾	7/8	1 ³ / ₈	3¼	7/8	4	¾	4	3¾
¾	5½	1	1 ¹¹ / ₁₆	3½	7/8	4	¾	4¼	4
1	5 ⁷ / ₈	1 ¹ / ₈	2	4	1	4	7/8	4¾	4½
1¼	6¼	1 ¹ / ₈	2½	4 ³ / ₈	1	4	7/8	4¾	4½
1½	7	1¼	2 ⁷ / ₈	4 ⁷ / ₈	1 ¹ / ₈	4	1	5¼	5
2	8½	1½	3 ⁵ / ₈	6½	1	8	7/8	5½	5¼
2½	9 ⁹ / ₈	1 ⁵ / ₈	4 ¹ / ₈	7½	1 ¹ / ₈	8	1	6	5¾
3	10½	1 ⁷ / ₈	5	8	1¼	8	1 ¹ / ₈	6¾	6½
4	12¼	2 ¹ / ₈	6 ³ / ₁₆	9½	1 ³ / ₈	8	1¼	7½	7¼
5	14¾	2 ⁷ / ₈	7 ⁵ / ₁₆	11½	1 ⁵ / ₈	8	1½	9½	9¼
6	15½	3¼	8½	12½	1½	12	1 ³ / ₈	10	9¾
8	19	3 ⁵ / ₈	10 ⁵ / ₈	15½	1¾	12	1 ⁵ / ₈	11¼	11
10	23	4¼	12¾	19	2	12	1 ⁷ / ₈	13¼	13
12	26½	4 ⁷ / ₈	15	22½	2 ¹ / ₈	16	2	14¾	14½
14	29½	5¼	16¼	25	2 ³ / ₈	16	2¼	16	15¾
16	32½	5¾	18½	27¾	2 ⁵ / ₈	16	2½	17½	17¼
18	36	6 ³ / ₈	21	30½	2 ⁷ / ₈	16	2¾	19¼	19
20	38¾	7	23	32¾	3 ¹ / ₈	16	3	21	20¾
24	46	8	27¼	39	3 ⁵ / ₈	16	3½	24	23¾

The regular ¼-inch raised face of Class 900 and 1500 flanges is not included in the minimum flange thickness given above. The addition of any facing is beyond the outside edge of the flange.