

# Gate Valve - Dimensions

Dimensions in mm, Weights in Kg & Valve Size in Inch

FE • Flanged End, BWE • Butt Weld End

VALVE SIZE	Class 150						Class 300						Class 600					
	A		B	C	Weight		A		B	C	Weight		A		B	C	Weight	
	FE	BWE			FE	BWE	FE	BWE			FE	BWE	FE	BWE			FE	BWE
2"	178	216	320	200	22	20	216	216	315	200	25	23	292	292	310	200	30	27
3"	203	282	390	300	35	32	282	282	385	250	48	44	356	356	365	300	60	55
4"	229	305	445	350	50	45	305	305	440	350	70	65	432	432	435	400	100	92
6"	267	403	550	350	82	75	403	403	590	400	150	138	559	559	635	450	205	188
8"	292	419	755	400	130	120	419	419	755	450	215	195	660	660	755	450	350	320
10"	330	457	890	450	200	185	457	457	915	500	340	300	787	787	955	500	650	570
12"	356	502	955	GB	290	255	502	502	1020	GB	425	375	838	838	995	GB	900	790
14"	381	572	1055	GB	410	360	762	762	1150	GB	715	630	889	889	1115	GB	1300	1145
16"	406	610	1190	GB	505	445	838	838	1320	GB	1050	925	991	991	1265	GB	1610	1415
18"	432	660	1330	GB	605	530	914	914	1390	GB	1235	1085	1092	1092	1400	GB	2275	2000
20"	457	711	1500	GB	735	645	991	991	1495	GB	1655	1455	1194	1194	1540	GB	2970	2615
24"	508	813	1770	GB	1175	1035	1143	1143	1810	GB	2320	2040	1397	1397	1825	GB	3975	3495
26"	559	559	2050	GB	1690	1435	1245	1245	1900	GB	3250	2860	1448	1448	1850	GB	4765	4190
28"	610	610	2120	GB	1980	1685	1346	1346	2020	GB	3645	3095	1549	1549	2095	GB	5800	4930
30"	610	610	2245	GB	2300	1955	1397	1397	2350	GB	4370	3715	1651	1651	2225	GB	6500	5525
32"	660	660	2350	GB	2620	2225	1524	1524	2410	GB	4650	3950	1778	1778	2375	GB	7125	6055
34"	711	711	2450	GB	3015	2560	1626	1626	2400	GB	5750	4480						
36"	711	711	2575	GB	3410	2895	1727	1727	2550	GB	6850	5820						
38"	736	736	2650	GB	3800	3040												
40"	762	762	2900	GB	4300	3440												
42"	787	1118	3000	GB	4900	3920												
48"	864	1118	3450	GB	6800	5440												

MATERIAL	
Shell	WCB, WC1, WC6, WC9, LCB, LCC, C5, C12, CF3, CF3M, CF8, CF8M, CF8C, CD4MCu, Hastalloy, Inconel, Duplex Stainless steel.
Trim	13% Cr Steel, SS 304, 316, 304L, 316L, 321, 347, F51, Monel
STRUCTURE	
End Connection	Flanged End Raised Face, Butt Weld End, RTJ, Etc.
Operation	Hand wheel operated, Gear Operated, Pneumatic, Hydraulic, Chain Wheel. Electric Actuator

- GB stands for Gear Box.
- Dimensions,Weights and other Engineering data are subjected to change without notice.
- Weight indicated are without gear box.
- Other accessories like limit switch,solenoid valve,air filter regulator,positioner available on request.
- Other flange drilling available on request.
- Weight for sizes 26" & above are for ASME B16.47 Series B Flanges. For series A consult factory.



# Globe Valve Dimensions

Dimensions in mm, Weights in Kg & Valve Size in Inch

FE • Flanged End, BWE • Butt Weld End

VALVE SIZE	Class 150						Class 300						Class 600					
	A		B	C	Weight		A		B	C	Weight		A		B	C	Weight	
	FE	BWE			FE	BWE	FE	BWE			FE	BWE	FE	BWE			FE	BWE
2"	203	203	305	200	20	18	267	267	330	200	30	28	292	292	350	300	40	36
3"	241	241	380	250	35	32	318	318	380	250	55	50	356	356	430	300	70	65
4"	292	292	410	300	55	50	356	356	410	350	95	88	432	432	505	400	120	110
6"	406	406	450	400	105	95	444	444	510	400	165	150	559	559	560	450	255	235
8"	495	495	545	450	160	148	533	533	645	450	270	250	660	660	660	GB	380	350
10"	622	622	640	450	230	210	622	622	680	500	420	385	787	787	800	GB	585	540
12"	698	698	650	GB	320	280	711	711	725	GB	540	475	838	838	900	GB	890	785
14"	787	787	710	GB	510	450	838	838	760	GB	885	780	889	889	840	GB	1115	980
16"	914	914	735	GB	835	735	864	864	840	GB	1135	995	991	991	935	GB	1450	1275
18"	978	978	820	GB	1290	1135												
20"	978	978	1020	GB	1510	1285												
24"	1295	1295	1250	GB	1840	1565												

MATERIAL	
Shell	WCB, WC1, WC6, WC9, LCB, LCC, C5, C12, CF3, CF3M, CF8, CF8M, CF8C, CD4MCu, Hastalloy, Inconel, Duplex Stainless steel.
Trim	13% Cr Steel, SS 304, 316, 304L, 316L, 321, 347, F51, Monel
STRUCTURE	
End Connection	Flanged End Raised Face, Butt Weld End, RTJ, Etc.
Operation	Hand wheel operated, Gear Operated, Pneumatic, Hydraulic, Chain Wheel, Electric Actuator

- GB stands for Gear Box.
- Dimensions, Weights and other Engineering data are subjected to change without notice.
- Weight indicated are without gear box.
- Other accessories like limit switch, solenoid valve, air filter regulator, positioner available on request.
- Other flange drilling available on request.



# Swing Check Valve

## Swing Check Valve-Dimension

Dimensions in mm, Weights in Kg & Valve Size in Inch

FE • Flanged End, BWE • Butt Weld End

VALVE SIZE	Class 150					Class 300					Class 600				
	A		B	Weight		A		B	Weight		A		B	Weight	
	FE	BWE		FE	BWE	FE	BWE		FE	BWE	FE	BWE		FE	BWE
2"	203	203	160	15	13	267	267	165	18	16	292	292	165	28	25
3"	241	241	185	27	24	318	318	205	45	41	356	356	205	52	45
4"	292	292	190	45	40	356	356	240	70	65	432	432	250	90	80
6"	356	356	225	75	69	444	444	280	114	105	559	559	300	225	210
8"	495	495	280	120	110	533	533	315	220	205	660	660	380	355	325
10"	622	622	340	195	180	622	622	365	335	305	787	787	410	675	620
12"	698	698	380	275	242	711	711	645	470	415	838	838	425	790	695
14"	787	787	430	360	315	838	838	480	600	530	889	889	450	890	785
16"	864	864	480	490	430	864	864	520	850	750	991	991	560	1200	1055
18"	978	978	545	650	572	978	978	575	1005	885	1092	1092	620	1600	1410
20"	978	978	595	850	748	1016	1016	630	1275	1120	1194	1194	745	2420	2130
24"	1295	1295	680	1350	1188	1346	1346	760	1650	1452	1397	1397	845	3150	2775
26"	1295	1295	780	1830	1555	1346	1346	800	2250	1915	1448	1448	910	4010	3410
28"	1448	1448	840	2150	1830	1499	1499	890	2800	2380	1600	1600	980	5160	4385
30"	1524	1524	980	3000	2550	1594	1594	970	3200	2720	1651	1651	1100	6540	5550
32"	1676	1676	1100	3650	3100	1787	1787	1010	4000	3400	1787	1787	1250	7230	6145

MATERIAL	
Shell	WCB, WC1, WC6, WC9, LCB, LCC, C5, C12, CF3, CF3M, CF8, CF8M, CF8C, CD4MCu, Hastalloy, Inconel, Duplex Stainless steel.
Trim	13% Cr Steel, SS 304, 316, 304L, 316L, 321, 347, F51, Monel
STRUCTURE	
End Connection	Flanged End Raised Face, Butt Weld End, RTJ, Etc.

- Dimensions, Weights and other Engineering data are subjected to change without notice.
- Other flange drilling available on request.
- Weight indicated are approximate.
- Other accessories like damper arrangement, dashpot arrangement available on request.



## Cryogenic Gate Valve-Dimensions

Dimensions in mm, Weights in Kg & Valve Size in Inch

VALVE SIZE	Class 150				Class 300				Class 600			
	A	B	C	Weight	A	B	C	Weight	A	B	C	Weight
2"	178	645	200	33	216	640	200	37	292	660	200	45
3"	203	715	300	52	282	710	250	70	356	715	300	90
4"	229	770	350	75	305	765	350	105	432	785	400	150
6"	267	875	350	125	403	915	400	225	559	985	450	305
8"	292	1080	400	195	419	1080	450	325	660	1105	450	525
10"	330	1215	450	300	457	1240	500	510	787	1305	500	975
12"	356	1280	GB	375	502	1345	GB	555	838	1345	GB	1170
14"	381	1380	GB	535	762	1475	GB	930	889	1465	GB	1690
16"	406	1515	GB	655	838	1645	GB	1365	991	1615	GB	2095
18"	432	1655	GB	785	914	1715	GB	1665	1092	1750	GB	2955
20"	457	1825	GB	955	991	1820	GB	2150	1194	1890	GB	3860
24"	508	2095	GB	1525	1143	2135	GB	3015	1397	2175	GB	5160

MATERIAL	
Shell	LCB, LCC, CF3, CF3M, CF8, CF8M,
Trim	SS304 , 316, 304L, 316L
STRUCTURE	
End Connection	Flanged End Raised Face, Butt Weld End, RTJ, Etc.
Operation	Hand wheel operated, Gear Operated, Pneumatic, Hydraulic, Chain Wheel. Electric actuator

- GB stands for Gear Box.
- Dimensions, Weights and other Engineering data are subjected to change without notice.
- Weight indicated are without gear box.
- Other accessories like limit switch, solenoid valve, air filter regulator, positioner available on request.
- Other flange drilling available on request.
- 250 mm Stem Extension is our standard as per Non cold box application. If any special height required consult factory.



## Cryogenic Globe Valve-Dimensions

Dimensions in mm, Weights in Kg & Valve Size in Inch

VALVE SIZE	Class 150				Class 300				Class 600			
	A	B	C	Weight	A	B	C	Weight	A	B	C	Weight
2"	203	630	200	30	267	655	200	45	292	675	300	60
3"	241	705	250	52	318	705	250	82	356	755	300	100
4"	292	735	300	82	356	735	350	145	432	830	400	180
6"	406	775	400	155	444	835	400	245	559	885	450	300
8"	495	870	450	240	533	970	450	405	660	985	GB	520
10"	622	965	450	345	622	1005	500	630	787	1125	GB	780
12"	698	975	GB	475	711	1050	GB	800	838	1225	GB	970
14"	787	1035	GB	665	838	1085	GB	1150	889	1165	GB	1230
16"	914	1060	GB	1085	864	1165	GB	1475	991	1260	GB	1650

MATERIAL	
Shell	LCB, LCC, CF3, CF3M, CF8, CF8M,
Trim	SS 304 , 316 , 304L , 316L ,
STRUCTURE	
End Connection	Flanged End Raised Face, Butt Weld End, RTJ, etc.
Operation	Hand wheel operated, Gear Operated, Pneumatic, Hydraulic, Chain Wheel. Electric actuator

- GB stands for Gear Box.
- Dimensions, Weights and other Engineering data are subjected to change without notice.
- Weight indicated are without gear box.
- Other accessories like limit switch, solenoid valve, air filter regulator, positioner available on request.
- Other flange drilling available on request.
- 250 mm Stem Extension is our standard as per Non cold box application. If any special height required consult factory.



## Cryogenic Swing Check Valve-Dimensions

Dimensions in mm, Weights in Kg & Valve Size in Inch

VALVE SIZE	Class 150			Class 300			Class 600		
	A	B	Weight	A	B	Weight	A	B	Weight
2"	203	160	16	267	165	20	292	165	30
3"	241	185	30	318	205	50	356	205	58
4"	292	190	50	356	240	80	432	250	100
6"	356	225	85	444	280	125	559	300	250
8"	495	280	135	533	315	245	660	380	390
10"	622	340	215	622	365	370	787	410	745
12"	698	380	305	711	645	520	838	425	870
14"	787	430	395	838	480	660	889	450	980
16"	864	480	540	864	520	935	991	560	1320
18"	978	545	715	978	575	1105	1092	620	1760
20"	978	595	935	1016	630	1400	1194	745	2665
24"	1295	680	1485	1346	760	1815	1397	845	3465

MATERIAL	
Shell	LCB, LCC, CF3, CF3M, CF8, CF8M,
Trim	SS 304, 316, 304L, 316L,
STRUCTURE	
End Connection	Flanged End Raised Face, Butt Weld End, RTJ, Etc.

- Dimensions, Weights and other Engineering data are subjected to change without notice.
- Other flange drilling available on request.
- Weight indicated are approximate.



## Gate, Globe & Check Valves

### TEMPERATURE LIMITS OF SHELL MATERIALS

MATERIAL	ASTM SPECIFICATION	LOWER TEMPERATURE °F (°C)	HIGHER TEMPERATURE °F (°C)
Carbon Steel	ASTM A216 Gr WCB	-20 (-29)	1000(538)
Martensitic 1 1/4 Cr - 1/2 Mo	ASTM 217 Gr WC6	-20 (-29)	1100(593)
Martensitic 2 1/4 Cr - 1 Mo	ASTM A217 Gr WC9	-20 (-29)	1100(593)
Martensitic 5 Cr - 1/2 Mo	ASTM A217 Gr C5	-20 (-29)	1200(649)
Martensitic 9 Cr - 1 Mo	ASTM A217 Gr C12	-20 (-29)	1200(649)
Austenitic Stainless Steel	ASTM A351 Gr CF8 / CF8M	-320 (-198)	1200 (649)
Carbon Steel	ASTM A352 Gr LCB	-50 (-45)	650 (343)
3 1/2 Ni	ASTM A352 Gr LC3	-150 (-101)	650 (343)

Other material like Duplex Stainless steel, Hastalloy, Monel, etc made available on request.

### DISC SEATS AND BODY SEATS

Following are the Trims as per API 600, Table 3. available as our standard. Other Material combination available on request.

Trim No.	Nominal Trim	Trim Material	Stem Material	Temperature
1.	F6/F6	a) ASTM A 182 F6 / 13% Cr Steel	13%Cr(410)	1100°F
		b) 13% Cr Deposit		
2.*	304 / 304	a) ASTM A 182 (F304) or A351 (CF8)	304 SS	1200°F
		b) 304 deposit		
5.	HF/HF	Co-Cr-W Alloy (Stellite 6) Deposit	13%Cr(410)	1200°F
8.	F6/HF	Trim No. 1 + No. 5	13%Cr(410)	1100°F
9.*	Monel / Monel	a) Monel Deposit	Monel	450° F
		b)B164		
10.*	316/316	a) ASTM A 182 (F31 6) or A351 (CF8M)	316SS	850° F
		b) 316 Deposit		
11.*	Monel / HF	Trim No.5 + No. 9	Monel	450° F
12.*	316 /HF	Trim No. 5 + No. 10	316SS	850° F

\* Available optionally.

Trim parts are defined as follows

Gate Valve - Body & Wedge seating surface, Stem, Back seat surface.

Globe Valve - Body & Disc seating surface, Stem, Back seat surface.

Check Valve - Body & Disc seating surface, Hinge pin.

### SOUR GAS SERVICE MATERIALS

For servicing sour gases or other hydrocarbon fluids, Spire cast steel valves may be furnished with materials specially heat treated and hardness controlled in compliance with NACE MR 0175 standard. The shell are WCB with double tempered trim 2 and class II bolting. Other materials and trims are also available on request.

### TEST PRESSURE

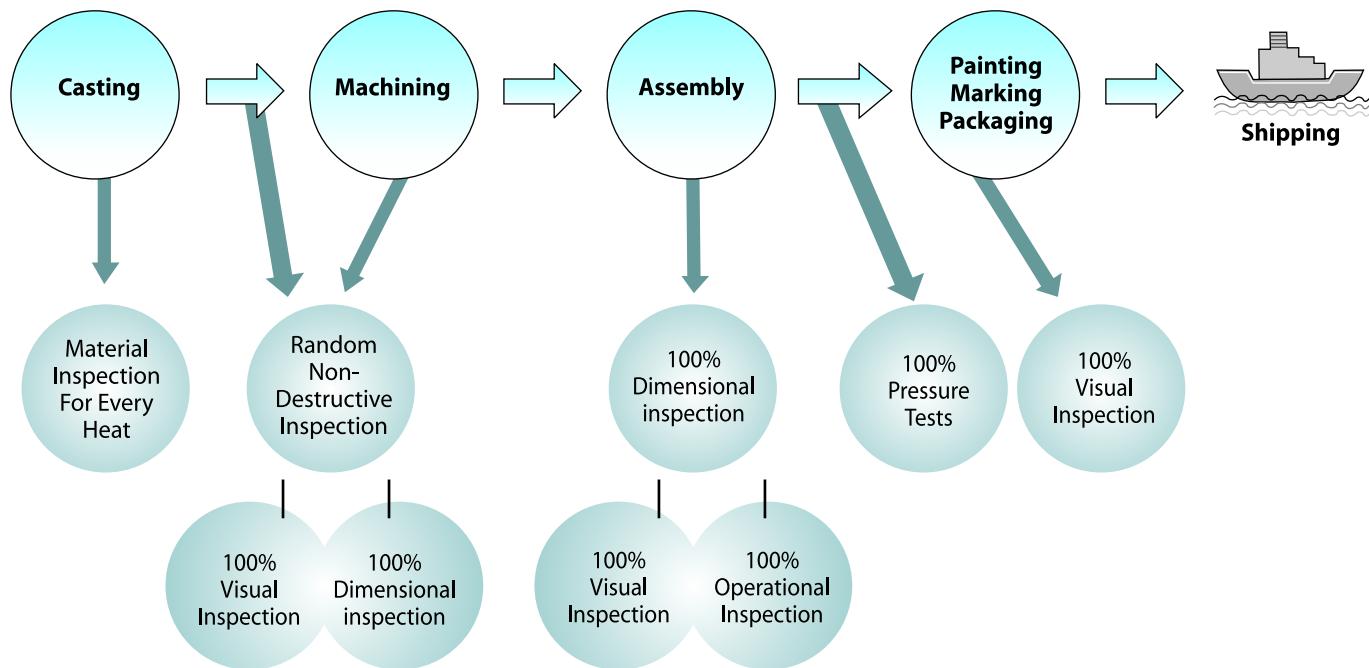
Hydrostatic Shell Test	Hydrostatic tested at 1.5 Times the rated pressure for applicable pressure class at 100°F in accordance with ASME B16.34 and API 598
Hydrostatic Seat Test	Hydrostatic tested at 1.1 Times the rated pressure for applicable pressure class at 100°F in accordance with ASME B16.34 and API 598
Pneumatic Seat Test	Pneumatic tested at 80 Psi pressure at 100°F in accordance with ASME B16.34 and API 598
Hydrostatic Back Seat Test	Hydrostatic tested at 1.1 Times the rated pressure for applicable pressure class at 100°F in accordance with ASME B16.34 and API 598



# Cast Steel Inspection Flow Chart

TEST /INSPECTION	METHOD	ACCEPTANCE CRITERIA
Mechanical Property	ASTM A 370	Relevant ASTM Standard
Chemical Composition Analysis		Relevant ASTM Standard
Radiography Inspection	ASME B 16.34/ASTME142	ASME B 16.34 / ASTM A446
Liquid Penetrant Inspection	ASTM E 165	ASME B 16.34
Magnetic Particle Inspection	ASTM E 138/ASTME709	
Low Temperature Impact Test	ASTM E 23	ASTM A 352
Pressure Test	ASME B16.34 /API 598	ASME B 16.34 /API 598
Dimensional Inspection		Valve Standard
Visual Inspection		MSS SP - 55
Ultrasonic Inspection	ASTM A 388	ASME B 16.34

## SPIRE INSPECTION FLOW CHART



**Spire Industrial Equipments Co.** are manufactured in a wide range of materials, supplied by the best available steel mills, forged by well known forgery with outstanding equipment and experience. All the material can be certified in the chemical composition and the mechanical characteristic.

BODY AND BONNET MATERIALS								
Material Common	Group Name	Nominal Type	UNS	Forging Spec.	Casting Spec. Equivalent	DIN	DIN W. N	Application Notes
Carbon Steel	CS	C-Mn-Fe	K03504	A105N	A216-WCB	C22.8 DIN 17243	1.0460	General non-corrosive service from -20F(-29C) to 800F(427C)
Low Temperature Carbon Steel	LTCS	C-Mn-Fe	K03011	A350-LF2	A352-LCA A352-LCB A352-LCC	TSTE 355 DIN 8103	1.0566	General non-corrosive from -50F (-46C) to 650F(340C), LF2 to 800(427C).
Low Temperature Alloy Steel	Nickel Steel	3.1/2Ni	K32025	A350-LF3	A352-LC3	10Ni14	1.5637	-150F(-101C) to 650F(340C)
Low Alloy Steel	Moly Steel	C-1/2Mo	K12822	A182-F1	A217-WC1	15M03	1.5415	Up to 875F (468C)
	Alloy Steel Chrome Moly	1.1/4Cr-1/2Mo	K11572	A182-F11c12	A217-WC6	13CRM044	1.7335	Up to 1100F (593C)
		2.1/4Cr-1Mo	K21590	A182-F22cl3	A217-WC9	10CRM0910	1.7380	Up to 1100F(593C), HP Steam
		5Cr-1/2Mo	K41545	A182-F5	A217-C5	12CRM0195	1.7362	High temp refinery service
		9Cr-1Mo	K90941	A182-F9	A217-C12	X 12 CrMo91	1.7386	High temp erosive refinery service
		9Cr-Mo-V		A182-F91	A217-C12A	X10CrMoVNb 91	1.4903	High pressure steam
Stainless Steel	Austenitic S. Steel 300 series S. Steel	304 : 18Cr-8Ni	S30400	A182-F304	A351-CF8	DIN X5CrNi189	1.4301	0.04%Min.carbon for temp.>1000F(538C)
		304L : 18Cr-8Ni	S30403	A182-F304L	A351-CF3	X 2 CrNi9 11	1.4306	Up to 800F (427C)
		304H:	S30409	A182-F304H		n/a	n/a	
		316 :16Cr-12Ni-2Mo	S31600	A182-F316	A351-CF8M	DIN X5CrNiMo 18 10	1.4401	0.04% min. carbon for temp.>1000F(538C)
		316L:16Cr-12Ni-2Mo	S31603	A182-F316L	A351-CF3M	X 5 CrNiMo 17 12 2	1.4404	Up to 800F(427C)
		316H :	S31609	A182-F316H		n/a	n/a	
		316Ti :	S31635	A182-F316Ti		X 6 CrNiMoTi 17 12 2	1.4571	
		321 :18Cr-10Ni-Ti 321H	S32100 S32109	A182-F321 A182-F321H		X 6 CrNiTi 18 10 n/a	1.4541 n/a	0.04% min.carbon(grade F321H)& heat treat at 2000F(1100C)for servicetemps.>1000F(538C)
		347:18Cr-10Ni-Cb(Nb) 347H	S34700 S34709	A182-F347 A182-F347H	A351-CF8C	DIN 8556 n/a	1.4550 n/a	0.04% min.carbon(grade F321H)& heat treat at 2000F(1100C)for servicetemps.>1000F(538C)
		317L	S31703	A182-F317L	A351-CG3M	X2CrNiMo18-19-4	1.4438	
	Alloy 20	28Ni-19Cr-Cu-Mo	N08020	A182-F20	A351-CN7M	DIN 1.4500	2.4660	service to 600F(316C)
	Duplex 2205	22Cr-5Ni-3Mo-N	S31803 S32205	A182-F51	A890-J92205	X2CrNiMoN22-5-3 DIN 10088-1 (95)	1.4462	service to 600F(316C)-The original S31803 UNS designation has been supplemented by S32205 which has higher minimum N, Cr and Mo.
	Super Duplex 2507	25Cr-7Ni-4Mo-N	S32750	A182-F53	A351-CD4MCu A890 5A	X2CrNiMoN25-7-4 DIN10088-1 (95)	1.4501	service to 600F(316C)
	Super Austenitic 6 Mo	20Cr-18Ni-6Mo	S31254	A182-F44	A351-CK3MCuN	X1CrNiMoCuN20-18-7 DIN 10088-1 (95)	1.4547	service to 600F (316C)
Nickel-Iron Alloy	Incoloy 800	33Ni-42Fe-21Cr	N08800	B564-N08800		X10NiCrAlT32-20	1.4876	service to 1000F(538C)
	Incoloy 825	42Ni-21.Cr-3Mo-2.3Cu	N08825	B564-N08825	A494-CU5MCuC	DIN 17744	2.4858	service to 600F(316C) for N02200, 1200F(648C) for N02201
Nickel	Nickel	99/95Ni	N02200	B160-N02200	A494-CZ-100	NW2200	1.7740	
Nickel-Copper	Monel 400 Monel 500	67Ni-30Cu	N04400 N05500	B564-N04400 B564-N05500	A494-M35	DIN 17730	2.4360 2.4375	
Nickel Alloy	904L		N08904	904L	n/a	Z2NCDU 25-20	1.4539	
Nickel Superalloys	Inconel 600	72Ni-15Cr-8Fe	N06600	B564-N06600	A494-CY40	DIN 17742	2.4816	
	Inconel 625	60Ni-22Cr-9Mo-3.5Cb	N06625	B564-N06625*	A494-CW-6MC		2.4856	*Difficult to forge in close dye
	Hastelloy C-276	54Ni-15Cr-16Mo	N10276	B564-N10276*	A494-CW-2M	NiMo16 Cr 15W	2.4819	*Difficult to forge in close dye

Notes : these charts are for reference only. we recommends customer engineers to analize service requirements and specify the materials they consider optimum.

We cannot be held liable for any damage occurred due to the use of the tables.



# Pressure Temperature Chart

## PRESSURE-TEMPERATURE RATINGS STANDARD CLASS VALVES, FLANGED AND BUTT WELD END

### A-216 GR. WCB

Temp °C	GAUGE WORKING PRESSURE BY RATING NUMBER, bar						
	PN20	PN50	PN100	FN150	PN250	PN420	PN760
38	19.6	51.1	102.1	153.2	255.3	425.5	765.8
50	19.2	50.1	100.2	150.2	250.4	417.3	751.1
100	17.7	46.4	92.8	139.1	231.9	396.5	695.7
150	15.8	45.2	90.5	135.7	226.1	376.9	678.4
200	14.0	43.8	87.6	131.5	219.1	365.2	657.3
250	12.1	41.7	83.4	125.2	208.6	347.7	625.8
300	10.2	38.7	77.5	116.2	193.7	322.8	581.0
350	8.4	37.0	73.9	110.9	184.8	308.0	554.4
375	7.4	36.5	72.9	109.4	182.3	303.9	547.0
400	6.5	34.5	69.0	103.5	172.5	287.5	517.5
425	5.6	28.8	57.5	86.3	143.8	239.6	431.4
450 <sup>(1)</sup>	4.7	20.0	40.1	60.1	100.2	166.9	300.5
475 <sup>(1)</sup>	3.7	13.5	27.1	40.6	67.7	112.9	203.2
500 <sup>(1)</sup>	2.8	8.8	17.6	26.4	44.0	73.3	131.9
525 <sup>(1)</sup>	1.9	5.2	10.4	15.5	25.9	43.2	77.7
540 <sup>(1)</sup>	1.3	3.3	6.5	9.8	16.3	27.2	48.9

### A-217 GR. WC6

Temp °C	GAUGE WORKING PRESSURE BY RATING NUMBER, bar						
	PN20	PN50	PN100	FN150	PN250	PN420	PN760
38	20.0	51.7	103.4	155.2	258.6	431.0	775.9
50	19.5	50.7	103.4	155.2	258.6	431.0	775.9
100	17.7	51.4	103.0	154.5	257.4	429.1	772.4
150	15.8	49.6	99.6	149.2	248.8	414.5	746.3
200	13.9	48.1	95.5	143.9	239.8	399.6	719.6
250	12.1	46.2	92.4	138.6	231.0	385.0	692.6
300	10.2	42.9	85.8	128.6	214.4	357.2	642.8
350	8.3	40.3	80.3	120.8	201.1	335.4	603.5
375	7.4	3.89	77.6	116.6	194.1	323.3	582.0
400	6.5	36.5	73.3	109.8	183.1	305.0	548.7
425	5.6	35.2	70.2	105.4	175.7	292.6	526.3
450 <sup>(1)</sup>	4.6	33.7	67.7	101.4	169.1	281.9	507.2
475	3.7	31.7	63.4	95.1	158.2	263.9	475.0
500	2.8	25.3	50.6	75.7	126.1	210.1	378.6
525	1.9	18.1	36.3	54.5	90.8	151.2	272.5
550	1.4 <sup>(1)</sup>	12.7	25.4	38.1	63.6	105.9	190.7
575	1.4 <sup>(1)</sup>	8.8	17.7	26.3	44.0	73.4	132.1
600 <sup>(2)</sup>	1.4 <sup>(1)</sup>	6.0	12.0	18.3	30.3	50.5	90.8

### A-217 GR. WC9

Temp °C	GAUGE WORKING PRESSURE BY RATING NUMBER, bar						
	PN20	PN50	PN100	FN150	PN250	PN420	PN760
38	20.0	51.7	103.4	155.2	258.6	431.0	775.9
50	19.5	51.7	103.4	155.2	258.6	431.0	775.9
100	17.7	51.6	103.1	154.6	257.7	429.5	773.2
150	15.8	50.3	100.3	150.6	250.9	418.3	753.0
200	13.9	48.8	97.5	146.3	244.1	406.6	731.9
250	12.1	46.3	92.7	139.1	231.9	386.3	695.0
300	10.2	42.9	85.8	128.6	214.4	357.2	642.8
350	8.3	40.3	80.3	120.8	201.1	335.4	603.5
375	7.4	38.9	77.6	116.6	194.1	323.3	582.0
400	6.5	36.5	73.3	109.8	183.1	305.0	548.7
425	5.6	35.2	70.2	105.4	175.7	292.6	526.3
450 <sup>(1)</sup>	4.6	33.7	67.7	101.4	169.1	281.9	507.2
475	3.7	31.7	63.4	95.1	158.2	263.9	475.0
500	2.8	25.3	50.6	75.7	126.1	210.1	378.6
525	1.9	18.1	36.3	54.5	90.8	151.2	272.5
550	1.4 <sup>(1)</sup>	12.7	25.4	38.1	63.6	105.9	190.7
575	1.4 <sup>(1)</sup>	8.8	17.7	26.3	44.0	73.4	132.1
600 <sup>(2)</sup>	1.4 <sup>(1)</sup>	6.0	12.0	18.3	30.3	50.5	90.8

## CAST: ASTM MATERIAL STANDARD-TO ASME B 16.34 (bar/°C) CLASSES 150-4500

### A-217 GR. C5

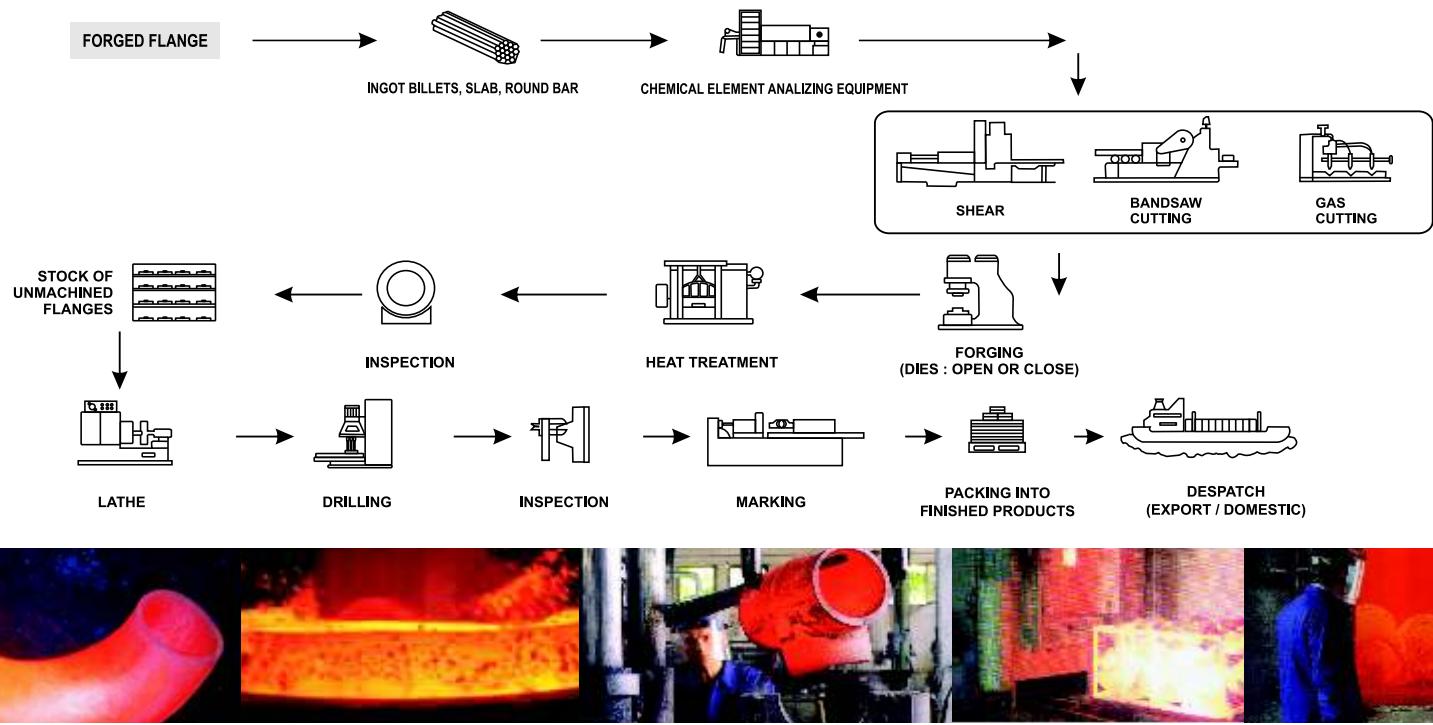
Temp °C	GAUGE WORKING PRESSURE BY RATING NUMBER, bar						
	PN20	PN50	PN100	FN150	PN250	PN420	PN760
38	20.0	51.7	103.4	155.2	258.6	431.0	775.9
50	19.5	51.7	103.4	155.2	258.6	431.3	774.6
100	17.7	51.1	102.3	153.4	257.2	425.9	766.8
150	15.8	49.3	98.6	148.2	246.8	411.2	740.5
200	13.9	48.7	97.4	146.1	243.7	406.0	730.8
250	12.1	46.3	92.7	139.1	231.9	386.3	695.0
300	10.2	42.9	85.8	128.6	214.4	357.2	642.8
350	8.3	40.3	80.3	120.8	201.1	335.4	603.5
375	7.4	38.9	77.5	116.4	193.9	323.0	582.0
400	6.5	36.5	72.6	109.2	181.8	303.0	545.4
425	5.6	35.2	70.1	105.4	175.6	292.4	526.1
450 <sup>(1)</sup>	4.6	33.7	67.1	100.8	167.9	280.1	504.0
475	3.7	31.7	63.4	100.8	183.1	305.0	548.7
500	2.8	27.7	55.7	84.6	156.4	292.6	526.3
525	1.9	21.4	42.8	64.1	107.1	178.6	321.1
550	1.4 <sup>(1)</sup>	15.0	30.0	45.0	75.0	125.1	225.0
575	1.4 <sup>(1)</sup>	9.0	21.0	31.4	52.1	87.2	156.7
600 <sup>(2)</sup>	1.4 <sup>(1)</sup>	6.2	14.3	21.5	35.8	59.9	107.5
625 <sup>(2)</sup>	1.3 <sup>(1)</sup>	3.9	8.1	12.0	24.7	41.5	74.5
650 <sup>(2)</sup>	1.0 <sup>(1)</sup>	2.4	4.8	7.2	11.7	29.7	53.1

### A-351 GR. CF8M<sup>(3)</sup>, A-351 GR. CF3M<sup>(2)</sup>

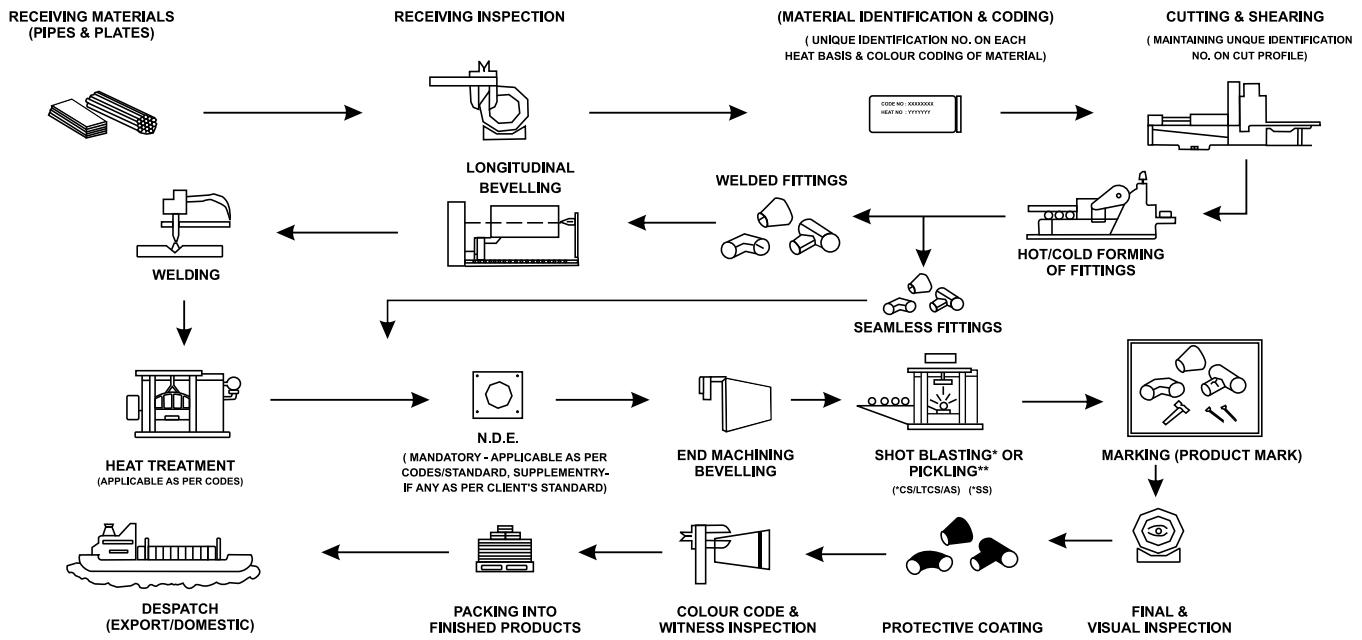
Temp °C	GAUGE WORKING PRESSURE BY RATING NUMBER, bar						
	PN20	PN50	PN100	FN150	PN250	PN420	PN760
38	19.0	49.7	99.3	149.0	248.3	413.8	744.8
50	18.3	48.1	96.3	144.4	240.6	401.0	721.9
100	16.1	42.3	84.6	126.8	211.0	351.7	633.2
150	14.8	38.6	77.1	115.7	192.4	320.8	577.7
200	13.9	48.8	97.5	146.3	244.1	406.6	731.9
250	12.0	33.5	66.8	100.3	167.0	278.2	500.8
300	10.2	31.6	63.1	95.0	158.1	263.6	474.6
350	8.3	30.4	61.0	91.3	152.3	253.9	456.9
375	7.4	29.6	59.9	89.7	149.3	249.1	448.3
400	6.5	29.3	59.0	88.2	147.2	245.4	441.9
425	5.6	29.6	58.3	87.3	145.6	242.9	437.2
450	4.6	29.0	57.7	86.7	144.3	240.4	432.8
475	3.7	28.7	57.3	86.1	143.4	239.0	430.3
500	2.8	27.3	54.8	82.1	136.7	228.0	410.5
525	1.9	25.2	50.6	75.9	126.4	210.7	379.2
550(3)	1.4(1)	24.0	47.8	71.8	119.8	199.5	359.0
575(3)	1.4(1)	22.8	45.4	68.3	114.1	190.1	341.9
600(3)	1.4(1)	19.9	39.9	59.7	99.5	166.0	298.6
625(3)	1.4(1)	15.7	31.7	47.4	79.2	131.7	237.3
650(3)	1.4(1)	12.6	25.3	37.9	63.2	105.7	189.8
675(3)	1.4(1)	10.1	20.6	30.8	51.4	86.1	154.8
700(3)	1.4(1)	8.3	16.9	25.1	42.0	69.8	125.8
725(3)	1.4(1)	6.9	13.9	21.1	35.0	58.2	104.9
750(3)	1.4(1)	5.7	11.3	17.1	28.7	47.7	85.7
775(3)	1.4(1)	4.6	9.0	13.7	22.8	38.1	68.4
800(3)	1.4(1)	3.5	7.0	10.6	17.4	29.2	52.6

# Flow Chart

## SCHEMATIC DETAILS OF PRODUCTION PROCESS FOR FLANGES



## SCHEMATIC DETAILS OF MANUFACTURING PROCEDURE OF BUTTWELD & PIPE FITTINGS

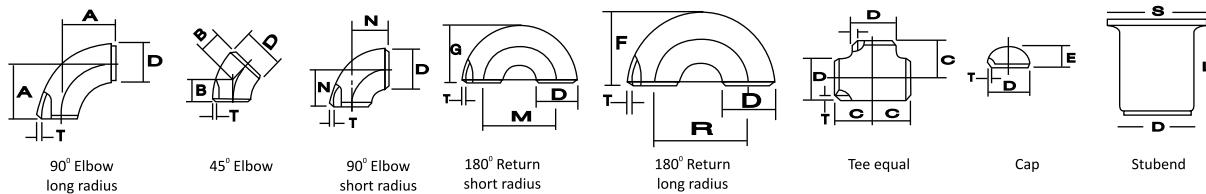


### NOTE :

- STAGE WISE & ONLINE INSPECTION AT EVERY STAGE AND PROCESS BY 100%
- UNIQUE IDENTIFICATION NO. MAINTAINED AT EACH & EVERY STAGE OF PROCESS FOR TRACEABILITY BACK TO THE STARTING RAW MATERIAL.



### BUTT WELDING PIPE FITTING DIMENSIONAL STANDARD ANSI B-16.9, B-16.28

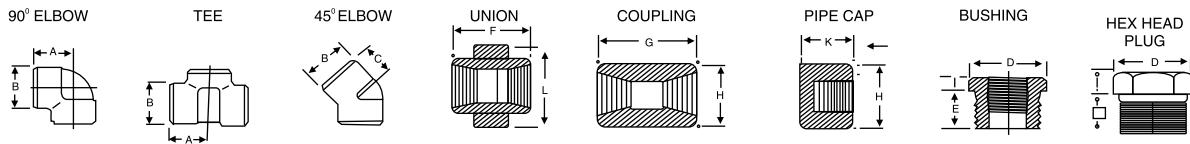


Nominal Pipe Size		Outside Diameter	Center to Face			Back to Face			Center to Center			Length 'L' MSS SP 43 B16.9		
INCH	MM	D	A R=1.5D	B	C	N R=1D	E	F	G	R	M	S	Short L	Long L
1/2	15	21.3	38.00	16.0	25.0	-	25.0	48.0	-	76.0		34.93	50.8	76.2
3/4	20	26.7	29.00	11.0	29.0	-	25.0	43.0	-	57.0		42.86	50.8	76.2
1	25	33.4	38.00	22.0	38.0	25.0	38.0	56.0	41.0	76.0	51.0	50.8	50.8	101.6
1.1/4	32	42.2	48.00	25.0	48.0	32.0	38.0	70.0	52.0	95.0	64.0	63.5	50.8	101.6
1.1/2	40	48.3	57.15	29.0	57.0	38.0	38.0	83.0	62.0	114.0	76.0	73.2	50.8	101.6
2	50	60.3	76.00	35.0	64.0	51.0	38.0	106.0	81.0	152.0	102.0	92.08	63.5	152.4
2.1/2	65	73.0	95.25	44.0	76.0	64.0	38.0	132.0	100.0	191.0	127.0	104.78	63.5	152.4
3	80	88.9	114.30	51.0	86.0	76.0	51.0	159.0	121.0	229.0	152.0	127	63.5	152.4
3.1/2	90	101.6	133.35	57.0	95.0	89.0	64.0	184.0	140.0	267.0	178.0	139.7	76.2	152.4
4	100	114.3	152.0	64.0	105.0	102.0	64.0	210.0	159.0	305.0	203.0	157.16	76.2	152.4
5	125	141.3	190.0	79.0	123.0	127.0	76.0	262.0	197.0	381.0	254.0	185.74	76.2	203.2
6	150	168.3	229.0	95.0	143.0	152.0	102.0	313.0	237.0	457.0	305.0	269.88	88.9	203.2
8	200	219.1	305.0	127.0	178.0	203.0	89.0	414.0	313.0	610.0	406.0	323.85	101.6	203.2
10	250	273.1	381.0	159.0	216.0	254.0	102.0	515.0	391.0	762.0	508.0	324.0	127.0	254.0
12	300	323.8	457.0	190.0	254.0	305.0	127.0	619.0	467.0	914.0	610.0	381	152.4	254.0
14	350	355.6	533.0	222.0	279.0	356.0	152.0	711.0	533.0	1067.0	711.0	412.75	152.4	305.0
16	400	406.4	610.0	254.0	305.0	406.0	165.0	813.0	610.0	1219.0	813.0	469.9	152.4	305.0
18	450	457.2	686.0	286.0	343.0	457.0	178.0	914.0	686.0	1372.0	914.0	533.4	152.4	305.0
20	500	508.0	762.0	318.0	381.0	508.0	203.0	1016.0	762.0	1524.0	1016.0	584.2	152.4	305.0
22	550	559.0	838.0	343.0	419.0	559.0	229.0	1118.0	838.0	1676.0	1118.0	692.15	152.4	305.0
24	600	610.0	914.0	381.0	432.0	610.0	254.0	1219.0	914.0	1829.0	1219.0	692.15	152.4	305.0
26	650	660.0	991.0	405.0	495.0	660.0	267.0							
28	700	711.0	1067.0	438.0	521.0	771.0	267.0							
30	750	762.0	1143.0	470.0	559.0	762.0	267.0							
32	800	813.0	1219.0	502.0	597.0	813.0	267.0							
34	850	864.0	1295.0	533.0	635.0	864.0	267.0							
36	900	914.4	1372.0	565.0	673.0	914.0	267.0							

All Dimensions in Millimeters



### FORGED SCREWED FITTING TO ANSI B-16.11 3000/6000 LBS. THREADED TO ASA B 2.1

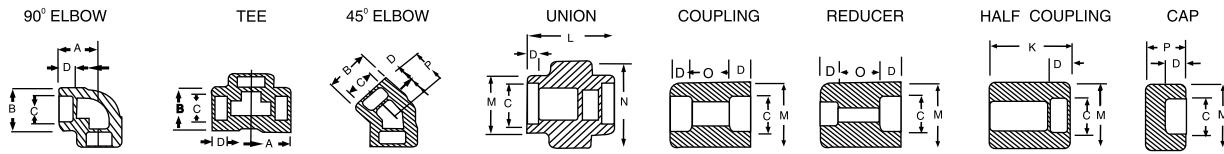


(DIMENSIONS IN MM)

NOM. BORE	PIPE O.D.	3000 LBS.					COMMON FACTORS						6000 LBS.						
		A	B	C	G	H	K	D	E	F	I	J	L	A	B	C	G	H	K
1/8"	10.3	21	22	17	32	16	19	11	10	40	-	6	-	25	25	19	32	22	-
1/4"	13.7	25	25	19	35	19	25	16	11	43	3	6	32	29	33	22	35	25	27
3/8"	17.2	29	33	22	38	22	25	17.5	13	48	4	8	38	33	38	25	38	32	27
1/2"	21.3	33	38	25	48	29	32	22	15	51	5	8	46	38	46	29	48	38	33
3/4"	26.7	38	46	29	51	35	37	27	16	57	6	10	51	44	56	33	51	44	38
1"	33.4	44	56	33	60	44	41	35	19	64	6	10	60	51	62	35	60	57	43
1 1/4"	42.2	51	62	35	67	57	44	44.5	21	70	7	14	72	60	75	43	67	64	46
1 1/2"	48.3	60	75	43	79	64	44	51	21	79	8	16	80	64	84	44	79	76	48
2"	60.3	64	84	45	86	76	48	63.5	22	88	9	17	94	83	102	52	86	92	51
2 1/2"	73.02	83	102	52	92	92	60	76	27	118	10	21	122	95	121	64	92	108	64
3"	89.0	95	121	64	108	108	65	89	29	121	10	65	140	106	146	79	108	127	68
4"	114.5	114	152	79	121	140	68	117.5	32	150	13	25	180	114	152	79	121	159	75

DIMENSIONS AND OTHERS SPECIFICATIONS AS PER CUSTOMERS REQUIREMENTS ARE AVAILABLE ON REQUEST

### SOCKET WELD FITTING TO ANSI B-16.11



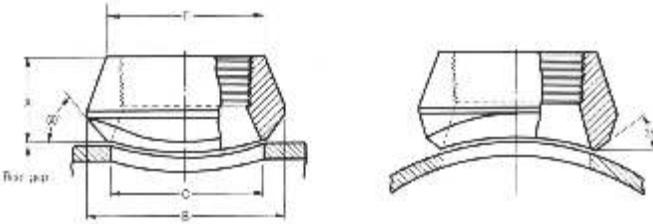
NOM. BORE	PIPE O.D.	3000 LBS.						COMMON FACTORS						6000 LBS.					
		A max.	B max.	K	J	L	M	N	P	Q	C min.	D min.	O min.	O max.	A	B	M	K	N
1/8"	10.3	22	18.5	26	16	40	17.3	32	15	10	10.7	10	5	8	22	22	20	25	46
1/4"	13.7	22	22	26	18	43	21.2	32	15	10	14.1	10	5	8	27	25	24	25	51
3/8"	17.2	25	25	26	19	48	25.4	36	16.5	10	17.6	10	3	9	27	28	28	26	60
1/2"	21.3	27	32	30	21	51	31	41	16.5	10	21.7	10	6	13	31	34	34	31	72
3/4"	26.7	34	38	36	24	57	37	50	19.5	13	27	13	6	13	37	42	41	35	80
1"	33.4	37	46	40	25	64	45.2	60	22.5	13	33.8	13	9	17	42	50	50	40	94
1 1/4"	42.2	42	56	40	29	70	55	70	22.5	13	42.6	13	9	17	47	59	58	41	100
1 1/2"	48.3	47	62	40	30	79	61.4	78	24	13	48.7	13	9	17	53	67	66	43	122
2"	60.3	56	75	52	37	89	75	95	29	13	61.2	16	15	23	59	84	83	55	
2 1/2"	73.02	60	92	52	48	114	91.3	125	32	16	73.8	16	14	24		102		56	
3"	89.00	76	110	52	51	127	108.8	140	35	16	89.8	16	14	24		121		58	
4"	114.50	88	137	58		150	136.9		42	19	115.5	19	14	24		152		64	



## FORGED STEEL OLETS FITTINGS - SOCKOLETS, WELDOLETS, THREDOLETS

### FORGED STEEL OLETS FITTINGS

SOCKOLETS  
**3000#, 6000#**



Olets Size	A		B		C	
	3000#	6000#	3000#	6000#	3000#	6000#
½	25.4	31.8	34.9	44.5	23.8	19.1
¾	27.0	36.5	44.5	50.8	30.2	25.4
1	33.3	39.7	54.0	61.9	36.5	33.3
1 ¼	33.3	41.3	65.1	69.9	44.5	38.1
1 ½	34.9	42.9	73.0	82.6	50.8	49.2
2	38.1	58.7	88.9	103.2	65.1	69.9
2 ½	46.0	-	103.2	-	76.2	-
3	50.8	-	122.2	-	93.7	-
4	57.2	-	152.4	-	120.7	-

Applicable Run Pipe Sizes are From out-Let to 36"

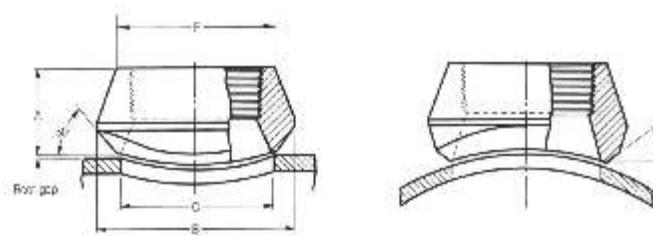
For the 3000# and 6000# Sockolets and Threolets, Inside Bore, Thread, Socket Bore and Socket depth Dimensions are According to ANSI B16.11

Pipe Schedule Numbers and Weight Designation are in Accordance With ANSI B36.10

When Ordering Sockolets and Threolets, Include The Quantity, Run and Olet Size, Item And Rating(or Schedule Number)and Material

### THREDOLETS

**3000#, 6000#**



Olets Size	A		B		C	
	3000#	6000#	3000#	6000#	3000#	6000#
½	25.4	31.8	34.9	44.5	23.8	19.1
¾	27.0	36.5	44.5	50.8	30.2	25.4
1	33.3	39.7	54.0	61.9	36.5	33.3
1 ¼	33.3	41.3	65.1	69.9	44.5	38.1
1 ½	34.9	42.9	73.0	82.6	50.8	49.2
2	38.1	52.4	88.9	103.2	65.1	69.9
2 ½	46.0	-	103.2	-	76.2	-
3	50.8	-	122.2	-	93.7	-
4	57.2	-	152.4	-	120.7	-

Applicable Run Pipe Sizes are From Olet to 36"

For the 3000# and 6000# Sockolets and Threolets, Inside Bore, Thread, Socket Bore and Socket depth Dimensions are According to ANSI B16.11

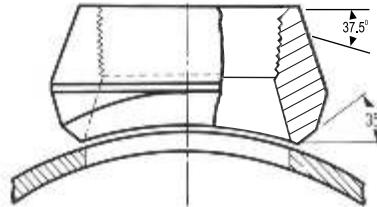
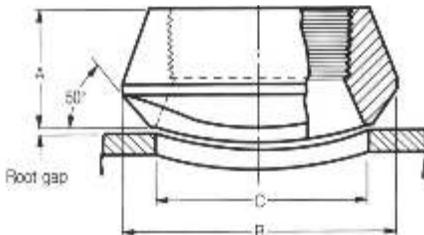
Pipe Schedule Numbers and Weight Designation are in Accordance With ANSI B36.10

When Ordering Sockolets and Threolets, Include The Quantity, Run and Olet Size, Item And Rating(or Schedule Number)and Material



## FORGED STEEL OLETS FITTINGS - SOCKOLETS, WELDOLETS, THREDOLETS

### FORGED STEEL OLET FITTINGS WELDOLETS - STD (SCH. 40), XS (SCH 80)



**3000#, 6000#**

Olet Size	A		B		C	
	STD	XS	STD	XS	STD	XS
1/2	19.1	19.1	34.9	34.9	23.8	23.8
3/4	22.2	22.2	44.5	44.5	30.2	30.2
1	27.0	27.0	54.0	54.0	36.5	36.5
1 1/4	31.8	31.8	65.1	65.1	44.5	44.5
1 1/2	41.3	41.3	73.0	73.0	50.8	50.8
2	38.1	38.1	88.9	88.9	65.1	65.1
2 1/2	41.3	41.3	103.2	103.2	76.2	76.2
3	44.5	44.5	122.2	122.2	93.7	93.7
4	50.8	50.8	152.4	152.4	120.7	120.7
5	57.2	57.2	179.4	179.4	141.3	141.3
6	60.3	77.8	215.9	225.4	169.9	169.9
8	69.9	98.5	263.5	292.1	220.7	220.7
10	77.8	93.7	322.3	323.9	274.7	265.1
12	85.7	103.2	377.8	379.4	325.4	317.5
14	88.9	100.0	409.6	431.8	357.2	350.8
16	93.7	106.4	463.6	466.7	408.0	403.2
18	96.8	111.1	520.7	523.9	458.8	455.8
20	101.6	119.1	571.5	582.6	508.0	509.6
24	115.9	139.7	689.0	708.0	614.4	638.2
26	119.1	146.1	736.2	765.2	666.8	692.2

Applicable Run Pipe Sizes Are From Olet to 36"

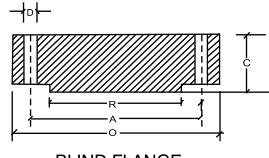
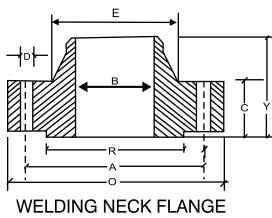
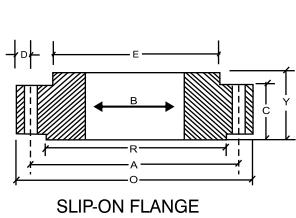
For the 3000# and 6000# Sockolets and Thredolets, Inside Bore, Thread, Socket Bore and Socket depth Dimensions are According to ANSI B16.11

Pipe Schedule Numbers and Weight Designation are in Accordance With ANSI B36.10

When Ordering Sockolets and Thredolets, Include The Quantity, Run and Olet Size, Item And Rating(or Schedule Number) and Material



### DIMENSIONS OF FORGED FLANGES ANSI B 16.5



### ASA 150 CLASS

Nominal Pipe Size (MM) (INCH.)	Flange Dia O	Dia of Bolt Circle A	Dia of Bolt Holes D	No. of Holes	Thk of Flange C	Dia of Hub E	Length through Hub			Dia of Bore			Dia of R/F R	Depth of Socket F	Pipe Dia X
							S/O & S/W Y	W/N Y	L/J Y	S/O & S/W B	W/N B	L/J B			
15 1/2	88.9	60.3	15.9	4	11.1	30.2	15.9	47.6	15.9	22.3	22.9	34.9	9.5	21.33	
20 3/4	98.4	69.8	15.9	4	12.7	38.1	15.9	52.4	15.9	27.7	28.2	42.9	11.1	26.67	
25 1	107.9	79.4	15.9	4	14.3	49.2	17.5	55.6	17.5	34.5	35.0	50.8	12.7	33.40	
32 1 1/4	117.5	88.9	15.9	4	15.9	58.7	20.6	57.1	20.6	43.2	43.7	63.5	14.3	42.16	
40 1 1/2	127.0	98.4	15.9	4	17.5	65.1	22.2	61.9	22.2	49.5	50.0	73.0	15.9	48.26	
50 2	152.4	120.6	19.0	4	19.0	77.8	25.4	63.5	25.4	62.0	62.5	92.1	17.5	60.31	
65 2 1/2	177.8	139.7	19.0	4	22.2	90.5	28.6	69.8	28.6	74.7	75.4	104.8	19.0	73.02	
80 3	190.5	152.4	19.0	4	23.8	107.9	30.2	69.8	30.2	90.7	91.4	127.0	20.6	88.90	
100 4	228.6	190.5	19.0	8	23.8	134.9	33.3	76.2	33.3	116.1	116.8	157.2	23.8	114.30	
125 5	254.0	215.9	22.2	8	23.8	163.5	36.5	88.9	36.5	143.8	144.5	185.7	23.8	141.30	
150 6	279.4	241.3	22.2	8	25.4	192.1	39.7	88.9	39.7	170.7	171.4	215.9	27.0	168.27	
200 8	342.9	298.4	22.2	8	28.6	246.1	44.4	101.6	44.4	221.5	222.2	269.9	31.7	219.07	
250 10	406.4	361.9	25.4	12	30.2	304.8	49.2	101.6	49.2	276.3	277.4	323.8	33.3	273.05	
300 12	482.6	431.8	25.4	12	31.8	365.1	55.6	114.3	55.6	327.1	328.2	381.0	39.7	323.85	
350 14	533.4	476.2	28.6	12	34.9	400.0	57.1	127.0	79.4	359.1	360.2	412.7	41.3	355.60	
400 16	596.9	539.7	28.6	16	36.5	457.2	63.5	127.0	87.3	410.5	411.2	469.9	44.4	406.40	
450 18	635.0	577.8	31.7	16	39.7	504.8	68.3	139.7	96.8	461.8	462.3	533.4	49.2	457.20	
500 20	698.5	635.0	31.7	20	42.9	558.8	73.0	144.5	103.2	513.1	514.3	584.2	54.0	508.00	
600 24	812.8	749.3	34.9	20	47.6	663.6	82.5	152.4	111.1	615.9	615.9	692.1	63.5	609.60	

All Dimensions are in Millimeters • Flanges except Lap Joint will be furnished with (1.6mm) Raised Face, which is included in Thickness(C) and Length through Hub(Y).

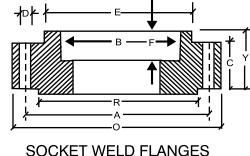
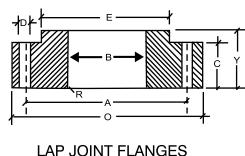
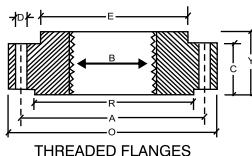
### ASA 300 CLASS

Nominal Pipe Size (MM) (INCH.)	Flange Dia O	Dia of Bolt Circle A	Dia of Bolt Holes D	No. of Holes	Thk of Flange C	Dia of Hub E	Length through Hub			Dia of Bore			Dia of R/F R	Depth of Socket F	Pipe Dia X
							S/O & S/W Y	W/N Y	L/J Y	S/O & S/W B	W/N B	L/J B			
15 1/2	95.2	66.7	15.9	4	14.3	38.1	22.2	52.4	22.2	22.3	22.9	34.9	9.5	21.33	
20 3/4	117.5	82.5	19.0	4	15.9	47.6	25.4	57.1	25.4	27.7	28.2	42.9	11.1	26.67	
25 1	123.8	88.9	19.0	4	17.5	54.0	27.0	61.9	27.0	34.5	35.0	50.8	12.7	33.40	
32 1 1/4	133.3	98.4	19.0	4	19.0	63.5	27.0	65.1	27.0	43.2	43.7	63.5	14.3	42.16	
40 1 1/2	155.6	114.3	22.2	4	20.6	69.8	30.2	68.3	30.2	49.5	50.0	73.0	15.9	48.26	
50 2	165.1	127.0	19.0	8	22.2	84.1	33.3	69.8	33.3	62.0	62.5	92.1	17.5	60.31	
65 2 1/2	190.5	149.2	22.2	8	25.4	100.0	38.1	76.2	38.1	74.7	75.4	104.8	19.0	73.02	
80 3	209.5	168.3	22.2	8	28.6	117.5	42.9	79.4	42.9	90.7	91.4	127.0	20.6	88.90	
100 4	254.0	200.0	22.2	8	31.8	146.0	47.6	85.7	47.6	116.1	116.8	157.2	23.8	114.30	
125 5	279.4	234.9	22.2	8	34.9	177.8	50.8	98.4	50.8	143.8	144.5	185.7	-	141.30	
150 6	317.5	269.9	22.2	12	36.5	206.4	52.4	98.4	52.4	170.7	171.4	215.9	-	168.27	
200 8	381.0	330.2	25.4	12	41.3	260.3	61.9	111.1	61.9	221.5	222.2	269.9	-	219.07	
250 10	444.5	387.3	28.6	16	47.6	320.7	66.7	117.5	95.2	276.3	277.4	323.8	-	273.05	
300 12	520.7	450.8	31.7	16	50.8	374.6	73.0	130.2	101.6	327.1	328.2	381.0	-	323.85	
350 14	584.2	514.3	31.7	20	54.0	425.4	76.2	142.9	111.1	359.1	360.2	412.7	-	355.60	
400 16	647.7	571.5	34.9	20	57.2	482.6	82.5	146.0	120.6	410.5	411.2	469.9	-	406.40	
450 18	711.2	628.5	34.9	24	60.3	533.4	88.9	158.7	130.2	461.8	462.3	533.4	-	457.20	
500 20	774.7	685.8	34.9	24	63.5	587.4	95.2	161.9	139.7	513.1	514.3	584.2	-	508.00	
600 24	914.4	812.8	41.3	24	69.8	701.7	106.4	168.3	152.4	615.9	615.9	692.1	-	609.60	

All Dimensions are in Millimeters • Flanges except Lap Joint will be furnished with(6.35mm) Raised Face, which is not included in Thickness(C) and Length through Hub(Y).



### DIMENSIONS OF FORGED FLANGES ANSI B 16.5



### ASA 600 CLASS

Nominal Pipe Size (MM)	Flange Dia O	Dia of Bolt Circle A	Dia of Bolt Holes D	No. of Holes	Thk of Flange C	Dia of Hub E	Length through Hub			Dia of Bore		Dia of R/F R	Depth of Socket F	Pipe Dia X
							S/O & S/W Y	W/N Y	L/J Y	S/O & S/W B	L/J B			
15	95.2	66.7	15.9	4	14.3	38.1	22.2	52.4	22.3	22.3	22.8	34.9	9.5	21.33
20	117.5	82.5	19.0	4	15.9	47.6	25.4	57.1	25.4	27.7	28.1	42.9	11.1	26.67
25	123.8	88.9	19.0	4	17.5	54.0	27.0	61.9	26.9	34.5	35.0	50.8	12.7	33.40
32	133.3	98.4	19.0	4	20.6	63.5	28.6	66.7	28.4	43.2	43.6	63.5	14.2	42.16
40	155.6	114.3	22.2	4	22.2	69.8	31.7	69.8	31.7	49.5	50.0	73.0	15.8	48.26
50	165.1	127.0	19.0	8	25.4	84.1	36.5	73.0	36.5	62.0	62.4	92.1	17.4	60.31
65	190.5	149.2	22.2	8	28.6	100.0	41.3	79.4	41.1	74.7	75.4	104.8	19.0	73.02
80	209.5	168.3	22.2	8	31.8	117.5	46.0	82.5	45.9	90.7	91.4	127.0	-	88.90
100	273.0	215.9	25.4	8	38.1	152.4	54.0	101.6	53.8	116.1	116.8	157.2	-	114.30
125	330.2	266.7	28.6	8	44.4	188.9	60.3	114.3	60.4	143.8	144.5	185.7	-	141.30
150	355.6	292.1	28.6	12	47.6	222.2	66.7	117.5	66.5	170.7	171.4	215.9	-	168.27
200	419.1	349.2	31.7	12	55.6	273.0	76.2	133.3	76.2	221.5	222.2	269.9	-	219.07
250	508.0	431.8	34.9	16	63.5	342.9	85.7	152.4	111.2	276.3	277.4	323.8	-	273.05
300	558.8	488.9	34.9	20	66.7	400.0	92.1	155.6	117.3	327.1	328.2	381.0	-	323.85
350	603.2	527.0	38.1	20	69.9	431.8	93.7	165.1	127.0	359.1	360.1	412.7	-	355.60
400	685.8	603.2	41.3	20	76.2	495.3	106.4	177.8	139.7	410.5	411.2	469.9	-	406.40
450	742.9	654.0	44.4	20	82.6	546.1	117.5	184.1	152.4	461.8	462.3	533.4	-	457.20
500	812.8	723.9	44.4	24	88.9	609.9	127.0	190.5	165.1	513.1	514.3	584.2	-	508.00
600	939.8	838.2	50.8	24	101.6	717.5	139.7	203.2	184.1	615.9	615.9	692.1	-	609.60

All Dimensions are in Millimeters • Flanges except Lap Joint will be furnished with(6.35mm) Raised Face, which is not included in Thickness(C) and Length through Hub(Y).

### ASA 900 CLASS

Nominal Pipe Size (MM)	Flange Dia O	Dia of Bolt Circle A	Dia of Bolt Holes D	No. of Holes	Thk of Flange C	Dia of Hub E	Length through Hub			Dia of Bore		Dia of R/F R	Depth of Socket F	Pipe Dia X
							S/O & S/W Y	W/N Y	L/J Y	S/O & S/W B	L/J B			
15	120.6	82.5	22.2	4	22.2	38.1	31.7	60.3	31.7	22.3	22.8	34.9	9.5	21.33
20	130.2	88.9	22.2	4	25.4	44.4	34.9	69.8	35.0	27.7	28.1	42.9	11.1	26.67
25	149.2	101.6	25.4	4	28.6	52.4	41.3	73.0	41.1	34.5	35.0	50.8	12.7	33.40
32	158.7	111.1	25.4	4	28.6	63.5	41.3	73.0	41.1	43.2	43.6	63.5	14.2	42.16
40	177.8	123.8	28.6	4	31.8	69.8	44.4	82.5	44.4	49.5	50.0	73.0	15.8	48.26
50	215.9	165.1	25.4	8	38.1	104.8	57.1	101.6	57.1	62.0	62.4	92.1	17.4	60.31
65	244.5	190.5	28.6	8	41.3	123.8	63.5	104.8	63.5	74.7	75.4	104.8	19.0	73.02
80	241.3	190.5	25.4	8	38.1	127.0	53.9	101.6	53.8	90.7	91.4	127.0	-	88.90
100	292.1	234.9	31.7	8	44.4	158.7	69.8	114.3	69.8	116.0	116.8	157.2	-	114.30
125	349.2	279.4	35.0	8	50.8	190.5	79.3	127.0	79.2	143.7	144.5	185.7	-	141.30
150	381.0	317.5	31.7	12	55.6	234.9	85.8	139.7	85.8	170.6	171.4	215.9	-	168.27
200	469.9	393.7	38.1	12	63.5	298.4	101.6	162.0	114.3	221.4	222.2	269.9	-	219.07
250	546.1	469.9	38.1	16	69.8	368.3	107.9	184.1	127.0	276.3	277.3	323.8	-	273.05
300	609.6	533.4	38.1	20	79.3	419.1	117.4	200.0	142.7	327.1	328.1	381.0	-	323.85

All Dimensions are in Millimeters • Flanges except Lap Joint will be furnished with(6.35mm) Raised Face, which is not included in Thickness(C) and Length through Hub(Y).



## CHEMICAL COMPOSITION OF STAINLESS STEEL

Stainless Steel is essentially a low carbon steel which contains chromium at 10% or more by weight. It is this addition of chromium that gives the steel its unique stainless corrosion resisting Properties. The corrosion resistance and other useful properties of the steel are enhanced by increased chromium content and the addition of other elements such as molybdenum, nickel and nitrogen.

Chemical Composition of Stainless Steel										Nearest Equivalent Specification	
AISI Grade	C Max	Mn Max	P Max	S Max	Si Max	Cr	Ni	Mo	Other Element	I.S.	En'
<b>Austentic</b>											
201	0.15	5.5/7.5	0.06	0.03	1	16.0/18.0	3.5/5.5	-	-	-	-
202	0.15	7.5/10	0.06	0.03	1	17.0/19.0	4.0/6.0	-	-	-	-
301	0.15	2.0max	0.045	0.040	1.0	16.0/18.0	6.0/8.0	-	-	10Cr17Ni7	-
302	0.15	2.0	0.045	0.030	1.0	17.0/19.0	8.0/10.0	-	E-4-3-4%	07Cr18Ni9	En-58A
302HQ	0.03	2.0	0.045	0.03	1	17.0/19.0	9.0/10.0	-	CU:3-4.0	-	-
303	0.15	2.0	0.045	0.15 min	1.0	17.0/19.0	8.0/10.0	-	E-4-1%Max	15Cr18Ni9	En-58M
303EHS	0.15	2.0	0.02	0.3-0.33	1	17.0/19.0	8.0/10.0	-	CU:1%Max	-	-
304	0.08	2.0	0.045	0.030	1.0	18.0/20.0	8.0/10.0	-	-	04Cr18Ni10	En-58E
304L	0.030	2.0	0.045	0.030	1.0	18.0/20.0	8.0/12.0	-	-	02Cr18Ni11	-
304H	0.05	2.0	0.045	0.03	1	18.0/20.0	8.5/9.5	-	CU:-2-2.50	-	-
308	0.08	2.0	0.040	0.030	1.0	18.0/21.0	10.0/12.0	-	-	-	-
308LER	0.02	1.5/2.0	0.025	0.02	0.5	19.0/21.0	9.5/11.0	-	-	-	-
309	0.20	2.0max	0.045	0.030	1.0	22.0/24.0	12.0/15.0	-	-	20Cr24Ni12	-
309LER	0.03	1.5/2.5	0.02	0.015	0.5	23.0/25.0	12.0/14.0	-	-	-	-
309S	0.08	2.0	0.045	0.030	1.0	22.0/24.0	12.0/15.0	-	-	-	-
310	0.25	2.0	0.045	0.030	1.50	24.0/26.0	19.0/22.0	-	-	10Cr25Ni12	-
310S	0.08	2.0	0.045	0.030	1.50	24.0/26.0	19.0/22.0	-	-	-	-
314	0.25	2.0	0.040	0.030	1.5 / 3	25.0/26.0	19.0/22.0	-	-	-	-
316	0.08	2.0	0.045	0.030	1.0	16.0/18.0	10.0/14.0	2.0/3.0	-	04Cr17Ni12Mo2	En 58H
316L	0.030	2.0	0.045	0.030	1.0	16.0/18.0	10.0/14.0	2.0/3.0	-	03Cr17Ni12Mo2	-
316 LER	0.02	1.5/2.0	0.02	0.02	0.5	18.0/20.0	12.0/14.0	2.0/2.75	-	-	-
316Ti	0.080	2.0	0.045	0.030	1.0	16.0/18.0	10.0/14.0	2.0/3.0	Ti5xCmin	-	-
317	0.08	2.0	0.045	0.030	1.0	18.0/20.0	11.0/15.0	3.0/4.0	-	-	-
317L	0.030	2.0	0.045	0.030	1.0	18.0/20.0	11.0/15.0	3.0/4.0	N:0.10/0.22	-	-
317LN	0.03	2.0	0.045	0.03	1	18.0/20.0	11.0/15.0	3.0/4.0	N:0.10/0.22	-	-
321	0.08	2.0	0.045	0.030	1.0	17.0/19.0	9.0/12.0	-	Ti5xCmin	04Cr18Ni10Ti20	En-58C
347	0.08	2.0	0.045	0.030	1.0	17.0/19.0	9.0/12.0	-	Nb/Ta10xCmin	04Cr18Ni10Nb-40	En-58G
904L	0.02	2.0	0.045	0.035	1	19.0/23.0	23.0/28.0	4.0-5.0	CU :1-2	-	-
<b>Ferritic</b>											
410	0.15	1.00	0.04	0.03	1.0	11.50/13.5	0.60	-	-	12Cr13	En-56A
416	0.15	1.25	0.06	0.15min	1.0	12.0/14.0	1.25/2.50	-	-	-	-
420	0.15min	1.0	0.04	0.03	1.0	12.0/14.0	0.06	-	-	-	En-56C&D
430	0.12	1.0	0.04	0.03	1.0	16.0/18.0	0.06	-	-	07Cr17	En-60
430L	0.03	1.0	0.04	0.03	1.0	16.0/18.0	0.06	-	-	-	-
430F	0.12	1.25	0.06	0.15min	1.0	16.0/18.0	0.60	-	-	-	-
431	0.2	1.0	0.04	0.03	1.0	15.0/17.0	1.25/2.5	-	-	-	En-57
174-PH	0.07	1.0	0.04	0.03	1.0	15.0/17.0	3.0/5.0	-	NB :0.15/0.45	-	-
<b>Duplex</b>											
1905	0.03	1.2/1.8	0.04	0.03	1.2/2	18.0/19.0	4.3/5.2	2.5/3	N:0.5/0.10	-	-
2205	0.03	2	0.03	0.02	1.0	21.0/23.0	4.5/6.5	2.5/3.5	N:0.8/0.20	-	-
2506	0.08	1.0	0.04	0.03	0.75	26.0/28.0	4/5	1.3/2	-	-	-



### STAINLESS STEEL PIPE DIMENSION AS PER ASTM AND WEIGHT-KG. PER MTR. (ANSI B 36.19-1965)

Nominal Bore		Outside Diameter	Schedule 5S		Schedule 10S		Schedule 40S		Schedule 80S		Schedule 160S		Schedule XXS	
mm	INCH	mm	Wt mm	Weight (Kg/mt)	Wt mm	Weight (Kg/mt)	Wt mm	Weight (Kg/mt)	Wt mm	Weight (Kg/mt)	Wt mm	Weight (Kg/mt)	Wt mm	Weight (Kg/mt)
3	1/8	10.3	1.24	0.276	1.24	0.28	1.73	0.37	2.41	0.47	-	-	-	-
6	1/4	13.7	1.24	0.390	1.65	0.49	2.24	0.631	3.02	0.80	-	-	-	-
10	3/8	17.1	1.24	0.490	1.65	0.63	2.31	0.845	3.20	1.10	-	-	-	-
15	1/2	21.3	1.65	0.800	2.11	1.00	2.77	1.27	3.75	1.62	4.75	1.94	7.47	2.55
20	3/4	26.7	1.65	1.03	2.11	1.28	2.87	1.68	3.91	2.20	5.54	2.89	7.82	3.63
25	1	33.4	1.65	1.30	2.77	2.09	3.38	2.50	4.55	3.24	6.35	4.24	9.09	5.45
32	1.1/4	42.2	1.65	1.65	2.77	2.70	3.56	3.38	4.85	4.47	6.35	5.61	9.70	7.77
40	1.1/2	48.3	1.65	1.91	2.77	3.11	3.68	4.05	5.08	5.41	7.14	7.25	10.16	9.54
50	2	60.3	1.65	2.40	2.77	3.93	3.91	5.44	5.54	7.48	8.74	11.1	11.07	13.44
65	2.1/2	73.0	2.11	3.69	3.05	5.26	5.16	8.63	7.01	11.4	9.53	14.9	14.2	20.39
80	3	88.9	2.11	4.51	3.05	6.45	5.49	11.30	7.62	15.2	11.1	21.3	15.24	27.65
100	4	114.3	2.11	5.84	3.05	8.36	6.02	16.07	8.56	22.3	13.49	33.54	17.12	41.03
125	5	141.3	2.77	9.47	3.40	11.57	6.55	21.8	9.53	31.97	15.88	49.11	19.05	57.43
150	6	168.3	2.77	11.32	3.40	13.84	7.11	28.3	10.97	42.7	18.2	67.56	21.95	79.22
200	8	219.1	2.77	14.79	3.76	19.96	8.18	42.6	12.7	64.6	23.0	111.2	22.23	107.8
250	10	273.1	3.40	22.63	4.19	27.78	9.27	60.5	12.7	96.0	28.6	172.4	25.40	155.15
300	12	323.9	3.96	31.25	4.57	36.00	9.52	73.88	12.7	132.0	33.32	238.76	25.40	186.97
350	14	355.6	3.96	34.36	4.78	41.3	11.13	94.59	19.05	158.08	35.71	281.70	-	-
400	16	406.4	4.19	41.56	4.78	47.29	12.7	123.30	21.41	203.33	40.46	365.11	-	-
450	18	457.2	4.19	46.80	4.78	53.42	14.27	155.80	23.8	254.36	45.71	466.40	-	-
500	20	508.0	4.78	59.25	5.54	68.71	15.09	183.42	26.19	311.2	49.99	564.68	-	-
600	24	609.6	5.54	82.47	6.35	94.45	17.48	255.41	30.96	442.08	59.54	808.22	-	-
650	26	660.4			7.92	129.40	9.53	155.32	12.70	205.97	-	-	-	-
700	28	711.2			7.92	139.47	9.53	167.44	12.70	222.13	-	-	-	-
750	30	762.0	6.35	120.15	7.92	149.55	9.53	179.56	12.70	238.28	-	-	-	-
800	32	812.8	-	-	7.92	159.62	9.53	191.69	12.70	254.44	-	-	-	-
850	34	863.6	-	-	7.92	169.64	9.53	203.74	12.70	270.50	-	-	-	=
900	36	914.4	-	-	7.92	179.77	9.53	215.93	12.70	286.75	-	-	-	-



## SHEETS/PLATES PRODUCT CHARACTERISTICS & APPLICATIONS

Series	Grades	Characteristics	Applications
Austenitic Series	Basic	304	Widely used, corrosion resistant, heat resistant, good mechanical properties in low temperature, no heat treatment hardening, weak magnetism.
		304L	Better intergranular corrosion resistance, can be heat treated after welding.
	High Tensile Strength	301	Low content of Cr and N than 304 grade, It's strength, hardness and magnetism can be increased by cold working.
		301L*	Improving, intergranular corrosion resistance by decreasing content and increasing N content from 301 grade.
	Deep Drawing	304Cu	Better formability than 304 grade by addition of cu, suitable for deep drawing.
		304Ni8.5	Better formability than 304 grade by increasing Ni content, suitable for deep drawing.
		304Ni9	Better formability than 304 grade by increasing Ni content, suitable for deep drawing.
	High Corrosion Resistance	316*	Better formability than 304 grade in sea water and other corrosive solutions, higher heat-resistance, good cold work hardening and performance, no magnetism.
		316L	Compare with SUS316, has better intergranular corrosion resistance and water heat-resistance, no magnetism.
		321	Intergranular corrosion resistance, heat resistant, heat resistant, good formability and weldability, anti-oxidizing in high temperature.
Ferretic Series	Basic	430	Typical ferritic, stainless steel grade, low thermal extensibility, good formability and antioxygenic property.
	Weldable and Corrosion Resistant	409L	good formability and weldability, antioxygenic property in high temperature.
		436L*	good corrosion resistance, formability and weldability, corrosion resistant to condensates in exhaust piping of automobiles.
		444*	good corrosion resistance, formability and weldability, compare with 316L, has better stress corrosion resistance and spot corrosion resistance.
Martensite Series	Basic	420J2*	Knife, pipe nozzles, valves, metal rules and cooking utensils.



## STAINLESS STEEL BRIGHT BARS

We, within a short span has become a major source for Stainless Steel Rolled / Forged / Peeled Rounds, Rcs, Blooms & Billets. We have huge stocks for our quality products which are supplied on time at lowest possible rates meeting most of our customer's requirement.

### Product Range

Condition	Pealed, Centreless & Polished	Pealed & Polished	Pealed (Rough Turned)	Forged, Rough Turned
Grades	201, 202, 301, 303, 304, 304L, 310, 316, 316L, 321, 410, 416, 416, 420, 430, 431, 430F & others		304, 304L, 316L, 410, 416 420, 430	303, 304, 304L, 316, 316L, 410, 416, 420, 431
Diameter (Size)	20mm to 85mm (3/4" to 3-1/4")	85mm to 140mm (3-1/4" to 5 - 1/2")	25mm to 140mm (1" to 5-1/2")	150mm to 400mm (6" to 16")
Diameter /+3mm Tolerance	h9 (Din 671) (ASTM A484)	h 11	K 12/K 13 (Din 1013)	-0mm to (-0"+0.12")
Length	3/4/5, 6/6 meter (12/14ft/20 feet)	3/4/5, 6/6 meter (12/14ft/20 feet)	3/4/5, 6/6 meter 10 feet, 16 feet	3 meter - 5 meter
Length Tolerance	-0/+200mm of +100mm to +50mm (-0"/+1 feet or +4" or 2")	-0/+200mm or +100mm or +50mm (-0"/+1 feet or +4" or 2")	-0/+100mm or 500mm (-0"/+3 feet or +2 feet)	-0/+2 meter (-0/+6 feet)

### ASTM A182 Alloy Steel Round Bar Chemical & Physical Properties

ASTM Grade	C	Mn	Si	S	P	Cr	Ni	Mo	Other	Tensile Psi (MPa)	Yield Psi(Mpa)	Elongation Strip/Round	Hardn.	Redu. in Area. (%)
182 F11 Class 2	0.10 0.20	0.30 0.80	0.50 1.0	0.04 max	0.04 max	1.0 1.50	-	0.04 0.65	-	70000 (485)	40000 (275)	20	143-207	30
A 182 F22 Class	0.05 0.15	0.30 0.60	0.50 max	0.04 max	0.04 max	2.0 2.50	-	0.87 1.13	-	75000 (515)	45000 (310)	20	156-207	30
A 182 F5	0.15 max	0.30 0.06	0.50 max	0.03 max	0.03 max	4.0 6.0	0.5 max	0.44 0.65	-	70000 (485)	40000 (275)	20	143-217	35
A 182 F9	0.15 max	0.30 0.60	0.50 1.00	0.03 max	0.03 max	8.0 10.0	-	0.90 1.10	-	85 (585)	55 (380)	20	179-217 (BHN)	40

### Stainless Steel Bright Bars (Cold Drawn)

Condition	Cold Drawn and Polished	Cold Drawn, Center less Ground & Polished	Cold Drawn, Center less Ground and Polished (Strain Hardened)
Grades	201, 202, 303, 304, 304L, 310, 316, 316L, 321, 410, 420, 416, 430, 431, 430F, & others		304, 304L, 316, 316L
Diameter (Size)	2mm to 5mm (1/8" to 3/16")	6mm to 22mm (1/4" to 7/8")	10mm to 40mm (3/8" to 1-1/2")
Diameter Tolerance	h9 (Din 671), h11 ASTM A 484	h9 (Din 671) ASTM A 484	h9 (Din 671), h11 ASTM A 484
Length	3/4/5, 6/6 meter (12/14ft/20 feet)	3/4/5, 6/6 meter (12/14ft/20 feet)	3/4/5, 6/6 meter (12/14ft/20 feet)
Length Tolerance	-0/+200mm of +100mm or+50mm (-0"/+1 feet or+ 4" or 2")	-0/+200mm or +100mm or +50mm (-0"/+1 feet or+4" or2")	-0/+200mm (-0"/+1 feet)



### Stainless Steel Hexagon & Square Bars

Type	Cold Drawn and Polished(Squares)	Cold Drawn and Polished (Hexagons)
Grades	304, 304L, 316, 316L	304, 304L, 316, 316L
Diameter	5mm to 40mm (1/4" to 1-1/2")	10mm to 40mm (3/8" to 1-1/2")
Diameter	h 11	h 11
Tolerance	(ASTM A 484)	(ASTM A 484)
Length	3/4/6 meter (12/14ft/20feet)	3/4/6 meter (12/14ft/20 feet)
Length Tolerance	-0/+500mm (-0"/+2 feet)	-0/+500mm or+100mm or +50mm (-0"/+2feet)

### Stainless Steel Cold Heading Wires

Condition	Cold drawn, Annealed and Pickled
Diameter	1.6 mm to 17 mm (1/16" to 11/16")
Tensile Strength	65kg / mm <sup>2</sup> max
Packing	HDPE wrapped coils of 300 kg to 500 kg
Grades	202, 304, 304L, 316, 316L, 304HC, 302HQ

