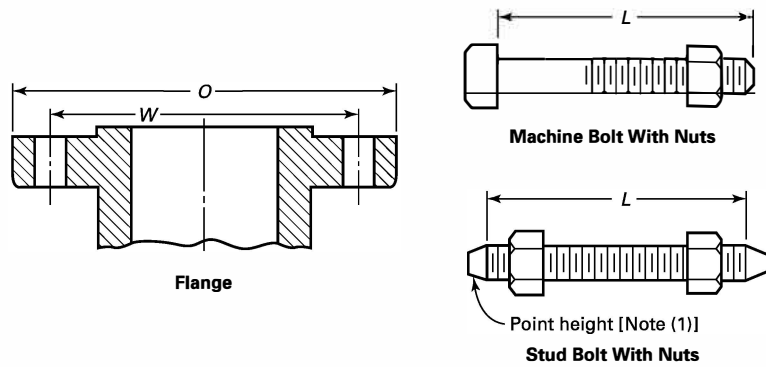


(17)

Table 10 Templates for Drilling Class 300 Pipe Flanges and Flanged Fittings

1	2	3	4	5	6	7	8	9
Nominal Pipe Size, NPS	Outside Diameter of Flange, O	Drilling [Notes (2), (3)]				Length of Bolts, L [Note (4)]		
		Diameter of Bolt Circle, W	Diameter of Bolt Holes, in.	Number of Bolts	Diameter of Bolts, in.	Stud Bolts [Note (1)]		Machine Bolts
						2-mm Raised Face	Ring Joint	2-mm Raised Face
1/2	95	66.7	5/8	4	1/2	65	75	55
3/4	115	82.6	3/4	4	5/8	75	90	65
1	125	88.9	3/4	4	5/8	75	90	65
1 1/4	135	98.4	3/4	4	5/8	85	95	70
1 1/2	155	114.3	7/8	4	3/4	90	100	75
2	165	127.0	3/4	8	5/8	90	100	75
2 1/2	190	149.2	7/8	8	3/4	100	115	85
3	210	168.3	7/8	8	3/4	110	120	90
3 1/2	230	184.2	7/8	8	3/4	110	125	95
4	255	200.0	7/8	8	3/4	115	125	95
5	280	235.0	7/8	8	3/4	120	135	110
6	320	269.9	7/8	12	3/4	120	140	110
8	380	330.2	1	12	7/8	140	150	120
10	445	387.4	1 1/8	16	1	160	170	140
12	520	450.8	1 1/4	16	1 1/8	170	185	145
14	585	514.4	1 1/4	20	1 1/8	180	190	160
16	650	571.5	1 3/8	20	1 1/4	190	205	165
18	710	628.6	1 3/8	24	1 1/4	195	210	170
20	775	685.8	1 3/8	24	1 1/4	205	220	185
22	840	743.0	1 3/8	24	1 1/2	230	255	205
24	915	812.8	1 5/8	24	1 1/2	230	255	205

GENERAL NOTES:

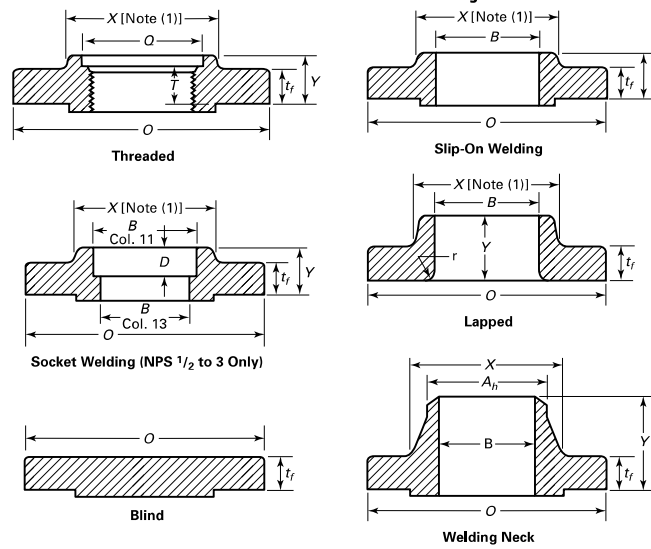
- (a) Dimensions of Table 10 are in millimeters, except for diameters of bolts and bolt holes, which are in inch units. For dimensions in inch units, refer to [Mandatory Appendix II, Table II-10](#).
- (b) For other dimensions, see [Tables 11 and 12](#).

NOTES:

- (1) Length of stud bolt does not include the height of the points (see [para. 6.10.2](#)).
- (2) For flange bolt holes, see [para. 6.5](#).
- (3) For spot facing, see [para. 6.6](#).
- (4) Bolt lengths not shown in the table may be determined in accordance with [Nonmandatory Appendix C](#) (see [para. 6.10.2](#)).

(17)

Table 11 Dimensions of Class 300 Flanges



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Nominal Pipe Size, NPS	Outside Diameter of Flange, <i>O</i>	Minimum Thickness of Flange, <i>t_f</i> [Notes (2)- (4)]	Minimum Thickness Lap Joint, <i>t_f</i>	Diameter of Hub, <i>X</i>	Hub Diameter Beginning of Chamfer Welding, Neck, <i>A_h</i> [Note (4)]	Length Through Hub			Minimum Thread Length Threaded, <i>T</i> [Note (5)]	Bore			Corner Radius of Bore of Lapped Flange and Pipe, <i>r</i>	Minimum Counter- bore Threaded Flange, <i>Q</i>	Depth of Socket, <i>D</i>
						Threaded/ Slip-On/ Socket Welding, <i>Y</i>	Lapped, <i>Y</i>	Welding Neck, <i>Y</i>		Minimum Slip-On/ Socket Welding, <i>B</i>	Minimum Lapped, <i>B</i>	Welding Neck/ Socket Welding, <i>B</i> [Note (6)]			
1/2	95	12.7	14.3	38	21.3	21	22	51	16	22.2	22.9	15.8	3	23.6	10
3/4	115	14.3	15.9	48	26.7	24	25	56	16	27.7	28.2	20.9	3	29.0	11
1	125	15.9	17.5	54	33.4	25	27	60	18	34.5	34.9	26.6	3	35.8	13
1 1/4	135	17.5	19.1	64	42.2	25	27	64	21	43.2	43.7	35.1	5	44.4	14
1 1/2	155	19.1	20.7	70	48.3	29	30	67	23	49.5	50.0	40.9	6	50.3	16

(17)

Table 11 Dimensions of Class 300 Flanges (Cont'd)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Nominal Pipe Size, NPS	Outside Diameter of Flange, O	Minimum Thickness of Flange, t_f [Notes (2)- (4)]	Minimum Thickness Lap Joint, t_f	Diameter of Hub, X	Hub Diameter Beginning of Chamfer Welding, Neck, A_h [Note (4)]	Length Through Hub			Minimum Thread Length Threaded, T [Note (5)]	Bore			Corner Radius of Bore of Lapped Flange and Pipe, r	Minimum Counter- bore Threaded Flange, Q	Depth of Socket, D
						Threaded/ Slip-On/ Socket Welding, Y	Lapped, Y	Welding Neck, Y		Minimum Slip-On/ Socket Welding, B	Minimum Lapped, B	Welding Neck/ Socket Welding, B [Note (6)]			
2	165	20.7	22.3	84	60.3	32	33	68	29	61.9	62.5	52.5	8	63.5	17
2½	190	23.9	25.4	100	73.0	37	38	75	32	74.6	75.4	62.7	8	76.2	19
3	210	27.0	28.6	117	88.9	41	43	78	32	90.7	91.4	77.9	10	92.2	21
3½	230	28.6	30.2	133	101.6	43	44	79	37	103.4	104.1	90.1	10	104.9	...
4	255	30.2	31.8	146	114.3	46	48	84	37	116.1	116.8	102.3	11	117.6	...
5	280	33.4	35.0	178	141.3	49	51	97	43	143.8	144.4	128.2	11	144.4	...
6	320	35.0	36.6	206	168.3	51	52	97	47	170.7	171.4	154.1	13	171.4	...
8	380	39.7	41.3	260	219.1	60	62	110	51	221.5	222.2	202.7	13	222.2	...
10	445	46.1	47.7	321	273.0	65	65	116	56	276.2	277.4	254.6	13	276.2	...
12	520	49.3	50.8	375	323.8	71	102	129	61	327.0	328.2	304.8	13	328.6	...
14	585	52.4	54.0	425	355.6	75	111	141	64	359.2	360.2	Note (7)	13	360.4	...
16	650	55.6	57.2	483	406.4	81	121	144	69	410.5	411.2	Note (7)	13	411.2	...
18	710	58.8	60.4	533	457.0	87	130	157	70	461.8	462.3	Note (7)	13	462.0	...
20	775	62.0	63.5	587	508.0	94	140	160	74	513.1	514.4	Note (7)	13	512.8	...
22	840	65.1	66.7	640	558.8	100	145	164	...	564.4	565.2	Note (7)	13	...	...
24	915	68.3	69.9	702	610.0	105	152	167	83	616.0	616.0	Note (7)	13	614.4	...

GENERAL NOTES:

- (a) Dimensions of Table 11 are in millimeters. For dimensions in inch units, refer to Mandatory Appendix II, Table II-11.
 (b) For tolerances, see section 7.
 (c) For facings, see para. 6.4.
 (d) For flange bolt holes, see para. 6.5 and Table 10.
 (e) For spot facing, see para. 6.6.
 (f) For reducing threaded and slip-on flanges, see Table 6.
 (g) Blind flanges may be made with or without hubs at the manufacturer's option.
 (h) For reducing welding neck flanges, see para. 6.8.

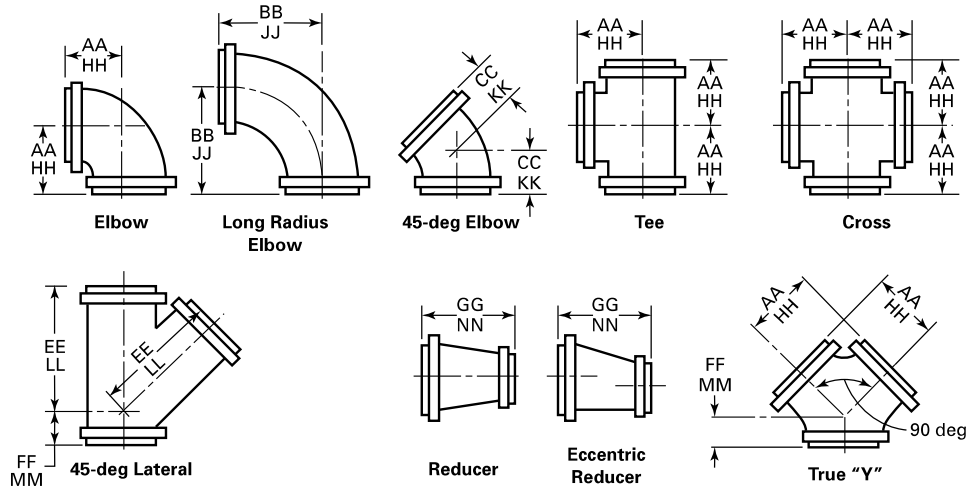
NOTES:

- (1) This dimension is for the large end of the hub, which may be straight or tapered. Taper shall not exceed 7 deg on threaded, slip-on, socket-welding, and lapped flanges. This dimension is defined as the diameter at the intersection between the hub taper and back face of the flange.

Table 11 Dimensions of Class 300 Flanges (Cont'd)

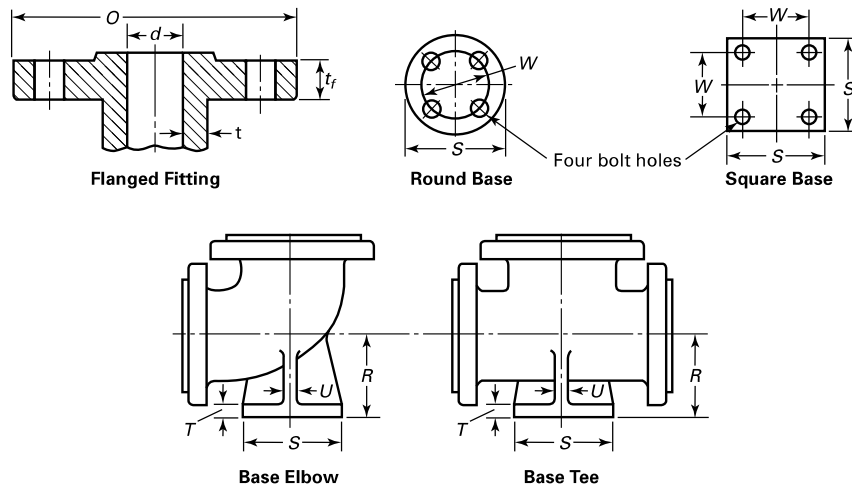
- NOTES (Cont'd):
- (2) These flanges may be supplied with a flat face. The flat face may be either the full t_f dimension thickness plus 2-mm or the t_f dimension thickness without the raised face height. See [para. 6.3.2](#) for additional restrictions.
 - (3) The flange dimensions illustrated are for regularly furnished 2-mm raised face (except lapped); for requirements of other facings, see [Figure 6](#).
 - (4) For welding end bevel, see [para. 6.7](#).
 - (5) For thread of threaded flanges, see [para. 6.9](#).
 - (6) Dimensions in Column 13 correspond to the inside diameters of pipe as given in ASME B36.10M for standard wall pipe. Standard wall dimensions are the same as Schedule 40 in sizes NPS 10 and smaller. Tolerances in [para. 7.5.2](#) apply. These bore sizes are furnished unless otherwise specified by the purchaser.
 - (7) To be specified by the purchaser.

Table 12 Dimensions of Class 300 Flanged Fittings



1	2	3	4	5	6	7	8	9	10	11	12
Nominal Pipe Size, NPS	Outside Diameter of Flange, <i>O</i>	Minimum Thickness of Flange, <i>t_f</i> [Notes (1)- (4)]	Minimum Wall Thickness of Fitting, <i>t_m</i>	Inside Diameter of Fitting, <i>d</i>	2-mm Raised Face (Flange Edge) [Note (4)]						Ring Joint [Note (4)]
					Center- to- Contact Surface of Raised Face Elbow, Tee, Cross, and True "Y," AA	Center- to- Contact Surface of Raised Face Long Radius Elbow, BB	Center- to- Contact Surface of Raised Face 45-deg Elbow, CC	Long Center- to- Contact Surface of Raised Face Lateral, EE	Short Center- to- Contact Surface of Raised Face Lateral and True "Y," FF [Note (5)]	Contact Surface- to- Contact Surface of Raised Face Reducer, GG [Note (5)]	Center- to-End Elbow, Tee, Cross, and True "Y," HH [Note (6)]
1	125	15.9	4.8	25	102	127	57	165	51	114	108
1¼	135	17.5	4.8	32	108	140	64	184	57	114	114
1½	155	19.1	4.8	38	114	152	70	216	64	114	121
2	165	20.7	6.4	51	127	165	76	229	64	127	135
2½	190	23.9	6.4	64	140	178	89	267	64	140	148
3	210	27.0	7.1	76	152	197	89	279	76	152	160
3½	230	28.6	7.4	89	165	216	102	318	76	165	173
4	255	30.2	7.9	102	178	229	114	343	76	178	186
5	280	33.4	9.5	127	203	260	127	381	89	203	211
6	320	35.0	9.5	152	216	292	140	445	102	229	224
8	380	39.7	11.1	203	254	356	152	521	127	279	262
10	445	46.1	12.7	254	292	419	178	610	140	305	300
12	520	49.3	14.3	305	330	483	203	698	152	356	338
14	585	52.4	15.9	337	381	546	216	787	165	406	389
16	650	55.6	17.5	387	419	610	241	876	190	457	427
18	710	58.8	19.0	432	457	673	254	952	203	483	465
20	775	62.0	20.6	483	495	737	267	1029	216	508	505
24	915	68.3	23.8	584	572	864	305	1206	254	610	583

Table 12 Dimensions of Class 300 Flanged Fittings (Cont'd)



13	14	15	16	17	18	19	20	21	22	23	1
Ring Joint [Note (5)]								Base Drilling [Note (11)]			Nominal Pipe Size, NPS
Center-to-End Long Radius Elbow, JJ [Note (7)]	Center-to-End 45-deg Elbow, KK [Note (7)]	Long Center-to-End Lateral, LL [Note (7)]	Short Center-to-End Lateral and True "Y," MM [Note (7)]	End-to-End Reducer, NN	Center-to-Base, R [Notes (7)-(9)]	Diameter of Round Base or Width of Square Base, S [Note (7)]	Thickness of Base, T [Notes (7)-(10)]	Thickness of Ribs, U [Note (7)]	Bolt Circle or Bolt Spacing, W	Diameter of Drilled Holes	
133	64	171	57	...	...	...	...	...	...	...	1
146	70	191	64	...	...	...	...	...	...	...	1¼
159	76	222	70	...	...	...	...	...	...	...	1½
173	84	237	71	...	114	133	19	13	98.4	¾	2
186	97	275	71	...	121	133	19	13	98.4	¾	2½
205	97	287	84	...	133	156	21	16	114.3	⅞	3
224	110	325	84	...	143	156	21	16	114.3	⅞	3½
268	135	389	97	...	171	190	25	19	149.2	⅞	5
300	148	452	110	...	190	190	25	19	149.2	⅞	6
364	160	529	135	...	229	254	32	22	200.0	⅞	8
427	186	618	148	...	267	254	32	22	200.0	⅞	10
491	211	706	160	...	305	318	36	25	269.9	⅞	12
554	224	795	173	...	343	318	36	25	269.9	⅞	14
618	249	884	198	...	375	318	36	29	269.9	⅞	16
681	262	960	211	...	413	381	41	29	330.2	1	18
746	276	1038	225	...	454	381	41	32	330.2	1	20
875	316	1218	265	...	527	444	48	32	387.4	1⅛	24

Table 12 Dimensions of Class 300 Flanged Fittings (Cont'd)

GENERAL NOTES:

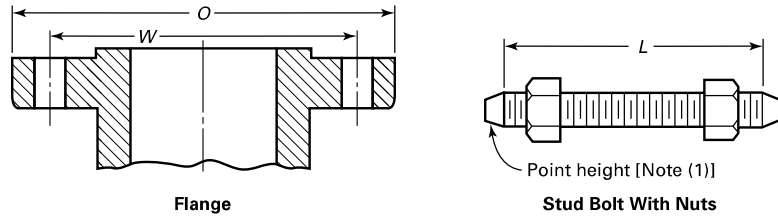
- (a) Dimensions of Table 12 are in millimeters. For dimensions in inch units, refer to [Mandatory Appendix II, Table II-12](#).
- (b) For tolerances, see [section 7](#).
- (c) For facings, see [para. 6.4](#).
- (d) For flange bolt holes, see [para. 6.5](#) and [Table 8](#).
- (e) For spot facing, see [para. 6.6](#).
- (f) For intersecting centerlines, center-to-contact surface, and center-to-end dimensions of side outlet fittings, see [para. 6.2.4](#).
- (g) For center-to-contact surface and center-to-end dimensions of special degree elbows, see [para. 6.2.5](#).
- (h) For reinforcement of certain fittings, see [para. 6.1.1](#).
- (i) For drains, see [para. 6.12](#).

NOTES:

- (1) These fittings may be supplied with a flat face flange. The flat face may be either the full t_f dimension thickness plus 2 mm or the t_f dimension thickness without the raised face height. See [para. 6.3.2](#) for additional restrictions.
- (2) The thickness of the flange dimension illustrated is for regularly furnished 2-mm raised face (except lapped); for thickness requirements of other facings, see [Figure 6](#).
- (3) The thickness of flange minimum dimensions for loose flanges, [Table 9](#), size NPS 3½ and smaller, are slightly heavier than for flanges on these fittings that are reinforced by being cast integral with the body of fitting.
- (4) For center-to-contact surface and center-to-end dimensions of reducing fittings, see [para. 6.2.3](#).
- (5) For contact surface-to-contact surface and end-to-end dimensions of reducers and eccentric reducers, see [para. 6.2.3](#).
- (6) These dimensions apply to straight sizes only (see [paras. 6.2.3](#) and [6.4.2.2](#)). For center-to-end dimensions of reducing fittings or end-to-end dimensions of reducers, use center-to-contact surface or contact surface-to-contact surface dimensions of 2-mm raised face (flange edge) for the largest opening, and add the proper height to provide for the ring joint groove applying to each flange. See [Table 5](#) for ring joint facing dimensions.
- (7) The base dimensions apply to all straight and reducing sizes.
- (8) For reducing fittings, the size and center-to-face dimension of base are determined by the size of the largest opening of fittings. In the case of reducing base elbows, orders shall specify whether the base shall be opposite the larger or smaller opening.
- (9) Bases shall be plain faced unless otherwise specified, and the center-to-base dimension R shall be the finished dimension.
- (10) Bases may be cast integral or attached as weldments at the option of the manufacturer.
- (11) The bases of these fittings are intended for support in compression and are not to be used for anchors or supports in tension or shear.

(17)

Table 13 Templates for Drilling Class 400 Pipe Flanges



1	2	3	4	5	6	7	8	9
Nominal Pipe Size, NPS	Outside Diameter of Flange, <i>O</i>	Drilling [Notes (2), (3)]				Length of Bolts, <i>L</i> [Notes (1), (4)]		
		Diameter of Bolt Circle, <i>W</i>	Diameter of Bolt Holes, in.	Number of Bolts	Diameter of Bolts, in.	7-mm Raised Face	Male and Female/ Tongue and Groove	Ring Joint
$\frac{1}{2}$								
$\frac{3}{4}$								
1								
$1\frac{1}{4}$								
$1\frac{1}{2}$								
Use Class 600 dimensions in these sizes								
2								
$2\frac{1}{2}$								
3								
$3\frac{1}{2}$								
4	255	200.0	1	8	$\frac{7}{8}$	145	135	140
5	280	235.0	1	8	$\frac{7}{8}$	145	135	145
6	320	269.9	1	12	$\frac{7}{8}$	150	145	150
8	380	330.0	$1\frac{1}{8}$	12	1	170	165	170
10	445	387.4	$1\frac{1}{4}$	16	$1\frac{1}{8}$	190	185	190
12	520	450.8	$1\frac{3}{8}$	16	$1\frac{1}{4}$	205	195	205
14	585	514.4	$1\frac{3}{8}$	20	$1\frac{1}{4}$	210	205	210
16	650	571.5	$1\frac{1}{2}$	20	$1\frac{3}{8}$	220	215	220
18	710	628.6	$1\frac{1}{2}$	24	$1\frac{3}{8}$	230	220	230
20	775	685.8	$1\frac{5}{8}$	24	$1\frac{1}{2}$	240	235	250
22	840	743.0	$1\frac{3}{4}$	24	$1\frac{5}{8}$	255	250	260
24	915	812.8	$1\frac{7}{8}$	24	$1\frac{3}{4}$	265	260	280

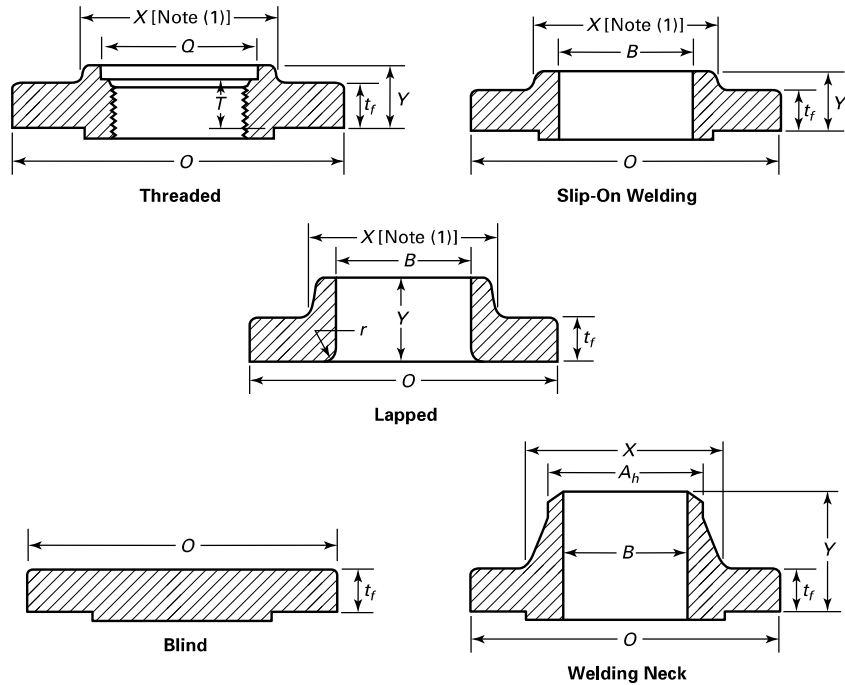
GENERAL NOTES:

- (a) Dimensions of Table 13 are in millimeters, except for diameters of bolts and bolt holes, which are in inch units. For dimensions in inch units, refer to Mandatory Appendix II, Table II-13.
- (b) For other dimensions, see Table 14.

NOTES:

- (1) The length of the stud bolt does not include the height of the points. See para. 6.10.2.
- (2) For flange bolt holes, see para. 6.5.
- (3) For spot facing, see para. 6.6.
- (4) Bolt lengths not shown in the table may be determined in accordance with Nonmandatory Appendix C (see para. 6.10.2).

(17)

Table 14 Dimensions of Class 400 Flanges

1	2	3	4	5	6	7	8	9	10	11	12	13	14	
				Length Through Hub				Bore				Corner Bore Radius of Lapped Flange and Pipe, r	Minimum Counterbore Threaded Flange, Q	
Nom. Pipe Size, NPS	Outside Diam. of Flange, O	Min. Thickness of Flange, t_f	Diam. of Hub, X	Hub Diam. Beginning of Chamfer of Neck, A_h [Note (2)]	Threaded/ Slip-On, Y	Lapped, Y	Welding Neck, Y	Minimum Thread Length Threaded Flange, T [Note (3)]	Min. Slip-On, B	Min. Lapped, B	Welding Neck, B			
$\frac{1}{2}$														
$\frac{3}{4}$														
1														
$1\frac{1}{4}$														
$1\frac{1}{2}$					Use Class 600 dimensions in these sizes [Note (4)]									
2														
$2\frac{1}{2}$														
3														
$3\frac{1}{2}$														
4	255	35.0	146	114.3	51	51	89	37	116.1	116.8	Note (5)	11	117.6	
5	280	38.1	178	141.3	54	54	102	43	143.8	144.5	Note (5)	11	144.4	
6	320	41.3	206	168.3	57	57	103	46	170.7	171.4	Note (5)	13	171.4	
8	380	47.7	260	219.1	68	68	117	51	221.5	222.2	Note (5)	13	222.2	
10	445	54.0	321	273.0	73	102	124	56	276.2	277.4	Note (5)	13	276.2	
12	520	57.2	375	323.8	79	108	137	61	327.0	328.2	Note (5)	13	328.6	
14	585	60.4	425	355.6	84	117	149	64	359.2	360.2	Note (5)	13	360.4	
16	650	63.5	483	406.4	94	127	152	69	410.5	411.2	Note (5)	13	411.2	
18	710	66.7	533	457.0	98	137	165	70	461.8	462.3	Note (5)	13	462.0	

Use Class 600 dimensions in these sizes [Note (4)]

(17)

Table 14 Dimensions of Class 400 Flanges (Cont'd)

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Nom. Pipe Size, NPS	Outside Diam. of Flange, <i>O</i>	Min. Thickness of Flange, <i>t_f</i>	Diam. of Hub, <i>X</i>	Hub Diam. Beginning of Chamfer Welding Neck, <i>A_h</i> [Note (2)]	Length Through Hub			Minimum Thread Length Threaded Flange, <i>T</i> [Note (3)]	Bore			Corner Bore Radius of Lapped Flange and Pipe, <i>r</i>	Minimum Counterbore Threaded Flange, <i>Q</i>
					Threaded/ Slip-On, <i>Y</i>	Lapped, <i>Y</i>	Welding Neck, <i>Y</i>		Min. Slip- On, <i>B</i>	Min. Lapped, <i>B</i>	Welding Neck, <i>B</i>		
20	775	69,9	587	508,0	102	146	168	74	513,1	514,4	Note (5)	13	512,8
22	840	73,1	640	22,0	108	152	171	...	564,4	565,2	Note (5)	13	...
24	915	76,2	702	610,0	114	159	175	83	616,0	616,0	Note (5)	13	614,4

GENERAL NOTES:

- (a) Dimensions of Table 14 are in millimeters, except for the diameter of bolts and bolt holes, which are in inch units. For dimensions in inch units, refer to [Mandatory Appendix II, Table II-14](#).
- (b) For tolerances, see [section 7](#).
- (c) For facings, see [para. 6.4](#).
- (d) For flange bolt holes, see [para. 6.5](#) and [Table 13](#).
- (e) For spot facing, see [para 6.6](#).
- (f) For reducing threaded and slip-on flanges, see [Table 6](#).
- (g) Blind flanges may be made with or without hubs at the manufacturer's option.
- (h) For reducing welding neck flanges, see [para 6.8](#).

NOTES:

- (1) This dimension is for the large end of the hub, which may be straight or tapered. Taper shall not exceed 7 deg on threaded, slip-on, socket-welding, and lapped flanges. This dimension is defined as the diameter at the intersection between the hub taper and back face of the flange.
- (2) For welding end bevel, see [para. 6.7](#).
- (3) For thread of threaded flanges, see [para. 6.9](#).
- (4) Socket welding flanges may be provided in NPS ½ through NPS 2½, using Class 600 dimensions.
- (5) To be specified by the purchaser.