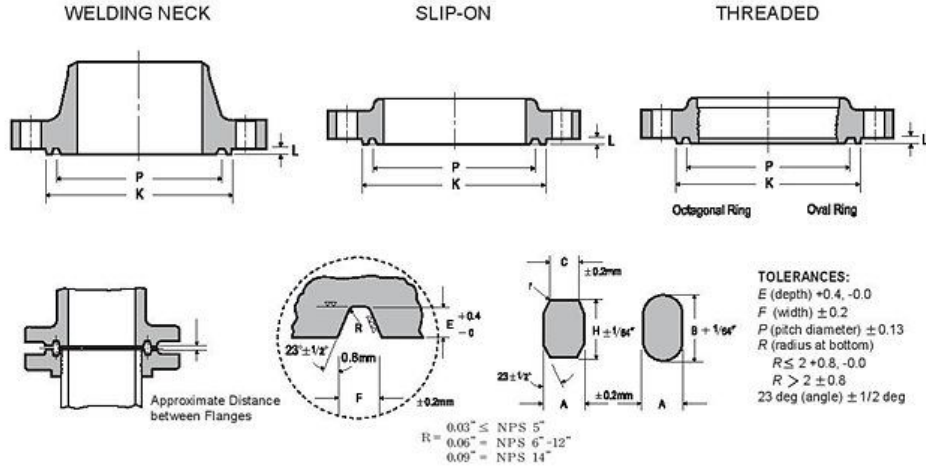


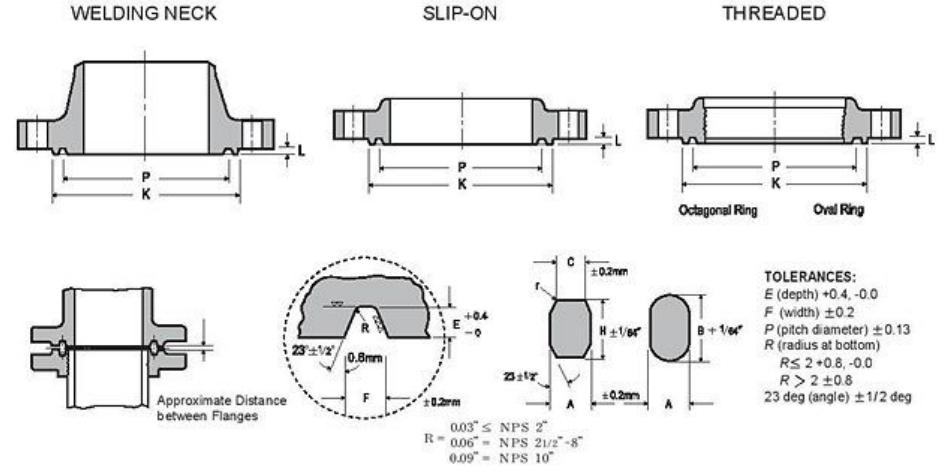
ASME RING JOINT FLANGES CLASS 1500 FLANGES

ASME RING JOINT FLANGES CLASS 2500 FLANGES

RING JOINT FLANGES FACING DIMENSIONS



RING JOINT FLANGES FACING DIMENSIONS



ASME B16.5 FORGED FLANGES

Unit:mm

Nominal Pipe Size	Pitch Diam. of Ring and Groove	Width of Ring	HEIGHT OF RING		Width of Flat on Octagonal Ring	Width of Groove	Depth of Groove	Diam. of R.F for Ring Joint or Lapped	Ring Number	Approximate Distance Between Flanges of Ring Joints When Ring is Compressed
			Oval	Octagonal						
			B	H						
1/2	39.7	8.0	14.3	12.7	5.2	8.7	6.4	60.5	R12	4.1
3/4	44.5	8.0	14.3	12.7	5.2	8.7	6.4	66.8	R14	4.1
1	50.8	8.0	14.3	12.7	5.2	8.7	6.4	71.4	R16	4.1
1 1/4	60.3	8.0	14.3	12.7	5.2	8.7	6.4	81.0	R18	4.1
1 1/2	68.3	8.0	14.3	12.7	5.2	8.7	6.4	92.2	R20	4.1
2	95.3	11.1	17.5	15.9	7.7	11.9	7.9	124.0	R24	3.0
2 1/2	108.0	11.1	17.5	15.9	7.7	11.9	7.9	136.7	R27	3.0
3	136.5	11.1	17.5	15.9	7.7	11.9	7.9	168.4	R35	3.0
4	161.9	11.1	17.5	15.9	7.7	11.9	7.9	193.8	R39	3.0
5	193.7	11.1	17.5	15.9	7.7	11.9	7.9	228.6	R44	3.0
6	211.2	12.7	19.1	17.5	8.7	13.5	9.5	247.7	R46	3.0
8	269.9	15.9	22.2	20.7	10.5	16.7	11.1	317.5	R50	4.1
10	323.9	15.9	22.2	20.7	10.5	16.7	11.1	371.6	R54	4.1
12	381.0	22.2	28.6	27.0	14.8	23.0	14.3	438.2	R58	4.8
14	419.1	25.4	33.4	31.8	17.3	27.0	15.9	489.0	R63	5.6
16	469.9	28.6	36.5	34.9	19.8	30.2	17.5	546.1	R67	7.9
18	533.4	28.6	36.5	34.9	19.8	30.2	17.5	612.9	R71	7.9
20	584.2	31.8	39.7	38.1	22.3	33.4	17.5	673.1	R75	9.7
24	692.2	34.9	44.5	41.3	24.8	36.5	20.6	793.8	R79	11.2

- Notes :**
- Unless otherwise specified by the customer, Ring Type Joint Flanges will be furnished in accordance with these details.
 - The depth of groove is added to the minimum flange thickness.
 - * Raised face "L" is equal to groove dimension "E" but is not subject to tolerances for "E".
 - * A plus tolerance of 3/64 in. for heights B and H is permitted providing the variation in the height of any given ring does not exceed 1/64 in. throughout its entire circumference.
 - Dimension "R" is max.
 - Radius "Y" is 1/16" for ring widths 7/8" and less and 3/32" for ring widths 1" (25.4mm) and over.

ASME B16.5 FORGED FLANGES

Unit:mm

Nominal Pipe Size	Pitch Diam. of Ring and Groove	Width of Ring	HEIGHT OF RING		Width of Flat on Octagonal Ring	Width of Groove	Depth of Groove	Diam. of R.F for Ring Joint or Lapped	Ring Number	Approximate Distance Between Flanges of Ring Joints When Ring is Compressed
			Oval	Octagonal						
			B	H						
1/2	42.9	8.0	14.3	12.7	5.2	8.7	6.4	65.0	R13	4.1
3/4	50.8	8.0	14.3	12.7	5.2	8.7	6.4	73.2	R16	4.1
1	60.3	8.0	14.3	12.7	5.2	8.7	6.4	82.6	R18	4.1
1 1/4	72.2	11.1	17.5	15.9	7.7	11.9	7.9	101.6	R21	3.0
1 1/2	82.6	11.1	17.5	15.9	7.7	11.9	7.9	114.3	R23	3.0
2	101.6	11.1	17.5	15.9	7.7	11.9	7.9	133.4	R26	3.0
2 1/2	111.1	12.7	19.1	17.5	8.7	13.5	9.5	149.4	R28	3.0
3	127.0	12.7	19.1	17.5	8.7	13.5	9.5	168.4	R32	3.0
4	157.2	15.9	22.2	20.7	10.5	16.7	11.1	203.2	R38	4.1
5	190.5	19.1	25.4	23.8	12.3	19.8	12.7	241.3	R42	4.1
6	228.6	19.1	25.4	23.8	12.3	19.8	12.7	279.4	R47	4.1
8	279.4	22.2	28.6	27.0	14.8	23.0	14.3	339.9	R51	4.8
10	342.9	28.6	36.5	34.9	19.8	30.2	17.5	425.5	R55	6.4
12	406.4	31.8	39.7	38.1	22.3	33.4	17.5	495.3	R60	7.9

- Notes :**
- Unless otherwise specified by the customer, Ring Type Joint Flanges will be furnished in accordance with these details.
 - The depth of groove is added to the minimum flange thickness.
 - * Raised face "L" is equal to groove dimension "E" but is not subject to tolerances for "E".
 - * A plus tolerance of 3/64 in. for heights B and H is permitted providing the variation in the height of any given ring does not exceed 1/64 in. throughout its entire circumference.
 - Dimension "R" is max.
 - Radius "Y" is 1/16" for ring widths 7/8" and less and 3/32" for ring widths 1" (25.4mm) and over.

REDUCING FLANGES

THREADED AND SLIP-ON TYPES

HUB

For hub diameter (X) and height of hub above the back of the flange (N) refer to the list of standard flange specification of the same type and pressure and use the dimensions of a flange one nominal pipe size smaller than the nominal pipe size from which the reduction is being made.

FLANGE O.D., DRILLING TEMPLATE AND THICKNESS

Outside diameter, drilling template and flange thickness Q (see note on FACINGS) agree with the dimensions of a standard of the nominal pipe size from which the reduction is being made.

FACING

Facing dimensions also agree with dimensions of a standard flanges of the nominal pipe size from which the reduction is being made.

150 lb. and 300 lb. forged steel Threaded, Slip-on, Welding Neck and Blind flanges are furnished with American Standard 1/16" raised face which is included in flange thickness. Q.400 lb., 600 lb., 900 lb., 1500 lb. and 2500 lb. flanges are supplied with American Standard 1/4" raised face which is not included in flange thickness (Q).

BORE OR TAPPING

The bore or tapping is machined to accept a pipe of the nominal pipe size to which the reduction is being made. For reduction to sizes smaller than shown, BLIND FLANGES are tapped or bored to specified nominal pipe size.

EXAMPLE :

THREADED

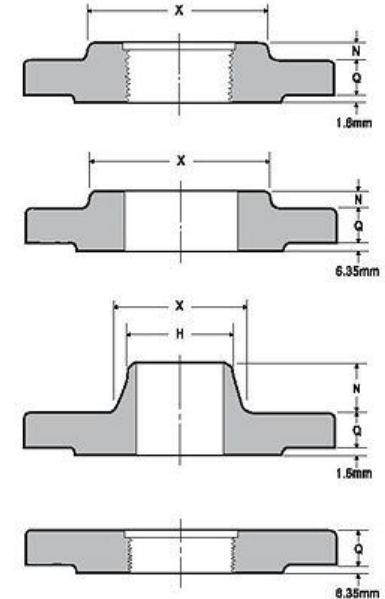
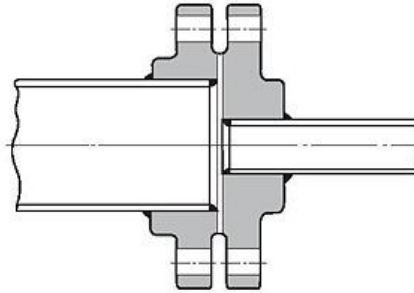
- A. The size designation is NPS 6x2 1/2 - Class 300 reducing threaded flange. This flange has the following dimensions : following dimensions:
 NPS 2 1/2 = taper pipe thread tapping (ASME B1.20.1)
 320 mm = diameter of regular NPS 6 Class 300 threaded flange
 35 mm = thickness of regular NPS 6 Class 300 threaded flange
 178 mm = diameter of hub for regular NPS 5 Class 300 threaded flange. Hub diameter may be one size small to reduce machining. In this example a hub diameter of NPS 2 1/2 would be the smallest acceptable.
 15.5mm = height of hub for regular NPS 5 Class 300 threaded flange.
- B. The size designation is NPS 6x2 - Class 300 reducing threaded flange. Use regular NPS 6 Class 300 blind flange tapped with NPS 2 taper pipe thread (ASME B1.20.1).

WELDING NECK TYPES

On Reducing Welding Neck Flanges, which are made only on special order, the hub dimensions agree with the hub dimensions of standard flanges of the size to which reduction is being made. Other flange dimensions, including the drilling template, agree with the standard dimensions of the size from which the reduction is being made.

REDUCING FLANGES

THREADED / SLIP-ON / WELDING NECK



In ordering Reducing Flanges : specify (1) nominal pipe size of the tapping or bore to which the reduction is being made, (2) the outside diameter of the flange from which the reduction is being made and (3) pressure rating.

EXAMPLE : A 300 lb. Reducing Flange for reducing from a 6"(152.4mm) to a 3"(76.2mm) nominal pipe size should be designated as a 3"(76.2mm)x12 1/2" 300 lb. Reducing Flange, whether Threaded, Slip-On, or Welding Neck type is desired must also be specified.

ASME B16.5 FORGED FLANGES

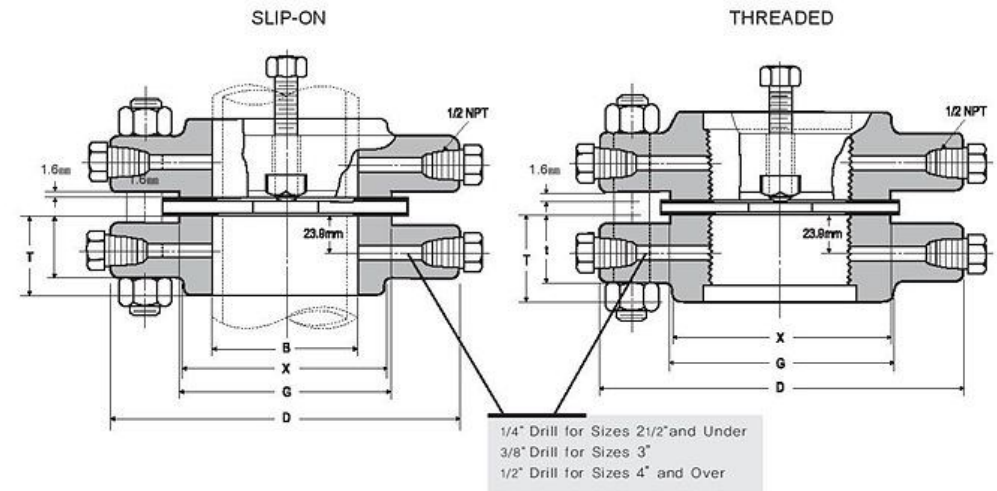
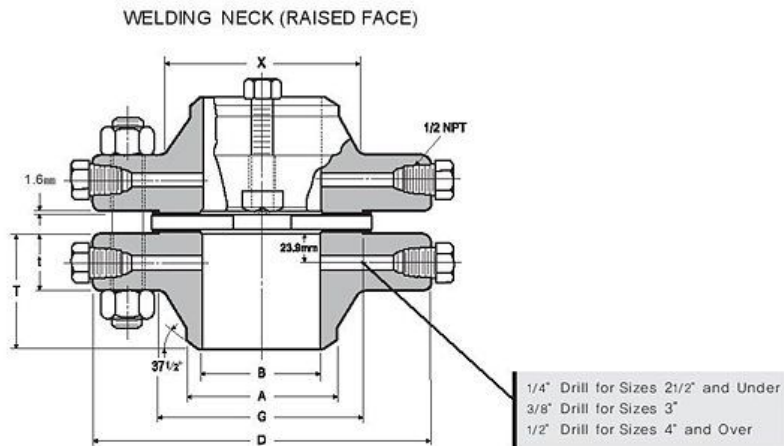
Unit:mm

Nominal Flange	OUTSIDE DIAMETER OF FLANGE FROM WHICH REDUCTION IS BEING MADE								Smallest Size Bore or Tapping Requiring Hub Flange
	150 lb. Standard	300 lb. Standard	400 lb. Standard	600 lb. Standard	900 lb. Standard	1500 lb. Standard	2500 lb. Standard		
Nominal Pipe Size to Which Reduction Made to be Specified by Purchaser	3/4	98.4	117.5	117.5	117.5	130.2	130.2	139.7	12.7
	1	108.0	123.8	123.8	123.8	149.2	149.2	158.8	12.7
	1 1/4	117.5	133.4	133.4	133.4	158.8	158.8	184.2	12.7
	1 1/2	127.5	155.6	155.6	155.6	177.8	177.8	203.2	12.7
	2	152.4	165.1	165.1	165.1	215.9	215.9	235.0	25.4
	2 1/2	177.8	190.5	190.5	190.5	244.5	244.5	266.7	31.8
	3	190.5	200.6	209.6	209.6	266.7	266.7	304.8	31.8
	3 1/2	215.4	228.6	228.6	228.6	-	-	-	38.1
	4	228.9	254.0	254.0	273.1	292.1	311.2	355.6	38.1
	5	254.0	279.4	279.4	330.2	349.3	374.7	419.1	38.1
	6	279.4	317.5	317.5	355.6	381.0	393.7	482.6	63.5
	8	342.9	381.0	381.0	419.1	469.9	482.6	552.5	76.2
	10	406.4	444.5	444.5	508.0	546.1	584.2	673.1	88.9
	12	482.6	520.7	520.7	558.8	609.6	673.1	762.0	88.9
14	533.4	584.2	584.2	603.3	641.4	-	-	88.9	
16	596.9	647.7	647.7	685.8	704.9	-	-	101.6	
18	635.0	711.2	711.2	743.0	787.4	-	-	101.6	
20	698.5	774.7	774.7	812.8	857.3	-	-	101.6	
24	812.8	914.4	914.4	939.8	1041.1	-	-	101.6	

Notes : For reductions to sizes smaller than shown, blind flanges are tapped or bored to specified nominal pipe size.

ASME ORIFICE FLANGES CLASS 300 ORIFICE FLANGES

ASME ORIFICE FLANGES CLASS 300 ORIFICE FLANGES



ASME B16.36 FORGED FLANGES

Unit:mm

Nominal Pipe Size	Outside Diam. of Flange D	Thickness of Flange(t) Raised Face	Diam. of Hub at Base X	Diam. of Raised Face G	Diam. of Hub at Bevel A	LENGTH THRU HUB (T)		BORE (B)	
						Welding Neck	Slip-on & Threaded	Welding Neck	Slip-on
						Raised Face	Raised Face		
1	124	38.1	53.8	50.8	33.5	82.6	47.8	26.7	34.5
1 1/4	133	38.1	63.5	63.5	42.2	84.1	46.0	35.1	43.2
1 1/2	155	38.1	69.9	73.2	48.3	85.9	47.8	40.9	49.5
2	165	38.1	84.1	91.9	60.5	85.9	49.3	52.6	62.0
2 1/2	191	38.1	100.1	104.6	73.2	88.9	50.8	62.7	74.7
3	210	38.1	117.3	127.0	88.9	88.9	52.3	78.0	90.7
4	254	38.1	146.1	157.2	114.3	91.9	53.8	102.4	116.1
5	279	38.1	177.8	185.7	141.2	101.6	53.8	128.3	143.8
6	318	38.1	206.2	215.9	168.4	100.1	53.8	154.2	170.7
8	381	41.1	260.4	269.7	219.2	111.3	62.0	202.7	221.5
10	445	47.8	320.5	323.9	273.1	117.3	66.5	254.5	276.4
12	521	50.8	374.7	381.0	323.9	130.0	73.2	304.8	327.2
14	584	53.8	425.5	412.8	355.6	142.7	76.2	336.6	359.2
16	648	57.2	482.6	469.9	406.4	146.1	82.6	387.4	410.5
18	711	60.5	533.4	533.4	457.2	158.8	88.9	438.2	461.8
20	775	63.5	587.2	584.2	508.0	162.1	95.3	489.0	513.1
24	914	69.9	701.5	692.2	609.6	168.1	106.4	590.6	616.0

Notes :

- (1) For the 'Bore' (B) of Welding Neck Flanges other than Standard Wall Thickness, refer to page 126~127.
- (2) Class 300 Welding Neck Flanges of sizes 24" (609.6mm) and smaller will be bored to match Standard Wall Pipe unless otherwise specified.
- (3) Class 300 Orifice flanges will be furnished with 0.06" (1.6mm) raised face, which is included in 'Thickness' (t) and 'Length through Hub' (T).

Unit:mm

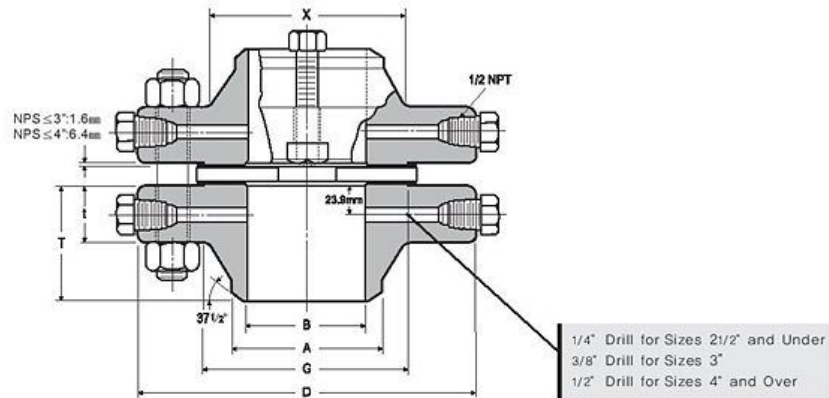
Nominal Pipe Size	Pitch Diam. of Ring and Groove P	Ring Number	DEPTH OF JACK SCREW SLOT Raised Face	JACK SCREW SIZE Raised Face	DRILLING TEMPLATE				
					Diam. of Bolt Circle	Number of Bolts	Diam. of Stud Bolts (inch)	Diam. of Stud Holes	Length of Stud Bolts Raised Face
1	50.8	R16	9.7	Jack screw size for 1" thru 24" are those shown for length and diameter of bolts.	88.9	4	5/8	17.5	152.4
1 1/4	60.3	R18	9.7		98.6	4	5/8	17.5	152.4
1 1/2	68.3	R20	12.7		114.3	4	3/4	20.6	152.4
2	82.6	R23	9.7		127.0	8	5/8	17.5	152.4
2 1/2	101.6	R26	12.7		149.4	8	3/4	20.6	152.4
3	123.8	R31	12.7		168.1	8	3/4	20.6	152.4
4	149.2	R37	12.7		200.2	8	3/4	20.6	152.4
5	181.0	R41	12.7		235.0	8	3/4	22.4	152.4
6	211.1	R45	12.7		269.7	12	3/4	22.4	152.4
8	269.9	R49	15.7		330.2	12	7/8	25.4	158.8
10	323.9	R53	19.1		387.4	16	1	28.4	165.1
12	381.0	R57	22.4		450.9	16	1 1/8	31.8	177.8
14	419.1	R61	22.4		514.4	20	1 1/8	31.8	184.2
16	469.9	R65	25.4		571.5	20	1 1/4	35.1	196.9
18	533.4	R69	25.4		628.7	24	1 1/4	35.1	203.2
20	584.2	R73	25.4		685.8	24	1 1/4	35.1	215.9
24	692.2	R77	31.8		812.8	24	1 1/2	41.1	241.3

- (4) Bolt lengths for raised face flanges include allowance for orifice and gasket thickness of 0.25" (6.4mm) for NPS 1-12 and 0.38" (9.7mm) for NPS 14-24.
- (5) Unless otherwise specified, unions of 1" (25.4mm) thru 24" (609.6mm) furnished with carbon steel regular square headed bolts with seminished American Standard heavy series hex nuts.

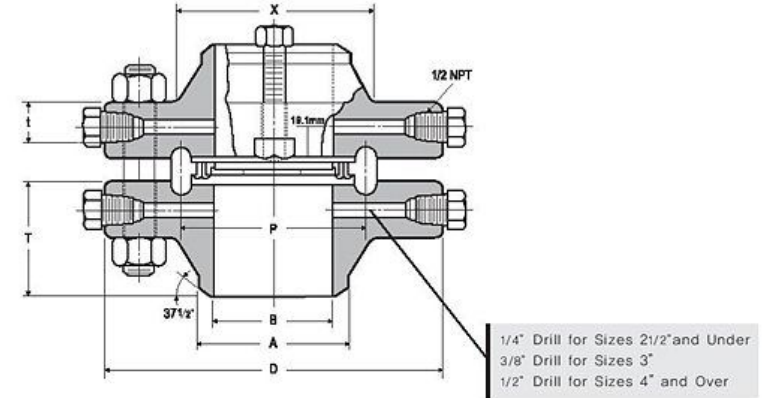
ASME ORIFICE FLANGES CLASS 400 ORIFICE FLANGES

ASME ORIFICE FLANGES CLASS 400 ORIFICE FLANGES

WELDING NECK (RAISED FACE)



WELDING NECK (RING-TYPE JOINT)



ASME B16.36 FORGED FLANGES

Unit:mm

Nominal Pipe Size	Outside Diam. of Flange D	Thickness of Flange(t)		Diam. of Hub at Base X	Diam. of Raised Face G	Diam. of Hub at Bevel A	LENGTH THRU HUB (T)				BORE (B)	
		Raised Face	Ring Joint				Welding Neck		Slip-on & Threaded		Welding Neck	Slip-on
							Raised Face	Ring Joint	Raised Face	Ring Joint		
1	124	38.1	31.8	53.8	50.8	33.5	82.6	76.2	47.8	41.1		34.5
1 1/4	133	38.1	31.8	63.5	63.5	42.2	84.1	77.7	46.0	39.6		43.2
1 1/2	155	38.1	31.8	69.9	73.2	48.3	85.9	79.2	47.8	41.1		49.5
2	165	38.1	31.8	84.1	91.9	60.5	85.9	79.2	49.3	42.9		62.0
2 1/2	191	38.1	31.8	100.1	104.6	73.2	88.9	82.6	50.8	44.5		74.7
3	210	38.1	31.8	117.3	127.0	88.9	88.9	82.6	52.3	46.0		90.7
4	254	35.1	35.1	146.1	157.2	114.3	88.9	88.9	50.8	50.8		116.1
5	279	38.1	38.1	177.8	185.7	141.2	101.6	101.6	53.8	53.8		143.8
6	318	41.1	41.1	206.2	215.9	168.4	103.1	103.1	57.2	57.2		170.7
8	381	47.8	47.8	260.4	269.7	219.2	117.3	117.3	68.3	68.3		221.5
10	445	53.8	53.8	320.5	323.9	273.1	124.0	124.0	73.2	73.2		276.4
12	521	57.2	57.2	374.7	381.0	323.9	136.7	136.7	79.2	79.2		327.2
14	584	60.7	60.5	425.5	412.8	355.6	149.4	149.4				359.2
16	648	63.5	63.5	482.6	469.9	406.4	152.4	152.4				410.5
18	711	66.5	66.5	533.4	533.4	457.2	165.1	165.1				461.8
20	775	69.9	69.9	587.2	584.2	508.0	168.1	168.1				513.1
24	914	96.2	76.2	701.5	692.2	609.6	174.8	174.8				564.4

See Note(1)
To be specified by purchaser

Notes :

- (1) For the inside diameter of pipes (corresponding to 'Bore' (B) of Welding Neck Flanges), refer to page 126~127.
- (2) Class 400 flanges of sizes 3" (76.2mm) and smaller will be furnished with 0.06" (1.6mm) raised face, which is included in 'Thickness' (t) and 'Length through Hub' (T).
- (3) Each union includes two carbon steel jack screw bolts with hex nuts.

Unit:mm

Nominal Pipe Size	Pitch Diam. of Ring and Groove P	Ring Number	DEPTH OF JACK SCREW SLOT		JACK SCREW SIZE		DRILLING TEMPLATE					
			Raised Face	Ring Joint	Raised Face (inch)	Raised Joint (inch)	Diam. of Bolt Circle	Number of Bolt	Diam. of Stud Bolts (inch)	Diam. of Bolt Holes	Length of Stud Bolts	
											Raised Face	Ring Joint
1	50.8	R16	9.7	6.4	5/8x4.00	5/8x4.75	88.9	4	5/8	17.5	127.0	146.1
1 1/4	60.3	R18	9.7	6.4	5/8x4.00	5/8x4.75	98.6	4	5/8	17.5	127.0	120.7
1 1/2	68.3	R20	12.7	6.4	3/4x4.25	3/4x5.00	114.3	4	3/4	21.0	133.4	152.4
2	82.6	R23	9.7	6.4	5/8x4.00	5/8x4.75	127.0	8	5/8	17.5	127.0	152.4
2 1/2	101.6	R26	12.7	6.4	3/4x4.25	3/4x5.00	149.4	8	3/4	20.6	133.4	158.8
3	123.8	R31	12.7	6.4	3/4x4.25	3/4x5.00	168.1	8	3/4	20.6	133.4	158.8
4	149.2	R37	6.4	15.7	3/4x3.00	3/4x4.00	200.2	8	7/8	25.4	139.7	152.4
5	181.0	R41	6.4	15.7	3/4x3.00	3/4x4.00	235.0	8	7/8	25.4	146.1	158.8
6	211.1	R45	12.7	22.4	1x3.50	1x4.00	269.7	12	7/8	25.4	158.8	165.1
8	269.9	R49	12.7	22.4	1x3.50	1x4.50	330.2	12	1	28.4	171.5	184.2
10	323.9	R53	12.7	22.4	1x4.00	1x4.50	387.4	16	1 1/8	31.8	190.5	203.2
12	381.0	R57	12.7	22.4	1x4.00	1x5.00	450.9	16	1 1/4	35.1	203.2	215.9
14	419.1	R61	12.7	22.4	1x4.25	1x5.00	514.4	20	1 1/4	35.1	209.6	228.6
16	469.9	R65	12.7	22.4	1x4.25	1x5.00	571.5	20	1 3/8	38.1	222.3	235.0
18	533.4	R69	12.7	22.4	1x4.50	1x5.00	628.7	24	1 3/8	38.1	235.0	241.3
20	584.2	R73	12.7	22.4	1x4.75	1x5.50	685.8	24	1 1/2	41.1	247.7	260.4
24	692.2	R77	12.7	22.4	1x5.00	1x6.00	812.8	24	1 3/4	47.8	279.4	285.8

- (4) Unless otherwise specified, raised face union are furnished with alloy bolt studs per ASTM A193 Grade B7 with American Standard heavy series hex nuts ASTM A194 Class 2H.
- (5) On ring joint flanges having a groove depth 0.375" (9.5mm) and less, the distance from the center line of the tap hole to the flange face is 0.750" (19.1mm). When the depth of groove is 0.438" (11.1mm) or greater, changes in drill size or method of drilling are necessary.
- (6) Bolt lengths for raised face flanges include allowance for orifice and gasket thickness of 0.25" (6.4mm) for NPS 4-12 and 0.38" (9.7mm) for NPS 14-24. Bolt lengths for ring type joint flanges include allowance of 0.62" (15.7mm) for NPS 4-10, 0.75" (19.1mm) for NPS 12-18 and 0.88" (22.4mm) for NPS 20.

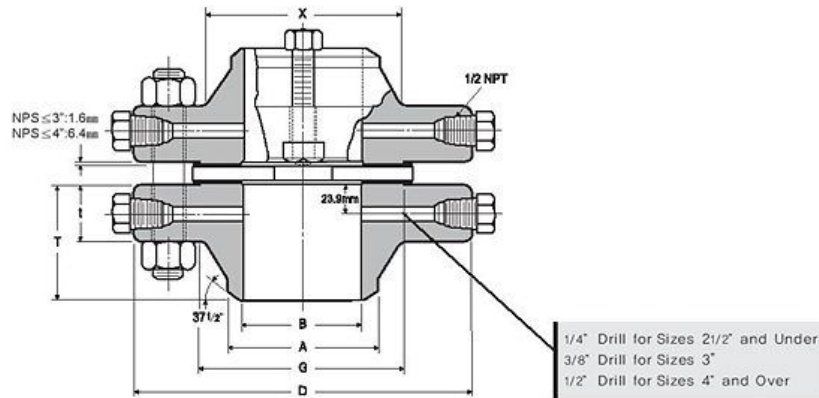
ASME ORIFICE FLANGES

CLASS 600 ORIFICE FLANGES

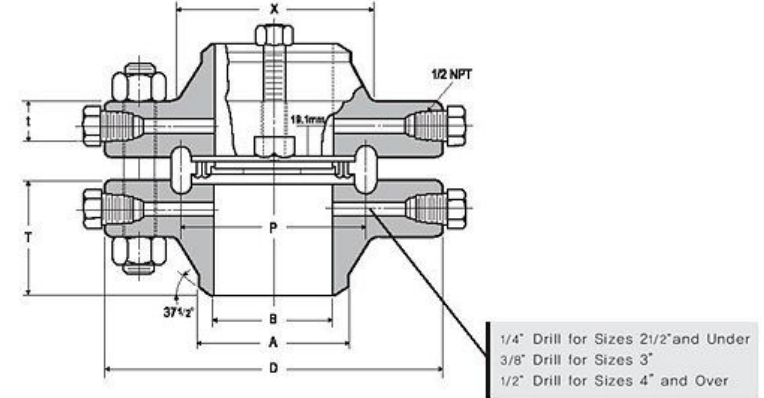
ASME ORIFICE FLANGES

CLASS 600 ORIFICE FLANGES

WELDING NECK (RAISED FACE)



WELDING NECK (RING-TYPE JOINT)



ASME B16.36 FORGED FLANGES

Unit:mm

Nominal Pipe Size	Outside Diam. of Flange	Thickness of Flange(t)		Diam. of Hub at Base	Diam. of Raised Face	Diam. of Hub at Bevel	LENGTH THRU HUB (T)				BORE (B)	
		Raised Face	Ring Joint				Welding Neck		Slip-on & Threaded		Welding Neck	Slip-on
							Raised Face	Ring Joint	Raised Face	Ring Joint		
1	124	38.1	31.8	53.8	50.8	33.5	82.6	76.2	47.8	41.1		34.5
1 1/4	133	38.1	31.8	63.5	63.5	42.2	84.1	77.7	46.0	39.6		43.2
1 1/2	155	38.1	31.8	69.9	73.2	48.3	85.9	79.2	47.8	41.1		49.5
2	165	38.1	31.8	84.1	91.9	60.5	85.9	79.2	49.3	42.9		62.0
2 1/2	191	38.1	31.8	100.1	104.6	73.2	88.9	82.6	50.8	44.5		74.7
3	210	38.1	31.8	117.3	127.0	88.9	88.9	82.6	52.3	46.0		90.7
4	273	38.1	31.8	152.4	157.2	114.3	101.6	101.6	53.8	53.8		116.1
5	330	44.5	44.5	189.0	185.7	141.2	114.3	114.3	60.5	60.5		143.8
6	256	47.8	47.8	222.3	215.9	168.4	117.3	117.3	66.5	66.5		170.7
8	419	55.6	55.6	273.1	269.7	219.2	133.4	133.4	76.2	76.2		221.5
10	508	63.5	63.5	342.9	323.9	273.1	152.4	152.4	85.9	85.9		276.4
12	559	66.5	66.5	400.1	381.0	323.9	155.4	155.4	91.9	91.9		327.2
14	603	69.9	69.9	431.8	412.8	355.6	165.1	165.1				
16	686	76.2	76.2	495.3	469.9	406.4	177.8	177.8				
18	743	82.6	82.6	546.1	533.4	457.2	184.2	184.2				
20	813	88.9	88.9	609.6	584.2	508.0	190.5	190.5				
24	940	101.6	101.6	717.6	692.2	609.6	203.2	203.2				

- Notes :
- (1) For the inside diameter of pipes (corresponding to 'Bore' (B) of Welding Neck Flanges), refer to page 126~127.
 - (2) Class 600 flanges of size 3' (76.2mm) and smaller will be furnished with 0.06" (1.6mm) raised face, which is included in 'Thickness' (t) and 'Length through Hub' (T). The 0.25"(6.4mm) raised face for size 4' (101.6mm) and larger is not included in (t) and (T).
 - (3) Each union includes two carbon steel jack screw bolts with hex nuts.

Unit:mm

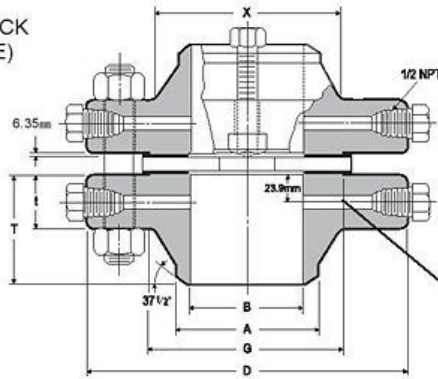
Nominal Pipe Size	Pitch Diam. of Ring and Groove	Ring Number	DEPTH OF JACK SCREW SLOT		JACK SCREW SIZE		DRILLING TEMPLATE						
			Raised Face	Ring Joint	Raised Face (inch)	Raised Joint (inch)	Diam. of Bolt Circle	Number of Bolt	Diam. of Stud Bolts (inch)	Diam. of Bolt Holes		Length of Stud Bolts	
										RF	RTJ	Raised Face	Ring Joint
1	50.8	R16	9.7	6.4	5/8x4.00	5/8x4.75	88.9	4	5/8	17.5	19.1	127.0	146.1
1 1/4	60.3	R18	9.7	6.4	5/8x4.00	5/8x4.75	98.6	4	5/8	17.5	-	27.0	146.1
1 1/2	68.3	R20	12.7	6.4	3/4x4.25	3/4x5.00	114.3	4	3/4	20.6	22.4	133.4	152.4
2	82.6	R23	9.7	6.4	5/8x4.00	5/8x4.75	127.0	8	5/8	17.5	19.7	127.0	152.4
2 1/2	101.6	R26	12.7	6.4	3/4x4.25	3/4x5.00	149.4	8	3/4	20.6	22.4	133.4	158.8
3	123.8	R31	12.7	6.4	3/4x4.25	3/4x5.00	168.1	8	3/4	20.6	22.4	133.4	158.8
4	149.2	R37	6.41	15.7	3/4x3.00	3/4x4.00	215.9	8	7/8	25.4	25.4	152.4	165.1
5	181.0	R41	6.41	15.7	3/4x3.50	3/4x4.50	266.7	8	1	28.4	28.4	139.7	177.8
6	211.1	R45	12.7	22.4	1x3.50	1x4.50	292.1	12	1	28.4	28.4	177.8	190.5
8	269.9	R49	12.7	22.4	1x4.00	1x4.75	349.3	12	1 1/8	31.8	31.8	196.9	209.6
10	232.9	R53	12.7	22.4	1x4.00	1x5.00	431.8	16	1 1/4	35.1	35.1	222.3	235.0
12	381.0	R57	12.7	22.4	1x4.00	1x5.00	489.0	20	1 1/4	35.1	35.1	222.6	241.3
14	419.1	R61	12.7	22.4	1x5.00	1x5.50	527.1	20	1 3/8	38.1	38.1	241.3	254.0
16	469.9	R65	12.7	22.4	1x5.00	1x5.00	489.0	20	1 1/2	41.1	41.1	260.4	273.1
18	533.4	R69	12.7	22.4	1x5.00	1x5.75	654.1	20	1 5/8	44.5	44.5	279.4	292.1
20	584.2	R73	12.7	22.4	1x6.00	1x6.25	723.9	24	1 5/8	44.5	44.5	298.5	317.5
24	692.2	R77	12.7	22.4	1x6.00	1x7.00	838.2	24	1 7/8	50.8	50.8	336.6	342.9

- (4) Bolt lengths for raised face flanges include for allowance orifice and gasket thickness of 0.25" (6.4mm) for NPS 1-12 and 0.38" (9.7mm) for NPS 14-24. Bolt lengths for ring type joint flanges include allowance of 0.62" (15.7mm) for NPS 1-10, 0.75" (19.1mm) for NPS 12-18 and 0.88" (22.4mm) for NPS 20.
- (5) Unless otherwise specified, raised face union are furnished with alloy bolt studs per ASTM A193 Grade B7 with American Standard heavy series hex nuts ASTM A194 Class 2H.
- (6) On ring joint flanges having a groove depth 0.375" (9.5mm) and less, the distance from the center line of the tap hole to the flange face is 0.750" (19.1mm). When the depth of groove is 0.438" (11.1mm) or greater, changes in drill size or method of drilling are necessary.

ASME ORIFICE FLANGES

CLASS 900-1500 ORIFICE FLANGES

WELDING NECK
(RAISED FACE)

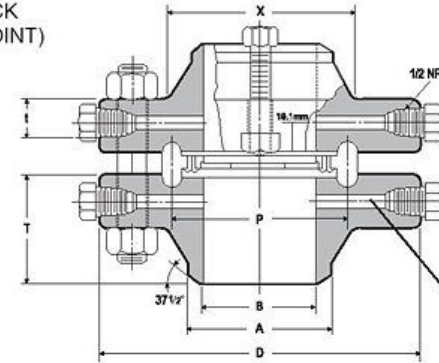


1/4" Drill for Sizes 2 1/2" and Under
3/8" Drill for Sizes 3"
1/2" Drill for Sizes 4" and Over

ASME ORIFICE FLANGES

CLASS 900-1500 ORIFICE FLANGES

WELDING NECK
(RING-TYPE JOINT)



1/4" Drill for Sizes 2 1/2" and Under
3/8" Drill for Sizes 3"
1/2" Drill for Sizes 4" and Over

ASME B16.36 FORGED FLANGES

Unit:mm

Nominal Pipe Size	Outside Diam. of Flange D	THICKNESS OF FLANGE (t)		Diam. of Hub at Base X	Diam. of Raised Face G	Diam. of Hub at Bevel A	LENGTH THRU HUB (T)				BORE (B)		
		Raised Face	Ring Joint				Welding Neck		Slip-on & Threaded		Welding Neck	Slip-on	
							Raised Face	Ring Joint	Raised Face	Ring Joint			
CLASS 900													
3	241	38.1	38.1	127.0	127.0	88.9	101.6	101.6	53.8	53.8		90.7	
4	292	44.5	44.5	158.8	157.2	114.3	114.3	114.3	69.9	69.9		116.1	
5	349	50.8	50.8	190.5	185.7	141.2	127.0	127.0	79.2	79.2		143.8	
6	381	55.6	55.6	235.0	215.9	168.4	139.7	139.7	85.9	85.9		170.7	
8	470	63.5	63.5	298.5	269.7	219.2	162.1	162.1	101.6	101.6		221.5	
10	546	69.9	69.9	368.3	323.9	273.1	184.2	184.2	108.0	108.0		276.4	
12	610	79.2	79.2	419.1	381.0	323.9	200.2	200.2	117.3	117.3		327.2	
14	641	85.9	-	450.9	412.8	355.6	212.9	-	-	-		-	
16	705	88.9	-	508.0	469.9	406.4	215.9	-	-	-		-	
18	787	101.6	-	565.2	533.4	457.2	228.6	-	-	-		-	
20	857	108.0	-	622.3	584.2	508.0	247.7	-	-	-		-	
24	1041	139.7	-	749.3	692.2	609.6	292.1	-	-	-		-	
CLASS 1500													
1	149	38.1	38.1	52.3	50.8	33.5	82.6	82.6	47.8	44.5		34.5	
1 1/4	159	35.1	35.1	63.5	63.5	42.2	73.2	73.2	47.8	44.5		43.2	
1 1/2	178	38.1	38.1	69.9	73.2	48.3	88.9	88.9	47.8	44.5		49.5	
2	216	38.1	38.1	104.6	91.9	60.5	101.6	101.6	57.2	57.2		62.0	
2 1/2	244	41.1	41.1	124.0	104.6	73.2	104.6	104.6	63.5	63.5		74.7	
3	267	47.8	47.8	133.4	127.0	88.9	117.3	117.3	73.2	73.2		90.7	
4	311	53.8	53.8	162.1	157.2	114.3	124.0	124.0	90.4	90.4		116.1	
5	375	73.2	73.2	196.9	185.7	141.2	155.4	104.6	104.6	104.6		143.8	
6	394	82.6	82.6	228.6	215.9	168.4	171.5	171.5	119.1	119.1		170.7	
8	483	92.0	92.0	292.1	269.7	219.2	212.9	212.9	142.7	142.7		221.5	
10	584	108.0	108.0	368.3	323.9	273.1	254.0	254.0	158.8	158.8		276.4	
12	673	124.0	124.0	450.9	381.0	323.9	282.4	282.4	180.8	180.8		327.2	
14	749	133.4	-	495.3	412.8	355.6	298.5	-	-	-		-	
16	826	146.1	-	552.5	469.9	406.4	311.2	-	-	-		-	
18	914	162.1	-	596.9	533.4	457.2	327.2	-	-	-		-	
20	984	177.8	-	641.4	584.2	508.0	355.6	-	-	-		-	
24	1168	203.2	-	762.0	692.2	609.6	406.4	-	-	-		-	

To be specified by purchaser

Notes :

- (1) For the inside diameter of pipes (corresponding to 'Bore' (B) of Welding Neck Flanges), refer to page 126~127.
- (2) Class 900 dimensions of size 't' (25.4mm) through 2 1/2" are the same as for Class 1500.
- (3) Class 900 and 1500 is not included in 'thickness' (t) and 'Length through Hub' (T).
- (4) Each union includes two carbon steel jack screw bolts with hex nuts.

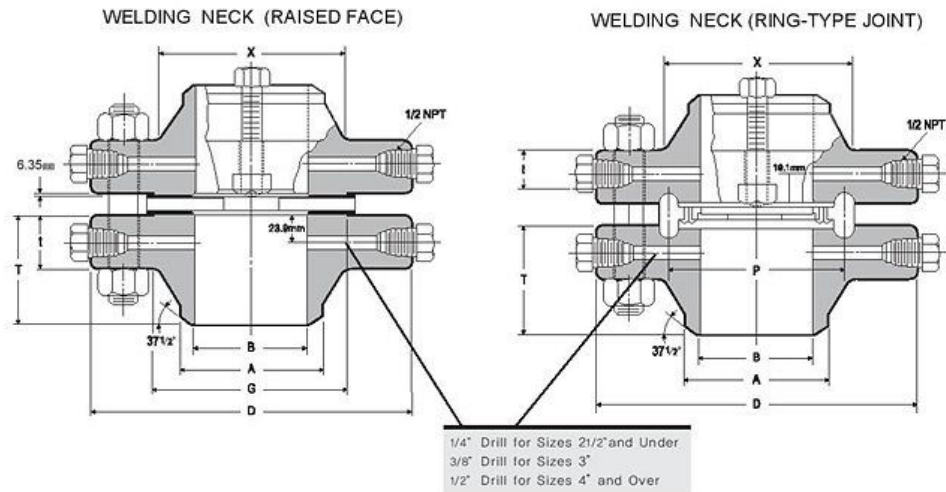
Unit:mm

Nominal Pipe Size	Pitch Diam. of Ring and Groove P	Ring Number	DEPTH OF JACK SCREW SLOT		JACK SCREW SIZE		DRILLING TEMPLATE						
			Raised Face	Raised Joint	Raised Face (inch)	Raised Joint (inch)	Diam. of Bolt Circle	Number of Bolt	Diam. of Stud Bolts (inch)	Diam. of Bolt Holes	Length of Stud Bolts		
											Raised Face	Ring Joint	
CLASS 900													
3	123.8	R31	9.7	15.7	3/4x3.50	3/4x4.00	190.5	8	7/8	25.4	152.4	165.1	
4	149.2	R37	9.7	15.7	3/4x3.50	3/4x4.50	235.0	8	1 1/8	31.8	177.8	190.5	
5	181.0	R41	9.7	15.7	3/4x3.50	3/4x4.00	279.4	8	1 1/4	35.1	190.5	203.2	
6	211.1	R45	15.7	22.4	1x4.50	1x4.75	317.5	12	1 1/8	31.8	196.9	209.6	
8	269.9	R49	15.7	22.4	1x4.50	1x5.00	393.7	12	1 3/8	38.1	228.6	241.3	
10	323.9	R53	15.7	22.4	1x4.50	1x5.25	469.9	16	1 3/8	38.1	241.3	254.0	
12	381.0	R57	15.7	22.4	1x4.50	1x5.50	533.4	20	1 3/8	38.1	260.4	273.1	
14	-	-	-	-	-	-	555.8	20	1 1/2	41.1	279.4	-	
16	-	-	-	-	-	-	616.0	20	1 5/8	44.5	292.1	-	
18	-	-	-	-	-	-	685.8	20	1 7/8	50.8	330.2	-	
20	-	-	-	-	-	-	749.3	20	2	53.8	355.8	-	
24	-	-	-	-	-	-	901.7	20	2 1/2	66.5	444.5	-	
CLASS 1500													
1	50.8	R16	6.4	12.7	5/8x3.00	5/8x3.50	101.6	4	7/8	25.4	152.4	158.8	
1 1/4	60.3	R18	6.4	12.7	5/8x3.00	5/8x3.50	111.3	4	7/8	25.4	139.7	146.1	
1 1/2	68.3	R20	6.4	12.7	5/8x3.00	5/8x3.50	124.0	4	1	28.4	158.8	165.1	
2	95.3	R24	6.4	12.7	5/8x3.00	5/8x4.00	165.1	8	7/8	25.4	152.4	165.1	
2 1/2	108.0	R27	6.4	12.7	5/8x3.00	5/8x4.00	190.5	8	1	28.4	165.1	177.8	
3	136.5	R35	9.7	15.7	5/8x3.50	3/4x4.50	203.2	8	1 1/8	31.8	184.2	196.9	
4	161.9	R39	9.7	15.7	3/4x3.50	3/4x4.50	241.3	8	1 1/4	35.1	203.2	215.9	
5	193.7	R44	9.7	15.7	3/4x3.50	3/4x4.50	292.1	8	1 1/2	41.1	247.7	260.4	
6	211.1	R46	15.8	22.4	1x6.00	1x6.50	317.5	12	1 3/8	38.1	266.7	279.4	
8	269.9	R50	15.7	22.4	1x6.50	1x6.50	393.7	12	1 5/8	44.5	298.5	317.5	
10	323.9	R54	15.7	22.4	1x6.50	1x7.00	482.6	12	1 7/8	50.8	342.9	362.0	
12	381.0	R58	15.7	22.4	1x6.50	1x8.00	571.5	16	2	53.8	381.0	406.4	
14	-	-	-	-	-	-	635.0	16	2 1/4	60.5	412.8	-	
16	-	-	-	-	-	-	704.9	16	2 1/2	66.5	450.9	-	
18	-	-	-	-	-	-	774.7	16	2 3/4	73.2	501.7	-	
20	-	-	-	-	-	-	831.9	16	3	79.2	546.1	-	
24	-	-	-	-	-	-	990.6	16	3 1/2	91.9	622.3	-	

- (5) Unless otherwise specified raised face unions are furnished with alloy bolt studs per ASTM A193 Grade B7 with American Standard heavy series hex nuts ASTM A194 Class 2H.
- (6) ON ring joint flanges having a groove depth 0.375" (9.5mm) and less, the distance from the center line of the tap hole to the flange face is 0.750" (19.1mm). When the depth of groove is 0.438" (11.1mm) or greater, changes in drill size or method of drilling are necessary.
- (7) Bolt lengths for raised face flanges include allowance for orifice and gasket thickness of 0.25" (6.4mm) for NPS 3-12 (#900), 1-12 (#1500) and 0.38" (9.7mm) for NPS 14-24 (#900, #1500). Bolt lengths for ring type joint flanges include Allowance of 0.62 in (15.7mm) for NPS 3-10 (#900), 0.62 in (15.7mm) for NPS 12-24 (#900, #1500).

ASME ORIFICE FLANGES

CLASS 2500 ORIFICE FLANGES



ASME B16.36 FORGED FLANGES

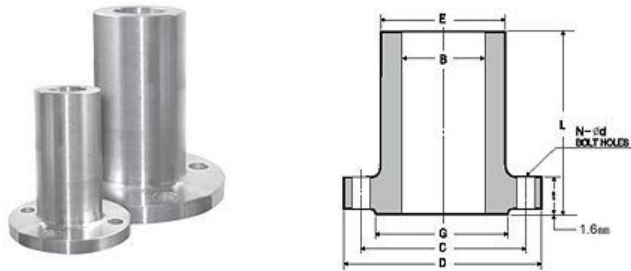
Unit: mm

Nominal Pipe Size	O.D of Flange Face	O.D of Raised Face	THK S of Hub Min	Length Thru	Diam. of Hub	Diam. of Hub at Bevel	Bore	Ring Type Joint	Ring Number	DRILLING TEMPLATE						
										Pitch Diam.	Diam Bolt Circle	Number of Holes	Diam. of Holes	Diam. of Bolt (inch)	LENGTH OF STUD BOLTS	
															Raised Face	Ring Joint
D	G	t	T	X	A	B	P									
1	159	50.8	38.1	91.9	57.2	33.5	To be specified by purchaser See Note(1)	60.3	R18	108.0	4	25.4	7/8	152.4	158.8	
1 1/2	203	73.2	44.5	111.3	79.2	48.3		82.6	R23	146.1	4	31.8	1 1/8	177.8	190.5	
2	235	91.9	50.8	127.0	95.3	60.5		101.6	R26	171.5	8	28.4	1	184.2	196.9	
2 1/2	267	104.6	57.2	142.7	114.3	73.2		111.1	R28	196.9	8	31.8	1 1/8	203.2	215.9	
3	305	127.0	66.5	168.1	133.4	88.9		127.0	R32	228.6	8	35.1	1 1/4	228.6	241.3	
4	356	157.2	76.2	190.5	165.1	114.3		-	-	273.1	8	41.1	1 1/2	260.4	-	
6	483	215.9	108.0	273.1	235.0	168.4		-	-	368.3	8	53.8	2	349.3	-	
8	552	269.7	127.0	317.5	304.8	219.2		-	-	438.2	12	53.8	2	387.4	-	
10	673	323.9	165.1	419.1	374.7	273.1		-	-	539.8	12	66.5	2 1/2	489.0	-	
12	762	381.0	184.2	463.6	441.5	323.9		-	-	619.3	12	73.2	2 3/4	539.8	-	

Notes :

- (1) For the inside diameter of pipes (corresponding to 'Bore' (B) of Welding Neck Flange), refer to page 126~127.
- (2) Class 2500 flanges will be furnished with 0.25" (6.4mm) raised face, which is not included in 'Thickness' (t) and 'Length through Hub' (T).
- (3) Each union includes two carbon steel jack screw bolts with hex nuts.
- (4) Unless otherwise specified raised face unions are furnished with alloy bolt studs per ASTM A193 Grade B7 with American Standard heavy series hex nuts ASTM A194 Class 2H.
- (5) On ring joint flanges having a groove depth 0.375" (9.5mm) and less, the distance from the center line of the tap hole to the flange face is 0.750" (19.1mm). When the depth of groove is 0.438" (11.1mm) or greater, changes in drill size or method of drilling are necessary.
- (6) Class 2500 Slip-on flanges are not covered by ASME B16.5.
- (7) Bolt lengths for raised face flanges include allowance for orifice and gasket thickness of 0.25" (6.4mm) NPS 1-12. Bolt lengths for ring type joint flanges include allowance of 0.62" (15.7mm) for NPS 1-3.

ASME LONG WELDING NECK FLANGES CLASS 150 / 300 FLANGES



CLASS 150 FLANGES

Unit:mm

Nominal Pipe Size	Out side Diameter	O.D of Raised Face	Hub Diameter at Bevel	Diameter of Bore	Thickness of Flange Min	Length Through Hub	DRILLING		
							Diameter of Bolt Circle	Number of Holes	Diameter of Holes
	D	G	E	B	t	L	C	N	d
1/2	89	35.1	30.2	12.7	11.2	228.6	60.5	4	15.7
3/4	99	42.9	38.1	19.1	12.7	228.6	69.9	4	15.7
1	108	50.8	49.2	25.4	14.2	228.6	79.2	4	15.7
1 1/4	117	63.5	58.6	31.8	15.7	228.6	88.9	4	15.7
1 1/2	127	73.2	65.0	38.1	17.5	228.6	98.6	4	15.7
2	152	91.9	77.7	50.8	19.1	228.6	120.7	4	19.1
2 1/2	178	104.6	90.4	63.5	22.4	228.6	139.7	4	19.1
3	191	127.0	108.0	76.2	23.9	228.6	152.4	4	19.1
3 1/2	216	139.7	122.1	88.9	23.9	228.6	177.8	8	19.1
4	229	157.2	134.8	101.6	23.9	304.8	190.5	8	19.1
5	254	185.7	163.5	127.0	23.9	304.8	215.9	8	22.4
6	279	215.9	192.0	152.4	25.4	304.8	241.3	8	22.4
8	343	269.7	246.1	203.2	28.4	304.8	298.5	8	22.4
10	406	323.9	304.8	254.0	30.2	304.8	362.0	12	25.4
12	483	381.0	365.3	304.8	31.8	304.8	431.8	12	25.4
14	533	412.8	400.0	355.6	35.1	304.8	476.3	12	28.4
16	597	469.9	457.2	406.4	36.6	304.8	539.8	16	28.4
18	635	533.4	504.9	457.2	39.6	304.8	577.9	16	31.8
20	699	584.2	558.8	508.0	42.9	304.8	635.0	20	31.8
24	813	692.2	663.4	609.6	47.8	304.8	749.3	20	35.1

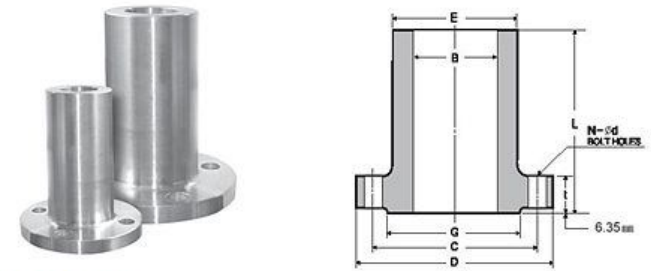
CLASS 300 FLANGES

Unit:mm

Nominal Pipe Size	Out side Diameter	O.D of Raised Face	Hub Diameter at Bevel	Diameter of Bore	Thickness of Flange Min	Length Through Hub	DRILLING		
							Diameter of Bolt Circle	Number of Holes	Diameter of Holes
	D	G	E	B	t	L	C	N	d
1/2	95	35.1	38.1	12.7	14.2	228.6	66.5	4	15.7
3/4	117	42.9	47.8	19.1	15.7	228.6	82.6	4	19.1
1	124	50.8	53.8	25.4	17.5	228.6	88.9	4	19.1
1 1/4	133	63.5	63.5	31.8	19.1	228.6	98.6	4	19.1
1 1/2	155	73.2	69.9	38.1	20.6	228.6	114.3	4	22.4
2	165	91.9	84.1	50.8	22.4	228.6	127.0	8	19.1
2 1/2	191	104.6	100.1	63.5	25.4	228.6	149.4	8	22.4
3	210	127.0	117.3	76.2	28.4	228.6	168.1	8	22.4
3 1/2	229	139.7	133.4	88.9	30.2	228.6	184.2	8	22.4
4	254	157.2	146.1	101.6	31.8	304.8	200.2	8	22.4
5	279	185.7	177.8	127.0	35.1	304.8	235.0	8	22.4
6	318	215.9	206.2	152.4	36.6	304.8	269.7	12	22.4
8	381	269.7	260.4	203.2	41.1	304.8	330.2	12	25.4
10	445	323.9	320.5	254.0	47.8	304.8	397.4	16	28.4
12	521	381.0	374.7	304.8	50.8	304.8	450.9	16	31.8
14	584	412.8	425.5	355.6	53.8	304.8	514.4	20	31.8
16	648	469.9	482.6	406.4	57.2	304.8	571.5	20	35.1
18	711	533.4	533.4	457.2	60.5	304.8	628.7	24	35.1
20	775	584.2	587.2	508.0	63.5	304.8	685.8	24	35.1
24	914	692.2	701.5	609.6	69.9	304.8	812.8	24	41.1

Notes : (1) Bore(B) is the same as nominal pipe size.
(2) Welding neck longer than listed are available in all sizes on special order.

ASME LONG WELDING NECK FLANGES CLASS 400 / 600 FLANGES



CLASS 400 FLANGES

Unit:mm

Nominal Pipe Size	Out side Diameter	O.D of Raised Face	Hub Diameter at Bevel	Diameter of Bore	Thickness of Flange Min	Length Through Hub	DRILLING		
							Diameter of Bolt Circle	Number of Holes	Diameter of Holes
	D	G	E	B	t	L	C	N	d
1	114								
1 1/2									
2									
2 1/2									
3									
3 1/2									
4	254	157.2	146.1	101.6	35.1	304.8	200.2	8	25.4
5	279	185.7	177.8	127.0	38.1	304.8	235.0	7	25.4
6	318	215.9	206.4	152.2	41.1	304.8	269.7	12	25.4
8	381	269.7	260.4	203.2	47.8	304.8	330.2	12	28.4
10	445	323.9	320.5	254.0	53.8	304.8	387.4	16	31.8
12	521	381.0	374.7	304.8	57.2	304.8	450.9	16	35.1
14	584	412.8	425.5	355.6	60.5	304.8	514.4	20	35.1
16	648	469.9	482.6	406.4	63.5	304.8	571.5	24	38.1
18	711	533.4	533.4	457.2	66.5	304.8	628.7	24	38.1
20	775	584.2	587.2	508.0	69.9	304.8	685.8	24	41.1
24	914	692.2	701.5	609.6	76.2	304.8	812.8	24	47.8

Use Class 600 dimensions in these sizes.

CLASS 600 FLANGES

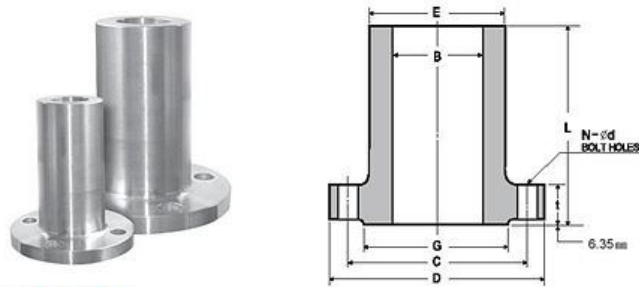
Unit:mm

Nominal Pipe Size	Out side Diameter	O.D of Raised Face	Hub Diameter at Bevel	Diameter of Bore	Thickness of Flange Min	Length Through Hub	DRILLING		
							Diameter of Bolt Circle	Number of Holes	Diameter of Holes
	D	G	E	B	t	L	C	N	d
1	124	50.8	53.8	25.4	17.5	228.6	88.9	4	19.1
1 1/4	133	63.5	63.5	31.8	20.6	228.6	98.6	4	19.1
1 1/2	155	73.2	69.9	38.1	22.4	228.6	114.3	4	22.4
2	165	91.9	84.1	50.8	25.4	228.6	127.0	8	19.1
2 1/2	191	104.6	100.1	63.5	28.4	228.6	149.4	8	22.4
3	210	127.0	117.3	76.2	31.8	228.6	168.1	8	22.4
3 1/2	229	139.7	133.4	88.9	35.1	228.6	184.2	8	25.4
4	273	157.2	152.4	101.6	38.1	304.8	215.9	8	25.4
5	330	185.7	190.5	127.0	44.5	304.8	266.7	8	28.4
6	356	215.9	222.3	152.4	47.8	304.8	292.1	12	28.4
8	419	269.7	273.1	203.2	55.6	304.8	349.3	12	31.8
10	508	323.9	342.9	254.0	63.5	304.8	431.8	16	35.1
12	559	381.0	400.1	304.8	66.5	304.8	489.0	20	35.1
14	603	412.8	431.8	355.6	69.9	304.8	527.1	20	38.1
16	686	469.9	495.3	406.4	76.2	304.8	603.3	20	41.1
18	743	533.4	546.1	457.2	82.6	304.8	654.1	20	44.5
20	813	584.2	609.6	508.0	88.9	304.8	723.9	24	44.5
24	940	692.2	717.6	609.6	101.6	304.8	838.2	24	50.8

Notes : (1) Bore(B) is the same as nominal pipe size.
(2) Welding neck longer than listed are available in all sizes on special order.

ASME LONG WELDING NECK FLANGES

CLASS 900 / 1500 FLANGES



CLASS 900 FLANGES

Unit:mm

Nominal Pipe Size	Out side Diameter	O.D of Raised Face	Hub Diameter at Bevel	Diameter of Bore	Thickness of Flange Min	Length Through Hub	DRILLING		
							Diameter of Bolt Circle	Number of Holes	Diameter of Holes
	D	G	E	B	t	L	C	N	d
1									
1 1/4									
1 1/2									
2									
2 1/2									
Use Class 1500 dimensions in these sizes.									
3	241	127.0	127.0	76.2	38.1	304.8	190.5	8	25.4
4	292	157.2	158.8	101.6	44.5	304.8	235.0	8	31.8
5	349	185.7	90.5	127.0	50.8	304.8	279.4	8	35.1
6	381	215.9	235.0	152.4	55.6	304.8	317.5	12	31.8
8	470	269.7	298.5	203.2	63.5	304.8	393.7	12	38.1
10	546	323.9	368.3	254.0	69.9	406.4	469.9	16	38.1
12	610	381.0	419.1	304.8	79.2		533.4	20	38.1
14	641	412.8	450.9	355.6	85.9		558.8	20	41.1
16	705	469.9	508.0	406.4	88.9		616.0	20	44.5
18	787	533.4	565.2	457.2	101.6		685.8	20	50.8
20	857	584.2	622.3	508.0	108.0		749.3	20	53.8
24	1041	692.2	749.3	609.6	139.7		901.7	20	66.5

CLASS 1500 FLANGES

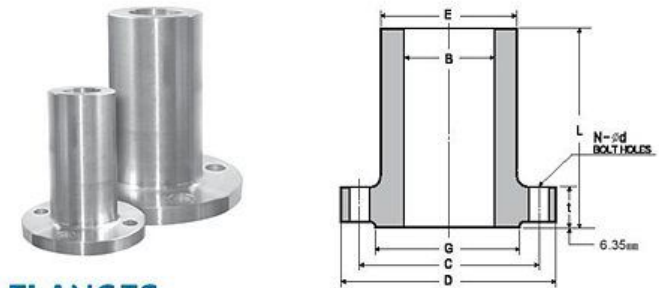
Unit:mm

Nominal Pipe Size	Out side Diameter	O.D of Raised Face	Hub Diameter at Bevel	Diameter of Bore	Thickness of Flange Min	Length Through Hub	DRILLING		
							Diameter of Bolt Circle	Number of Holes	Diameter of Holes
	D	G	E	B	t	L	C	N	d
1	149	50.8	52.3	25.4	28.4	228.6	101.6	4	25.4
1 1/4	159	63.5	63.5	31.8	28.4	228.6	111.3	4	25.4
1 1/2	178	73.2	69.9	38.1	31.8	228.6	124.0	4	28.4
2	216	91.9	104.6	50.8	38.1	228.6	165.1	8	25.4
2 1/2	244	104.6	124.0	63.5	41.1	304.8	190.5	8	28.4
3	267	127.0	133.4	76.2	47.8	304.8	203.2	8	31.8
4	311	157.2	162.1	101.6	53.8	304.8	241.3	8	35.1
5	375	185.7	196.9	127.0	73.2	304.8	292.1	8	41.1
6	394	215.9	228.6	152.4	82.6	304.8	317.5	12	38.1
8	483	269.7	292.1	203.2	91.9	304.8	393.7	12	44.5
10	584	323.9	368.3	254.0	108.0	406.4	482.6	12	50.8
12	673	381.0	450.9	304.8	124.0	406.4	571.5	16	53.8
14	749	412.8	495.3	355.6	133.4		635.0	16	60.5
16	826	469.9	552.5	406.4	146.1		704.9	16	66.5
18	914	533.4	596.9	457.2	162.1		774.7	16	73.2
20	984	584.2	641.4	508.0	177.8		831.9	16	79.2
24	1168	692.2	762.0	609.6	203.2		990.6	16	91.9

Notes : (1) Bore(B) is the same as nominal pipe size.
 (2) Welding neck longer than listed are available in all sizes on special order.

ASME LONG WELDING NECK FLANGES

CLASS 2500 FLANGES



CLASS 2500 FLANGES

Unit:mm

Nominal Pipe Size	Out side Diameter	O.D of Raised Face	Hub Diameter at Bevel	Diameter of Bore	Thickness of Flange Min	Length Through Hub	DRILLING		
							Diameter of Bolt Circle	Number of Holes	Diameter of Holes
	D	G	E	B	t	L	C	N	d
1	159	50.8	57.2	25.4	35.1	228.6	108.0	4	25.4
1 1/4	184	63.5	73.2	31.8	38.1	228.6	130.0	4	28.4
1 1/2	203	73.2	79.2	38.1	44.5	228.6	146.1	4	31.8
2	235	91.9	95.3	50.8	50.8	228.6	171.5	8	28.4
2 1/2	267	104.6	114.3	63.5	57.2	304.8	196.9	8	31.8
3	305	127.0	133.4	76.2	66.5	304.8	228.6	8	35.1
4	356	157.2	165.1	101.6	76.2	304.8	273.1	8	41.1
5	419	185.7	203.2	127.0	91.9	304.8	323.9	8	47.8
6	483	215.9	235.0	152.4	108.0	304.8	368.3	8	53.8
8	552	269.7	304.8	203.2	127.0	304.8	438.2	12	53.8
10	673	323.9	374.7	254.0	165.1	406.4	539.8	12	66.5
12	762	381.0	441.5	304.8	184.2	406.4	619.3	16	73.2

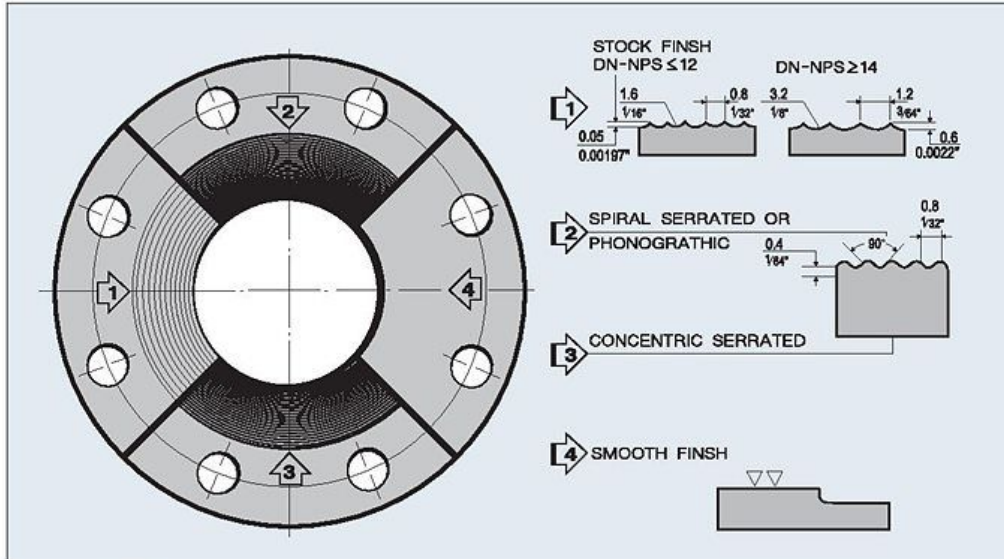
Notes : (1) Bore(B) is the same as nominal pipe size.
 (2) Welding neck longer than listed are available in all sizes on special order.
 (3) E=diameter of hub tolerance (3mm-0) B16.5-2009

GUIDE TO MATERIAL LAYOUT & SPECIFICATIONS

Pipe	Weld Fittings	Screwed & Socket Fittings	Flanges	Valves
A-53	A-234 WPB	A-105, A-181 Gr. 60 or 70	A-105, A-181 Gr. 60 or 70	A-105 A-216 WCB
A-106B	A-334 WPB	A-105 A-181 Gr. 60 or 70	A-105 A-181 Gr. 60 or 70	A-105 A-216 WCB
A-312 T304	A-403 WP-304	A-182 F-304	A-182 F-304	A-182 F-304 CMO
A-312 T316	A-403 WP-316	A-182 F-316	A-182 F-316	A-182 F-316 CM BMO
A-333 Gr. 1 or 6	A-420 WPL 1 & 6	A-350 LF-1	A-350 LF-1	A-350 LF-1 A-352 LCB
A-333 Gr. 3	A-420 WPL-3	A-350 LF-3	A-350 LF-3	A-350 LF-3 A-352 LC3
A-335 P-1	A-234 WP-1	A-182 F-1	A-182 F-1	A-217 WC-6
A-335 P-11	A-234 WP-11	A-182 F-11	A-182 F-11	A-182 F-11 A-217 WC-6
A-335 P-12	A-234 WP-12	A-182 F-12	A-182 F-12	A-217 WC-6
A-335 P-22	A-234 WP-22	A-182 F-22	A-182 F-22	A-182 F-22 A-217 WC-9
A-335 P-5	A-234 WP-5	A-182 F-5	A-182 F-5	A-182 F-5 A-216 WC-5
A-335 P-7	A-234 WP-7	A-182 F-7	A-182 F-7	A-182 F-7 A-217 WC-12
A-335 P-9	A-234 WP-9	A-182 F-9	A-182 F-9	A-182 F-9 A-217 WC-12

STANDARD FINISH

STANDARD FINISHES for Face of Flange(ASME B16.5)



STOCK FINISH

The most widely used of any gasket finish, because, practically, is suitable for all ordinary service conditions. This is a continuous spiral groove. Flanges sizes 12" (304.8mm) and smaller, are produced with a 1/16" round-nosed tool at a feed of 1/32" per revolution. For sizes 14" (355.6mm) and larger, the finish is made with 1/8" round-nosed tool at a feed of 3/64" per revolution.

SPIRAL SERRATED OR PHONOGRAPHIC

This finish is produced by using a 90° round-nosed tool.

CONCENTRIC SERRATED

This finish is produced by using a 90° round-nosed tool.

SMOOTH FINISH

The cutting tool employed shall have an approximate 0.06" radius. The resultant surface finish shall have a 125µ inch to 250µ inch(ASME B16.5 para 6.4.5.3)

1. RAISED FACE, AND LARGE MALE AND FEMALE

Either a serrated concentric or serrated spiral finish having a resultant surface finish from 3.2µm to 6.3µm (125µm to 250µm), average roughness shall be furnished. The cutting tool employed should have an approximate 1.5mm (0.06 in) or larger radius, and there should be from 1.8 grooves/mm through 2.2 grooves / mm (45grooves / in. through 55 grooves / in).

2. TONGUE AND GROOVE, AND SMALL MAKE AND FEMALE

The gasket contact surface finish shall not exceed 125µ inch (3.2µm) roughness.

3. RING JOINT

The side wall surface finish of the gasket groove shall not exceed 63µ inch (1.6µm) roughness.

4. BLIND

Blind flanges need not be faced in the center if when this center part is raised, its diameter is at least 1 in. smaller than the inside diameter of fittings of the corresponding pressure class. When the center part is depressed, its diameter is not greater than the inside diameter of the corresponding pressure class fittings. Machining of the depressed center is not required.

TOLERANCE

ASME B16.5 - 2009

SOLID FLANGE

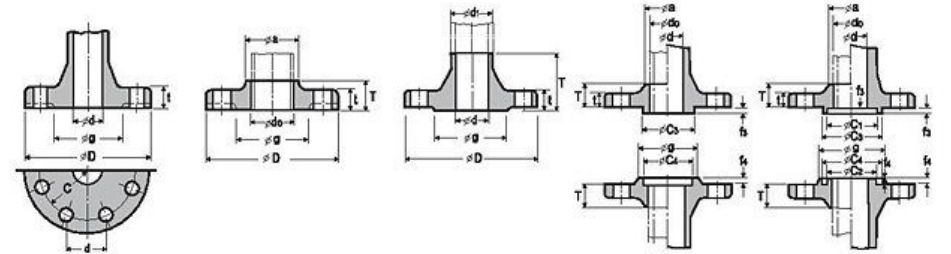
SLIP-ON

WELDING NECK FLANGE

TYPE OF GASKET SURFACE

MALE & FEMALE TYPE

TONGUE & GROOVE TYPE



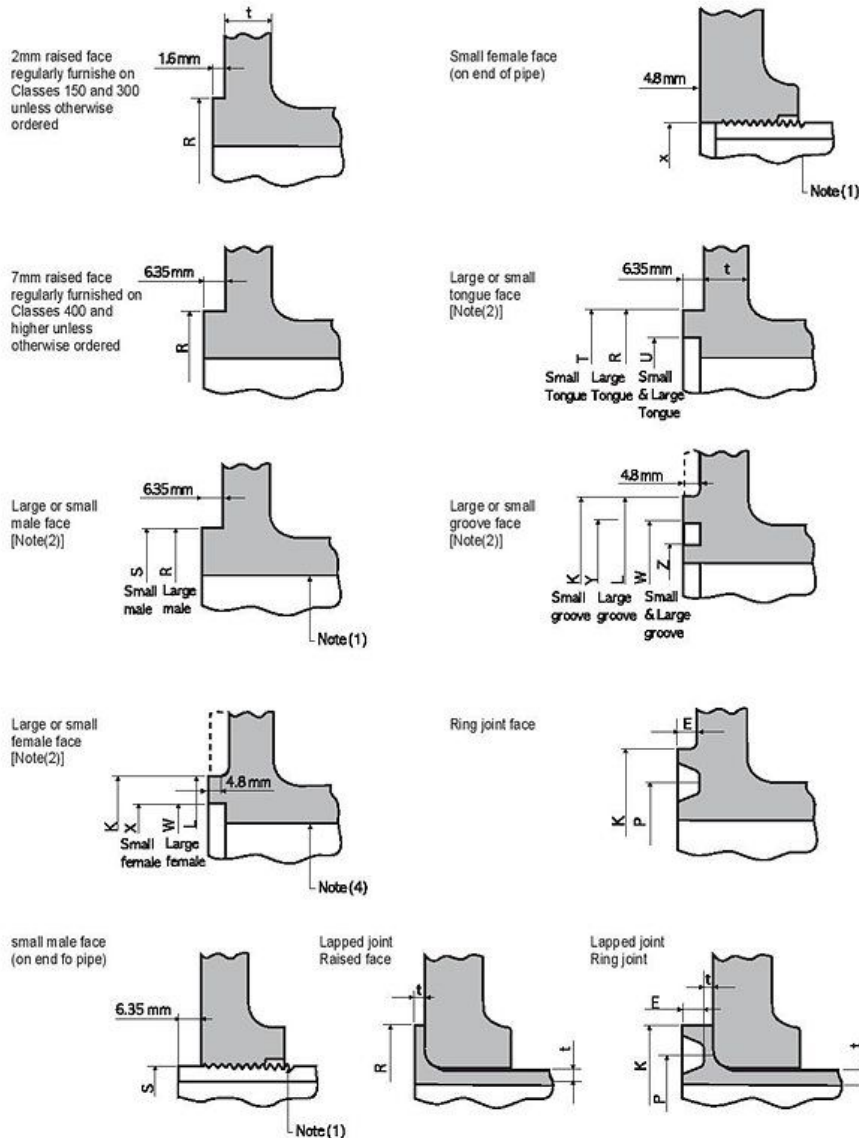
WELDING NECK

Place	Range	Tolerance (mm)
Outside Diameter	When O.D is 24" or Less	±1.6* (±0.063in)
	When O.D. is Over 24"	±3.2* (±0.125in)
Inside Diameter	10" and Smaller	±0.8 (±0.03in)
	12" thru 18"	±1.5 (±0.06in)
Diameter of Contact Face	1.6mm Raised Face (Outside)	±0.8 (±0.03in)
	6.4mm Raised Face (Outside)	±0.5 (±0.02in)
Diameter of Hub at Base	When Hub Base is 24" or Smaller	±1.6* (±0.063in)
	When Hub Base is Over 24"	±3.2* (±0.125in)
Diameter of Hub at Welding Point	When O.D is 5" or Less	+2.3 (+0.09in) -0.8 (-0.03in)
	When O.D is Over 6"	+4.0 (+0.16in) -0.8 (-0.03in)
Drilling	Bolt Circle Diameter	±1.5 (±0.06in)
	Bolt to Bolt Hole	±0.8 (±0.03in)
	Eccentricity of Bolt Circle with Respect to Facing	NPS≤2 1/2' 0.8(0.03in) Max. NPS≥3' 1.5(0.06in) Max.
	Eccentricity of Bolt Circle with Respect to Bore	0.8 Max.* (0.03in)
Thickness	When O.D is 18" or Less	+3.0 (+0.12in) -0.0 (-0.0in)
	When O.D is Over 20"	+4.8 (+0.19in) -0.0 (-0.0in)
Length Thru Hub	When O.D is 4" or Less	±1.5 (±0.06in)
	5" thru 10"	+1.5 (±0.06in) -3.0 (-0.12in)
	When O.D is Over 12"	+3.0 (+0.12in) -4.6 (-0.18in)

THREAD, SOCKET-WELDING, SLIP-ON, LAP JOINT AND BLIND

Place	Range	Tolerance (mm)	
Outside Diameter	When O.D is 24" or Less	±1.6* (±0.063in)	
	When O.D. is Over 24"	±3.2* (±0.125in)	
Inside Diameter	Counter-bored Threaded	When O.D is 10" or Less When O.D is Over 12"	±0.8 (±0.03in) -0.0 (-0.0in) ±1.5 (±0.06in) -0.0 (-0.0in)
	Counter-bored Socket Welding	1/2" NPS ≤ 3"	±0.25* (±0.01in)
Diameter of Contact Face	Lap joint Slip-On Socket Welding	When O.D is 10" or Less When O.D is Over 12"	±0.8 (±0.03in) -0.0 (-0.0in) ±1.5 (±0.06in) -0.0 (-0.0in)
	Diameter of Hub at Base	1.6mm Raised Face (Outside)	±0.8 (±0.03in)
Diameter of Hub at Base		6.35mm Raised Face (Outside)	±0.5 (±0.125in)
	Diameter of Hub at Base	Tongue, groove, female (Inside & Outside)	±0.5 (±0.02in)
Diameter of Hub at Base		When Hub Base is 24" or Smaller	±1.6* (±0.063in)
	Diameter of Hub at Base	When Hub Base is Over 24"	±3.2* (±0.125in)
Diameter of Hub at Base		Bolt Circle Diameter	±1.5 (±0.06in)
	Diameter of Hub at Base	Bolt to Bolt Hole	±0.8 (±0.03in)
Diameter of Hub at Base		Eccentricity of Bolt Circle with Respect to Facing	NPS≤2 1/2' 0.8(0.03in) Max. NPS≥3' 1.5(0.06in) Max.
	Diameter of Hub at Base	Eccentricity of Bolt Circle with Respect to Bore	0.8 Max.* (0.03in)
Diameter of Hub at Base		Eccentricity of Facing with Respect to Bore	0.8 Max.* (0.03in)
	Diameter of Hub at Base	When O.D is 18" or Less	+3.0 (+0.12in) -0.0 (-0.0in)
Diameter of Hub at Base		When O.D is Over 20"	+4.8 (+0.19in) -0.0 (-0.0in)
	Diameter of Hub at Base	When O.D is 4" or Less	±1.5 (±0.06in)
Diameter of Hub at Base		5" thru 10"	+1.5 (±0.06in) -3.0 (-0.12in)
	Diameter of Hub at Base	When O.D is Over 12"	+3.0 (+0.12in) -4.6 (-0.18in)

FLANGES FACINGS



ASME B16.5 FORGED FLANGES

Unit:mm

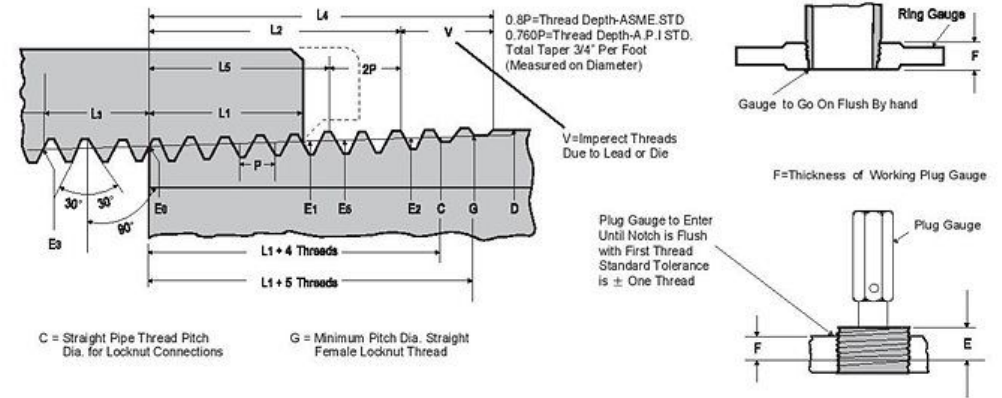
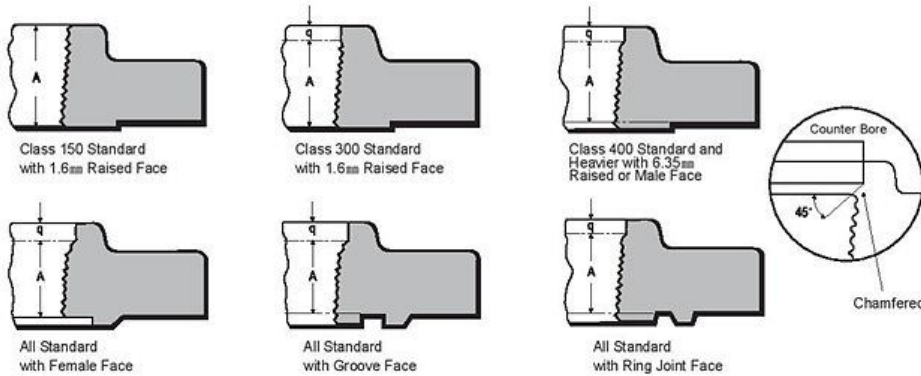
Nominal Pipe Size	OUTSIDE DIAMETER			Inside Diameter of Large and Small Tongue	OUTSIDE DIAMETER			Inside Diameter of Large and Small Groove	HEIGHT		Depth of Groove or Female	MIN. OUTSIDE DIAMETER OF RAISED PORTION	
	Raised Face, Lapped, Large Male & Large Tongue	Small Male	Small Tongue		Large Female and Large Groove	Small Female	Small Groove		Raised Face and 300 ST DS	Large & Small Male and Tongue Class400 ~2500		Small Female & Groove	Large Female & Groove
	R	S	T		U	W	X						
1/2	34.9	18.3	35.1	25.4	36.5	19.9	36.5	23.8	2.0	7.0	5.0	44	46
3/4	42.9	23.8	42.9	33.3	44.4	25.4	44.4	31.8	2.0	7.0	5.0	52	54
1	50.8	30.2	47.8	38.1	52.4	31.8	49.2	36.5	2.0	7.0	5.0	57	62
1 1/4	63.5	38.1	57.2	47.6	65.1	39.7	58.7	46.0	2.0	7.0	5.0	67	75
1 1/2	73.0	44.4	63.5	54.0	74.6	46.0	65.1	52.4	2.0	7.0	5.0	73	84
2	92.1	57.2	82.6	73.0	93.7	58.8	84.1	71.4	2.0	7.0	5.0	92	103
2 1/2	104.8	68.3	95.2	85.7	106.4	69.8	96.8	84.1	2.0	7.0	5.0	105	116
3	127.0	84.1	117.5	108.0	128.6	85.7	119.1	106.4	2.0	7.0	5.0	127	138
3 1/2	139.7	96.8	130.2	120.6	141.3	98.4	131.8	119.1	2.0	7.0	5.0	140	151
4	157.2	109.5	144.5	131.8	158.8	111.1	146.0	130.2	2.0	7.0	5.0	157	168
5	185.7	136.5	173.0	160.3	187.3	138.1	174.6	158.8	2.0	7.0	5.0	186	197
6	215.9	161.9	203.2	190.5	217.5	163.5	204.8	188.9	2.0	7.0	5.0	216	227
8	269.9	212.7	254.0	238.1	271.5	214.3	255.6	236.5	2.0	7.0	5.0	270	281
10	323.8	266.7	304.8	285.8	325.4	268.3	306.4	284.2	2.0	7.0	5.0	324	335
12	381.0	317.5	362.0	342.9	382.6	319.1	363.5	341.3	2.0	7.0	5.0	381	392
14	412.8	349.2	393.7	374.6	414.3	350.8	395.3	373.1	2.0	7.0	5.0	413	424
16	469.9	400.0	447.5	425.4	471.5	401.6	449.3	423.9	2.0	7.0	5.0	470	481
18	533.4	450.8	511.2	489.0	535.0	452.4	512.8	487.4	2.0	7.0	5.0	553	544
20	584.2	501.6	558.8	533.4	585.8	503.2	560.4	531.8	2.0	7.0	5.0	584	595
24	692.2	603.2	666.8	641.4	693.7	604.8	668.3	639.8	2.0	7.0	5.0	692	703

Notes :

- (1) For small male and female joints, care should be taken in the use of these dimensions to insure that the inside diameter of fitting or pipe is small enough to permit sufficient bearing surface to prevent the crushing of the gasket. This applies particularly on lines where the joint is made on the end of the pipe. Inside diameter of fitting should match inside diameter of pipe as specified by purchaser. Threaded companion flanges for small male and female joints are furnished with plain face and are threaded with American National Standard Locknut Thread (NPSL).
- (2) Raised portion of full face may be furnished unless otherwise specified on order.
- (3) Large male and female faces and large tongue and groove are not applicable to Class 150 because of potential dimensional conflicts.
- (4) Height of raised face is either 1.6 mm or 6.4mm.
- (5) Height of large and small male and tongue is 6.35mm.
- (6) Depth of groove of female is 4.8 mm.

THREAD

THREAD AND STANDARDS FOR ASME FLANGES (ASME B2.1)



ASME B16.5 FORGED FLANGES

Unit:mm

Nominal Pipe Size	A-THREAD LENGTHS						
	Class 150	Class 300	Class 400	Class 600	Class 900	Class 1500	Class 2500
1/2	15.9	15.9	15.9	15.9	22.2	22.2	28.6
3/4	15.9	15.9	15.9	15.9	25.4	25.4	31.8
1	17.5	17.5	17.5	17.5	28.6	28.6	34.9
1 1/4	20.0	20.7	20.7	20.7	30.2	30.1	38.1
1 1/2	22.2	22.2	22.2	22.2	31.8	31.8	44.5
2	25.4	28.6	28.6	28.6	38.1	38.1	50.8
2 1/2	28.6	31.8	31.8	31.8	47.6	47.6	57.2
3	30.1	31.8	34.9	34.9	41.3	50.8	63.5
3 1/2	31.8	36.5	39.7	39.7	-	-	-
4	33.4	36.5	41.3	41.3	47.6	57.2	69.9
5	36.5	42.9	42.9	47.6	54.0	63.5	76.2
6	39.7	46.1	46.1	50.8	57.2	69.9	82.6
8	44.5	50.8	50.8	60.3	63.5	76.2	95.3
10	49.2	55.6	55.6	65.1	71.5	84.2	108.0
12	55.6	60.3	60.3	69.9	76.2	92.1	120.7
14	57.2	63.5	63.5	73.0	82.6	-	-
16	63.5	68.3	68.3	77.8	85.7	-	-
18	68.3	69.9	69.9	79.4	88.9	-	-
20	69.9	73.0	73.0	82.6	92.1	-	-
24	82.6	82.6	82.6	92.1	101.6	-	-

Notes :

- Except flanges with Small Male/Female Face(on pipe end), threaded flanges, have an American National Standard taper pipe thread conforming to ASME B2.1
- The thread is concentric with the axis of the flange and variations in alignment do not exceed 0.06(1.6mm) in. per foot(0.5percent).
- Class 150 flanges are made without counterbore. The threads are chamfered approximately to the major diameter of the thread at the back of the flange at an angle of approximately 45 degrees with the axis of the thread. The chamfer is concentric with the thread and included in the measurement of the thread length.
- Class 300 and higher pressure flanges are made with a counterbore at the back of the flange. The threads are chamfered to the diameter of the counterbore at an angle of approximately 45 degrees with the axis of the thread. The counterbore and chamfer are concentric with the thread.
- The minimum length of effective thread in reducing flanges is at least equal to dimension Q of the corresponding class of threaded flanges as shown in the above tables. Threads do not necessarily extend to the face to the flange.

ASME B16.36 FORGED FLANGES

Unit:mm

Nominal Pipe Size	Outside Diameter of Pipe	Threads Per inch	Pitch of Thread	Pitch Diameter Beginning of External Threads	Handtight Engagement		Effective Thread External		Wrench Mack-up Length for Internal Threaded		Over all Length External Threads
					Length	Pitch Diameter	Length	Pitch Diameter	Length	Pitch Diameter	
1/2	21	14	1.8	19.3	8.1	19.8	13.6	20.1	5.4	18.9	19.9
3/4	27	14	1.8	24.6	8.6	25.1	13.9	25.4	5.4	24.2	20.2
1	33	11 1/2	2.2	30.8	10.2	31.5	17.3	31.9	6.6	30.4	25.0
1 1/4	42	11 1/2	2.2	39.6	10.7	40.2	18.0	40.7	6.6	39.1	25.6
1 1/2	48	11 1/2	2.2	45.6	10.7	46.3	18.4	46.8	6.6	45.2	26.0
2	60	11 1/2	2.2	57.6	11.1	58.3	19.2	58.8	6.6	57.2	26.9
2 1/2	73	8	3.2	69.1	17.3	70.2	28.9	70.9	6.4	68.7	39.9
3	89	8	3.2	84.9	19.5	86.1	30.5	86.8	6.4	84.5	41.5
3 1/2	102	8	3.2	97.5	20.9	98.8	31.8	99.5	6.4	97.1	42.8
4	114	8	3.2	110.1	21.4	111.4	33.0	112.2	6.4	109.7	44.0
4 1/2	127	8	3.2	122.7	22.2	124.1	34.3	123.0	-	-	-
5	141	8	3.2	136.9	23.8	138.4	35.7	139.2	6.4	136.5	46.7
6	168	8	3.2	163.7	24.3	165.3	38.4	166.1	6.4	163.3	49.4
7	194	8	3.2	189.0	25.4	190.6	41.0	189.3	-	-	-
8	219	8	3.2	214.2	27.0	215.9	43.5	216.9	6.4	213.8	54.5
9	244	8	3.2	239.5	28.7	241.2	46.0	239.8	-	-	-
10	273	8	3.2	267.9	30.7	269.8	48.9	270.9	6.4	267.5	59.9
11	298	8	3.2	293.1	32.6	295.1	51.4	293.5	-	-	-
12	324	8	3.2	318.3	34.5	320.5	54.0	321.7	6.4	317.9	65.0
14	356	8	3.2	349.9	39.7	352.4	57.2	353.5	6.4	349.5	68.2
15	381	8	3.2	375.1	42.8	377.8	59.7	375.6	-	-	-
16	406	8	3.2	400.4	46.0	403.2	62.2	404.3	6.4	400.0	73.2
17	432	8	3.2	425.6	48.3	428.6	64.8	426.1	-	-	-
18	457	8	3.2	450.9	50.8	454.0	67.3	455.1	6.4	450.5	78.3
20	508	8	3.2	501.3	54.0	504.7	72.4	505.9	6.4	500.9	83.4
22	559	8	3.2	551.8	57.2	555.4	77.5	552.4	-	-	-
24	610	8	3.2	602.3	60.3	601.1	82.6	607.5	6.4	601.9	93.6

ASTM Material Chemical composition & Mechanical Requirements

APPLICABLE ASTM SPECIFICATIONS

ASTM Grade	UNS Designation	Chemical Composition(%)													Mechanical Requirements				
		C	Si	Mn	P	S	Ni	Cr	Mo	Cu	V	Nb	N	Y, S ¹⁾ (Mpa)	T.S (Mpa)	E.L (%)	R.A (%)	H.B	
A105	K03504	Max. 0.35	0.35	1.05	0.035	0.040	0.40	0.30	0.12	0.40	0.08			250	485	22	30	187	
A266 GR.1	K03506	Max. 0.30	0.35	1.05	0.025	0.025								205	415	23	38		
A266 GR.2	K03506	Max. 0.30	0.35	1.05	0.025	0.025								250	485	20	33		
A266 GR.3	K05001	Max. 0.35	0.35	1.35	0.025	0.025								260	490	19	30		
A266 GR.4	K03017	Max. 0.30	0.35	1.35	0.025	0.025								250	485	20	33		
A350 LF.1	K03009	Max. 0.30	0.40	1.35	0.035	0.040	0.40	0.30	0.12	0.4	0.08	0.02		205	415	38		197	
A350 LF.2	K03011	Max. 0.30	0.30	1.35	0.035	0.040	0.40	0.30	0.12	0.4	0.08	0.02		205	415	38		197	
A694	K03014	Max. 0.03	0.35	1.05	0.025	0.025								F42-290 F46-315 F48-330 F50-345 F52-360 F56-385 F60-415 F65-450 F70-485	F42-415 F46-415 F48-425 F50-440 F52-445 F56-470 F60-515 F65-530 F70-565	F42~ F65 :20	F70:18		
A182 F1	K12822	Max. 0.28	0.28	0.90	0.045	0.045								275	485	20	30	143	
A182 F5	K41545	Max. 0.15	0.15	0.60	0.030	0.030	0.50	6.00						275	485	20	35	143	
A182 F5a	K42544	Max. 0.25	0.50	0.60	0.040	0.040	0.50	6.00						450	620	22	50	187	
A182 F9	K90941	Max. 0.15	1.00	0.60	0.030	0.030		10.00	1.10					380	585	20	40	179	
A182 F91	K90901	Max. 0.12	0.50	0.60	0.020	0.010	0.40	9.50	1.05		0.25	0.10	0.07	415	585	20	40	248	
A182 F11CL1	K11597	Max. 0.15	1.00	0.60	0.030	0.030		1.50	0.65					205	415	20	45	121	
A182 F11CL2	K11572	Max. 0.20	1.00	0.80	0.040	0.040		1.50	0.65					275	485	20	30	143	
A182 F11CL3	K11572	Max. 0.20	1.00	0.80	0.040	0.040		1.50	0.65					310	515	20	30	156	
A182 F12CL1	K11562	Max. 0.15	0.50	0.60	0.045	0.045		1.25	0.65					220	415	20	45	121	
A182 F12CL2	K11564	Max. 0.20	0.60	0.80	0.040	0.040		1.25	0.65					275	485	20	30	143	
A182 F22CL1	K21590	Max. 0.15	0.50	0.60	0.040	0.040		2.50	1.13					205	415	20	35	170	
A182 F22CL3	K21590	Max. 0.15	0.50	0.60	0.040	0.040		2.50	1.13					310	515	20	30	156	
A182 F22V	K31838	Max. 0.15	0.10	0.60	0.015	0.010	0.25	2.50	1.10	0.20	0.35	0.07		415	585	18	45	121	
A350 LF3	K32025	Max. 0.20	0.35	0.90	0.035	0.040	0.30	0.30	0.12	0.40	0.03	0.02		260	485	35		197	
A182 F304	S30400	Max. 0.08	1.00	2.00	0.045	0.030	11.00	20.00						205	515 ⁸⁾	30	50		
A182 F304H	S30403	Max. 0.03	1.00	2.00	0.045	0.030	13.00	20.00						170	485 ⁹⁾	30	50		
A182 F310	S31000	Max. 0.10	1.00	2.00	0.045	0.030	11.00	20.00						205	515 ⁸⁾	30	50		
A182 F316	S31600	Max. 0.08	1.00	2.00	0.045	0.030	14.00	18.00	3.00					205	515 ⁸⁾	30	50		
A182 F316L	S31603	Max. 0.03	1.00	2.00	0.045	0.030	15.00	18.00	3.00					170	485 ⁹⁾	30	50		
A182 F316H	S31609	Max. 0.10	1.00	2.00	0.045	0.030	14.00	18.00	3.00					205	515 ⁸⁾	30	50		
A182 F317	S31700	Max. 0.08	1.00	2.00	0.045	0.030	15.00	20.00	4.00					205	515 ⁸⁾	30	50		
A182 F317L	S31703	Max. 0.03	1.00	2.00	0.045	0.030	15.00	20.00	4.00					170	485 ⁹⁾	30	50		
A182 F321	S32100	Max. 0.08	1.00	2.00	0.045	0.030	12.00	19.00						205	515 ⁸⁾	30	50		
A182 F347	S34700	Max. 0.08	1.00	2.00	0.045	0.030	13.00	20.00						205	515 ⁸⁾	30	50		
A182 F6aCL1	S41000	Max. 0.15	1.00	1.00	0.040	0.030	0.50	13.50						275	485	18	35	143	
A182 F51	S31803	Max. 0.03	1.00	2.00	0.030	0.020	6.50	23.00	3.50					450	620	25	45	310	
A182 F53	S32750	Max. 0.03	0.80	1.20	0.035	0.020	8.00	26.00	5.00	0.50				550 ¹⁰⁾	800 ¹⁰⁾	15			

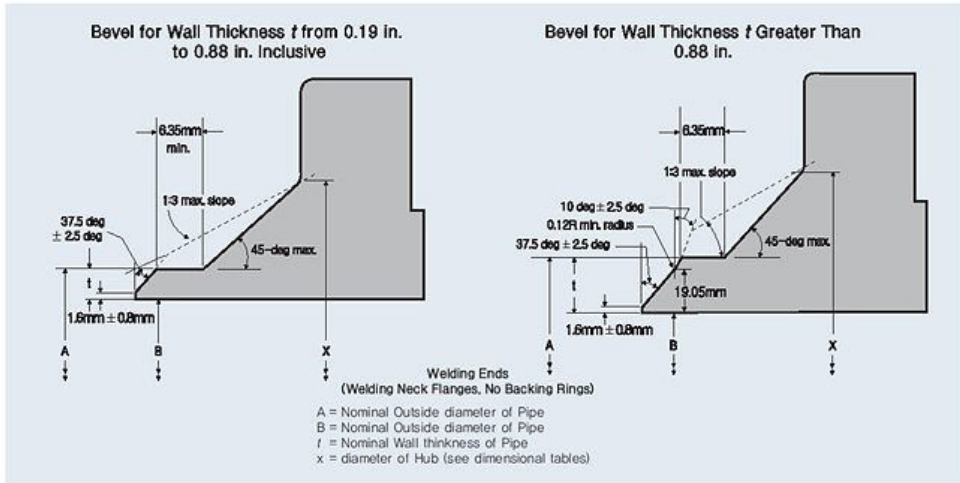
Notes :
 (1) All values are maximum unless otherwise stated
 (2) The present grade F5a(0.25 max carbon) previous to 1955 was assigned the identification symbol F5. Identification symbol F5 in 1955 was assigned to the 0.15 max carbon grade to be consistent with ASTM specifications for other products such as pipe, tubing, bolting, welding fittings, and the like

Nominal Group No.	Nominal Designation Steel	GROUP 1 MATERIALS		PRODUCT FORMS	
		Forgings Spec.-Gr.	Castings Spec.-Gr.	Plates Spec.-Gr.	
1.1	C-Si	A105	A210-WCB	A515-70	
	C-Mn-Si	A350-LF2		A516-70	
1.2	3 1/2 Ni	A350-LF3			
	C-Mn-Si		A216-WCC		
1.3	2 1/2 Ni		A352-LCC		
	3 1/2 Ni		A352-LC2		
1.4	C-Si		A352-LC3		
	C-Mn-Si		A352-LCB (1)	A515-65	
1.5	2 1/2 Ni			A516-65	
	3 1/2 Ni			A203-A	
1.6				A203-D	
	C-Si	A350-LF1		A515-60	
1.7	C-Mn-Si	CL1		A516-60	
	C-1/2 Mo	A182-LF2		A204-A	
1.8				A204-B	
	1/2Cr-1/2Mo				
1.9	Ni-1/2Cr-1/2Mo			A217-WC4	
	3/4Ni-3/4Cr-1Mo			A217-WC5	
2.0	1/4Cr-1/2Mo			A217-WC6	
	1/4Cr-1/2Mo-Si	A182-11		A378-11	
2.1		CL2		CL2	
	2 1/4Cr-1Mo	A182-22		A378-22	
2.2		CL3		CL2	
	5 Cr-1/2Mo	A181-F5a	A217-C5		
2.3	9 Cr-1 Mo	A182-F9	A217-C12		
2.4					
2.5					
2.6					
2.7					

(3) For Grade F22V, rare earth metals(REM) may be added in place of calcium, subject to agreement between the producer and the purchaser. In that case the total amount of REM shall be determined and reported.
 (4) Grade F304, F304L, F316, and F316L shall have a nitrogen content of 0.10%.
 (5) Grade F321 shall have a titanium content of not less than four times the carbon content and not more than 0.70%.
 (6) Grade F347 shall have a columbium content of not less than ten times the carbon content and not more than 1.10%.
 (7) Determined by the 0.2% offset method. For ferritic steels only, the 0.5% extension-under-load method may also be used.
 (8) For sections over 5 in.(130mm) in thickness, the minimum tensile strength shall be 70ksi(485 Mpa).
 (9) For sections over 5 in.(130mm) in thickness, the minimum tensile strength shall be 65ksi(450 Mpa).
 (10) For sections over 2 in.(50mm) in thickness, the minimum tensile strength shall be 106ksi(730 Mpa); the minimum yield strength shall be 75ksi(515Mpa).

WELDING ENDS

ASME B16.5 FORGED FLANGES

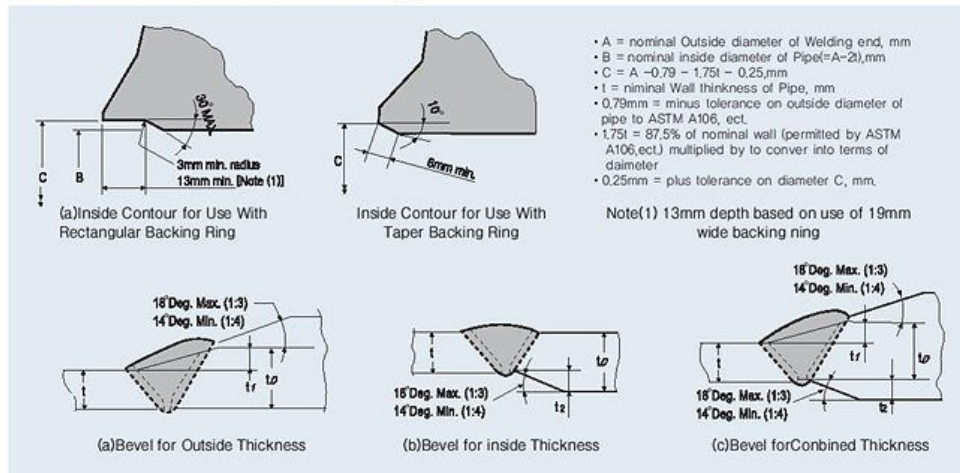


Notes :

When the thickness of the hub at the bevel is greater than that of the pipe to which the flange is joined and the additional thickness is provided on the outside diameter, a taper weld having a slope not exceeding 1 to 3 may be employed or, alternatively the greater outside diameter may be tapered, at the same maximum slope or less, from a point on the welding bevel equal to the outside diameter of the mating pipe. Similarly, when the greater thickness is provided on the inside of the flange, it shall be taper-bored from the welding end at a slope not exceeding 1 to 3.

When flanges covered by this standard are intended for services with light wall, higher strength pipe, the thickness of the hub at bevel may be greater than that of the pipe to which the flange is joined. Under these conditions, a single taper hub may be provided, and the outside diameter of the hub at the base (Dimension X) may also be modified.

The additional thickness may be provided on either inside or outside or partially on each side, but the total additional thickness shall not exceed one-half times the nominal wall thickness of intended mating pipe.



Notes :

- (1) When the materials joined have equal minimum specified yield strength, there shall be no restriction on the minimum slope.
- (2) Neither t_1 , t_2 nor their sum(t_1+t_2) shall exceed 0.5t.
- (3) When the minimum specified yield strengths of the sections to be joined are unequal, the value of t shall at least equal times the ratio of minimum specified yield strength of the pipe to minimum specified yield strength of the flange.

1. MATERIALS

- A. The steel used in the manufacture of these flanges shall be selected by the manufacturer meet the following requirements.
- B. All materials used for flanges shall be killed steel.
- C. The steel used shall be suitable for field welding to other flanges fittings, or pipe manufactured under ASTM specifications A105, A53, A106, A381, A694, A707, or API Standards 5L.

$$C, E = C + \frac{Mn}{6} + \frac{Si+Mo+V}{5} + \frac{Ni+Cu}{15}$$

- D. The steel used shall have a maximum carbon content of 0.35 and a carbon equivalent computed by the following equation: that should not exceed 0.48%, based on alde analysis, if the carbon equivalent factor exceeds 0.48%, the acceptance of the flanges shall be based on agreement between purchaser and manufacturer.
- E. The choice and use of alloying elements, combined with the elements within the limits prescribed in Section 1-D to give the required tensile properties prescribed in Section 3.1.4 shall be made by the flange manufacturer and included and reported in the ladle analysis to identify the type of steel.

2. HEAT TREATMENT

The F42 and higher grades of flanges of all pressure classes and the class 400 and higher classes of Grade F36 flanges shall be normalized or quenched and tempered.

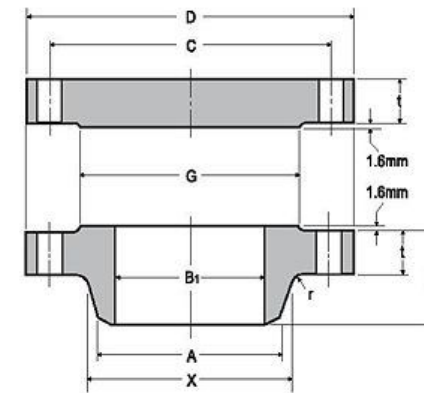
3. TEST SPECIMENS

The test specimens may be taken from the forgings or, at the manufactures' option, from the billets or forging bar entering into the finished product, provided such test blank has undergone relatively the same forming and the equivalent heat treatment as the finished flange. The dimensions of the test blank must be such as to adequately reflect the heat treatment properties of the hub of the flange. Specimens shall be obtained from the midwall of the thinnest section of the flange or 19mm (3/4 in.) from the surface of the test blank. The orientation of specimens taken from a flange shall be longitudinal.

4. Tensile Requirements (Metric & U.S. Customary)

Grade	Yield Point Min.		Tensile Strength Min.		Elongation 50mm or 2 in. Min Recent
	KSI	Mpa	KSI	Mpa	
F36	36 ^(a)	248 ^(a)	60	414	20
F42	42	290	60	414	20
F46	46	317	60	414	20
F48	48	331	62	427	20
F50	50	345	64	441	20
F52	52	359	66	455	20
F56	56	386	68	469	20
F60	60	414	75	517	20
F65	65	448	77	531	18
F70	70	483	80	552	18

(a) Notes: except as required in MSS-SP-44, Section 4.2.



ASME B16.47 SER.A-2006 (MSS SP 44-2006)

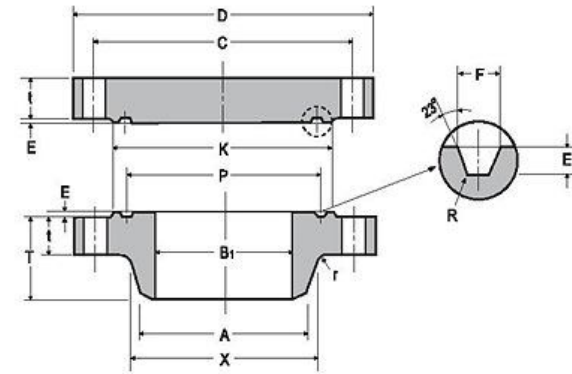
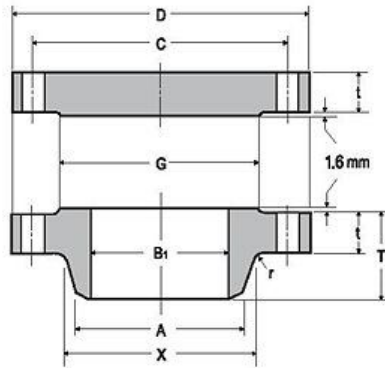
Unit:mm

Nominal Pipe Size (inch)	Outside Diameter	Thickness		Bore wall Thickness		Length through Hub	O.D of Raised Face	Diameter of Hub Bevel	Diameter of Base of Hub	Drilling			Radius of Fillet
		Welding Neck	Blind	9.5mm	12.7mm					Diameter of Bolt Circle	Number of holes	Diameter of Bolt hole	
12	485	30.2	30.2	304.9	298.5	113	381.0	323.8	365	431.8	12	25.4	10
14	535	33.4	33.4	336.6	330.2	125	412.8	355.6	400	476.3	12	28.4	10
16	595	35.0	35.0	387.4	381.0	125	469.9	406.4	457	539.8	16	28.4	10
18	635	38.1	38.1	438.2	431.8	138	533.4	457.0	506	577.9	16	31.8	10
20	700	41.3	41.3	489.0	482.6	143	584.2	508.0	559	635.0	20	31.8	10
22	750	44.5	44.5	539.8	533.4	148	641.4	558.8	610	692.2	20	35.1	10
24	815	46.1	46.1	590.6	584.2	151	692.2	610.0	663	749.3	20	35.1	10
26	870	66.7	66.7	641.4	635.0	119	749.0	660.4	676	806.4	24	35.1	10
28	925	69.9	69.9	692.2	685.8	124	800.0	711.2	727	863.6	28	35.1	11
30	985	73.1	73.1	743.0	736.6	135	857.0	762.0	781	914.4	28	35.1	11
32	1060	79.4	79.4	793.8	787.4	143	914.0	812.8	832	977.9	28	41.3	11
34	1110	81.0	81.0	844.6	838.2	148	965.0	863.6	883	1028.7	32	41.3	13
36	1170	88.9	88.9	895.4	898.0	156	1022.0	914.4	933	1085.8	32	41.3	13
38	1240	85.8	85.8	946.2	939.8	156	1073.0	965.2	991	1149.4	32	41.3	13
40	1290	88.9	88.9	997.0	990.6	162	1124.0	1016.0	1041	1200.2	36	41.3	13
42	1345	95.3	95.3	1047.8	1041.4	170	1194.0	1066.8	1092	1257.3	36	41.3	13
44	1405	100.1	100.1	1098.6	1092.2	176	1245.0	1117.6	1143	1314.4	40	41.3	13
46	1455	101.6	101.6	1149.4	1143.0	184	1295.0	1168.4	1197	1365.2	40	41.3	13
48	1510	106.4	106.4	1200.2	1193.8	191	1359.0	1219.2	1248	1422.4	44	41.3	13
50	1570	109.6	109.6	1251.0	1244.6	202	1410.0	1270.0	1302	1479.6	44	47.6	13
52	1625	114.3	114.3	1301.8	1295.4	208	1461.0	1320.8	1353	1536.7	44	47.6	13
54	1685	119.1	119.1	1352.6	1346.2	214	1511.0	1371.6	1403	1593.8	44	47.6	13
56	1745	122.3	122.3	1403.4	1397.0	227	1575.0	1422.4	1457	1651.0	48	47.6	13
58	1805	127.0	127.0	1454.2	1447.8	233	1626.0	1473.2	1508	1708.2	48	47.6	13
60	1855	130.2	130.2	1505.0	1498.6	238	1676.0	1524.0	1559	1759.0	52	47.6	13

Notes:

- (1) For the 'Bore' (B1) other than wall thickness 0.375(9.5mm) and 0.500(12.7mm), refer to page 126~127.
- (2) Class 150 flanges will be furnished with 0.06(1.6mm) raised face, which is excepted from 'Thickness' (t) and 'Length through Hub' (T).
- (3) Flanges dimensions of size 12" through 24" flanges [except 22"] are in accordance with ASME 16.5
- (4) Blind flanges may be made with or without hubs at the manufactures' option.

CLASS 300 FLANGES



TOLERANCES:
 E (depth) +0.4, -0.0
 F (width) ±0.2
 P (pitch diameter) ±0.13
 R (radius at bottom)
 R ≤ 2 +0.8, -0.0
 R > 2 ±0.8
 25 deg (angle) ±1/2 deg

ASME B16.47 SER.A-2006 (MSS SP 44-2006)

Unit:mm

Nominal Pipe Size (inch)	Outside Diameter	Thickness		Bore wall Thickness		Length through Hub	O.D of Raised Face	Diameter of Hub Bevel	Diameter of Base of Hub
		Welding Neck	Blind	9.5mm	12.7mm				
		t	t	B1	T				
12	520	49.3	49.3	304.8	298.4	129	381.0	323.8	375
14	585	52.4	52.4	336.8	330.2	141	412.8	355.6	425
16	650	55.6	55.6	387.4	381.0	144	469.9	406.4	483
18	710	58.8	58.8	468.2	431.8	157	533.4	457.0	533
20	775	62.0	62.0	489.0	482.6	160	584.2	508.0	587
22	840	65.1	65.1	539.8	533.4	164	641.5	558.8	641
24	915	68.3	68.3	590.6	584.2	167	692.2	610.0	702
26	970	77.8	82.6	641.4	635.0	183	749.0	660.4	721
28	1035	84.2	88.9	692.2	685.8	195	800.0	711.2	775
30	1090	90.5	93.7	743.0	736.6	208	857.0	762.0	827
32	1150	96.9	98.5	793.8	787.4	221	914.0	812.8	881
34	1205	100.1	103.2	844.6	838.2	230	965.0	863.6	937
36	1270	103.2	109.6	895.4	889.0	240	1022.0	914.4	991
38	1170	106.4	106.4	946.2	939.8	179	1029.0	965.2	994
40	1240	112.8	112.8	997.0	990.6	192	1086.0	1016.0	1048
42	1290	117.5	117.5	1047.8	1041.4	198	1137.0	1066.8	1099
44	1355	122.3	122.3	1198.6	1092.2	205	1194.0	1117.6	1149
46	1415	127.0	127.0	1149.4	1143.0	214	1245.0	1168.4	1203
48	1465	131.8	131.8	1200.2	1193.8	222	1302.0	1219.2	1254
50	1530	138.2	138.2	1251.0	1244.6	230	1359.0	1270.0	1305
52	1580	142.9	142.9	1301.8	1295.4	237	1410.0	1320.8	1356
54	1660	150.9	150.9	1352.6	1346.2	251	1467.0	1371.6	1410
56	1710	152.4	152.4	1403.4	1397.0	259	1518.0	1422.4	1464
58	1760	157.2	157.2	1454.2	1447.8	265	1575.0	1473.2	1514
60	1810	162.0	162.0	1505.0	1498.6	271	1626.0	1524.0	1565

Notes:

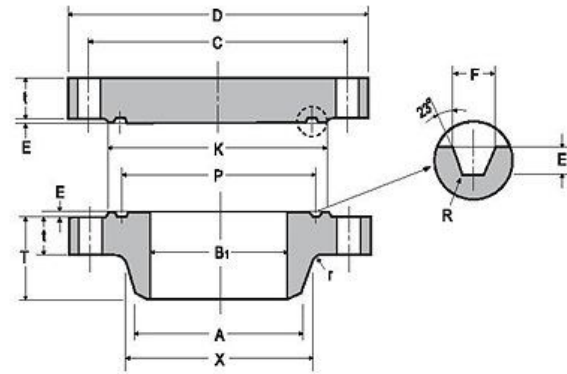
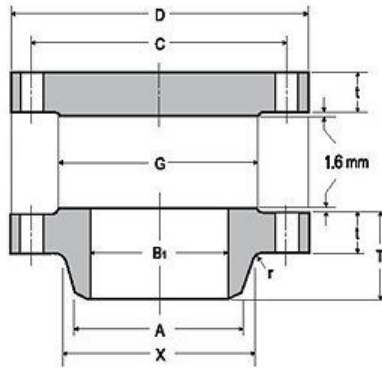
- (1) For the 'Bore' (B1) other than wall thickness 0.375"(9.5mm) and 0.500"(12.7mm), refer to page 126~127.
- (2) Class 150 flanges will be furnished with 0.06"(1.6mm) raised face, which is excepted from 'Thickness' (t) and 'Length through Hub' (T).
- (3) Flanges dimensions of size 12" through 24" flanges [except 22"] are in accordance with ASME 16.5
- (4) Blind flanges may be made with or without hubs at the manufacturer's option.

ASME B16.47 SER.A-2006 (MSS SP 44-2006)

Unit:mm

Nominal Pipe Size (inch)	Drilling			Radius of Fillet	Pitch Diameter	GROOVE DIMENSIONS			Diameter of Raised Face	Ring & Groove Number
	Diameter of Bolt Circle	Number of holes	Diameter of Bolt hole			Width	Depth	Radius		
	C					F	E	R		
12	450.8	16	31.8	10	381.0	11.9	7.9	0.8	413	R57
14	514.4	20	31.8	10	419.1	11.9	7.9	0.8	457	R61
16	571.5	20	35.0	10	469.9	11.9	7.9	0.8	508	R65
18	628.6	24	35.0	10	533.4	11.9	7.9	0.8	575	R69
20	685.8	24	35.0	10	584.2	13.5	9.5	1.5	635	R73
22	743.0	24	41.1	10	635.0	15.1	11.1	1.5	686	R81
24	812.8	24	41.1	10	692.2	16.7	11.1	1.5	749	R77
26	876.3	28	44.5	10	749.3	19.8	12.7	1.5	810	R93
28	939.8	28	44.5	11	800.1	19.8	12.7	1.5	861	R94
30	997.0	28	47.6	11	857.3	19.8	12.7	1.5	917	R95
32	1054.1	28	50.8	11	914.4	23.0	14.3	1.5	984	R96
34	1104.9	28	50.8	13	965.2	23.0	14.3	1.5	1035	R97
36	1168.4	32	53.8	13	1022.4	23.0	14.3	1.5	1092	R98
38	1092.2	32	41.1	13	-	-	-	-	-	-
40	1155.7	32	44.5	13	-	-	-	-	-	-
42	1206.5	32	44.5	13	-	-	-	-	-	-
44	1263.6	32	47.8	13	-	-	-	-	-	-
46	1320.8	28	50.8	13	-	-	-	-	-	-
48	1371.6	32	50.8	13	-	-	-	-	-	-
50	1428.8	32	54.0	13	-	-	-	-	-	-
52	1479.6	32	54.0	13	-	-	-	-	-	-
54	1549.4	28	60.5	13	-	-	-	-	-	-
56	1600.2	28	60.5	13	-	-	-	-	-	-
58	1651.0	32	60.5	13	-	-	-	-	-	-
60	1701.8	32	60.5	13	-	-	-	-	-	-

ASME / MSS FLANGES CLASS 400 FLANGES



TOLERANCES:
 E (depth) +0.4, -0.0
 F (width) ±0.2
 P (pitch diameter) ±0.13
 R (radius at bottom)
 R ≤ 2 +0.8, -0.0
 R > 2 ±0.8
 23 deg (angle) ±1/2 deg

ASME B16.47 SER.A-2006 (MSS SP 44-2006)

Unit:mm

Nominal Pipe Size (inch)	Outside Diameter	Thickness		Bore wall Thickness		Length through Hub	O.D of Raised Face	Diameter of Hub Bevel	Diameter of Base of Hub
		Welding Neck	Blind	9.5mm	12.7mm				
		t	t	B1					
12	520	57.2	57.2	304.8	298.4	137	381	323.8	375
14	585	60.4	60.4	336.6	330.2	149	413	355.6	425
16	650	63.5	63.5	387.4	381.0	152	470	406.4	483
18	710	66.7	66.7	438.2	431.6	165	533	457.0	533
20	775	69.9	69.9	489.0	482.6	168	584	508.0	587
22	840	73.1	73.1	539.8	533.6	171	642	559.0	641
24	915	76.2	76.2	590.6	584.6	175	692	610.0	702
26	970	88.9	98.5	641.4	635.0	194	749	660.4	727
28	1035	95.3	104.8	692.2	685.8	206	800	711.2	783
30	1090	101.6	111.2	743.0	736.6	219	857	762.0	837
32	1150	108.0	115.9	793.8	787.4	232	914	812.8	889
34	1205	111.2	122.3	844.6	838.2	241	965	863.6	945
36	1270	114.3	128.6	895.4	889.0	251	1022	914.4	1000
38	1205	123.9	123.9	946.2	939.8	206	1035	965.2	1003
40	1270	130.2	130.2	997.0	990.6	216	1092	1016.0	1064
42	1320	133.4	133.4	1047.8	1041.4	224	1143	1066.8	1108
44	1385	139.7	139.7	1098.6	1092.2	233	1200	1117.6	1159
46	1440	146.1	146.1	1149.4	1143.0	244	1257	1168.4	1213
48	1510	152.4	152.4	1200.2	1193.8	257	1308	1219.2	1267
50	1570	157.2	158.8	1251.0	1244.6	268	1362	1270.0	1321
52	1620	162.0	163.6	1301.8	1295.4	276	1413	1320.8	1372
54	1700	169.9	171.5	1352.6	1346.2	289	1470	1371.6	1426
56	1755	174.7	176.3	1403.4	1397.0	298	1527	1422.4	1480
58	1805	177.8	181.0	1454.2	1447.8	306	1578	1473.2	1530
60	1885	185.8	189.0	1505.0	1498.6	319	1635	1524.0	1584

Notes:

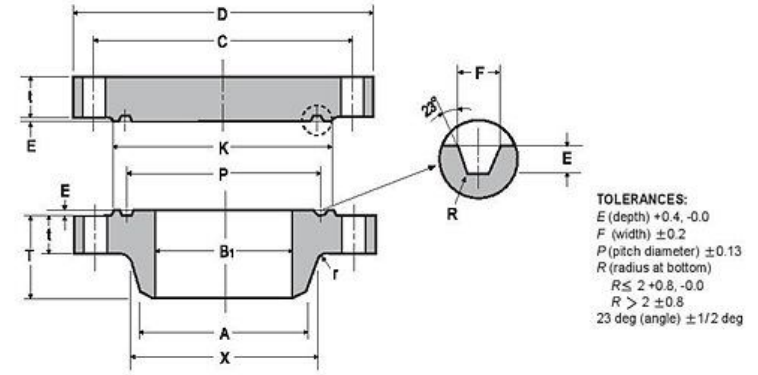
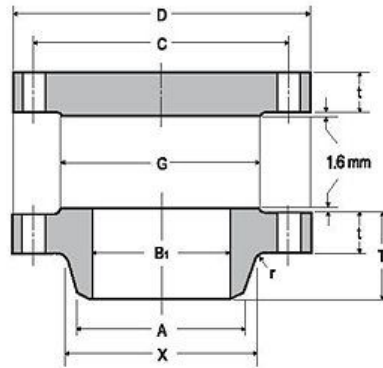
- For the 'Bore' (B1) other than wall thickness 0.375'(9.5mm) and 0.500'(12.7mm), refer to page 126~127.
- Class 150 flanges will be furnished with 0.06'(1.6mm) raised face, which is excepted from 'Thickness' (t) and 'Length through Hub' (T).
- Flanges dimensions of size 12" through 24" flanges [except 22"] are in accordance with ASME 16.5
- Blind flanges may be made with or without hubs at the manufacturer's option.

ASME B16.47 SER.A-2006 (MSS SP 44-2006)

Unit:mm

Nominal Pipe Size (inch)	Drilling			Radius of Fillet	Pitch Diameter	GROOVE DIMENSIONS			Diameter of Raised Face	Ring & Groove Number
	Diameter of Bolt Circle	Number of holes	Diameter of Bolt hole			Width	Depth	Radius		
	C					F	E	R		
12	450.8	16	35.1	11	381.0	11.9	7.9	0.8	413	R57
14	514.4	20	35.1	11	419.1	11.9	7.9	0.8	457	R61
16	571.5	20	38.1	11	469.9	11.9	7.9	0.8	508	R65
18	628.6	24	38.1	11	533.4	11.9	7.9	0.8	575	R69
20	685.8	24	41.1	11	584.2	13.5	9.5	1.5	635	R73
22	743.0	24	44.5	11	635.0	15.1	11.1	1.5	686	R81
24	812.8	24	47.8	11	692.2	16.7	11.1	1.5	749	R77
26	876.3	28	47.6	11	749.3	19.8	12.7	1.5	810	R93
28	939.8	28	50.8	13	800.1	19.8	12.7	1.5	861	R94
30	997.0	28	53.9	13	857.3	19.8	12.7	1.5	917	R95
32	1054.1	28	53.9	13	914.4	23.0	14.3	1.5	984	R96
34	1104.9	28	53.9	14	965.2	23.0	14.3	1.5	1035	R97
36	1168.4	32	53.9	14	1022.4	23.0	14.3	1.5	1092	R98
38	1117.6	32	47.6	14	-	-	-	-	-	-
40	1174.8	32	50.8	14	-	-	-	-	-	-
42	1125.6	32	50.8	14	-	-	-	-	-	-
44	1282.7	32	53.9	14	-	-	-	-	-	-
46	1339.8	36	53.9	14	-	-	-	-	-	-
48	1403.4	28	60.3	14	-	-	-	-	-	-
50	1460.5	32	60.3	14	-	-	-	-	-	-
52	1511.3	32	60.3	14	-	-	-	-	-	-
54	1581.2	28	66.7	14	-	-	-	-	-	-
56	1632.0	32	66.7	14	-	-	-	-	-	-
58	1682.8	32	66.7	14	-	-	-	-	-	-
60	1752.6	32	73.0	14	-	-	-	-	-	-

CLASS 600 FLANGES



TOLERANCES:
 E (depth) +0.4, -0.0
 F (width) ±0.2
 P (pitch diameter) ±0.13
 R (radius at bottom)
 R ≤ 2 +0.8, -0.0
 R > 2 ±0.8
 23 deg (angle) ±1/2 deg

ASME B16.47 SER.A-2006 (MSS SP 44-2006)

Unit:mm

Nominal Pipe Size (inch)	Outside Diameter	Thickness		Bore wall Thickness		Length through Hub	O.D of Raised Face	Diameter of Hub Bevel	Diameter of Base of Hub
		Welding Neck	Blind	9.5mm	12.7mm				
		D	t	t	B1				
12	560	66.7	66.5	304.8	298.4	156.0	381.0	323.8	400
14	606	69.9	69.9	336.6	330.2	165.0	412.8	355.6	432
16	685	76.2	76.2	387.4	381.0	178.0	469.9	406.4	495
18	745	82.6	82.6	438.2	431.6	184.0	533.4	457.0	546
20	815	88.9	88.9	489.0	482.6	190.0	584.2	508.0	610
22	870	95.3	95.3	539.8	533.6	197.0	641.4	559.0	667
24	940	101.6	101.6	590.6	584.6	203.0	692.2	610.0	718
26	1015	108.0	125.5	641.4	635.0	222.0	749	660.4	748
28	1075	111.2	131.8	692.2	685.8	235.0	800	711.2	803
30	1130	114.3	139.7	743.0	736.6	248.0	857	762.0	862
32	1195	117.5	147.7	793.8	787.4	260.0	914	812.8	918
34	1245	120.7	154.0	844.6	838.2	270.0	965	863.6	973
36	1315	123.9	162.0	895.4	889.0	283.0	1022	914.4	1032
38	1270	152.4	155.0	946.2	939.8	254.0	1054	965.2	1022
40	1320	158.8	162.0	997.0	990.6	264.0	1111	1016.0	1073
42	1405	168.3	171.5	1047.8	1041.4	279.0	1168	1066.8	1127
44	1455	173.1	177.8	1098.6	1092.2	289.0	1226	1117.6	1181
46	1510	179.4	185.8	1149.4	1143.0	300.0	1276	1168.4	1235
48	1595	189.0	195.3	1200.2	1193.8	316.0	1334	1219.2	1289
50	1670	196.9	203.2	1251.0	1244.6	329.0	1384	1270.0	1343
52	1720	203.2	209.6	1301.8	1295.4	337.0	1435	1320.8	1394
54	1780	209.6	217.5	1352.6	1346.2	349.0	1492	1371.6	1448
56	1855	217.5	225.5	1403.4	1397.0	362.0	1543	1422.4	1502
58	1905	222.3	231.8	1454.2	1447.8	370.0	1600	1473.2	1553
60	1995	233.4	242.9	1505.0	1498.6	389.0	1657	1524.0	1610

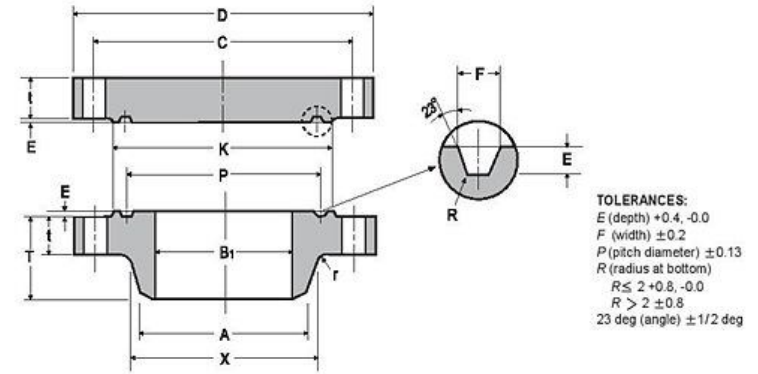
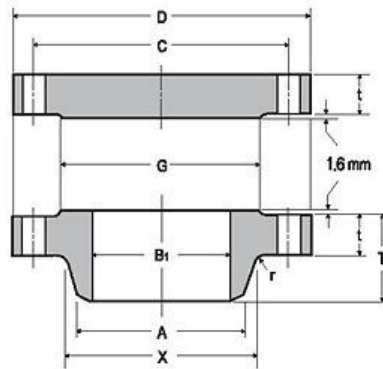
Notes:

- (1) For the 'Bore' (B1) other than wall thickness 0.375"(9.5mm) and 0.500"(12.7mm), refer to page 126~127.
- (2) Class 150 flanges will be furnished with 0.06"(1.6mm) raised face, which is excepted from 'Thickness' (t) and 'Length through Hub' (T).
- (3) Flanges dimensions of size 12" through 24" flanges [except 22"] are in accordance with ASME 16.5
- (4) Blind flanges may be made with or without hubs at the manufacturer's option.

Unit:mm

Nominal Pipe Size (inch)	Drilling			Radius of Fillet	Pitch Diameter	GROOVE DIMENSIONS			Diameter of Raised Face	Ring & Groove Number
	Diameter of Bolt Circle	Number of holes	Diameter of Bolt hole			Width	Depth	Radius		
	C									
12	489.0	20	35.1	11	381.0	11.9	7.9	0.8	413	R57
14	527.0	20	38.1	11	419.1	11.9	7.9	0.8	457	R61
16	603.2	20	41.1	11	469.9	11.9	7.9	0.8	508	R65
18	654.0	20	44.5	11	533.4	11.9	7.9	0.8	575	R69
20	723.9	24	44.5	11	584.2	13.5	9.5	1.5	635	R73
22	777.8	24	47.8	11	635.0	15.1	11.1	1.5	686	R81
24	838.2	24	50.8	11	692.2	16.7	11.1	1.5	749	R77
26	914.4	28	50.8	13	749.3	19.8	12.7	1.5	810	R93
28	965.2	28	54.0	13	800.1	19.8	12.7	1.5	861	R94
30	1022.4	28	54.0	13	857.3	19.8	12.7	1.5	917	R95
32	1079.5	28	60.3	13	914.4	23.0	14.3	1.5	984	R96
34	1130.3	28	60.3	14	965.2	23.0	14.3	1.5	1035	R97
36	1193.8	28	66.7	14	1022.4	23.0	14.3	1.5	1092	R98
38	1162.0	28	60.3	14	-	-	-	-	-	-
40	1212.8	32	60.3	14	-	-	-	-	-	-
42	1282.7	28	66.7	14	-	-	-	-	-	-
44	1333.5	32	66.7	14	-	-	-	-	-	-
46	1390.6	32	66.7	14	-	-	-	-	-	-
48	1460.5	32	73.0	14	-	-	-	-	-	-
50	1524.0	28	79.4	14	-	-	-	-	-	-
52	1574.8	32	79.4	14	-	-	-	-	-	-
54	1632.0	32	79.4	14	-	-	-	-	-	-
56	1695.4	32	85.7	16	-	-	-	-	-	-
58	1746.2	32	85.7	16	-	-	-	-	-	-
60	1822.4	28	92.1	17	-	-	-	-	-	-

CLASS 900 FLANGES



TOLERANCES:
 E (depth) +0.4, -0.0
 F (width) ±0.2
 P (pitch diameter) ±0.13
 R (radius at bottom)
 R ≤ 2 +0.8, -0.0
 R > 2 ±0.8
 23 deg (angle) ±1/2 deg

ASME B16.47 SER.A-2006 (MSS SP 44-2006)

Unit:mm

Nominal Pipe Size (inch)	Outside Diameter	Thickness		Length through Hub	O.D of Raised Face	Diameter of Hub Bevel	Diameter of Base of Hub	Drilling		
		Welding Neck	Blind					Diameter of Bolt Circle	Number of holes	Diameter of Bolt hole
12	610	79.4	79.4	200	381.0	323.8	419	533.4	20	38.1
14	640	85.8	85.8	213	412.8	355.6	451	558.8	20	41.1
16	705	88.9	88.9	216	469.9	406.4	508	616.0	20	44.5
18	785	101.6	101.6	229	533.4	457.0	565	685.8	20	50.8
20	855	108.0	108.0	248	584.2	508.0	622	749.3	20	53.8
24	1040	139.7	139.7	292	692.2	610.0	749	901.7	20	66.5
26	1085	139.7	160.4	286	749	660.4	775	952.5	20	73.0
28	1170	142.9	171.5	298	800	711.2	832	1022.4	20	79.4
30	1230	149.3	182.6	311	857	762.0	889	1085.8	20	79.4
32	1315	158.8	193.7	330	914	812.8	946	1155.7	20	85.7
34	1395	165.1	204.8	349	965	863.6	1006	1225.6	20	92.1
36	1460	171.5	214.4	362	1022	914.4	1064	1289.0	20	92.1
38	1460	190.5	215.9	352	1099	965.2	1073	1289.0	20	92.1
40	1510	196.9	223.9	364	1162	1016.0	1127	1339.8	24	92.1
42	1560	206.4	231.8	371	1213	1066.8	1176	1390.6	24	92.1
44	1650	214.4	242.9	391	1270	1117.6	1235	1463.7	24	98.4
46	1735	225.5	255.6	411	1334	1168.4	1292	1536.7	24	104.8
48	1785	233.4	263.6	419	1384	1219.2	1343	1587.5	24	104.8

Notes:

- For the 'Bore' (B₁) other than wall thickness 0.375'(9.5mm) and 0.500'(12.7mm), refer to page 126~127.
- Class 150 flanges will be furnished with 0.06'(1.6mm) raised face, which is excepted from 'Thickness' (t) and 'Length through Hub' (T).
- Flanges dimensions of size 12" through 24" flanges [except 22"] are in accordance with ASME 16.5
- Blind flanges may be made with or without hubs at the manufacturer's option.

Unit:mm

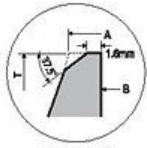
Nominal Pipe Size (inch)	Radius of Fillet	Bore wall Thickness		Pitch Diameter	GROOVE DIMENSIONS			Diameter of Rased Face	Ring & Groove Number
		9.5mm	12.7mm		Width	Depth	Radius		
12	11	304.8	298.4	381.0	11.9	7.9	0.8	419	R57
14	11	336.6	330.2	419.1	16.7	11.1	1.5	467	R62
16	11	387.4	381.0	469.9	16.7	11.1	1.5	524	R66
18	11	438.2	431.6	533.4	19.8	12.7	1.5	594	R70
20	11	489.0	482.6	584.2	19.8	12.7	1.5	648	R74
24	11	590.6	584.6	692.2	27.0	15.9	2.3	772	R78
26	11	641.4	635.0	749.3	30.2	17.5	2.3	832	R100
28	13	692.2	685.8	800.1	33.3	17.5	2.3	889	R101
30	13	743.0	736.6	857.3	33.3	17.5	2.3	946	R102
32	13	793.8	787.4	914.4	33.3	17.5	2.3	1003	R103
34	14	844.6	838.2	965.2	36.5	20.6	2.3	1067	R104
36	14	895.4	889.0	1022.4	36.5	20.6	2.3	1124	R105
38	19	946.2	939.8	-	-	-	-	-	-
40	21	997.0	990.6	-	-	-	-	-	-
42	21	1047.8	1041.4	-	-	-	-	-	-
44	22	1098.6	1092.2	-	-	-	-	-	-
46	22	1149.4	1143.0	-	-	-	-	-	-
48	24	1200.2	1193.8	-	-	-	-	-	-

FORGED FLANGES TOLERANCE

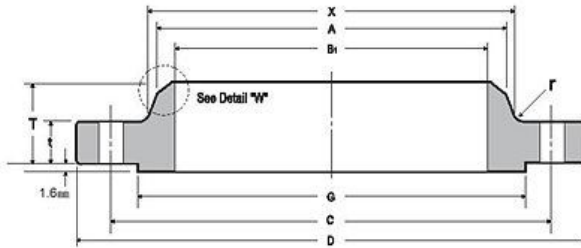
Place		Range	Tolerance (mm)	
Outside diameter	D		±3.2* (±0.12in)	
Inside diameter	B1	12 ≤ NPS ≤ 18	±1.5 (±0.06in)	
		NPS ≥ 20	+3.0 (+0.12in) -1.5 (-0.06in)	
	G	1.6mm Raised Face	12 ≤ NPS ≤ 18	±1.0 (±0.03in)
			NPS ≥ 26	±2.0 (±0.08in)
		6.4mm Raised Face	12 ≤ NPS ≤ 18	±0.5 (±0.02in)
			NPS ≥ 26	±1.0 (±0.04in)
Diameter of Hub at Base	X		±3.2* (±0.125in)	
Diameter of Hub at Welding Point	A	12 ≤ NPS ≤ 24	+4.0 (+0.16in) -1.0 (-0.03in)	
		NPS ≥ 26	+5.0 (+0.21in) -1.5 (-0.06in)	
Drilling	Bolt Circle Diameter		±1.5 (±0.06in)	
	Bolt to bolt holes		±0.8(±0.03in)	
	Eccentricity of Bolt Circle with Respect to Facing	12 ≤ NPS ≤ 24	±1.5 (±0.06in)	
NPS ≥ 26		±2.0(±0.09in)		
Thickness	t	NPS ≤ 18	+3.0 (+0.12in) -0.0 (-0.00in)	
		NPS ≥ 20	+5.0 (+0.19in) -0.0 (-0.00in)	
Length Thru Hub	T	12 ≤ NPS ≤ 24	+3.0 (+0.12in) -5.0 (-0.18in)	
		NPS ≥ 26	±5.0(±0.19in)	

Notes:

- (1) Sizes NPS 10 and smaller.
- (2) Tolerance for these sizes shall be as specified in ASME B 16.5. The listing of tolerances does not imply method of measurement.



Detail "W"
Typical Welding
end Preparation



ASME B16.47 SER.B-2006 (API 605-1988)

CLASS 600

Unit:mm

Nominal Pipe Size	Outside Diam.	O.D. of Raised Face	Diam. at Base of Hub	Diam. of Hub at Bevel	BORE			Length Thru Hub	THICKNESS			Radius at Base of Hub	DRILLING			Approximate Weight(Kg)	
					Wall Thickness				Welding Neck	Blind	Bolt Circle Diam.		Num. of Holes	Diam. of Holes	Welding Neck	Blind	
					6.35mm	9.5mm	12.7mm										
D	G	X	A	B ₁			T ₁	t	t	r	C						
26	890	727	698	660.4	647.7	641.4	635.0	181	111.2	111.3	13	806.4	28	44.5	249.5	541.6	
28	950	784	752	711.2	698.5	692.2	685.8	190	115.9	115.9	13	863.6	28	47.6	294.8	647.3	
30	1020	841	806	762.0	749.3	743.0	736.6	205	125.5	127.0	13	927.1	28	50.8	367.4	817.4	
32	1085	895	860	812.8	800.1	793.8	787.4	216	130.2	134.9	13	984.2	28	54.0	430.9	979.3	
34	1160	953	914	863.6	850.9	844.6	838.2	233	141.3	144.2	14	1054.1	24	60.3	546.6	1199.8	
36	1215	1010	968	914.4	901.7	895.4	889.0	243	146.1	150.9	14	1104.9	28	60.3	607.8	1366.7	

CLASS 900

Unit:mm

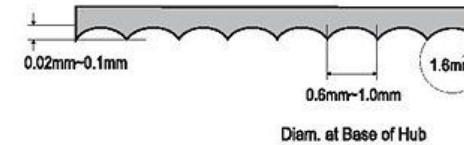
Nominal Pipe Size	Outside Diam.	O.D. of Raised Face	Diam. at Base of Hub	Diam. of Hub at Bevel	BORE			Length Thru Hub	THICKNESS			Radius at Base of Hub	DRILLING			Approximate Weight(Kg)	
					Wall Thickness				Welding Neck	Blind	Bolt Circle Diam.		Num. of Holes	Diam. of Holes	Welding Neck	Blind	
					6.35mm	9.5mm	12.7mm										
D	G	X	A	B ₁			T ₁	t	t	r	C						
26	1020	762	743	660.4	647.7	614.4	635.0	259	135.0	154.0	11	901.7	20	66.7	476.3	990.7	
28	1105	819	797	711.2	698.5	692.2	685.8	276	147.7	166.7	13	971.6	20	73.0	689.5	1252.8	
30	1180	876	851	762.0	749.3	743.0	736.6	289	155.6	176.1	13	1035.0	20	79.4	825.6	1512.3	
32	1240	927	908	812.8	800.1	793.8	787.4	303	160.4	186.0	13	1092.2	20	79.4	936.7	1753.2	
34	1315	991	962	863.6	850.9	844.6	838.2	319	171.5	195.0	14	1155.7	20	85.7	1111.3	2075.7	
36	1345	1029	1016	914.4	901.7	895.4	889.0	325	173.1	201.7	14	1200.2	24	79.4	1143.1	2251.2	

Notes :
 (1) 'Bore' (B₁) of flanges is shall be specified by the purchaser.
 (2) The flange Thickness(t) & Length through Hub(T₁) does not include the raised face thickness.

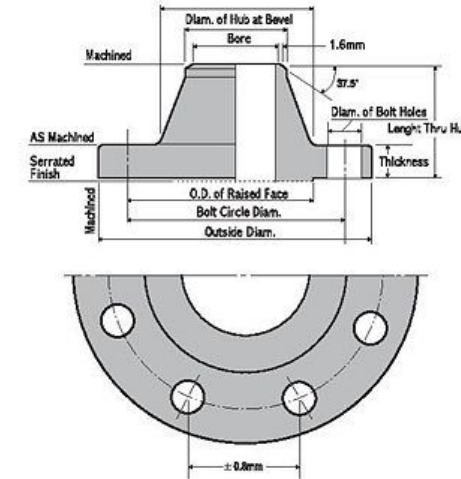
API 605-1988 FORGED FLANGES

1. Standard Finishes for Contact Face of Flanges

The flange face shall have a serrated finish consisting of 20 to 40 grooves per inch, 0.002 in. to 0.005 in. deep, cut spirally or concentrically with a round-nose tool.



2. Dimensional Tolerances for API 605 Flanges



- Notes :
- Flanges shall have bearing surfaces for bolting that are parallel to the flange face within 1 degree. Any back facing or spot facing required to accomplish parallelism between the flange face and nut bearing surface on the back of the flange shall not reduce the flange thickness.
 - Tolerance for the welding end of a welding neck flange shall be in conformance with ASME B12.25.
 - Other tolerances than specified the table shall be in accordance with ASME B16.5.
 - The flange shall be either back-faced or spot-faced at the bolt-holes on the flange back if the nut bearing surface at the back of the flange is not parallel with the flange face within the tolerances listed in Note (1), if the fillet at the hub interferes with the nut bearing surface or if the flange thickness exceed the minimum required thickness by more than 0.19 inch (4.8mm). The nut bearing surface is the spot-facing diameter at the bolt-holes as given in MSS SP-9. Spot-facing shall be in accordance with MSS SP-9
 - Tolerance marked * are not covered in ASME B16.47 SER.B

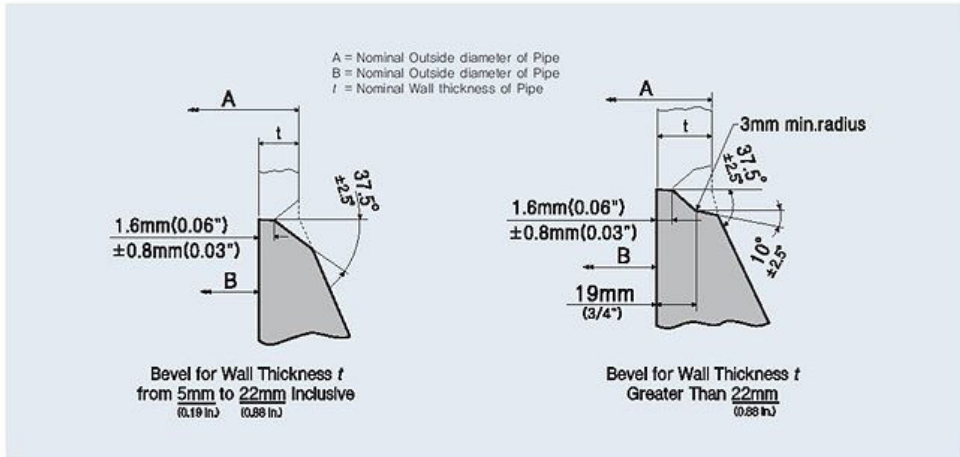
Range	Tolerance (mm)
Outside diameter of Raised Face	±0.8 (±0.03in)
Flange Thickness	+4.8 (+0.19in) -0.0 (-0.00in)
Length Thru Hub	±3.2in (+0.12in)
Diameter of Hub at bevel	+4.0 (+0.16in) -0.8 (-0.03in)
Bolt Circle Diameter	±1.6 (±0.06in)
Center to Center of adjacent bolt holes	±0.8 (±0.03in)
Bore	+3.0 (+0.12in) -1.6 (-0.06in)
Outside Diameter	±3.0 (±0.12in)*
Diameter of Base of Hub	±3.0 (±0.12in)*

ASME 16.47-2006 Tolerance

Place	Range	Tolerance (mm)
Outside diameter		±3.2* (±0.125in)
Inside diameter		+3.0(+0.12in) -1.6(-0.06in)
Facing	Outside diameter of Raised Face	±2.0(±0.08in)
	1.6mm Raised Face	±0.5(±0.02in)
	6.4mm Raised Face	±2.0(±0.08in)
Diameter of Hub at Base		±3.2* (±0.125in)*
Diameter of Hub at Welding Point		+4.8(+0.19in) -1.6(-0.06in)
Drilling	Bolt Circle Diameter	±1.6(±0.06in)
	Bolt Hole to Bolt Hole	±0.8(±0.03in)
	Bolt Circle Concentricity	1.6(±0.06in)
Thickness	t ≤ 25mm (1.0in)	+3.0(+0.12in) -0.0(-0.00in)
	25mm (1.0in) (t ≤ 50mm (2.0in)	+4.8(+0.19in) -0.0(-0.00in)
	50mm (2.0in) (t ≤ 75mm (3.0in)	+8.0(+0.31in) -0.0(-0.00in)
	t > 75mm (3.0in)	+10.0(+0.38in) -0.0(-0.00in)
Length Thru Hub		+3.0(+0.12in) -4.8(-0.19in)

WELDING ENDS

ASME B16.47 FORGED FLANGES

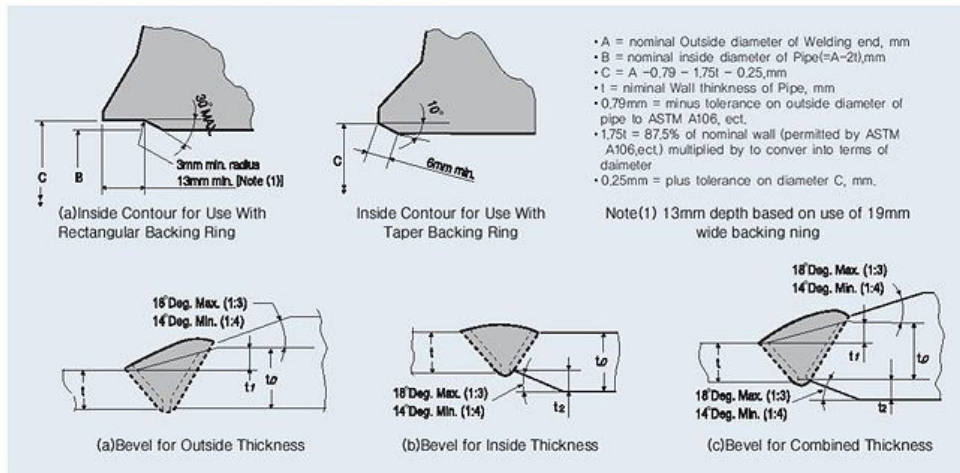


Notes :

When the thickness of the hub at the bevel is greater than that of the pipe to which the flange is joined and the additional thickness is provided on the outside diameter, a taper weld having a slope not exceeding 1 to 3 may be employed or, alternatively the greater outside diameter may be tapered, at the same maximum slope or less, from a point on the welding bevel equal to the outside diameter of the mating pipe. Similarly, when the greater thickness is provided on the inside of the flange, it shall be taper-bored from the welding end at a slope not exceeding 1 to 3.

When flanges covered by this standard are intended for services with light wall, higher strength pipe, the thickness of the hub at bevel may be greater than that of the pipe to which the flange is joined. Under these conditions, a single taper hub may be provided, and the outside diameter of the hub at the base (Dimension X) may also be modified.

The additional thickness may be provided on either inside or outside or partially on each side, but the total additional thickness shall not exceed one-half times the nominal wall thickness of intended mating pipe.



Notes :

- (1) When the materials joined have equal minimum specified yield strength, there shall be no restriction on the minimum slope.
- (2) Neither t_1 , t_2 nor their sum (t_1+t_2) shall exceed 0.5t.
- (3) When the minimum specified yield strengths of the sections to be joined are unequal, the value of t_1 shall be at least equal times the ratio of minimum specified yield strength of the pipe to minimum specified yield strength of the flange.

AWWA FLANGES SPECIFICATIONS

AWWA FLANGES CLASS B & D SO-RING

AWWA C207 - 07 SPECIFICATION

Steel pipe Flanges for Waterworks Service-Size 4 in. Through 144in.(100mm through 3,600mm)
-Revision of ANSI/AWWA C207-07

I. Material

1. Flanges. Flanges shall be made from seamless forgings, cut from plate as a single piece, welded bar rings, or segmented and welded plates.

1.1 Forgings. Forgings shall meet the minimum requirements of ASTM A105 or A181.

1.2 Steel plate or bar. Steel plate or bar used in the manufacture of flanges shall meet the following requirements:

1. Tensile strength = 50,000 psi(345 MPa) (min).
2. Yield strength = 32,000 psi(221 MPa)(min).
3. Carbon(max) = 0.29 percent.
4. Phosphorous(max) = 0.04 percent.
5. Sulfur(max) = 0.05 percents.

The following plate designations will meet the previously listed requirements:

- ①. ASTM A36.
- ②. ASTM A516. GR 60,65, or 70.

II. TOLERANCES

The dimensions listed in Tables 2 through 7(following Sec.6.1)

shall apply prior to attachment and are subject to the following tolerances:

2.1 Inside diameter of flange	+ 1/16 in.(1.6mm), -0
2.2 Outside diameter of flange	± 1/8 in.(3.2mm)
2.3 Thickness of flanges 18 in.(450mm) and smaller	+ 1/8 in.(3.2mm), -0
2.4 Thickness of flanges 20 in.(500mm) and larger	+ 3/16 in.(4.8mm), -0
2.5 Length hub 18 in.(450mm) and smaller	+ 1/8 in.(3.2mm)
	- 1/32 in.(0.79mm)
2.6 Length through hub 20 in.(500mm) and larger	+ 3/16 in.(4.8mm)
	- 1/16 in.(1.6mm)
2.7 Bolt-circle diameter	± 1/16 in.(1.6mm)
2.8 Bolt-hole spacing	± 1/32 in.(0.79mm)

III. FACING

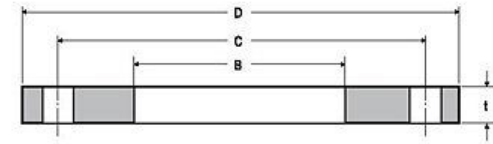
Flanges of all classes shall be flat faced-that is, without projection or raised face.

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 0.06in.(1.52mm) or larger.

The resultant surface finish shall have a 250- to 500- μ in.(6.35- to 12.7- μ m) roughness.



AWWA C207- 07 Standard steel-ring Flanges

TABLE 2 CLASS B* (86 psi) & CLASS D† (175-150 psi)

Unit:mm

Nominal Pipe Size	Outside Diameter of Flange	Inside Diameter of Flange	Diameter of Bolt Circle	Number of Bolts	Diameter of Bolts ¹	Thickness of Flange		
						Class B	Class D	
in.	mm.	D	B [†]	C		t	t	
4	100	228.6	116.1	190.5	8	15.9	15.9	15.9
5	125	254.0	143.8	215.9	8	19.1	15.9	15.9
6	150	279.4	170.7	241.3	8	19.1	17.5	17.5
8	200	342.9	221.5	298.5	8	19.1	17.5	17.5
10	250	406.4	276.4	362.0	12	22.2	17.5	17.5
12	300	482.6	327.2	431.8	12	22.2	17.5	20.6
14	350	533.4	360.4	476.3	12	26.4	17.5	23.8
16	400	596.9	411.2	539.8	16	26.4	17.5	26.4
18	450	635.0	462.0	577.9	16	28.6	17.5	27.0
20	500	698.5	512.8	635.0	20	28.6	17.5	28.6
22	550	749.3	563.6	692.2	20	31.8	19.1	30.2
24	600	812.8	614.4	749.3	20	31.8	19.1	31.8
26	650	870.0	-	806.5	24	31.8	20.6	33.3
28	700	927.1	-	863.6	28	31.8	22.2	33.3
30	750	984.3	-	914.4	28	31.8	22.2	34.9
32	800	1060.5	-	977.9	28	38.1	23.8	38.1
34	850	1111.3	-	1028.7	32	38.1	23.8	38.1
36	900	1168.4	-	1085.9	32	38.1	25.4	41.3
38	950	1238.3	-	1149.4	32	38.1	25.4	41.3
40	1000	1289.1	-	1200.2	36	38.1	25.4	41.3
42	1050	1346.2	-	1257.3	36	38.1	28.6	44.5
44	1100	1403.4	-	1314.5	40	38.1	28.6	44.5
46	1150	1454.2	-	1365.3	40	38.1	28.6	44.5
48	1200	1511.3	-	1422.4	44	38.1	31.8	47.6
50	1250	1568.5	-	1479.6	44	44.5	31.8	50.8
52	1300	1625.6	-	1536.7	44	44.5	31.8	50.8
54	1350	1682.8	-	1593.9	44	44.5	34.9	54.0
60	1500	1854.2	-	1759.0	52	44.5	38.1	57.2
66	1650	2032.0	-	1930.4	52	44.5	41.3	63.5
72	1800	2197.1	-	2095.5	60	44.5	44.5	66.7
78	1950	2362.2	-	2260.6	64	50.8	50.8	69.9
84	2100	2533.7	-	2425.7	64	50.8	50.8	73.0
90	2250	2705.1	-	2590.8	68	57.2	57.2	76.2
96	2400	2876.6	-	2755.9	68	57.2	57.2	82.6
102	2550	3048.0	-	2908.3	72	63.5	63.5	82.6
108	2700	3219.5	-	3067.1	72	63.5	63.5	85.7
114	2850	3390.9	-	3219.5	76	69.9	69.9	88.9
120	3000	3562.4	-	3371.9	76	69.9	69.9	88.9
126	3150	3733.8	-	3537.0	80	76.2	76.2	95.3
132	3300	3905.3	-	3702.1	80	76.2	76.2	98.4
138	3450	4076.7	-	3860.8	84	82.6	82.6	101.6
144	3600	4248.2	-	4019.6	84	82.6	82.6	104.8

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 ASME B16.1). In sizes 24 in. and smaller, they also match ANSI/ASME B16.5 150 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 (ANSI/ASME B16.1). In sizes 24 in. and smaller, they also match ANSI/ASME B16.5 150psi 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

TABLE 7 AWWA C207- 07 BLIND FLANGE THICKNESS

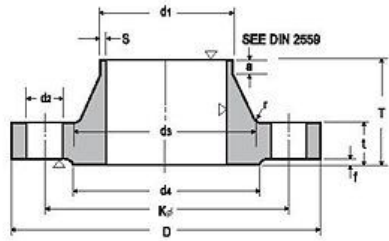
Unit:mm

Nominal Pipe Size		Mating Flange ID	Mating Flange ID			
			Class B	Class D [†]	Class E	Class F
in.	mm.		86psi	175-150psi	275psi	3000psi
4	100	116	15.88	15.88	28.58	28.70
5	125	144	15.88	16.51	30.18	30.73
6	150	171	17.48	17.59	33.35	33.27
8	200	221	17.48	20.62	38.10	33.27
10	250	276	17.48	24.21	39.70	38.10
12	300	327	18.26	28.37	44.45	41.40
14	350	360	20.10	28.78	47.63	49.28
16	400	411	22.66	32.13	50.80	54.36
18	450	462	24.13	33.81	53.98	57.15
20	500	513	26.42	36.77	60.33	59.18
22	550	564	28.74	39.83	63.50	63.50
24	600	648	30.89	42.18	66.68	68.53
26	650	699	33.20	45.37	69.85	76.20
28	700	749	35.50	48.40	69.85	79.50
30	750	800	37.53	51.00	73.03	80.42
32	800	851	40.16	54.60	76.20	84.62
34	850	902	42.19	57.21	77.46	88.25
36	900	956	44.48	60.20	81.51	93.25
38	950	1006	47.06	63.66	86.20	96.90
40	1000	1057	49.09	66.28	89.74	101.40
42	1050	1108	51.40	69.32	93.86	105.92
44	1100	1159	53.70	72.36	97.97	110.19
46	1150	1210	55.73	74.99	101.53	114.43
48	1200	1260	58.03	78.03	105.65	121.44
50	1250	1314	60.38	81.17	109.90	
52	1300	1365	62.69	84.21	114.02	
54	1350	1416	64.99	87.25	118.14	
60	1500	1568	71.63	95.97	129.95	
66	1650	1724	78.53	105.06	142.26	
72	1800	1876	85.17	113.80	154.08	

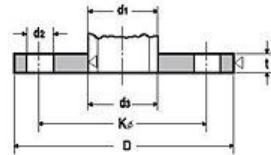
Notes:

- (1) All flanges are flat faced.
- (2) ASTM A-36 steel used (allowable stress 16,000 psi).
- (3) ASTM A-307 Grade bolts (7,000 psi allowable stress) used for class B and D.
- (4) ASTM A-193 Grade bolts (25,000 psi allowable stress) used for class E and F.
- (5) For diameters over 48 in., designers should consider using dished heads welded to a standard flange.
 - * Design Method: ASEM Boiler & Pressure Vessel Code, Sec. VIII, Div. 1.
 - † Class D flanges are rated at 175 psi (1,207 kPa) for nominal pipe size ≤ 12 in. (600mm), and 150 psi (1,034kPa) for nominal pipe size 12 in. (600mm)

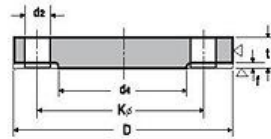
DIN 2573 SLIP - ON FLANGES
DIN 2527 BLIND FLANGES
DIN 2631 WELDING NECK FLANGES



WELDING NECK



SLIP-ON



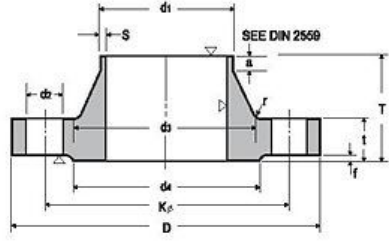
BLIND

Unit:mm

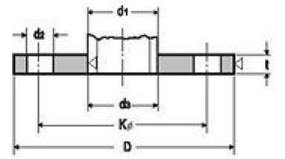
Nominal Bore	Bore		Common Dimension				Hub				Raised Face		Drilling			Approx.Weight(kg)			
	d1	D	Welding Neck	Slip-on	Blind	k	T	d3	s	r	a	d4	f	Number of Bolt	Diam. of Bolt	d2	DIN 2573	DIN 2631	
10	14 (1/2")	75	12	12	12	50	28	22	1.8	4	6	35	2	4	M10	-	11.5	0.036	0.325
15	20 (3/4")	80	12	12	12	55	30	20	2.0	4	6	40	2	4	M10	-	11.5	0.410	0.392
20	25 (1")	90	14	14	14	65	32	2.3	2.3	4	6	50	2	4	M10	-	11.5	0.600	0.592
25	30 (1 1/4")	100	14	14	14	75	35	2.6	2.6	4	6	60	2	4	M10	-	11.5	0.740	0.747
32	38 (1 1/2")	120	14	16	14	90	35	2.6	2.6	6	6	70	2	4	M12 (1/2")	14	1.19	1.05	1.05
40	48 (1 7/8")	130	14	16	14	100	38	2.6	2.6	6	7	80	3	4	M12 (1/2")	14	1.39	1.18	1.18
50	57 (2 1/4")	140	14	16	14	110	38	2.9	2.9	6	8	90	3	4	M12 (1/2")	14	1.53	1.34	1.34
65	76 (3")	160	14	16	14	130	38	2.9	2.9	6	9	110	3	4	M12 (1/2")	14	1.89	1.67	1.67
80	88 (3 1/2")	190	16	18	16	150	42	3.2	3.2	8	10	128	3	4	M16 (5/8")	18	2.98	2.71	2.71
100	108 (4 1/4")	210	16	18	16	170	45	3.6	3.6	8	10	148	3	4	M16 (5/8")	18	3.46	3.24	3.24
125	133 (5")	240	18	20	18	200	48	4.0	4.0	8	10	178	3	8	M16 (5/8")	18	4.60	4.49	4.49
150	158 (6 1/4")	265	18	20	18	225	48	4.5	4.5	10	12	202	3	8	M16 (5/8")	18	5.22	5.15	5.15
200	216 (8 1/2")	320	20	22	20	280	55	5.9	5.9	10	15	258	3	8	M16 (5/8")	18	7.15	7.78	7.78
250	267 (10 1/2")	375	22	24	22	335	60	6.2	6.2	12	15	312	3	12	M16 (5/8")	18	9.61	10.8	10.8
300	318 (12 1/2")	440	22	24	22	395	62	7.1	7.1	12	15	365	4	12	M20 (3/4")	23	12.6	14.0	14.0
350	355 (14")	490	22	26	22	445	62	7.1	7.1	12	15	415	4	12	M20 (3/4")	23	15.6	16.1	16.1
400	406 (16")	540	22	28	22	495	65	7.1	7.1	12	15	455	4	16	M20 (3/4")	23	18.4	18.3	18.3
500	508 (20")	645	24	30	24	600	68	7.1	7.1	12	15	570	4	20	M20 (3/4")	23	24.5	24.6	24.6
600	609 (24")	755	24	-	-	705	70	7.1	7.1	12	16	670	5	20	M24 (7/8")	27	-	-	-
700	711 (28")	860	24	-	-	810	70	7.1	7.1	12	16	775	5	24	M24 (7/8")	27	-	-	-
800	812 (32")	975	24	-	-	920	70	7.1	7.1	12	16	880	5	24	M27 (1")	30	-	-	-
900	914 (36")	1075	26	-	-	1020	70	7.1	7.1	12	16	980	5	24	M27 (1")	30	-	-	-
1000	1016 (40")	1175	26	-	-	1120	70	7.1	7.1	16	16	1080	5	28	M27 (1")	30	-	-	-

Notes :
(1) Out side diameter of pipe complies with ISO recommendation R64
*Dimensions are only used in Germany

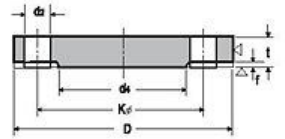
DIN 2576 SLIP - ON FLANGES
DIN 2527 BLIND FLANGES
DIN 2632 WELDING NECK FLANGES



WELDING NECK



SLIP-ON



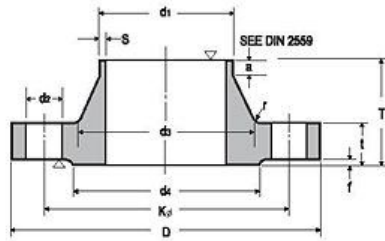
BLIND

Unit:mm

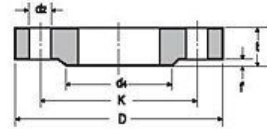
Nominal Bore	Bore		Common Dimension				Hub				Raised Face		Drilling			Approx.Weight(kg)		
	d1	D	Welding Neck	Slip-on	Blind	k	T	d3	s	r	a	d4	f	Number of Bolt	Diam. of Bolt	d2	DIN 2576	DIN 2632
10	14 (1/2")	90	14	14	14	60	35	25	1.8	4	6	40	2	4	M12 (1/2")	14	0.163	0.580
15	20 (3/4")	95	14	14	14	65	35	2.0	2.0	4	6	45	2	4	M12 (1/2")	14	0.675	0.648
20	25 (1")	105	16	16	16	75	38	2.3	2.3	4	6	58	2	4	M12 (1/2")	14	0.947	0.952
25	30 (1 1/4")	115	16	16	16	85	38	2.6	2.6	4	6	68	2	4	M12 (1/2")	14	1.14	1.14
32	38 (1 1/2")	140	16	16	16	100	40	2.6	2.6	6	6	78	2	4	M16 (5/8")	18	1.66	1.69
40	48 (1 7/8")	150	16	16	16	110	42	2.6	2.6	6	7	88	3	4	M16 (5/8")	18	1.89	1.86
50	57 (2 1/4")	165	18	18	18	125	45	2.9	2.9	6	8	102	3	4	M16 (5/8")	18	2.51	2.53
65	76 (3")	185	18	18	18	145	45	2.9	2.9	6	10	122	3	4	M16 (5/8")	18	3.00	3.06
80	88 (3 1/2")	200	20	20	20	160	50	3.2	3.2	8	10	138	3	4	M16 (5/8")	18	3.79	3.70
100	108 (4 1/4")	220	20	20	20	180	52	3.6	3.6	8	12	158	3	8	M16 (5/8")	18	4.20	4.62
125	133 (5")	250	22	22	22	210	55	4.0	4.0	8	12	188	3	8	M16 (5/8")	18	5.71	6.30
150	158 (6 1/4")	285	22	22	22	240	55	4.5	4.5	10	12	212	3	8	M20 (3/4")	23	6.72	7.75
200	216 (8 1/2")	340	24	24	24	295	62	5.9	5.9	10	16	268	3	8	M20 (3/4")	23	9.50	11.3
250	267 (10 1/2")	395	26	26	26	350	68	6.3	6.3	12	16	320	3	12	M20 (3/4")	23	12.5	14.7
300	318 (12 1/2")	445	26	26	26	400	68	7.1	7.1	12	16	370	4	12	M20 (3/4")	23	14.4	17.6
350	355 (14")	505	26	28	30	460	68	7.1	7.1	12	16	430	4	16	M20 (3/4")	23	20.6	21.4
400	406 (16")	565	26	32	32	515	72	7.1	7.1	12	16	482	4	16	M24 (7/8")	27	27.9	26.1
500	508 (20")	670	28	38	34	620	75	7.1	7.1	12	16	585	4	20	M24 (7/8")	27	41.1	34.7
600	609 (24")	780	28	-	-	725	80	7.1	7.1	12	18	685	5	20	M27 (1")	30	-	-
700	711 (28")	895	30	-	-	840	80	7.1	7.1	12	18	800	5	24	M27 (1")	30	-	-
800	812 (32")	1015	32	-	-	950	90	7.1	7.1	12	18	905	5	24	M30 (1 1/8")	33	-	-
900	914 (36")	1115	34	-	-	1050	95	7.1	7.1	12	20	1005	5	28	M30 (1 1/8")	33	-	-
1000	1016 (40")	1230	34	-	-	1160	95	7.1	7.1	16	20	1110	5	28	M33 (1 1/2")	36	-	-

Notes :
(1) Out side diameter of pipe complies with ISO recommendation R64

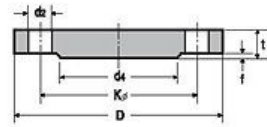
DIN 2543 SLIP - ON FLANGES
DIN 2527 BLIND FLANGES
DIN 2633 WELDING NECK FLANGES



WELDING NECK



SLIP-ON



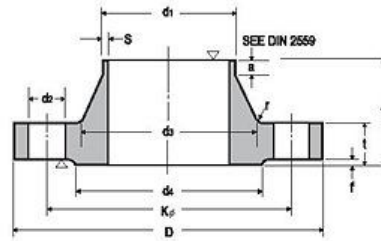
BLIND

Unit:mm

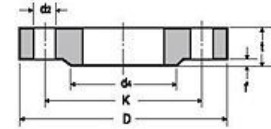
Nominal Bore	Bore		Common Dimension					Hub				Raised Face		Drilling			Approx.Weight(kg)		
	d1	D	Welding Neck	Slip-on (no-hub)	Blind	k	T	ds	s	r	a	d4	f	Number of Bolt	Diam. of Bolt	d2	DIN 2543	DIN 2633	
10	14 (1/2")	90	14	14	14	60	35	25	1.8	4	6	40	2	4	M12	(1/2")	14	0.63	0.58
15	20 (3/4")	95	14	14	14	65	35	30	2.0	4	6	45	2	4	M12	(1/2")	14	0.72	0.64
20	25 (1")	105	16	16	16	75	38	30	2.3	4	6	58	2	4	M12	(1/2")	14	1.01	0.95
25	30 (1 1/4")	115	16	16	16	85	38	42	2.6	4	6	68	2	4	M12	(1/2")	14	1.23	1.14
32	38 (1 1/2")	140	16	16	16	100	40	52	2.6	6	6	78	2	4	M16	(5/8")	18	1.80	1.69
40	48 (1 7/8")	150	16	16	16	110	42	60	2.6	6	7	88	3	4	M16	(5/8")	18	2.09	1.86
50	57 (2")	165	18	18	18	125	45	72	2.9	6	8	102	3	4	M16	(5/8")	18	2.88	2.53
65	76 (3")	185	18	18	18	145	45	90	2.9	6	10	122	3	4	M16	(5/8")	18	3.66	3.06
80	88 (3 1/2")	200	20	20	20	160	50	105	3.2	8	10	138	3	8	M16	(5/8")	18	4.77	3.70
100	108 (4 1/4")	220	20	20	20	180	52	120	3.6	8	12	158	3	8	M16	(5/8")	18	5.65	4.62
125	133 (5")	250	22	22	22	210	55	150	4.0	8	12	188	3	8	M16	(5/8")	18	8.42	6.30
150	158 (6")	285	22	22	22	240	55	184	4.5	10	12	212	3	8	M20	(3/4")	23	10.4	7.75
200	216 (8 1/2")	340	24	24	24	295	62	232	5.9	10	16	268	3	12	M20	(3/4")	23	16.1	11.0
250	267 (10 1/2")	405	26	26	26	355	70	295	6.3	12	16	320	3	12	M24	(7/8")	27	24.9	15.6
300	318 (12 1/2")	460	28	28	28	410	78	338	7.1	12	16	378	4	12	M24	(7/8")	27	35.1	22.0
350	355 (14")	520	30	30	30	470	82	390	8.0	12	16	438	4	16	M24	(7/8")	27	47.8	28.7
400	406 (16")	580	32	32	32	525	85	445	8.0	12	16	490	4	16	M27	(1")	30	63.5	36.3
500	501 (19 3/4")	715	34	34	34	650	90	548	8.0	12	16	610	4	20	M30	(1 1/8")	33	102.0	59.3
600	609 (22 3/4")	840	36	40	-	770	95	652	8.8	12	18	725	5	20	M33	(1 1/4")	36	-	-
700	711 (28")	910	36	-	-	840	100	755	8.8	12	18	795	5	24	M33	(1 1/4")	36	-	-
800	812 (31 1/2")	1025	38	-	-	950	105	855	10.0	12	20	900	5	24	M36	(1 3/8")	39	-	-
900	914 (35 3/4")	1125	40	-	-	1050	110	955	10.0	12	20	1000	5	28	M36	(1 3/8")	39	-	-
1000	1016 (40")	1255	42	-	-	1170	120	1058	10.0	16	20	1115	5	28	M39	(1 1/2")	42	-	-

Notes :
(1) Out side diameter of pipe complies with ISO recommendation R64

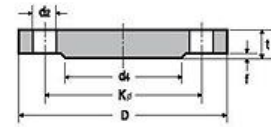
DIN 2544 SLIP - ON FLANGES
DIN 2527 BLIND FLANGES
DIN 2634 WELDING NECK FLANGES



WELDING NECK



SLIP-ON



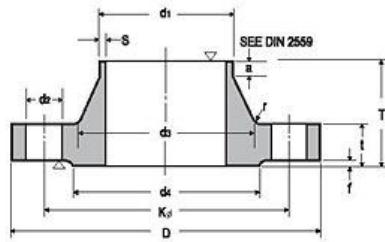
BLIND

Unit:mm

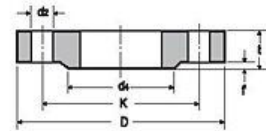
Nominal Bore	Bore		Common Dimension					Hub				Raised Face		Drilling			Approx.Weight(kg)		
	d1	D	Welding Neck	Slip-on	Blind	k	T	ds	s	r	a	d4	f	Number of Bolt	Diam. of Bolt	d2	DIN 2543	DIN 2633	
10	14 (1/2")	90	16	16	16	60	35	25	1.8	4	6	40	2	4	M12	(1/2")	14	0.72	0.661
15	20 (3/4")	95	16	16	16	65	38	30	2.0	4	6	45	2	4	M12	(1/2")	14	0.81	0.746
20	25 (1")	105	18	18	18	75	40	30	2.3	4	6	58	2	4	M12	(1/2")	14	1.24	1.06
25	30 (1 1/4")	115	18	18	18	85	40	42	2.6	4	6	68	2	4	M12	(1/2")	14	1.38	1.29
32	38 (1 1/2")	140	18	18	18	100	42	52	2.6	6	6	78	2	4	M16	(5/8")	18	2.03	1.88
40	48 (1 7/8")	150	18	18	18	110	45	60	2.6	6	7	88	3	4	M16	(5/8")	18	2.35	2.34
50	57 (2")	165	20	20	20	125	48	72	2.9	6	8	102	3	4	M16	(5/8")	18	3.20	2.82
65	76 (3")	185	22	22	22	145	52	90	2.9	6	10	122	3	8	M16	(5/8")	18	4.29	3.74
80	88 (3 1/2")	200	24	24	24	160	58	105	3.2	8	12	138	3	8	M16	(5/8")	18	5.88	4.75
100	108 (4 1/4")	235	24	24	24	190	65	120	3.6	8	12	162	3	8	M20	(3/4")	23	7.54	6.52
125	133 (5")	270	26	26	26	220	68	150	4.0	8	12	188	3	8	M24	(7/8")	27	10.8	9.07
150	158 (6")	300	28	28	28	250	75	180	4.5	10	12	218	3	8	M24	(7/8")	27	14.5	11.8
200	216 (8 1/2")	360	30	30	30	310	80	240	6.3	10	16	278	3	12	M24	(7/8")	27	22.3	17.0
250	267 (10 1/2")	425	32	32	32	370	88	295	7.1	12	18	335	3	12	M27	(1")	30	33.5	24.4
300	318 (12 1/2")	485	34	34	34	430	92	345	8.0	12	18	395	4	16	M27	(1")	30	46.3	31.2
350	355 (14")	555	38	38	38	490	100	398	8.0	12	20	450	4	16	M30	(1 1/4")	33	68.0	45.0
400	406 (16")	620	40	40	40	550	110	452	8.8	12	20	505	4	16	M33	(1 1/4")	36	89.7	58.7
500	501 (19 3/4")	730	44	44	44	660	125	558	10.0	12	20	615	4	20	M33	(1 1/4")	36	138.0	86.1
600	609 (22 3/4")	845	46	-	-	770	125	660	11.0	12	20	720	5	20	M36	(1 3/8")	39	-	101.0
700	711 (28")	960	46	-	-	875	125	760	12.5	12	20	820	5	24	M39	(1 1/2")	42	-	134.0
800	812 (31 1/2")	1085	50	-	-	990	135	865	14.2	12	22	930	5	24	M45	(1 3/4")	48	-	183.0
900	914 (35 3/4")	1185	54	-	-	1090	145	968	16.0	12	24	1030	5	28	M45	(1 3/4")	48	-	232.0
1000	1016 (40")	1320	58	-	-	1210	155	1070	17.5	16	24	1140	5	28	M52	(2")	56	-	302.0

Notes :
(1) Out side diameter of pipe complies with ISO recommendation R64

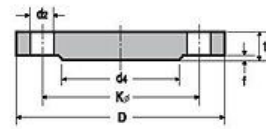
DIN 2545 SLIP - ON FLANGES
 DIN 2527 BLIND FLANGES
 DIN 2635 WELDING NECK FLANGES



WELDING NECK



SLIP-ON



BLIND

Unit:mm

Nominal Bore	Bore		Common Dimension				Hub				Raised Face		Drilling			Approx.Weight(kg)			
	di	D	t			k	T	ds	s	r	a ≈	d4	f	Number of Bolt	Diam. of Bolt	d2	DIN 2545	DIN 2635	
			Welding Neck	Slip-on (no-hub)	Blind														
10	14 (17.2")	90	16	16	16	60	35	25 28 30	1.8	4	6	40	2	4	M12	(1/2")	14	0.72	0.661
15	20 (21.3")	95	16	16	16	65	38	30 32	2.0	4	6	45	2	4	M12	(1/2")	14	0.81	0.746
20	25 (26.9")	105	18	18	18	75	40	38 40	2.3	4	6	58	2	4	M12	(1/2")	14	1.24	1.06
25	30 (33.7")	115	18	18	18	85	40	42 46 52	2.6	4	6	68	2	4	M12	(1/2")	14	1.38	1.29
32	38 (42.4")	140	18	18	18	100	42	52 56	2.6	6	6	78	2	4	M16	(5/8")	18	2.03	1.88
40	44.5 (48.3")	150	18	18	18	110	45	60 64	2.6	6	7	88	3	4	M16	(5/8")	18	2.35	2.33
50	57 (60.3")	165	20	20	20	125	48	72 75	2.9	6	8	102	3	4	M16	(5/8")	18	3.20	2.82
65	76.1")	185	22	22	22	145	52	90	2.9	6	10	122	3	8	M16	(5/8")	18	4.29	3.74
80	88.9")	200	24	24	24	160	58	105	3.2	8	12	138	3	8	M16	(5/8")	18	5.88	4.75
100	108 (114.3")	235	24	24	24	190	65	128 134	3.6	8	12	162	3	8	M20	(3/4")	23	7.54	6.52
125	133 (139.7")	270	26	26	26	220	68	155 162	4.0	8	12	188	3	8	M24	(7/8")	27	10.8	9.07
150	159 (168.3")	300	28	28	28	250	75	182 192	4.5	10	12	218	3	8	M24	(7/8")	27	14.5	11.80
(175)	(191) (193.7")	350	32	32	32	295	82	215 218	5.6	10	15	260	3	12	M27	(1")	30	22.1	18.2
200	216 (219.1")	375	34	34	34	320	88	240 244	6.3	10	16	285	3	12	M27	(1")	30	27.2	21.5
250	267 (273")	450	38	38	38	385	105	298 306	7.1	12	18	345	3	12	M30	(1 1/8")	33	43.8	34.9
300	318 (323.9")	515	42	42	42	450	115	352 362	8.0	12	18	410	4	16	M30	(1 1/8")	33	63.3	49.7
350	355.6") 368	580	46	46	46	510	125	408	8.8	12	20	465	4	16	M33	(1 1/4")	36	89.5	68.1
400	406.4") 419	660	50	50	50	585	135	462	11.0	12	20	535	4	16	M36	(1 3/8")	39	127.0	96.5
500	508") 521	755	52	52	52	670	140	562	14.2	12	20	615	4	20	M39	(1 1/2")	42	172.0	117.0

Notes :

(1) Out side diameter of pipe complies with ISO recommendation R64

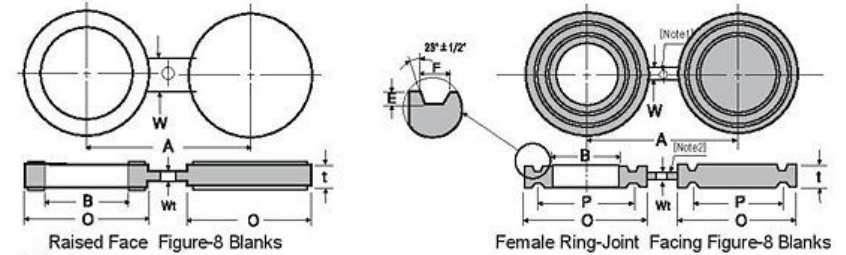
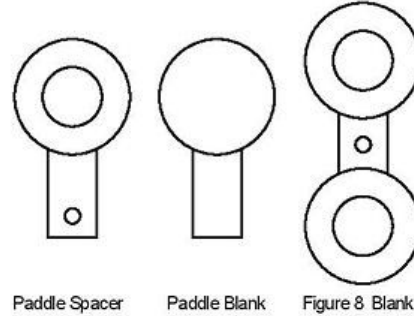
STEEL LINE BLANKS

ASME LINE BLANKS FLANGES CLASS 150 / 300 FLANGES

ASME B16.48-2005

1. General

- a. Figure 8 Blank
A figure 8 blank (also called a spectacle blank) is a pressure retaining plate with one solid end and one open end connected with a web or tie bar
- b. Paddle Blank
A paddle blank is similar to the solid end of a figure 8 blank (with handle) and is generally used in conjunction with a paddle spacer in large sizes.
- c. Paddle Spacer
A paddle spacer is similar to the open end of a figure 8 blank (with handle) and is generally used in conjunction with a paddle blank.



2. MATERIAL

Material Group	Forgings	Plate	Castings
1.1	A105 ⁽¹⁾	A515 Gr.70 ⁽¹⁾	A216 Gr. WCB ⁽¹⁾
		A515 Gr.70 ⁽¹⁾⁽²⁾	
		A537 Cl.1 ⁽³⁾	
1.7	A182 Gr.F2 ⁽⁴⁾	A204 Gr.C3 ⁽⁵⁾	-
1.9	A182 Gr.F11 Cl.2 ⁽⁶⁾	A387 Gr.11 Cl.2 ⁽⁷⁾	A217 Gr.WC6 ⁽⁸⁾
1.10	A182 Gr.F22 Cl.3 ⁽⁷⁾	A387 Gr.22 Cl.2 ⁽⁷⁾	A217 Gr.WC9 ⁽⁸⁾
1.13	A182 Gr.F5	-	-
2.1	A182 Gr.F304 ⁽⁹⁾	A240 Gr.304 ⁽⁹⁾	A351 Gr. CF8 ⁽⁹⁾
2.2	A182 Gr.F316 ⁽⁹⁾	A240 Gr.316 ⁽⁹⁾	A351 Gr. CF8M ⁽⁹⁾
2.4	A182 Gr.F321 ⁽⁴⁾	A240 Gr.321 ⁽⁴⁾	-
2.5	A182 Gr.F347 ⁽⁴⁾	A240 Gr.347 ⁽⁴⁾	A351 Gr. CF8C ⁽⁹⁾

NOTE:

- (1) Upon prolonged exposure to temperatures above 427°C..., the carbide phase of carbon steel may be converted to graphite. Permissible but not recommended for prolonged service above 427°C...
- (2) Not to be used over 454°C...
- (3) Not to be used over 371°C...
- (4) Not to be used above 538°C...
- (5) Upon prolonged exposure to temperatures above 468°C..., the carbide phase of carbon-molybdenum steel may be converted to graphite. Permissible but not recommended for prolonged service above 468°C...
- (6) Permissible but not recommended for prolonged use above 593°C.... Use normalized and tempered material only.
- (7) Permissible but not recommended for prolonged use above 593°C....
- (8) Not to be used over 593°C.... Use the normalized and tempered material only.
- (9) At temperatures over 538°C..., use the material only when the carbon content is 0.04% or higher.

3. TOLERANCE

Tolerance for facings shall be in accordance with ASME B16.5. Thickness tolerances are:
 NPS 18 and smaller +3 / -0
 NPS 20 and larger +4.8 / -0

Class 150

Unit:mm

Nominal Pipe Size	RAISED FACE FIGURE-8 BLANKS							FEMALE RING-JOINT FACING FIGURE-8 BLANKS									
	Inside Diam.	Outside Diam.	Center-line Diam.	Thickness	Web Width	Hole Diam.	B16.5 Raised Face	Inside Diam.	Outside Diam.	Center-line Diam.	Thickness	Web Width	Pitch Diam.	Width of Groove	Depth of Groove	Hole Diam.	
	B	O	A	t	W			B	O	A	t	W	P	F	E		
1/2	15.7	44.5	60.5	3.0	38.1	15.7	35.1	-	-	-	-	-	-	-	-	-	-
3/4	20.8	53.8	69.9	3.0	38.1	15.7	42.9	-	-	-	-	-	-	-	-	-	-
1	26.7	63.5	79.2	3.0	38.1	15.7	50.8	33.5	63.5	79.2	19.1	50.8	47.6	8.7	6.4	15.7	
1 1/4	42.2	73.2	88.9	6.4	38.1	15.7	63.5	42.2	73.2	88.9	19.1	60.8	57.2	8.7	6.4	15.7	
1 1/2	48.3	82.6	98.6	6.4	38.1	15.7	73.2	48.3	82.6	98.6	19.1	67.2	65.1	8.7	6.4	15.7	
2	60.5	101.6	120.7	6.4	50.8	19.1	91.9	60.5	101.6	120.7	19.1	57.2	82.6	8.7	6.4	19.1	
2 1/2	73.2	120.7	139.7	6.4	50.8	19.1	104.6	73.2	120.7	139.7	22.4	57.2	101.6	8.7	6.4	19.1	
3	88.9	133.4	152.4	6.4	63.5	19.1	127.0	88.9	133.4	152.4	22.4	57.2	114.3	8.7	6.4	19.1	
3 1/2	101.6	158.8	177.8	9.7	63.5	19.1	139.7	101.6	153.9	177.8	22.4	63.5	131.8	8.7	6.4	19.1	
4	114.3	171.5	190.5	9.7	63.5	19.1	157.2	114.3	171.5	190.5	22.4	63.5	149.2	8.7	6.4	19.1	
5	141.2	193.5	215.9	9.7	76.2	22.4	185.7	141.2	193.5	215.9	25.4	69.9	171.5	8.7	6.4	22.4	
6	168.1	218.9	241.3	12.7	76.2	22.4	215.9	168.1	218.9	241.3	25.4	82.6	193.7	8.7	6.4	22.4	
8	218.9	276.4	298.5	12.7	76.2	22.4	269.7	218.9	273.1	298.5	28.4	95.3	247.7	8.7	6.4	22.4	
10	273.1	336.6	362.0	15.7	101.6	25.4	323.9	273.1	330.2	362.0	31.8	101.6	304.8	8.7	6.4	25.4	
12	323.9	406.4	431.8	19.1	101.6	25.4	381.0	323.9	406.4	431.8	35.1	120.7	381.0	8.7	6.4	25.4	
14	355.6	447.5	476.3	19.1	108.0	28.4	412.8	355.6	425.5	476.3	35.1	127.0	396.9	8.7	6.4	28.4	
16	406.4	511.0	539.8	22.4	108.0	28.4	469.9	406.4	482.6	539.8	38.1	127.0	454.0	8.7	6.4	28.4	
18	457.2	546.1	577.9	25.4	114.3	31.8	533.4	457.2	546.1	577.9	41.1	127.0	517.5	8.7	6.4	31.8	
20	508.0	603.3	635.0	28.4	120.7	31.8	584.2	508.0	596.9	635.0	41.1	127.0	558.8	8.7	6.4	31.8	
24	609.6	714.2	749.3	31.8	139.7	35.1	692.2	609.6	711.2	749.3	47.8	152.4	673.1	8.7	6.4	35.1	

Class 300

Unit:mm

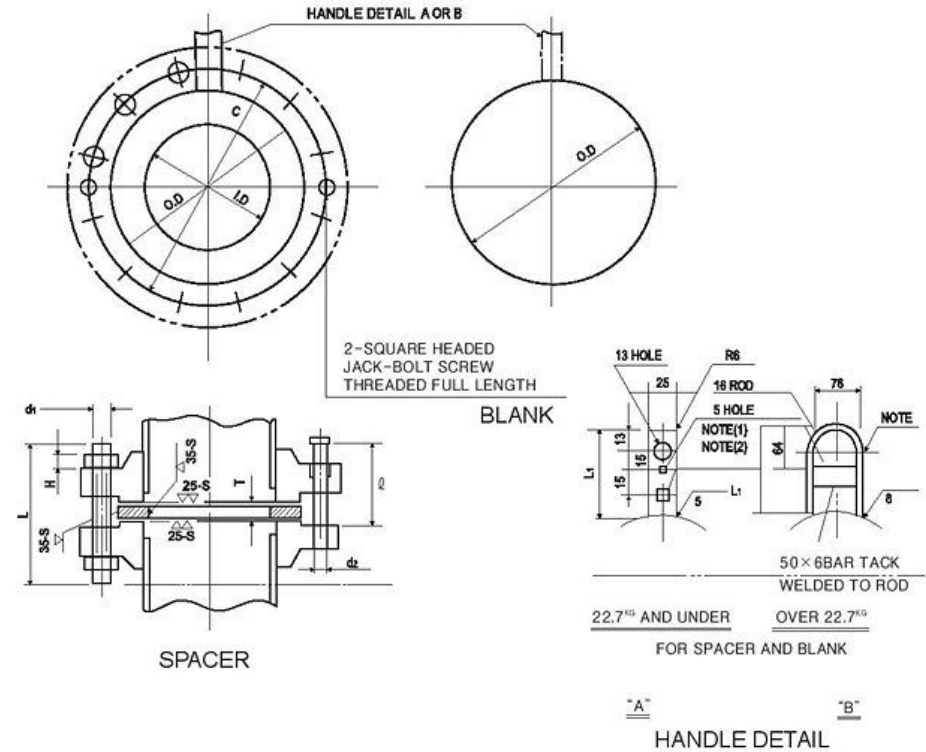
Nominal Pipe Size	RAISED FACE FIGURE-8 BLANKS							FEMALE RING-JOINT FACING FIGURE-8 BLANKS								
	Inside Diam.	Outside Diam.	Center-line Diam.	Thickness	Web Width	Hole Diam.	B16.5 Raised Face	Inside Diam.	Outside Diam.	Center-line Diam.	Thickness	Web Width	Pitch Diam.	Width of Groove	Depth of Groove	Hole Diam.
	B	O	A	t	W			B	O	A	t	W	P	F	E	
1/2	15.7	50.8	66.5	6.4	38.1	15.7	35.1	21.3	50.8	66.5	15.7	38.1	34.1	7.1	5.6	15.7
3/4	20.8	63.5	82.6	6.4	38.1	19.1	42.9	26.7	63.5	82.6	19.1	44.5	42.9	8.7	6.4	19.1
1	26.7	69.9	88.9	6.4	38.1	19.1	50.8	33.5	69.9	88.9	19.1	50.8	50.8	8.7	6.4	19.1
1 1/4	42.2	79.2	98.6	6.4	38.1	19.1	63.5	42.2	79.2	98.6	22.4	50.8	60.3	8.7	6.4	19.1
1 1/2	48.3	91.9	114.3	6.4	38.1	22.4	73.2	48.3	90.4	114.3	22.4	57.2	68.3	8.7	6.4	22.4
2	60.5	108.0	127.0	9.7	50.8	19.1	91.9	60.5	108.0	127.0	25.4	57.2	82.6	11.9	7.9	19.1
2 1/2	73.2	127.0	149.4	9.7	50.8	22.4	104.6	73.2	127.0	149.4	28.4	57.2	101.6	11.9	7.9	22.4
3	88.9	146.1	168.1	9.7	63.5	22.4	127.0	88.9	146.1	168.1	28.4	57.2	123.8	11.9	7.9	22.4
3 1/2	101.6	162.1	184.2	12.7	63.5	22.4	139.7	101.6	158.8	184.2	28.4	63.5	131.8	11.9	7.9	22.4
4	114.3	177.8	200.2	12.7	63.5	22.4	157.2	114.3	174.8	200.2	31.8	63.5	149.2	11.9	7.9	22.4
5	141.2	212.9	235.0	15.7	76.2	22.4	185.7	141.2	209.6	235.0	35.1	69.9	181.0	11.9	7.9	22.4
6	168.1	247.7	269.7	15.7	76.2	22.4	215.9	168.1	241.3	269.7	35.1	82.6	211.2	11.9	7.9	22.4
8	218.9	304.8	330.2	22.4	76.2	25.4	269.7	218.9	301.8	330.2	41.1	95.3	269.9	11.9	7.9	25.4
10	273.1	358.6	387.4	25.4	101.6	28.4	323.9	273.1	355.6	387.4	44.5	101.6	323.9	11.9	7.9	28.4
12	323.9	419.1	450.9	28.4	101.6	31.8	381.0	323.9	412.8	450.9	50.8	120.7	381.0	11.9	7.9	31.8
14	355.6	482.6	514.4	31.8	108	31.8	412.8	355.6	457.2	514.4	53.8	127.0	419.1	11.9	7.9	31.8
16	406.4	536.4	571.5	38.1	108	35.1	469.9	406.4	508.0	571.5	57.2	127.0	469.9	11.9	7.9	35.1
18	457.2	593.9	628.7	41.1	114.3	35.1	533.4	457.2	574.5	628.7	60.5	127.0	533.4	11.9	7.9	35.1
20	508.0	650.7	685.8	44.5	120.7	35.1	584.2	508.0	635.0	685.8	69.9	127.0	584.2	13.5	9.5	35.1
24	609.6	771.7	812.8	50.8	139.7	41.1	692.2	609.6	749.3	812.8	79.2	152.4	692.2	16.7	11.1	41.1

Notes :

- (1) Holes size (where required due to bolt spacing) shall be the same as the flange bolt hole, and located such that it will not interfere with bolting between two flanges.
- (2) The handle or web (tie bar) may be integral or attached to the line blank or spacer. The web and its attachment shall be capable of

SPACER AND BLANK

150LB SPACER AND BLANK



Unit:mm

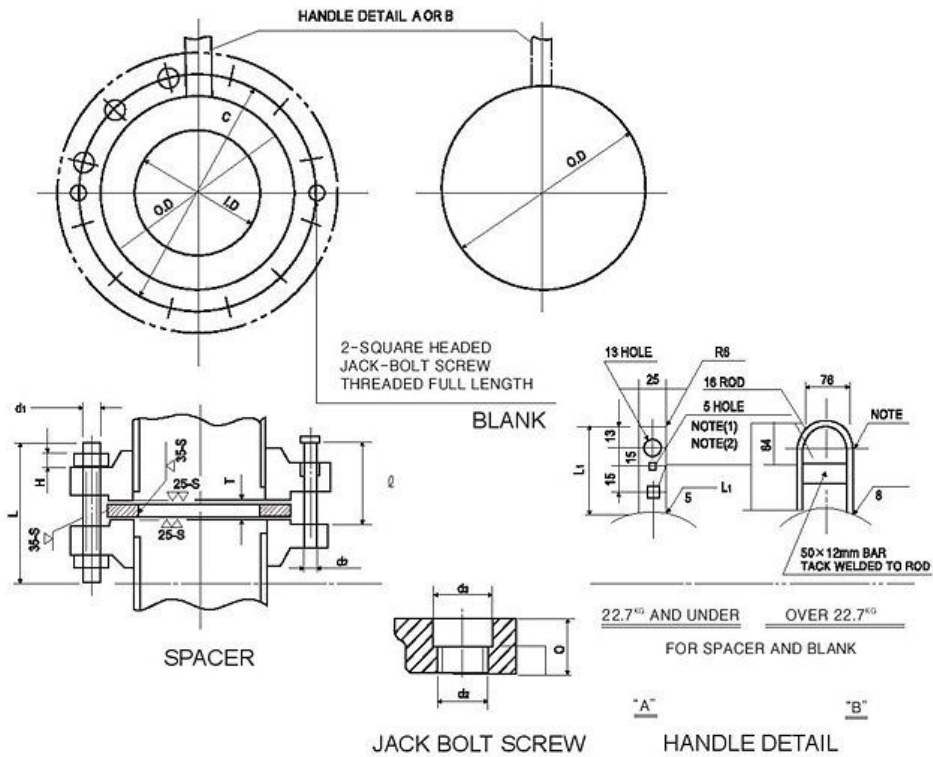
SIZE (B)	SPACER & BLANK				BOLT & NUT				JACK SCREW		WEIGHT(KG)		REMARK	
	O.D	I.D	T	L1	C	d1	NO	L	H	d2	ℓ	SPACER		BLANK
8	276	219	13	165	298.4	M20	8	140	20	M20	75	3.6	7.8	-
10	337	273	16	165	361.9	M22	12	150	22	M20	80	5.8	13.5	-
12	406	324	19	165	431.8	M22	12	155	22	M20	85	9.9	22.7	-
14	448	359	19	172	476.2	M27	12	175	27	M20	90	12.4	30.6	-
16	511	406	22	172	539.7	M27	16	180	27	M22	90	17.0	42.8	-
18	546	457	25	172	577.8	M30	16	195	30	M22	100	17.9	54.2	-
20	603	508	28	178	635.0	M30	20	210	30	M22	105	24.2	73.0	-
24	714	610	32	178	749.3	M33	20	230	33	M24	115	36.7	121.0	-

Notes :

- (1) 5ø Hole shall only be applied to the spacer.
- (2) To be die stamp on both side as follows, spacer is "S" and blank is "B"
- (3) For dimensional tolerances

SPACER AND BLANK

300LB SPACER AND BLANK



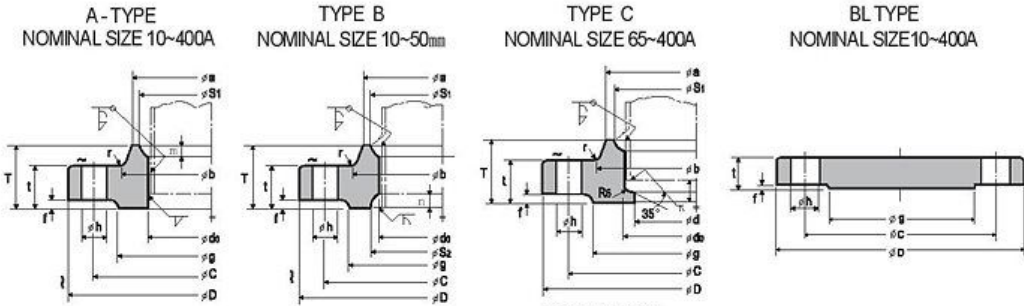
Unit:mm

SIZE (B)	SPACER & BLANK					BOLT & NUT				JACK SCREW		JACK BOLT SCREW				WEIGHT(KG)	
	O.D	I.D	T	L1	C	d1	N0	L	H	d2	l	d2	d3	l	Q	SPACER	BLANK
8	305	219	22	165	330.2	M22	12	175	22	M20	95	-	-	-	-	7.9	14.0
10	359	273	25	172	387.3	M27	16	205	27	M20	106	-	-	-	-	11.2	22.5
12	419	324	28	178	450.8	M30	16	225	30	M20	115	-	-	-	-	17.3	37.7
14	483	356	32	178	514.3	M30	20	235	30	M22	120	M22	25	40	52.4	27.1	54.2
16	537	406	38	184	571.2	M33	20	250	33	M22	130	M22	25	40	55.9	34.2	73.9
18	594	457	41	191	628.6	M33	24	260	33	M22	135	M22	25	40	58.9	44.5	101.2
20	651	508	44	191	685.8	M33	24	275	33	M24	145	M24	27	45	61.9	56.7	134.6
24	772	610	51	203	812.6	M39	24	310	39	M24	160	M24	27	45	68.4	89.1	222.2

Notes :

- (1) 5ø Hole shall only be applied to the spacer.
- (2) To be die stamp on both side as follows, spacer is "S" and blank is "B".

**KS B 1506-2012 (KS B 1503-2007)
STAINLESS STEEL PIPE FLANGES**



* The surface finish (—) is in the case of die forging

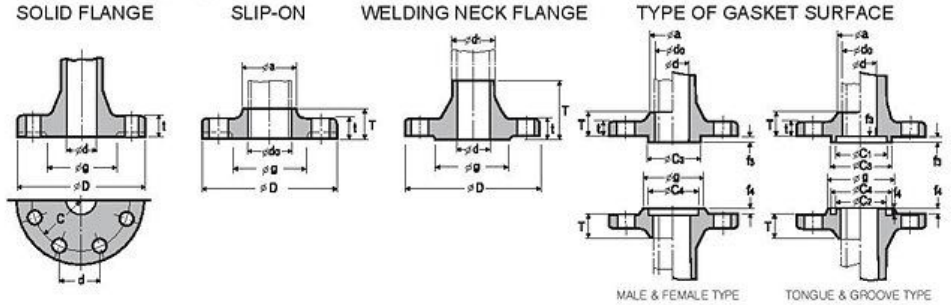
Unit:mm

Nominal Diam. of Flange	Outside Diam. of Pipe	Inside Diam. of Flange do	Outside Diam. of Flange D	Sectional Dimensions of Flange										Bolt Hole			Reference					Approx. Weight(kg)		
				t	T	Diam. of Hub		Rad. r	f	g	d	Bolt Circle Diameter C	Number of Bolt Holes	Hole Diameter h	Nominal Bolt Size	S1	m	S2	n	l	SOH A TYPE	SOH B-C TYPE	BL	
						a	b																	
10	17.3	17.8	110	16	24	30	34	4	1	52	-	75	4	19	M16	-	-	-	-	-	-1.00	1.00	1.00	
15	21.7	22.2	115	18	26	36	40	5	1	55	-	80	4	19	M16	31	4	40	5	-	1.24	1.22	1.25	
20	27.2	27.7	120	18	28	42	46	5	1	60	-	85	4	19	M16	37	5	44	5	-	1.36	1.34	1.38	
25	34.0	34.5	130	20	30	50	54	5	1	70	-	95	4	19	M16	44	6	52	5	-	1.77	1.75	1.84	
32	42.7	43.2	140	22	32	60	64	6	2	80	-	105	4	19	M16	52	6	60	5	-	2.17	1.75	1.84	
40	48.6	49.1	160	22	34	66	70	6	2	90	-	120	4	23	M20	58	6	66	5	-	2.82	2.79	3.00	
50	60.5	61.1	165	22	36	82	86	6	2	105	-	130	8	19	M16	70	6.5	78	5	-	2.89	2.86	3.14	
65	76.3	77.1	200	26	40	102	106	8	2	130	65.9	160	8	23	M20	96	9.5	94	5	6	4.88	4.96	5.50	
80	89.1	90.0	210	28	44	115	121	8	2	140	78.1	170	8	23	M20	109	9.5	-	-	6	5.70	5.80	6.63	
(90)	101.6	102.6	230	30	46	128	134	8	2	150	90.2	185	8	25	M22	122	9.5	-	-	6	7.13	7.25	8.55	
100	114.3	115.4	240	32	48	141	147	8	2	160	102.3	195	8	25	M22	135	9.5	-	-	6	8.01	8.16	10.0	
125	139.8	141.2	275	36	54	166	172	8	2	195	126.6	230	8	25	M22	160	9.5	-	-	6	11.6	11.9	15.3	
150	165.2	166.6	325	38	58	196	204	8	2	235	151.0	275	12	27	M24	186	9.5	-	-	6	17.0	17.3	22.2	
200	216.3	218.0	370	42	64	248	256	8	2	280	199.9	320	12	27	M24	237	9.5	-	-	6	22.2	22.6	32.6	
250	267.4	269.5	450	48	72	306	314	10	2	345	248.8	390	12	33	M30x3	290	10	-	-	6	36.8	37.5	55.2	
300	318.5	321.0	515	52	78	360	370	10	3	405	297.9	450	16	33	M30x3	345	12	-	-	6	49.1	50.0	77.9	
350	355.6	358.1	560	54	84	402	412	12	3	450	333.4	495	16	33	M30x3	383	13	-	-	6	60.4	61.5	96.9	
400	406.4	409.0	630	60	92	456	468	15	3	510	381.0	560	16	39	M36x3	435	14	-	-	7	82.0	83.7	136	

Notes:

- (1) Flanges of parenthesized nominal diameter had better not be used.
- (2) The facing of flanges shall conform to KS B1519.
- (3) For dimensional tolerance, refer to page 101.
- (4) Size disindicated based on schedule 40 of KS D3562, KS D3564 and KSD3570. But, Regarding diameter above 450mm, the thickness of In diameter is 12.7mm.
- (5) Regarding the material and size for bolt and nut, refer to remark (B) of KS B1511.

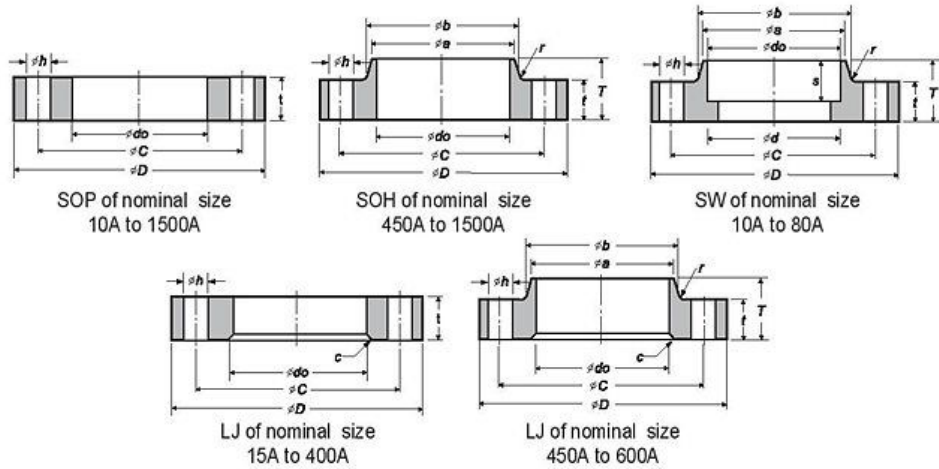
**KS B 1506-2007
TOLERANCE FOR PIPE FLANGES**



Flange Section	Surface Condition	Basic Size	Dimensional Tolerance	Flange Section		Surface Condition	Basic Size	Dimensional Tolerance
				Bolt Hole	Arch of Hole D			
Outside Diameter	As Forged (1)	300 & below	+Not Specified	Diam. of Hole	Slip-on Flange (a) and Welding Neck Flange (d1)	As Forged	-	±0.5
		over 300 thru 600	-2.0				220 & below	±0.5
		over 600 thru 1000	-2.0				over 220 thru 450	±0.5
		over 1000 thru 1500	+Not Specified				over 450 thru 650	±0.5
		over 1500	-3.0				over 650 thru 850	±0.5
	Finish	300 & below	±1			over 850 thru 1000	±0.5	
		over 300 thru 600	±1.5			over 1000	±0.5	
		over 600 thru 1000	±2			220 & below	±0.5	
		over 1000 thru 1500	±2.5			over 220 thru 450	±0.5	
		over 1500	±3			over 450 thru 650	±0.5	
Inside Diameter	As Forged (1)	16 & below	±1	Gasket Seat	C1, C2, C3, C4	Finish	500 & below	±0.3
		over 16 thru 63	±1.5				over 500 thru 1000	±0.35
		over 63 thru 125	±2				over 1000 thru 1500	±0.4
		over 125 thru 150	±2.5				over 1500	±0.5
		over 250 thru 500	±3				over 500 thru 1000	±0.5
	Slip-on Flange do	100 & below	±0.5		f4, f3	Finish	8 & below	±0.2
		over 100 thru 400	±0.5		over 8	±0.25		
		over 400 thru 600	±1.0		g	Finish	200 & below	±0.8
		over 600 thru 800	±1.5				over 200 thru 650	±0.9
		over 800 thru 1000	±2.0				over 650 thru 1000	±1
over 1000	±3.0	over 1000	±1.2					
Welding Neck Flange d	Finish	100 & below	±0.5	Thickness t	One-side Finish	20 & below	±0.5	
		over 100 thru 400	±1			over 20 thru 50	±0.5	
		over 400 thru 600	±1.5			over 50 thru 100	±0.5	
		over 600 thru 800	±2			20 & below	±1	
		over 800 thru 1000	±2.5			over 20 thru 50	±1.5	
Bolt Hole	Bolt Circle Diam. C	250 & below	±0.5		Hub Height T	Both-side Finish	over 50 thru 100	±0.5
		over 250 thru 550	±0.6				over 50 thru 100	±1
		over 550 thru 950	±0.8				over 50 thru 100	±1.5
		over 950 thru 1350	±1				over 100 thru 200	±2
		over 1350	±1.5				Flange with Pipe Inserted	Finish
Flange with Bolt-welded Pipe	Finish	250 & below	±0.5	over 50 thru 100	±1.5			
		over 250 thru 550	±0.6	over 100 thru 200	±2			

Notes:

- (1) This dimensional tolerance applies to the machined surface, as required.
 - (2) This dimension d has been specified only for the flange, of which the bore part is cylindrical in shape.
- REMARKS**
- (1) The dimensions d of bore part of the solid flanges with surface, as forged of valves, Pumps, etc. are allowed up to plus 100% of the above dimensional tolerance. Provided that the required thickness shall be free from its influence.
 - (2) The thickness of flange of valve and the like, to which the dimension between flange faces is limited. To a fixed valve, are allowed up to plus 100% of the above dimensional tolerance in the column of thickness.
 - (3) In the case of spot facing of the single surface finishing the thickness of spot facing is allowed up to 70% of the dimensional tolerance in the above column of thickness in negative side.

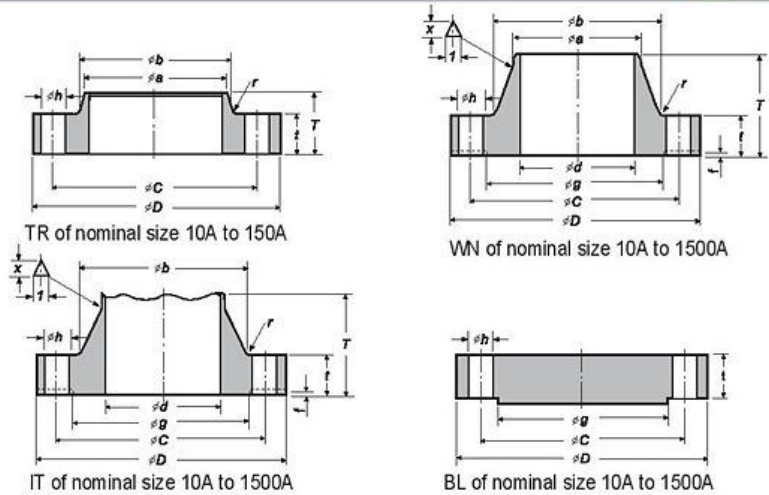


JIS B 2220-2004 STEEL PIPE FLANGES

Unit:mm

Nominal Size	Outside Diam. of Applicable Pipe	Outside Diam. of Flange	Inside Diam. of Flange				Thickness of Flange		Total Length of Flange				Diameter of hub			
			SO, SW	LJ	SW, WN	IT	Except for BL	BL	SO, SW LJ, TR	WN	Small Diameter		Large Diameter			
											a	b	a	b ⁽³⁾		
10	17.3	75	17.8	-	12.7	10	9	9	13	24	23	17.3	26	26		
15	21.7	80	22.2	23.4	16.1	15	9	9	13	25	27	21.7	30	31		
20	27.2	85	27.7	28.9	21.6	20	10	10	15	28	33	27.2	36	38		
25	34.0	95	34.5	35.6	27.6	25	10	10	17	30	41	34.0	44	46		
32	42.7	115	43.2	44.3	35.7	32	12	12	19	33	50	42.7	53	55		
40	48.6	120	49.1	50.4	41.6	40	12	12	20	34	56	48.6	60	62		
50	60.5	130	61.1	62.7	52.9	50	14	14	24	36	69	60.5	73	73		
65	76.3	155	77.1	78.7	67.9	65	14	14	27	39	86	76.3	91	91		
80	89.1	180	90.0	91.6	80.7	80	14	14	30	41	99	89.1	105	105		
90	101.6	190	102.6	104.1	93.2	90	14	14	-	41	-	101.6	-	117		
100	114.3	200	115.4	116.9	105.3	100	16	16	36	41	127	114.3	130	128		
125	139.8	235	141.2	143.0	130.8	125	16	16	40	43	154	139.8	161	156		
150	165.2	265	166.6	168.4	155.2	150	18	18	40	49	182	165.2	189	184		
175	190.7	300	192.1	-	180.1	175	18	18	-	49	-	190.7	-	209		
200	216.3	320	218.0	219.5	204.7	200	20	20	-	53	-	216.3	-	235		
225	241.8	345	243.7	-	229.4	225	20	20	-	54	-	241.8	-	261		
250	267.4	385	269.5	271.7	254.2	250	22	22	-	61	-	267.4	-	290		
300	318.5	430	321.0	322.8	304.7	300	22	22	-	62	-	318.5	-	342		
350	355.6	480	358.1	360.2	339.8	340	24	24	-	73	-	355.6	-	385		
400	406.4	540	409.0	411.2	390.6	400	24	24	-	76	-	406.4	-	438		
450	457.2	605	460.0	462.3	441.4	450	24	24	40	79	495	457.2	500	491		
500	508.0	655	511.0	514.4	492.2	500	24	24	40	79	546	508.0	552	541		
550	558.8	720	562.0	565.2	543.0	550	26	26	42	81	597	558.8	603	593		
600	609.6	770	613.0	616.0	593.8	600	26	26	44	81	648	609.6	654	643		
650	660.4	825	664.0	-	644.6	650	26	28	48	85	702	660.4	708	698		
700	711.2	875	715.0	-	695.4	700	26	30	48	94	751	711.2	758	748		
750	762.0	945	766.0	-	746.2	750	28	32	52	100	802	762.0	810	802		
800	812.8	995	817.0	-	797.0	800	28	34	52	100	854	812.8	862	852		
850	863.6	1045	868.0	-	847.8	850	28	36	54	108	904	863.6	912	902		
900	914.4	1095	919.0	-	898.6	900	30	36	56	108	956	914.4	964	952		
1000	1016.0	1195	1021.0	-	1000.2	1000	32	40	60	116	1058	1016.0	1066	1052		
1100	1117.6	1305	1122.0	-	1098.6	1100	32	44	71	136	1158	1117.6	1170	1162		
1200	1219.2	1420	1224.0	-	1200.2	1200	34	48	77	155	1260	1219.2	1272	1272		
1350	1371.6	1575	1376.0	-	1346.2	1350	34	54	80	164	1414	1371.6	1426	1427		
1500	1524.0	1730	1529.0	-	1498.6	1500	36	58	86	172	1568	1524.0	1580	1582		

Notes :
 (1) The facing of flanges shall conform to JIS B2202-2004
 (2) Adjustment shall be made according to the inside diameter of the steel pipes to be joined with

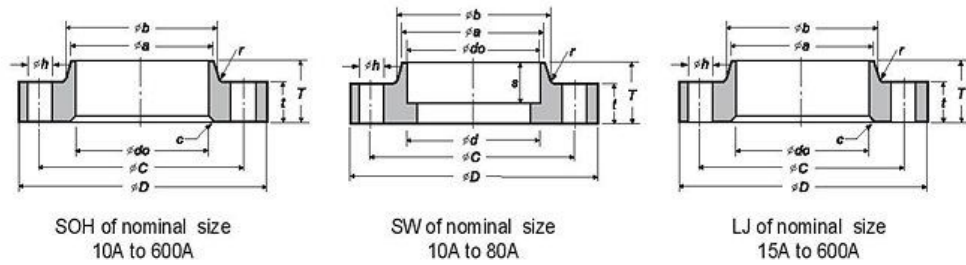


JIS B 2220-2004 STEEL PIPE FLANGES

Unit:mm

Nominal Size	Depth of Socket	Nominal designation of thread	Cham-fering ⁽¹⁾	Radius of Fillet			Raised face		Diameter of Bolt		Nom-inal Bolt Size	Taper of hub		Substitutional Diameter of WN ⁽⁵⁾		
				LJ	SO, SW, LJ, TR	WN, IT	Height	Diameter	Diam. of Bolt Circle	Num. of Bolt Holes		Diam. of Bolt Hole	WN	IT (Min)	Thickness	Taper of hub
10	10	Rc 3/8	-	4	4	4	1	39	55	4	12	M10	1.25	1.25	-	-
15	10	Rc 1/2	3	4	4	4	1	44	60	4	12	M10	1.25	1.25	-	-
20	13	Rc 3/4	3	4	4	4	1	49	65	4	12	M10	1.25	1.25	-	-
25	13	Rc 1	3	4	4	4	1	59	75	4	12	M10	1.25	1.25	-	-
32	13	Rc1 1/4	4	4	4	4	2	70	90	4	15	M12	1.25	1.25	-	-
40	13	Rc1 1/2	4	4	4	4	2	75	95	4	15	M12	1.25	1.25	-	-
50	16	Rc 2	4	4	4	4	2	85	105	4	15	M12	1.25	1.25	-	-
65	16	Rc2 1/2	5	4	4	4	2	110	130	4	15	M12	1.25	1.25	-	-
80	16	Rc 3	5	4	4	4	2	121	145	4	19	M16	1.25	1.25	-	-
90	-	-	5	-	4	4	2	131	155	4	19	M16	1.25	1.25	-	-
100	-	Rc 4	5	4	4	4	2	141	165	8	19	M16	1.25	1.25	-	-
125	-	Rc 5	6	4	4	4	2	176	200	8	19	M16	1.25	1.25	-	-
150	-	Rc 6	6	4	4	4	2	206	230	8	19	M16	1.25	1.25	-	-
175	-	-	-	-	4	4	2	232	260	8	23	M20	1.25	1.25	-	-
200	-	-	6	-	4	4	2	252	280	8	23	M20	1.25	1.25	-	-
225	-	-	-	-	4	4	2	277	305	12	23	M20	1.25	1.25	-	-
250	-	-	6	-	4	4	2	317	345	12	23	M20	1.25	1.25	-	-
300	-	-	9	-	4	4	3	360	390	12	23	M20	1.25	1.25	-	-
350	-	-	9	-	4	3	403	435	12	25	M22	1.25	1.25	-	-	
400	-	-	9	-	4	3	463	495	16	25	M22	1.25	1.25	-	-	
450	-	-	9	5	5	3	523	555	16	25	M22	1.25	1.25	-	-	
500	-	-	9	5	5	3	573	605	20	25	M22	1.25	1.25	-	-	
550	-	-	9	5	5	3	630	665	20	27	M24	1.25	1.25	-	-	
600	-	-	9	5	5	3	680	715	20	27	M24	1.25	1.25	-	-	
650	-	-	-	5	5	3	735	770	24	27	M24	1.25	1.25	-	-	
700	-	-	-	5	5	3	785	820	24	27	M24	1.5	1.5	36	1.25	
750	-	-	-	5	5	3	840	880	24	33	M30	1.5	1.5	38	1.25	
800	-	-	-	5	5	3	890	930	24	33	M30	1.5	1.5	38	1.25	
850	-	-	-	5	5	3	940	980	24	33	M30	1.75	1.75	38	1.50	
900	-	-	-	5	5	3	990	1030	24	33	M30	1.75	1.75	40	1.50	
1000	-	-	-	5	5	3	1090	1130	28	33	M30	2	2	50	1.50	
1100	-	-	-	7	8	3	1200	1240	28	33	M30	2	2	56	1.50	
1200	-	-	-	7	8	3	1305	1350	32	33	M30	2	2	62	1.50	
1350	-	-	-	7	8	3	1460	1505	32	33	M30	2	2	62	1.50	
1500	-	-	-	7	10	3	1615	1660	36	33	M30	2	2	66	1.50	

(3) With IT flanges, this dimension is shown for reference.
 (4) This may be rounded off with the dimension c as a guide.
 (5) This dimension may be determined on the agreement between the parties concerned

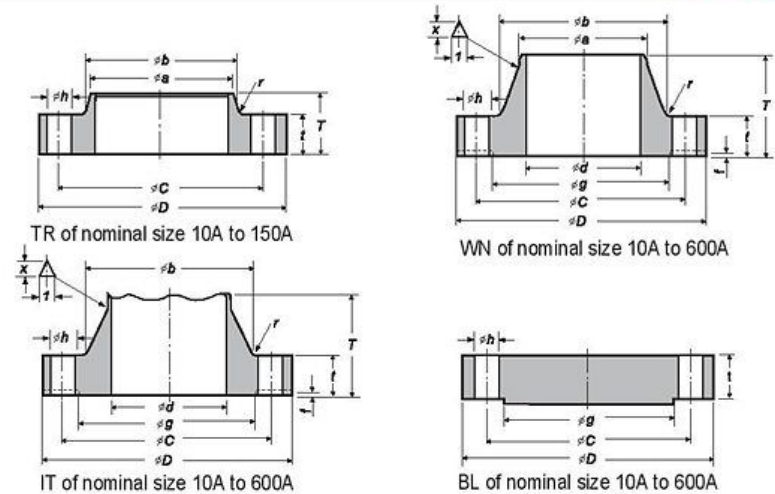


JIS B 2220-2004 STEEL PIPE FLANGES

Unit:mm

Nominal Size	Outside Dim. of Applicable Pipe	Outside Dim. of Flange	Inside Diam. of Flange				Thickness of Flange	Total Length of Flange			Diameter of hub				
			SO,SW	LJ	SW,WN	IT		SO, SW	LJ	TR	WN	Small Diameter		Large Diameter	
												SO, SW	LJ	SO, SW	WN
A	D	d _o	d _o	d _o ⁽¹⁾	d	t	T	T	T	a	a	b	b ⁽²⁾		
10	17.3	90	17.8	-	12.7	10	12	16	16	31	26	17.3	28	29	
15	21.7	95	22.2	23.4	16.1	15	12	16	16	32	30	21.7	32	34	
20	27.2	100	27.7	28.9	21.4	20	14	20	20	34	38	27.2	42	39	
25	34.0	125	34.5	35.6	27.2	25	14	20	20	36	46	34	50	47	
32	42.7	135	43.2	44.3	35.5	32	16	22	22	39	56	42.7	60	56	
40	48.6	140	49.1	50.4	41.2	40	16	24	24	39	62	48.6	66	62	
50	60.5	155	61.1	62.7	52.7	50	16	24	24	40	76	60.5	80	75	
65	76.3	175	77.1	78.7	65.9	65	18	26	27	46	94	76.3	98	92	
80	89.1	200	90.0	91.6	78.1	80	20	28	30	49	108	89.1	112	105	
90	101.6	210	102.6	104.1	90.2	90	20	30	-	50	120	101.6	124	118	
100	114.3	225	115.4	116.9	102.3	100	22	34	36	56	134	114.3	138	134	
125	139.8	270	141.2	143.0	126.6	125	22	34	40	60	164	139.8	170	162	
150	165.2	305	166.6	168.4	151.0	150	24	38	40	69	196	165.2	202	192	
200	216.3	350	218.0	219.5	199.9	200	26	40	-	73	244	216.3	252	244	
250	267.4	430	269.5	271.7	248.8	250	28	44	-	81	304	267.4	312	298	
300	318.5	480	321.0	322.8	297.9	300	30	48	-	88	354	318.5	364	352	
350	355.6	540	358.1	360.2	333.4	335	34	52	-	104	398	355.6	408	398	
400	406.4	605	409.0	411.2	381.0	380	38	60	-	115	446	406.4	456	452	
450	457.2	675	460.0	462.3	431.8	430	40	64	-	126	504	457.2	514	510	
500	508.0	730	511.0	514.4	482.6	480	42	68	-	128	558	508	568	561	
550	558.8	795	562.0	565.2	533.4	530	44	70	-	135	612	558.8	622	616	
600	609.6	845	613.0	616.0	584.2	580	46	74	-	141	666	609.6	676	670	

- Notes :
- (1) The facing of flanges shall conform to JIS B2202-2004
 - (2) Adjustment shall be made according to the inside diameter of the steel pipes to be joined with.

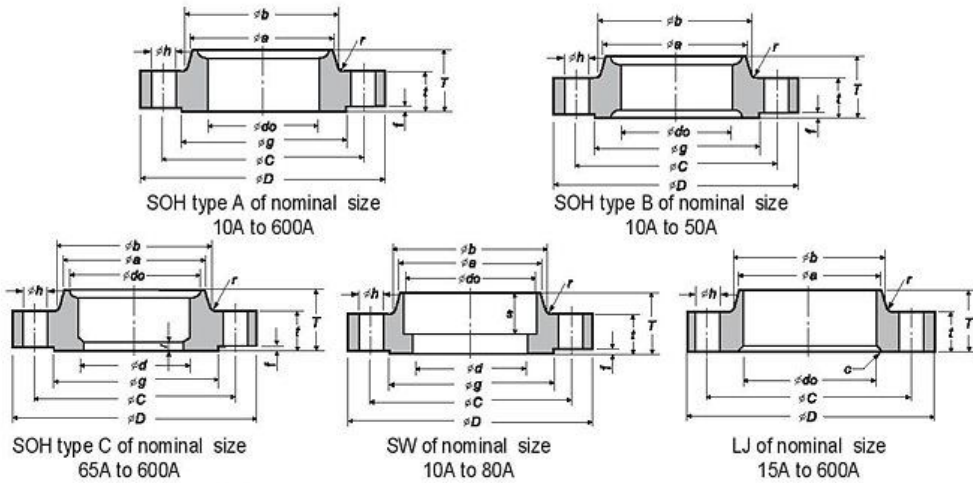


JIS B 2220-2004 STEEL PIPE FLANGES

Unit:mm

Nominal Size	Depth of Socket	Nominal designation of thread	Cham-ferring ⁽⁴⁾	Radius of Fillet	Raised face		Diameter of Bolt			Nom-inal Bolt Size	Taper of hub	
					Height	Diameter	Diam. of Bolt Circle	Num. of Bolt Holes	Diam. of Bolt Hole		WN	IT (Min)
A	S		c	r	f	g	C		h		x	x
10	10	Rc 3/8	-	4	1	46	65	4	15	M12	1.25	1.25
15	10	Rc 1/2	3	4	1	51	70	4	15	M12	1.25	1.25
20	13	Rc 3/4	3	4	1	56	75	4	15	M12	1.25	1.25
25	13	Rc 1	3	4	1	67	90	4	19	M16	1.25	1.25
32	13	Rc1 1/4	4	5	2	76	100	4	19	M16	1.25	1.25
40	13	Rc1 1/2	4	5	2	81	105	4	19	M16	1.25	1.25
50	16	Rc 2	4	5	2	96	120	8	19	M16	1.25	1.25
65	16	Rc2 1/2	5	5	2	116	140	8	19	M16	1.25	1.25
80	16	Rc 3	5	6	2	132	160	8	23	M20	1.25	1.25
90	-	-	5	6	2	145	170	8	23	M20	1.25	1.25
100	-	Rc 4	5	6	2	160	185	8	23	M20	1.25	1.25
125	-	Rc 5	6	6	2	195	225	8	25	M22	1.25	1.25
150	-	Rc 6	6	6	2	230	260	12	25	M22	1.25	1.25
200	-	-	6	6	2	275	305	12	25	M22	1.25	1.25
250	-	-	6	6	2	345	380	12	27	M24	1.25	1.25
300	-	-	9	8	3	395	430	16	27	M24	1.25	1.25
350	-	-	9	8	3	440	480	16	33	M30×3	1.25	1.25
400	-	-	9	10	3	495	540	16	33	M30×3	1.25	1.25
450	-	-	9	10	3	560	605	20	33	M30×3	1.25	1.25
500	-	-	9	10	3	615	660	20	33	M30×3	1.25	1.25
550	-	-	9	10	3	670	720	20	39	M36×3	1.25	1.25
600	-	-	9	10	3	720	770	24	39	M36×3	1.25	1.25

- (3) With IT flanges, this dimension is shown for reference.
 (4) This may be rounded off with the dimension c as a radius.



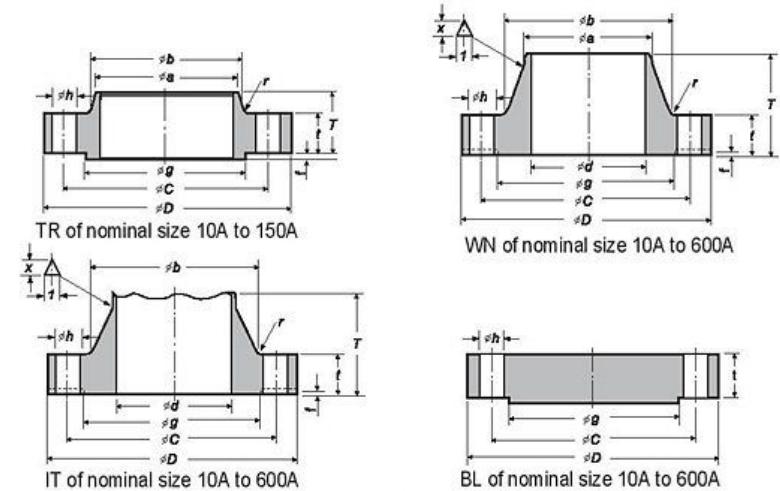
JIS B 2220-2004 STEEL PIPE FLANGES

Unit:mm

Nominal Size	Outside Diam. of Applicable Pipe	Outside Diam. of Flange	Inside Diam. of Flange				Thickness of Flange		Total Length of Flange		Diameter of hub				
			SO,SW	LJ	SW,WN	IT	Except for BL	BL	SO, SW	LJ, TR	WN	Small Diameter		Large Diameter	
												SO, SW	WN	SO, SW	WN, IT
A	D	d _o	d _o	d _o ⁽¹⁾	d	t	t	T	T	a	a	b	b ⁽²⁾		
10	17.3	90	17.8	-	12.7	10	14	14	20	33	30	17.3	32	29	
15	21.7	95	22.2	23.4	16.1	15	14	14	20	34	34	21.7	36	34	
20	27.2	100	27.7	28.9	21.4	20	16	16	22	36	40	27.2	42	39	
25	34.0	125	34.5	35.6	27.2	25	16	16	24	38	48	34	50	47	
32	42.7	135	43.2	44.3	35.5	32	18	18	26	41	56	42.7	60	56	
40	48.6	140	49.1	50.4	41.2	40	18	18	26	41	62	48.6	66	62	
50	60.5	155	61.1	62.7	52.7	50	18	18	26	42	76	60.5	80	75	
65	76.3	175	77.1	78.7	65.9	65	20	20	30	48	100	76.3	104	92	
80	89.1	200	90.0	91.6	78.1	80	22	22	34	51	113	89.1	117	105	
90	101.6	210	102.6	104.1	90.2	90	24	24	36	54	126	101.6	130	118	
100	114.3	225	115.4	116.9	102.3	100	24	24	36	58	138	114.3	142	134	
125	139.8	270	141.2	143.0	126.6	125	26	26	40	64	166	139.8	172	162	
150	165.2	305	166.6	168.4	151.0	150	28	28	42	73	196	165.2	202	192	
200	216.3	350	218.0	219.5	199.9	200	30	30	46	77	244	216.3	252	244	
250	267.4	430	269.5	271.7	248.8	250	34	34	52	87	304	267.4	312	298	
300	318.5	480	321.0	322.8	297.9	300	36	36	56	94	354	318.5	364	352	
350	355.6	540	358.1	360.2	333.4	335	40	40	62	110	398	355.6	408	398	
400	405.4	605	409.0	411.2	381.0	380	46	46	70	123	446	405.4	456	452	
450	457.2	675	460.0	462.3	431.8	430	48	48	78	134	504	457.2	514	510	
500	508.0	730	511.0	514.4	482.6	480	50	50	84	136	558	508	568	561	
550	558.8	795	562.0	565.2	533.4	530	52	52	90	143	612	558.8	622	616	
600	609.6	845	613.0	616.0	584.2	580	54	56	96	149	666	609.6	676	670	

Notes :

- (1) The facing of flanges shall conform to JIS B2202-2004
- (2) Adjustment shall be made according to the inside diameter of the steel pipes to be joined with.



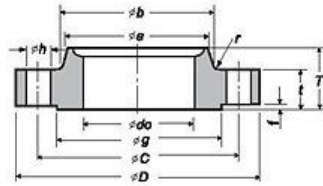
JIS B 2220-2004 STEEL PIPE FLANGES

Unit:mm

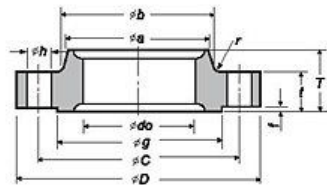
Nominal Size	Depth of Socket	Nominal designation of thread	Cham-ferring ⁽¹⁾	Radius of Fillet	Raised face		Diameter of Bolt			Nom -inal Bolt Size	Stopper SOH type-C	Taper of hub	
					Height	Diameter	Diam. of Bolt Circle	Num. of Bolt Holes	Diam. of Bolt Hole			WN	IT (Min)
A	S		c	r	f	g	C	h		l	x	x	
10	10	Rc 3/8	-	4	1	46	65	4	15	M12	-	1.25	1.25
15	10	Rc 1/2	3	4	1	51	70	4	15	M12	-	1.25	1.25
20	13	Rc 3/4	3	4	1	56	75	4	15	M12	-	1.25	1.25
25	13	Rc 1	3	4	1	67	90	4	19	M16	-	1.25	1.25
32	13	Rc1 1/4	4	5	2	76	100	4	19	M16	-	1.25	1.25
40	13	Rc1 1/2	4	5	2	81	105	4	19	M16	-	1.25	1.25
50	16	Rc 2	4	5	2	96	120	8	19	M16	-	1.25	1.25
65	16	Rc2 1/2	5	5	2	116	140	8	19	M16	6	1.25	1.25
80	16	Rc 3	5	6	2	132	160	8	23	M20	6	1.25	1.25
90	-	-	5	6	2	145	170	8	23	M20	6	1.25	1.25
100	-	Rc 4	5	6	2	160	185	8	23	M20	6	1.25	1.25
125	-	Rc 5	6	6	2	195	225	8	25	M22	6	1.25	1.25
150	-	Rc 6	6	6	2	230	260	12	25	M22	6	1.25	1.25
200	-	-	6	6	2	275	305	12	25	M22	6	1.25	1.25
250	-	-	6	6	2	345	380	12	27	M24	6	1.25	1.25
300	-	-	9	8	3	395	430	16	27	M24	6	1.25	1.25
350	-	-	9	8	3	440	480	16	33	M30×3	6	1.25	1.25
400	-	-	9	10	3	495	540	16	33	M30×3	7	1.25	1.25
450	-	-	9	10	3	560	605	20	33	M30×3	7	1.25	1.25
500	-	-	9	10	3	615	660	20	33	M30×3	7	1.25	1.25
550	-	-	9	10	3	670	720	20	39	M36×3	7	1.25	1.25
600	-	-	9	10	3	720	770	24	39	M36×3	7	1.25	1.25

(3) With IT flanges, this dimension is shown for reference.

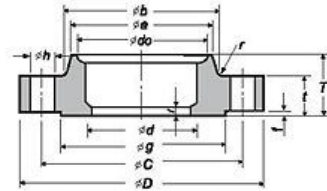
(4) This may be rounded off with the dimension c as a radius.



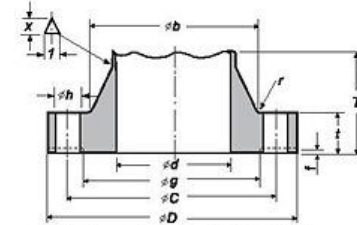
SOH type A of nominal size 10A to 400A



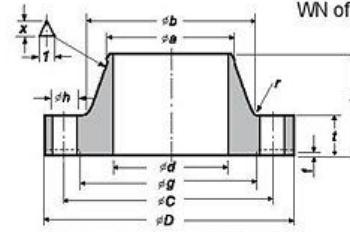
SOH type B of nominal size 10A to 50A



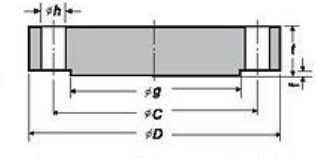
SOH type C of nominal size 65A to 400A



WN of nominal size 15A to 400A



IT of nominal size 15A to 400A



BL of nominal size 10A to 400A

JIS B 2220-2004 STEEL PIPE FLANGES

Unit:mm

Nominal Size	Outside Diam. of Applicable Pipe	Outside Diam. of Flange	Inside Diam. of Flange			Thickness of Flange	Total Length of Flange		Diameter of hub				Radius of Fillet		
			SOH	SOH,WN	IT		SO, WN, IT, BL	SOH	WN	Small Diameter		Large Diameter		SOH	WN, IT
										SO	WN	SO	WN, IT		
A		D	do	d ⁽¹⁾	d	T	T	a	a	b	b ⁽²⁾	r	r ⁽³⁾		
10	17.3	110	17.8	-	-	16	24	-	30	-	34	-	4		
15	21.7	115	22.2	16.1	15	18	26	45	36	21.7	40	40	5		
20	27.2	120	27.7	21.4	20	18	28	45	42	27.2	46	44	5		
25	34.0	130	34.5	27.2	25	20	30	48	50	34.0	54	52	5		
32	42.7	140	43.2	35.5	32	22	32	52	60	42.7	64	62	6		
40	48.6	160	49.1	41.2	40	22	34	54	66	48.6	70	70	6		
50	60.5	165	61.1	52.7	50	22	36	57	82	60.5	86	84	6		
65	76.3	200	77.1	65.9	65	26	40	69	102	76.3	106	104	8		
80	89.1	210	90.0	78.1	80	28	44	73	115	89.1	121	118	8		
90	101.6	230	102.6	90.2	90	30	46	74	128	101.6	134	130	8		
100	114.3	240	115.4	102.3	100	32	48	76	141	114.3	147	142	8		
125	139.8	275	141.2	126.6	125	36	54	86	166	139.8	172	172	8		
150	165.2	325	166.6	151.0	150	38	58	95	196	165.2	204	202	8		
200	216.3	370	218.0	199.9	200	42	64	102	248	216.3	256	254	8		
250	267.4	450	269.5	248.8	250	48	72	118	306	267.4	314	312	10		
300	318.5	515	321.0	297.9	300	52	78	127	360	318.5	370	366	10		
350	355.6	560	358.1	333.4	335	54	84	134	402	355.6	412	406	12		
400	406.4	630	409.0	381.0	380	60	92	149	456	406.4	468	462	15		

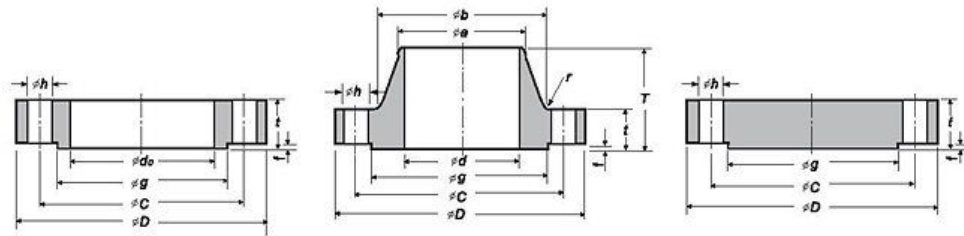
Notes :

- (1) The facing of flanges shall conform to JIS B2202-2004
- (2) Adjustment shall be made according to the inside diameter of the steel pipes to be joined with.
- (3) With IT flanges, this dimension is shown for reference.

JIS B 2220-2004 STEEL PIPE FLANGES

Unit:mm

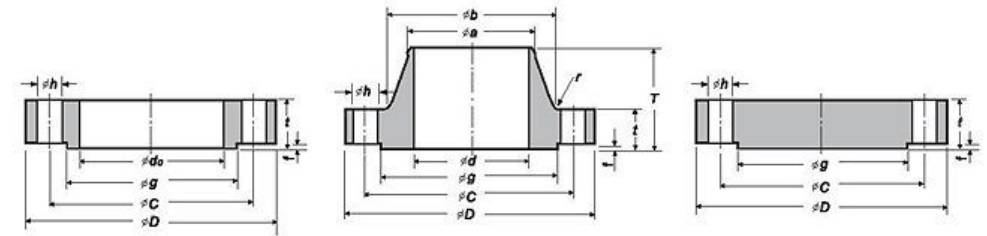
Nominal Size	Raised face		Diameter of Bolt			Nominal Bolt Size	Stopper SOH Type-C	Taper of hub	
	Height	diameter	Diam. of Bolt Circle	Num. of Bolt Holes	Diam. of Bolt Holes			WN	IT (Min)
A	f	g	C		h			x	x
10	1	52	75	4	19	M16	-	-	-
15	1	55	80	4	19	M16	-	1.25	1.25
20	1	60	85	4	19	M16	-	1.25	1.25
25	1	70	95	4	19	M16	-	1.25	1.25
32	2	80	105	4	19	M16	-	1.25	1.25
40	2	90	120	4	23	M20	-	1.25	1.25
50	2	105	130	8	19	M16	-	1.25	1.25
65	2	130	160	8	23	M20	6	1.25	1.25
80	2	140	170	8	23	M20	6	1.25	1.25
90	2	150	185	8	25	M22	6	1.25	1.25
100	2	160	195	8	25	M22	6	1.25	1.25
125	2	195	230	8	25	M22	6	1.25	1.25
150	2	235	275	12	27	M24	6	1.25	1.25
200	2	280	320	12	27	M24	6	1.25	1.25
250	2	345	390	12	33	M30×3	6	1.25	1.25
300	3	405	450	16	33	M30×3	6	1.25	1.25
350	3	450	495	16	33	M30×3	6	1.25	1.25
400	3	510	560	16	39	M36×3	7	1.25	1.25



SOP of nominal size
10A to 400A

WN of nominal size
10A to 400A

BL of nominal size
10A to 400A



SOP of nominal size
10A to 400A

WN of nominal size
10A to 400A

BL of nominal size
10A to 400A

JIS B 2238-1996

Unit:mm

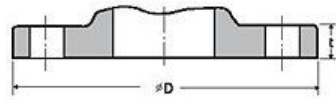
Nominal Size	Outside Diam. of Applicable Pipe	Outside Diam. of Flange	Thickness of Flange	Inside, Diam. of Flange		Diameter of Hub		Total Length of Flange	Raised face		Diameter of Bolt			Approx Weight (Kg)		
				SOP	WN	a	b		f	g	C	Num. of Bolt Holes	Diam. of Bolt Holes	SOP	BL	WN
10	17.3	110	18	17.8	-	17.3	38	53	1	52	75	4	19	1.2	1.2	-
15	21.7	115	20	22.2	15.8	21.7	40	53	1	55	80	4	19	1.3	1.4	1.5
20	27.2	120	20	27.7	21.1	27.2	45	58	1	60	85	4	19	1.5	1.6	1.7
25	34.0	130	22	34.5	26.8	34.0	54	63	1	70	95	4	19	1.9	2.1	2.2
32	42.7	140	24	43.2	35.1	42.7	62	69	2	80	105	4	19	2.4	2.7	2.8
40	48.6	160	24	49.1	40.7	48.6	72	72	2	90	120	4	23	3.1	3.5	3.5
50	60.5	165	26	61.1	52.2	60.5	88	75	2	105	130	8	19	3.3	3.9	4.1
65	76.3	200	30	77.1	65.3	76.3	108	81	2	130	160	8	23	5.5	6.6	6.9
80	89.1	210	32	90.0	76.4	89.1	119	85	2	140	170	8	23	6.4	8.0	7.9
90	101.6	230	34	102.6	89.5	101.6	130	88	2	150	185	8	25	7.9	10.1	9.4
100	114.3	250	36	115.4	101.5	114.3	146	104	2	165	205	8	25	9.9	12.9	12.3
125	139.8	300	40	141.2	-	-	-	-	2	200	250	8	27	15.9	20.8	-
150	165.2	355	44	166.6	150.0	165.2	215	120	2	240	295	12	33	23.2	30.8	30.6
200	216.3	405	50	218.0	198.7	216.3	270	135	2	290	345	12	33	32.1	46.8	41.6
250	267.4	475	56	269.5	247.5	267.4	333	154	2	355	410	12	33	48.6	73.8	68.1
300	318.5	540	60	321.0	296.4	318.5	400	159	3	410	470	16	39	61.1	99.4	96.0
350	355.6	585	64	358.1	331.8	355.6	432	168	3	455	515	16	39	75.2	126.1	115.0
400	406.4	645	70	409.0	379.1	406.4	466	181	3	515	570	16	39	97.4	170.0	143.0

JIS B 2238-1996

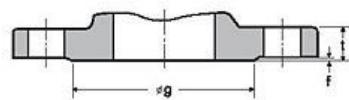
Unit:mm

Nominal Size	Outside Diam. of Applicable Pipe	Outside Diam. of Flange	Thickness of Flange	Inside, Diam. of Flange		Diameter of Hub		Total Length of Flange	Raised face		Diameter of Bolt			Approx Weight (Kg)		
				SOP	WN	a	b		f	g	C	Num. of Bolt Holes	Diam. of Bolt Holes	SOP	BL	WN
10	17.3	115	23	17.8	-	17.3	40	61	1	52	80	4	19	1.6	1.7	-
15	21.7	120	23	22.2	15.8	21.7	42	61	1	55	85	4	19	1.8	1.9	1.9
20	27.2	135	25	27.7	21.1	27.2	46	71	1	60	95	4	23	2.4	2.5	2.5
25	34.0	140	27	34.5	26.8	34.0	56	74	1	70	100	4	23	2.7	2.9	3.5
32	42.7	150	30	43.2	35.1	42.7	60	75	2	80	110	4	23	3.4	3.8	3.7
40	48.6	175	32	49.1	40.7	48.6	75	85	2	90	130	4	25	5.1	5.6	5.5
50	60.5	185	34	61.1	52.2	60.5	92	104	2	105	145	8	23	5.5	6.3	6.5
65	76.3	220	38	77.1	65.3	76.3	118	107	2	130	175	8	25	5.8	7.2	10.3
80	89.1	230	40	90.0	76.4	89.1	130	120	2	140	185	8	25	9.9	11.9	12.4
90	101.6	255	42	102.6	89.5	101.6	140	126	2	150	205	8	27	12.7	15.4	15.2
100	114.3	270	44	115.4	101.5	114.3	154	126	2	165	220	8	27	14.7	18.3	17.7
125	139.8	325	50	141.2	-	-	-	-	2	200	265	8	33	23.8	30.0	-
150	165.2	365	54	166.6	150.0	165.2	230	173	2	240	305	12	33	30.9	40.2	39.4
200	216.3	425	60	218.0	198.7	216.3	280	215	2	290	360	12	33	44.6	62.3	60.1
250	267.4	500	68	269.5	247.5	267.4	348	256	2	355	430	12	39	67.1	97.7	114.0
300	318.5	560	77	321.0	296.4	318.5	402	286	3	410	485	16	39	88.9	138.1	154.0
350	355.6	615	81	358.1	331.8	355.6	438	301	3	455	530	16	46	108.5	172.9	191.0
400	406.4	680	89	409.0	379.1	406.4	490	314	3	515	590	16	46	144.2	236.5	247.0

JIS FLANGE
FACING 1

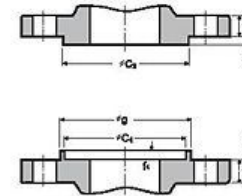


Full face(FF)

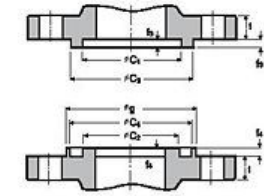


Raised face(RF)

JIS B2220 / KS B1503
FACING 2



Male-female face(MF)



Tongue and groove(TG)

KS / JIS FLANGES

Unit:mm

Nominal Size A	Raised face (RF)									
	Nominal pressure									
	5K		10K		16K		20K		30K	
	g	f	g	f	g	f	g	f	g	f
10	39	1	46	1	46	1	46	1	52	1
15	44	1	51	1	51	1	51	1	55	1
20	49	1	56	1	56	1	56	1	60	1
25	59	1	67	1	67	1	67	1	70	1
32	70	2	76	2	76	2	76	2	80	2
40	75	2	81	2	81	2	81	2	90	2
50	85	2	96	2	96	2	96	2	105	2
65	110	2	116	2	116	2	116	2	130	2
80	121	2	126	2	132	2	132	2	140	2
90	131	2	136	2	145	2	145	2	150	2
100	141	2	151	2	160	2	160	2	160	2
125	176	2	182	2	195	2	195	2	195	2
150	206	2	212	2	230	2	230	2	235	2
175	232	2	237	2	-	-	-	-	-	-
200	252	2	262	2	275	2	275	2	280	2
225	177	2	282	2	-	-	-	-	-	-
250	317	2	324	2	345	2	345	2	345	2
300	360	3	368	3	395	3	395	3	405	3
350	403	3	413	3	440	3	440	3	450	3
400	463	3	475	3	495	3	495	3	510	3
450	523	3	530	3	560	3	560	3	-	-
500	573	3	585	3	615	3	615	3	-	-
550	630	3	640	3	670	3	670	3	-	-
600	680	3	690	3	720	3	720	3	-	-
650	735	3	740	3	-	-	-	-	-	-
700	785	3	800	3	-	-	-	-	-	-
750	840	3	855	3	-	-	-	-	-	-
800	890	3	905	3	-	-	-	-	-	-
850	940	3	955	3	-	-	-	-	-	-
900	990	3	1005	3	-	-	-	-	-	-
1000	1090	3	1110	3	-	-	-	-	-	-
1100	1200	3	1220	3	-	-	-	-	-	-
1200	1305	3	1325	3	-	-	-	-	-	-
1350	1460	3	1480	3	-	-	-	-	-	-
1500	1615	3	1635	3	-	-	-	-	-	-

Notes :

- (1) Dimension D of full face (FF) shall conform to the outside diameter D of the flange of the attached table 4 to 7.
- (2) The thickness of the flange t shall conform to the attached tables 4 to 9.
- (3) Dimension g in male-female face (MF) and tongue and groove (TG) shall conform to dimension g of raised face (RF).

KS / JIS FLANGES

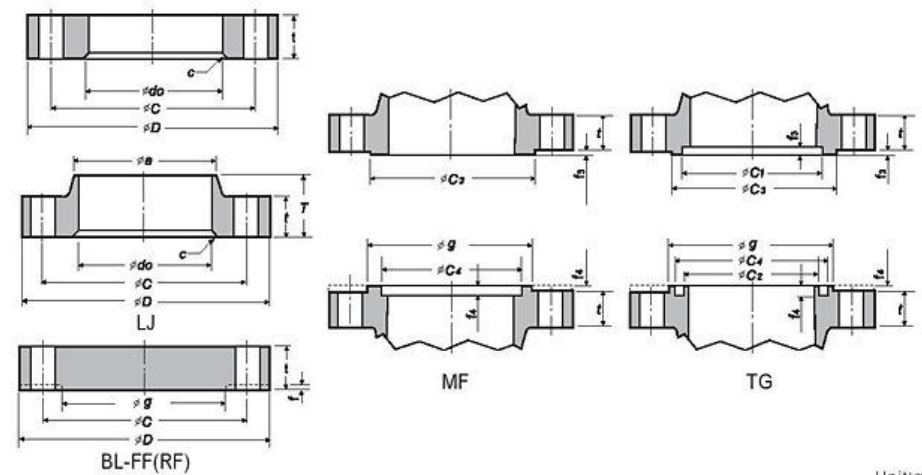
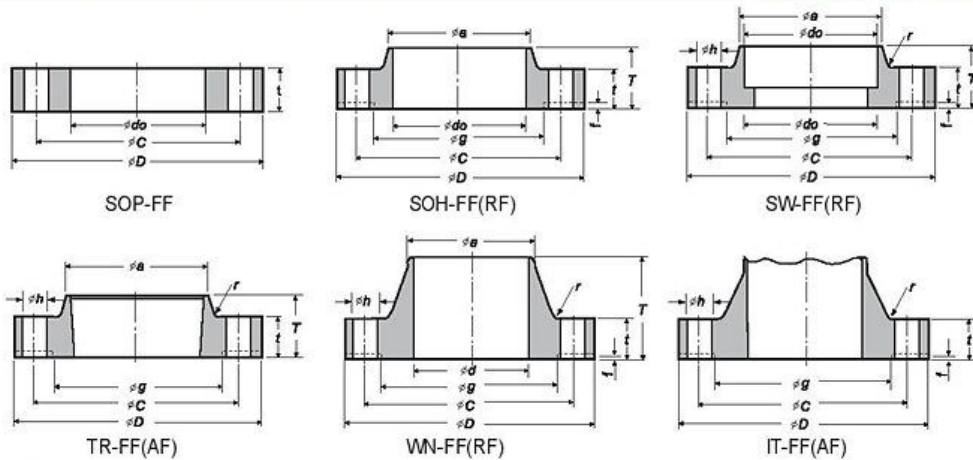
Unit:mm

Nominal Size A	Male-Female face (MF)				Tongue and groove (TG)					
	Male seat		Female seat		Tongue seat			Groove seat		
	(MF-M)		(MF-F)		(TG-T)			(TG-G)		
	C3	f3	C4	f4	C1	C2	f3	C2	C4	f4
10	38	6	39	5	28	38	6	27	39	5
15	42	6	43	5	32	42	6	31	43	5
20	50	6	51	5	38	50	6	37	51	5
25	60	6	61	5	45	60	6	44	61	5
32	70	6	71	5	55	70	6	54	71	5
40	75	6	76	5	60	75	6	59	76	5
50	90	6	91	5	70	90	6	69	91	5
65	110	6	111	5	90	110	6	89	111	5
80	120	6	121	5	100	120	6	99	121	5
90	130	6	131	5	110	130	6	109	131	5
100	145	6	146	5	125	145	6	124	146	5
125	175	6	176	5	150	175	6	149	176	5
150	215	6	216	5	190	215	6	189	216	5
175	-	-	-	-	-	-	-	-	-	-
200	260	6	261	5	230	260	6	229	261	5
225	-	-	-	-	-	-	-	-	-	-
250	325	6	326	5	295	325	6	294	326	5
300	375	6	376	5	340	375	6	339	376	5
350	415	6	416	5	380	415	6	379	416	5
400	475	6	476	5	440	475	6	439	476	5
450	523	6	524	5	483	523	6	482	524	5
500	575	6	576	5	535	575	6	534	576	5
550	625	6	626	5	585	625	6	584	626	5
600	675	6	676	5	635	675	6	634	676	5
650	727	6	728	5	682	727	6	681	728	5
700	777	6	778	5	732	777	6	731	778	5
750	832	6	833	5	787	832	6	786	833	5
800	882	6	883	5	837	882	6	836	883	5
850	934	6	935	5	889	934	6	888	935	5
900	987	6	988	5	937	987	6	936	988	5
1000	1092	6	1094	5	1042	1092	6	1040	1094	5
1100	1192	6	1194	5	1142	1192	6	1140	1194	5
1200	1292	6	1294	5	1237	1292	6	1235	1294	5
1350	1442	6	1444	5	1387	1442	6	1385	1444	5
1500	1592	6	1594	5	1537	1592	6	1535	1594	5

Notes :

- (4) The female seat(MF-F) and the groove (TG-G) for nominal pressure 5K and 10K shall be of the shapes shown by an imaginary line of the figures.

TOLERANCE FOR PIPE FLANGES



Dimensional tolerance on flange

Unit:mm

Dimension	Type of Flange	Gasket face	Dimensional Division	Dimensional Tolerance	
Outside diameter of flange	D	-	600 or less	± 1.5	
			Over 600	± 3	
	IT	-	1000 or less	Not specified for plus side values -2	
			Over 1000	Not specified for plus side values -3	
Diameter of bolt Centre circle	C	ALL	950 or less	± 0.8	
Pitch of bolt hole	-	ALL	Over 950	± 1.5	
Inside Diameter	do	SOP, SOH SW, LJ	-	± 0.8	
			100 or less	+0.5 0	
			Over 100 to and incl. 400	+1 0	
			Over 400 to and incl. 600	+1.5 0	
			Over 600 to and incl. 800	+2 0	
			Over 800 to and incl. 1000	+2.5 0	
Over 1000	+3 0				
Inside Diameter	d	SW, WN	-	± 0.8	
			100 or less	-0.5 0	
			Over 100 to and incl. 400	0 -1	
			Over 400 to and incl. 600	0 -1.5	
			Over 600 to and incl. 800	0 -2	
			Over 800 to and incl. 1000	0 -2.5	
Over 1000	-3 0				
Diameter of gasket face	g	SOH, SW, TR WN, IT, BL	RF, MF, TG	700 or less Over 700	± 0.8 ± 1.5
Diameter of gasket face	C1 C2 C3 C4	Except for LJ	MF, TG	500 or less	± 0.3
				Over 500 to and incl. 1000	± 0.35
				Over 1000 to and incl. 1500	± 0.4
				Over 1500	± 0.5
Height of gasket face	t	Except for LJ	MF, TG	-	+0.2

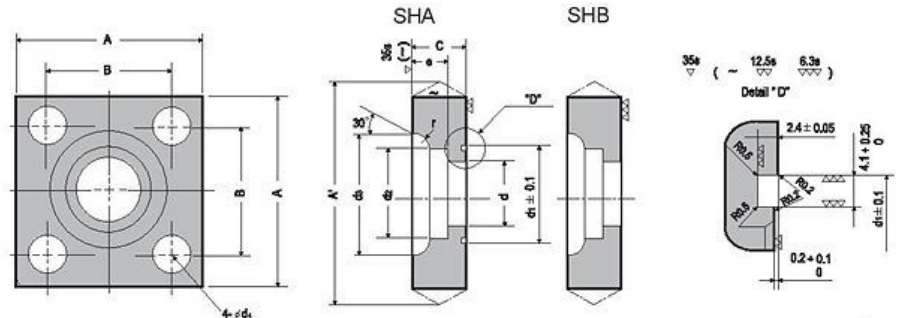
Unit:mm

Dimension	Type of Flange	Gasket face	Dimensional Division	Dimensional Tolerance	
Thickness of flange	t (1) (2)	Except for LJ	FF, MF, TG	20 or less	+1.5 0
				Over 20 to and incl. 50	+2 0
	LJ	-	20 or less	+1.5 0	
			Over 20 to and incl. 50	+2 0	
Thickness of flange	t-f (1) (2)	SOH, SW, TR WN, IT, BL	RF	Over 50	+3 0
				20 or less	+1.5 0
Diameter of hub Small diameter side	a	SOH, SW, LJ TR, WN	-	20 or less	+1.5 0
				Over 20 to and incl. 50	+2 0
				Over 50	+3 0
Total length of flange	T	SOH, SW, LJ, TR	-	220 or less	+2 0
				Over 220 to and incl. 650	+4 0
	WN	-	Over 650	+8 0	
Chamfering	c	LJ	-	200 or less	+2 0
				Over 200	+3 0
Parallelism between gasket face and bolt nut bearing surface	-	Except for LJ	ALL	6 or less	+0.8 0
				Over 6	+1.6 0
				Within 1 degree	

Notes :

- The tolerance on thickness of integral flange (IT) of piping parts with which the dimension between flange facings is limited to a specific value may be set at twice the specified value.
- For the spot facing of flanges, if they are so processed, the thickness is permitted in the minus side to 70% of the tolerance on thickness of spot facing given in the table.

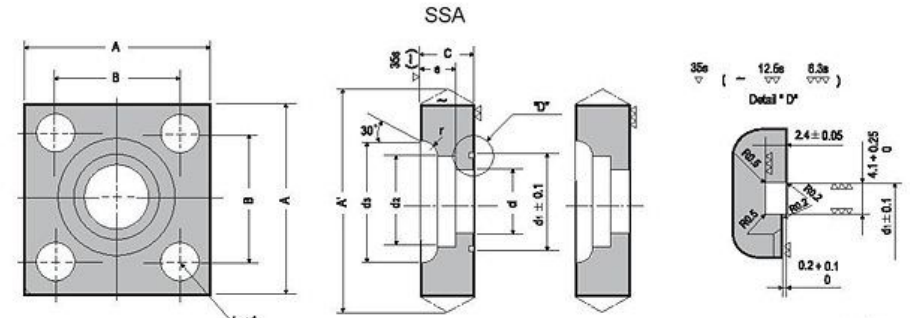
JIS B 2291 SQUARE FLANGES
FLANGE FOR OIL PRESSURE



Unit:mm

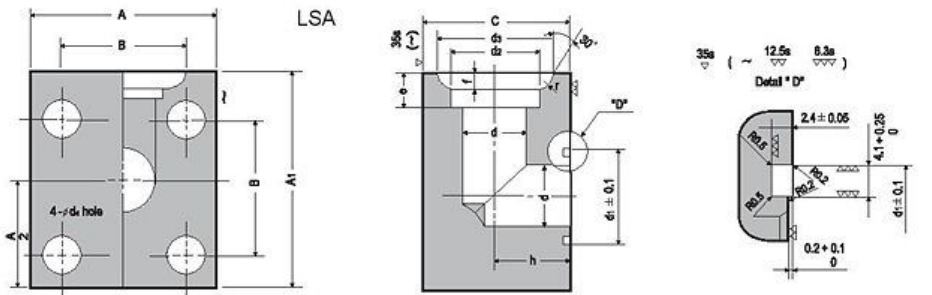
Nominal Bore	A	A' (MAX)	B	C	d	d ₁	d ₂	e	d ₃	d ₄	f	r	Weight (kg)	G개형 O형		
15	63		40	22	+0	16	30	22.2	+0.2	11	32	11	3.5	5	0.6	G25
20	68	±1	45	22	-1	20	35	27.7	-0	12	38	11	4.0	5	0.7	G30
25	80		53	28	+0	25	40	34.5		14	45	13	4.0	5	1.2	G35
32	90	±1.2	63	28	-1.5	31.5	45	43.2	+0.3	16	56	13	6.0	5	1.5	G40
40	100		70	36		37.5	55	49.1	-0	18	63	18	7.0	5	2.4	G50
50	112	±1.5	80	36	+0	47.5	65	61.1		20	75	18	7.0	5	2.8	G60
65	140		100	45	-2	60	80	77.1	+0.4	22	95	22	9.5	6	5.3	G75
80	155	±2	112	45		71	90	90.0	-0	25	108	24	11.0	6	6.2	G85

JIS B 2291 SQUARE FLANGES
FLANGE FOR OIL PRESSURE



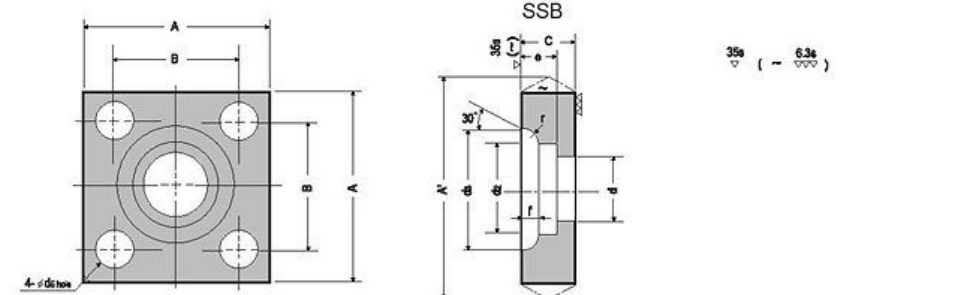
Unit:mm

Nominal Bore	A	A' (MAX)	B	C	d	d ₁	d ₂	e	d ₃	d ₄	f	r	Weight (kg)		
15	54		36	22	+0	16	30	22.2	+0.2	11	32	11	3.5	5	0.5
20	58	±1	40	22	-1	20	35	27.7	-0	12	38	11	4.0	5	0.6
25	68		48	28	+0	25	40	34.5		14	45	13	4.0	5	0.8
32	76	±1.2	56	28	-1.5	31.5	45	43.2	+0.3	16	56	13	6.0	5	1.0
40	92		65	36		37.5	55	49.1	-0	18	63	18	7.0	5	1.9
50	100	±1.5	73	36	+0	47.5	65	61.1		20	75	18	7.0	5	2.0
65	128		80	45	-2	60	80	77.1	+0.4	22	95	22	9.5	6	4.1
80	140	±2	103	45		71	90	90.0	-0	25	108	24	11.0	6	4.7



Unit:mm

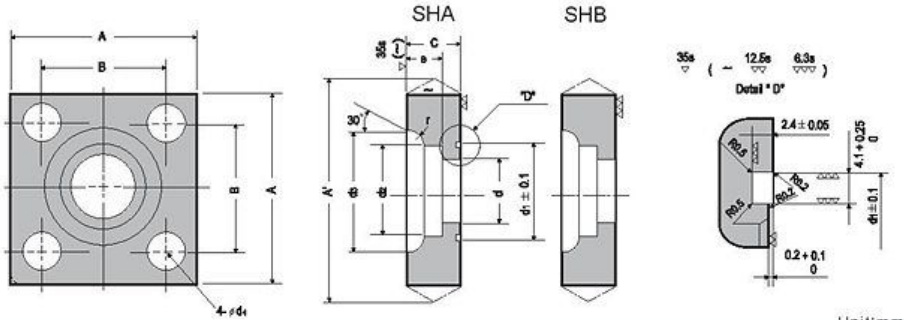
Nominal Bore	A	A ₁	B	C	h	d	d ₁	d ₂	e	d ₃	d ₄	f	r	Weight (kg)	
15	54		36	40		20	16	30	22.2	+0.2	11	32	11	3.5	1.0
20	58	±1	40	45		22.5	20	35	27.7	-0	12	38	11	4.0	1.3
25	68		48	50		25	25	40	34.5		14	45	13	4.0	1.9
32	76	±1.2	56	63	+0	31.5	31.5	45	43.2	+0.3	16	56	13	6.0	2.9
40	92		65	71	-2	35.5	37.5	55	49.1	-0	18	63	18	7.0	4.7
50	100	±1.5	73	85		42.5	47.5	65	61.1		20	75	18	7.0	6.8
65	128		80	106		53	60	80	77.1	+0.4	22	95	22	9.5	12.8
80	140	±2	103	118		59	71	90	90.0	-0	25	108	24	11.0	17.0



Unit:mm

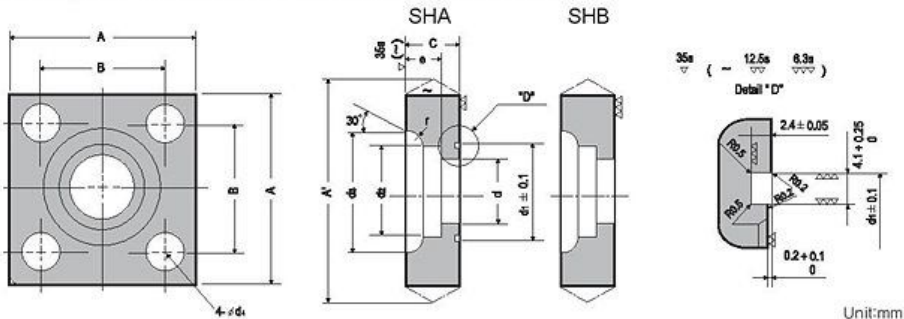
Nominal Bore	A	A' (MAX)	B	C	d	d ₂	e	d ₃	d ₄	f	r	Weight (kg)		
15	54		36	22	+0	16	22.2	+0.2	11	32	M10	3.5	5	0.5
20	58	±1	40	22	-1	20	27.7	-0	12	38	M10	4.0	5	0.6
25	68		48	28	+0	25	34.5		14	45	M12	4.0	5	0.8
32	76	±1.2	56	28	-1.5	31.5	43.2	+0.3	16	56	M12	6.0	5	1.0
40	92		65	36		37.5	49.1	-0	18	63	M16	7.0	5	1.9
50	100	±1.5	73	36	+0	47.5	61.1		20	75	M16	7.0	5	2.0
65	128		80	45	-2	60	77.1	+0.4	22	95	M20	9.5	6	4.1
80	140	±2	103	45		71	90.0	-0	25	108	M22	11.0	6	4.7

JIS F 7806 SQUARE FLANGES
280kg/Cm² FLANGE FOR OIL PRESSURE



Nominal Bore	A	A' (MAX)	B	C	d	d ₁	d ₂	e	d ₃	d ₄	f	r	Weight (kg)		
15	66	±1	70 43	22	+0	12.3	24	22.2	+0.2	12	34	11	4.0	5	0.63
20	72		76 48	25	-1	16.2	30	27.7	-0	12	40	11	4.5	5	0.85
25	85	±1.2	91 58	35	+0	21.2	35	34.5		14	48	13.5	5.0	5	1.64
32	98		104 68	35	-1.5	29.9	45	43.2	+0.3	18	60	17.5	6.5	5	2.03
40	105	±1.5	112 74	40		34.4	50	49.1	-0	20	66	17.5	7.5	5	2.66
50	130		139 90	50	+0	43.1	60	61.1		20	79	22	8.0	5	5.14
65	150	±2	161 108	60	-2	57.3	75	77.1	+0.4	25	100	24	10.0	6	7.95
80	170		181 120	65		66.9	85	90.0	-0	25	114	26	12.0	6	11.0

JIS F 7806 SQUARE FLANGES
350kg/Cm² FLANGE FOR OIL PRESSURE



Nominal Bore	A	A' (MAX)	B	C	d	d ₁	d ₂	e	d ₃	d ₄	f	r	Weight (kg)		
15	68	±1.2	73 45	28	+0	12.3	24	22.2	+0.2	12	37.5	11	4	5	0.88
20	82		87 55	30	-1.5	16.2	30	27.7	-0	12	43.5	13.5	5	5	1.34
25	95	±1.2	101 65	35		21.2	35	34.5		14	53	17.5	5.5	6	2.02
32	100		106 70	35		23.3	40	43.2	+0.3	18	63	17.5	7	6	2.16
40	105	±1.5	112 75	42		28.2	45	49.1	-0	20	70	17.5	8	6	2.84
50	132		140 92	50	+0	38.3	55	61.1		25	84	22	9	6	5.30
65	160	±2	170 112	60	-2	48.3	65	77.1	+0.4	30	105	26	12	7	9.92
80	190		202 130	68		58.7	75	90.0	-0	30	120	33	13.5	7	14.8

MATERIAL	Chemical Composition (%)											Mechanical Requirements						
	C	Si	Mn	P	S	Ni	Cr	Mo	Cu	V	Nb	Sn	YS (N/mm ²)	TS (N/mm ²)	E.L.(%) axial	R.A.(%) axial	H.B	
SF440A	Max. 0.60	0.50	1.20	0.030	0.035								540	720	24.0	19.0	45.0	121
SF490A	Max. 0.60	0.50	1.20	0.030	0.035								590	770	24.0	19.0	45.0	134
SFVC 1	Max. 0.30	0.35	1.35	0.030	0.030								560	740	21.0	17.0	40.0	
SFVC 2A	Max. 0.35	0.35	1.35	0.030	0.030								410	590	18.0	14.0	33.0	
SFVC 2B	Max. 0.30	0.35	1.35	0.030	0.030								410	590	18.0	14.0	33.0	
SFL 1	Max. 0.30	0.35	1.35	0.030	0.030								590	770	22.0	17.0	38.0	
SFL 2	Max. 0.30	0.35	1.35	0.030	0.030								590	770	22.0	17.0	38.0	
S15C	Max. 0.18	0.35	0.60	0.030	0.035								370	510	30.0	25.0		111-167
S20C	Max. 0.23	0.35	0.60	0.030	0.035								400	550	28.0	23.0		116-174
S25C	Max. 0.28	0.35	0.60	0.030	0.035								440	600	27.0	22.0		123-183
S30C	Max. 0.33	0.35	0.90	0.030	0.035								470	640	25.0	20.0		137-197
S35C	Max. 0.38	0.35	0.90	0.030	0.035								510	690	23.0	18.0		149-207
S40C	Max. 0.43	0.35	0.90	0.030	0.035								550	730	22.0	17.0		156-217
S45C	Max. 0.48	0.35	0.90	0.030	0.035								590	770	20.0	15.0		167-229
SFVA F1	Max. 0.30	0.35	0.90	0.030	0.030								480	660	18.0	14.0	35.0	
SFVA F5A/B	Max. 0.15	0.50	0.60	0.030	0.030								480	660	18.0	14.0	35.0	
SFVA F9	Max. 0.15	1.00	0.60	0.030	0.030								520	700	18.0	14.0	35.0	
SFVA F11A/B	Max. 0.20	1.00	0.60	0.030	0.030								560	740	18.0	14.0	35.0	
SFVA F12	Max. 0.20	0.60	0.60	0.030	0.030								600	780	18.0	14.0	35.0	
SFVA F22A/B	Max. 0.15	0.50	0.60	0.030	0.030								640	820	18.0	14.0	35.0	
SFL3	Max. 0.20	0.35	0.90	0.030	0.030								490	670	19.0	15.0	35.0	
SFVQ 1A	Max. 0.25	0.40	1.50	0.030	0.030								550	730	16.0	12.0	38.0	
SFVQ 2A	Max. 0.27	0.40	1.00	0.030	0.030								590	770	16.0	12.0	38.0	
SFVQ 3	Max. 0.23	0.40	0.40	0.020	0.020								630	810	18.0	14.0	38.0	
SFVC 2B	Max. 0.30	0.35	1.35	0.030	0.030								410	590	18.0	14.0	33.0	
SUS F304	Max. 0.08	1.00	2.00	0.040	0.030								520	700	43.0	30.0	50.0	182
SUS F304L	Max. 0.03	1.00	2.00	0.040	0.030								480	660	29.0	20.0	45.0	182
SUS F304H	Max. 0.10	1.00	2.00	0.040	0.030								520	700	43.0	30.0	50.0	182
SUS F310	Max. 0.15	1.00	2.00	0.040	0.030								520	700	34.0	25.0	50.0	187
SUS F316	Max. 0.08	1.00	2.00	0.040	0.030								520	700	43.0	30.0	50.0	187
SUS F316L	Max. 0.03	1.00	2.00	0.040	0.030								480	660	29.0	20.0	45.0	187
SUS F316H	Max. 0.10	1.00	2.00	0.040	0.030								520	700	43.0	30.0	50.0	187
SUS F317	Max. 0.08	1.00	2.00	0.040	0.030								520	700	43.0	30.0	50.0	187
SUS F317L	Max. 0.03	1.00	2.00	0.040	0.030								480	660	29.0	20.0	45.0	187
SUS F321	Max. 0.08	1.00	2.00	0.040	0.030								520	700	43.0	30.0	50.0	187
SUS F347	Max. 0.08	1.00	2.00	0.040	0.030								520	700	43.0	30.0	50.0	187
SUS F410	Max. 0.15	1.00	1.00	0.040	0.030								520	700	29.0	20.0	45.0	187

COMPARISON OF ASTM SPECIFICATIONS

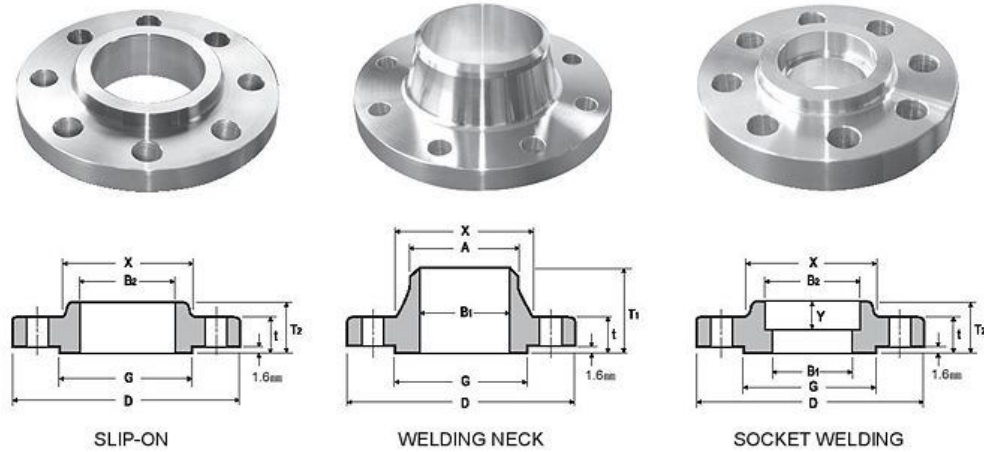
AND SIMILAR STANDARDS

Steel Composition	ASTM Specification and Grade				JIS Specification and Grade	
	Marking Symbol	Pipe	Plate	Forging	Pipe	Plate
Carbon Steel	-	A120	A283-A	-	SCP (STPY400)	SS 400
Carbon Steel	-	A53-B	A284	-	STPG370	SM 418
Carbon Steel	-	A53-B	A284	-	STGP410	SM 3148
-	-	-	-	-	STPT370	SB 42
Carbon Steel	WPB	A106-B	A515-65 or 70	A181-2 and A105	STPT 410	SB 42
Carbon Steel	WPC	A106-C	-	-	STPT 490	SB 49
Carbon and Low-Alloy Steel	WPL6	A333 and A334-6	A516-60	A350-LF2	STPL 380	-
3 1/2% Ni Steel	WPL3	A333 and A334-3	A203-D	A350-LF3	STPL 450	-
Carbon Mo Steel	WP1	A335-P1	A204-B	A1820F1	STPA 12	-
1% Cr-1/2% Mo Steel	WP12	A335-P12	A387-12	A182-F12	STPA 22	-
11/4% Cr-1/2% Mo Steel	WP11	A335-P11	A387-11	A182-F11	STPA 23	-
21/4% Cr-1/2% Mo Steel	WP22	A335-P22	A387-22	A182-F22	STPA 24	SCMV 4
5% Cr-1/2% Mo Steel	WP5	A335-P5	A387-5	A182-F5	STPA 25	-
7% Cr-1/2% Mo Steel	WP7	A335-P7	-	A182-F7	-	-
9% Cr-1% Mo Steel	WP9	A335-P9	-	A182-F9	STPA 26	-
18% Cr-8% Ni Steel	WP304	A312-TP304	A240-Type 304	A182-F304	SUS304 TP	SUS304
18% Cr-8% Ni-(0.04-0.10)% C Steel	WP304H	A312-TP304H	A240-Type 304H	A182-F304H	SUS304 HTP	-
18% Cr-8% Ni-0.035% C Steel	WP304L	A312-TP304L	A240-Type 304L	A182-F304L	SUS304 LTP	SUS304L
22% Cr-12% Ni Steel	WP309	A312-TP309	A240-Type 309S	-	SUS309 STP	SUS309S
25% Cr-20% Ni Steel	WP310	A312-TP310	A240-Type 310S	A182-F310	SUS310 STP	SUS310S
18% Cr-8% Ni-(Cb+Ta) Steel	WP347	A312-TP347	A240-Type 347	A182-F347	SUS347 TP	SUS347
18% Cr-8% Ni-Mo Steel	WP316	A312-TP316	A240-Type 316	A182-F316	SUS316 TP	SUS316
18%Cr-8% Ni-Mo-(0.04-0.01)% C Steel	WP316H	A312-TP316H	A240-Type 316	A182-F316H	SUS316 HTP	-
18% Cr-8% Ni-Mo-0.035% C Steel	WP316L	A312-TP316L	A240-Type 316L	A182-F316L	SUS316LTP	SUS316L
18% Cr-8% Ni-Ti Steel	WP321	A312-TP321	A240-Type 321	A182-F321	SUS321TP	SUS321
18% Cr-8% Ni-Ti-(0.04-0.01)% C Steel	WP321H	A312-TP321H	A240-Type 321	A182-F321H	SUS321HTP	-
18% Cr-8% Ni-(Cb+Ta)-(0.04-0.01)% C Steel	WP347H	A312-TP347H	A240-Type 347	A182-F347H	SUS347 HTP	-

KS Specification		B.S. Specification and Grade	DIN specification and Grade	Steel Composition
Pipe	Plate	Pipe	Plate	
SPP	SB41	1387-M	2440-ST33-1	Carbon Steel
SPPS 38	SWS 41B	3602-ERW 23	1626-ST37	Carbon Steel
SPPS 42	SWS 41B	3602-ERW 27	-	Carbon Steel
SPHT 38	SBB 42	3602-Steel 23	17175-ST35.8	Carbon Steel
SPHT 42	SBB 42	3602-Steel 27	17175-ST45.8	Carbon Steel
SPHT 49	SBB 49	3602-Steel 35	-	Carbon Steel
STPL 39	SLAL 39	3603-Steel 27 LT 30	-	Carbon and Low-Alloy Steel
-	-	3603-Steel 503 LT 100	-	31/2% Ni Steel
SPA 12	SBB 46M	-	1717-15Mo3	Carbon-Mo Steel
SPA 22	SCMV 2	3604-HF 620	17175-13 Cr Mo44	1% Cr-1/2% Mo Steel
SPA 23	SCMV 3	3604-HF 621	-	11/4% Cr-1/2% Mo Steel
SPA 24	SCMV 4	3604-HF 622,27	17175-10 Cr Mo910	21/4% Cr-1% Mo Steel
SPA 25	SCMV 6	3604-HF 625	-	5% Cr-1/2% Mo Steel
-	-	-	-	7% Cr-1/2% Mo Steel
-	-	-	-	9% Cr-1% Mo Steel
STS304 TP	STS304	3605-801	17440-X5 Cr Ni189	18% Cr-8% Ni Steel
-	-	3605-811	-	18% Cr-8% Ni-(0.04-0.10)% C Steel
STS304 LTP	STS304 L	3605-811L	17440x2 Cr Ni189	18% Cr-8% Ni-0.035% C Steel
STS309 STP	STS309 S	-	-	22% Cr-12% Ni Steel
STS310 STP	STS310 S	3605-8055	-	25% Cr-20% Ni Steel
STS347 TP	STS347	3605-822Nb	17440-X1 Cr Ni Nb 189	18% Cr-8% Ni-(Cb-Ta) Steel
STS316 TP	STS316	3605-845	17440-X5 Cr Ni Mo1810	18% Cr-8% Ni-Mo Steel
STS316 HTP	-	3605-855	-	18% Cr-8% Ni-Mo-(0.04-0.10)% C Steel
STS316 LTP	STS316 L	3605-845L	17440-X2 Cr Ni Mo 1810	18% Cr-8% Ni-Mo-0.035% C Steel
STS321 TP	STS321	3605-822Ti	17440-X10 Cr Ni Ti 189	18% Cr-8% Ni-Ti Steel
-	-	3605-832Ti	-	18% Cr-8% Ni-Ti-(0.04-0.10)% C Steel
STS347 HTP	-	3605-832Nb	-	18% Cr-8% Ni-(Cb+Ta)-(0.04-0.10)% C Steel

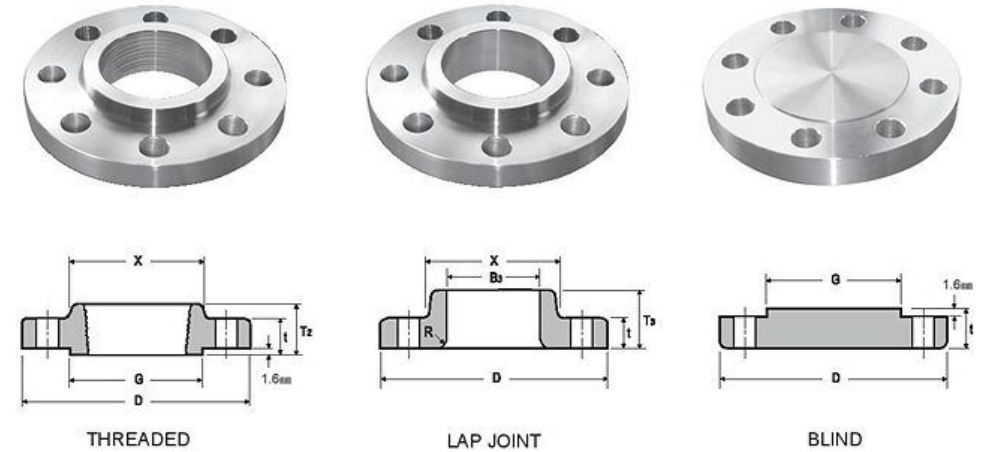
ASME FLANGES

CLASS 150 FLANGES



ASME FLANGES

CLASS 150 FLANGES



ASME B16.5 FORGED FLANGES

Unit:mm

Nominal Pipe Size	Outside Diam.	O.D of Raised Face	Diam. at Base of Hub	Thick-ness	BORE			LENGTH THRU HUB			Diam. of Hub at Bevel	Radius of Fillet	Thread Length
					Welding Neck Socket Welding	Slip-on Socket Welding	Lap Joint	Welding Neck	Slip-on Threaded Socket Welding	Lap Joint			
1/2	89	35.1	30.2	11.2	15.7	22.4	22.9	47.8	15.7	15.7	21.3	3.0	15.7
3/4	99	42.9	38.1	12.7	20.8	27.7	28.2	52.3	15.7	15.7	26.7	3.0	15.7
1	108	50.8	49.3	14.2	26.7	34.5	35.1	55.6	17.5	17.5	33.5	3.0	17.5
1 1/4	117	63.5	58.7	15.7	35.1	43.2	43.7	57.2	20.6	20.6	42.2	4.8	20.6
1 1/2	127	73.2	65.0	17.5	40.9	49.5	50.0	62.0	22.4	22.4	48.3	6.4	22.4
2	152	91.9	77.7	19.1	52.6	62.0	62.5	63.5	25.4	25.4	60.5	7.9	25.4
2 1/2	178	104.6	90.4	22.4	62.7	74.7	75.4	69.9	28.4	28.4	73.2	7.9	28.4
3	191	127.0	108.0	23.9	78.0	90.7	91.4	69.9	30.2	30.2	88.9	9.7	30.2
3 1/2	216	139.7	122.2	23.9	90.2	103.4	104.1	71.4	31.8	31.8	101.6	9.7	31.8
4	229	157.2	134.9	23.9	102.4	116.1	116.8	76.2	33.3	33.3	114.3	11.2	33.3
5	254	185.7	163.6	23.9	128.3	143.8	144.5	88.9	36.6	36.6	141.2	11.2	36.6
6	279	215.9	192.0	25.4	154.2	170.7	171.5	88.9	39.6	39.6	168.4	12.7	39.6
8	343	269.7	246.1	28.4	202.7	221.5	222.3	101.6	44.5	44.5	219.2	12.7	44.5
10	406	323.9	304.8	30.2	254.5	276.4	277.4	101.6	49.3	49.3	273.1	12.7	49.3
12	483	381.0	365.3	31.8	304.8	327.2	328.2	114.3	55.6	55.6	323.9	12.7	55.6
14	533	412.8	400.1	35.1	336.6	359.2	360.2	127.0	57.2	79.2	356.6	12.7	57.2
16	597	469.9	457.2	36.6	387.4	410.5	411.2	127.0	63.5	87.4	406.4	12.7	63.5
18	635	533.4	505.0	39.6	438.2	461.8	462.3	139.7	68.3	93.8	457.2	12.7	68.3
20	699	584.2	558.8	42.9	489.0	513.1	514.4	144.5	73.2	103.1	508.0	12.7	73.2
24	813	692.2	663.4	47.8	590.6	616.0	616.0	152.4	82.6	111.3	609.6	12.7	82.6

Notes :

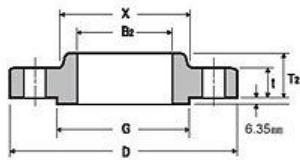
- (1) For the 'Bore'(B) other than Standard Wall Thickness, refer to page 126~127.
- (2) Class 150 flanges except Lap Joint will be furnished with 0.06" (1.6mm) raised face, which is included in 'Thickness' (t) and 'Length through Hub' (T₁), (T₂).
- (3) For Slip-on, Threaded, Socket Welding and Lap Joint Flanges, the hubs can be shaped either vertical from base to top or tapered within the limits of 7 degrees.

Unit:mm

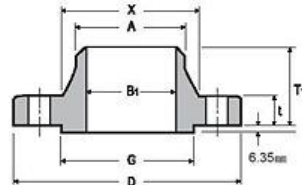
Nominal Pipe Size	Depth of Socket	DRILLING				BOLTING			APPROXIMATE WEIGHT									
		Bolt Circle Diam.	Num. of Holes	Diam. of Holes	Diam. of Bolts (inch)	Machine Bolt Length	Stud Bolt Length	Ring Joint	Welding Neck		Slip-on and Threaded		Lap Joint		Blind		Socket Welding	
									Raised Face	Ring Joint	Kg	lb.	Kg	lb.	Kg	lb.	Kg	lb.
1/2	9.7	60.5	4	15.7	1/2	50.8	57.2	-	0.51	1.10	0.47	1.00	0.51	1.00	0.47	1.00	0.47	1.00
3/4	11.2	69.9	4	15.7	1/2	50.8	63.5	-	0.73	1.60	0.58	1.30	0.64	1.40	0.63	1.40	0.59	1.30
1	12.7	79.2	4	15.7	1/2	57.2	63.5	76.2	1.07	2.40	0.86	1.90	0.93	1.80	0.94	2.10	0.87	1.90
1 1/4	14.2	88.9	4	15.7	1/2	57.2	69.9	82.6	1.40	3.10	1.08	2.40	1.16	2.00	1.23	2.70	1.11	2.40
1 1/2	15.7	98.6	4	15.7	1/2	63.5	69.9	82.6	1.81	4.00	1.41	3.10	1.51	3.30	1.62	3.60	1.45	3.20
2	17.5	120.7	4	19.1	5/8	69.9	82.6	95.3	2.59	5.70	2.26	5.00	2.38	5.20	2.64	5.80	2.33	5.00
2 1/2	19.1	139.7	4	19.1	5/8	76.2	88.9	101.6	4.28	9.40	3.43	7.60	3.60	7.90	4.06	9.00	3.55	7.80
3	20.6	152.4	4	19.1	5/8	76.2	88.9	101.6	5.18	11.40	3.87	8.50	4.04	8.90	4.06	10.80	4.02	8.90
3 1/2	22.4	177.8	8	19.1	5/8	76.2	88.9	101.6	5.45	12.00	4.99	11.00	4.99	11.00	5.90	13.00	4.99	11.00
4	23.9	190.5	8	19.1	5/8	76.2	88.9	101.6	7.32	16.10	5.75	12.70	5.96	13.00	7.41	16.30	5.99	13.20
5	23.9	215.9	8	22.4	3/4	82.6	95.3	108.0	8.91	19.60	6.22	13.70	6.44	14.00	6.44	14.00	6.68	14.70
6	26.9	241.3	8	22.4	3/4	82.6	101.6	114.3	11.26	24.80	7.38	16.30	7.59	16.70	11.31	24.90	7.99	17.60
8	31.8	298.5	8	22.4	3/4	88.9	108.0	120.7	17.68	39.00	12.36	27.30	12.66	27.90	19.92	43.90	13.29	29.30
10	33.3	362.0	12	25.4	7/8	101.6	114.3	127.0	24.79	54.70	17.10	37.70	16.78	37.00	29.39	64.80	19.50	43.00
12	39.6	431.8	12	25.4	7/8	101.6	120.7	133.4	38.98	85.90	27.68	61.00	28.30	62.40	43.70	96.30	29.03	64.00
14	41.4	476.3	12	28.4	1	114.3	133.4	146.1	51.71	114.00	35.20	77.60	41.50	91.50	59.42	140.00	38.56	85.00
16	44.5	539.8	16	28.4	1	114.3	133.4	146.1	64.41	142.00	42.18	93.00	52.98	116.80	77.11	170.00	44.49	98.00
18	49.3	577.9	16	31.8	1 1/8	127.0	146.1	158.8	74.84	165.00	49.71	109.60	59.00	130.00	94.80	209.00	54.43	120.00
20	54.1	635.0	20	31.8	1 1/8	139.7	158.8	171.5	89.36	197.00	65.50	140.00	72.12	159.00	123.38	272.00	70.31	155.00
24	63.5	749.3	20	35.1	1 1/4	152.4	171.5	184.2	119.66	263.80	90.50	199.50	99.02	218.30	188.24	415.00	95.25	210.00

- (4) Blind Flanges may be made with the same hub as that used for Slip-on Flanges or without hub.
- (5) The gasket surface and backside (bearing surface for bolting) are made parallel within 1 degree. To accomplish parallelism, spot facing is carried out according to MSS SP-9, without reducing thickness(t).
- (6) Depth of Socket (Y) is covered by ASME B16.5 only in sizes through 3 inch, over 3 inch is at the manufacturer's option.

ASME FLANGES CLASS 400 FLANGES

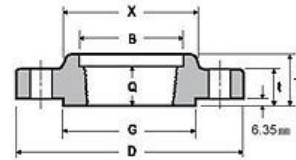


SLIP-ON

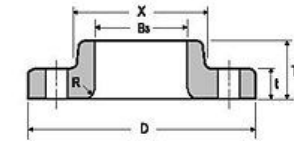


WELDING NECK

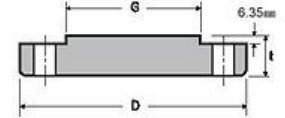
ASME FLANGES CLASS 400 FLANGES



THREADED



LAP JOINT



BLIND

ASME B16.5 FORGED FLANGES

Unit:mm

Nominal Pipe Size	Outside Diam.	Diam. at Base of Hub	O.D of Raised Face	Thick-ness	BORE				LENGTH THRU HUB			Diam. of Hub at Bevel
					Welding Neck	Slip-on	Lap Joint	Counter Bore Min. Threaded	Welding Neck	Slip-on And Threaded	Lap Joint	
1/2	95	38.1	35.1	14.2		22.4	22.9	23.6	52.3	22.4	22.4	21.3
3/4	117	47.8	42.9	15.7		27.7	28.2	29.0	57.2	25.4	25.4	26.7
1	124	53.8	50.8	17.5		34.5	35.1	35.8	62.0	26.9	26.9	33.5
1 1/4	133	63.5	63.5	20.6	See Note(1) To be specified by purchaser.	43.2	43.7	44.5	66.5	28.4	28.4	42.2
1 1/2	155	69.9	73.2	22.4		49.5	50.0	50.5	69.9	31.8	31.8	48.3
2	165	84.1	91.9	25.4		62.0	62.5	63.5	73.2	36.6	36.6	60.5
2 1/2	191	100.1	104.6	28.4		74.7	75.4	76.2	79.2	41.1	41.1	73.2
3	210	117.3	127.0	31.8		90.7	91.4	92.2	82.6	46.0	46.0	88.9
3 1/2	229	133.4	139.7	35.1		103.4	104.1	104.9	85.9	49.3	49.3	101.6
4	254	146.1	157.2	35.1		116.1	116.8	117.6	88.9	50.8	50.8	114.3
5	279	177.8	185.7	38.1		143.8	144.5	144.5	101.6	53.8	53.8	141.2
6	318	206.2	215.9	41.1		170.7	171.5	171.5	103.1	57.2	57.2	168.4
8	381	260.4	269.7	47.8		221.5	222.3	222.3	117.3	68.3	68.3	219.2
10	445	320.5	323.9	53.8		276.4	277.4	276.4	124.0	73.2	101.6	273.1
12	521	374.7	381.0	57.2		327.2	328.2	328.7	136.7	79.2	108.0	323.9
14	584	425.5	412.8	60.5		359.2	360.2	360.4	149.4	84.1	117.3	355.6
16	648	482.6	469.9	63.5		410.5	411.2	411.2	152.4	93.7	127.0	406.4
18	711	533.4	533.4	66.5		461.8	462.3	462.0	165.1	98.6	136.7	457.2
20	775	587.2	584.2	69.9		513.1	514.4	512.8	168.1	101.6	146.1	508.0
24	914	701.5	692.2	76.2		616.0	616.0	614.4	174.8	114.3	158.8	609.6

Notes:

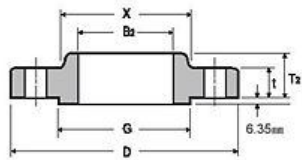
- (1) For the inside diameter of pipes (corresponding to 'Bore' (Bt) of Welding Neck Flanges), refer to page 126~127.
- (2) Class 400 flanges except Lap Joint will be furnished with 0.25" (6.35mm) raised face, which is included in 'Thickness' (t) and 'Length through Hub' (T1), (T2).
- (3) For Slip-on, Threaded, Lap and Lap Joint Flanges, the hubs can be shaped either vertical from base to top or tapered within the limits of 7 degrees.

Unit:mm

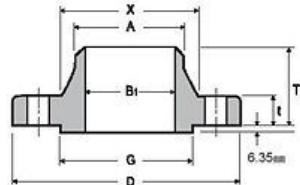
Nominal Pipe Size	Radius of Fillet	Thread Length	DRILLING				BOLTING			APPROXIMATE WEIGHT							
			Bolt Circle Diam.	Num. of Holes	Diam. of Holes	Diam. of Bolts (inch)	Stud Bolt Length			Welding Neck		Slip-on and Threaded		Lap Joint		Blind	
							0.25" Raised Face	Male-Female Tongue-Groove	Ring Joint	Kg	lb.	Kg	lb.	Kg	lb.	Kg	lb.
1/2	3.0	15.7	66.5	4	15.7	1/2	76.2	69.9	76.2	1.36	3.00	0.91	2.00	0.80	1.80	0.91	2.00
3/4	3.0	15.7	82.6	4	19.1	5/8	88.9	82.6	88.9	1.59	3.50	1.36	3.00	1.36	3.00	1.40	3.00
1	3.0	17.5	88.9	4	19.1	5/8	88.9	82.6	88.9	1.81	4.00	1.59	3.50	1.59	3.50	1.70	3.80
1 1/4	4.8	20.6	98.6	4	19.1	5/8	95.3	88.9	95.3	2.50	5.50	2.10	4.60	2.04	4.50	2.27	5.00
1 1/2	6.4	22.4	114.3	4	22.4	3/4	108.0	101.6	108.0	3.63	8.00	3.10	6.80	2.95	6.50	3.40	7.50
2	7.9	28.4	127.0	8	19.1	5/8	108.0	101.6	108.0	4.54	10.00	3.63	8.00	3.63	8.00	4.40	9.70
2 1/2	7.9	31.8	149.4	8	22.4	3/4	120.7	114.3	120.7	6.35	14.00	5.44	12.00	4.99	11.00	6.80	15.00
3	9.7	35.1	168.1	8	22.4	3/4	127.0	120.7	120.7	8.17	18.00	7.26	16.00	6.35	14.00	8.90	19.60
3 1/2	9.7	39.6	184.2	8	25.4	7/8	139.7	133.4	139.7	11.80	26.00	9.53	21.00	9.08	20.00	13.17	29.00
4	11.2	36.6	200.2	8	25.4	7/8	139.7	133.4	139.7	13.61	30.00	10.89	24.00	9.98	22.00	14.40	31.70
5	11.2	42.9	235.0	8	25.4	7/8	146.1	139.7	146.1	17.69	39.00	14.07	31.00	13.15	29.00	19.50	43.00
6	12.7	46.0	269.7	12	25.4	7/8	152.4	146.1	152.4	22.23	49.00	19.98	44.00	16.78	37.00	27.67	61.00
8	12.7	50.8	330.2	12	28.4	1	171.5	165.1	171.5	35.38	78.00	30.40	67.00	26.16	59.00	45.36	100.00
10	12.7	55.6	387.4	16	31.8	1 1/8	190.5	184.2	190.5	49.89	110.00	41.28	91.00	43.09	95.00	68.00	150.00
12	12.7	60.5	450.9	16	35.1	1 1/4	203.2	196.9	203.2	72.57	160.00	59.02	130.00	68.95	152.00	98.00	216.00
14	12.7	63.5	514.4	20	35.1	1 1/4	209.6	203.2	209.6	105.69	233.00	81.72	180.00	95.25	210.00	131.66	290.00
16	12.7	68.3	571.5	20	38.1	1 3/8	222.3	215.9	222.3	133.30	294.00	106.69	235.00	127.00	280.00	167.00	368.00
18	12.7	69.9	628.7	24	38.1	1 3/8	228.6	222.3	228.6	158.90	350.30	129.39	285.30	156.49	345.00	206.57	455.40
20	12.7	73.2	685.8	24	41.1	1 1/2	241.3	235.0	247.7	193.00	425.50	152.00	335.00	190.51	420.00	261.00	575.40
24	12.7	82.6	812.8	24	47.8	1 3/4	266.7	260.4	279.4	281.48	620.50	231.54	510.50	278.96	615.00	395.00	870.80

- (4) Blind Flanges may be made with the same hub as that used for Slip-on Flanges or without hub.
- (5) The gasket surface and backside (bearing surface for bolting) are made parallel within 1 degree. To accomplish parallelism, spot facing is carried out according to MSS SP-9, without reducing thickness (t).
- (6) Dimensions of sizes 1/2" through 3-1/2" are the same as for Class 600 Flanges.

ASME FLANGES CLASS 900 FLANGES

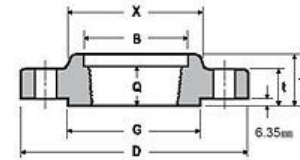


SLIP-ON

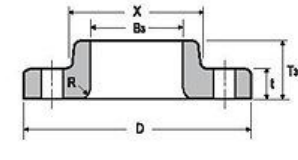


WELDING NECK

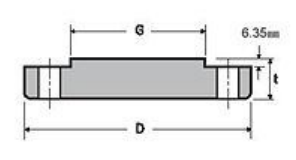
ASME FLANGES CLASS 900 FLANGES



THREADED



LAP JOINT



BLIND

ASME B16.5 FORGED FLANGES

Unit:mm

Nominal Pipe Size	Outside Diam.	Diam. at Base of Hub	O.D. of Raised Face	Thick-ness	BORE								Diam. of Hub at Bevel
					Welding Neck				LENGTH THRU HUB				
					Slip-on	Lap Joint	Counter Bore Min. Threaded	Welding Neck	Slip-on and Threaded	Lap Joint	Welding Neck	Slip-on and Threaded	
D	X	G	t	B1	B2	B3	B	T1	T2	T3	A		
1/2	121	38.1	35.1	22.4	See Note(1) To be specified by purchaser.	22.4	22.9	23.6	60.5	31.8	31.8	21.3	
3/4	130	44.5	42.9	25.4		27.7	28.2	29.0	69.9	35.1	35.1	26.7	
1	149	52.3	50.8	28.4		34.5	35.1	35.8	73.2	41.1	41.1	33.5	
1 1/4	159	63.5	63.5	28.4		43.2	43.7	44.5	73.2	41.1	41.1	42.2	
1 1/2	178	69.9	73.2	31.8		49.5	50.0	50.5	82.6	44.5	44.5	48.3	
2	216	104.6	91.9	38.1		62.0	62.5	63.5	101.6	57.2	57.2	60.5	
2 1/2	244	124.0	104.6	41.1		74.7	75.4	76.2	104.6	63.5	63.5	73.2	
3	241	127.0	127.0	38.1		90.7	91.4	92.2	101.6	53.8	53.8	88.9	
4	292	158.8	157.2	44.5		116.1	116.8	117.6	114.3	69.9	69.9	114.3	
5	349	190.5	185.7	50.8		143.8	144.5	144.5	127.0	79.2	79.2	141.2	
6	381	235.0	215.9	55.6		170.7	171.5	171.5	139.7	85.9	85.9	168.4	
8	470	298.5	269.7	63.5		221.5	222.3	222.3	162.1	101.6	114.3	219.2	
10	546	368.3	323.9	69.9		276.4	277.4	276.4	184.2	108.0	127.0	273.1	
12	610	419.1	381.0	79.2		327.2	328.2	328.7	200.2	117.3	142.7	323.9	
14	641	450.9	412.8	85.9		359.2	360.2	360.4	212.9	130.3	155.4	355.6	
16	705	508.0	469.9	88.9		410.5	411.2	411.2	215.9	133.4	165.1	406.4	
18	787	565.2	533.4	101.6		461.8	462.3	462.0	228.6	152.4	190.5	457.2	
20	857	622.3	584.2	108.0		513.1	514.4	512.8	247.7	158.8	209.6	508.0	
24	1041	749.3	692.2	139.7		616.0	616.0	614.4	292.1	203.2	266.7	609.6	

Notes :

- (1) For the inside diameter of pipes (corresponding to 'Bore' (B₁) of Welding Neck Flanges), refer to page 126~127.
- (2) Class 900 flanges except Lap Joint will be furnished with 0.25" (6.35mm) raised face, which is included in 'Thickness' (t) and 'Length through Hub' (T₁), (T₂).
- (3) For Slip-on, Threaded, and Lap Joint Flanges, the hubs can be shaped either vertical from base to top or tapered within the limits of 7 degrees.

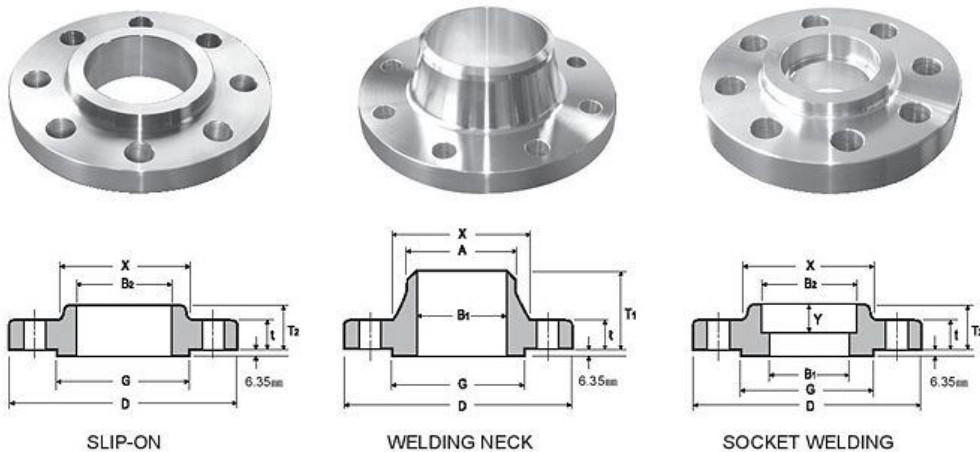
Unit:mm

Nominal Pipe Size	Radius of Fillet	Thread Length	DRILLING				BOLTING			APPROXIMATE WEIGHT							
			Bolt Circle Diam.	Num. of Holes	Diam. of Holes	Diam. of Bolts (inch)	Stud Bolt Length			Welding Neck		Slip-on and Threaded		Lap Joint		Blind	
							0.25" Raised Face	Male-Female Tongue-Groove	Ring Joint	Kg	lb.	Kg	lb.	Kg	lb.	Kg	lb.
R	Q																
1/2	3.0	22.4	82.6	4	22.4	3/4	108.0	101.6	108.0	2.10	4.60	1.81	4.00	1.90	4.20		
3/4	3.0	25.4	88.9	4	22.4	3/4	114.3	108.0	114.3	2.72	6.00	2.40	5.30	2.30	6.00		
1	3.0	28.4	101.6	4	25.4	7/8	127.0	120.7	127.0	3.86	8.50	3.41	7.50	3.40	9.00		
1 1/4	4.8	30.2	111.3	4	25.4	7/8	127.0	120.7	127.0	4.54	10.00	4.10	9.00	4.09	9.00		
1 1/2	6.4	31.8	124.0	4	28.4	1	139.7	133.4	139.7	5.90	13.00	5.45	12.00	5.40	11.90		
2	7.9	38.1	165.1	8	25.4	7/8	146.1	139.7	146.1	10.89	24.00	9.98	22.00	9.53	21.00		
2 1/2	7.9	47.8	190.5	8	28.4	1	158.8	152.4	158.8	16.33	36.00	15.80	34.80	13.15	29.00		
3	9.7	41.1	190.5	8	25.4	7/8	146.1	139.7	146.1	15.00	33.00	11.80	26.00	11.34	25.00		
4	11.2	47.8	235.0	8	31.8	1 1/8	171.5	165.1	171.5	23.13	51.00	23.20	51.00	22.60	48.50		
5	11.2	53.8	279.4	8	35.1	1 1/4	190.5	184.2	190.5	38.50	84.90	37.65	83.00	36.74	81.00		
6	12.7	57.2	317.5	12	31.8	1 1/8	190.5	184.2	196.9	49.89	110.00	48.30	106.50	47.50	104.70		
8	12.7	63.5	393.7	12	38.1	1 3/8	222.3	215.9	222.3	79.45	175.00	75.00	166.30	86.00	189.60		
10	12.7	71.4	469.9	16	38.1	1 3/8	235.0	228.6	235.0	118.04	260.00	111.13	245.00	125.64	277.00		
12	12.7	76.2	533.4	20	38.1	1 3/8	254.0	247.7	254.0	157.00	346.00	146.00	321.80	167.00	368.00		
14	12.7	82.6	558.8	20	41.1	1 1/2	273.1	266.7	292.1	181.60	400.40	172.36	380.00	180.07	397.00		
16	12.7	85.9	616.0	20	44.5	1 5/8	285.8	279.4	298.5	224.73	495.50	192.95	425.40	211.11	465.40		
18	12.7	88.9	685.8	20	50.8	1 7/8	323.9	317.5	333.6	308.72	690.60	272.40	600.50	295.10	650.60		
20	12.7	91.9	749.3	20	53.8	2	349.3	342.9	362.0	376.82	830.70	331.42	730.60	367.74	810.70		
24	12.7	101.6	901.7	20	66.5	2 1/2	438.2	431.8	457.2	685.00	1510.00	632.00	1393.30	700.00	1543.00		

- (4) Blind Flanges may be made with the same hub as that used for Slip-on Flanges or without hub.
- (5) The gasket surface and backside (bearing surface for bolting) are made parallel within 1 degree. To accomplish parallelism, spot facing is carried out according to MSS SP-9, without reducing thickness (t).
- (6) Dimensions of sizes 1/2" through 2 1/2" are the same as for Class 1500 Flanges.

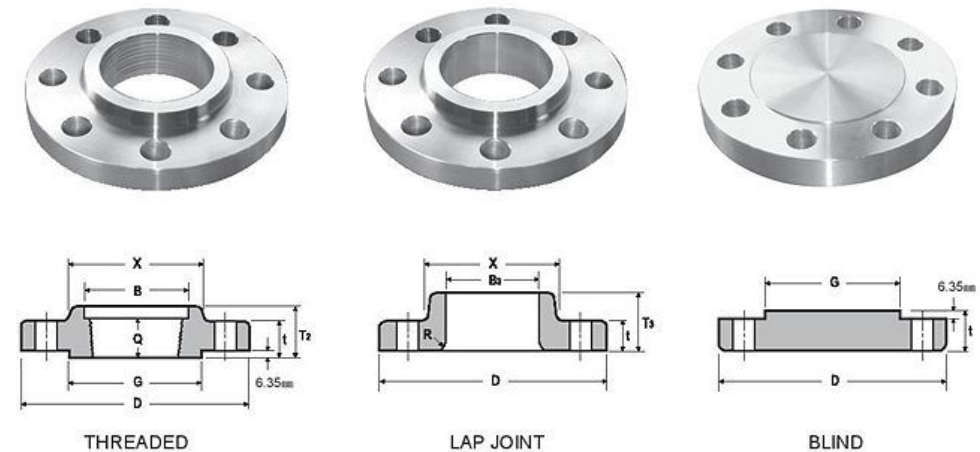
ASME FLANGES

CLASS 1500 FLANGES



ASME FLANGES

CLASS 1500 FLANGES



ASME B16.5 FORGED FLANGES

Unit:mm

Nominal Pipe Size	Outside Diam.	Diam. at Base of Hub	O.D. of Raised Face	Thick-ness	BORE											
					Welding Neck Socket Welding				Length Thru Hub				Diam. of Hub at Bevel	Radius of Fillet	Thread Length	
					Slip-on Socket Welding	Lap Joint	Counter Bore Min. Threaded	Welding Neck	Slip-on Threaded Socket Welding	Lap Joint						
D	X	G	t	B1	B2	B3	B	T1	T2	T3	A	R	Q			
1/2	121	38.1	35.1	22.4	22.4	22.9	23.6	60.5	31.8	31.8	21.3	3.0	22.4			
3/4	130	44.5	42.9	25.4	27.7	28.2	29.0	69.9	35.1	35.1	26.7	3.0	25.4			
1	149	52.3	50.8	28.4	34.5	35.1	35.8	73.2	41.1	41.4	33.5	3.0	28.4			
1 1/4	159	63.5	63.5	28.4	43.2	43.7	44.5	73.2	41.1	41.1	42.2	4.8	30.2			
1 1/2	178	69.9	73.2	31.8	49.5	50.0	50.5	82.6	44.5	44.5	48.3	6.4	31.8			
2	216	104.6	91.9	38.1	62.0	62.5	63.5	101.6	57.2	57.2	60.5	7.9	38.1			
2 1/2	244	124.0	104.6	41.1	74.7	75.4	76.2	104.6	63.5	63.5	73.2	7.9	47.8			
3	267	133.4	127.0	47.8	90.7	91.4	92.2	117.3	73.2	73.2	88.9	9.7	50.8			
4	311	162.1	157.2	53.8	116.1	116.8	117.6	124.0	90.4	90.4	114.3	11.2	57.2			
5	375	196.9	185.7	73.2	143.8	144.5	144.5	155.4	104.6	104.6	141.2	11.2	63.5			
6	394	228.6	215.9	82.6	170.7	171.5	171.5	171.5	119.1	119.1	168.4	12.7	69.9			
8	483	292.1	269.7	91.9	221.5	222.3	222.3	212.9	142.7	142.7	219.2	12.7	76.2			
10	584	368.3	323.9	108.0	276.4	277.4	276.4	254.0	158.8	177.8	273.1	12.7	84.1			
12	673	450.9	381.0	124.0	327.2	328.2	328.7	282.4	180.8	218.9	323.9	12.7	91.9			
14	749	495.3	412.8	133.4	359.2	360.2	360.4	298.5	-	241.3	355.6	12.7	-			
16	826	552.5	469.9	146.1	410.5	411.2	411.2	311.2	-	260.4	406.4	12.7	-			
18	914	596.9	533.4	162.1	461.8	462.3	462.0	327.2	-	276.4	457.2	12.7	-			
20	984	641.4	584.2	177.8	513.1	514.4	512.8	355.6	-	292.1	508.0	12.7	-			
24	1168	762.0	692.2	203.2	616.0	616.0	614.4	406.4	-	330.2	609.6	12.7	-			

- Notes :
- (1) For the inside diameter of pipes (corresponding to 'Bore' (B) of Welding Neck Flanges), refer to page 126~127.
 - (2) Class 1500 flanges except Lap Joint will be furnished with 0.25" (6.35mm) raised face, which is not included in 'Thickness' (t) and 'Length through Hub' (T1), (T2).
 - (3) For Slip-on, Threaded Lap Joint and Socket Welding Flanges, the hubs can be shaped either vertical from base to top or tapered within the limits 7 degrees.

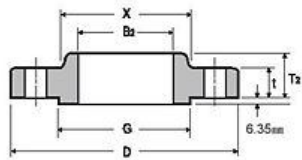
Unit:mm

Nominal Pipe Size	Depth of Socket	DRILLING							BOLTING			APPROXIMATE WEIGHT							
		Bolt Circle Diam.	Num. of Holes	Diam. of Holes	Stud Bolt Length			Welding Neck		Slip-on and Threaded		Lap Joint		Blind		Socket Welding			
					Diam. of Bolts (inch)	0.25" Raised Face	Male-Female Tongue-Groove	Ring Joint	Kg	lb.	Kg	lb.	Kg	lb.	Kg	lb.	Kg	lb.	
Y																			
1/2	9.7	82.6	4	22.4	3/4	108.0	101.6	108.0	2.10	4.60	1.80	4.00	1.80	4.00	1.90	4.00	1.81	4.00	
3/4	11.2	88.9	4	22.4	3/4	114.3	108.0	114.3	2.72	6.00	2.27	5.00	2.27	5.00	2.72	6.00	2.81	6.20	
1	12.7	101.6	4	25.4	7/8	127.0	120.7	127.0	3.86	8.50	3.40	7.50	3.40	7.50	4.08	9.00	3.61	8.00	
1 1/4	14.21	113	4	25.4	7/8	127.0	120.7	127.0	4.54	10.00	4.10	9.00	4.09	10.80	4.30	9.50	4.99	11.00	
1 1/2	15.71	240	4	28.4	1	139.7	133.4	139.7	5.90	13.00	5.45	12.00	5.40	11.90	5.90	13.00	6.76	14.90	
2	17.5	165.1	8	25.4	7/8	146.1	139.7	146.1	10.89	24.00	10.50	23.00	9.53	21.00	11.30	25.00	10.89	24.00	
2 1/2	19.1	190.5	8	28.4	1	158.8	152.4	158.8	16.34	36.00	15.80	34.80	13.15	29.00	16.00	35.30	16.34	36.00	
3	20.6	203.2	8	31.8	1 1/8	177.8	171.5	177.8	21.79	48.00	21.79	48.00	21.79	48.00	21.79	48.00	21.79	48.00	
4	23.9	241.3	8	35.1	1 1/4	196.9	190.5	196.9	31.30	69.00	31.00	68.40	29.00	63.90	33.11	73.00	31.30	69.00	
5	23.9	292.1	8	41.1	1 1/2	247.7	241.3	247.7	59.02	130.00	58.80	129.60	54.00	119.00	60.00	132.30	59.02	130.00	
6	26.9	317.5	12	38.1	1 3/8	260.4	254.0	266.7	74.91	165.00	74.91	165.00	74.00	163.00	75.00	165.30	74.91	165.00	
8	31.8	393.7	12	44.5	1 5/8	292.1	285.8	323.9	123.83	273.00	117.73	258.00	129.73	236.00	136.98	302.00	123.83	273.00	
10	33.3	482.6	12	50.8	1 7/8	336.6	330.2	342.9	205.93	454.00	197.49	435.40	220.19	485.40	229.97	507.00	205.93	454.00	
12	39.6	571.5	16	58.4	2	368.3	361.9	374.6	306.00	674.60	264.00	582.00	286.02	630.60	316.00	696.70	306.00	674.60	
14	41.4	635.0	16	60.5	2 1/4	406.4	400.1	425.5	416.00	917.00	-	-	404.06	890.80	421.00	928.00	416.00	917.00	
16	44.5	704.9	16	66.5	2 1/2	444.5	438.2	469.9	567.50	1250.00	-	-	522.10	1151.00	559.00	1232.70	567.50	1250.00	
18	49.3	774.7	16	73.2	2 3/4	495.3	489.0	527.1	736.00	1622.60	-	-	669.65	1476.30	761.00	1677.70	736.00	1622.60	
20	54.1	831.9	16	79.2	3	539.8	533.4	565.2	929.00	2048.00	-	-	805.85	1776.60	967.00	2131.80	929.00	2048.00	
24	63.5	990.6	16	91.9	3 1/2	616.0	609.6	647.7	1504.00	3315.70	-	-	1285.55	2834.00	1568.00	3456.80	1504.00	3315.70	

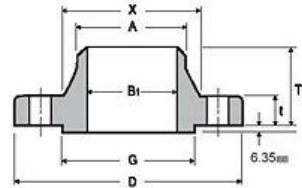
- (4) Blind Flanges may be made with the same hub as that used for Slip-on Flanges or without hub.
- (5) The gasket surface and backside (bearing surface for bolting) are made parallel within 1 degree. To accomplish parallelism, and facing is carried out according to MSS SP-9, without reducing thickness (t).
- (6) Dimensions of sizes 1/2" through 2 1/2" are the same as for Class 900 Flanges.
- (7) Depth of Socket (Y) is covered by ASME B16.5 only in sizes through 2 1/2 inch, over 2 1/2 inch is at the manufacturer's option.

ASME FLANGES

CLASS 2500 FLANGES



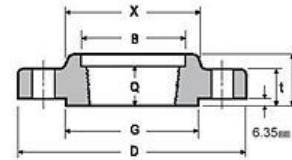
SLIP-ON



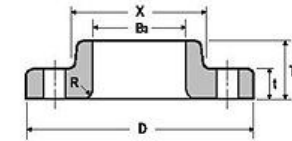
WELDING NECK

ASME FLANGES

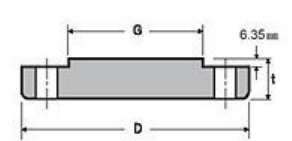
CLASS 2500 FLANGES



THREADED



LAP JOINT



BLIND

ASME B16.5 FORGED FLANGES

Unit:mm

Nominal Pipe Size	Outside Diam.	Diam. at Base of Hub	O.D. of Raised Face	Thick-ness	BORE														
					Welding Neck Socket Welding			Lap Joint			Counter Bore Min. Threaded			Welding Neck			Diam. of Hub at Bevel	Radius of Fillet	Thread Length
					B1	B2	B3	B	T1	T2	T3	A	R	Q					
1/2	133	42.9	35.1	30.2	22.4	22.9	23.6	73.2	39.6	39.6	21.3	3.0	28.4						
3/4	140	50.8	42.9	31.8	27.7	28.2	29.0	79.2	42.9	42.9	26.7	3.0	31.8						
1	159	57.2	50.8	35.1	34.5	35.1	35.8	88.9	47.8	47.8	33.5	3.0	35.1						
1 1/4	184	73.2	63.5	38.1	43.2	43.7	44.5	95.3	52.3	52.3	42.2	4.8	38.1						
1 1/2	203	79.2	73.2	44.5	49.5	50.0	50.5	111.3	60.5	60.5	48.3	6.4	44.5						
2	235	95.3	91.9	50.8	62.0	62.5	63.5	127.0	69.9	69.9	60.5	7.9	50.8						
2 1/2	267	114.3	104.6	57.2	74.7	75.4	76.2	142.7	79.2	79.2	73.2	7.9	57.2						
3	305	133.4	127.0	66.5	90.7	91.4	92.2	168.1	91.9	91.9	88.9	9.7	63.5						
4	356	165.1	157.2	76.2	116.1	116.8	117.6	190.5	108.0	108.0	114.3	11.2	69.9						
5	419	203.2	185.7	91.9	143.8	144.5	144.5	228.6	130.0	130.0	141.2	11.2	76.2						
6	483	235.0	215.9	108.0	170.7	171.5	171.5	273.1	152.4	152.4	168.4	12.7	82.6						
8	552	304.8	269.7	127.0	221.5	222.3	222.3	317.5	177.8	177.8	219.2	12.7	95.3						
10	673	374.7	323.9	165.1	276.4	277.4	276.4	419.1	228.6	228.6	273.1	12.7	108.0						
12	762	441.5	381.0	184.2	327.2	328.2	328.7	463.6	254.0	254.0	322.9	12.7	120.7						

To be specified by purchaser.

- Notes :**
- (1) For the inside diameter of pipes (corresponding to 'Bore' (B) of Welding Neck Flanges), refer to page 126~127.
 - (2) Class 2500 flanges except Lap Joint will be furnished with 0.25" (6.35mm) raised face, which is included in Thickness (t) and 'Length through Hub' (T₁), (T₂).
 - (3) For Slip-on, Threaded and Lap Joint Flanges, the hubs can be shaped either vertical from base to top or tapered within the limits of 7 degrees.

Unit:mm

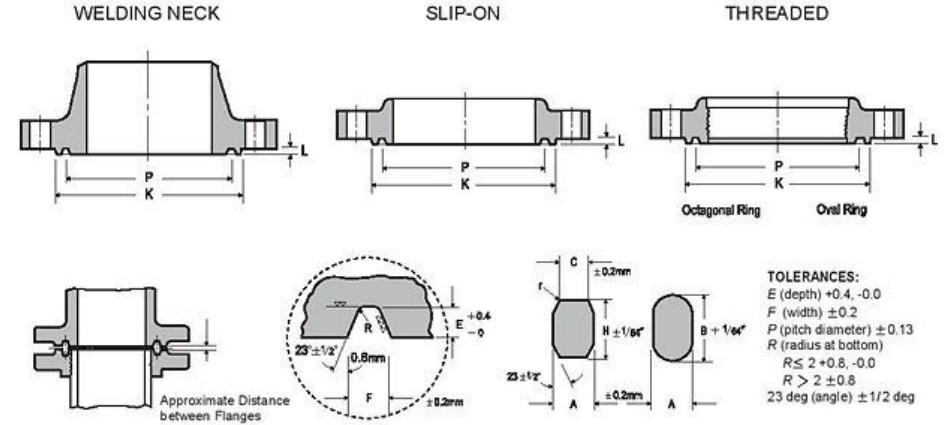
Nominal Pipe Size	DRILLING			BOLTING				APPROXIMATE WEIGHT							
	Bolt Circle Diam.	Num. of Holes	Diam. of Holes	Stud Bolt Length				Welding Neck		Slip-on and Threaded		Lap Joint		Blind	
				Diam. of Bolts (inch)	0.25" Raised Face	Male-Female Tongue-Groove	Ring Joint	Kg	lb.	Kg	lb.	Kg	lb.	Kg	lb.
1/2	88.9	4	22.4	3/4	120.7	114.3	120.7	3.18	7.00	3.18	7.00	3.00	6.60	3.18	7.00
3/4	95.3	4	22.4	3/4	127.0	120.7	127.0	4.08	9.00	4.08	9.00	3.63	8.00	4.54	10.00
1	108.0	4	25.4	7/8	139.7	133.4	139.7	5.45	12.00	5.44	12.00	4.99	11.00	5.44	12.00
1 1/4	130.0	4	28.4	1	152.4	146.1	152.4	9.07	20.00	8.16	18.00	7.26	16.00	8.16	18.00
1 1/2	146.1	4	31.8	1 1/8	171.5	165.1	171.5	11.35	25.00	11.00	24.30	9.99	22.00	10.44	23.00
2	171.5	8	28.4	1	177.8	171.5	177.8	19.07	42.00	17.25	38.00	16.80	37.00	17.71	39.00
2 1/2	196.9	8	31.8	1 1/8	196.9	190.5	203.2	23.61	52.00	24.97	55.00	24.06	53.00	25.42	56.00
3	228.6	8	35.1	1 1/4	222.3	215.9	228.6	42.68	94.00	37.68	83.00	36.32	80.00	39.04	86.00
4	273.1	8	41.1	1 1/2	254.0	247.7	260.4	64.00	141.00	58.00	127.90	54.48	120.00	60.38	133.00
5	323.9	8	47.8	1 3/4	298.5	292.1	311.2	110.68	244.00	95.25	210.00	92.53	204.00	101.15	223.00
6	368.3	8	53.8	2	342.9	336.6	355.6	176.46	378.00	146.51	323.00	143.01	315.30	156.63	345.30
8	438.2	12	53.8	2	381.0	374.7	393.7	261.27	576.00	219.99	485.00	213.38	470.40	240.62	530.50
10	539.8	12	66.5	2 1/2	489.0	482.6	508.0	484.43	1068.00	419.57	925.00	408.60	900.80	465.36	1026.00
12	619.3	12	73.2	2 3/4	539.8	533.4	558.8	692.35	1526.30	590.20	1301.00	572.95	1263.00	644.06	1464.00

- (4) Blind Flanges may be made with the same hub as that used for Slip-on Flanges or without hub.
- (5) The gasket surface and backside (bearing surface for bolting) are made parallel within 1 degree. To accomplish parallelism, spot facing is carried out according to MSS SP-9, without reducing thickness (t).
- (6) Class 2500 Slip-on Flanges are not covered by ASME B16.5, slip-on flanges are at the manufacturer's option.

ASME RING JOINT FLANGES

CLASS 150 FLANGES

RING JOINT FLANGES FACING DIMENSIONS



ASME B16.5 FORGED FLANGES

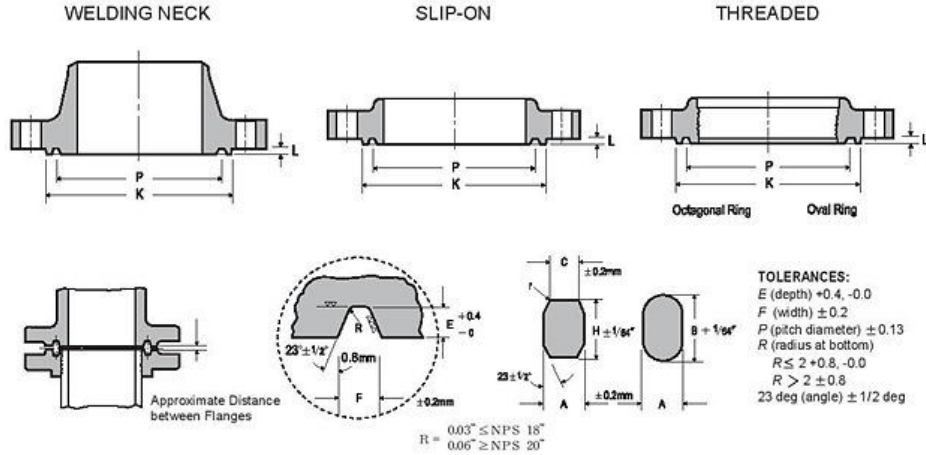
Unit:mm

Nominal Pipe Size	Pitch Diam. of Ring and Groove	Width of Ring of Ring	HEIGHT OF RING		Width of Flat on Octagonal Ring	Width of Groove	Depth of Groove	Diam. of R,F for Ring Joint or Lapped	Ring Number	Approximate Distance Between Flanges of Ring Joints When Ring is Compressed
			Oval	Octagonal						
			B	H						
1	47.6	8.0	14.3	12.7	5.2	8.7	6.4	63.5	R15	4.1
1 1/4	57.2	8.0	14.3	12.7	5.2	8.7	6.4	73.2	R17	4.1
1 1/2	65.1	8.0	14.3	12.7	5.2	8.7	6.4	82.6	R19	4.1
2	82.6	8.0	14.3	12.7	5.2	8.7	6.4	101.6	R22	4.1
2 1/2	101.6	8.0	14.3	12.7	5.2	8.7	6.4	120.7	R25	4.1
3	114.3	8.0	14.3	12.7	5.2	8.7	6.4	133.4	R29	4.1
3 1/2	131.8	8.0	14.3	12.7	5.2	8.7	6.4	153.9	R33	4.1
4	149.2	8.0	14.3	12.7	5.2	8.7	6.4	171.5	R36	4.1
5	171.5	8.0	14.3	12.7	5.2	8.7	6.4	193.5	R40	4.1
6	193.7	8.0	14.3	12.7	5.2	8.7	6.4	218.9	R43	4.1
8	247.7	8.0	14.3	12.7	5.2	8.7	6.4	273.1	R48	4.1
10	304.8	8.0	14.3	12.7	5.2	8.7	6.4	330.2	R52	4.1
12	381.0	8.0	14.3	12.7	5.2	8.7	6.4	406.4	R56	4.1
14	396.9	8.0	14.3	12.7	5.2	8.7	6.4	425.5	R59	3.0
16	454.0	8.0	14.3	12.7	5.2	8.7	6.4	482.6	R64	3.0
18	517.5	8.0	14.3	12.7	5.2	8.7	6.4	546.1	R68	3.0
20	558.8	8.0	14.3	12.7	5.2	8.7	6.4	596.8	R72	3.0
24	673.1	8.0	14.3	12.7	5.2	8.7	6.4	711.2	R76	3.0

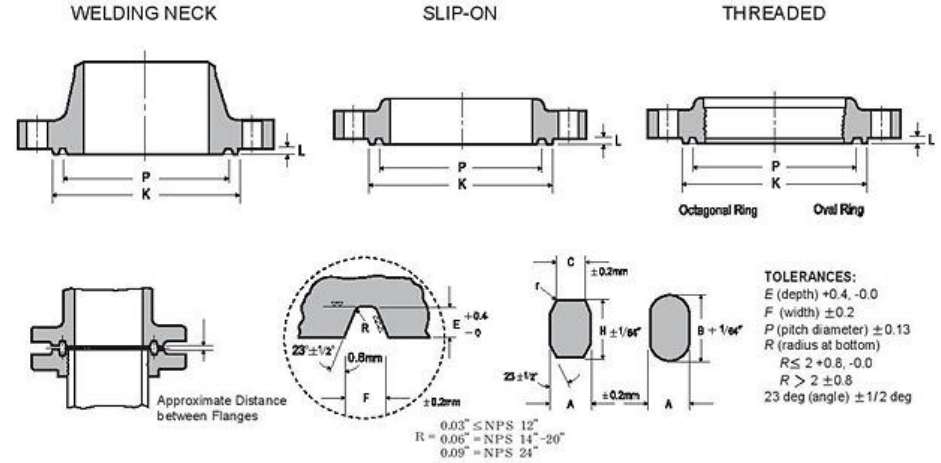
Notes :

- Unless other wise specified by the customer, Ring Type Joint Flanges will be furnished in accordance with these details.
- The depth of groove is added to the minimum flange thickness.
- * Raised face "L" is equal to groove dimension "E" but is not subject to tolerances for "E".
- * A plus tolerance of 3/64 in, for heights B and H is permitted providing the variation in the height of any given ring does not exceed 1/64 in, throughout its entire circumference.
- Dimension "R" is max.
- Radius "r" is 1/16" for ring widths 7/8" and less and 3/32" for ring widths 1" (25.4mm) and over.

RING JOINT FLANGES FACING DIMENSIONS



RING JOINT FLANGES FACING DIMENSIONS



ASME B16.5 FORGED FLANGES

Unit:mm

Nominal Pipe Size	Pitch Diam. of Ring and Groove	Width of Ring	HEIGHT OF RING		Width of Flat on Octagonal Ring	Width of Groove	Depth of Groove	Diam. of R.F. for Ring Joint or Lapped	Ring Number	Approximate Distance Between Flanges of Ring Joints When Ring is Compressed		
			Oval	Octagonal						Class300	Class400	Class600
			B	H								
1/2	34.1	6.4	11.1	9.5	4.3	7.1	5.6	50.8	R11	3.0	-	3.0
3/4	42.9	8.0	14.3	12.7	5.2	8.7	6.4	63.5	R13	4.1	-	4.1
1	50.8	8.0	14.3	12.7	5.2	8.7	6.4	69.9	R16	4.1	-	4.1
1 1/4	60.3	8.0	14.3	12.7	5.2	8.7	6.4	79.5	R18	4.1	-	4.1
1 1/2	68.3	8.0	14.3	12.7	5.2	8.7	6.4	90.4	R20	4.1	-	4.1
2	82.6	11.1	17.5	15.9	7.7	11.9	7.9	108.0	R23	5.6	-	4.8
2 1/2	101.6	11.1	17.5	15.9	7.7	11.9	7.9	127.0	R26	5.6	-	4.8
3	123.8	11.1	17.5	15.9	7.7	11.9	7.9	146.1	R31	5.6	-	4.8
3 1/2	131.8	11.1	17.5	15.9	7.7	11.9	7.9	158.8	R34	5.6	-	4.8
4	149.2	11.1	17.5	15.9	7.7	11.9	7.9	174.8	R37	5.6	-	4.8
5	181.0	11.1	17.5	15.9	7.7	11.9	7.9	209.6	R41	5.6	5.6	4.8
6	211.2	11.1	17.5	15.9	7.7	11.9	7.9	241.3	R45	5.6	5.6	4.8
8	269.9	11.1	17.5	15.9	7.7	11.9	7.9	301.8	R49	5.6	5.6	4.8
10	323.9	11.1	17.5	15.9	7.7	11.9	7.9	355.6	R53	5.6	5.6	4.8
12	381.0	11.1	17.5	15.9	7.7	11.9	7.9	412.8	R57	5.6	5.6	4.8
14	419.1	11.1	17.5	15.9	7.7	11.9	7.9	457.2	R61	5.6	5.6	4.8
16	469.9	11.1	17.5	15.9	7.7	11.9	7.9	508.0	R65	5.6	5.6	4.8
18	583.4	11.1	17.5	15.9	7.7	11.9	7.9	574.8	R69	5.6	5.6	4.8
20	584.2	12.7	19.1	17.5	8.7	13.5	9.5	635.0	R73	5.6	5.6	4.8
24	692.2	15.9	22.2	20.7	10.5	16.7	11.1	749.3	R77	6.4	6.4	5.6

- Notes :**
- Unless otherwise specified by the customer, Ring Type Joint Flanges will be furnished in accordance with these details.
 - The depth of groove is added to the minimum flange thickness.
 - * Raised face "L" is equal to groove dimension "E" but is not subject to tolerances for "E".
 - * A plus tolerance of 3/64 in. for heights B and H is permitted providing the variation in the height of any given ring does not exceed 1/64 in. throughout its entire circumference.
 - Dimension "R" is max.
 - Radius "r" is 1/16" for ring widths 7/8" and less and 3/32" for ring widths 1" (25.4mm) and over.

ASME B16.5 FORGED FLANGES

Unit:mm

Nominal Pipe Size	Pitch Diam. of Ring and Groove	Width of Ring	HEIGHT OF RING		Width of Flat on Octagonal Ring	Width of Groove	Depth of Groove	Diam. of R.F. for Ring Joint or Lapped	Ring Number	Approximate Distance Between Flanges of Ring Joints When Ring is Compressed
			Oval	Octagonal						
			B	H						
3	123.8	11.1	17.5	15.9	7.7	11.9	7.9	155.4	R31	4.1
4	149.2	11.1	17.5	15.9	7.7	11.9	7.9	180.8	R37	4.1
5	181.0	11.1	17.5	15.9	7.7	11.9	7.9	215.9	R41	4.1
6	211.2	11.1	17.5	15.9	7.7	11.9	7.9	241.3	R45	4.1
8	269.9	11.1	17.5	15.9	7.7	11.9	7.9	307.8	R49	4.1
10	323.9	11.1	17.5	15.9	7.7	11.9	7.9	362.0	R53	4.1
12	381.0	11.1	17.5	15.9	7.7	11.9	7.9	419.1	R57	4.1
14	419.1	15.9	22.2	20.7	10.5	16.7	11.1	466.9	R62	4.1
16	469.9	15.9	22.2	20.7	10.5	16.7	11.1	523.7	R66	4.1
18	533.4	19.1	25.4	23.8	11.1	19.8	12.7	593.9	R70	4.8
20	584.2	19.1	25.4	23.8	12.3	19.8	12.7	647.7	R74	4.8
24	692.2	25.4	33.4	31.8	17.3	27.0	15.9	771.7	R78	5.6

For size 2 1/2 and smaller, use Class 1500 Ring Joint Flanges

- Notes :**
- Unless otherwise specified by the customer, Ring Type Joint Flanges will be furnished in accordance with these details.
 - The depth of groove is added to the minimum flange thickness.
 - * Raised face "L" is equal to groove dimension "E" but is not subject to tolerances for "E".
 - * A plus tolerance of 3/64 in. for heights B and H is permitted providing the variation in the height of any given ring does not exceed 1/64 in. throughout its entire circumference.
 - Dimension "R" is max.
 - Radius "r" is 1/16" for ring widths 7/8" and less and 3/32" for ring widths 1" (25.4mm) and over.