



PRODUCT CATALOG

FLANGES & ACCESSORIES

CATALOG
EDITION

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01

FLANGES & ACCESORIES

FOR SALE



Products: Flanges

A flange is a forged or cast ring of steel designed to connect sections of pipe or join pipe to a pressure Vessel, pump or any other integral flanges assembly.

Flanges are joined to each other by bolting and joined to the piping system by welding or threading.

There are many different flange standards to be found worldwide. To allow easy functionality and inter-changeability, these are designed to have standardised dimensions. Common world standards include ASA/ANSI/ASME (USA), PN/DIN (European), BS10 (British/Australian), and JIS/KS (Japanese/Korean).

In most cases these are not interchangeable (e.g. an ANSI/ASME flange will not mate against a JIS flange). Further, many of the flanges in each standard are divided into "pressure classes", allowing flanges to be capable of taking different pressure ratings. Again these are not generally interchangeable (e.g. an ANSI/ASME 150 will not mate with an ANSI/ASME 300).

These pressure classes also have differing pressure and temperature ratings for different materials. Unique pressure classes for piping can also be developed for a process plant or power generating station; these may be specific to the corporation,



Slip-On Flanges

The flange is slipped over the pipe and then fillet welded both inside and outside to provide sufficient strength and prevent leakage. This flange is used in preference to weld necks by many users because of its lower cost and the fact that less accuracy is required when cutting pipe to length. Slip-on Flanges are easy to use in fabricated applications.

Blind Flanges

This is a flange without a bore and is used to shut off / blank off a piping system or vessel opening. It also permits easy access to vessels or piping systems for inspection purposes. Blind flange can be supplied with or without hubs at the manufacturers option. It is sometimes referred to as a blanking flange.

Weld-Neck Flanges

This flange is circumferentially welded into the system at its neck. It is designed to be joined to a piping system by butt welding. It is relatively expensive because of its long neck, but is preferred for high stress applications. The neck, or hub transmits stresses to the base of the hub to the wall thickness at the butt weld, provide important reinforcement of the flange. The bore of the flange matches the bore of the pipe, reducing turbulence and erosion. The weld-neck is therefore favoured in critical applications.

Threaded Flanges

This is referred to as either threaded or screwed. This is similar to a slip-on flange in outline, but the bore is threaded, thus enabling assembly without welding. This obviously limits its application to relatively low pressure piping systems. The flange may be welded around the joint after assembly, but this is not considered a satisfactory method of increasing its applications. Usually no welding is required.

engineering procurement and construction (EPC) contractor, or the process plant owner. The ANSI/ASME pressure classes for Flat-Face flanges are 125# and 250#. The classes for Ring-Joint, Tongue & Groove, and Raised-Face flanges are 150#, 300#, (400# - unusual), 600#, 900#, 1500#, and 2500#.

The flange faces are also made to standardized dimensions and are typically "flat face", "raised face", "tongue and groove", or "ring joint" styles, although other obscure styles are possible.

Flange designs are available as "weld neck", "slip-on", "lap joint", "socket weld", "threaded", and also "blind".

The most common facings machined on flanges are:

- Raised face, 1/16 inch for 150lb and 300lb, 1/4 inch for 400lb and heavier.
- Flat face, for 150lb and 300lb only, other may be flat face on request.
- Ring type joint, may be applied to all pressure ratings.



Socket Weld Flanges

This is similar to a slip-on flange in outline, but the bore is counter-bored to accept pipe before being fillet welded. The diameter of the remaining bore is the same as the inside diameter of the pipe therefore giving good flow characteristics. The flange is attached to the pipe by a fillet weld around the hub of the flange. An optional interval weld may be applied in high stress applications. It's biggest use is in high pressure systems such as hydraulic and steam lines.

Lap-Joint Flanges

This is again similar to a slip-on flange, but it has a radius at the intersection of the bore and the flange face to accommodate a lap stub end. The face on the stub end forms the gasket face on the flange. This type of flange is used in low-pressure applications where section of piping systems need to be dismantled quickly and easily assembled for inspection or replacement.

Orifice Flanges

The function of an orifice flange is to provide access to a line for metering of gases or liquids. An orifice plate is clamped between a pair of flanges when installed in a line and the whole assembly is referred to as an orifice flange union. Jack-screws within the assembly facilitate removal of the orifice plate. The orifice plate, the metering device, consists of a thin plate with a concentric, square edge, circular hole in the center. Two pressure tap-holes are drilled in each flange to measure pressure difference through the orifice.

Groove & Tongue Flanges

The Groove and Tongue faces of these flanges must be matched. One flange face has a raised ring (Tongue) machined onto the flange face while the mating flange has a matching depression (Groove) machined into its face. These are commonly found on pump covers and Valve Bonnets. Tongue and groove joints also have an advantage in that they are self-aligning and act as a reservoir for the adhesive.

Products: Socket Weld Pipe Fittings

A Socket Weld is a pipe attachment detail in which a pipe is inserted into a recessed area of a Valve, fitting or flange. In contrast to butt-weld fittings, Socket Weld fittings are mainly used for small pipe diameters (Small Bore Piping) to join pipe to Valves and fittings or to other sections of pipe, fillet-type seal welds be used. Socket-welded Joints construction is a good choice wherever the benefits of high leakage integrity and great structural strength are important design considerations. Fatigue resistance is lower than that in butt-welded construction due to the use of fillet welds and abrupt fitting geometry, but it is still better than that of most mechanical joining methods.

Socket Weld Fittings are family of high pressure fittings are used in various industrial processes.

- They are used for lines conveying flammable, toxic or expensive material where no leakage can be permitted, and for steam 300 to 600 PSI.
- They are used only in conjunction with ASME Pipe and are available in the same size range.
- They are used in areas where pipe-work is permanent and are designed to provide good flow characteristics.



SW Full Coupling

Termed Coupling, joins pipe two pipe or to a nipple etc

SW Half Coupling

The Half Coupling can be directly welded to the run pipe, to make a branch connection

SW Reducing Coupling

Joints two different outside diameters of pipe

SW Cap

Seals the end of Pipes

SW Union

It is a screwed joint design and it consists of three interconnected pieces: two internally threads and a center piece that draws the ends together when rotated. Unions should be screwed tight before the ends are welded to minimize warping of the seats.

Advantages

- The pipe need not be bevelled for weld preparation.
- Temporary tack welding is no needed for alignment, because in principle the fitting ensures proper alignment.
- The weld metal cannot penetrate into the bore of the pipe.
- They can be used in place of threaded fittings, so the risk of leakage is much smaller.
- Radiography is not practical on the fillet weld; therefore correct fitting and welding is crucial. The fillet weld may be inspected by surface examination, magnetic particle (MP), or liquid penetrant (PT) examination methods.
- Construction costs are lower than with butt-welded joints due to the lack of exacting fit-up requirements and elimination of special machining for butt weld end preparation.

Pipe Fitting Capacity / Range: Pipe Fitting products mix includes ½” to 12”.



SW Elbow 45 Degrees

This Elbows make 45 degrees changes of direction in the run of pipe

SW Tee Straight

This Tee makes 90 degrees branch from the main run of pipe

SW Cross

Crosses makes 90° branch from the main run of pipe

SW Reducer Insert

Socket Weld Reducer Inserts enable quick and economic combinations of pipeline reductions to be made using standard Socket Weld fittings

SW Elbow 90 Degrees

It is a screwed joint design and it consists of three interconnected pieces: two internally threads and a centerpiece that draws the ends together when rotated. Unions should be screwed tight before the ends are welded to minimize warping of the seats

Products: Threaded Pipe Fittings

Threaded joints probably represent the oldest method of joining piping systems. Like Socket Weld fittings, threaded fittings are mainly used for small pipe diameters (Small Bore Piping); generally for piping whose nominal diameter is NPS 2 or smaller.

The dimensional standards for taper pipe threads are given in ASME B1.20.1. That document gives all required dimensions including number of threads per inch, pitch diameter, and normal engagement lengths for all pipe diameters.

Threaded piping is commonly used in low-cost, noncritical applications such as domestic water, fire protection, and industrial cooling water systems.

Threaded fittings are normally made of cast gray or malleable iron, cast brass or bronze, or forged alloy and carbon steel.

They are available in three pressure ratings: Class 2000, 3000 and 6000.



Threaded Elbow 90°

Elbow 90°
This Elbows make 90° changes of direction in the run of pipe.

Threaded Elbow 45°

Threaded Elbow 45°
This Elbows make 45° changes of direction in the run of pipe.

Threaded Tee

Tee
This Tee makes 90 degrees branch from the main run of pipe.

Threaded Cross

Crosses makes 90 degrees branch from the main run of pipe.

NPT Thread

All fittings in this section are described, are provided with NPT thread, ASME B1.20.1. The American National Pipe Thread Tapered, is the best known and most widely used connection where the pipe thread provides both the mechanical joint and the hydraulic seal. NPT has a tapered male and female thread which seals with Teflon® tape or jointing compound.



Threaded Full Coupling

Threaded Full Coupling
A Full Coupling, joins pipe two pipe or to a nipple etc.

Threaded Cap (End Cap)

Threaded Cap (End Cap)
Seals the threaded end of pipe.

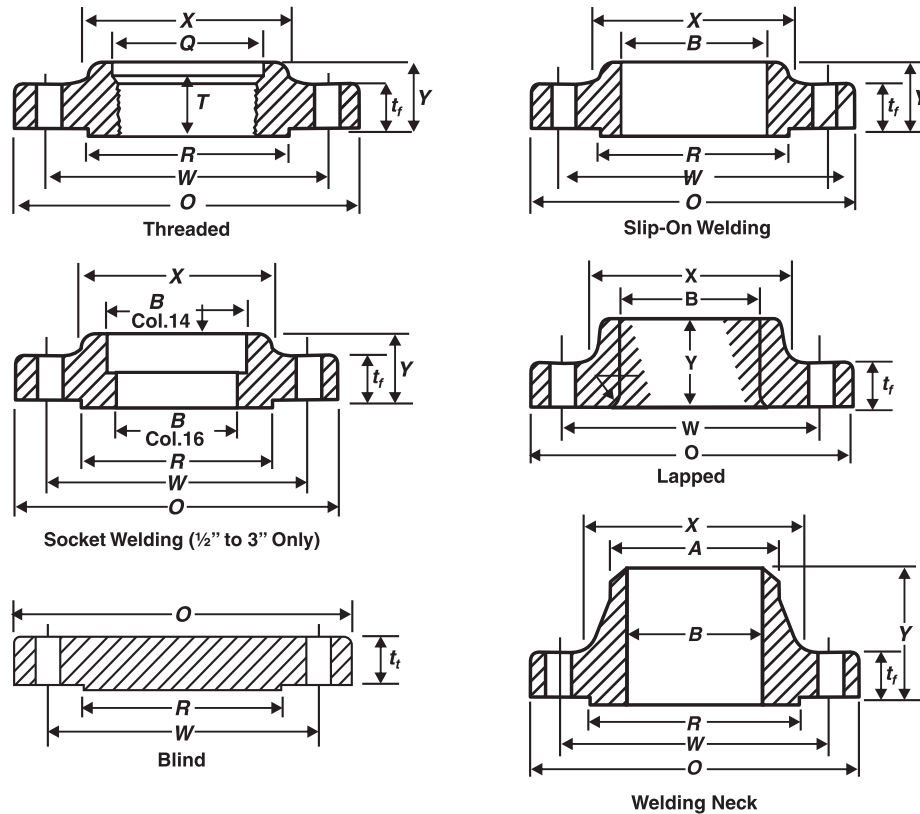
Threaded Half Coupling

Threaded Half Coupling
The Half Coupling can be directly welded to the run pipe, to make a branch connection.

Threaded Union

Unions are primarily used for maintenance and installation purposes. It is a screwed joint design and it consists of three interconnected pieces. Two internally threads and a centerpiece that draws the ends together when rotated.

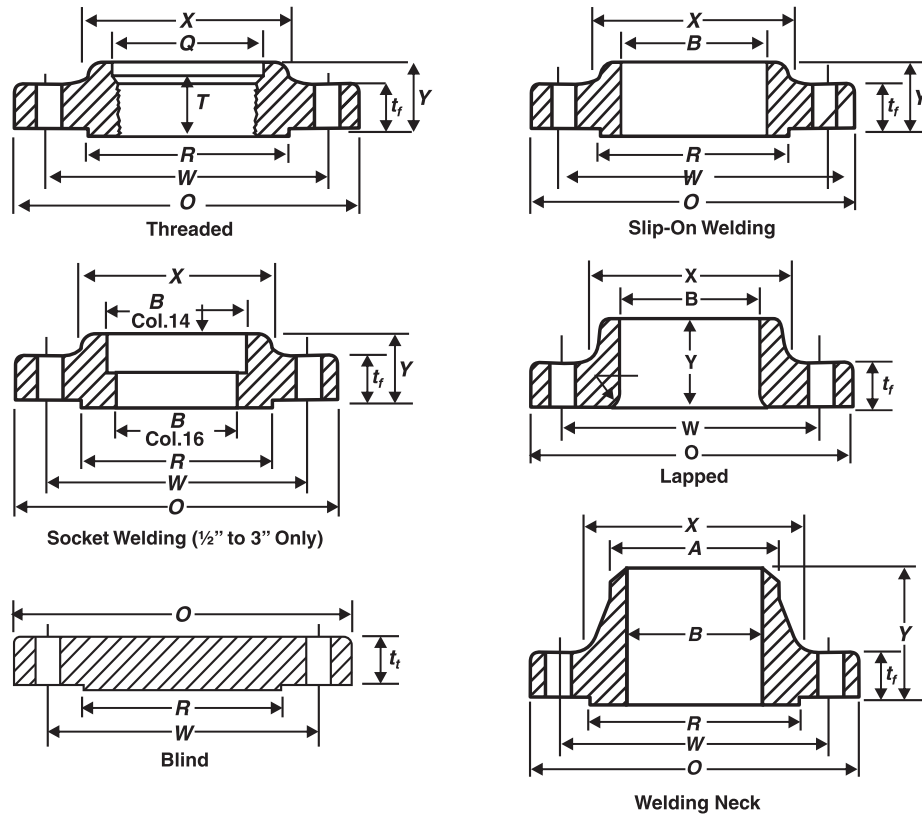
DIMENSIONS OF CLASS 150 FLANGES



DIMENSIONS OF CLASS 150 FLANGES																	
1	2	3	4 5 6			7	8	9 10 11			12	13	14	15	16	17	18
Nominal Pipe Size NPS	Outside Diameter of Flange, O	Thickness of Flange of Min., t _f	Drilling			Diameter of Hub, X	Hub Diameter Beginning of Chamfer Welding Neck, A	Length Thru Hub			Threaded/Length Threaded, T	Bore			Corner Radius of Bore of Lapped Flange and Pipe, r	Depth of Socket, D	Diameter of RF R
			Diameter of Bolt Circle, W	Diameter of Bolt Holes	Number of Bolts			Threaded/Slip-On/Socket Welding, Y	Lapped, Y	Welding Neck, Y		Slip-On/Socket Welding Min., B	Lapped Min., B	Welding Neck/Socket Welding, B [Note (2)]			
1/2	89.0	11.2	60.3	15.9	4	30	21.3	14	16	46	16	22.2	22.9	15.8	3	10	34.9
3/4	98.5	12.7	69.9	15.9	4	38	26.7	14	16	51	16	27.7	28.2	20.9	3	11	42.9
1	108.0	14.3	79.4	15.9	4	49	33.4	16	17	54	17	34.5	34.9	26.6	3	13	50.8
1 1/4	117.5	15.9	88.9	15.9	4	59	42.2	19	21	56	21	43.2	43.7	35.1	5	14	63.5
1 1/2	127.0	17.5	98.4	15.9	4	65	48.3	21	22	60	22	49.5	50.0	40.9	6	16	73.0
2	152.5	19.1	120.7	19.1	4	78	60.3	24	25	62	25	61.9	62.5	52.5	8	17	92.1
2 1/2	178.0	22.3	139.7	19.1	4	90	73.0	27	29	68	29	74.6	75.4	62.7	8	19	104.8
3	190.5	23.9	152.4	19.1	4	108	88.9	29	30	68	30	90.7	91.4	77.9	10	21	127.0
3 1/2	216.0	23.9	177.8	19.1	8	122	101.6	30	32	70	32	103.4	104.1	90.1	10	....	139.7
4	228.5	23.9	190.5	19.1	8	135	114.3	32	33	75	33	116.1	116.8	102.3	11	....	157.2
5	254.0	23.9	215.9	22.3	8	164	141.3	35	36	87	36	143.8	144.4	128.2	11	....	185.7
6	279.0	25.4	241.3	22.3	8	192	168.3	38	40	87	40	170.7	171.4	154.1	13	....	215.9
8	343.0	28.6	298.5	22.3	8	246	219.1	43	44	100	44	221.5	222.2	202.7	13	....	269.9
10	406.5	30.2	362.0	25.4	12	305	273.0	48	49	100	49	276.2	277.4	254.6	13	....	323.8
12	482.5	31.8	431.8	25.4	12	365	323.8	54	56	113	56	327.0	328.2	304.8	13	....	381.0
14	533.5	35.0	476.3	28.6	12	400	355.6	56	79	125	57	359.2	360.2	To be Specified by Purchaser	13	....	412.8
16	597.0	36.6	539.8	28.6	16	457	406.4	62	87	125	64	410.5	411.2		13	....	469.9
18	635.0	39.7	577.9	31.8	16	505	457.0	67	97	138	68	461.8	462.3		13	....	533.4
20	698.5	42.9	635.0	31.8	20	559	508.0	71	103	143	73	513.1	514.4		13	....	584.2
24	813.0	47.7	749.3	35.0	20	663	610.0	81	111	151	83	616.0	616.0		13	....	692.2

NOTE: (1) Height of RF 2 mm
 (2) Dimensions in Column 16 correspond to the inside diameters of pipe as given in ASME B36. 10M for Standard Wall pipe. Thickness of Standard Wall is the same as Schedule 40 in sizes NPS 10 and smaller. These bore sizes are furnished unless otherwise specified by the purchaser.

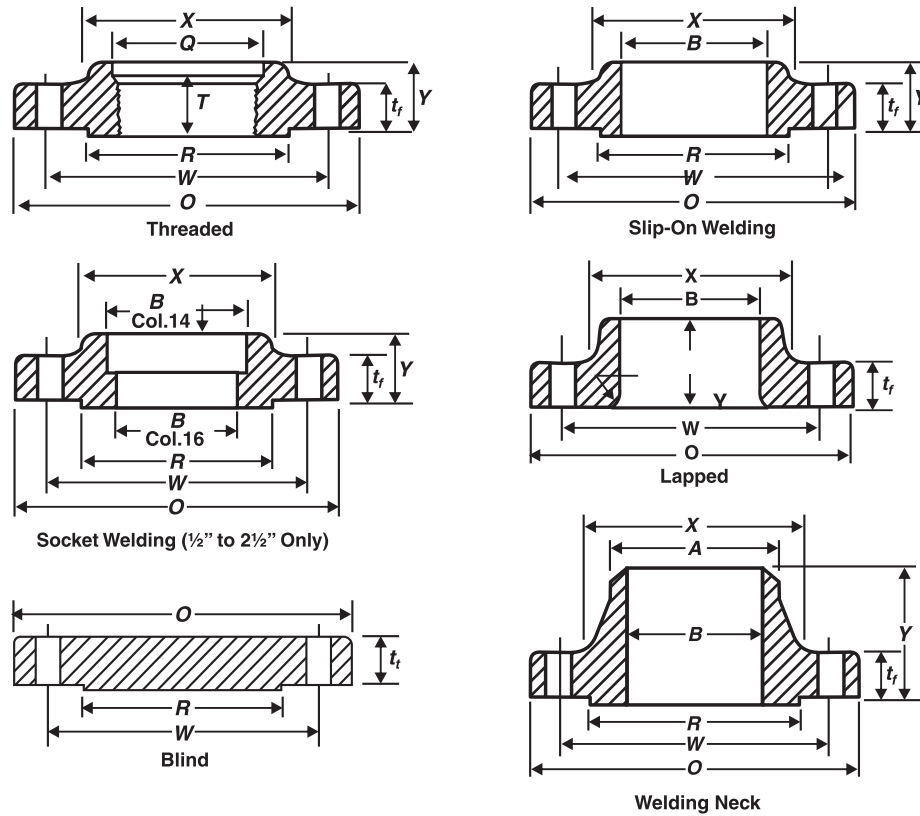
DIMENSIONS OF CLASS 300 FLANGES



DIMENSIONS OF CLASS 300 FLANGES																		
1	2	3	4 5 6			7	8 9 10			11	12 13		14	15	16	17	18	19
Nominal Pipe Size NPS	Outside Diameter of Flange, O	Thickness of Flange Min., t_f	Drilling			Diameter of Hub, X	Hub Diameter Beginning of Chamfer Welding Neck, A	Length Thru Hub			Threading Length Thru Hub Min., T	Bore		Welding Neck/Socket Welding, B [Note (2)]	Corner Radius of Bore of Lapped Flange and Pipe, r	Counter-bore Threaded FLANGE Min., Q	Depth of Socket, D	Diameter of RF R
			Diameter of Bolt Circle W	Diameter of Bolt Holes	Number of Bolts			Threading/Slip-On/Socket Welding, Y	Lapped, Y	Welding Neck, Y		Slip-On/Socket Welding Min., B	Lapped Min., B					
1/2	95.5	14.3	66.7	15.9	4	38	21.3	24	22	51	16	22.2	22.9	15.8	3	23.6	10	34.9
3/4	117.5	15.9	82.6	19.1	4	48	26.7	24	25	56	16	27.7	28.2	20.9	3	29.0	11	42.9
1	124.0	17.5	88.9	19.1	4	54	33.4	25	27	60	18	34.5	34.9	26.6	3	35.8	13	50.8
1 1/4	133.5	19.1	98.4	19.1	4	64	42.2	25	27	64	21	43.2	43.7	35.1	5	44.4	14	63.5
1 1/2	155.5	20.7	114.3	22.2	4	70	48.3	29	30	67	23	49.5	50.0	40.9	6	50.3	16	73.0
2	165.0	22.3	127.0	19.0	8	84	60.3	32	33	68	29	61.9	62.5	52.5	8	63.5	17	92.1
2 1/2	190.5	25.4	149.2	22.3	8	100	73.0	37	38	75	32	74.6	75.4	62.7	8	76.2	19	104.8
3	209.5	28.6	168.3	22.3	8	117	88.9	41	43	78	32	90.7	91.4	77.9	10	92.2	21	127.0
3 1/2	228.5	30.2	184.2	22.3	8	133	101.6	43	44	79	37	103.4	104.1	90.1	10	104.9	....	139.7
4	254.0	31.8	200.0	22.3	8	146	114.3	46	48	84	37	116.1	116.8	102.3	11	117.6	....	157.2
5	279.5	35.0	235.0	22.3	8	178	141.3	49	51	97	43	143.8	144.4	128.2	11	144.4	....	185.7
6	317.5	36.6	269.9	22.3	12	206	168.3	51	52	97	47	170.7	171.4	154.1	13	171.4	....	215.9
8	381.0	41.3	330.2	25.4	12	260	219.1	60	62	110	51	221.5	222.2	202.7	13	222.2	....	269.9
10	444.5	47.7	387.4	28.6	16	321	273.0	65	95	116	56	276.2	277.4	254.6	13	276.2	....	323.8
12	520.5	50.8	450.8	31.8	16	375	323.8	71	102	129	61	327.0	328.2	304.8	13	328.6	....	381.0
14	584.0	54.0	514.4	31.8	20	425	355.6	75	111	141	64	359.2	360.2	To be Specified by Purchaser	13	360.4	....	412.8
16	647.5	57.2	571.5	35.0	20	483	406.4	81	121	144	69	410.5	411.2		13	411.2	....	469.9
18	711.0	60.4	628.6	35.0	24	533	457.0	87	130	157	70	461.8	462.3		13	462.0	....	533.4
20	774.5	63.5	685.8	35.0	24	587	508.0	94	140	160	74	513.1	514.4		13	512.8	....	584.2
24	914.5	69.9	812.8	41.3	24	702	610.0	105	152	167	83	616.0	616.0		13	614.4	....	692.2

NOTE: (1) Height of RF 2 mm
 (2) Dimensions in Column 16 correspond to the inside diameters of pipe as given in ASME B36. 10M for Standard Wall pipe. Thickness of Standard Wall is the same as Schedule 40 in sizes NPS 10 and smaller. These bore sizes are furnished unless otherwise specified by the purchaser.

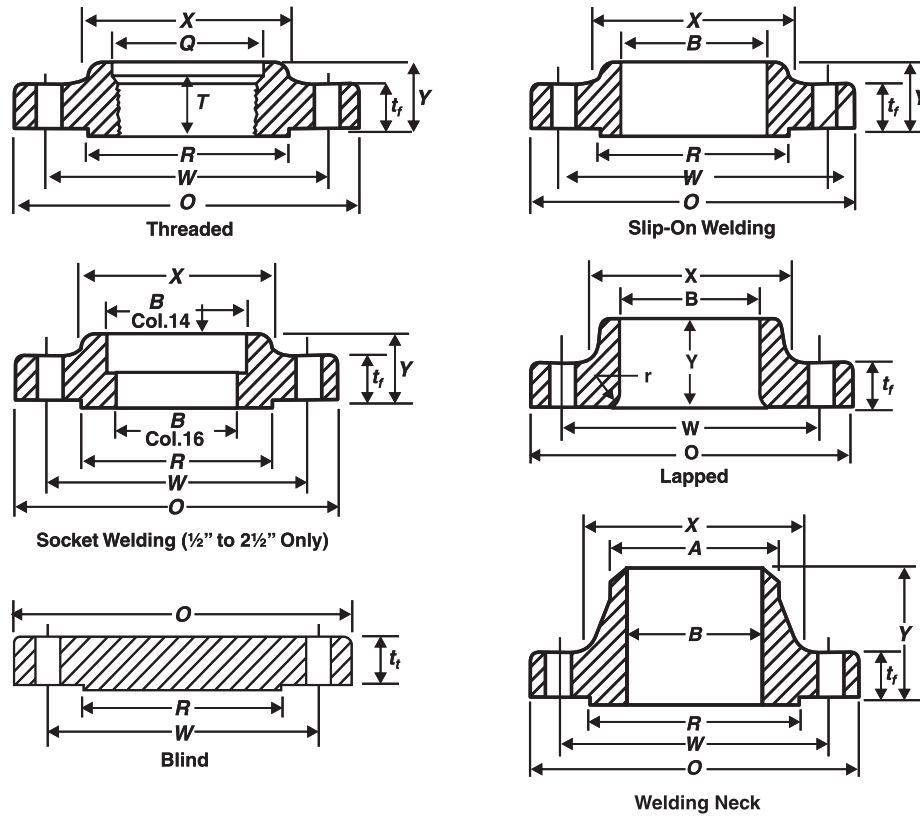
DIMENSIONS OF CLASS 400 FLANGES



DIMENSIONS OF CLASS 400 FLANGES																		
1	2	3	4	Drilling			8	Length Thru Hub			12	Bore			16	17	18	19
				5	6	7		9	10	11		13	14	15				
Nominal NPS	Outside Diameter of Flange, O	Thickness of Flange, Min., t_f	Diameter of Hub, X	Diameter of Bolt Circle, W	Diameter of Bolt Holes, in.	Number of Bolts	Hub Diameter Beginning of Chamfer Welding Neck, A	Threaded/Slip-On/ Y	Lapped, Y	Welding Meck, Y	Threaded/Length Threaded Min., T	Slip-On/ Min., B	Lapped Min., B	Socket Weld/ Welding Neck, B	Corner Radius of Bore of Lapped Flange and Pipe, r	Counter-bore Threaded FLANGE Min., Q	Diameter of RF, R	Socket, Weld D
1/2	95	14.3	38	66.7	15.9	4	21.3	22	22	52	16	22.2	22.9		3	23.6	34.9	10
3/4	115	15.9	48	82.6	19.0	4	26.7	25	25	57	16	27.7	28.2		3	29.0	42.9	11
1	125	17.5	54	88.9	19.0	4	33.4	27	27	62	18	34.5	34.9		3	35.8	50.8	13
1 1/4	135	20.7	64	98.4	19.0	4	42.2	29	29	67	21	43.2	43.7		5	44.4	63.5	14
1 1/2	155	22.3	70	114.3	22.2	4	48.3	32	32	70	23	49.5	50.0		6	50.6	73.0	16
2	165	25.4	84	127.0	19.0	8	60.3	37	37	73	29	61.9	62.5		8	63.5	92.1	17
2 1/2	190	28.6	100	149.2	22.2	8	73.0	41	41	79	32	74.6	75.4		8	76.2	104.8	19
3	210	31.8	117	168.3	22.2	8	88.9	46	46	83	35	90.7	91.4		10	92.2	127.0	
3 1/2	230	35.0	133	184.2	25.4	8	101.6	49	49	86	40	103.4	104.1		10	104.9	139.7	
4	255	35.0	146	200.0	25.4	8	114.3	51	51	89	37	116.1	116.8		11	117.6	157.2	
5	280	38.1	178	235.0	25.4	8	141.3	54	54	102	43	143.8	144.4	To be Specified by Purchaser	11	144.4	185.7	
6	320	41.3	206	269.9	25.4	12	168.3	57	57	103	46	170.7	171.4		13	171.4	215.9	
8	380	47.7	260	330.0	28.6	12	219.1	68	68	117	51	221.5	222.2		13	222.2	269.9	
10	445	54.0	321	387.4	31.8	16	273.0	73	102	124	56	276.2	277.4		13	276.2	323.8	
12	520	57.2	375	450.8	35.0	16	323.8	79	108	137	61	327.0	328.2		13	328.6	381.0	
14	585	60.4	425	514.4	35.0	20	355.6	84	117	149	64	359.2	360.2		13	360.4	412.8	
16	650	63.5	483	571.5	38.1	20	406.4	94	127	152	69	410.5	411.2	13	411.2	469.9		
18	710	66.7	533	628.6	38.1	24	457.0	98	137	165	70	461.8	462.3	13	462.0	533.4		
20	775	69.9	587	685.8	41.3	24	508.0	102	146	168	74	513.1	514.4	13	512.8	584.2		
24	915	76.2	702	812.8	47.7	24	610.0	114	159	175	83	616.0	616.0	13	614.4	692.2		

NOTE: (1) Height of RF 7 mm

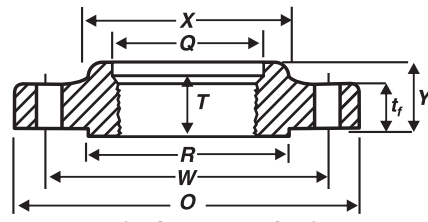
DIMENSIONS OF CLASS 600 FLANGES



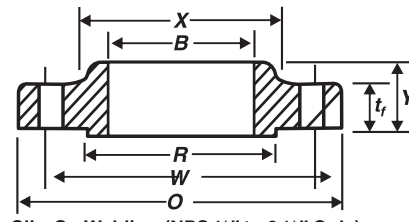
DIMENSIONS OF CLASS 600 FLANGES																		
1	2	3	4	Drilling			8	Length Thru Hub			12	Bore			16	17	18	19
				5	6	7		9	10	11		13	14	15				
Nominal Pipe Size NPS	Outside Diameter of Flange, O	Thickness of Flange, Min., t_f	Diameter of Hub, X	Diameter of Bolt Circle W	Diameter of Bolt Holes, in.	Number of Bolts	Hub Diameter Beginning of Chamfer Welding Neck, A	Threaded/ Slip-On/ Socket Welding, Y	Lapped, Y	Welding Meck, Y	Threaded/ Length Threaded Min., T	Slip-On/ Socket Welding Min., B	Lapped Min., B	Welding Neck/ Socket Welding, B	Corner Radius of Bore of Lapped Flange and Pipe, r	Counter-bore Threaded FLANGE Min., Q	Depth of Socket, D	Diameter of RF R
1/2	95.5	14.3	38	66.7	15.9	4	21.3	22	22	52	16	22.2	22.9	To be Specified by Purchaser	3	23.6	10	34.9
3/4	117.5	15.9	48	82.6	19.1	4	26.7	25	25	57	16	27.7	28.2		3	29.0	11	42.9
1	124.0	17.5	54	88.9	19.1	4	33.4	27	27	62	18	34.5	34.9		3	35.8	13	50.8
1 1/4	133.5	20.7	64	98.4	19.1	4	42.2	29	29	67	21	43.2	43.7		5	44.4	14	63.5
1 1/2	155.5	22.3	70	114.3	22.3	4	48.3	32	32	70	23	49.5	50.0		6	50.6	16	73.0
2	165.0	25.4	84	127.0	19.1	8	60.3	37	37	73	29	61.9	62.5		8	63.5	17	92.1
2 1/2	190.5	28.6	100	149.2	22.3	8	73.0	41	41	79	32	74.6	75.4		8	76.2	19	104.8
3	209.5	31.8	117	168.3	22.3	8	88.9	46	46	83	35	90.7	91.4		10	92.2	21	127.0
3 1/2	228.5	35.0	133	184.2	25.4	8	101.6	49	49	86	40	103.4	104.1		10	104.9	....	139.7
4	273.0	38.1	152	215.9	25.4	8	114.3	54	51	102	42	116.1	116.8		11	117.6	....	157.2
5	330.0	44.5	189	266.7	28.6	8	141.3	60	54	114	48	143.8	144.4		11	144.4	....	185.7
6	355.5	47.7	222	292.1	28.6	12	168.3	67	57	117	51	170.7	171.4		13	171.4	....	215.9
8	419.0	55.6	273	349.2	31.8	12	219.1	76	68	133	58	221.5	222.2	13	222.2	....	269.9	
10	508.0	63.5	343	431.8	35.0	16	273.0	86	102	152	66	276.2	277.4	13	276.2	....	323.8	
12	559.0	66.7	400	489.0	35.0	20	323.8	92	108	156	70	327.0	328.2	13	328.6	....	381.0	
14	603.5	69.9	432	527.0	38.1	20	355.6	94	117	165	74	359.2	360.2	13	360.4	....	412.8	
16	686.0	76.2	495	603.2	41.3	20	406.4	106	127	178	78	410.5	411.2	13	411.2	....	469.9	
18	743.0	82.6	546	654.0	44.5	20	457.0	117	137	184	80	461.8	462.3	13	462.0	....	533.4	
20	813.0	88.9	610	723.9	44.5	24	508.0	127	146	190	83	513.1	514.4	13	512.8	....	584.2	
24	940.0	101.6	718	838.2	50.8	24	610.0	140	159	203	93	616.0	616.0	13	614.4	....	692.2	

NOTE: (1) Height of RF 7 mm

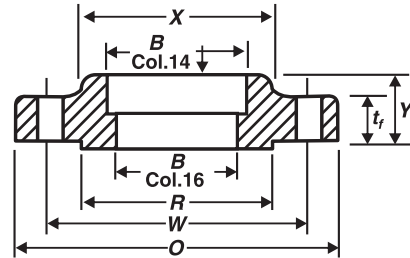
DIMENSIONS OF CLASS 900 FLANGES



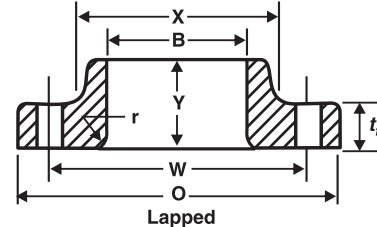
Thread (NPS 1/2" to 2 1/2" Only)



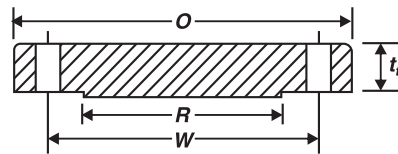
Slip-On Welding (NPS 1/2" to 2 1/2" Only)



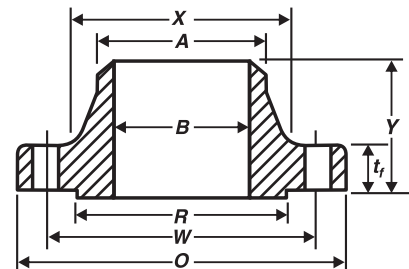
Socket Welding (1/2" to 2 1/2" Only)



Lapped



Blind

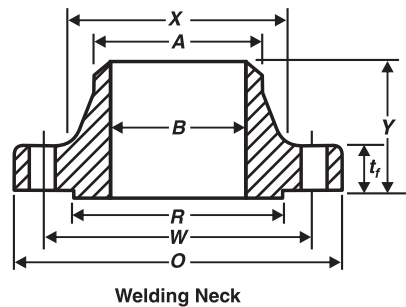
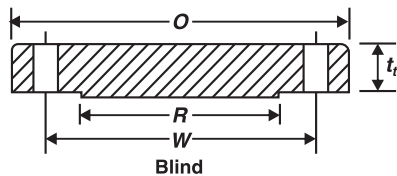
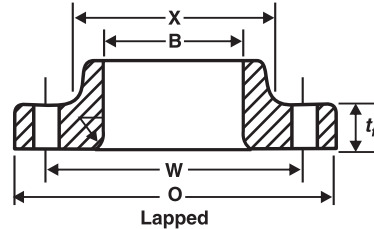
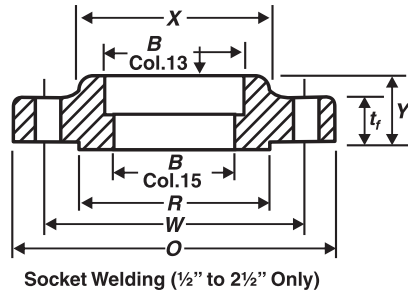
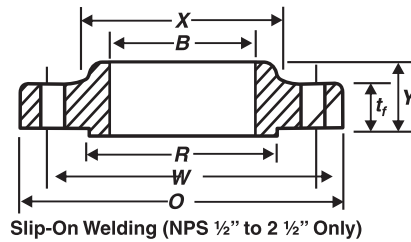
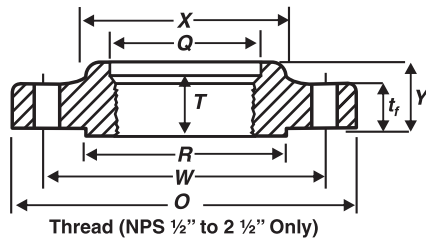


Welding Neck

DIMENSIONS OF CLASS 900 FLANGES																			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
Nominal Pipe Size NPS	Outside Diameter of Flange, O	Thickness of Flange, Min., t _f	Diameter of Hub, X	Drilling			Hub Diameter Beginning of Chamfer Welding Neck, A	Length Thru Hub			Threaded Length Threaded Flange Min., T	Bore			Corner Radius of Bore of Lapped Flange and Pipe, r	Counter-bore Threaded FLANGE Min., Q	Diameter of RF R	Socket, Weld D	
				Diameter of Bolt Circle W	Diameter of Bolt Holes, in.	Number of Bolts		Threaded/ Slip-On/ Y	Lapped, Y	Welding Neck, Y		Slip-On/ Min., B	Lapped Min., B	Welding Neck/ B					
1/2	120.7	22.3	38	82.6	22.3	4	21.3	32	32	60	23	22.2	22.9		3	23.6	34.9	10	
3/4	130.0	25.4	44	88.9	22.3	4	26.7	35	35	70	26	27.7	28.2		3	29.0	42.9	11	
1	149.4	28.6	52	101.6	25.4	4	33.4	41	41	73	29	34.5	34.9		3	35.8	50.8	13	
1 1/4	158.8	28.6	64	111.1	25.4	4	42.2	41	41	73	31	43.2	43.7		5	44.4	63.5	14	
1 1/2	177.8	31.8	70	123.8	28.6	4	48.3	44	44	83	32	49.5	50.0		6	50.6	73.0	16	
2	215.9	38.1	105	165.1	25.4	8	60.3	57	57	102	39	61.9	62.5		8	63.5	92.1	17	
2 1/2	244.3	41.3	124	190.5	28.6	8	73.0	64	64	105	48	74.6	75.4		8	76.2	104.8	19	
3	241.3	38.1	127	190.5	25.4	8	88.9	54	54	102	42	90.7	91.4		10	92.2	127.0		
4	292.1	44.5	159	235.0	31.8	8	114.3	70	70	114	48	116.1	116.8		11	117.6	139.7		
5	349.3	50.8	190	279.4	35.0	8	141.3	79	79	127	54	143.8	144.4	To be Specified by Purchaser	11	144.4	157.2		
6	381.0	55.6	235	317.5	31.8	12	168.3	86	86	140	58	170.7	171.4			13	171.4	185.7	
8	469.9	63.5	298	393.7	38.1	12	219.1	102	114	162	64	221.5	222.2			13	222.2	215.9	
10	546.1	69.9	368	469.9	38.1	16	273.0	108	127	184	72	276.2	277.4			13	276.2	269.9	
12	609.5	79.4	419	533.4	38.1	20	323.8	117	143	200	77	327.0	328.2			13	328.6	323.8	
14	641.4	85.8	451	558.8	41.3	20	355.6	130	156	213	83	359.2	360.2			13	360.4	381.0	
16	704.9	88.9	508	616.0	44.5	20	406.4	133	165	216	86	410.5	411.2			13	411.2	412.8	
18	787.4	101.6	565	685.8	50.8	20	457.0	152	190	229	89	461.8	462.3			13	462.0	469.9	
20	857.3	108.0	622	749.3	54.0	20	508.0	159	210	248	93	513.1	514.4			13	512.8	533.4	
24	1041.4	139.7	749	901.7	66.7	20	610.0	203	267	292	102	616.0	616.0			13	614.4	584.2	
																			692.2

NOTE: (1) Height of RF 7 mm

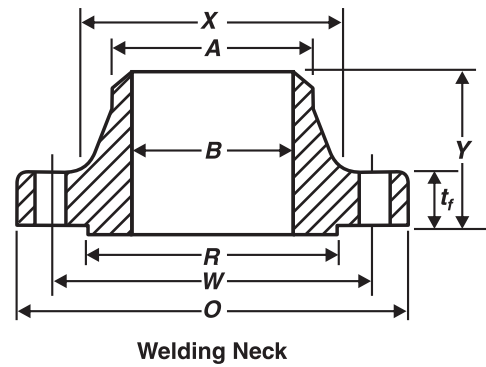
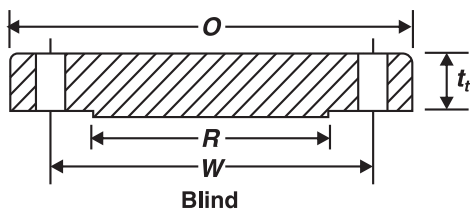
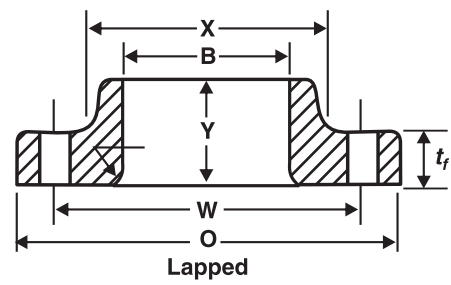
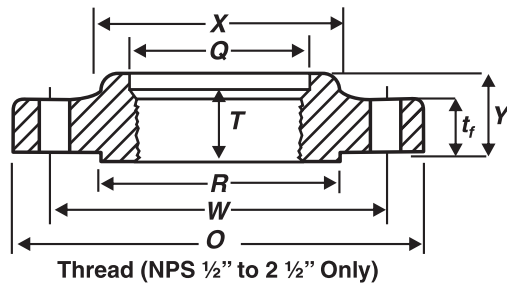
DIMENSIONS OF CLASS 1500 FLANGES



DIMENSIONS OF CLASS 1500 FLANGES																		
1	2	3	4	Drilling			8	Length Thru Hub			12	Bore			16	17	18	19
				5	6	7		9	10	11		13	14	15				
Pipe Size NPS	Outside Diameter of Flange, O	Thickness of Flange, Min., t _r	Diameter of Hub, X	Diameter of Bolt Circle W	Diameter of Bolt Holes, in.	Number of Bolts	Hub Diameter Beginning of Chamfer Welding Neck, A	Threaded/ Slip-On/ Socket Welding, Y	Lapped, Y	Welding Neck, Y	Threaded/ Length Threaded Min., T	Slip-On/ Socket Welding Min., B	Lapped Min., B	Welding Neck/ Socket Welding, B	Corner Radius of Bore of Lapped Flange and Pipe, r	Counter-bore Threaded FLANGE Min., Q	Depth of Socket, D	Diameter of RF R
½	120.7	22.3	38	82.6	22.3	4	21.3	32	32	60	23	22.2	22.9		3	23.6	10	34.9
¾	130.0	25.4	44	88.9	22.3	4	26.7	35	35	70	26	27.7	28.2		3	29.0	11	42.9
1	149.4	28.6	52	101.6	25.4	4	33.4	41	41	73	29	34.5	34.9		3	35.8	13	50.8
1¼	158.8	28.6	64	111.1	25.4	4	42.2	41	41	73	31	43.2	43.7		5	44.4	14	63.5
	177.8															73.0		
1½		31.8	70	123.8	28.6	4	48.3	44	44	83	32	49.5	50.0		6	50.6	16	
2	215.9	38.1	105	165.1	25.4	8	60.3	57	57	102	39	61.9	62.5		8	63.5	17	92.1
2½	244.3	41.3	124	190.5	28.6	8	73.0	64	64	105	48	74.6	75.4		8	76.2	19	104.8
3	266.7	47.7	133	203.2	31.8	8	88.9	...	73	117	...	...	91.4		10	...	...	127.0
4	311.2	54.0	162	241.3	35.0	8	114.3	...	90	124	...	...	116.8		11	...	...	139.7
																157.2		
5	374.7	73.1	197	292.1	41.3	8	141.3	...	105	156	...	...	144.4	To be Specified by Purchaser	11	...	...
6	393.7	82.6	229	317.5	38.1	12	168.3	...	119	171	...	...	171.4		13	...	...	185.7
8	482.6	92.1	292	393.7	44.5	12	219.1	...	143	213	...	...	222.2		13	...	...	215.9
10	584.2	108.0	368	482.6	50.8	12	273.0	...	178	254	...	...	277.4		13	...	...	269.9
12	673.1	123.9	451	571.5	54.0	16	323.8	...	219	283	...	...	328.2		13	...	...	323.8
																381.0		
14	749.3	133.4	495	635.0	60.4	16	355.6	...	241	298	...	...	360.2		13	...	...
16	825.5	146.1	552	704.8	66.7	16	406.4	...	260	311	...	...	411.2		13	...	...	412.8
18	914.4	162.0	597	774.7	73.0	16	457.0	...	276	327	...	...	462.3		13	...	...	469.9
20	984.3	177.8	641	831.8	79.4	16	508.0	...	292	356	...	...	514.4		13	...	...	533.4
24	1168.4	203.2	762	990.6	92.1	16	610.0	...	330	406	...	...	616.0		13	...	...	584.2
																692.2		

NOTE: (1) Height of RF 7 mm

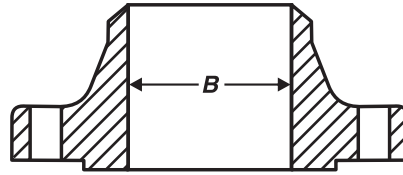
DIMENSIONS OF CLASS 2500 FLANGES



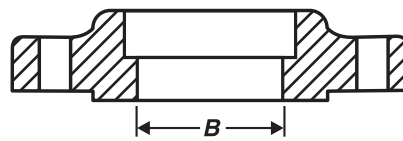
DIMENSIONS OF CLASS 2500 FLANGES																
1	2	3	4	Drilling			8 Hub Diameter Beginning of Chamfer Welding Neck, A	Length Throw Hub			12 Threaded/Length Threaded Min., T	Bore		15 Corner Radius of Bore of Lapped Flange and Pipe, r	16 Counter-bore Threaded Flange Min., Q	17 Diameter of RF R
Nominal Pipe Size NPS	Outside Diameter of Flange, O	Thickness of Flange, Min., t _f	Diameter of Hub, X	Diameter of Bolt Circle W	Diameter of Bolt Holes, in.	Number of Bolts		Threaded, Y	Lapped, Y	Welding Neck, Y		Lapped, Min., B	Welding Neck/Socket Welding, B				To be Specified by Purchaser
½	133.4	30.2	48	88.9	22.3	4	21.3	40	40	73	29	22.9	3	23.6	34.9	
¾	139.7	31.8	51	95.2	22.3	4	26.7	43	43	79	32	28.2	3	29.0	42.9	
1	158.8	35.0	57	108.0	25.4	4	33.4	48	48	89	35	34.9	3	35.8	50.8	
1¼	184.2	38.1	73	130.2	28.6	4	42.2	52	52	95	39	43.7	5	44.4	63.5	
1½	203.2	44.5	79	146.0	31.8	4	48.3	60	60	111	45	50.0	6	50.6	73.0	
2	235.0	50.9	95	171.4	28.6	8	60.3	70	70	127	51	62.5	8	63.5	92.1	
2½	266.7	57.2	114	196.8	31.8	8	73.0	79	79	143	58	75.4	8	76.2	104.8	
3	304.8	66.7	133	228.6	35.0	8	88.9	...	92	168	...	91.4	10	...	127.0	
4	355.6	76.2	165	273.0	41.3	8	114.3	...	108	190	...	116.8	11	...	139.7	
5	419.1	92.1	203	323.8	47.7	8	141.3	...	130	229	...	144.4	11	...	157.2	
6	482.6	108.0	235	368.3	54.0	8	168.3	...	152	273	...	171.4	13	...	185.7	
8	552.5	127.0	305	438.2	54.0	12	219.1	...	178	318	...	222.2	13	...	215.9	
10	673.1	165.1	375	539.8	66.7	12	273.0	...	229	419	...	277.4	13	...	269.9	
12	762.0	184.2	441	619.1	73.0	12	323.8	...	254	464	...	328.2	13	...	323.8	

NOTE: (1) Height of RF 7 mm

BORE (w.r.t) SCHEDULES



Welding Neck

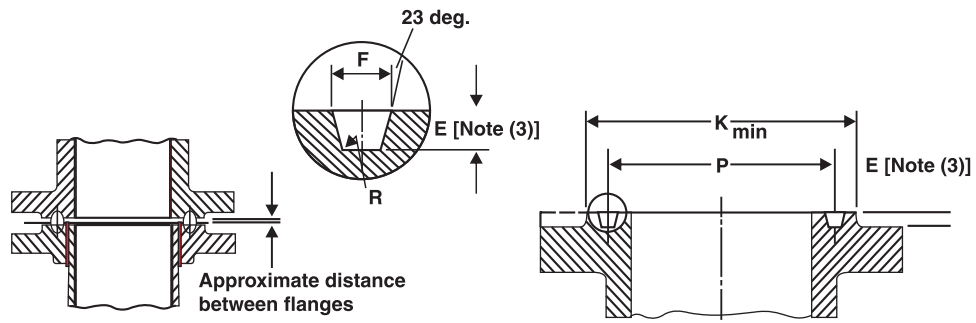


Socket Welding (½ to 3 Only)

BORE (w.r.t) SCHEDULES															
N.P	PIPE DIA	5S	10/10S	20	30	STD	40/40S	XS	60	80/80S	100	120	140	160	XXS
½	21.3	18.0	17.0	N.A.	16.4	15.7	15.7	13.8	N.A.	13.8	N.A.	N.A.	N.A.	11.7	6.3
¾	26.7	23.4	22.4	N.A.	21.8	20.9	20.9	18.8	N.A.	18.8	N.A.	N.A.	N.A.	15.5	11.0
1	33.4	30.1	27.8	N.A.	27.6	26.6	26.6	24.3	N.A.	24.3	N.A.	N.A.	N.A.	20.7	15.2
1¼	42.2	38.9	36.6	N.A.	36.2	35.0	35.0	32.5	N.A.	32.5	N.A.	N.A.	N.A.	29.5	22.8
1½	48.3	45.0	42.7	N.A.	41.9	40.9	40.9	38.1	N.A.	38.1	N.A.	N.A.	N.A.	34.0	28
2	60.3	57.0	54.7	N.A.	53.9	52.4	52.4	49.2	N.A.	49.2	N.A.	N.A.	N.A.	42.8	38.1
2½	73.0	68.7	66.9	N.A.	63.4	62.6	62.6	58.9	N.A.	58.9	N.A.	N.A.	N.A.	53.9	44.9
3	88.9	84.6	82.8	N.A.	79.3	77.9	77.9	73.6	N.A.	73.6	N.A.	N.A.	N.A.	66.6	58.4
3 ½	101.6	97.3	95.5	N.A.	92.0	90.1	90.1	85.4	N.A.	85.4	N.A.	N.A.	N.A.	N.A.	N.A.
4	114.3	110.0	108.2	N.A.	104.7	102.2	102.2	97.1	N.A.	97.1	N.A.	92.0	N.A.	87.3	80.0
5	141.3	135.7	134.5	N.A.	N.A.	128.2	128.2	122.2	N.A.	122.2	N.A.	115.9	N.A.	109.5	103.2
6	168.3	162.7	161.5	N.A.	N.A.	154.0	154.0	146.3	N.A.	146.3	N.A.	139.7	N.A.	131.7	124.4
8	219.1	213.5	211.5	206.4	205.0	202.7	202.7	193.7	198.4	193.7	188.9	182.5	177.8	173.0	174.6
10	273.0	266.2	264.6	260.3	257.4	254.4	254.4	247.6	247.6	242.8/247.6	236.4	230.1	222.2	215.8	222.2
12	323.8	315.8	314.6	311.1	307.0	304.7	303.1/303.7	298.4	295.2	288.8/298.4	280.9	273	266.6	257.1	273
14	355.6	347.6	342.9/346.0	339.7	336.5	336.5	333.3	330.2	325.4	317.5	307.9	300.0	292.1	284.1	N.A.
16	406.4	398.0	393.7/396.8	390.5	387.3	387.3	381	381	373.0	363.5	354.0	344.4	333.3	325.4	N.A.
18	457.2	448.6	443.3/447.6	441.1	434.7	437.9	428.4	431.6	418.9	409.3	398.2	387.1	377.6	366.5	N.A.
20	508.0	498.4	495.3/496.9	488.9	482.6	488.9	477.8	482.6	466.7	455.6	442.9	431.8	419.1	407.9	N.A.
22	559.0	549.4	546.3/547.7	539.9	533.6	539.9	N.A.	533.6	514.5	501.8	489.1	476.4	463.7	451.0	N.A.
24	610	598.9	597.3	590.9	581.4	590.9	575.0	584.6	560.7	548.0	532.2	517.9	505.2	490.9	N.A.

DIMENSION OF RING-JOINT FACINGS

(ALL PRESSURE RATING CLASSES) AS PER ASME B16.5 - 2003



DIMENSION OF RING-JOINT FACINGS (ALL PRESSURE RATING CLASSES) AS PER ASME B16.5 - 2003																
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Nominal Size							Groove Number	Groove Dimensions			Radius at Bottom, R	Diameter of Raised Portion, K				
Class 150 NPS	Class 300 NPS	Class 400 NPS	Class 600 NPS	Class 900 NPS	Class 1500 NPS	Class 2500 NPS		Groove Diameter, P	Depth, E	Width, F		Class 150	Class 300 400 600	Class 900	Class 1500	Class 2500
...	1/2	...	1/2	...	...	...	R11	34.14	5.54	7.14	0.8	...	51.0	...	...	...
...	...	...	...	...	1/2	...	12	39.67	6.35	8.74	0.8	...	...	...	60.5	...
...	3/4	...	3/4	...	...	1/2	13	42.88	6.35	8.74	0.8	...	63.5	...	...	65.0
...	...	...	...	...	3/4	...	14	44.45	6.35	8.74	0.8	...	...	...	66.5	...
1	...	...	...	...	...	...	15	47.63	6.35	8.74	0.8	63.5	...	...	...	...
...	1	...	1	...	1	3/4	16	50.80	6.35	8.74	0.8	...	70.0	...	71.5	73.0
1 1/4	...	...	...	...	...	...	17	57.15	6.35	8.74	0.8	73.0	...	...	...	...
...	1 1/4	...	1 1/4	...	1 1/4	1	18	60.33	6.35	8.74	0.8	...	79.5	...	81.0	82.5
1 1/2	...	...	...	...	...	...	19	65.07	6.35	8.74	0.8	82.5	...	...	...	...
...	1 1/2	...	1 1/2	...	1 1/2	...	20	68.27	6.35	8.74	0.8	...	90.5	...	92.0	...
...	...	...	...	...	...	1 1/4	21	72.23	7.92	11.91	0.8	...	...	...	...	102
2	...	...	...	...	...	...	22	82.55	6.35	8.74	0.8	102	...	...	...	...
...	2	...	2	...	...	1 1/2	23	82.55	7.92	11.91	0.8	...	108	...	...	114
...	...	...	...	...	2	...	24	95.25	7.92	11.91	0.8	...	...	...	124	...
2 1/2	...	...	...	...	...	...	25	101.60	6.35	8.74	0.8	121	...	...	...	...
...	2 1/2	...	2 1/2	...	...	2	26	101.60	7.92	11.91	0.8	...	127	...	...	133
...	...	...	...	...	2 1/2	...	27	107.95	7.92	11.91	0.8	...	...	...	137	...
...	...	...	...	...	...	2 1/2	28	111.13	9.52	13.49	0.8	...	...	...	...	149
3	...	...	...	...	...	...	29	114.30	6.35	8.74	0.8	133	...	...	...	...
...	(2)	...	(2)	...	...	...	30	117.48	7.92	11.91	0.8	...	...	...	...	...
...	3 (2)	...	3 (2)	3	...	...	31	123.83	7.92	11.91	0.8	...	146	156	...	...
...	...	...	...	...	...	3	32	127.00	9.53	13.49	1.5	...	...	...	...	168
3 1/2	...	...	...	...	...	...	33	131.78	6.35	8.74	0.8	154	...	...	...	...
...	3 1/2	...	3 1/2	...	...	...	34	131.78	7.92	11.91	0.8	...	159	...	...	...
...	...	...	...	...	3	...	35	136.53	7.92	11.91	0.8	...	...	...	168	...
4	...	...	...	...	...	...	36	149.23	6.35	8.74	0.8	171	...	...	...	...
...	4	4	4	4	...	...	37	149.23	7.92	11.91	0.8	...	175	181	...	...
...	...	...	...	...	...	4	38	157.18	11.13	16.66	1.5	...	...	...	...	203
...	...	...	...	...	4	...	39	161.93	7.92	11.91	0.8	...	...	...	194	...
5	...	...	...	...	...	...	40	171.45	6.35	8.74	0.8	194	...	...	...	...
...	5	5	5	5	...	...	41	180.98	7.92	11.91	0.8	...	210	216	...	...
...	...	...	...	...	...	5	42	190.50	12.70	19.84	1.5	...	...	...	...	241
6	...	...	...	...	...	...	43	193.69	6.35	8.74	0.8	219	...	...	...	...
...	...	...	...	...	5	...	44	193.68	7.92	11.91	0.8	...	...	...	229	...
...	6	6	6	6	...	...	45	211.12	7.92	11.91	0.8	...	241	241	...	...
...	...	...	...	...	6	...	46	211.14	9.53	13.49	1.5	...	...	...	...	248
...	...	...	...	...	...	6	47	228.60	12.70	19.84	1.5	...	...	...	...	279
8	...	...	...	...	...	...	48	247.65	6.35	8.74	0.8	273	...	...	...	...
...	8	8	8	8	...	...	49	269.88	7.92	11.91	0.8	...	302	308	...	...

NOTE: (1) USE CLASS 600 FOR SIZES NPS 1/2 TO NPS 3 1/2 FOR CLASS 400
 (2) USE CLASS 1500 FOR SIZES NPS 1/2 TO NPS 2 1/2 FOR CLASS 900
 (3) Height of raised portion is equal to the depth of groove dimension E, but is not subjected to the tolerance for E, Former full-face contour may be used.
 (4) For ring joints with lapped flanges in Classes 300 and 600, ring and groove number R30 is used instead of R31.
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

GENERAL TOLERANCES

1. Facings

Required tolerances for various flange and flanged fitting facings are as follows:

- 1.1 Inside and outside diameter of large and small tongue and Groove and female, ± 0.5 mm
- 1.2 Outside diameter, 2.0 mm Raised face, ± 1.0 mm
- 1.3 Outsidediameter, 7.0 mm Raised face, ± 0.5 mm

2. Flange Thickness

Required tolerances for flange thickness are as follows.

- NPS ≤ 18 + 3.0,-0.0 MM
- NPS ≤ 20 + 5.0,-0.0 MM

The plus tolerances is applicable to bolting bearing surfaces whether as forged, as cast, spot-faced or back-faced.

3. Welding End Flange Ends and Hubs

3.1 Outside Diameter. Required tolerances for the nominal outside diameter dimension A of figs. Welding end of welding neck flanges are as follow:

- NPS ≤ 5 + 2.0,-1.0 mm
- NPS ≤ 6 + 4.0,-1.0 mm

3.2 Inside Diameter. Required tolerances for the nominal inside diameter of welding ends of welding neck flanges and smaller bore of socket welding flanges (dimension B in the referenced figures) are as follows.

- NPS ≤ 1 + 1.0 mm
- 12 \leq NPS ≤ 18 + 1.5 mm
- NPS ≤ 20 , + 3.0, 1.5 mm

3.3 Hub Thickness. Despite the tolerances specified for dimensions A and B, the thickness of the hub at the welding end shall not be less than 87½% of the nominal thickness of the Pipe, having an under tolerance of 2.5% for the pipe wall thickness to which the flange is to be attached, or the minimum wall thickness as specified by the purchaser.

4.0 Length Through Hub on Welding Neck Flanges

The required tolerances for the length through hubs on welding neck flanges are as follows.

- NPS ≤ 4 ± 1.5 mm
- 5 \leq NPS ≤ 10 + 1.5, -3.0mm
- NPS ≤ 12 , + 3.0, mm -5.0 mm

5.0 Flange Bore

5.1 Lapped, Slip-on, and Socket Welding Flange Bores.

The required tolerances for lapped, slip-on and socket welding flange bores are as follows.

- NPS ≤ 10 + 1.0, -0.0 mm
- NPS ≤ 12 + 1.5, -0.0 mm

5.2 Counterbores, Threaded Flanges. The required tolerances for threaded flange counterbores are as follows.

- NPS ≤ 10 + 1.0, -0.0 mm
- NPS ≤ 12 + 1.5, -0.0 mm

5.3 Counterbores, Socket Welding Flanges. The required tolerances for socket and counterbores is as follows.

- $\frac{1}{2} \leq$ NPS ≤ 3 ± 0.25 mm

6.0 Drilling and Facing

6.1 Bolt Circle Diameter. The required tolerance for all bolt circle diameters is ± 1.5 mm

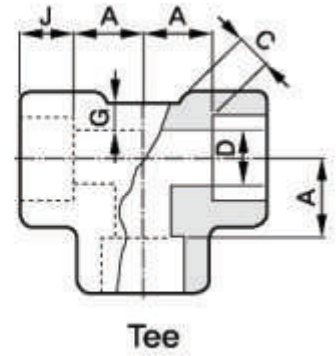
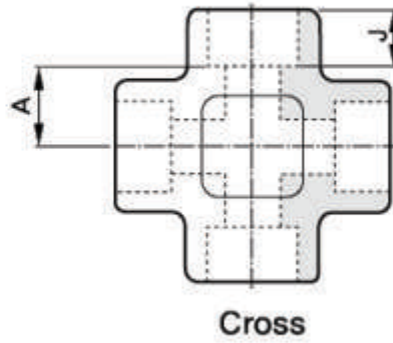
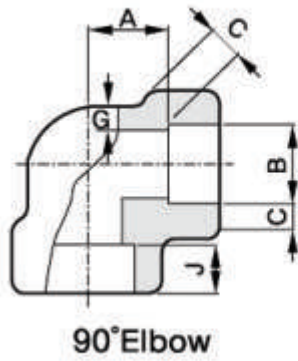
6.2 Bolt Hole to Bolt Hole. The required tolerance for the center-to-center of adjacent bolt holes is ± 0.8 mm

6.3 Bolt Circle Concentricity. The required tolerances for concentricity between the flange bolt circle diameter and machined facing diameters are as follows.

- NPS $\leq 2\frac{1}{2}$ " 0.8 mm
- NPS ≥ 3 " 1.5 mm

Forged Steel Socket Welding Fitting

90° Elbow, 45° Elbow, Tee, Cross, Coupling
 Class 3000, 6000, 9000



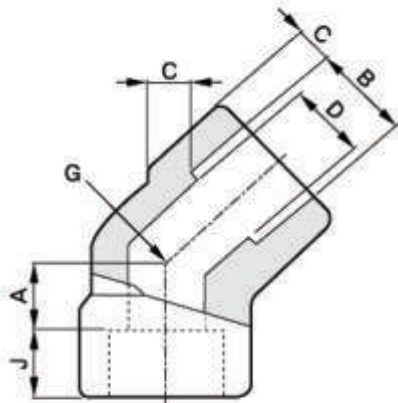
ASME B16. 11

(in millimeters)

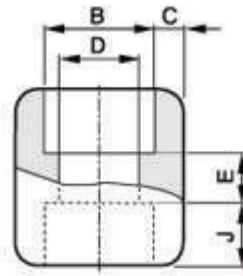
Nominal Pipe Size	Socket Bore Diameter, B	Bore Diameter of Fitting, D			Socket Wall Thickness, C						Body Wall, G		
		Class Designation			45 Elbows						Class Designation		
		3000	6000	9000	Class Designation			Class Designation			Class Designation		
					3000		6000		9000		3000	6000	9000
Avg.	Min.	Avg.	Min.	Avg.	Min.	Min.	Min.	Min.					
1/8	10.8 ~ 11.2	6.1 ~ 7.6	3.2 ~ 4.8		3.18	3.18	3.96	3.43			2.41	3.15	
1/4	14.2 ~ 14.6	8.5 ~ 10.0	5.6 ~ 7.1		3.78	3.30	4.60	4.01			3.02	3.68	
3/8	17.6 ~ 18.0	11.8 ~ 13.3	8.4 ~ 9.9		4.01	3.50	5.03	4.37			3.20	4.01	
1/2	21.8 ~ 22.2	15.0 ~ 16.6	11.0 ~ 12.5	5.6 ~ 7.2	4.67	4.09	5.97	5.18	9.35	8.18	3.73	4.78	7.47
3/4	27.2 ~ 27.6	20.2 ~ 21.7	14.8 ~ 16.3	10.3 ~ 11.8	4.90	4.27	6.96	6.04	9.78	8.56	3.91	5.56	7.82
1	33.9 ~ 34.3	25.9 ~ 27.4	19.9 ~ 21.5	14.4 ~ 16.0	5.69	4.98	7.92	6.93	11.38	9.96	4.55	6.35	9.09
1 1/4	42.7 ~ 43.1	34.3 ~ 35.8	28.7 ~ 30.8	22.0 ~ 23.5	6.07	5.28	7.92	6.93	12.14	10.62	4.85	6.35	9.70
1 1/2	48.8 ~ 49.2	40.1 ~ 41.6	33.2 ~ 34.7	27.2 ~ 28.7	6.35	5.54	8.92	7.80	12.70	11.12	5.08	7.14	10.15
2	61.2 ~ 61.7	51.7 ~ 53.3	42.1 ~ 43.6	37.4 ~ 38.9	6.93	6.04	10.92	9.50	13.84	12.12	5.54	8.74	12.12
2 1/2	73.9 ~ 74.4	61.2 ~ 64.2			8.76	7.67					7.01		
3	89.8 ~ 90.3	76.4 ~ 79.4			9.52	8.30					7.62		
4	115.2 ~ 115.7	100.7 ~ 103.8			10.69	9.35					8.56		

Forged Steel Socket Welding Fitting

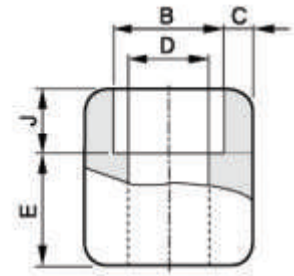
90° Elbow, 45° Elbow, Tee, Cross, Coupling
 Class 3000, 6000, 9000



45° Elbow



Coupling



Half Coupling

ASME B16.11

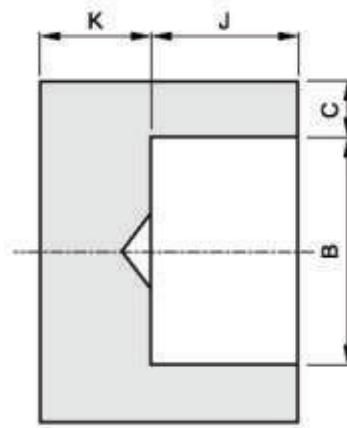
(in millimeters)

Nominal Pipe Size	Min. Depth of Socket, J	Center to Bottom of Socket, A						Laying Lengths		Tolerances, ±		
		90° Elbows, Tees and Cross			45° Elbows			Couplings, E	Half Couplings, F	A	E	F
		Class Designation			Class Designation							
		3000	6000	9000	3000	6000	9000					
1/8	9.5	11.0	11.0		8.0	8.0		6.5	16.0	1.0	1.5	1.0
1/4	9.5	11.0	13.5		8.0	8.0		6.5	16.0	1.0	1.5	1.0
3/8	9.5	13.5	15.5		8.0	11.0		6.5	17.5	1.5	3.0	1.5
1/2	9.5	15.5	19.0	25.5	11.0	12.5	15.5	9.5	22.5	1.5	3.0	1.5
3/4	12.5	19.0	22.5	28.5	13.0	14.0	19.0	9.5	24.0	1.5	3.0	1.5
1	12.5	22.5	27.0	32.0	14.0	17.5	20.5	12.5	28.5	2.0	4.0	2.0
1-1/4	12.5	27.0	32.0	35.0	17.5	20.5	22.5	12.5	30.0	2.0	4.0	2.0
1-1/2	12.5	32.0	38.0	38.0	20.5	25.5	25.5	12.5	32.0	2.0	4.0	2.0
2	16.0	38.0	41.0	54.0	25.5	28.5	28.5	19.0	41.0	2.0	4.0	2.0
2-1/2	16.0	41.0			28.5			19.0	43.0	2.5	5.0	2.5
3	16.0	57.0			32.0			19.0	44.5	2.5	5.0	2.5
4	19.0	66.5			41.0			19.0	48.0	2.5	5.0	2.5

Forged Steel Socket Welding Fitting

CAP

Class 3000, 6000, 9000



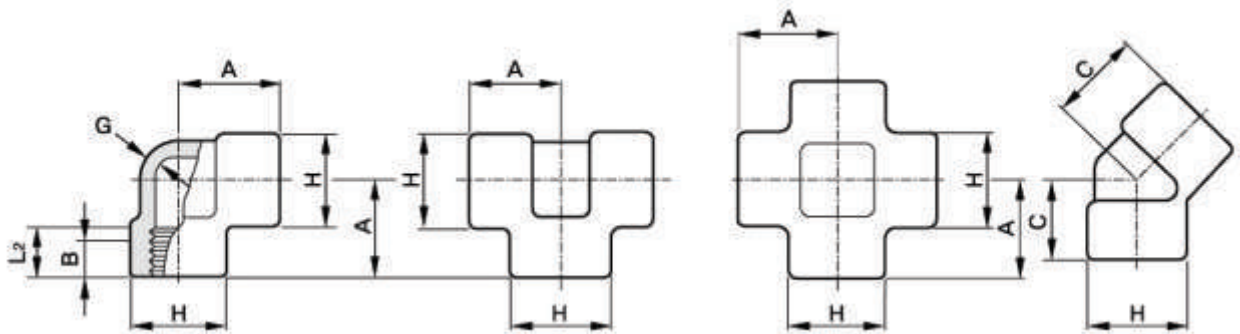
ASME B16.11

(in millimeters)

Nominal Pipe Size	Socket Bore Dia. B	Socket Wall Thickness C (Min)			Depth of Socket J (Min)	K (Min)		
		Class Designation				Class Designation		
		3000	6000	9000		3000	6000	9000
1/8	10.8 ~ 11.2	3.18	3.43		9.5	4.8	6.4	
1/4	14.2 ~ 14.6	3.30	4.01		9.5	4.8	6.4	
3/8	17.6 ~ 18.0	3.50	4.37		9.5	4.8	6.4	
1/2	21.8 ~ 22.2	4.09	5.18	8.18	9.5	6.4	7.9	11.2
3/4	27.2 ~ 27.6	4.27	6.04	8.56	12.5	6.4	7.9	12.7
1	33.9 ~ 34.3	4.98	6.93	9.96	12.5	9.6	11.2	14.2
1-1/4	42.7 ~ 43.1	5.28	6.93	10.62	12.5	9.6	11.2	14.2
1-1/2	48.8 ~ 49.2	5.54	7.80	11.12	12.5	11.2	12.7	15.7
2	61.2 ~ 61.7	6.04	9.50	12.12	16.0	12.7	15.7	19.0
2-1/2	73.9 ~ 74.4	7.67			16.0	15.7	19.0	
3	89.8 ~ 90.3	8.30			16.0	19.0	22.4	
4	115.2 ~ 115.7	9.35			19.0	22.4	28.4	

Forged Steel Threaded Fitting

90° Elbow, 45° Elbow, Tee, Cross
 Class 3000, 6000, 9000



ASME B16.11

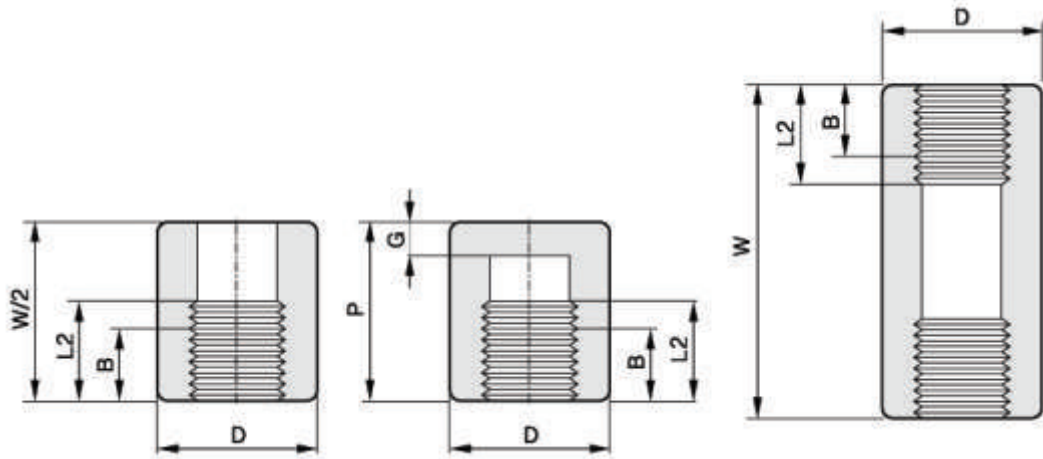
(in millimeters)

Nominal Pipe Size	Center to End Elbows, Tees, Crosses A			Center to End 45° Elbows C			Outside Diameter of Band H			Minimum Wall Thickness G			Length of Thread Min(1)	
	2000	3000	6000	2000	3000	6000	2000	3000	6000	2000	3000	6000	B	L ₂
1/8	21	21	25	17	17	19	22	22	25	3.18	3.18	6.35	6.4	6.7
1/4	21	25	28	17	19	22	22	25	33	3.18	3.30	6.60	8.1	10.2
3/8	25	28	33	19	22	25	25	33	38	3.18	3.51	6.98	9.1	10.4
1/2	28	33	38	22	25	28	33	38	46	3.18	4.09	8.15	10.9	13.6
3/4	33	38	44	25	28	33	38	46	56	3.18	4.32	8.53	12.7	13.9
1	38	44	51	28	33	35	46	56	62	3.68	4.98	9.93	14.7	17.3
1-1/4	44	51	60	33	35	43	56	62	75	3.89	5.28	10.59	17.0	18.0
1-1/2	51	60	64	35	43	44	62	75	84	4.01	5.56	11.07	17.8	18.4
2	60	64	83	43	44	52	75	84	102	4.27	7.14	12.09	19.0	19.2
2-1/2	76	83	95	52	52	64	92	102	121	5.61	7.65	15.29	23.6	28.9
3	86	95	106	64	64	79	109	121	146	5.99	8.84	16.64	25.9	30.5
4	106	114	114	79	79	79	146	152	152	6.55	11.18	18.67	27.7	33.0

(1) Dimension B is minimum length of perfect thread. The length of useful thread (B plus threads with fully formed roots and flat crests) shall not be less than L₂ (effective length of external thread) required by American National Standard for Pipe Threads (ASME B1.20.1)

Forged Steel Threaded Fitting

Coupling, Half Coupling, Cap Class 3000, 6000



ASME B16.11

(in millimeters)

Nominal Pipe Size	End-to-End Couplings W	End-to-End Caps P		Outside Diameter D		End Wall Thickness Min G		Length of Thread Min (1)	
	3000 and 6000	3000	6000	3000	6000	3000	6000	B	L ₂
1/8	32	19		16	22	4.8		6.4	6.7
1/4	35	25	27	19	25	4.9	6.4	8.1	10.2
3/8	38	25	27	22	32	4.8	6.4	9.1	10.4
1/2	48	32	33	28	38	6.4	7.9	10.9	13.6
3/4	51	37	38	35	44	6.4	7.9	12.7	13.9
1	60	41	43	44	57	9.7	11.2	14.7	17.3
1-1/4	67	44	46	57	64	9.7	11.2	17.0	18.0
1-1/2	79	44	48	64	76	11.2	12.7	17.8	18.4
2	86	48	51	76	92	12.7	15.7	19.0	19.2
2-1/2	92	60	64	92	108	15.7	19.0	23.6	28.9
3	108	65	68	108	127	19.0	22.4	25.9	30.5
4	121	68	75	140	159	22.4	28.4	27.7	33.0

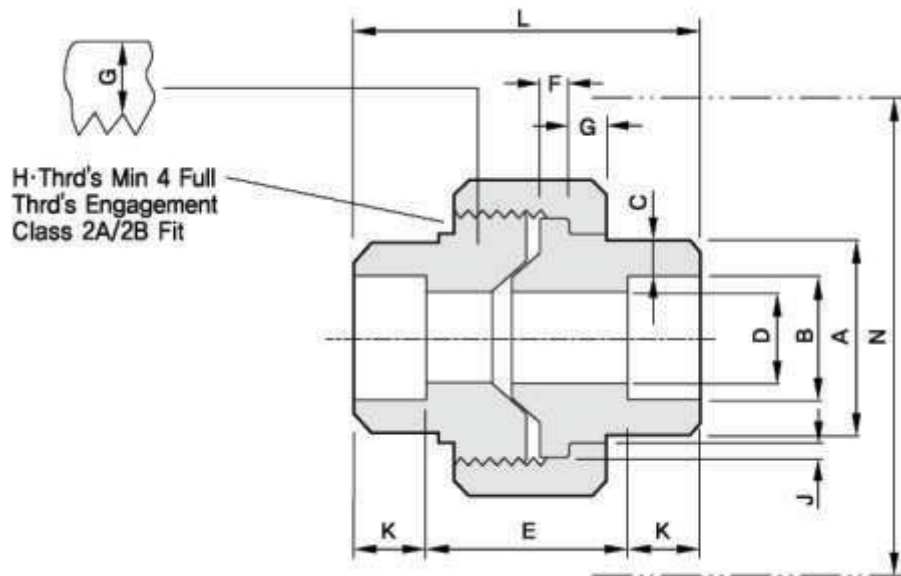
(1) Dimension B is minimum length of perfect thread. The length of useful thread (B plus threads with fully formed roots and flat crests) shall not be less than L₂ (effective length of external thread) required by American National Standard for Pipe Threads (ASME B1.20.1)

*Class 2000 and NPT 1/8 class 6000 couplings, half couplings and caps are not included in this standard.

Forged Steel Socket Fitting

Union

Class 3000



MSS SP - 83

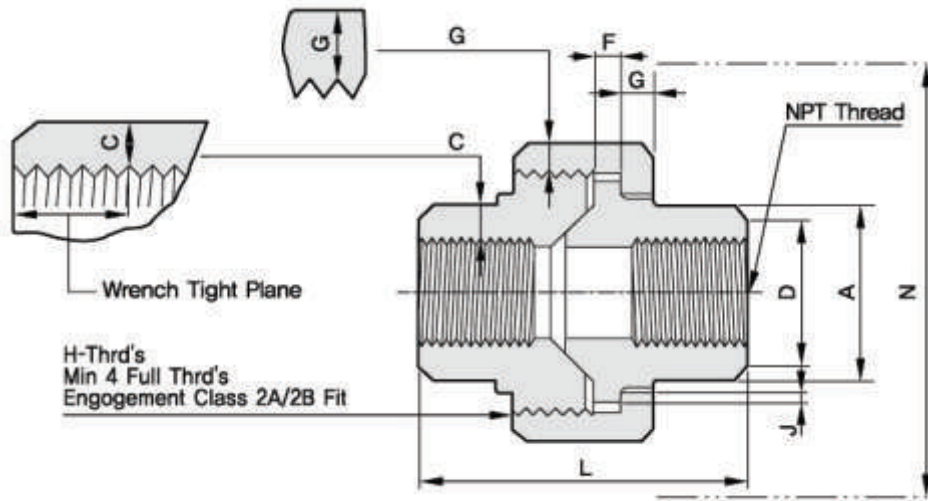
(in millimeters)

Nominal Pipe Size	Pipe End Min	Socket Bore Dia	Socket Wall Min	Water Way Bore	Laying Length	Male Flange Min	Nut Min	Threads Per 25.4 mm Max	Bearing Min		Length Assem. Nominal	Clear Assem. Nut
	A	B	C	D	E	F	G	H	J	K	L	N
1/8	21.8	10.67 ~ 10.92	3.17	6.43 ~ 6.68	19.0 ~ 22.4	3.17	3.17	16	1.24	9.6	41.4	49.0
1/4	21.8	13.97 ~ 14.22	3.30	9.45 ~ 9.85	19.0 ~ 22.4	3.17	3.17	16	1.24	9.6	41.4	49.0
3/8	25.9	17.53 ~ 17.78	3.48	13.51 ~ 13.92	20.6 ~ 26.9	3.43	3.43	14	1.37	9.6	46.0	55.0
1/2	31.2	21.59 ~ 21.84	4.06	17.07 ~ 17.47	20.6 ~ 26.9	3.68	3.68	14	1.50	9.6	49.0	57.0
3/4	37.1	26.92 ~ 27.18	4.27	21.39 ~ 21.79	25.4 ~ 31.8	4.06	4.06	11	1.68	12.7	56.9	67.0
1	45.5	33.78 ~ 34.04	4.95	27.74 ~ 28.14	26.2 ~ 34.3	4.57	4.44	11	1.85	12.7	62.0	79.0
1-1/4	54.9	42.42 ~ 42.67	5.28	35.36 ~ 35.76	32.5 ~ 40.6	5.33	5.21	11	2.13	12.7	71.1	94.0
1-1/2	61.5	48.51 ~ 48.77	5.54	41.20 ~ 41.61	34.0 ~ 42.2	5.84	5.59	10	2.31	12.7	76.5	111.0
2	75.2	61.21 ~ 61.47	6.05	52.12 ~ 52.53	37.3 ~ 45.5	6.60	6.35	10	2.69	15.8	86.1	132.0
2-1/2	91.7	73.66 ~ 74.17	7.65	64.31 ~ 64.72	52.1 ~ 61.7	7.49	7.11	8	3.07	15.8	102.4	148.0
3	109.2	89.66 ~ 90.17	8.31	77.27 ~ 77.67	53.6 ~ 63.8	8.25	8.00	8	3.53	15.8	109.0	175.0

Forged Steel Threaded Fitting

Union

Class 3000



MSS SP - 83

(in millimeters)

Nominal Pipe Size	Pipe End Min	Wall Min	Water Way Bore	Male Flange Min	Nut Min	Threads Per 25.4 mm Max	Bearing Min	Length Assem. Nominal	Clear Assem. Nut
	A	C	D	F	G	H	J	L	N
1/8	14.7	2.41	6.43 ~ 6.83	3.17	3.2	16	1.24	41.4	49.0
1/4	19.0	3.02	9.45 ~ 9.85	3.17	3.2	16	1.24	41.4	49.0
3/8	22.9	3.20	13.51 ~ 13.92	3.43	3.4	14	1.37	46.0	55.0
1/2	27.7	3.73	17.07 ~ 17.47	3.68	3.7	14	1.50	49.0	57.0
3/4	33.5	3.91	21.39 ~ 21.79	4.06	4.1	11	1.68	56.9	67.0
1	41.4	4.55	27.74 ~ 28.14	4.57	4.4	11	1.85	62.0	79.0
1-1/4	50.5	4.85	35.36 ~ 35.76	5.33	5.2	11	2.13	71.1	94.0
1-1/2	57.2	5.08	41.20 ~ 41.61	5.84	5.6	10	2.31	76.4	111.0
2	70.1	5.54	52.12 ~ 52.53	6.60	6.4	10	2.69	86.1	132.0
2-1/2	85.3	7.01	64.31 ~ 64.72	7.49	7.1	8	3.07	102.4	148.0
3	102.4	7.62	77.27 ~ 77.67	8.25	8.0	8	3.53	109.0	175.0



THANK YOU!

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