

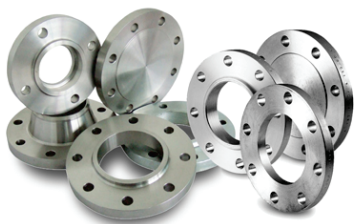
IBR Certified Company



An ISO 9001 : 2008 Certified Co.

SUMIT PIPE INDUSTRIES

PRODUCT CATALOGUE



One stop solution to all Pipe Fittings & Flanges

'SUMIT PIPE INDUSTRIES' an ISO 9001-2008 approved company was founded in 2009. We are a leading manufacturer of specialized Butt Welding Pipe Fittings & Flanges, both seamless and welded, Forged and Plate meeting National / International Standards such as ASTM / ASME, MSS, BS, IS, IBR and NON IBR, from Carbon Steel, Alloy Steel and Stainless Steel Materials.

The plant is situated in SIDCO Industrial Estate, Vichoor, CHENNAI, Tamilnadu, India.

We are a leading certified manufacturer & export house, supplying quality pipe fittings for projects and engineering services needs in diverse industry verticals such as Oil & Gas, Petrochemical, Power conventional as well as nuclear, Steel Plants, Textile, Shipping & all other process industries.

As manufacturers for the world's most demanding markets, we are proud to be at the forefront of technological development, with a continuous program of research, refinement and improvement.

Establishing a global reputation for excellence in any field is a significant achievement in these days of intense competition and burgeoning new economies. When the markets are the highly complex and technologically advancing petrochemical, nuclear, gas and oil industries, that achievement is more impressive.

**OUR QUALITY CREATES CONFIDENCE AND GROWTH THROUGH
REPUTATION - QUALITY FIRST & CUSTOMERS SUPREME**



ASTM A 105

ASTM A 182

ASTM A 234

ASTM A 350

ASTM A 403

ASTM A 420

ASTM A 694

ASTM A 815

ASTM A 860

ASTM B 366

ASTM : AMERICAN SOCIETY FOR TESTING AND MATERIALS

Carbon Steel Forgings for Piping Applications

Forged or Rolled Alloy Steel Pipe Flanges, Forged Fittings, and Valves and Parts for high Temperature Service

Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service

Carbon and Low-Alloy Steel Forgings, Requiring Notch Toughness Testing for Piping Components

Wrought Austenitic Stainless Steel Piping Fittings

Piping Fittings of Wrought Carbon Steel and Alloy Steel for Low-Temperature Service

Carbon and Alloy Steel Forgings for Pipe Flanges, Fittings, Valves, and Parts for High-Pressure Transmission Service

Wrought Ferritic, Ferritic/Austenitic, and Martensitic Stainless Steel Piping Fittings

Wrought High-Strength Low-Alloy Steel Butt-Welding Fittings

Factory-Made Wrought Nickel and Nickel Alloy Fittings

MSS : MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY

MSS SP-25

MSS SP-43

MSS SP-44

MSS SP-75

MSS SP-79

MSS SP-83

MSS SP-87

MSS SP-95

MSS SP-97

Standard Marketing System for Valves, Fittings, Flanges and Unions.

Wrought Stainless Steel Butt Welding Fittings.

Standard for Steel Pipe Line Flanges.

Specification for High Test Wrought Butt Welding Fittings.

Socket Welding Reducer Inserts.

Carbon Steel Pipe Union Socket welding and Threaded.

Factory-Made Butt Welding Fittings for Class 1 Nuclear Piping Applications.

Swage(d) Nipples and Bull Plugs.

Integrally Reinforced Forged Branch Outlet Fittings socket Welding, Threaded and Butt Welding Ends.

ASME : AMERICAN SOCIETY OF MECHANICAL ENGINEERS

ASME : ASME BOILER AND PRESSURE VESSEL CODE AN INTERNATIONAL CODE

ASME B 16.5

ASME B 16.9

ASME B 16.11

ASME B 16.25

ASME B 36.10

ASME B 36.19

ASME B31.1

ASME B31.3

ASME SECTION

ASME SECTION

ASME SECTION

ASME SECTION

ASME SECTION

Pipe Flanges and Flanged Fittings.

Factory Made Wrought Steel Butt Welding Fittings.

Forged Fittings, Socket welding and Threaded

Butt Welding Ends.

Welded and Seamless Wrought Steel Pipe.

Stainless Steel Pipe.

Power piping.

Process piping.

Materials.

Rules for Construction of Nuclear Facility Components.

Nondestructive Examination.

Rule for Construction of Pressure Vessels.

Welding and Brazing Qualifications.

API : AMERICAN PETROLEUM INSTITUTE

API 5L

Line Pipe.

KS : KOREAN INDUSTRIAL STANDARDS

KS B 1522

KS B 1541

KS B 1542

KS B 1543

Steel Butt Welding Pipe Fittings for Ordinary use and Fuel Gas.

Steel Butt Welding Pipe Fittings.

Steel Socket Welding Pipe Fittings.

Steel Plate Butt Welding Pipe Fittings.

JIS : JAPANESE INDUSTRIAL STANDARDS

JIS B 2311

JIS B 2312

JIS B 2313

JIS B 2316

Steel Butt Welding Pipe Fittings for Ordinary use.

Steel Butt Welding Pipe Fittings.

Steel Plate Butt Welding Pipe Fittings.

Steel Socket Welding Pipe Fittings.

Butt Weld Fittings general

A pipe fitting is defined as a part used in a piping system, for changing direction, branching or for change of pipe diameter, and which is mechanically joined to the system. There are many different types of fittings and they are the same in all sizes and schedules as the pipe.

Fittings are divided into three groups:

- Butt weld (BW) fittings whose dimensions, dimensional tolerances et cetera are defined in the ASME B16.9 standards. Light-weight corrosion resistant fittings are made to MSS SP43.
- Socket Weld (SW) fittings Class 3000, 6000, 9000 are defined in the ASME B16.11 standards.
- Threaded (THD), screwed fittings Class 2000, 3000, 6000 are defined in the ASME B16.11 standards.

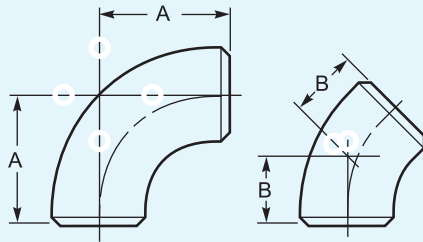


1. Elbow 90° long radius
2. Elbow 45°
3. Elbow 90° short radius
4. Elbow 180° long radius

5. Elbow 180° short radius
6. Tee straight
7. Tee reducing
8. Reducer concentric

9. Reducer eccentric
10. End cap
11. Lap joint Stub End

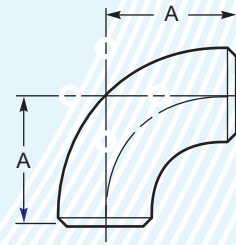
Dimensions of Long Radius Elbows



Nominal Pipe Size (NPS)	Outside Diameter at Bevel	Center-to-End	
		90-deg Elbows, A	45-deg Elbows, B
1/2	21.3	38	16
3/4	26.7	38	19
1	33.4	38	22
1 1/4	42.2	48	25
1 1/2	48.3	57	29
2	60.3	76	35
2 1/2	73.0	95	44
3	88.9	114	51
3 1/2	101.6	133	57
4	114.3	152	64
5	141.3	190	79
6	168.3	229	95
8	219.1	305	127
10	273.0	381	159
12	323.8	457	190
14	355.6	533	222
16	406.4	610	254
18	457.0	686	286
20	508.0	762	318
22	559.0	838	343
24	610.0	914	381
26	660.0	991	406
28	711.0	1 067	438
30	762.0	1 143	470
32	813.0	1 219	502
34	864.0	1 295	533
36	914.0	1 372	565
38	965.0	1 448	600
40	1 016.0	1 524	632
42	1 067.0	1 600	660
44	1 118.0	1 676	695
46	1 168.0	1 753	727
48	1 219.0	1 829	759

GENERAL NOTE: All dimensions are in millimeters.

Dimensions of Short Radius Elbows

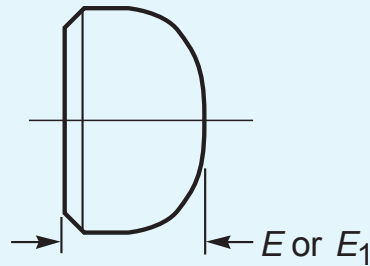


Nominal Pipe Size (NPS)	Outside Diameter at Bevel	Center-to-End, A
1	33.4	25
1 1/4	42.2	32
1 1/2	48.3	38
2	60.3	51
2 1/2	73.0	64
3	88.9	76
3 1/2	101.6	89
4	114.3	102
5	141.3	127
6	168.3	152
8	219.1	203
10	273.0	254
12	323.8	305
14	355.6	356
16	406.4	406
18	457.0	457
20	508.0	508
22	559.0	559
24	610.0	610

GENERAL NOTE: All dimensions are in millimeters.

The above Data are for reference purpose only. Kindly refer standards for actual Data

Dimensions of Caps



Nominal Pipe Size (NPS)	Outside Diameter at Bevel	Length, <i>E</i>	Limiting Wall Thickness for Length, <i>E</i>	Length, <i>E</i> ₁ [Note (2)]
1/2	21.3	25	4.57	25
3/4	26.7	25	3.81	25
1	33.4	38	4.57	38
1 1/4	42.2	38	4.83	38
1 1/2	48.3	38	5.08	38
2	60.3	38	5.59	44
2 1/2	73.0	38	7.11	51
3	88.9	51	7.62	64
3 1/2	101.6	64	8.13	76
4	114.3	64	8.64	76
5	141.3	76	9.65	89
6	168.3	89	10.92	102
8	219.1	102	12.70	127
10	273.0	127	12.70	152
12	323.8	152	12.70	178
14	355.6	165	12.70	191
16	406.4	178	12.70	203
18	457.0	203	12.70	229
20	508.0	229	12.70	254
22	559.0	254	12.70	254
24	610.0	267	12.70	305
26	660.0	267	...	...
28	711.0	267	...	...
30	762.0	267	...	...
32	813.0	267	...	...
34	864.0	267	...	...
36	914.0	267	...	...
38	965.0	305	...	...
40	1 016.0	305	...	...
42	1 067.0	305	...	...
44	1 118.0	343	...	...
46	1 168.0	343	...	...
48	1 219.0	343	...	...

GENERAL NOTES:

(a) All dimensions are in millimeters.

(b) The shape of these caps shall be ellipsoidal and shall conform to the requirements given in the ASME Boiler and Pressure Vessel Code.

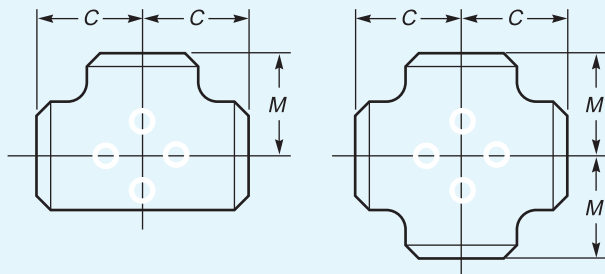
NOTES:

(1) Length *E* applies for thickness not exceeding that given in column "Limiting Wall Thickness for Length, *E*."

(2) Length *E*₁ applies for thickness greater than that given in column "Limiting Wall Thickness" for NPS 24 and smaller. For NPS 26 and larger, length *E*₁ shall be by agreement between the manufacturer and purchaser.

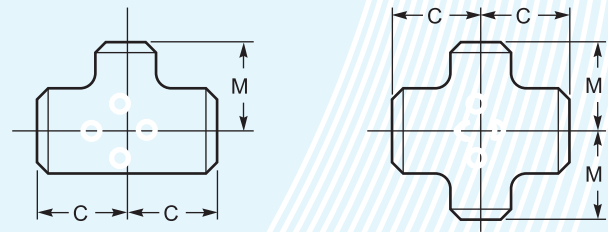
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Dimensions of Straight Tees and Crosses



Nominal Pipe Size (NPS)	Outside Diameter at Bevel	Center-to-End	
		Run, C	Outlet, M [Notes (1) and (2)]
1/2	21.3	25	25
3/4	26.7	29	29
1	33.4	38	38
1 1/4	42.2	48	48
1 1/2	48.3	57	57
2	60.3	64	64
2 1/2	73.0	76	76
3	88.9	86	86
3 1/2	101.6	95	95
4	114.3	105	105
5	141.3	124	124
6	168.3	143	143
8	219.1	178	178
10	273.0	216	216
12	323.8	254	254
14	355.6	279	279
16	406.4	305	305
18	457.0	343	343
20	508.0	381	381
22	559.0	419	419
24	610.0	432	432
26	660.0	495	495
28	711.0	521	521
30	762.0	559	559
32	813.0	597	597
34	864.0	635	635
36	914.0	673	673
38	965.0	711	711
40	1 016.0	749	749
42	1 067.0	762	711
44	1 118.0	813	762
46	1 168.0	851	800
48	1 219.0	889	838

Dimensions of Reducing Tees and Reducing Crosses



Nominal Pipe Size (NPS)	Outside Diameter at Bevel		Center-to-End	
	Run	Outlet	Run, C	Outlet M Note (2)
1/2	1/2	3/8	25	25
1/2	1/2	1/4	25	25
3/4	3/4	1/2	29	29
3/4	3/4	3/8	29	29
1	1	3/4	38	38
1	1	1/2	38	38
1 1/4	1 1/4	1	48	48
1 1/4	1 1/4	3/4	48	48
1 1/4	1 1/4	1/2	48	48
1 1/2	1 1/2	1 1/4	57	57
1 1/2	1 1/2	1	57	57
1 1/2	1 1/2	3/4	57	57
1 1/2	1 1/2	1/2	57	57
2	2	1 1/2	64	60
2	2	1 1/4	64	57
2	2	1	64	51
2	2	3/4	64	44
2 1/2	2 1/2	2	76	70
2 1/2	2 1/2	1 1/2	76	67
2 1/2	2 1/2	1 1/4	76	64
2 1/2	2 1/2	1	76	57
3	3	2 1/2	86	83
3	3	2	86	76
3	3	1 1/2	86	73
3	3	1 1/4	86	70
3 1/2	3 1/2	3	95	92
3 1/2	3 1/2	2 1/2	95	89
3 1/2	3 1/2	2	95	83
3 1/2	3 1/2	1 1/2	95	79

GENERAL NOTE: All dimensions are in millimeters.

NOTES:

(1) Outlet dimension M for NPS 26 and larger is recommended but not required.

(2) Dimensions applicable to crosses NPS 24 and smaller.

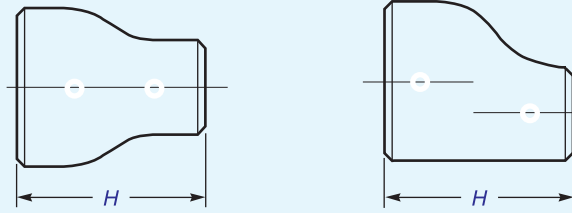
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Dimension of Reducing Tees and Reducing Crosses (Contd)

Nominal Pipe Size (NPS)	Outside Diameter at Bevel		Center-to-End				Nominal Pipe Size (NPS)	Outside Diameter at Bevel		Center-to-End			
	Run	Outlet	Run, C	Outlet, M		Run, C		Run	Outlet	Run, C	Outlet, M		
				[Note (1)]							[Note (1)]		
4	4	3½	114.3	101.6	105	102	24	24	22	610.0	559.0	432	432
4	4	3	114.3	88.9	105	98	24	24	20	610.0	508.0	432	432
4	4	2½	114.3	73.0	105	95	24	24	18	610.0	457.0	432	419
4	4	2	114.3	60.3	105	89							
4	4	1½	114.3	48.3	105	86	24	24	16	610.0	406.4	432	406
							24	24	14	610.0	355.6	432	406
							24	24	12	610.0	323.8	432	397
							24	24	10	610.0	273.0	432	384
5	5	4	141.3	114.3	124	117							
5	5	3½	141.3	101.6	124	114							
5	5	3	141.3	88.9	124	111	26	26	24	660.0	610.0	495	483
5	5	2½	141.3	73.0	124	108	26	26	22	660.0	559.0	495	470
5	5	2	141.3	60.3	124	105	26	26	20	660.0	508.0	495	457
6	6	5	168.3	141.3	143	137	26	26	18	660.0	457.0	495	444
6	6	4	168.3	114.3	143	130	26	26	16	660.0	406.4	495	432
6	6	3½	168.3	101.6	143	127	26	26	14	660.0	355.6	495	432
6	6	3	168.3	88.9	143	124	26	26	12	660.0	323.8	495	422
6	6	2½	168.3	73.0	143	121							
							28	28	26	711	660.0	521	521
8	8	6	219.1	168.3	178	168	28	28	24	711	610.0	521	508
8	8	5	219.1	141.3	178	162	28	28	22	711	559.0	521	495
8	8	4	219.1	114.3	178	156	28	28	20	711	508.0	521	483
8	8	3½	219.1	101.6	178	152							
							28	28	18	711	457.0	521	470
10	10	8	273.0	219.1	216	203	28	28	16	711	406.4	521	457
10	10	6	273.0	168.3	216	194	28	28	14	711	355.6	521	457
10	10	5	273.0	141.3	216	191	28	28	12	711	323.8	521	448
10	10	4	273.0	114.3	216	184							
							30	30	28	762	711.0	559	546
12	12	10	323.8	273.0	254	241	30	30	26	762	660.0	559	546
12	12	8	323.8	219.1	254	229	30	30	24	762	610.0	559	533
12	12	6	323.8	168.3	254	219	30	30	22	762	559.0	559	521
12	12	5	323.8	141.3	254	216	30	30	20	762	508.0	559	508
14	14	12	355.6	323.8	279	270	30	30	18	762	457.0	559	495
14	14	10	355.6	273.0	279	257	30	30	16	762	406.4	559	483
14	14	8	355.6	219.1	279	248	30	30	14	762	355.6	559	483
14	14	6	355.6	168.3	279	238	30	30	12	762	323.8	559	473
							30	30	10	762	273.0	559	460
16	16	14	406.4	355.6	305	305							
16	16	12	406.4	323.8	305	295	32	32	30	813	762.0	597	584
16	16	10	406.4	273.0	305	283	32	32	28	813	711.0	597	572
16	16	8	406.4	219.1	305	273	32	32	26	813	660.0	597	572
16	16	6	406.4	168.3	305	264	32	32	24	813	610.0	597	559
18	18	16	457.0	406.4	343	330							
18	18	14	457.0	355.6	343	330	32	32	22	813	559.0	597	546
18	18	12	457.0	323.8	343	321	32	32	20	813	508.0	597	533
18	18	10	457.0	273.0	343	308	32	32	18	813	457.0	597	521
18	18	8	457.0	219.1	343	298	32	32	16	813	406.4	597	508
							32	32	14	813	355.6	597	508
20	20	18	508.0	457.0	381	368							
20	20	16	508.0	406.4	381	356	34	34	32	864	813.0	635	622
20	20	14	508.0	355.6	381	356	34	34	30	864	762.0	635	610
20	20	12	508.0	323.8	381	346	34	34	28	864	711.0	635	597
20	20	10	508.0	273.0	381	333	34	34	26	864	660.0	635	597
20	20	8	508.0	219.1	381	324							
							34	34	24	864	610.0	635	584
22	22	20	559.0	508.0	419	406	34	34	22	864	559.0	635	572
22	22	18	559.0	457.0	419	394	34	34	20	864	508.0	635	559
22	22	16	559.0	406.4	419	381	34	34	18	864	457.0	635	546
22	22	14	559.0	355.6	419	381	34	34	16	864	406.4	635	533
22	22	12	559.0	323.8	419	371							
22	22	10	559.0	273.0	419	359							

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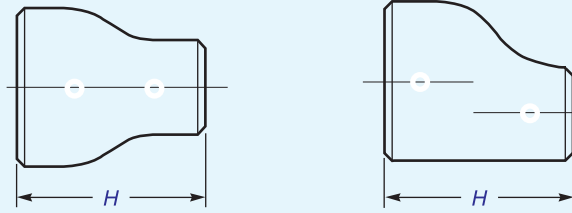
Dimensions of Reducers



Nominal Pipe Size (NPS)	Outside Diameter at Bevel		End-to-End, H	Nominal Pipe Size (NPS)	Outside Diameter at Bevel		End-to-End, H
	Large End	Small End			Large End	Small End	
3/4 1/2	26.7	21.3	38	5 4	141.3	114.3	127
3/4 3/8	26.7	17.3	38	5 3 1/2	141.3	101.6	127
1 3/4	33.4	26.7	51	5 3	141.3	88.9	127
1 1/2	33.4	21.3	51	5 2 1/2	141.3	73.0	127
				5 2	141.3	60.3	127
1 1/4 1	42.2	33.4	51	6 5	168.3	141.3	140
1 1/4 3/4	42.2	26.7	51	6 4	168.3	114.3	140
1 1/4 1/2	42.2	21.3	51	6 3 1/2	168.3	101.6	140
				6 3	168.3	88.9	140
1 1/2 1 1/4	48.3	42.2	64	6 2 1/2	168.3	73.0	140
1 1/2 1	48.3	33.4	64				
1 1/2 3/4	48.3	26.7	64	8 6	219.1	168.3	152
1 1/2 1/2	48.3	21.3	64	8 5	219.1	141.3	152
				8 4	219.1	114.3	152
2 1 1/2	60.3	48.3	76	8 3 1/2	219.1	101.6	152
2 1 1/4	60.3	42.2	76				
2 1	60.3	33.4	76	10 8	273.0	219.1	178
2 3/4	60.3	26.7	76	10 6	273.0	168.3	178
				10 5	273.0	141.3	178
2 1/2 2	73.0	60.3	89	10 4	273.0	114.3	178
2 1/2 1 1/2	73.0	48.3	89				
2 1/2 1 1/4	73.0	42.2	89	12 10	323.8	273.0	203
2 1/2 1	73.0	33.4	89	12 8	323.8	219.1	203
				12 6	323.8	168.3	203
3 2 1/2	88.9	73.0	89	12 5	323.8	141.3	203
3 2	88.9	60.3	89				
3 1 1/2	88.9	48.3	89	14 12	355.6	323.8	330
3 1 1/4	88.9	42.2	89	14 10	355.6	273.0	330
				14 8	355.6	219.1	330
3 1/2 3	101.6	88.9	102	14 6	355.6	168.3	330
3 1/2 2 1/2	101.6	73.0	102				
3 1/2 2	101.6	60.3	102	16 14	406.4	355.6	356
3 1/2 1 1/2	101.6	48.3	102	16 12	406.4	323.8	356
3 1/2 1 1/4	101.6	42.2	102	16 10	406.4	273.0	356
				16 8	406.4	219.1	356
4 3 1/2	114.3	101.6	102				
4 3	114.3	88.9	102	18 16	457	406.4	381
4 2 1/2	114.3	73.0	102	18 14	457	355.6	381
4 2	114.3	60.3	102	18 12	457	323.8	381
4 1 1/2	114.3	48.3	102	18 10	457	273.0	381

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Dimensions of Reducers



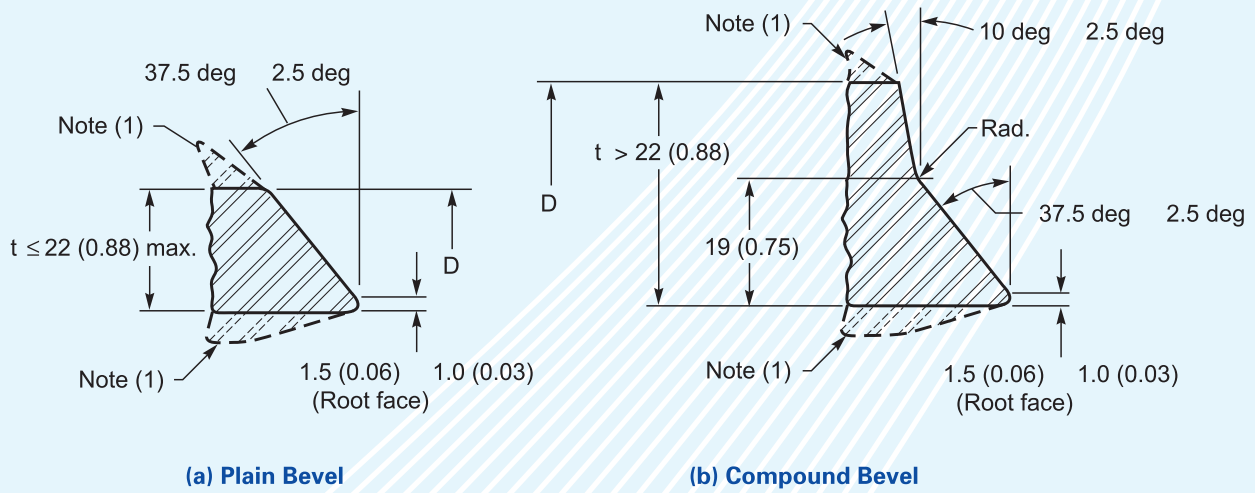
Nominal Pipe Size (NPS)	Outside Diameter at Bevel			End-to-End, H	Nominal Pipe Size (NPS)	Outside Diameter at Bevel		
	Large End	Small End				Large End	Small End	
20 18	508	457.0		508	36 34	914	864	610
20 16	508	406.4		508	36 32	914	813	610
20 14	508	355.6		508	36 30	914	762	610
20 12	508	323.8		508	36 26	914	660	610
					36 24	914	610	610
22 20	559	508.0		508	38 36	965	914	610
22 18	559	457.0		508	38 34	965	864	610
22 16	559	406.4		508	38 32	965	813	610
22 14	559	355.4		508	38 30	965	762	610
					38 28	965	711	610
24 22	610	559.0		508	38 26	965	660	610
24 20	610	508.0		508				
24 18	610	457.0		508	40 38	1 016	965	610
24 16	610	406.4		508	40 36	1 016	914	610
					40 34	1 016	864	610
26 24	660	610.0		610	40 32	1 016	813	610
26 22	660	559.0		610	40 30	1 016	762	610
26 20	660	508.0		610				
26 18	660	457.0		610	42 40	1 067	1 016	610
					42 38	1 067	965	610
28 26	711	660.0		610	42 36	1 067	914	610
28 24	711	610.0		610	42 34	1 067	864	610
28 20	711	508.0		610	42 32	1 067	813	610
28 18	711	457.0		610	42 30	1 067	762	610
30 28	762	711.0		610	44 42	1 118	1 067	610
30 26	762	660.0		610	44 40	1 118	1 016	610
30 24	762	610.0		610	44 38	1 118	965	610
30 20	762	508.0		610	44 36	1 118	914	610
32 30	813	762.0		610	46 44	1 168	1 118	711
32 28	813	711.0		610	46 42	1 168	1 067	711
32 26	813	660.0		610	46 40	1 168	1 016	711
32 24	813	610.0		610	46 38	1 168	965	711
34 32	864	813.0		610	48 46	1 219	1 168	711
34 30	864	762.0		610	48 44	1 219	1 118	711
34 26	864	660.0		610	48 42	1 219	1 067	711
34 24	864	610.0		610	48 40	1 219	1 016	711

GENERAL NOTES:

- (a) All dimensions are in millimeters.
- (b) While the figure illustrates a bell-shaped reducer, the use of a conical reducer is not prohibited.

The above Data are for reference purpose only. Kindly refer standards for actual Data

Table I2 Welding Bevels and Root Face



Nominal Wall Thickness, t	End Preparation	
Less than x[Note (2)]	Cut square or slightly chamfer, at manufacturer's option (not illustrated)	
x to 22 (0.88), inclusive		Plain bevel as in illustration (a) above
More than 22 (0.88)		Compound bevel as in illustration (b) above

GENERAL NOTES:

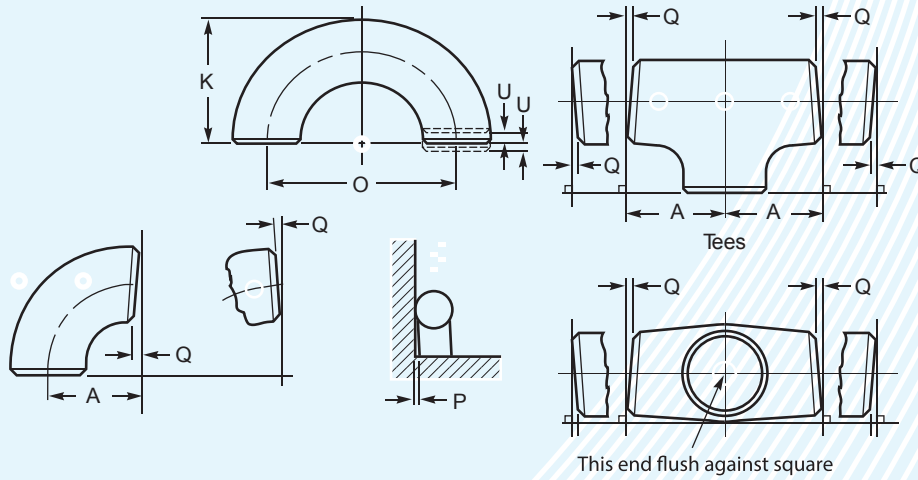
- (a) Dimensions in parentheses are in inches.
- (b) Other dimensions are in millimeters.

NOTES:

xp 5 (0.19) for carbon steel or ferritic alloy steel and 3 (0.12) for austenitic alloy steel.

The above Data are for reference purpose only. Kindly refer standards for actual Data

Tolerances



All Fittings [Notes (1) and (2)]				Center-to-End Dimensions				180-deg Returns		
Nominal Pipe Size (NPS)	DN	Outside Diameter at Bevel, D [Notes (3) and (4)]	Inside Diameter at End [Notes (3) and (5)]	90-deg and 45-deg Long and Short Radius Elbows and Tees, A, B, C, M	3D Radius Elbows, A, B	Overall Length of Reducers and Lap Joint Stub Ends, F, H	Overall Length of Caps, E	Center-to-Center Dimension, O	Back-to-Face Dimension, K	Alignment of Ends, U
1/2 to 2 1/2	15-65	+1.6, -0.8	0.8	2	3	2	3	6	6	1
3 to 3 1/2	80-90	1.6	1.6	2	3	2	3	6	6	1
4	100	1.6	1.6	2	3	2	3	6	6	1
5 to 8	125-200	+2.4, -1.6	1.6	2	3	2	6	6	6	1
10 to 18	250-450	+4.0, -3.2	3.2	2	3	2	6	10	6	2
20 to 24	500-600	+6.4, -4.8	4.8	2	3	2	6	10	6	2
26 to 30	650-750	+6.4, -4.8	4.8	3	6	5	10	...	...	...
32 to 48	800-1200	+6.4, -4.8	4.8	5	6	5	10	...	...	...

		Lap Joint Stub Ends [Note (6)]					Angularity Tolerances	
Nominal Pipe Size (NPS)	DN	Outside Diameter of Lap, G	Fillet Radius of Lap, R	Lap Thickness	Nominal Pipe Size (NPS)	DN	Off Angle, Q	Off Plane, P
1/2 to 2 1/2	15-65	+0, -1	+0, -1	+1.6, -0	1/2 to 4	15-100	1	2
3 to 3 1/2	80-90	+0, -1	+0, -1	+1.6, -0	5 to 8	125-200	2	4
4	100	+0, -1	+0, -2	+1.6, -0	10 to 12	250-300	3	5
5 to 8	125-200	+0, -1	+0, -2	+1.6, -0	14 to 16	350-400	3	6
10 to 18	250-450	+0, -2	+0, -2	+3.2, -0	18 to 24	450-600	4	10
20 to 24	500-600	+0, -2	+0, -2	+3.2, -0	26 to 30	650-750	5	10
26 to 30	650-750	...	...	...	32 to 42	800-1 050	5	13
32 to 48	800-1 200	...	...	...	44 to 48	1 100-1 200	5	19

GENERAL NOTES:

- (a) All dimensions are in millimeters.
- (b) Tolerances are equal plus and minus except as noted.

NOTES:

- (1) The inside diameter and the nominal wall thicknesses at ends are to be specified by the purchaser.
- (2) A minimum wall thickness of 87.5% applies unless the purchaser specifies a different wall thickness tolerance.
- (3) Out-of-round is the sum of absolute values of plus and minus tolerances.
- (4) This tolerance may not apply in localized areas of formed fittings where increased wall thickness is required to meet design requirements of para. 2.2.
- (5) Unless otherwise specified by the purchaser, these tolerances apply to the nominal inside diameter, which equals the difference between the nominal outside diameter and twice the nominal wall thickness.

The above Data are for reference purpose only. Kindly refer standards for actual Data

Definition and Details of Socket Weld Fittings

Socket Weld fittings general

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); generally for piping whose nominal diameter is NPS 2 or smaller.

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.

Some details of Socket Weld fittings

SW 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.

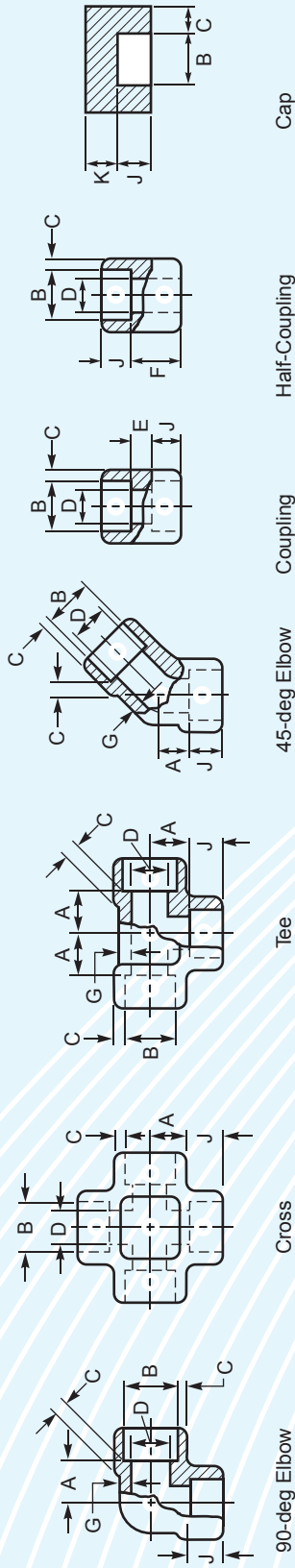
They are produced to several ASTM standards and are manufactured in accordance with ASME B16.11. The B16.11 standard covers pressure-temperature ratings, dimensions, tolerances, marking, and material requirements for forged carbon and alloy steel. Acceptable material forms are forgings, bars, seamless pipe, and seamless tubes which conform to the fittings chemical requirements, melting practices, and mechanical property requirements of ASTM A105, A182, or A350.

They are available in three pressure ratings: Class 3000, 6000 and 9000.

Types of socket weld fittings by class, size and wall thickness



Socket Welding Fittings



Nominal Pipe Size [Note (1)]	Bore Diameter of Fittings, D [Note (1)]			Socket Wall Thickness, C [Note (2)]			Body Wall, G			Center-to-Bottom of Socket, A			Laying Lengths			Erd Wall Thickness, K_{min}											
	Bore Diameter, B	Class Designation		Class Designation	Min.	Avg.	Min.	Class Designation		Min.	Avg.	Min.	45-deg Elbows			Tolerances, ±											
		3000	6000					9000	3000				6000	9000	3000	6000	9000	A	E	F	3000	6000	9000				
1/8	11.2	7.6	4.8	...	3.18	3.18	3.06	3.43	...	2.41	3.15	...	9.5	11.0	11.0	8.0	8.0	...	6.5	16.0	1.0	1.5	1.0	4.8	6.4	...	
1/4	10.8	6.1	3.2	...	3.78	3.30	4.00	4.01	...	3.02	3.68	...	9.5	11.0	13.5	...	8.0	8.0	...	6.5	16.0	1.0	1.5	1.0	4.8	6.4	...
3/8	14.2	8.5	5.6	...	4.01	3.50	5.03	4.37	...	3.20	4.01	...	9.5	13.5	15.5	...	8.0	11.0	...	6.5	17.5	1.5	3.0	1.5	4.8	6.4	...
1/2	18.0	13.3	9.9	...	4.67	4.09	5.97	5.18	9.35	4.78	5.56	7.47	9.5	15.5	19.0	25.5	11.0	12.5	15.5	9.5	22.5	1.5	3.0	1.5	6.4	7.9	11.2
3/4	22.2	16.6	12.5	7.2	4.90	4.27	6.06	6.04	9.78	5.56	7.82	12.5	19.0	22.5	28.5	13.0	14.0	19.0	9.5	24.0	1.5	3.0	1.5	6.4	7.9	12.7	
1	27.2	20.2	14.8	10.3	5.60	4.98	7.92	6.93	11.38	6.35	9.09	12.5	22.5	27.0	32.0	14.0	17.5	20.5	12.5	28.5	2.0	4.0	2.0	9.6	11.2	14.2	
1 1/4	33.9	25.9	19.9	14.4	6.07	5.28	7.92	6.93	12.14	6.35	9.70	12.5	27.0	32.0	35.0	17.5	20.5	22.5	12.5	30.0	2.0	4.0	2.0	9.6	11.2	14.2	
1 1/2	42.7	34.3	28.7	22.0	6.35	5.54	8.92	7.80	12.70	7.14	10.15	12.5	32.0	38.0	38.0	20.5	25.5	25.5	12.5	32.0	2.0	4.0	2.0	11.2	12.7	15.7	
2	48.8	40.1	33.2	27.2	6.93	6.04	10.92	9.50	13.84	8.74	11.07	16.0	38.0	41.0	54.0	25.5	28.5	28.5	19.0	41.0	2.0	4.0	2.0	12.7	15.7	19.0	
2 1/2	61.7	53.3	43.6	38.9	8.76	7.67	...	...	...	7.01	...	16.0	41.0	...	...	28.5	...	...	19.0	43.0	2.5	5.0	2.5	15.7	19.0	...
3	73.9	61.2	...	...	9.92	8.30	...	...	...	7.82	...	16.0	57.0	...	...	32.0	...	...	19.0	44.5	2.5	5.0	2.5	19.0	22.4	...
4	89.8	79.4	...	...	10.69	9.35	...	...	...	8.56	...	19.0	66.5	...	...	41.0	...	...	19.0	48.0	2.5	5.0	2.5	22.4	28.4	...

GENERANOTE Dimensions are in millimeters.

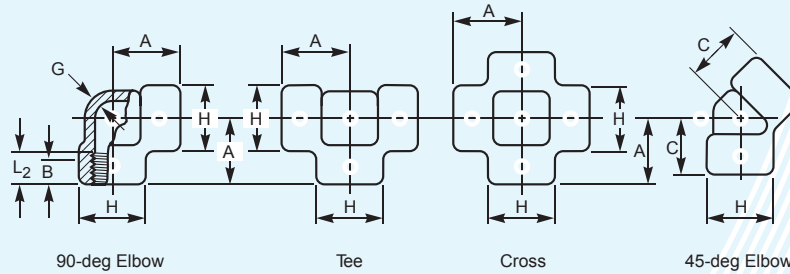
NOTES:

(1) Upper and lower values for each size are the respective maximum and minimum dimensions.

(2) Average of socket wall thickness around periphery shall not be less than listed values. The minimum values are permitted in localized areas.

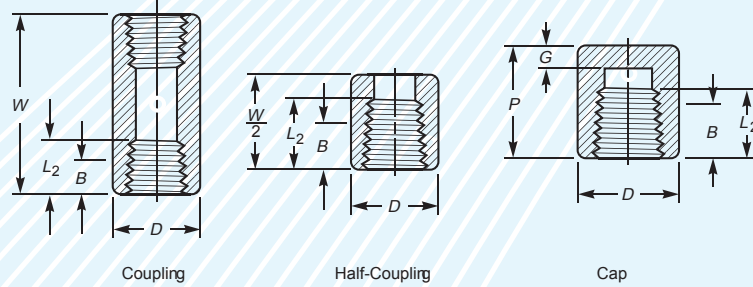
The above Data are for reference purpose only. Kindly refer standards for actual Data

Forged Threaded Fittings



Nominal Pipe Size	Center-to-End Elbows, Tees and Crosses, A			Center-to-End 45-deg Elbow, C			Outside Diameter of Band, H			Minimum Wall Thickness, G			Minimum Length of Thread [Note (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

Threaded Fittings



Nominal Pipe Size	End-to-End Couplings, W		End-to-End Caps, P		Outside Diameter, D		Minimum End Wall Thickness, G		Minimum Length of Thread [Note (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	4.8	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

NOTE:

(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; see para. 6.3).

Flanges General

A flange is a method of connecting pipes, valves, pumps and other equipment to form a piping system. It also provides easy access for cleaning, inspection or modification. Flanges are usually welded or screwed. Flanged joints are made by bolting together two flanges with a gasket between them to provide a seal.

Types of Flanges

The most used flange types in Petro and chemical industry are:

- Welding Neck Flange
- Slip On Flange
- Socket Weld Flange
- Lap Joint Flange
- Threaded Flange
- Blind Flange



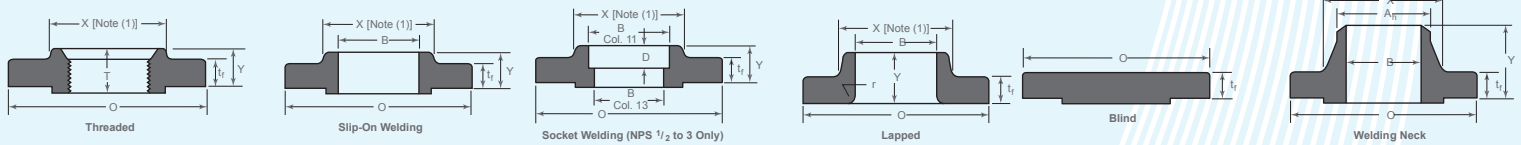
Special Flanges

Except the most used standard flanges, there are still a number of special flanges such as:

- Orifice Flanges
- Long Welding Neck Flanges
- Weldoflange / Nipoflange
- Expander Flange
- Reducing Flange



Dimensions of Class 150 Flanges



Dimensions of Class 150 Flanges

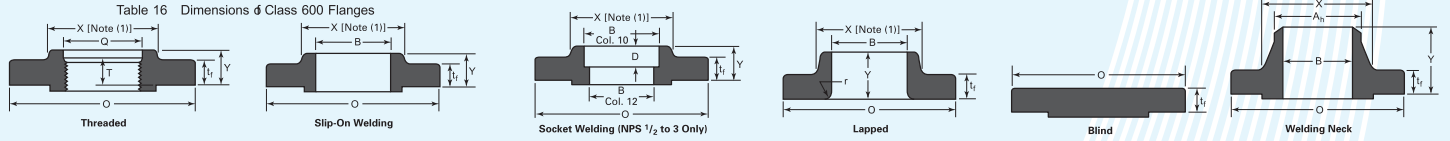
1	2	3	4	5	6	7			8	9	10	11		12	13	14	15
						Length Through Hub		Minimum Thread Length Threaded, T [Note (6)]				Bore						Welding Neck/Socket Welding, B [Note (7)]	Corner Bore Radius of Lapped Flange and Pipe, r	Depth of Socket, D
Nominal Pipe Size, NPS	Outside Diameter of Flange, O	Minimum Thickness of Flange, t_f [Notes (2)-(4)]	Minimum Thickness Lap Joint, t_f	Diameter of Hub, X	Hub Diameter Beginning of Chamfer Welding Neck, A_h [Note (5)]	Threaded/Slip-On/Socket Welding, Y	Lapped, Y		Welding Neck, Y	Minimum Thread Length Threaded, T [Note (6)]	Minimum Slip-On/Socket Welding, B	Minimum Lapped, B	Welding Neck/Socket Welding, B [Note (7)]	Corner Bore Radius of Lapped Flange and Pipe, r	Depth of Socket, D		
1/2	90	9.6	11.2	30	21.3	14	16	46	16	22.2	22.9	15.8	3	10			
3/4	100	11.2	12.7	38	26.7	14	16	51	16	27.7	28.2	20.9	3	11			
1	110	12.7	14.3	49	33.4	16	17	54	17	34.5	34.9	26.6	3	13			
1 1/4	115	14.3	15.9	59	42.2	19	21	56	21	43.2	43.7	35.1	5	14			
1 1/2	125	15.9	17.5	65	48.3	21	22	60	22	49.5	50.0	40.9	6	16			
2	150	17.5	19.1	78	60.3	24	25	62	25	61.9	62.5	52.5	8	17			
2 1/2	180	20.7	22.3	90	73.0	27	29	68	29	74.6	75.4	62.7	8	19			
3	190	22.3	23.9	108	88.9	29	30	68	30	90.7	91.4	77.9	10	21			
3 1/2	215	22.3	23.9	122	101.6	30	32	70	32	103.4	104.1	90.1	10	...			
4	230	22.3	23.9	135	114.3	32	33	75	33	116.1	116.8	102.3	11	...			
5	255	22.3	23.9	164	141.3	35	36	87	36	143.8	144.4	128.2	11	...			
6	280	23.9	25.4	192	168.3	38	40	87	40	170.7	171.4	154.1	13	...			
8	345	27.0	28.6	246	219.1	43	44	100	44	221.5	222.2	202.7	13	...			
10	405	28.6	30.2	305	273.0	48	49	100	49	276.2	277.4	254.6	13	...			
12	485	30.2	31.8	365	323.8	54	56	113	56	327.0	328.2	304.8	13	...			
14	535	33.4	35.0	400	355.6	56	79	125	57	359.2	360.2	Note (8)	13	...			
16	595	35.0	36.6	457	406.4	62	87	125	64	410.5	411.2	Note (8)	13	...			
18	635	38.1	39.7	505	457.0	67	97	138	68	461.8	462.3	Note (8)	13	...			
20	700	41.3	42.9	559	508.0	71	103	143	73	513.1	514.4	Note (8)	13	...			
24	815	46.1	47.7	663	610.0	81	111	151	83	616.0	616.0	Note (8)	13	...			

Dimensions of Class 300 Flanges

1	2	3	4	5	6	7			8	9	10	11		12	13	14	15	16
						Length Through Hub		Minimum Thread Length Threaded, T [Note (5)]				Bore							Welding Neck/Socket Welding, B [Note (6)]	Corner Radius of Bore of Lapped Flange and Pipe, r	Minimum Counter-bore Threaded Flange, Q	Depth of Socket, D
Nominal Pipe Size, NPS	Outside Diameter of Flange, O	Minimum Thickness of Flange, t_f [Notes (2)-(4)]	Minimum Thickness Lap Joint, t_f	Diameter of Hub, X	Hub Diameter Beginning of Chamfer Welding Neck, A_h [Note (4)]	Threaded/Slip-On/Socket Welding, Y	Lapped, Y		Welding Neck, Y	Minimum Thread Length Threaded, T [Note (5)]	Minimum Slip-On/Socket Welding, B	Minimum Lapped, B	Welding Neck/Socket Welding, B [Note (6)]	Corner Radius of Bore of Lapped Flange and Pipe, r	Minimum Counter-bore Threaded Flange, Q	Depth of Socket, D		
1/2	95	12.7	14.3	38	21.3	21	22	51	16	22.2	22.9	15.8	3	23.6	10			
3/4	115	14.3	15.9	48	26.7	24	25	56	16	27.7	28.2	20.9	3	29.0	11			
1	125	15.9	17.5	54	33.4	25	27	60	18	34.5	34.9	26.6	3	35.8	13			
1 1/4	135	17.5	19.1	64	42.2	25	27	64	21	43.2	43.7	35.1	5	44.4	14			
1 1/2	155	19.1	20.7	70	48.3	29	30	67	23	49.5	50.0	40.9	6	50.3	16			
2	165	20.7	22.3	84	60.3	32	33	68	29	61.9	62.5	52.5	8	63.5	17			
2 1/2	190	23.9	25.4	100	73.0	37	38	75	32	74.6	75.4	62.7	8	76.2	19			
3	210	27.0	28.6	117	88.9	41	43	78	32	90.7	91.4	77.9	10	92.2	21			
3 1/2	230	28.6	30.2	133	101.6	43	44	79	37	103.4	104.1	90.1	10	104.9	...			
4	255	30.2	31.8	146	114.3	46	48	84	37	116.1	116.8	102.3	11	117.6	...			
5	280	33.4	35.0	178	141.3	49	51	97	43	143.8	144.4	128.2	11	144.4	...			
6	320	35.0	36.6	206	168.3	51	52	97	47	170.7	171.4	154.1	13	171.4	...			
8	380	39.7	41.3	260	219.1	60	62	110	51	221.5	222.2	202.7	13	222.2	...			
10	445	46.1	47.7	321	273.0	65	95	116	56	276.2	277.4	254.6	13	276.2	...			
12	520	49.3	50.8	375	323.8	71	102	129	61	327.0	328.2	304.8	13	328.6	...			
14	585	52.4	54.0	425	355.6	75	111	141	64	359.2	360.2	Note (7)	13	360.4	...			
16	650	55.6	57.2	483	406.4	81	121	144	69	410.5	411.2	Note (7)	13	411.2	...			
18	710	58.8	60.4	533	457.0	87	130	157	70	461.8	462.3	Note (7)	13	462.0	...			
20	775	62.0	63.5	587	508.0	94	140	160	74	513.1	514.4	Note (7)	13	512.8	...			
24	915	68.3	69.9	702	610.0	105	152	167	83	616.0	616.0	Note (7)	13	614.4	...			

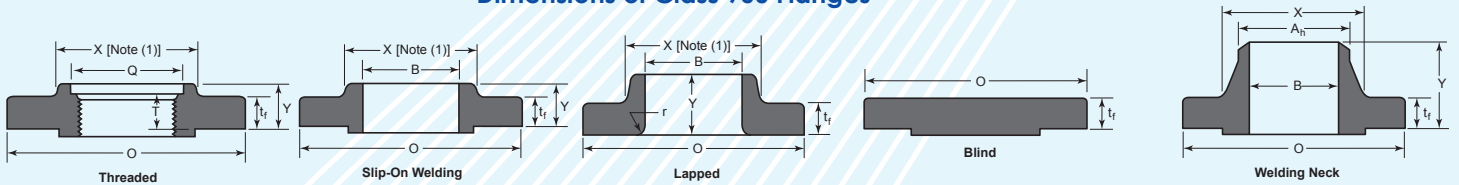
The above Data are for reference purpose only. Kindly refer standards for actual Data

Dimensions of Class 600 Flanges



Nominal Pipe Size, NPS	Outside Diameter of Flange, O	Minimum Thickness of Flange, t _f	Diameter of Hub, X	Hub Diameter Beginning of Chamfer Welding Neck, A _h [Note (2)]	Length Through Hub			Minimum Thread Length Threaded Flange, T [Note (3)]	Bore			Corner Bore Radius of Lapped Flange and Pipe, r	Minimum Counterbore Threaded Flange, Q	Depth of Socket, D
					Threaded/ Slip-On/ Socket Welding, Y	Lapped, Y	Welding Neck, Y		Minimum Slip-On/ Socket Welding, B	Minimum Lapped, B	Welding Neck/ Socket Welding, B			
1/2	95	14.3	38	21.3	22	22	52	16	22.2	22.9	Note (4)	3	23.6	10
3/4	115	15.9	48	26.7	25	25	57	16	27.7	28.2	Note (4)	3	29.0	11
1	125	17.5	54	33.4	27	27	62	18	34.5	34.9	Note (4)	3	35.8	13
1 1/4	135	20.7	64	42.2	29	29	67	21	43.2	43.7	Note (4)	5	44.4	14
1 1/2	155	22.3	70	48.3	32	32	70	23	49.5	50.0	Note (4)	6	50.6	16
2	165	25.4	84	60.3	37	37	73	29	61.9	62.5	Note (4)	8	63.5	17
2 1/2	190	28.6	100	73.0	41	41	79	32	74.6	75.4	Note (4)	8	76.2	19
3	210	31.8	117	88.9	46	46	83	35	90.7	91.4	Note (4)	10	92.2	21
3 1/2	230	35.0	133	101.6	49	49	86	40	103.4	104.1	Note (4)	10	104.9	...
4	275	38.1	152	114.3	54	54	102	42	116.1	116.8	Note (4)	11	117.6	...
5	330	44.5	189	141.3	60	60	114	48	143.8	144.4	Note (4)	11	144.4	...
6	355	47.7	222	168.3	67	67	117	51	170.7	171.4	Note (4)	13	171.4	...
8	420	55.6	273	219.1	76	76	133	58	221.5	222.2	Note (4)	13	222.2	...
10	510	63.5	343	273.0	86	111	152	66	276.2	277.4	Note (4)	13	276.2	...
12	560	66.7	400	323.8	92	117	156	70	327.0	328.2	Note (4)	13	328.6	...
14	605	69.9	432	355.6	94	127	165	74	359.2	360.2	Note (4)	13	360.4	...
16	685	76.2	495	406.4	106	140	178	78	410.5	411.2	Note (4)	13	411.2	...
18	745	82.6	546	457.0	117	152	184	80	461.8	462.3	Note (4)	13	462.0	...
20	815	88.9	610	508.0	127	165	190	83	513.1	514.4	Note (4)	13	512.8	...
24	940	101.6	718	610.0	140	184	203	93	616.0	616.0	Note (4)	13	614.4	...

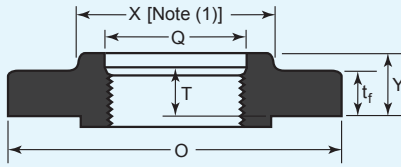
Dimensions of Class 900 Flanges



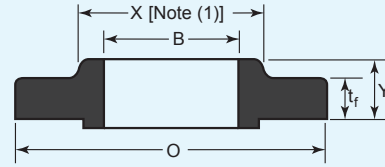
Nom. Pipe Size, NPS	Outside Diam. of Flange, O	Min. Thickness of Flange, t _f	Diam. of Hub, X	Hub Diam. Beginning of Chamfer Welding Neck, A _h [Note (2)]	Length Through Hub			Minimum Thread Length Threaded Flange, T [Note (3)]	Bore			Corner Bore Radius of Lapped Flange and Pipe, r	Minimum Counterbore Threaded Flange, Q	
					Threaded/ Slip-On, Y	Lapped, Y	Welding Neck, Y		Min. Slip-On, B	Min. Lapped, B	Welding Neck, B			
1/2														
3/4														
1														
1 1/4														
1 1/2														
2														
2 1/2														
3	240	38.1	127	88.9	54	54	102	42	90.7	91.4	Note (4)	10	92.2	
4	290	44.5	159	114.3	70	70	114	48	116.1	116.8	Note (4)	11	117.6	
5	350	50.8	190	141.3	79	79	127	54	143.8	144.4	Note (4)	11	144.4	
6	380	55.6	235	168.3	86	86	140	58	170.7	171.4	Note (4)	13	171.4	
8	470	63.5	298	219.1	102	114	162	64	221.5	222.2	Note (4)	13	222.2	
10	545	69.9	368	273.0	108	127	184	72	276.2	277.4	Note (4)	13	276.2	
12	610	79.4	419	323.8	117	143	200	77	327.0	328.2	Note (4)	13	328.6	
14	640	85.8	451	355.6	130	156	213	83	359.2	360.2	Note (4)	13	360.4	
16	705	88.9	508	406.4	133	165	216	86	410.5	411.2	Note (4)	13	411.2	
18	785	101.6	565	457.0	152	190	229	89	461.8	462.3	Note (4)	13	462.0	
20	855	108.0	622	508.0	159	210	248	93	513.1	514.4	Note (4)	13	512.8	
24	1,040	139.7	749	610.0	203	267	292	102	616.0	616.0	Note (4)	13	614.4	

Use Class 1500 dimensions in these sizes [Note (4)]

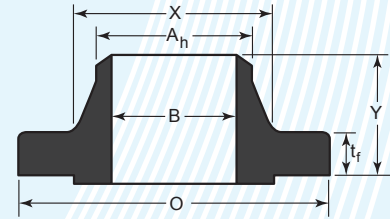
zzDimensions of Class 1500 Flanges



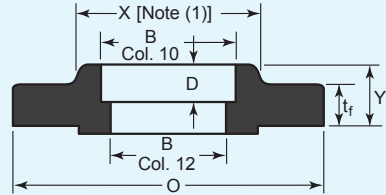
Threaded (NPS 1/2 to 2 1/2 Only)



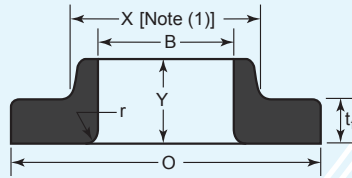
Slip-On Welding (NPS 1/2 to 2 1/2 Only)



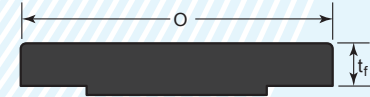
Welding Neck



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



Lapped



Blind

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Nominal Pipe Size, NPS	Outside Diameter of Flange, O	Minimum Thickness of Flange, t _f	Hub Diameter Beginning of Chamfer, X	Hub Diameter Welding Neck, A _h [Note (2)]	Length Through Hub			Minimum Thread Length Threaded Flange, T [Note (3)]	Bore			Corner Bore Radius of Lapped Flange and Pipe, r	Minimum Counterbore Threaded Flange, Q	Depth of Socket, D
					Threaded/ Slip-On/ Socket Welding, Y	Lapped, Y	Welding Neck, Y		Minimum Slip-On/ Socket Welding, B	Welding Neck/ Socket Welding, B	Minimum Slip-On/ Socket Welding, B			
1/2	120	22.3	38	21.3	32	32	60	23	22.2	22.9	Note (4)	3	23.6	10
3/4	130	25.4	44	26.7	35	35	70	26	27.7	28.2	Note (4)	3	29.0	11
1	150	28.6	52	33.4	41	41	73	29	34.5	34.9	Note (4)	3	35.8	13
1 1/4	160	28.6	64	42.2	41	41	73	31	43.2	43.7	Note (4)	5	44.4	14
1 1/2	180	31.8	70	48.3	44	44	83	32	49.5	50.0	Note (4)	6	50.6	16
2	215	38.1	105	60.3	57	57	102	39	61.9	62.5	Note (4)	8	63.5	17
2 1/2	245	41.3	124	73.0	64	64	105	48	74.6	75.4	Note (4)	8	76.2	19
3	265	47.7	133	88.9	...	73	117	...	...	91.4	Note (4)	10	...	...
4	310	54.0	162	114.3	...	90	124	...	...	116.8	Note (4)	11	...	...
5	375	73.1	197	141.3	...	105	156	...	...	144.4	Note (4)	11	...	...
6	395	82.6	229	168.3	...	119	171	...	...	171.4	Note (4)	13	...	...
8	485	92.1	292	219.1	...	143	213	...	...	222.2	Note (4)	13	...	...
10	585	108.0	368	273.0	...	178	254	...	...	277.4	Note (4)	13	...	...
12	675	123.9	451	323.8	...	219	283	...	...	328.2	Note (4)	13	...	...
14	750	133.4	495	355.6	...	241	298	...	...	360.2	Note (4)	13	...	...
16	825	146.1	552	406.4	...	260	311	...	...	411.2	Note (4)	13	...	...
18	915	162.0	597	457.0	...	276	327	...	...	462.3	Note (4)	13	...	...
20	985	177.8	641	508.0	...	292	356	...	...	514.4	Note (4)	13	...	...
24	1 170	203.2	762	610.0	...	330	406	...	...	616.0	Note (4)	13	...	...

NOTES:

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

The above Data are for reference purpose only. Kindly refer standards for actual Data

Carbon and Alloy Steel Pipe, Fittings and Flange

Material	Standard	Grade	Product	Chemical Composition										Min tensile		Min Yield					
				Carbon		Manganese		Phos	Sulphur	Silicon	Chro iu	Moly	Nic el	lb/in ²	MPA	lb/in ²	MPA				
				ax	ax	ax)	ax)														
Carbon Steel ¹	API5L	B	Linepipe	0.27	ax	1.15	ax	0.040	0.050						60,000	413	35,000	241			
		X42	Linepipe	0.29	ax	1.25	ax	0.040	0.050						60,000	413	42,000	289			
		X46	Linepipe	0.31	ax	1.35	ax	0.040	0.050						63,000	434	46,000	317			
		X52	Linepipe	0.31	ax	1.35	ax	0.040	0.050						66,000	455	52,000	358			
		X60	Linepipe	0.26	ax	1.35	ax	0.040	0.050						75,000	517	60,000	413			
Carbon Steel	ASTM A53	B	Pipe	0.30	ax	1.20	ax	0.050	0.060						60,000	415	35,000	240			
Carbon Steel ^{1,2}	ASTM A106	B	Pipe	0.30	ax	0.29	1.06	0.035	0.035	0.10	in				60,000	415	35,000	240			
	ASTM A234	WPB	Fittings	0.30	ax	0.29	1.06	0.050	0.058	0.10	in				60,000	415	35,000	240			
Carbon Steel ³	ASTM A106	C	Pipe	0.35	ax	0.29	1.06	0.035	0.035	0.10	in				70,000	485	40,000	275			
	ASTM A234	WPC	Fittings	0.35	ax	0.29	1.06	0.050	0.058	0.10	in				70,000	485	40,000	275			
Carbon Steel	ASTM A105 ⁵	N	Flanges Forged Fittings	0.35	ax	0.60	1.05	0.040	0.050	0.10	0.35				70,000	485	36,000	250			
Carbon Steel ^{1,2,3}	ASTM A333	6	Pipe	0.30	ax	0.29	1.06	0.025	0.025	0.10	in				60,000	415	35,000	240			
	ASTM A420	WPL6	Fittings	0.30	ax	0.39	1.06	0.030	0.030	0.10	in				60,000	415	35,000	240			
Carbon Steel	ASTM A350	LF 2	Flanges	0.30	ax	1.35	ax	0.035	0.040	0.15	0.30	0.30	ax	0.12	ax	0.40	ax	70,000	485	36,000	250
Alloy Steel 3.5% Ni el ³	ASTM A333	3	Pipe	0.19	ax	0.31	0.64	0.025	0.025	0.18	0.37			3.18	3.82	65,000	450	35,000	240		
	ASTM A420	WPL3	Fittings	0.20	ax	0.31	0.64	0.050	0.050	0.13	0.37			3.18	3.82	65,000	450	35,000	240		
	ASTM A350	LF 3	Flanges	0.20	ax	0.90	ax	0.035	0.040	0.20	0.35	0.30	ax	0.12	ax	3.25	3.75	70,000	485	36,000	250
Alloy Steel 1.25% Cr 0.5% Mo ⁴	ASTM A335	P11	Pipe	0.05	0.15	0.30	0.60	0.025	0.025	0.50	1.00	1.00	1.50	0.44	0.65	60,000	415	30,000	205		
	ASTM A234	WP11 CL1	Fittings	0.05	0.15	0.30	0.60	0.030	0.030	0.50	1.00	1.00	1.50	0.44	0.65	60,000	415	30,000	205		
	ASTM A234	WP11 CL2	Fittings	0.05	0.20	0.30	0.80	0.040	0.040	0.50	1.00	1.00	1.50	0.44	0.65	70,000	485	40,000	275		
	ASTM A234	WP11 CL3	Fittings	0.05	0.20	0.30	0.80	0.040	0.040	0.50	1.00	1.00	1.50	0.44	0.65	75,000	520	45,000	310		
	ASTM A182	F11 CL1	Flanges	0.05	0.15	0.30	0.60	0.030	0.030	0.50	1.00	1.00	1.50	0.44	0.65	60,000	415	30,000	205		
	ASTM A182	F11 CL2	Flanges	0.10	0.20	0.30	0.60	0.040	0.040	0.50	1.00	1.00	1.50	0.44	0.65	70,000	485	40,000	275		
	ASTM A182	F11 CL3	Flanges	0.05	0.20	0.30	0.80	0.040	0.040	0.50	1.00	1.00	1.50	0.44	0.65	75,000	520	45,000	310		
Alloy Steel 2.25% Cr 1% Mo ⁴	ASTM A335	P22	Pipe	0.05	0.15	0.30	0.60	0.025	0.025	0.50	ax	1.90	2.60	0.87	1.13	60,000	415	30,000	205		
	ASTM A234	WP22 CL1	Fittings	0.05	0.15	0.30	0.60	0.040	0.040	0.50	ax	1.90	2.60	0.87	1.13	60,000	415	30,000	205		
	ASTM A234	WP22 CL3	Fittings	0.05	0.15	0.30	0.60	0.040	0.040	0.50	ax	1.90	2.60	0.87	1.13	75,000	520	45,000	310		
	ASTM A182	F22 CL1	Flanges	0.05	0.15	0.30	0.60	0.040	0.040	0.50	ax	2.00	2.50	0.87	1.13	60,000	415	30,000	205		
	ASTM A182	F22 CL3	Flanges	0.05	0.15	0.30	0.60	0.040	0.040	0.50	ax	2.00	2.50	0.87	1.13	75,000	520	45,000	310		
Alloy Steel 5% Cr 0.05% Mo ⁴	ASTM A335	P5	Pipe	0.15	ax	0.30	0.60	0.025	0.025	0.50	ax	4.00	6.00	0.45	0.65	60,000	415	30,000	205		
	ASTM A234	WP5	Fittings	0.15	ax	0.30	0.60	0.040	0.030	0.50	ax	4.00	6.00	0.45	0.65	60,000	415	30,000	205		
	ASTM A182	F5	Flanges	0.15	ax	0.30	0.60	0.030	0.030	0.50	ax	4.00	6.00	0.45	0.65	70,000	485	40,000	275		
Alloy Steel 9% Cr 1% Mo ⁴	ASTM A335	P9	Pipe	0.15	ax	0.30	0.60	0.025	0.025	0.25	1.00	8.00	10.00	0.90	1.10	60,000	415	30,000	205		
	ASTM A234	WP9	Fittings	0.15	ax	0.30	0.60	0.030	0.030	0.25	1.00	8.00	10.00	0.90	1.10	60,000	415	30,000	205		
	ASTM A182	F9	Flanges	0.15	ax	0.30	0.60	0.030	0.030	0.50	1.00	8.00	10.00	0.90	1.10	85,000	585	55,000	380		

The above Data are for reference purpose only. Kindly refer standards for actual Data

American Specifications - Stainless Steels - Pipe, Fittings and Flange

Grade	Chemical Composition												Min Tensile		min Yield	
	Carbon (max ¹)	Man-ganese (max ¹)	Phos (max)	Sulphur (max)	Silicon (max ¹)	Nickel	Chro-mium	Molyb-denum	Titanium	Co-lumbium plus Tanta-lum	Tan-talum (max)	Nitro-gen ⁶	lb/ir ⁷	MPA	lb/ir ⁷	MPA
304	0.08	2.00	0.040	0.030	0.75	8.00-11.00	18.0-20.0	-	-	-	-	-	85,000	585	35,000	242
304H	0.04-0.10	2.00	0.040	0.030	0.75	8.00-11.00	18.0-20.0	-	-	-	-	-	85,000	585	35,000	242
304L	0.035 ¹	2.00	0.040	0.030	0.75	8.00-13.0	18.0-20.0	-	-	-	-	-	80,000	553	30,000	207
310S	0.08	2.00	0.045	0.030	0.75	19.0-22.0	24.0-26.0	0.75	-	-	-	-	95,000	656	45,000	311
316	0.08	2.00	0.040	0.030	0.75	11.0-14.0	16.0-18.0	2.00-3.00	-	-	-	-	90,000	622	40,000	276
316H	0.04-0.10	2.00	0.040	0.030	0.75	11.0-14.0	16.0-18.0	2.00-3.00	-	-	-	-	90,000	622	40,000	276
316L	0.035 ¹	2.00	0.040	0.030	0.75	10.0-15.0	16.0-18.0	2.00-3.00	-	-	-	-	80,000	553	35,000	242
317	0.08	2.00	0.040	0.030	0.75	11.0-14.0	18.0-20.0	3.00-4.00	-	-	-	-	90,000	622	40,000	276
317L	0.035	2.00	0.040	0.030	0.75	11.0-15.0	18.0-20.0	3.00-4.00	-	-	-	-	80,000	553	35,000	242
321	0.08	2.00	0.040	0.030	0.75	9.00-13.0	17.0-20.0	-	²	-	-	-	90,000	622	35,000	242
321H	0.04-0.10	2.00	0.040	0.030	0.75	9.00-13.0	17.0-20.0	-	³	-	-	-	90,000	622	35,000	242
347	0.08	2.00	0.040	0.030	0.75	9.00-13.0	17.0-20.0	-	-	⁴	-	-	95,000	656	40,000	276
347H	0.04-0.10	2.00	0.040	0.030	0.75	9.00-13.0	17.0-20.0	-	-	⁵	-	-	95,000	656	40,000	276

Notes:

1 For small diameter or thin walls or both, where many drawing passes are required, a carbon maximum of 0.040 per cent is necessary in grades TP304 and TP316L. Small outside diameter tubes are defined as those less than 0.500in. (12.7mm) in outside diameter and light wall tubes as those less than 0.049in. (1.24mm) in average wall thickness (0.044in. [1.12mm] in minimum wall thickness).

2 The titanium content shall not be less than five times the carbon content and not more than 0.6 per cent.

3 The titanium content shall not be less than four times the carbon content and not more than 0.6 per cent.

4 The columbium plus tantalum content shall be not less than ten times the carbon content and not more than 1.0 per cent.

5 The columbium plus tantalum content shall be not less than eight times the carbon content and not more than 1.0 per cent.

6 The method of analysis for nitrogen shall be a matter of agreement between the purchaser and manufacturer.

7 Maximum, unless otherwise indicated.

8 Vanadium content 0.10-0.30 per cent.

The above Data are for reference purpose only. Kindly refer standards for actual Data

Pipes

Nominal Pipe Size	OD	Schedule 10		Schedule 20		Schedule 30		Schedule Standard		Schedule 40		Schedule 60		Schedule XS		Schedule 80		Schedule 100		Schedule 120		Schedule 140		Schedule 160		Schedule XXS				
		mm	Inch	Wall	kg/m	Wall	g/cm	Wall	kg/m	Wall	Wt.	Wall	Wt.	Wall	Wt.	Wall	Wt.	Wall	Wt.	Wall	Wt.	Wall	Wt.	Wall	Wt.	Wall	Wt.	Wall	Wt.	
3	1/8	10.3						1.73	0.4	1.73	0.4			2.41	0.5	2.41	0.5													
6	1/4	13.7						2.24	0.6	2.24	0.6			3.02	0.8	3.02	0.8													
10	3/8	17.1						2.31	0.8	2.31	0.8			3.20	1.1	3.20	1.1													
15	1/2	21.3						2.77	1.3	2.77	1.3			3.73	1.6	3.73	1.6									4.78	1.9	7.47	2.5	
20	3/4	26.7						2.87	1.7	2.87	1.7			3.91	2.2	3.91	2.2									5.56	2.9	7.82	3.6	
25	1	33.4						3.38	2.5	3.38	2.5			4.55	3.2	4.55	3.2									6.35	4.2	9.09	5.4	
32	1 1/4	42.2						3.56	3.4	3.56	3.4			4.85	4.5	4.85	4.5									6.35	5.6	9.70	7.7	
40	1 1/2	48.3						3.68	4.0	3.68	4.0			5.08	5.4	5.08	5.4									7.14	7.2	10.15	9.6	
50	2	60.3						3.91	5.4	3.91	5.4			5.54	7.4	5.54	7.4									8.74	11.1	11.07	13.4	
65	2 1/2	73.0						5.16	8.7	5.16	8.7			7.01	11.4	7.01	11.4									9.53	14.9	14.02	20.3	
80	3	88.9						5.49	11.2	5.49	11.2			7.62	15.2	7.62	15.2									11.13	21.3	15.24	27.6	
90	3 1/2	101.6						5.74	13.5	5.74	13.5			8.08	18.6	8.08	18.6													
100	4	114.3						6.02	16.0	6.02	16.0			8.56	22.3	8.56	22.3									11.13	28.3			
125	5	141.3						6.55	21.7	6.55	21.7			9.53	30.9	9.53	30.9									12.70	40.2			
150	6	168.3						7.11	28.2	7.11	28.2			10.97	42.5	10.97	42.5									14.27	54.2			
200	8	219.1						6.35	33.3	7.04	36.8	8.18	42.5	8.18	42.5	10.31	35.6	12.70	64.6	15.09	75.9	18.26	90.4	20.62	100.9	23.01	111.2	22.23	107.9	
250	10	273.0						6.35	41.7	7.80	51.0	9.27	60.3	9.27	60.3	12.7	54.7	12.70	81.5	18.26	114.7	21.44	133.0	25.40	155.1	28.58	172.3	25.40	155.1	
300	12	323.9						6.35	49.7	8.38	65.2	9.53	73.8	10.31	79.7	14.27	73.1	12.70	97.4	17.48	132.0	21.44	159.9	25.40	186.9	28.58	208.1	33.32	238.7	
350	14	355.6						6.35	54.7	7.92	67.9	9.53	81.3	9.53	81.3	11.13	94.5	15.09	85.0	19.05	158.0	23.83	194.9	27.79	224.6	31.75	253.5	35.71	281.7	
400	16	406.4						6.35	62.6	7.92	77.8	9.53	93.3	9.53	93.3	16.66	107.5	12.70	123.3	21.44	203.5	26.19	245.5	30.96	286.6	36.53	333.1	40.49	365.3	
450	18	457.0						6.35	70.6	7.92	87.7	11.13	122.4	9.53	105.1	19.05	138.1	12.70	139.1	23.83	254.5	29.36	309.6	34.93	363.5	39.67	408.2	45.24	459.3	
500	20	508.0						6.35	78.5	9.53	117.1	12.70	155.1	9.53	117.1	20.62	166.4	12.70	155.1	26.19	311.1	32.54	381.5	38.10	441.4	44.45	508.1	50.01	564.8	
550	22	559.0						6.35	86.5	9.53	129.1	12.70	171.1	9.53	129.1	22.23	197.4	12.70	171.0	28.58	373.8	34.93	451.4	41.28	527.0	47.63	600.6	53.98	672.2	
600	24	610.0						6.35	94.5	9.53	141.1	14.27	209.6	9.53	141.1	24.61	238.3	12.70	187.0	30.96	442.0	38.89	547.7	46.02	640.0	52.37	720.0	59.54	808.2	
650	26	660.0						7.92	127.3	12.7	202.7	-	-	9.53	152.8					12.70	202.7									
700	28	711.0						7.92	137.3	12.7	218.6	15.88	271.2	9.53	164.8					12.70	218.6									
750	30	762.0						7.92	147.3	12.7	234.6	15.88	292.1	9.53	176.8					12.70	234.6									
800	32	813.0						7.92	157.2	12.7	250.6	15.88	312.1	9.53	188.8	17.48				12.70	250.6									
850	34	864.0						7.92	167.2	12.7	266.6	15.88	332.3	9.53	200.3	17.48				12.70	266.6									
900	36	914.0						7.92	176.9	12.7	282.2	15.88	351.7	9.53	212.5	19.05				12.70	282.2									

The above Data are for reference purpose only. Kindly refer standards for actual Data



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