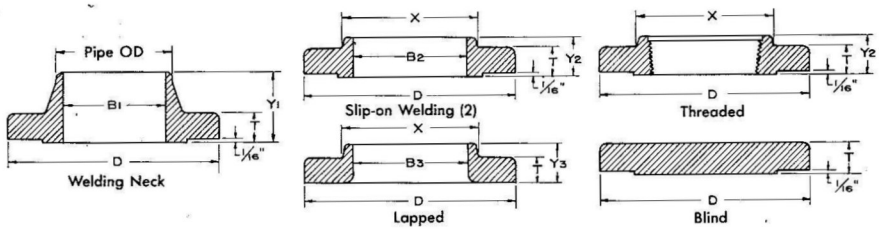
Forged Flanges—Class 150 and 300 Carbon, Alloy and Stainless Steels

ANSI B16.5

For Pressure—Temperature Ratings See Pages 58 thru 81.
For Socket-Welding Flanges See Page 147.



Pipe Size	Flange Diameter	Min.(1) Thick.	Bore			Dia. of Hub	Length Thru Hub			Drilling			Pipe Size
			Weld (3) Neck	Slip-on	Lapped		Weld(1) Neck	Slip-on (1) Threaded	Lapped	*Bolt ⅛" Smaller Bolt Hole			
	D	T	B_1	B_2	B_3	X	Y_1	Y_2	Y_3	No.	*Diam.	Circle	
Class 150													
1/2	3½	7/16	.62	.88	.90	1 3/16	1 7/8	5/8	5/8	4	5/8	2⅜	1/2
3/4	3⅞	½	.82	1.09	1.11	1 ½	2 1/16	5/8	5/8	4	5/8	2¾	3/4
1	4¼	9/16	1.05	1.36	1.38	1 15/16	2 3/16	11/16	11/16	4	5/8	3⅛	1
1-1/4	4⅝	5/8	1.38	1.70	1.72	2 5/16	2 ¼	13/16	13/16	4	5/8	3½	1-1/4
1-1/2	5	11/16	1.61	1.95	1.97	2 9/16	2 7/16	⅞	⅞	4	⅞	3⅞	1-1/2
2	6	¾	2.07	2.44	2.46	3 1/16	2 ½	1	1	4	¾	4¾	2
2-1/2	7	⅞	2.47	2.94	2.97	3 9/16	2 ¾	1 ⅛	1 ⅛	4	¾	5½	2-1/2
3	7½	15/16	3.07	3.57	3.60	4 ¼	2 ¾	1 3/16	1 3/16	4	¾	6	3
3-1/2	8½	15/16	3.55	4.07	4.10	4 13/16	2 13/16	1 ¼	1 ¼	8	¾	7	3-1/2
4	9	15/16	4.03	4.57	4.60	5 5/16	3	1 5/16	1 5/16	8	¾	7½	4
5	10	15/16	5.05	5.66	5.69	6 7/16	3 ½	1 7/16	1 7/16	8	⅞	8½	5
6	11	1	6.07	6.72	6.75	7 9/16	3 ½	1 9/16	1 9/16	8	⅞	9½	6
8	13½	1 ⅛	7.98	8.72	8.75	9 11/16	4	1 ¾	1 ¾	8	⅞	11¾	8
10	16	1 3/16	10.02	10.88	10.92	12	4	1 15/16	1 15/16	12	1	14¼	10
12	19	1 ¼	12.00	12.88	12.92	14 ⅜	4 ½	2 3/16	2 3/16	12	1	17	12
14	21	1 ⅜	13.25	14.14	14.18	15 ¾	5	2 ¼	3 ⅛	12	1⅛	18¾	14
16	23½	1 7/16	15.25	16.16	16.19	18	5	2 ½	3 7/16	16	1⅛	21¼	16
18	25	1 9/16	17.25	18.18	18.20	19 ⅞	5 ½	2 11/16	3 13/16	16	1¼	22¾	18
20	27½	1 11/16	19.25	20.20	20.25	22	5 11/16	2 ⅞	4 1/16	20	1¼	25	20
24	32	1 ⅞	23.25	24.25	24.25	26 ⅛	6	3 ¼	4 ⅜	20	1⅜	29½	24
Class 300													
1/2	3¾	9/16	.62	.88	.90	1 ½	2 1/16	⅞	⅞	4	⅝	2⅝	1/2
3/4	4⅛	5/8	.82	1.09	1.11	1 ⅞	2 ¼	1	1	4	¾	3¼	3/4
1	4⅞	11/16	1.05	1.36	1.38	2 ⅛	2 7/16	1 1/16	1 1/16	4	¾	3½	1
1-1/4	5¼	¾	1.38	1.70	1.72	2 ½	2 9/16	1 1/16	1 1/16	4	¾	3⅞	1-1/4
1-1/2	6⅛	13/16	1.61	1.95	1.97	2 ¾	2 11/16	1 3/16	1 3/16	4	⅞	4½	1-1/2
2	6½	⅞	2.07	2.44	2.46	3 5/16	2 ¾	1 5/16	1 5/16	8	¾	5	2
2-1/2	7½	1	2.47	2.94	2.97	3 15/16	3	1 ½	1 ½	8	⅞	5⅞	2-1/2
3	8¼	1 ⅛	3.07	3.57	3.60	4 ⅝	3 ⅛	1 11/16	1 11/16	8	⅞	6⅝	3
3-1/2	9	1 3/16	3.55	4.07	4.10	5 ¼	3 3/16	1 ¾	1 ¾	8	⅞	7¼	3-1/2
4	10	1 ¼	4.03	4.57	4.60	5 ¾	3 ⅜	1 ⅞	1 ⅞	8	⅞	7⅞	4
5	11	1 ⅜	5.05	5.66	5.69	7	3 ⅞	2	2	8	⅞	9¼	5
6	12½	1 7/16	6.07	6.72	6.75	8 ⅛	3 ⅞	2 1/16	2 1/16	12	⅞	10⅝	6
8	15	1 5/8	7.98	8.72	8.75	10 ¼	4 ⅜	2 7/16	2 7/16	12	1	13	8
10	17½	1 7/8	10.02	10.88	10.92	12 ⅝	4 ⅝	2 ⅝	3 ¾	16	1⅛	15¼	10
12	20½	2	12.00	12.88	12.92	14 ¾	5 ⅛	2 ⅞	4	16	1¼	17¾	12
14	23	2 ⅛	13.25	14.14	14.18	16 ¾	5 ⅜	3	4 ⅜	20	1¼	20¼	14
16	25½	2 ¼	15.25	16.16	16.19	19	5 ¾	3 ¼	4 ¾	20	1⅜	22½	16
18	28	2 ⅜	17.25	18.18	18.20	21	6 ¼	3 ½	5 ⅛	24	1⅜	24¾	18
20	30½	2 ½	19.25	20.20	20.25	23 ⅛	6 ⅜	3 ¾	5 ½	24	1⅜	27	20
24	36	2 ¾	23.25	24.25	24.25	27 ⅝	6 ⅝	4 3/16	6	24	1⅝	32	24

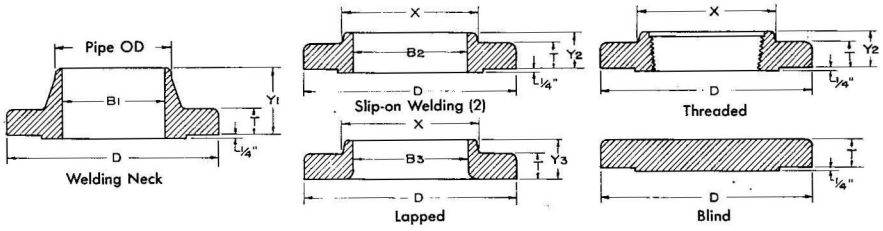
All dimensions given in inches.
(1) The 1/16" raised face is included in minimum thickness "T" and lengths Y1 and Y2.
(2) ANSI/ASME Code B31.1 limits the use of slip-on welding flanges to Class 300 or less with a further limitation to sizes 4" and less for use on Boiler External Pipe.
(3) The bore B1 for Class 150 and Class 300 welding neck flanges matches standard wall pipe and will be so furnished unless otherwise specified.

For material specifications see page 97.
For facing details see page 91.
For ring joint facing details see pages 92 and 93.

Forged Flanges—Class 400 and 600 Carbon, Alloy and Stainless Steels

ANSI B16.5

For Pressure—Temperature Ratings See Pages 58 thru 81.
For Socket-Welding Flanges See Page 147.



Pipe Size	Flange Diameter	Min.(1) Thick.	Bore			Dia. of Hub	Length Thru Hub			Drilling *Bolt ¼" Smaller			Pipe Size
			Weld Neck	Slip-on	Lapped		Weld(1) Neck	Slip-on (1) Threaded	Lapped	Bolt Hole			
	D	T	B_1	B_2	B_3	X	Y_1	Y_2	Y_3	No.	*Diam.	Circle	
						Class 400							
1/2													1/2
3/4													3/4
1													1
1-1/4													1-1/4
1-1/2			For sizes under 4" use the Dimensions of Class 600 Flanges										1-1/2
2													2
2-1/2													2-1/2
3													3
3-1/2													3-1/2
4	10	1 3/8	To Be Specified By Purchaser	4.57	4.60	5 3/4	3½	2	2	8	1	7⅞	4
5	11	1 ½		5.66	5.69	7	4	2 ⅛	2 ⅛	8	1	9¼	5
6	12½	1 5/8		6.72	6.75	8 ⅛	4 1/16	2 ¼	2 ¼	12	1	10⅝	6
8	15	1 7/8		8.72	8.75	10 ¼	4⅝	2 11/16	2 11/16	12	1⅛	13	8
10	17½	2 ⅛		10.88	10.92	12 ⅝	4⅞	2 ⅞	4	16	1¼	15¼	10
12	20½	2 ¼		12.88	12.92	14 ¾	5⅜	3 ⅛	4 ¼	16	1⅜	17¾	12
14	23	2 ⅜		14.14	14.18	16 ¾	5⅞	3 5/16	4 ⅜	20	1⅜	20¼	14
16	25½	2 ½		16.16	16.19	19	6	3 11/16	5	20	1½	22½	16
18	28	2 ⅝		18.18	18.20	21	6½	3 ⅞	5 ⅜	24	1½	24¾	18
20	30½	2 ¾		20.20	20.25	23 ⅛	6⅝	4	5 ¾	24	1⅝	27	20
24	36	3		24.25	24.25	27 ⅜	6⅞	4 ½	6 ¼	24	1⅞	32	24
						Class 600							
1/2	3¾	9/16	To Be Specified By Purchaser	.88	.90	1 ½	2 1/16	⅞	⅞	4	5/8	2⅝	1/2
3/4	4⅝	5/8		1.09	1.11	1 ⅞	2¼	1	1	4	¾	3¼	3/4
1	4⅞	11/16		1.36	1.38	2 ⅛	2 7/16	1 1/16	1 1/16	4	¾	3½	1
1-1/4	5¼	13/16		1.70	1.72	2 ½	2⅝	1 ⅛	1 ⅛	4	¾	3⅞	1-1/4
1-1/2	6⅛	⅞		1.95	1.97	2 ¾	2¾	1 ¼	1 ¼	4	⅞	4½	1-1/2
2	6½	1		2.44	2.46	3 5/16	2⅞	1 7/16	1 7/16	8	¾	5	2
2-1/2	7½	1 ⅛		2.94	2.97	3 13/16	3⅛	1 ⅝	1 ⅝	8	⅞	5⅞	2-1/2
3	8¼	1 ¼		3.57	3.60	4 ⅝	3¼	1 13/16	1 13/16	8	⅞	6⅝	3
3-1/2	9	1 3/8		4.07	4.10	5 ¼	3⅜	1 15/16	1 15/16	8	1	7¼	3-1/2
4	10¾	1 ½		4.57	4.60	6	4	2 ⅛	2 ⅛	8	1	8½	4
5	13	1 ¾		5.66	5.69	7 7/16	4½	2 ⅜	2 ⅜	8	1⅛	10½	5
6	14	1 7/8		6.72	6.75	8 ¾	4⅝	2 ⅝	2 ⅝	12	1⅛	11½	6
8	16½	2 3/16		8.72	8.75	10 ¾	5¼	3	3	12	1¼	13¾	8
10	20	2 ½		10.88	10.92	13 ½	6	3 ⅜	4 ⅜	16	1⅜	17	10
12	22	2 ⅝		12.88	12.92	15 ¾	6⅛	3 ⅝	4 ⅝	20	1⅜	19¼	12
14	23¾	2 ¾		14.14	14.18	17	6½	3 11/16	5	20	1½	20¾	14
16	27	3		16.16	16.19	19 ½	7	4 3/16	5 ½	20	1⅝	23¼	16
18	29¼	3 ¼		18.18	18.20	21 ½	7¼	4⅜	6	20	1¾	25¾	18
20	32	3 ½		20.20	20.25	24	7½	5	6 ½	24	1¾	28½	20
24	37	4		24.25	24.25	28 ¼	8	5 ½	7 ¼	24	2	33	24

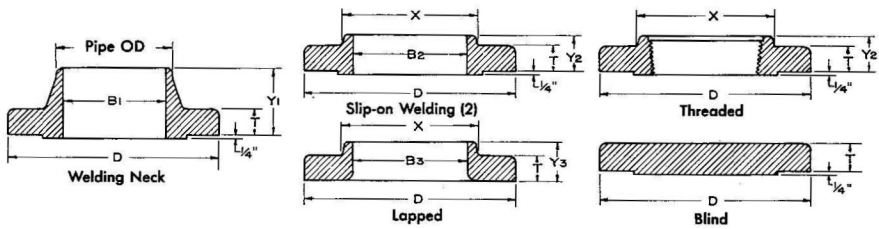
All dimensions given in inches.
(1) The ¼" raised face is not included in minimum thickness "T" and lengths Y1 and Y2.
(2) ANSI/ASME Code B31.1 limits the use of slip-on welding flanges to Class 300 or less with a further limitation to sizes 4" and less for use on Boiler External Pipe.

For material specifications see page 97.
For facing details see page 91.
For ring joint facing details see pages 92 and 93.

Forged Flanges—Class 900 and 1500 Carbon, Alloy and Stainless Steels

ANSI B16.5

For Pressure—Temperature Ratings See Pages 58 thru 81.
For Socket-Welding Flanges See Page 147.



Pipe Size	Class 900 Flange Diameter D	Min.(1) Thick. T	Bore: Weld Neck B_1	Bore: Slip-on B_2	Bore: Lapped B_3	Dia. of Hub X	Length Thru Hub: Weld(1) Neck Y_1	Length Thru Hub: Slip-on (1) Threaded Y_2	Length Thru Hub: Lapped Y_3	Drilling: No.	Drilling: *Bolt ⅛" Smaller Bolt Hole: *Diam.	Drilling: *Bolt ⅛" Smaller Bolt Hole: Circle	Pipe Size
1/2													1/2
3/4													3/4
1													1
1-1/4				For sizes under 3" use the Dimensions of Class 1500 Flanges									1-1/4
1-1/2													1-1/2
2													2
2-1/2													2-1/2
3	9½	1½		3.57	3.60	5	4	2 ⅛	2 ⅛	8	1	7½	3
4	11½	1¾		4.57	4.60	6¼	4½	2 ¾	2 ¾	8	1¼	9¼	4
5	13¾	2		5.66	5.69	7½	5	3 ⅛	3 ⅛	8	1⅜	11	5
6	15	2 3/16		6.72	6.75	9¼	5½	3 ⅜	3 ⅜	12	1¼	12½	6
8	18½	2½		8.72	8.75	11¾	6⅝	4	4 ½	12	1½	15½	8
10	21½	2¾		10.88	10.92	14½	7¼	4 ¼	5	16	1½	18½	10
12	24	3⅛		12.88	12.92	16½	7⅞	4 ⅝	5 ⅝	20	1½	21	12
14	25¼	3⅜		14.14	14.18	17¾	8⅝	5 ⅛	6 ⅛	20	1⅝	22	14
16	27¾	3½		16.16	16.19	20	8½	5 ¼	6 ½	20	1¾	24¼	16
18	31	4		18.18	18.20	22¼	9	6	7 ½	20	2	27	18
20	33¾	4¼		20.20	20.25	24½	9¾	6 ¼	8 ¼	20	2⅛	29½	20
24	41	5½		24.25	24.25	29½	11½	8	10 ½	20	2⅝	35½	24
						Class 1500							
1/2	4¾	⅞		.88	.90	1½	2⅜	1 ¼	1 ¼	4	⅞	3¼	1/2
3/4	5⅛	1		1.09	1.11	1¾	2¾	1 ⅜	1 ⅜	4	⅞	3½	3/4
1	5⅞	1⅛		1.36	1.38	2 1/16	2⅞	1 ⅝	1 ⅝	4	1	4	1
1-1/4	6¼	1⅛		1.70	1.72	2½	2⅞	1 ⅝	1 ⅝	4	1	4⅜	1-1/4
1-1/2	7	1¼		1.95	1.97	2¾	3¼	1 ¾	1 ¾	4	1⅛	4⅞	1-1/2
2	8½	1½		2.44	2.46	4⅛	4	2 ¼	2 ¼	8	1	6½	2
2-1/2	9⅞	1⅝		2.94	2.97	4⅞	4⅛	2 ½	2 ½	8	1⅛	7½	2-1/2
3	10½	1⅞		3.57	3.60	5¼	4⅝	2 ⅞	2 ⅞	8	1¼	8	3
4	12¼	2⅛		4.57	4.60	6⅜	4⅞	3 9/16	3 9/16	8	1⅜	9½	4
5	14¾	2⅞		5.66	5.69	7¾	6⅛	4 ⅛	4 ⅛	8	1⅝	11½	5
6	15½	3¼		6.72	6.75	9	6¾	4 11/16	4 11/16	12	1½	12½	6
8	19	3⅝		8.72	8.75	11½	8⅜	5 ⅝	5 ⅝	12	1¾	15½	8
10	23	4¼		10.88	10.92	14½	10	6 ¼	7	12	2	19	10
12	26½	4⅞		12.88	12.92	17¾	11⅛	7 ⅛	8 ⅝	16	2⅛	22½	12
14	29½	5¼		---	14.18	19½	11¾	---	9 ½	16	2⅜	25	14
16	32½	5¾		---	16.19	21¾	12¼	---	10 ¼	16	2⅝	27¾	16
18	36	6⅜		---	18.20	23½	12⅞	---	10 ⅞	16	2⅞	30½	18
20	38¾	7		---	20.25	25¼	14	---	11 ½	16	3⅛	32¾	20
24	46	8		---	24.25	30	16	---	13	16	3⅝	39	24

To Be Specified By Purchaser

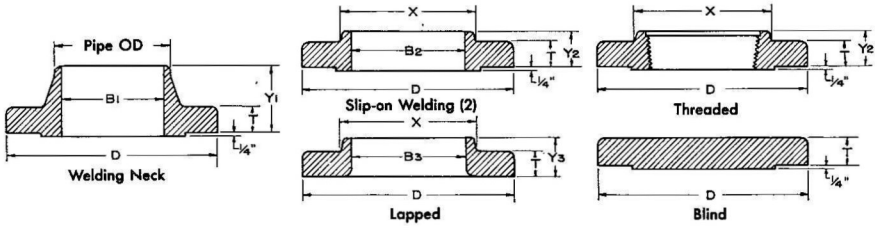
All dimensions given in inches.
(1) The ¼" raised face is not included in minimum thickness "T" and lengths Y1 and Y2.
(2) ANSI/ASME Code B31.1 limits the use of slip-on welding flanges to Class 300 or less with a further limitation to sizes 4" and less for use on Boiler External Pipe.

Class 1500 slip-on flanges, 3" size and above, and Class 1500 threaded flanges, 14" size and above, are not covered by ANSI Standard B16.5.
For material specifications see page 97.
For facing details see page 91.
For ring joint facing details see pages 92 and 93.

Forged Flanges—Class 2500
Carbon, Alloy and Stainless Steels

ANSI B16.5

For Pressure—Temperature Ratings See Pages 58 thru 81.



Pipe Size	Class 2500												Pipe Size
	Flange Diameter	Min.(1) Thick.	Bore			Dia. of Hub	Length thru Hub			Drilling			
			Weld Neck	Slip-on	Lapped		Weld(1) Neck	Slip-on (1) Threaded	Lapped	*Bolt 1/8" Smaller Bolt Hole			
	D	T	B_1	B_2	B_3	X	Y_1	Y_2	Y_3	No.	*Diam.	Circle	
1/2	5 1/4	13/16	To Be Specified By Purchaser	.88	.90	1 11/16	2 7/8	1 9/16	1 9/16	4	7/8	3 1/2	1/2
3/4	5 1/2	1 1/4		1.09	1.11	2	3 1/8	1 11/16	1 11/16	4	7/8	3 3/4	3/4
1	6 1/4	1 3/8		1.36	1.38	2 1/4	3 1/2	1 7/8	1 7/8	4	1	4 1/4	1
1-1/4	7 1/4	1 1/2		1.70	1.72	2 7/8	3 3/4	2 1/16	2 1/16	4	1 1/8	5 1/4	1-1/4
1-1/2	8	1 3/4		1.95	1.97	3 1/8	4 3/8	2 3/8	2 3/8	4	1 1/4	5 3/4	1-1/2
2	9 1/4	2		2.44	2.46	3 3/4	5	2 3/4	2 3/4	8	1 1/8	6 3/4	2
2-1/2	10 1/2	2 1/4		2.94	2.97	4 1/2	5 5/8	3 1/4	3 1/8	8	1 1/4	7 3/4	2-1/2
3	12	2 5/8		3.57	3.60	5 1/4	6 5/8	3 5/8	3 5/8	8	1 3/8	9	3
4	14	3		4.57	4.60	6 1/4	7 1/2	4 1/4	4 1/4	8	1 5/8	10 3/4	4
5	16 1/2	3 3/8		5.66	5.69	8	9	5 1/8	5 1/8	8	1 7/8	12 3/4	5
6	19	4 1/4		6.72	6.75	9 1/4	10 3/4	6	6	8	2 1/4	14 1/2	6
8	21 3/4	5		8.72	8.75	12	12 1/2	7	7	12	2 1/8	17 1/4	8
10	26 1/2	6 1/2		10.88	10.92	14 3/4	16 1/2	9	9	12	2 5/8	21 1/4	10
12	30	7 1/4		12.88	12.92	17 3/8	18 1/4	10	10	12	2 7/8	24 3/4	12

All dimensions given in inches.
(1) The 1/4" raised face is not included in minimum thickness "T" and lengths Y1 and Y2.
(2) ANSI/ASME Code B31.1 limits the use of slip-on welding flanges to Class 300 or less with a further limitation to sizes 4" and less for use on Boiler External Pipe.

Class 2500 slip-on flanges are not covered by ANSI Standard B16.5.
For facing details see page 91.
For ring joint facing details see page 92 and 93.

Material Specifications for Forged Flanges

Carbon steel flanges in all pressure classes are covered by ASTM Specification A-105.

Alloy steel flanges in all pressure classes are covered by ASTM Specification A-182 in Grades F1, F5, F5a, F6a, F7, F9, F11, F12, F21 and F22.

Austenitic stainless steel flanges in all pressure classes are covered by ASTM Specification A-182 in Grades F304, F304H, F304L, F310, F316, F316H, F316L, F321, F321H, F347, F347H, F348, F348H and F10.

Tabulation of Physical and Chemical Properties for Carbon Steel Flanges	
Physical and Chemical Properties	A-105
Tensile Strength (Min.) psi	70,000
Yield Point (Min.) psi	36,000
Carbon (Percent Max.)	0.35
Manganese (Percent)	0.60-1.05
Phosphorus (Percent Max.)	0.04
Sulphur (Percent Max.)	0.05