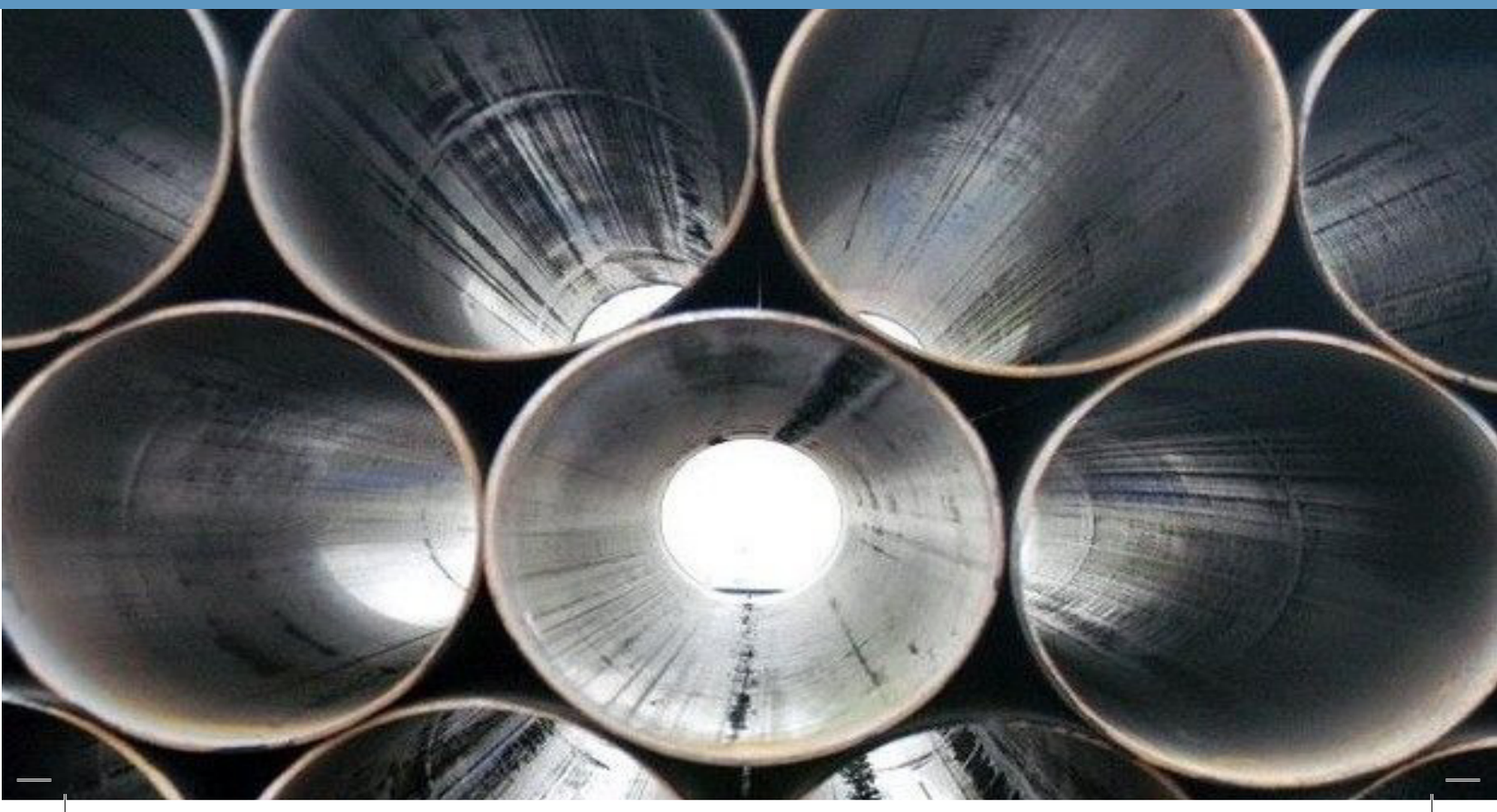
PRODUCT CATALOGUE

PROCESS PIPE



ABOUT US

Process Pipe has established a national footprint as a wholesaler of carbon and mild steel pipes, fittings and flanges in South Africa, with branches in Gauteng, Durban and Cape. Moreover, as Process Pipe prioritises distribution and high-quality customer service, the company has distributors in Namibia, Mozambique, Polokwane and Nelspruit and owns its own distribution fleet.

Process Pipe's products include carbon steel seamless pipes to specification A106 Grade B and A 53, welded SANS 62 and SANS 719 black PEUC and galvanised pipe; Japanese Industrial Standard (JIS) buttweld fittings and carbon steel seamless buttweld fittings to specification A 234 WPB; plate flanges to SANS 1123, BS 4504, BSEN 1092 and BS 10 and forged flanges to ANSI B16.5, malleable iron fittings and Recomb clamp-on grooved fittings. Process Pipe is also an official distributor of the Arcelor Mittal Seamless Steel pipe range for the petrochemicals sector.

Established in 1969, Process Pipe is ISO 9001-qualified and has a staff complement of 85. The company's sales personal are all knowledgeable, enthusiastic and helpful, and are happy to assist companies with any pipes- and fittings-related enquiries. Further, Process Pipe has made substantial investments over the years to ensure that it stocks the correct materials for a variety of applications and caters to various market segments such as but not limited to:

- Petrochemical,
- Air Conditioning / Gas, Fire Protection, Construction,
- Water, Drilling, Mining,
- General Engineering / Fabrication Agricultural Segments and Allied Industries.

Due to the efficient stock holding, product expertise and resources, Process Pipe Company is able to execute any order timeously in Southern Africa.

CONTACT DETAILS

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PIPE

S.A.N.S 62

Dimensions (in millimetres)				Masses (kilograms/metre)	
Nominal Bore	Approx. O.D.	Nominal Wall Thickness		Coated Tubes- Scrd & Socketed	
		Medium	Heavy	Medium	Heavy
6 8 10	10.2 13.5 17.2	2.00 2.35 2.35	2.65 2.90 2.90	0.410 0.654 0.858	0.496 0.773 1.03
15 20 25	21.3 26.9 33.7	2.30 2.30 2.80	2.80 2.80 3.50	1.10 1.42 2.19	1.30 1.69 2.67
32 40 50	42.4 48.3 60.3	2.80 2.80 3.30	3.50 3.50 4.00	2.80 3.19 4.57	3.43 3.92 5.49
65 80 100	76.1 88.9 114.3	3.30 3.50 3.90	4.00 4.30 4.80	5.85 7.49 10.82	7.04 8.89 12.91
125 150	139.7 165.1	4.30 4.30	4.80 4.80	14.31 17.11	15.92 19.04

Standard Lengths: Medium 6.0m
Heavy 6.0m

Notes: 1. For approximate masses of GALVANISED tubes add the following percentages to masses indicated above:
(a) Medium Tube + 5 and 3/4%
(b) Heavy Tube + 5%
2. S.A.N.S. 62 is equivalent to B.S.1387

RECOMMENDED WORKING PRESSURES

Pipes tested to 4800 kPa - hydraulic

Pipe size	Max. Working pressure in kPa/Maks Taper/parallel joint		Steam, air and gas service (260°C max.)	
	Water Service Ambient temp.			
mm	Medium	Heavy	Medium	Heavy
6	2100	2400	1050	1050
8	2100	2400	1050	1050
10	2100	2400	1050	1050
15	2100	2400	1050	1050
20	2100	2400	1050	1050
25	2100	2400	1050	1050
32	1700	2100	900	900
40	1700	2100	900	900
50	1400	1700	-	-
65	1400	1700	-	-
80	1400	1700	-	-
100	1050	1400	-	-
125	1050	1400	-	-
150	850	1050	-	-

NB: These pipes can be used for higher pressures than those above, or for special working conditions with suitable types of joint. The efficiensy of taper/parallel screwed joints is highly dependent on the degree of care taken in assembly and jointing compound used. Reference to steam service applies to saturated steam only.

PIPE

S.A.N.S 719

Mass Mass of Steel Pipe in kilograms per metre

Dimensions		Wall Thickness in Millimeters					
Nominal Diameter mm	Outside Diameter mm	4.5	5.0	6.0	8.0	10.0	12.0
200 250 300	219.1 273.0 323.9	24.9 31.2 37.1	27.7 34.6 41.3	33.1 41.4 49.3	43.6 54.7 65.2	54.2 68.0 81.3	64.6 81.5 97.5
350 400 500	355.6 406.4 508.0	40.7 46.6 58.5	45.4 52.0 65.1	54.2 62.1 78.0	71.7 82.2 103.0	89.5 103.0 129.0	108.0 123.0 155.0
600 700 800	609.6 711.2 812.8	70.2 82.0	78.3 91.5 105.0	93.6 110.0 125.0	124.0 145.0 166.0	155.0 182.0 208.0	186.0 219.0 250.0
900 1000	914.4 1 016.0		118.0 131.0	140.0 156.0	187.0 208.0	233.0 260.0	282.0 315.0

Standard Lengths: 6.096m and 9.144 m

NOTES: 1. Pipe outside diameters are to B.S. 534/1966; I.S.0./R336; B.S. 4504/1969; I.S.0./R2084.

2. The pipe outside diameters suit the metricated flanges of B.S. 4504/1969 and I.S.0./R2084.

Steel to S.A.N.S. 719

Test Pressure in kPA

Nominal Bore mm	Outside Diameter mm	Wall Thickness (mm)							
		4.0	4.5	5.0	6.0	8.0	10.0	12.0	14.0
200	219,1	6600	7430	8250	9900	13200	16500	19800	23100
250	273,0	5300	5960	6620	7950	10590	13240	15890	18540
300	323,9	4460	5020	5580	6700	8930	11160	13390	15630
350	355,6	4070	4580	5080	6100	8130	10170	12200	14230
400	406,4	3560	4000	4450	5340	7120	8900	10670	12450
450	457,2	3160	3560	3950	4740	6330	7910	9490	11070
500	508,0	2850	3200	3560	4270	5690	7120	8540	9960
600	609,6	2370	2670	2970	3560	4740	5930	7120	8300
700	711,2	2030	2290	2540	3010	4070	5080	6100	7120
800	812,8	1780	2000	2220	2670	3560	4450	5340	6230
900	914,4	1580	1780	1980	2370	3160	3950	4740	5540
1000	1016,0	1420	1600	1780	2140	2850	3560	4270	4980

Yield stress of steel - 300 MPa.

Test pressures above are based on stressing steel to 75% of minimum specified yield stress and are applied only to plain ended pipes.

PROCESS PIPE

PIPE

A.S.A. PIPE SCHEDULES | DIAMETERS | WALL THICKNESSES | WEIGHTS

Piping to ASTM A106 B + ANSI B36.19 + B36.10 + Inches and Metric

Inches Nominal pipe size	Metric O.D. mm	Schedule				STD AND 40 S	Schedule		XS and 80 S	Schedule					XXS
		10 S	10	20	30		40	60		80	100	120	140	160	
1/8"	**10.3**	**1.24** 0.28	- -	- -	- -	**1.73** 0.36		- -	**2.41** 0.46		- -	- -	- -	- -	- -
1/4"	**13.71**	**1.65** 0.49	- -	- -	- -	**2.24** 0.63		- -	**3.02** 0.80		- -	- -	- -	- -	- -
3/8"	**17.14**	**1.65** 0.63	- -	- -	- -	**2.31** 0.85		- -	**3.2** 1.10		- -	- -	- -	- -	- -
1/2"	**21.34**	**2.11** 1.00	- -	- -	- -	**2.77** 1.27		- -	**3.73** 1.62		- -	- -	- -	**4.78** 1.94	**7.47** 2.55
3/4"	**26.67**	**2.11** 1.28	- -	- -	- -	**2.87** 1.68		- -	**3.91** 2.19		- -	- -	- -	**5.56** 2.9	**7.82** 3.63
1"	**33.4**	**2.77** 2.08	- -	- -	- -	**3.38** 2.5		- -	**4.55** 3.23		- -	- -	- -	**6.35** 4.18	**9.09** 5.45
1 1/4"	**42.16**	**2.77** 2.69	- -	- -	- -	**3.56** 3.38		- -	**4.85** 4.46		- -	- -	- -	**6.35** 5.58	**9.7** 7.76
1 1/2"	**48.26**	**2.77** 3.12	- -	- -	- -	**3.68** 4.05		- -	**5.08** 5.41		- -	- -	- -	**7.14** 7.22	**10.16** 9.55
2"	**60.32**	**2.77** 3.94	- -	- -	- -	**3.91** 5.44		- -	**5.54** 7.49		- -	- -	- -	**8.74** 11.08	**11.07** 13.35
2 1/2"	**73.02**	**3.05** 5.26	- -	- -	- -	**5.16** 8.68		- -	**7.01** 11.42		- -	- -	- -	**9.52** 14.88	**14.02** 20.41
3"	**88.90**	**3.05** 6.45	- -	- -	- -	**5.49** 11.29		-	**7.62** 15.27		- -	- -	- -	**11.13** 20.98	**15.24** 27.67
3 1/2"	**101.60**	**3.05** 7.4	- -	- -	- -	**5.74** 13.37	**5.74** 13.57		**8.08** 18.63		- -	- -	- -	- -	- -
4"	**114.30**	**3.05** 8.34	- -	- -	- -	**6.02** 16.07			**8.56** 22.31		- -	**11.13** 28.25	- -	**13.49** 33.48	**17.12** 41.02
5"	**141.30**	**3.40** 11.56	- -	- -	- -	**6.55** 21.78			**9.52** 30.95		- -	**12.70** 40.24	- -	**15.88** 49.11	**19.05** 57.42
6"	**168.30**	**3.40** 13.82	- -	- -	- -	**7.11** 28.26			**10.97** 42.56			**14.47** 54.20	- -	**18.26** 67.22	**21.95** 79.18
8"	**219.10**	**3.76** 19.94	- -	**6.35** 33.03	**7.04** 36.72	**8.18** 42.53		**10.31** 52.88	**12.70** 64.63		**15.09** 75.80	**18.26** 90.32	**20.62** 101.04	**23.01** 111.32	**22.22** 107.87
10"	**273.00**	**4.19** 27.83	- -	**6.35** 41.76	**7.8** 51.00	**9.27** 60.29		**12.7** 81.46	**12.70** 81.46	**15.09** 95.95	**18.26** 114.59	**21.44** 132.74	**25.40** 154.94	**28.58** 172.14	**25.40** 154.94
12"	**323.85**	**4.57** 36.00	- -	**6.35** 49.81	**8.38** 65.07	**9.52** 73.82	**10.31** 79.67	**14.27** 108.97	**12.70** 97.36	**17.47** 131.70	**21.44** 159.52	**25.40** 186.77	**28.58** 206.96	**33.34** 238.11	**25.40** 186.77
14"	**355.60**	**4.78** 41.18	**6.35** 54.63	**7.92** 67.95	**9.52** 81.28	**9.52** 81.28	**11.13** 94.31	**15.09** 126.49	**12.70** 107.28	**19.05** 157.94	**23.82** 194.82	**27.79** 224.42	**31.75** 253.14	**35.71** 281.38	- -
16"	**406.40**	**4.78** 47.33	**6.35** 62.58	**7.92** 77.88	**9.25** 93.21	**9.52** 93.21	**12.70** 123.18	**16.64** 159.98	**12.70** 123.18	**21.44** 203.16	**26.19** 245.32	**30.96** 286.44	**36.52** 332.62	**40.49** 364.85	- -
18"	**457.20**	**4.78** 53.18	**6.35** 70.53	**7.92** 87.81	**11.13** 122.12	**9.52** 105.14	**14.27** 155.90	**19.05** 205.62	**12.70** 139.07	**23.82** 254.19	**29.36** 309.44	**34.92** 363.19	**39.69** 408.01	**45.24** 459.18	- -
20"	**508.00**	**5.54** 68.50	**6.35** 78.46	**9.52** 117.07	**12.7** 154.97	**9.52** 117.07	**15.09** 183.12	**20.62** 247.79	**12.70** 154.97	**26.19** 310.90	**32.54** 381.04	**38.10** 440.93	**44.45** 587.54	**50.01** 564.14	- -
22"	**558.80**	- -	**6.35** 86.49	**9.52** 129.01	**12.7** 171.01	**9.52** 129.01	- -	**22.22** 294.06	**12.70** 171.01	**28.60** 373.58	**34.92** 451.14	**41.28** 526.70	**47.62** 600.27	**53.98** 671.85	- -
24"	**609.60**	**6.35** 94.37	**6.35** 94.37	**9.52** 140.94	**14.27** 209.54	**9.52** 140.94	**17.48** 254.74	**24.61** 354.64	**12.70** 186.75	**30.96** 441.1	**38.89** 546.92	**46.02** 639.18	**52.3** 718.94	**59.54** 806.61	- -
26"	**660.40**	- -	**7.92** 127.58	**12.7** 202.65	- -	**9.52** 152.87	- -	- -	**12.70** 202.65	- -	- -	- -	- -	- -	- -
28"	**711.20**	- -	**7.92** 137.50	**12.7** 218.51	**15.88** 271.9	**9.52** 164.63	- -	- -	**12.70** 218.51	- -	- -	- -	- -	- -	- -
30"	**762.00**	- -	**7.92** 147.33	**12.7** 234.44	**15.88** 291.81	**9.52** 176.73	- -	- -	**12.70** 234.44	- -	- -	- -	- -	- -	- -
32"	**812.80**	- -	**7.92** 156.58	**12.7** 250.33	**15.88** 311.67	**9.52** 188.66	**17.48** 352.28	- -	**12.70** 250.33	- -	- -	- -	- -	- -	- -
34"	**863.60**	- -	**7.92** 166.82	**12.7** 266.35	**15.88** 331.54	**9.52** 200.59	**17.48** 363.91	- -	**12.70** 266.35	- -	- -	- -	- -	- -	- -
36"	**914.40**	- -	**7.92** 177.12	**12.7** 282.12	**15.88** 351.41	**9.52** 212.52	**19.05** 420.17	- -	**12.70** 282.12	- -	- -	- -	- -	- -	- -
38"	**965.2**	- -	- -	- -	- -	**9.52** 224.42	- -	- -	**12.70** 298.23	- -	- -	- -	- -	- -	- -
40"	**1,016.00**	- -	- -	- -	- -	**9.52** 236.35	- -	- -	**12.70** 314.14	- -	- -	- -	- -	- -	- -
42"	**1066.80**	- -	- -	- -	- -	**9.52** 248.34	- -	- -	**12.70** 330.00	- -	- -	- -	- -	- -	- -
44"	**1,117.6**	- -	- -	- -	- -	**9.52** 260.21	- -	- -	**12.70** 345.95	- -	- -	- -	- -	- -	- -

Note: bold-faced = wall thickness lean-faced = weight kg/m

PIPE

ALLOWABLE WORKING PRESSURES FOR PETROLEUM REFINERY PIPING & CARBON STEEL WELDING FITTINGS

(These values also apply to ASTM A106, Grade B Seamless Pipe)

Inches Nominal pipe size	WT* or Sch. No		Wall Thickness	Allowable working pressures in kPa For Temperatures (in Deg. F.) not to exceed				
	WT*	Sch No		-20 to 100	300	500	650	750
1/2"	ST	40	0.109	15582	14134	12755	11721	10135
3/4"	ST XS	40 80	0.113 0.154	13376 23856	12135 21649	10962 19512	10066 17857	8687 15444
1"	ST XS XXS	40 80 160	0.133 0.179 0.250 0.385	14548 23925 39438 65775	13169 21718 35852 59708	11928 19581 32267 53779	10894 17995 29578 49366	9446 15513 25579 42609
1 1/4"	ST XS XXS	40 80 160	0.140 0.191 0.250 0.382	12479 20684 30543 54744	11376 18753 27717 49711	10204 16892 24959 44747	9377 15513 22890 41092	8136 13375 19788 35439
1 1/2"	ST XS XXS	40 80 160	0.145 0.200 0.231 0.400	11538 19167 31026 49849	10480 17443 28130 45229	9446 15720 25372 40748	8687 14410 23304 37438	7515 12410 20063 32336
2"	ST XS XXS	40 80 160	0.154 0.218 0.343 0.436	10135 17168 31716 43368	9239 15582 28820 39369	8342 14065 25993 35439	7653 12893 23787 32543	6619 11169 20546 28061
2 1/2"	ST XS XXS	40 80 160	0.203 0.276 0.375 0.552	12755 19443 28958 47229	11583 17650 26269 42885	10411 15927 23649 38610	9584 14617 21718 35439	8274 12617 18753 30612
3"	ST XS XXS	40 80 160	0.216 0.300 0.438 0.636	11307 17650 28475 41989	10273 15996 25855 38128	9308 14410 23235 34336	8480 13238 21373 31509	7377 11445 18409 27234
3 1/2"	ST XS	40 80	0.226 0.318 0.636	10549 16547 38886	9584 15030 35301	8618 13514 31784	7929 12410 29164	6826 10687 25166
4"	ST XS XXS	40 80 160	0.237 0.337 0.531 0.674	9928 15720 27441 36611	9032 14272 24959 33232	8136 12893 22447 29923	7446 11790 20615 27510	6481 10204 17788 23718
5"	ST XS XXS	40 80 160	0.258 0.375 0.625 0.750	8963 14410 26544 32957	8136 13100 24131 29923	7308 11790 21718 26958	6757 10825 19926 24752	5791 9308 17237 21373
6"	ST XS XXS	40 80 160	0.280 0.432 0.718 0.864	8342 14272 25924 32129	7584 12962 23511 29164	6826 11652 21167 26269	6274 10687 19443 24131	5447 9239 16823 20822
8"	ST XS XXS	40 80 160	0.322 0.500 0.875 0.906	7584 12893 24545 25510	6895 11721 22270 23166	6205 10549 20063 20891	5723 9652 18409 19167	4964 8342 15927 16547
10"	ST XS	40 60 160	0.365 0.500 1.125	7101 10273 25786	6412 9308 23442	5791 8411 21098	5309 7722 19374	4619 6688 16685

Inches Nominal pipe size	WT* or Sch. No		Wall Thickness	Allowable working pressures in kPa For Temperatures (in Deg. F.) not to exceed				
	WT*	Sch No		-20 to 100	300	500	650	750
12"	ST XS 	 160	0.375 0.500 0.131	6136 8618 25510	5585 7860 23167	5033 7032 20891	4619 6481 19167	3999 5585 16547
14"	 ST XS	10 30 	0.250 0.375 0.500	3351 5585 7860	3047 5102 7101	2744 4619 6412	2516 4206 5860	2172 3654 5102
16"	 ST XS	10 30 40	0.250 0.375 0.500	2937 4895 6826	2668 4481 6205	2406 3999 5585	2206 3654 5171	1903 3158 4413
18"	 ST XS	10 	0.250 0.375 0.500	2606 4344 6067	2372 3930 5516	2137 3585 4964	1958 3240 4550	1689 2799 3930
20"	 ST XS	10 20 30	0.250 0.375 0.500	2344 3930 5447	2130 3585 4964	1917 3171 4481	1758 2909 4137	1524 2510 3585
22"	 ST XS	 	0.250 0.375 0.500	2123 3516 4964	1930 3192 4481	1737 2875 4068	1593 2641 3723	1379 2282 3199
24"	 ST XS	10 20 	0.250 0.375 0.500	1944 3227 4550	1765 2930 4137	1593 2641 3723	1462 2420 3385	1262 2096 2923
26"	ST XS	 	0.375 0.500	2978 4206	2710 3792	2441 3406	2234 3123	1930 2703
30"	ST XS	20 	0.375 0.500	2579 3654	2344 3268	2110 2944	1937 2703	1675 2330
34"	ST XS	 	0.375 0.500	2275 3171	2068 2882	1861 2599	1710 2379	1475 2055
36"	ST XS	 	0.375 0.500	2137 2992	1944 2723	1751 2448	1606 2248	1386 1944
42"	ST XS	 	0.375 0.500	1834 2565	1668 2330	1503 2103	1379 1924	1193 1662

Above values in kPa to conform with South African metric system.
All dimensions are in inches.
*LW - Light Weight (same thickness as 10S to 12" size inclusive)
ST - Standard Wall
XS - Extra Strong Wall
XXS - Double Extra Strong Wall
Numbers are Schedule Numbers.

The above tabular values are rounded off to the next higher unit of 10 for pressures 500 p.s.i. And higher. Interpolation is permissible for intermediate temperatures.

The allowable working pressures were calculated by the following formula given in the Code for Pressure Piping. ASA B31.3-1959, par, 304 1.2,

$$P = \frac{2 S t E}{D_o 2 yt}$$

where P = internal design pressure, psig
S = applicable allowable stress, psi
D_o = outside diameter of pipe, inches
E = longitudinal weld joint factor = 1,0
t = t_m - C = design thickness, inches
t_m = minimum thickness for the pipe selected considering manufacturer's tolerance = 12 2/2 % less than the thickness shown in the table.
C = mechanical, corrosion and erosion allowance in inches = 0.05" in above calculations.
y = a coefficient = 0.4 for ferritic steels to 900 F

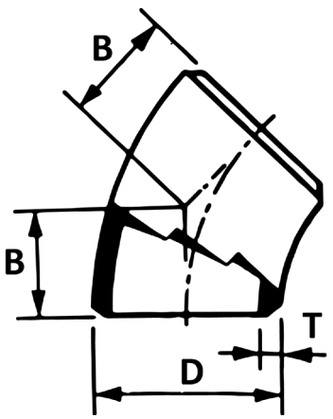
The allowable working stresses were obtained from the Code for Pressure Piping, ASA B31.3-1959, Table 302.3 1A.

Plant process piping: It is recommended that the allowable working pressures listed above be used also for process piping in plants other than oil refineries except where such piping is expressly covered in the ASME Boiler and Pressure Vessel Code or other sections of the Code for Pressure Piping. Interpretations of Code for Pressure Piping, Case No. 49, states that chemical process piping may be designed in accordance with the requirements of ASA B31.3, Petroleum Refinery Piping.

FITTINGS

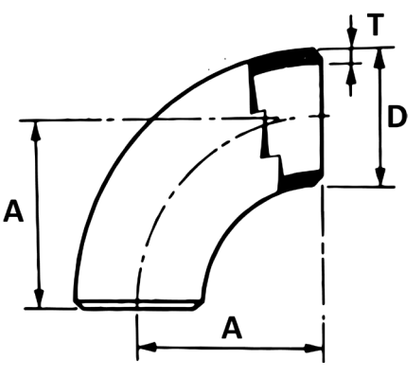
TYPES, DIMENSIONS AND WEIGHTS OF WELDING FITTINGS ANSI (ASA) B 16.9

45⁰ ELBOWS



Inches Nominal Pipe Size	Outside Diamiter D	Wall Thickness			Centre to End B	Weight kg.		
		Sch. 10s	Standard T	Extra Strong T		Sch. 10s	Standard	Extra Strong
1	33.40	2.77	3.38	4.55	22.22	0.08	0.08	0.10
1¼	42.16	2.77	3.56	4.85	25.40	0.11	0.13	0.18
1½	48.26	2.77	3.68	5.08	28.57	0.17	0.19	0.26
2	60.32	2.77	3.91	5.54	34.92	0.25	0.34	0.47
2½	73.02	3.05	5.16	7.01	44.45	0.48	0.67	0.89
3	88.90	3.05	5.49	7.62	50.80	0.63	1.08	1.44
3½	101.60	3.05	5.74	8.08	57.15	0.75	1.49	2.05
4	114.30	3.05	6.02	8.56	63.50	1.08	2.05	2.83
5	141.30	3.40	6.55	9.52	79.37	1.81	3.43	4.85
6	168.27	3.40	7.11	10.97	95.25	2.72	5.33	8.02
8	219.07	3.76	8.18	12.70	127.00	5.33	10.65	16.10
10	273.05	4.19	9.27	12.70	158.75	9.75	18.80	25.40
12	323.85	4.57	9.52	12.70	190.50	12.61	27.90	36.70
14	355.60	4.78	9.52	12.70	222.25	18.14	35.80	47.15
16	406.40	4.78	9.52	12.70	254.00	23.81	46.90	62.06
18	457.20	4.78	9.52	12.70	285.75	29.94	59.00	79.50
20	508.00	5.54	9.52	12.70	317.50	49.90	73.50	97.50
22	558.80	-	9.52	12.70	342.90	-	98.00	113.00
24	609.60	6.35	9.52	12.70	381.00	70.31	105.50	140.50

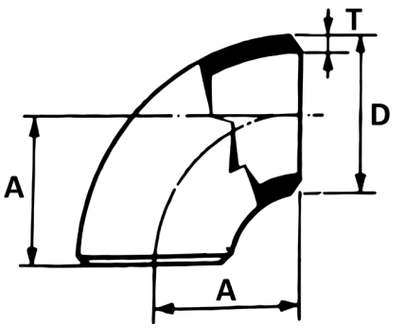
90⁰ ELBOWS LONG RADIUS



Nominal Pipe Size	Outside Diameter D	Wall Thickness			Centre to End B	Weight kg.		
		Sch. 10S	Standard T	Extra Strong T		Sch. 10s	Standard	Extra Strong
1	33.40	2.77	3.38	4.55	38.10	0.14	0.15	0.20
1¼	42.16	2.77	3.56	4.85	47.62	0.23	0.26	0.35
1½	48.26	2.77	3.68	5.08	57.15	0.30	0.38	0.51
2	60.32	2.77	3.91	5.54	76.20	0.50	0.68	0.94
2½	73.02	3.05	5.16	7.01	95.25	0.85	1.35	1.79
3	88.90	3.05	5.49	7.62	114.30	1.25	2.15	2.87
3½	101.60	3.05	5.74	8.08	113.35	1.70	2.88	4.10
4	114.30	3.05	6.02	8.56	152.40	2.10	4.10	5.65
5	141.30	3.40	6.55	9.52	190.50	3.65	6.85	9.70
6	168.27	3.40	7.11	10.97	228.60	5.45	10.65	16.00
8	219.07	3.76	8.18	12.70	304.80	10.20	21.30	32.20
10	273.05	4.19	9.27	12.70	381.00	18.15	37.60	50.80
12	323.85	4.57	9.52	12.70	457.20	27.25	55.80	73.40
14	355.60	4.78	9.52	12.70	533.40	39.95	71.60	94.30
16	406.40	4.78	9.52	12.70	609.60	51.60	93.80	123.70
18	457.20	4.78	9.52	12.70	685.80	65.40	118.00	159.00
20	508.00	8.54	9.52	12.70	762.00	84.90	147.00	195.00
22	558.80	-	9.52	12.70	838.20	-	196.00	226.00
24	609.60	6.55	9.52	12.70	914.40	146.08	211.00	281.00

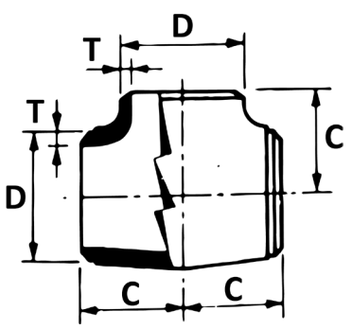
TYPES, DIMENSIONS AND WEIGHTS OF WELDING FITTINGS ANSI (ASA) B 16.9

90⁰ ELBOWS SHORT RADIUS CONTINUED



Inches Nominal Pipe Size	Outside Diamiter D	Wall Thickness			Centre to End B	Weight kg.		
		Sch. 10s	Standard T	Extra Strong T		Sch. 10s	Standard	Extra Strong
1	33.40	2.77	3.38	4.55	25.40	0.10	0.11	0.14
1¼	42.16	2.77	3.56	4.85	31.75	0.17	0.18	0.23
1½	48.26	2.77	3.68	5.08	38.10	0.22	0.25	0.34
2	60.32	2.77	3.91	5.54	50.80	0.37	0.45	0.62
2½	73.02	3.05	5.16	7.01	63.50	0.62	0.89	1.19
3	88.90	3.05	5.49	7.62	76.20	0.98	1.40	1.90
3½	101.60	3.05	5.74	8.08	88.90	1.38	1.97	2.72
4	114.30	3.05	6.02	8.56	101.60	1.72	2.66	3.71
5	141.30	3.40	6.55	9.52	127.00	2.78	4.55	6.44
6	168.27	3.40	7.11	10.97	152.40	4.15	7.02	10.58
8	219.07	3.76	8.18	12.70	203.20	8.00	14.22	21.61
10	273.05	4.19	9.27	12.70	254.00	15.88	25.23	34.06
12	323.85	4.57	9.52	12.70	304.80	18.14	36.86	48.60
14	355.60	4.78	9.52	12.70	355.80	23.59	47.56	62.97
16	406.40	4.78	9.52	12.70	406.40	30.84	62.50	82.45
18	457.20	4.78	9.52	12.70	457.20	39.00	74.90	97.60
20	508.00	5.54	9.52	12.70	508.00	64.86	93.00	125.00
24	609.60	6.35	9.52	12.70	609.60	91.63	134.00	177.00

EQUAL TEES



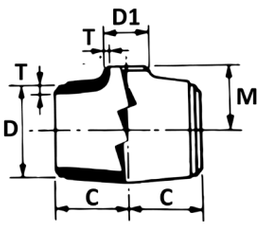
Nominal Pipe Size	Outside Diameter D	Wall Thickness			Centre to End B	Weight kg.		
		Sch. 10s	Standard T	Extra Strong T		Sch. 10s	Standard	Extra Strong
½	21.34	2.11	2.77	3.73	25.40	0.09	0.15	0.21
3/4	26.67	2.11	2.87	3.91	28.57	0.11	0.20	0.27
1	33.40	2.77	3.38	4.55	38.10	0.27	0.40	0.82
1¼	42.16	2.77	3.56	4.85	47.62	0.45	0.77	0.86
1½	48.26	2.77	3.68	5.08	57.15	0.65	1.08	1.22
2	60.32	2.77	3.91	5.54	63.50	1.70	1.48	1.86
2½	73.02	3.05	5.16	7.01	76.20	2.18	2.45	3.07
3	88.90	3.05	5.49	7.62	85.72	3.30	3.80	4.29
3½	101.60	3.05	5.74	8.08	95.25	2.67	4.98	6.15
4	114.30	3.05	6.02	8.56	104.77	4.40	5.90	7.24
5	141.30	3.40	6.55	9.52	123.82	7.42	9.50	12.95
6	168.27	3.40	7.11	10.97	142.87	12.35	14.90	19.25
8	219.07	3.76	8.18	12.70	177.80	20.00	27.18	34.42
10	273.05	4.19	9.27	12.70	215.90	28.15	41.30	58.40
12	323.85	4.57	9.52	12.70	254.00	47.45	56.60	79.30
14	355.60	4.78	9.52	12.70	279.40	69.90	81.54	117.78
16	406.40	4.78	9.52	12.70	304.80	72.65	99.66	142.69
18	457.20	4.78	9.52	12.70	342.90	101.70	126.80	170.00
20	508.00	5.54	9.52	12.70	381.00	169.90	168.00	245.00
24	609.60	6.35	9.52	12.70	431.80	306.50	347.00	423.00

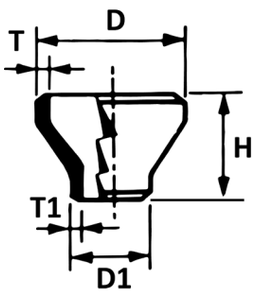
FITTINGS

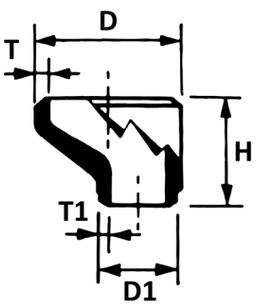
TYPES, DIMENSIONS AND WEIGHTS OF WELDING FITTINGS ANSI (ASA) B 16.9

REDUCING TEES

CONCENTRIC AND ECCENTRIC REDUCERS







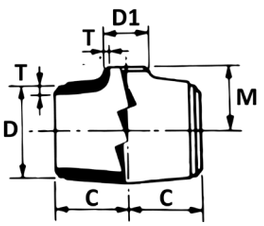
Inches Nominal Pipe Size	Outside Dia. D	Outside Dia. D1	Centre to End C	Centre to End M	Length H	Weight kg.					
						Sch. 10 S		Standard		Extra Strong	
						Tees	Red	Tees	Red	Tees	Red
½x¼	21.34	13.70	25.40	25.40	-	0.06	0.03	0.16	-	0.25	-
½x⅜	21.34	17.10	25.40	25.40	-	0.06	0.03	0.16	-	0.25	-
¾x⅜	26.67	17.10	28.57	28.57	38.10	0.08	0.04	0.22	0.07	0.24	0.10
¾ x ½	26.67	21.34	28.57	28.57	38.10	0.08	0.04	0.23	0.07	0.38	0.10
1 x ½	33.40	21.34	38.10	38.10	50.80	0.19	0.09	0.45	0.10	0.68	0.15
1 x ¾	33.40	26.67	38.10	38.10	50.80	0.19	0.10	0.45	0.10	0.68	0.15
1¼ x ½	42.16	21.34	47.62	47.62	50.80	0.27	0.10	0.68	0.15	0.81	0.20
1¼ x ¾	42.16	26.67	47.62	47.62	50.80	0.29	0.11	0.68	0.15	0.81	0.20
1¼ x 1	42.16	33.40	47.62	47.62	50.80	0.31	0.12	0.70	0.15	0.81	0.20
1½ x ½	48.26	21.34	57.15	57.15	63.50	0.36	0.14	0.86	0.25	1.13	0.32
1½ x ¾	48.26	26.67	57.15	57.15	63.50	0.39	0.15	0.91	0.27	1.13	0.33
1½ x 1	48.26	33.40	57.15	57.15	63.50	0.42	0.17	0.95	0.27	1.17	0.35
1½ x ¹¼	48.26	42.16	57.15	57.15	63.50	0.44	0.18	0.99	0.29	1.22	0.35
2 x ¾	60.32	26.67	63.50	44.45	76.20	0.52	0.22	1.13	0.40	1.49	0.50
2 x 1	60.32	33.40	63.50	50.80	76.20	0.54	0.23	1.17	0.40	1.54	0.50
2 x 1¼	60.32	42.16	63.50	57.15	76.20	0.57	0.25	1.26	0.43	1.58	0.52
2 x 1½	60.32	48.26	63.50	60.32	76.20	0.59	0.27	1.35	0.45	1.63	0.54
2½ x 1	73.02	33.40	76.20	57.15	88.90	0.84	0.37	2.00	0.68	2.44	0.84
2½ x 1¼	73.02	42.16	76.20	63.50	88.90	0.87	0.37	2.12	0.68	2.49	0.84
2½ x 1½	73.02	48.26	76.20	66.67	88.90	0.90	0.39	2.25	0.72	2.55	0.91
2 ½x2	73.02	60.32	76.20	69.85	88.90	0.94	0.43	2.35	0.77	2.62	0.97
3x1¼	88.90	42.16	85.72	69.85	88.90	1.17	0.43	2.89	0.86	3.40	1.18
3x1½	88.90	48.26	85.72	73.02	88.90	1.19	0.45	2.98	0.90	3.48	1.23
3x2	88.90	60.32	85.72	76.20	88.90	1.23	0.48	3.01	0.96	3.62	1.28
3x2½	88.90	73.02	85.72	82.55	88.90	1.31	0.52	3.17	1.04	3.73	1.39
3½x1½	101.60	48.26	95.25	79.37	101.60	1.50	0.60	3.75	1.22	4.53	1.54
3½x²	101.60	60.32	95.25	82.55	101.60	1.54	0.61	3.85	1.34	4.62	1.63
3½ x2½	101.60	73.02	95.25	88.90	101.60	1.61	0.65	3.94	1.34	4.79	1.63
3½x3	101.60	88.90	95.25	92.07	101.60	1.68	0.71	4.07	1.40	4.98	1.81
4x1½	114.30	48.26	104.77	85.72	101.60	1.81	0.63	4.30	1.54	5.88	2.04
4x2	114.30	60.32	104.77	88.90	101.60	1.88	0.67	4.57	1.63	6.11	2.13
4x2½	114.30	73.02	104.77	95.25	101.60	1.95	0.71	4.80	1.72	6.11	2.20
4x3	114.30	88.90	104.77	98.42	101.60	2.02	0.76	4.98	1.77	6.34	2.26
4x3½	114.30	101.60	104.77	101.60	101.60	2.08	0.81	5.11	1.81	6.40	2.38
5x2	141.30	60.32	123.82	104.77	127.00	3.00	1.00	6.83	2.62	9.96	3.17
5x2½	141.30	73.02	123.82	107.95	127.00	3.06	1.14	7.33	2.66	10.64	3.27
5x3	141.30	88.90	123.82	111.12	127.00	3.13	1.22	7.56	2.72	10.96	3.49
5x3½	141.30	101.60	123.82	114.30	127.00	3.19	1.27	7.79	2.75	11.32	3.92
5x4	141.30	114.30	123.82	117.47	127.00	3.26	1.33	8.15	2.81	11.77	3.71
6x2½	168.27	73.02	142.87	120.65	139.70	4.15	1.45	12.32	3.71	15.85	5.17
6x3	168.27	88.90	142.87	123.82	139.70	4.21	1.53	12.45	3.80	16.16	5.39
6x3½	168.27	101.60	142.87	127.00	139.70	4.27	1.58	12.68	3.95	16.49	5.94
6x4	168.27	114.30	142.87	130.17	139.70	4.34	1.65	12.91	3.94	16.70	5.62
6x5	168.27	141.30	142.87	136.52	139.70	4.56	1.78	13.13	4.03	17.20	5.84
8X6	219.07	168.27	177.80	168.27	152.40	7.91	2.72	23.80	6.34	31.71	9.78
10X4	273.05	114.30	215.90	184.15	177.80	12.40	3.82	33.34	9.98	44.39	13.14

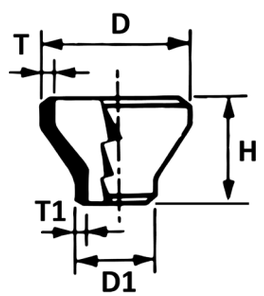
FITTINGS

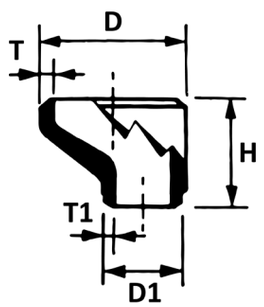
TYPES, DIMENSIONS AND WEIGHTS OF WELDING FITTINGS ANSI (ASA) B 16.9

REDUCING TEES

CONCENTRIC AND ECCENTRIC REDUCERS





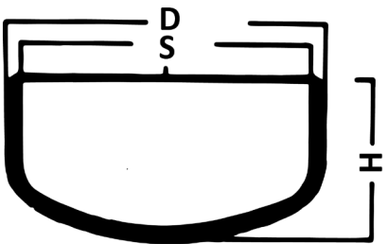


Inches Nominal Pipe Size	Outside Dia. D	Outside Dia. D1	Centre to End C	Centre to End M	Length H	Weight kg.					
						Sch. 10 S		Standard		Extra Strong	
						Tees	Red	Tees	Red	Tees	Red
8 x 3½	219.07	101.60	177.80	152.40	152.40	7.38	2.36	21.74	6.50	29.45	9.86
8 x 4	219.07	114.30	177.80	155.57	152.40	7.48	2.43	22.42	5.62	30.12	9.00
8 x 5	219.07	141.30	177.80	161.92	152.40	7.70	2.57	23.10	5.84	30.80	9.38
8 x 6	219.07	168.27	177.80	168.27	152.40	7.91	2.72	23.80	6.34	31.71	9.78
10 x 4	273.05	114.30	215.90	184.15	177.80	12.40	3.82	33.34	9.98	44.39	13.14
10 x 5	273.05	141.30	215.90	190.50	177,80	12.60	3.98	33.79	10.19	46.20	13.50
10 x 6	273.05	168.27	215.90	193.67	177,80	12.80	4.14	34.65	10.42	47.56	14.04
10 x 8	273.05	219.07	215.90	203.20	177,80	13.30	4.49	35.33	10.69	48.92	14.45
12 x 5	323.85	141.30	254.00	215.90	203.20	18.85	5.72	45.75	14.50	63.40	18.91
12 x 6	323.85	168.27	254.00	219.70	203.20	19.10	5.92	47.11	14.72	66.59	19.39
12 x 8	323.85	219.07	254.00	228.60	203.20	19.60	6.31	48.92	14.95	69.76	19.80
12 x 10	323.85	273.05	254.00	241.30	203.20	20.50	6.78	50.14	15.40	72.45	20.38
14 x 6	355.60	168.27	279.40	238.12	330.20	23.70	10.30	72.93	26.05	101.02	34.89
14 x 8	355.60	219.07	279.40	249.65	330.20	24.50	11.20	74.75	26.27	104.19	35.10
14 x 10	355.60	273.05	279.40	257.17	330.20	25.60	12.10	75.88	26.59	107.81	35.56
14 x 12	355.60	323.85	279.40	269.87	330.20	26.40	13.00	77.01	26.82	112.79	35.83
16 x 6	406.40	168.27	304.80	263.52	355.60	29.00	13.00	82.90	33.15	124.12	44.00
16 x 8	406.40	219.07	304.80	273.05	355.60	30.00	13.70	87.88	32.39	126.84	42.67
16 x 10	406.40	273.05	304.80	282.57	355.60	31.00	14.40	90.60	32.84	130.00	43.26
16 x 12	406.40	323.85	304.80	295.27	355.60	32.10	15.20	92.86	33.43	132.73	43.49
16 x 14	406.40	355.60	304.80	304.80	355.60	33.00	15.80	95.13	33.98	137.26	44.62
18 x 8	457.20	219.07	342.90	298.45	381.00	39.30	16.00	110.98	40.00	144.96	53.12
18 x 10	457.20	273.05	342.90	307.97	381.00	39.95	16.80	115.50	38.50	149.49	51.64
18 x 12	457.20	323.85	342.90	320.67	381.00	40.60	17.60	120.95	38.96	154.00	52.10
18 x 14	457.20	355.60	342.90	330.20	381.00	41.20	18.20	124.12	39.41	161.82	52.55
18 x 16	457.20	406.40	342.90	330.20	381.00	41.90	19.20	126.84	39.86	167.61	53.00
20 x 8	508.00	219.07	381.00	323.85	-	55.25	25.10	163.50	-	214.00	-
20 x 10	508.00	273.05	381.00	333.37	-	56.00	26.70	163,50	-	214.00	-
20 x 12	508.00	323.85	381.00	346.07	508.00	56.75	28.30	163,50	57.08	214.00	76.19
20 x 14	508.00	355.60	381.00	355.60	508.00	57.50	29.90	163,50	57.98	214.00	77.19
20 x 16	508.00	406.40	381.00	355.60	508.00	58.30	31.70	168,00	58.44	218.00	77.73
20 x 18	508.00	457.20	381.00	368.30	508.00	59.00	33.10	168,00	58.89	218.00	78.37
22 x 10	558.80	273.05	419.10	358.78	-	65.40	28.60	172,50	-	245.00	-
22 x 12	558.80	323.85	419.10	371.48	-	66.90	30.20	172.50	-	245.00	-
22 x 14	558.80	355.60	419.10	381.00	508.00	68.40	31.80	172.50	57.99	245.00	76.10
22 x 16	558.80	406.40	419.10	381.00	508.00	69.90	33.40	209.00	61.15	260.00	80.18
22 x 18	558.80	457.20	419.10	393.70	508.00	70.70	35.10	209.00	62.97	260.00	82.45
22 x 20	558.80	508.00	419.10	406.40	508.00	72.90	36.60	220.00	64.33	280.00	84.26
24 x 10	608.60	273.05	431.80	384.20	-	82.70	35.20	204.00	-	300.00	-
24 x 12	609.60	323.85	431.80	396.90	-	84.10	37.00	218.00	-	300.00	-
24 x 14	609.60	355.60	431.80	406.40	-	85.50	38.80	222.00	-	300.00	-
24 x 16	609.60	406.40	431.80	406.40	508.00	86.90	40.60	222.00	72.00	320.00	95.40
24 x 18	609.60	457.20	431.80	419.10	508.00	88.30	42.40	227.00	72.00	320.00	95.40
24 x 20	609.60	508.00	431.80	431.80	508.00	90.30	44.10	227.00	72.00	350.00	95.40
24 x 22	609.60	558.80	431.80	431.80	508.00	91.10	46.00	237.00	72.00	350.00	95.40

FITTINGS

TYPES, DIMENSIONS AND WEIGHTS OF WELDING FITTINGS ANSI (ASA) B 16.9

CAPS



Inches Nominal Pipe Size	Outside Diamiter D	Wall Thickness			Length H	Weight kg.		
		Sch. 10s	Standard	Extra Strong		Sch. 10s	Standard	Extra Strong
½	21.34	2.11	2.77	3.73	25.40	0.03	0.03	0.04
3/4	26.67	2.11	2.87	3.91	25.40	0.04	0.04	0.06
1	33.40	2.77	3.38	4.55	38.10	0.09	0.10	0.13
1¼	42.16	2.77	3.56	4.85	38.10	0.11	0.14	0.18
1½	48.26	2.77	3.68	5.08	38.10	0.13	0.17	0.22
2	60.32	2.77	3.91	5.54	38.10	0.17	0.23	0.30
2½	73.02	3.05	5.16	7.01	38.10	0.23	0.37	0.46
3	88.90	3.05	5.49	7.62	50.80	0.37	0.64	0.84
3½	101.60	3.05	5.74	8.06	63.50	0.51	0.97	1.36
4	114.30	3.05	6.02	8.56	63.50	0.59	1.16	1.65
5	141.30	3.40	6.55	9.52	76.20	0.99	1.91	2.78
6	168.27	3.40	7.11	10.97	88.90	1.39	2.91	4.47
8	219.07	3.76	8.18	12.70	101.60	2.38	5.13	8.05
10	273.05	4.19	9.27	12.70	127.00	4.14	9.09	12.50
12	323.85	4.57	9.52	12.70	152.40	6.39	13.40	17.70
14	355.60	4.78	9.52	12.70	165.10	7.98	15.90	21.20
16	406.40	4.78	9.52	12.70	178.00	10.00	20.00	26.70
18	457.20	4.78	9.52	12.70	203.00	12.80	25.60	34.10
20	508.00	5.54	9.52	12.70	229.00	18.50	31.90	42.50
24	609.60	6.35	9.52	12.70	226.70	30.10	45.10	60.10

JIS BUTTWELD FITTINGS DIMENSIONS

Inches Nominal Pipe Size	Outside Diameter	Wall Thickness
1/2	21.70	2.80
3/4	27.20	2.80
1	34.00	3.20
1 1/4	42.70	3.50
1 1/2	48.60	3.50
2	60.50	3.80
2 1/2	76.30	4.20
3	89.10	4.20
4	114.30	4.50
5	139.80	4.50
6	165.20	5.00
8	216.30	5.80
10	267.40	6.60
12	323.00	6.90
14	355.60	7.90
16	406.40	7.90
18	457.20	7.90
20	508.00	7.90

NOTE: All other dimensions as per ANSI (ASA) B16.9 Welding Fittings.

FITTINGS

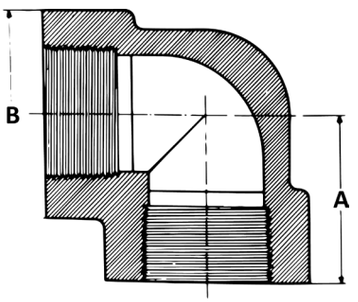
TYPES, DIMENSIONS AND WEIGHTS OF FORGED STEEL FITTINGS 3000LB SERIES

ANSI B16.11 - A 105

SCREWED

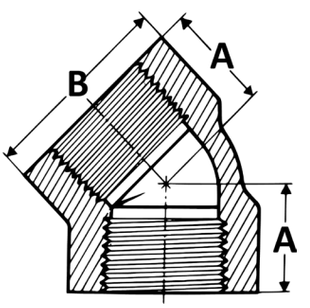
90⁰ ELBOWS

Inches Nominal Pipe Size	A		B		Appr. Weight	
	mm	inches	mm	inches	Kg.	Lbs
1/4	24,5	31/32	26,5	1	0,155	11/32
3/8	28,5	1 1/8	34,0	1 5/16	0,300	11/16
1/2	33,5	1 5/16	38,5	1 1/2	0,430	15/16
3/4	38,0	1 1/2	46,5	1 13/16	0,640	1 13/32
1	44,5	1 3/4	56,5	2 7/32	1 120	2 15/32
1 1/4	51,0	2	62,5	2 7/16	1 380	3
1 1/2	60,5	2 3/8	76,0	3	2 640	5 13/16
2	63,5	2 1/2	92,0	3 5/16	3 700	8
2 1/2	82,5	2 1/4	110,0	4 11/32	5 840	12 7/8
3	95,5	2 3/4	122,0	4 3/4	8 000	17 5/8
4	114,5	2 1/2	152,0	6	13 500	29 3/4



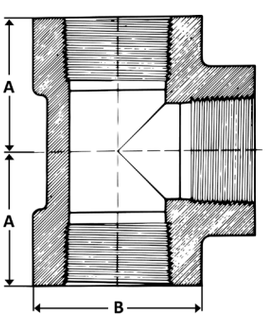
45⁰ ELBOWS

1/4	22,0	7/8	34,0	1 5/16	0,250	9/16
3/8	22,0	7/8	34,0	1 5/16	0,225	1/2
1/2	25,0	1	38,5	1 1/2	0,305	11/16
3/4	28,5	1 1/8	46,5	1 13/16	0,490	1 1/16
1	33,5	1 5/16	56,5	2 7/32	0,840	1 7/8
1 1/4	38,0	1 1/2	62,5	2 7/16	1 020	2 1/4
1 1/2	41,5	1 5/8	76,0	3	1 700	3 3/4
2	50,5	2	92,0	3 5/16	2 560	5 5/8
2 1/2	57,5	2 1/4	110,0	4 11/32	7 000	15 1/2
3	63,5	2 1/2	122,0	4 3/4	6 000	13 1/4
4	80,0	3 5/32	152,0	6	11 300	25



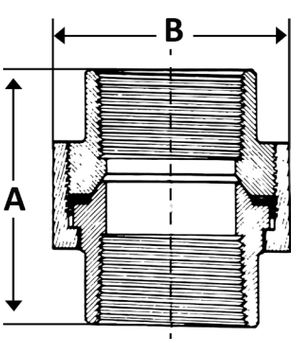
TEES

1/4	24,5	31/32	26,5	1	0,170	3/8
3/8	28,5	1 1/8	34,0	1 5/16	0,320	11/16
1/2	33,5	1 5/16	38,5	1 1/2	0,520	1 1/8
3/4	38,0	1 1/2	46,5	1 13/16	0,730	1 5/8
1	44,5	1 3/4	56,5	2 7/32	1 260	2 3/4
1 1/4	51,0	2	62,5	2 7/16	1 635	3 5/8
1 1/2	60,5	2 3/8	76,0	3	2 805	6 3/16
2	63,5	2 1/2	92,0	3 5/16	4 000	8 13/16
2 1/2	82,5	3 1/4	110,0	4 11/32	6 150	13 9/16
3	95,5	3 3/4	122,0	4 3/4	10 500	23 1/8
4	114,5	4 1/2	152,0	6	16 500	36 1/2



FEMALE - FEMALE UNIONS

1/4	42,0	1 21/32	36,0	1 7/16	0,140	5/16
3/8	47,0	1 27/32	41,0	1 5/8	0,190	13/32
1/2	52,0	1 1/16	46,0	1 13/16	0,340	3/4
3/4	57,0	2 1/4	56,0	2 7/32	0,440	31/32
1	63,0	2 15/32	65,0	2 9/16	0,600	1 5/16
1 1/4	72,0	2 27/32	78,0	3 1/16	0,995	2 3/16
1 1/2	78,0	3 1/16	86,0	3 13/32	1 255	2 25/32
2	89,0	3 1/2	103,0	4 1/16	2 120	4 11/16
2 1/2	114,0	4 1/2	122,0	4 13/16	5 500	12 1/8
3	130,0	5 1/8	144,0	5 11/16	8 000	17 5/8
4	150,0	5 29/32	180,0	7 3/32	12 800	28 7/32



Dimensions in accordance with specifications ANSI B 16.11 - 1973 and BS 3799 - 1974. Threads in accordance with specifications AP1.5B or ANSI B2.1

FITTINGS

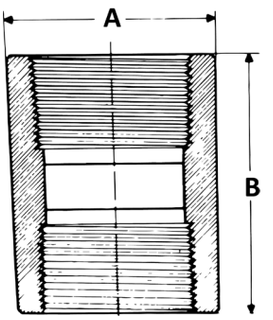
TYPES, DIMENSIONS AND WEIGHTS OF FORGED STEEL FITTINGS 3000LB SERIES

ANSI B16.11 - A 105

SCREWED

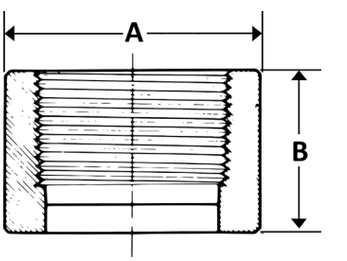
COUPLINGS

Inches Nominal Pipe Size	A		B		Appr. Weight	
	mm	inches	mm	inches	Kg.	Lbs
1/4	19,0	3/4	35,0	1 3/8	0,050	1/8
3/8	22,0	7/8	38,0	1 1/2	0,060	1/8
1/2	28,5	1 1/8	47,5	1 7/8	0,140	5/16
3/4	35,0	1 3/8	51,0	2	0,220	1/2
1	44,5	13/4	60,5	2 3/8	0,420	3/4
1 1/4	57,0	2/4	66,5	2 5/8	0,720	1 9/16
1 1/2	63,5	2 1/2	79,5	3 1/8	1065	2 3/8
2	76,0	3	85,5	3 3/8	1 400	3 1/16
2 1/2	92,0	3 5/8	92,0	3 5/8	2 500	5 1/2
3	108,0	4 1/4	108,0	4 1/4	3 700	8 5/32
4	140,0	5 1/2	120,0	4 3/4	6 500	14 5/16



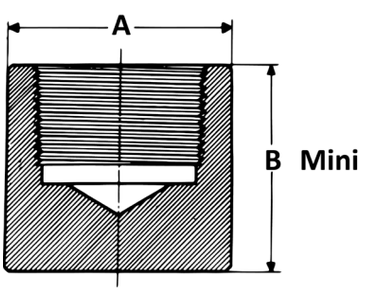
HALF COUPLINGS

1/4	19,0	3/4	17,5	11/16	0,025	1/16
3/8	22,0	7/8	19,0	3/4	0,030	1/16
1/2	28,5	1 1/8	24,0	15/16	0,070	3/16
3/4	35,0	1 3/8	25,5	1	0,100	1/4
1	44,5	1 3/4	30,0	1 3/16	0,210	7/16
1 1/4	57,0	2 1/4	33,0	1 5/16	0,365	13/16
1 1/2	63,5	2 1/2	40,0	1 9/16	0,520	1 1/8
2	76,0	3	43,0	1 11/16	0,690	1 1/2
2 1/2	92,0	3 5/8	46,0	113/16	1 150	2 17/32
3	108,0	4 1/4	54,0	2 1/8	1 600	3 17/32
4	140,0	5 1/2	60,0	2 3/8	3 200	7



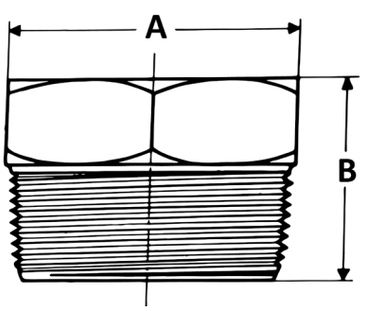
CAPS

1/4	19,0	3/4	25,5	1	0,050	1/8
3/8	22,0	7/8	25,5	1	0,035	3/16
1/2	28,5	1 1/8	32,5	1 9/32	0,115	1/4
3/4	35,0	1 3/8	37,0	1 7/16	0,200	7/16
1	44,5	1 3/4	42,0	1 5/8	0,310	11/16
1 1/4	57,0	2 1/4	45,5	1 13/16	0,600	1 5/16
1 1/2	63,5	2 1/2	46,5	1 3/4	0,725	1 5/8
2	76,0	3	48,0	1 7/8	1 050	2 5/16
2 1/2	92,0	3 5/8	75,0	2 15/18	3 350	7 3/8
3	108,0	4 1/4	81,0	3 3/18	5 300	11 11/16
4	140,0	5 1/2	88,0	3 15/32	10 200	22 1/2



HEXAGONAL HEAD PLUGS

1/4	16,0	5/8	23,0	29/32	0,025	1/16
3/8	19,0	1/4	25,5	1	0,035	3/32
1/2	22,0	7/8	29,0	1 5/32	0,070	3/16
3/4	27,0	1 1/16	31,5	1 1/4	0,140	5/16
1	35,0	1 3/8	35,5	1 13/32	0,210	7/16
1 1/4	46,0	113/16	41,5	1 5/8	0,415	15/16
1 1/2	50,0	2	43,0	1 11/16	0,575	1 1/4
2	63,0	2 1/2	46,0	1 13/16	1 000	2 3/16
2 1/2	77,0	3 1/32	59,0	2 5/16	1 850	4 1/16
3	94,0	3 11/16	62,5	2 15/32	3 000	6 5/8
4	116,0	4 9/16	77,0	3 1/32	6 000	13 1/4



Dimensions in accordance with specifications ANSI B 16.11 - 1973 and BS 3799 - 1974. Threads in accordance with specifications AP1.5B or ANSI B2.1

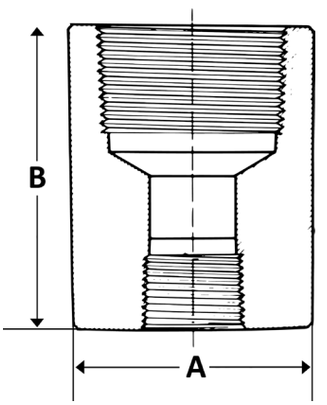
FITTINGS

TYPES, DIMENSIONS AND WEIGHTS OF FORGED STEEL FITTINGS 3000LB SERIES

ANSI B16.11 - ASTM - A 105

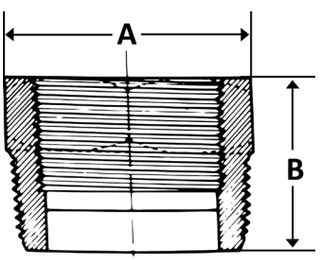
SCREWED

REDUCING COUPLINGS



Size	A		B		Appr. Weight	
	mm	inches	mm	inches	Kg.	Lbs
3/8 X 1/4	22,0	7/8	38,0	1 1/2	0,070	3/16
1/2 X 3/8	28,5	1 1/8	47,5	1 7/8	0,150	5/16
1/2 X 1/4	28,5	1 1/8	47,5	1 7/8	0,190	13/32
3/4 X 1/2	35,0	1 3/8	51,0	2	0,235	1/2
3/4 X 1/4	35,0	1 3/8	51,0	2	0,285	5/8
1 X 3/4	44,5	1 3/4	60,5	2 3/8	0,500	1 1/8
1 X 1/2	44,5	1 3/4	60,5	2 3/8	0,540	1 3/16
1 X 1/4	44,5	1 3/4	60,5	2 3/8	0,575	1 17/64
1 1/4 X 1	57,0	2 1/4	66,5	2 5/8	0,830	1 13/16
1 1/2 X 1	63,5	2 1/2	79,5	3 1/8	1 280	2 13/16
1 1/2 X 3/4	63,5	2 1/2	79,5	3 1/8	1 370	3
1 1/2 X 1/2	63,5	2 1/2	79,5	3 1/8	1 485	3 1/4
2 X 1 1/2	76,0	3	85,5	3 3/8	1 610	3 9/16
2 X 1	76,0	3	85,5	3 3/8	1 925	4 1/4
2 1/2 X 2	92,0	3 5/8	92,0	3 5/8	2 765	6 1/16
3 X 2	108,0	4 1/4	108,0	4 1/4	5 080	11 3/16
4 X 2	140,0	5 1/2	120,0	4 3/4	8 230	18 1/8
4 X 3	140,0	5 1/2	120,0	4 3/4	9 620	21 5/32

HEXAGONAL HEAD BUSHINGS



3/8 X 1/4	19,0	3/4	25,5	1	0,030	1/16
1/2 X 3/8	22,0	7/8	29,0	1 5/32	0,040	1/8
1/2 X 1/4	22,0	7/8	29,0	1 5/32	0,055	1/8
3/4 X 1/2	27,0	1 1/16	31,5	1 1/4	0,085	3/16
3/4 X 1/4	27,0	1 1/16	31,5	1 1/4	0,120	9/32
1 X 3/4	35,0	1 3/8	35,5	1 13/32	0,105	1/4
1 X 1/2	35,0	1 3/8	35,5	1 13/32	0,150	11/32
1 X 1/4	35,0	1 3/8	35,5	1 13/32	0,190	7/16
1 1/4 X 1	46,0	1 13/16	41,5	1 5/8	0,215	1/2
1 1/2 X 1	50,0	1 31/32	43,0	1 11/16	0,380	7/8
1 1/2 X 3/4	50,0	1 31/32	43,0	1 11/16	0,465	1
1 1/2 X 1/2	50,0	1 31/32	43,0	1 11/16	0,505	1 1/8
2 X 1 1/2	63,0	2 1/2	46,0	1 13/16	0,470	1 1/16
2 X 1	63,0	2 1/2	46,0	1 13/16	0,815	1 13/16
2 1/2 X 2	77,0	3 1/32	59,0	2 5/16	0,975	2 1/8
3 X 2	94,0	3 11/16	62,5	2 15/32	1 445	3 3/16
4 X 2	116,0	4 9/16	77,0	3 1/32	3 000	4 5/8
4 X 3	116,0	4 9/16	77,0	3 1/32	4 700	10 9/32

Dimensions in accordance with specifications ANSI B 16.11 - 1973 and BS 3799 - 1974.
Threads in accordance with specifications AP1.5B or ANSI B2.1

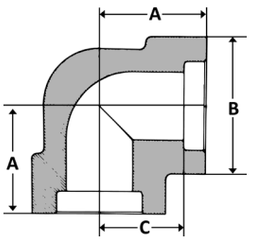
FITTINGS

TYPES, DIMENSIONS AND WEIGHTS OF FORGED STEEL FITTINGS 3000LB SERIES

ANSI B16.11 - ASTM - A 105

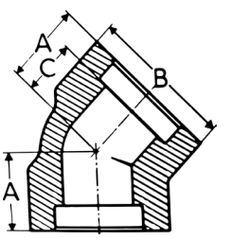
SOCKET WELD

90° ELBOWS



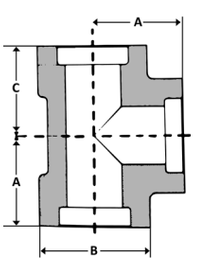
Size	A		B		C		Appr. Weight	
	mm	inches	mm	inches	mm	inches	Kg.	Lbs
1/4	20,5	13/16	22,0	7/8	11,5	15/32	0,065	9/64
3/8	24,5	31/32	26,5	1 1/16	13,0	17/32	0,130	9/32
1/2	28,5	1 1/8	34,0	1 11/32	15,5	5/8	0,230	1/2
3/4	33,5	1 5/16	38,5	1 1/2	18,5	3/4	0,300	21/32
1	38,0	1 1/2	46,5	1 27/32	22,0	7/8	0,490	1 1/16
1 1/4	44,5	1 3/4	56,5	2 7/32	27,0	1 1/16	0,760	1 11/16
1 1/2	51,0	2	62,5	2 15/32	32,0	1 9/32	1 050	2 5/16
2	60,5	2 3/8	76,0	3	38,0	1 1/2	1 730	3 13/16
2 1/2	63,5	2 1/12	92,0	3 5/8	41,0	1 5/8	2 550	5 5/8
3	82,5	3 1/4	110,0	4 11/32	57,0	2 1/4	4 000	8 13/16
4	114,5	4 1/2	152,0	6	67,0	2 21/32	14 300	31 1/2

45° ELBOWS



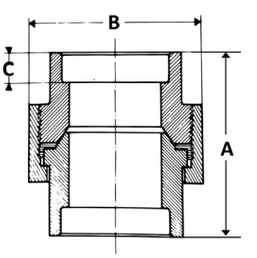
1/4	22,5	7/8	34,0	1 11/32	9,5	3/8	0,195	7/16
3/8	22,5	7/8	34,0	1 11/32	9,5	3/8	0,180	13/32
1/2	22,5	7/8	34,0	1 11/32	12,0	15/32	0,170	3/8
3/4	25,0	63/64	38,5	1 1/2	12,0	15/32	0,230	1/2
1	28,5	1 1/8	46,5	1 27/32	14,5	19/32	0,345	3/4
1 1/4	33,5	1 5/16	56,5	2 7/32	17,5	11/16	0,650	1 7/16
1 1/2	38,0	1 1/2	62,5	2 15/32	21,0	13/16	0,795	1 3/4
2	41,5	1 5/8	76,0	3	25,5	1	1 200	2 5/8
2 1/2	50,5	2	92,0	3 5/8	28,5	1 1/8	2 200	4 27/32
3	63,5	2 1/2	122,0	4 13/16	32,0	1 9/32	7 100	15 21/32
4	80,0	3 5/32	152,0	6	42,0	1 21/32	10 300	22 11/16

TEES



1/4	24,5	31/32	26,5	1 1/16	11,5	15/32	0,175	3/8
3/8	24,5	31/32	26,5	1 1/16	13,0	17/32	0,155	5/16
1/2	28,5	1 1/8	34,0	1 11/32	15,5	5/8	0,280	5/8
3/4	33,5	1 5/16	38,5	1 1/2	18,5	3/4	0,370	13/16
1	38,0	1 1/2	46,5	1 27/32	22,0	7/8	0,565	1 1/4
1 1/4	44,5	1 3/4	56,5	2 7/32	27,0	1 1/16	0,870	1 15/16
1 1/2	51,0	2	62,5	2 15/32	32,0	1 9/32	1 280	2 13/16
2	60,5	2 3/8	76,0	3	38,0	1 1/2	1 795	4
2 1/2	63,5	2 1/2	92,0	3 5/8	41,0	1 5/8	2 845	6 1/4
3	82,5	3 1/4	110,0	4 11/32	57,0	2 1/4	5 500	12 1/8
4	114,5	4 1/2	152,0	6	67,0	2 21/32	20 000	44

FEMALE-FEMALE UNIONS



1/4	42,0	1 21/32	36,0	1 7/16	9,5	3/8	0,150	11/32
3/8	47,0	1 27/32	41,0	1 5/8	9,5	3/8	0,220	1/2
1/2	52,0	2 1/16	46,0	1 13/16	9,5	3/8	0,380	27/32
3/4	57,0	2 1/4	56,0	2 7/32	13,0	1/2	0,460	1
1	63,0	2 15/32	65,0	2 9/16	13,0	1/2	0,700	1 9/16
1 1/4	72,0	2 27/32	78,0	3 1/16	13,0	1/2	1 200	2 5/8
1 1/2	78,0	3 1/16	86,0	3 13/32	13,0	1/2	1 500	3 5/16
2	89,0	3 1/2	103,0	4 1/16	16,0	5/8	2 575	5 11/16
2 1/2	114,0	4 1/2	122,0	4 13/16	16,0	5/8	6 100	13 7/16
3	130,0	5 1/8	144,0	5 11/16	16,0	5/8	8 800	19 3/8
4	150,0	5 29/32	180,0	7 3/32	20,0	25/32	13 500	29 3/4

Dimensions in accordance with specifications ANSI B 16.11 - 1973 and BS 3799 - 1974.

FITTINGS

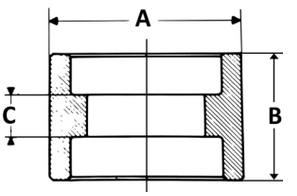
TYPES, DIMENSIONS AND WEIGHTS OF FORGED STEEL FITTINGS 3000LB SERIES

ANSI B16.11 - ASTM - A 105

SOCKET WELD

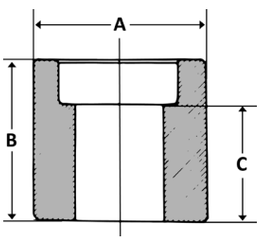
COUPLINGS

Size	A		B		C		Appr. Weight	
	mm	inches	mm	inches	mm	inches	Kg.	Lbs
1/4	22,5	7/8	25,5	1	6,5	1/4	0,055	1/8
3/8	26,5	1 1/16	25,5	1	6,5	1/4	0,060	1/8
1/2	32,0	1 1/4	28,5	1 1/8	9,5	3/8	0,110	1/4
3/4	38,0	1 1/2	35,5	1 3/8	9,5	3/8	0,170	3/8
1	46,5	1 27/32	39,0	1 1/2	13,0	1/2	0,270	5/8
1 1/4	56,0	2 7/32	39,0	1 1/2	13,0	1/2	0,350	3/4
1 1/2	62,5	2 15/32	39,0	1 1/2	13,0	1/2	0,425	1 5/16
2	76,5	3	51,0	2	19,0	3/4	0,715	1 9/16
2 1/2	93,0	3 21/32	51,0	2	19,0	3/4	1 130	2 1/2
3	110,5	4 11/32	51,0	2	19,0	3/4	1 500	3 5/16
4	138,5	5 15/32	60,0	2 11/32	19,0	3/4	2 500	5 1/2



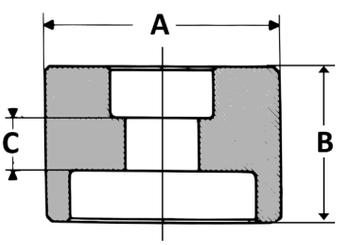
HALF COUPLINGS

1/4	22,5	7/8	25,5	1	16,0	5/8	0,060	1/8
3/8	26,5	1 1/16	27,0	1 1/16	17,5	11/16	0,075	3/16
1/2	32,0	1 1/4	32,0	1 1/4	22,5	7/8	0,140	5/16
3/4	38,0	1 1/2	37,0	1 7/16	24,0	15/16	0,200	7/16
1	46,5	1 27/32	41,5	1 5/8	28,5	1 1/8	0,335	3/4
1 1/4	56,0	2 7/32	43,5	1 23/32	30,5	1 3/16	0,480	1 1/16
1 1/2	62,5	2 15/32	45,0	1 3/4	32,0	1 1/4	0,570	1 1/4
2	76,5	3	57,5	2 1/4	41,5	1 5/8	1 000	2 3/16
2 1/2	93,0	3 21/32	59,0	2 5/16	43,0	1 11/16	1 550	3 7/16
3	110,5	4 11/32	60,5	2 3/8	44,5	1 3/4	2 130	4 11/16
4	138,5	5 15/32	70,0	2 3/4	50,0	1 31/32	3 650	8 1/16



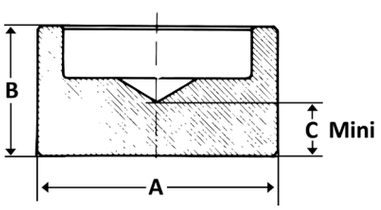
REDUCING COUPLINGS

3/8 x 1/4	26,5	1 1/16	25,5	1	6,5	1/4	0,070	3/16
1/2 x 3/8	32,0	1 1/4	28,5	1 1/8	9,5	3/8	0,120	1/4
1/2 x 1/4	32,0	1 1/4	28,5	1 1/8	9,5	3/8	0,130	9/32
3/4 x 1/2	38,0	1 1/2	32,0	1 1/4	9,5	3/8	0,195	7/16
3/4 x 1/4	38,0	1 1/2	32,0	1 1/4	9,5	3/8	0,220	1/2
1 x 3/4	46,5	1 27/32	39,0	1 1/2	13,0	1/2	0,315	11/16
1 x 1/2	46,5	1 27/32	39,0	1 1/2	16,5	21/32	0,350	25/32
1 x 1/4	46,5	1 27/32	39,0	1 1/2	16,5	21/32	0,380	27/32
1 1/4 x 1	56,0	2 7/32	39,0	1 1/2	13,0	1/2	0,435	15/16
1 1/2 x 1	62,5	2 15/32	39,0	1 1/2	13,0	1/2	0,580	1 9/32
1 1/2 x 3/4	62,5	2 15/32	39,0	1 1/2	13,0	1/2	0,630	1 3/8
1 1/2 x 1/2	62,5	2 15/32	35,5	1 13/32	13,0	1/2	0,670	1 1/2
2 x 1 1/2	76,5	3	48,0	1 29/32	19,0	3/4	0,920	2 1/32
2 x 1	76,5	3	48,0	1 29/32	19,0	3/4	1 140	2 17/32



CAPS

1/4	22,5	7/8	16,0	5/8	6,5	1/4	0,035	3/32
3/8	26,5	1 1/16	16,0	5/8	5,5	1/4	0,045	1/8
1/2	32,0	1 1/4	17,5	11/16	8,0	5/16	0,065	5/32
3/4	38,0	1 1/2	22,5	7/8	9,5	3/8	0,125	1/4
1	46,5	1 27/32	25,0	1	12,0	15/32	0,210	15/32
1 1/4	56,0	2 7/32	26,0	1 1/32	13,0	1/2	0,370	13/16
1 1/2	62,5	2 15/32	28,0	1 1/8	15,0	19/32	0,600	1 5/16
2	76,5	3	34,0	1 11/32	19,0	3/4	1 030	2 5/16
2 1/2	93,0	3 21/32	37,0	1 15/32	21,0	27/32	1 500	3 5/16
3	110,5	4 11/32	40,0	1 19/32	24,0	15/16	2 300	5 3/32
4	138,5	5 15/32	45,0	1 25/32	25,0	1	4 000	8 3/16



Dimensions in accordance with specifications ANSI B 16.11 - 1973 and BS 3799 - 1974.

FORGED STEEL PIPE FITTINGS SCREWED AND SOCKET WELD PRESSURE TEMPERATURE TABLES (IN PSI)

Pressure Class	2000 Lb				3000 Lb				4000 Lb				6000 Lb			
Service Temperature Degree F.	Carbon Steel A-105 Gr.2	¼ Cr. ½ Mo. A-182 Gr. F11	5 Cr. ½ Mo. A-182 Gr. F5	A-182 Grade F-316	Carbon Steel A-105 Gr.2	¼ Cr. ½ Mo. A-182 Gr. F11	5 Cr. ½ Mo. A-182 Gr. F5	A-182 Grade F-316	Carbon Steel A-105 Gr.2	¼ Cr. ½ Mo. A-182 Gr. F11	5 Cr. ½ Mo. A-182 Gr. F5	A-182 Grade F-316	Carbon Steel A-105 Gr.2	¼ Cr. ½ Mo. A-182 Gr. F11	5 Cr. ½ Mo. A-182 Gr. F5	A-182 Grade F-316
20 to 100	2000	2000	2000	2000	3000	3000	3000	3000	4000	4000	4000	4000	6000	6000	6000	6000
150	1970	1970	1970	1970	2955	2955	2955	2955	3940	3940	3940	3940	5915	5915	5915	5915
200	1940	1940	1949	1940	2915	2915	2915	2915	3885	3885	3885	3885	5830	5830	5830	5830
250	1915	1915	1915	1915	2875	2875	2875	2875	3830	3830	3830	3830	5750	5750	5750	5750
300	1895	1895	1895	1895	2845	2845	2845	2845	3790	3790	3790	3790	5690	5690	5690	5690
350	1875	1875	1875	1875	2810	2810	2810	2810	3750	3750	3750	3750	5625	5625	5625	5625
400	1850	1850	1850	1850	2775	2775	2775	2775	3700	3700	3700	3700	5550	5550	5550	5550
450	1810	1810	1810	1810	2715	2715	2715	2715	3620	3620	3620	3620	5430	5430	5430	5430
500	1735	1735	1735	1735	2605	2605	2605	2605	3470	3470	3470	3470	5210	5210	5210	5210
550	1640	1640	1640	1640	2460	2460	2460	2460	3280	3280	3280	3280	4925	4925	4925	4925
600	1540	1540	1540	1540	2310	2310	2310	2310	3080	3080	3080	3080	4620	4620	4620	4620
650	1430	1430	1430	1430	2150	2150	2150	2150	2865	2865	2865	2865	4300	4300	4300	4300
700	1305	1340	1340	1370	1960	2010	2010	2055	2610	2680	2680	2740	3920	4025	4025	4110
750	1180	1245	1245	1305	1775	1870	1870	1960	2365	2495	2495	2610	3550	3745	3745	3920
800	1015	1155	1155	1240	1525	1735	1735	1865	2030	2310	2310	2485	3050	3470	3470	3730
850	830(1)	1060	1060	1180	1250(1)	1595	1595	1770	1665(1)	2125	2125	2360	2500(1)	3190	3190	3540
875	725(1)	1015	1015	1145	1090(1)	1525	1525	1720	1450(1)	2035	2035	2295	2180(1)	3055	3055	3445
900	615(1)	970	970	1115	925(1)	1455	1455	1675	1235(1)	1940	1940	2230	1855(1)	2915	2915	3350
925	520(1)(2)	925	925	1085	785(1)(2)	1385	1385	1630	1045(1)(2)	1850	1850	2170	1570(1)(2)	2775	2775	3260
950	425(1)(2)	880	880	1055	640(1)(2)	1320	1320	1580	855(1)(2)	1760	1760	2110	1285(1)(2)	2640	2640	3165
975	330(1)(2)	830	830	1020	500(1)(2)	1250	1250	1535	655(1)(2)	1665	1665	2045	1000(1)(2)	2500	2500	3070
1000	235(1)(2)	740	695	990	355(1)(2)	1115	1040	1485	475(1)(2)	1485	1390	1980	715(1)(2)	2230	2085	2975
1025	-	630(1)	595	960	-	950(1)	890	1440	-	1265(1)	1190	1920	-	1900(1)	1785	2880
1050	-	520(1)	495	925	-	785(1)	740	1390	-	1045(1)	990	1855	-	1570(1)	1485	2785
1075	-	450(1)	405	895	-	675(1)	605	1345	-	900(1)	810	1790	-	1355(1)	1215	2690
1100	-	380(1)	315	865	-	570(1)	470	1295	-	760(1)	630	1730	-	1145(1)	945	2595
1125	-	310(1)(2)	260	830	-	465(1)(2)	390	1250	-	620(1)(2)	520	1665	-	930(1)(2)	:785	2500
1150	-	235(1)(2)	210	810	-	355(1)(2)	315	1215	-	475(1)(2)	420	1620	-	715(1)(2)	630	2430
1175	-	175(1)(2)	175	725	-	265(1)(2)	265	1090	-	350(1)(2)	350	1455	-	530(1)(2)	530	2185
1200	-	115(1)(2)	140	645	-	170(1)(2)	215	970	-	230(1)(2)	285	1295	-	345(1)(2)	430	1945

NOTES:

(1) Product used within the jurisdiction of Section 1, Power Boilers, of the ASME Boiler and Pressure Vessel Code is subject to the same maximum temperature limitations placed upon the material in Table P7, 1956 edition thereof.

(2) Product used within the jurisdiction of Section 1, Power Piping, of the ASA Code for Pressure Piping, B31.1, is subject to the same maximum temperature limitations upon piping of the same general composition in Table 2a of ASA B31.1 - 1955.

Steel valves, flanges, fittings, and unions are classified by either the Primary Rating or the Cold Working Pressure Rating depending on the type of product. The Primary Rating is a pressure rating established by standards and accepted practice at an elevated temperature. The Cold Working Pressure Rating is the rating at ambient temperature (minus 20°F. to 100°F.). This rating is frequently referred to as the CWP (Cold Working Pressure) or WOG (Water, Oil, and Gas) Rating.

FITTINGS

MALLEABLE CAST IRON PIPE FITTINGS TO SANS 509:1955 AND BS 143:1952 (BSEN 10241:2000)

WORKING PRESSURES AND TEMPERATURES

Malleable fittings may be used for water, gas, steam or air services for working pressures which do not exceed 14 bars for water and 10 bars in the case of steam, gas or oil. Working temperatures should not exceed 232°C (450°F).

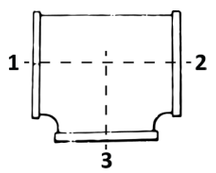
TOLERANCES

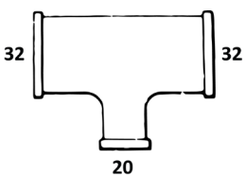
The plus or minus tolerances allowed on the length of sockets and nipples and centre to face dimensions of elbows, tees, crosses and bends shall be as follows:

Lengths up to	in	1 1/4"	2"	3"	4"	6"	8"	12"
	mm	**32**	**51**	**76**	**102**	**152**	**203**	**305**
Tolerances	in	1.5	2.0	2.5	3.0	3.5	4.0	5.1
	mm	**0.06**	**0.08**	**0.10**	**0.12**	**0.14**	**0.16**	**0.20**

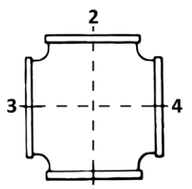
METHOD OF SPECIFYING OUTLETS

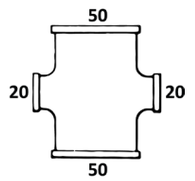
Reducing fittings should be ordered by specifying sizes in the order shown by the numbered diagrams.





32 x 32 x 20 mm

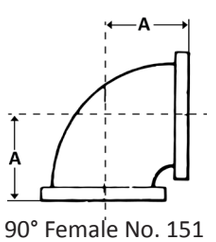




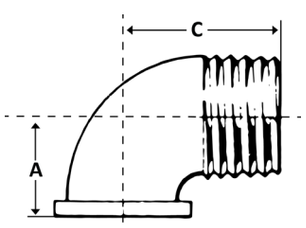
50 x 50 x 20 mm

ELBOWS

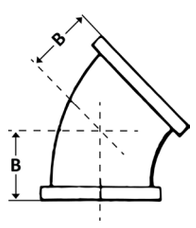
Size in	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6
Size mm	**6**	**8**	**10**	**15**	**20**	**25**	**32**	**40**	**50**	**65**	**80**	**100**	**125**	**150**
A **mm**	**18**	**21**	**24**	**28**	**33**	**38**	**44**	**49**	**57**	**69**	**78**	**96**	**114**	**130**
B **mm**	**18**	**19**	**21**	**22**	**25**	**28**	**33**	**36**	**43**	**50**	**55**	**66**	**78**	**88**
C **mm**	**25**	**30**	**37**	**41**	**48**	**54**	**62**	**68**	**83**	**98**	**115**	**144**	**-**	**-**



90° Female No. 151



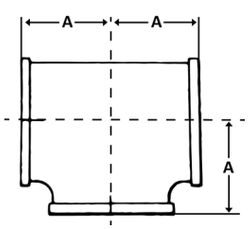
90° M & F. No. 152



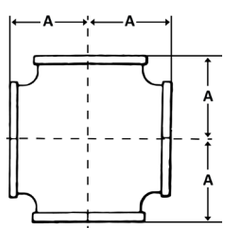
95° Female No. 155

TEES AND CROSSES

Size in	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6
Size mm	**6**	**8**	**10**	**15**	**20**	**25**	**32**	**40**	**50**	**65**	**80**	**100**	**125**	**150**
A **mm**	**18**	**21**	**24**	**28**	**33**	**40**	**44**	**49**	**57**	**69**	**78**	**96**	**114**	**130**



No. 161



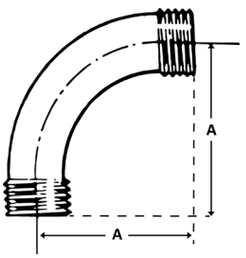
No. 171

FITTINGS

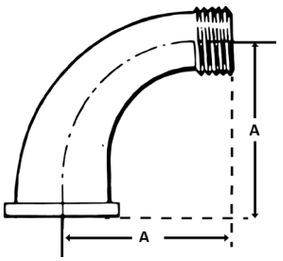
MALLEABLE CAST IRON PIPE FITTINGS TO SANS 509:1955 AND BS 143:1952 (BSEN 10241:2000)

BENDS

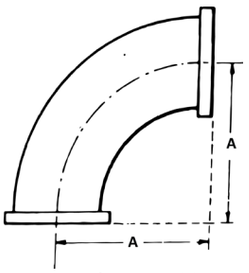
Size in	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6
Size mm	**6**	**8**	**10**	**15**	**20**	**25**	**32**	**40**	**50**	**65**	**80**	**100**	**125**	**150**
A **mm**	**25**	**30**	**37**	**45**	**51**	**65**	**80**	**90**	**102**	**114**	**127**	**165**	**190**	**230**



Male No. 191



M & F. No. 203

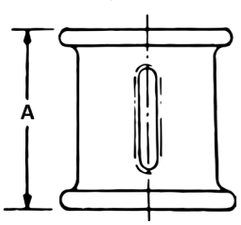


Female No. 193

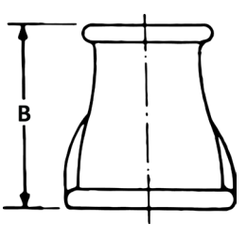
SOCKETS

Size in	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6
Size mm	**6**	**8**	**10**	**15**	**20**	**25**	**32**	**40**	**50**	**65**	**80**	**100**	**125**	**150**
A **mm**	**24**	**27**	**30**	**33**	**40**	**43**	**49**	**54**	**65**	**73**	**81**	**94**	**108**	**121**
B **mm**	**-**	**25**	**29**	**32**	**37**	**43**	**52**	**59**	**71**	**83**	**94**	**111**	**130**	**149**

The size of the reducing sockets in the above table is that of the larger end. When ordering, the required size at the smaller end should also be given.



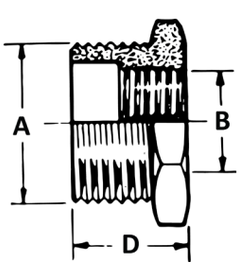
Parallel Thread No. 176



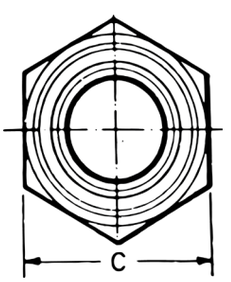
Taper Thread No. 179

BUSHES

Nom. Size A x B	A in	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6
	A **mm**	**8**	**10**	**15**	**20**	**25**	**32**	**40**	**50**	**65**	**80**	**100**	**125**	**150**
	B **mm**	**6**	**6** **8**	**6** **8** **10**	**8** **10** **15**	**8** **10** **15** **20**	**10** **15** **20** **25**	**8** **10** **15** **20** **25** **32**	**10** **15** **20** **25** **32** **40**	**-** **25** **32** **40** **50** **-**	**-** **25** **32** **50** **65** **-**	**25** **32** **40** **50** **65** **80**	**50** **65** **80** **100** **-** **-**	**50** **65** **80** **100** **125** **-**
	C **mm**	**27**	**30**	**33**	**40**	**43**	**49**	**54**	**65**	**73**	**81**	**94**	**108**	**121**
	D **mm**	**25**	**29**	**32**	**37**	**43**	**52**	**59**	**71**	**83**	**94**	**111**	**130**	**149**



Taper thread

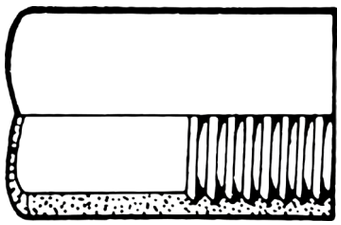


WROUGHT STEEL FITTINGS BS 21 AND BS 1740 - 1965 (BSEN 10241:2000)

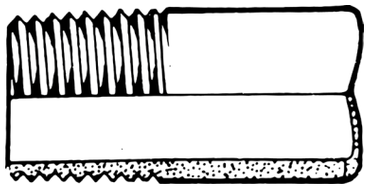
WORKING PRESSURES and TEMPERATURES

Wrought steel fittings to BS 1740 may be used for water, gas, steam or air services and are screwed for use with medium and heavy quality pipe to SANS 62. Maximum temperatures shall not exceed 232°C (450°F). Test pressure 48.5 bar.

DETAILS OF DIMENSIONS AND THREADS



Female thread (parallel)



Male thread (taper)

Size		Min. o.d. X	Minimum o.d. of body behind male thread Y		Maximum i.d. of body behind female thread D		Number of Threads per inch
mm	in	**mm**	**mm**	in	**mm**	in	
6	1/8	**15**	**9.5**	0.386	**8.5**	0.337	28
8	1/4	**18.5**	**13.2**	0.522	**11.5**	0.451	19
10	3/8	**22**	**16.8**	0.660	**15.0**	0.589	19
15	1/2	**27**	**21.1**	0.831	**18.6**	0.734	14
20	3/4	**32.5**	**26.6**	1.047	**24.1**	0.950	14
25	1	**39.5**	**33.4**	1.316	**30.3**	1.193	11
32	1 1/4	**49**	**42.1**	1.657	**39.0**	1.534	11
40	1 1/2	**56**	**48.0**	1.889	**44.9**	1.766	11
50	2	**68**	**59.8**	2.354	**56.6**	2.231	11
65	2 1/2	**84**	**75.4**	2.969	**72.3**	2.844	11
80	3	**98**	**88.1**	3.469	**85.0**	3.344	11
100	4	**124**	**113.2**	4.459	**110.0**	4.334	11
125	5	**151**	**138.7**	5.459	**135.4**	5.334	11
150	6	**178**	**164.0**	6.459	**161.0**	6.334	11

SOCKETS

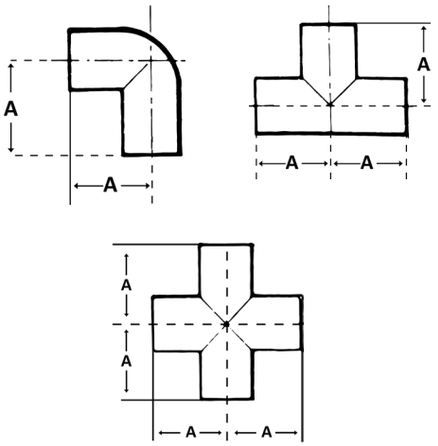
Parallel socket

Reducing socket

Size		Min. outside diameter		Min. length (Parallel sockets)	
mm	in	**mm**	in	**mm**	in
6	1/8	15	19/32	19	3/4
8	1/4	18.5	23/32	27	1 1/16
10	3/8	22	7/8	28	1 1/8
15	1/2	27	1 1/16	37	1 7/16
20	3/4	32.5	1 9/32	39	1 9/16
25	1	39.5	1 9/16	46	1 13/16
32	1 1/4	49	1 15/16	51	2
40	1 1/2	56	2 3/16	51	2
50	2	68	2 11/16	60	2 3/8
65	2 1/2	84	3 5/16	69	2 11/16
80	3	98	3 7/8	75	2 15/16
100	4	124	4 7/8	87	3 7/16
125	5	151	5 15/16	96	3 3/4
150	6	178	7	96	3 3/4

WROUGHT STEEL FITTINGS BS 21 AND BS 1740 - 1965 (BSEN 10241:2000)

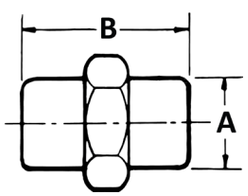
ELBOWS, TEES AND CROSSES



Size		Min. outside diameter	Min. length centre to face A
mm	inches	**mm**	**mm**
6	1/8	**15**	**16**
8	1/4	**18.5**	**22**
10	3/8	**22**	**24**
15	1/2	**27**	**32**
20	3/4	**32.5**	**35**
25	1	**39.5**	**43**
32	1 1/4	**49**	**50**
40	1 1/2	**56**	**52**
50	2	**68**	**65**
65	2 1/2	**84**	**80**
80	3	**98**	**102**
100	4	**124**	**114**
125	5	**151**	**140**
150	6	**178**	**160**

Details of Reducing elbows, tees and crosses are available on application.

SOCKET UNIONS

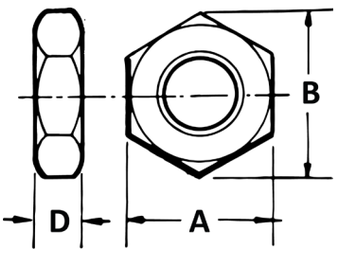


Size		Min. outside diameter	Min. length centre to face A
mm	inches	**mm**	**mm**
6	1/8	**15**	**40**
8	1/4	**18.5**	**45**
10	3/8	**22**	**50**
15	1/2	**27**	**57**
20	3/4	**32.5**	**67**
25	1	**39.5**	**80**
32	1 1/4	**49**	**86**
40	1 1/2	**56**	**98**
50	2	**68**	**111**
65	2 1/2	**84**	**121**
80	3	**98**	**133**
100	4	**124**	**160**
125	5	**151**	**184**
150	6	**178**	**210**

NOTE: Unions are normally supplied with flat seats and fitted with a washer. Other types of seats are obtainable if required.

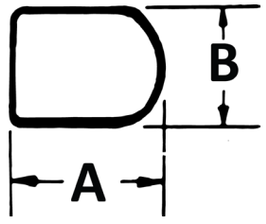
WROUGHT STEEL FITTINGS BS 21 AND BS 1740 - 1965 (BSEN 10241:2000)

BACKNUTS



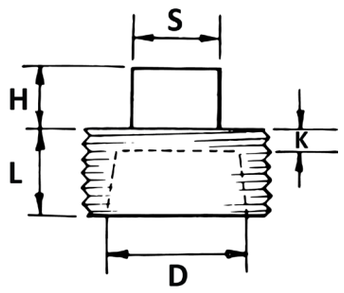
Size		Width across flats A	Thickness D	Width across corners B
mm	in	**mm**	**mm**	**mm**
6	1/8	**19**	**8**	**22**
8	1/4	**22**	**8**	**25**
10	3/8	**27**	**7**	**32**
15	1/2	**32**	**8**	**36.5**
20	3/4	**36.5**	**9**	**43**
25	1	**46**	**10**	**54**
32	1 1/4	**60**	**11**	**70**
40	1 1/2	**65**	**12**	**73**
50	2	**78**	**14**	**90.5**
65	2 1/2	**97**	**18**	**111**
80	3	**114**	**21**	**132**
100	4	**140**	**22**	**162**
125	5	**172**	**24**	**198**
150	6	**197**	**25**	**227**

CAPS



Size		Outside diameter B	Minimum overall length A
mm	in	**mm**	**mm**
6	1/8	**15**	**19**
8	1/4	**18.5**	**24**
10	3/8	**22**	**27**
15	1/2	**27**	**37**
20	3/4	**32.5**	**40**
25	1	**39.5**	**45**
32	1 1/4	**49**	**51**
40	1 1/2	**56**	**54**
50	2	**68**	**60**
65	2 1/2	**84**	**67**
80	3	**98**	**73**
100	4	**124**	**86**
125	5	**151**	**98**
150	6	**178**	**98**

PLUGS

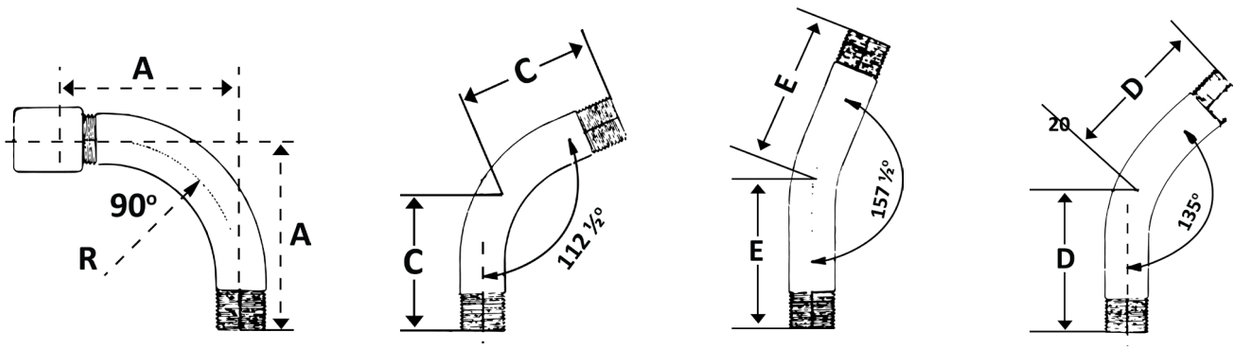


Size		Min. Length of thread for basic gauge length L	Approx. size of square S	Approx height of square H	Maximum internal diameter D	Minimum thickness of metal K
mm	in	**mm**	**mm**	**mm**	**mm**	**mm**
6	1/8	**7**	**8**	**8**	-	-
8	1/4	**10**	**9**	**8**	-	-
10	3/8	**10**	**11**	**10**	-	-
15	1/2	**13**	**13**	**10**	-	-
20	3/4	**15**	**14**	**13**	-	-
25	1	**17**	**18**	**13**	**22**	**4**
32	1 1/4	**19**	**22**	**16**	**31**	**5**
40	1 1/2	**19**	**27**	**16**	**33**	**5**
50	2	**23**	**32**	**19**	**48**	**5**
65	2 1/2	**27**	**37**	**19**	**62**	**7**
80	3	**30**	**37**	**22**	**73**	**8**
100	4	**36**	**46**	**25**	**97**	**10**
125	5	**40**	**51**	**28**	**121**	**12**
150	6	**40**	**60**	**32**	**144**	**13**

NOTE: Plugs may be either solid or hollow, and the attention of the purchaser is drawn to the necessity of stating in his enquiry and order which pattern is required.

STEEL PIPE FITTINGS TO BS 1387 : 1967 (BSEN 10241:2000)

BENDS AND SPRINGS
Taper threads



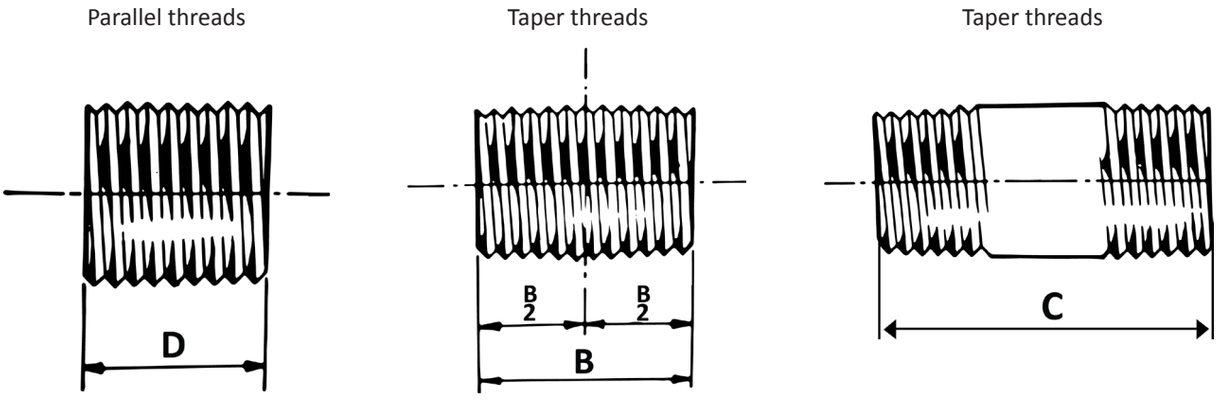
Type 1
MANUFACTURED FROM MEDIUM OR HEAVY TUBE

Size		Bends Type 1		Approximate radius		Springs					
		90°				112½°		135°		157½°	
		Approximate centre to face				Approximate centre to face					
		A		R		C		D		E	
mm	in	**mm**	in	**mm**	in	**mm**	in	**mm**	in	**mm**	in
6	1/8	**51**	2	**32**	1 1/4	**48**	1 7/8	**44**	1 3/4	**44**	1 3/4
8	1/4	**64**	2 1/2	**41**	1 5/8	**60**	2 3/8	**57**	2 1/4	**54**	2 1/8
10	3/8	**73**	2 7/8	**48**	1 7/8	**67**	2 5/8	**64**	2 1/2	**60**	2 3/8
15	1/2	**86**	3 3/8	**57**	2 1/4	**79**	3 1/8	**76**	3	**73**	2 7/8
20	3/4	**102**	4	**73**	2 7/8	**92**	3 5/8	**89**	3 1/2	**86**	3 3/8
25	1	**121**	4 3/4	**89**	3 1/2	**108**	4 1/4	**105**	4 1/8	**102**	4
32	1 1/4	**146**	5 3/4	**108**	4 1/4	**133**	5 1/4	**127**	5	**124**	4 7/8
40	1 1/2	**165**	6 1/2	**127**	5	**149**	5 7/8	**143**	5 5/8	**140**	5 1/2
50	2	**203**	8	**159**	6 1/4	**181**	7 1/8	**175**	6 7/8	**168**	6 5/8
65	2 1/2	**248**	9 3/4	**197**	7 3/4	**222**	8 3/4	**213**	8 3/8	**206**	8 1/8
80	3	**292**	11 1/2	**232**	9 1/8	**260**	10 1/4	**248**	9 3/4	**241**	9 1/2
100	4	**381**	15	**308**	12 1/8	**340**	13 3/8	**324**	12 3/4	**318**	12 1/2
125	5	**540**	21 1/4	**457**	18	**476**	18 3/4	**457**	18	**444**	17 1/2
150	6	**622**	24 1/2	**534**	21	**572**	22 1/2	**540**	21 1/4	**527**	20 3/4

BENDS - Type 1. These are socketed as illustrated.
SPRINGS - These are supplied without sockets unless otherwise ordered. The angle should be stated in enquiries and orders. Springs can be made to any angle required.

STEEL PIPE FITTINGS TO BS 1387 : 1967 (BSEN 10241:2000)

RUNNING NIPPLES, CLOSE TAPER NIPPLES, BARREL NIPPLES



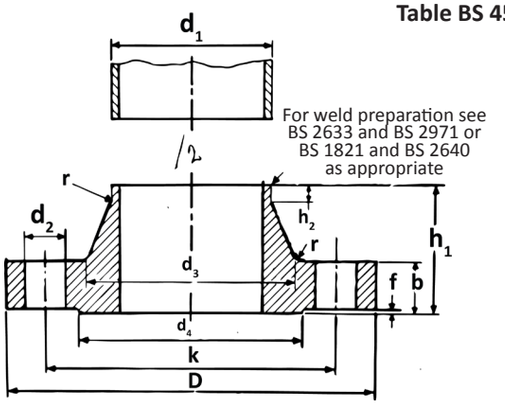
MANUFACTURED FROM MEDIUM OR HEAVY TUBE

Size		Standard lengths								
		Running nipples			Close taper nipples			Barrel nipples		
		minimum A		tol	minimum B		tol	minimum C		tol
mm	in	**mm**	in		**mm**	in		**mm**	in	
6	1/8	**13**	1/2	+1.5 mm (+1/16 in)	**19**	3/4	+1.5 mm (+1/16 in)	**32**	1 1/4	+3 mm (+1/8 in)
8	1/4	**19**	3/4		**27**	1 1/16		**38**	1 1/2	
10	3/8	**21**	13/16		**28**	1 1/8		**38**	1 1/2	
15	1/2	**27**	1 1/16		**37**	1 7/16		**51**	2	+4.5 mm (+3/16 in)
20	3/4	**30**	1 3/16		**39**	1 9/16		**54**	2 1/8	
25	1	**33**	1 5/16		**46**	1 13/16		**60**	2 3/8	
32	1 1/4	**38**	1 1/2		**51**	2		**70**	2 3/4	+6 mm (+1/4 in)
40	1 1/2	**38**	1 1/2		**51**	2		**70**	2 3/4	
50	2	**48**	1 7/8	+3 mm (+1/8 in)	**60**	2 3/8	+3 mm (+1/8 in)	**79**	3 1/8	+8 mm (+5/16 in)
65	2 1/2	**51**	2		**69**	2 11/16		**89**	3 1/2	
80	3	**57**	2 1/4		**75**	2 15/16		**102**	4	
100	4	**70**	2 3/4		**87**	3 7/16		**114**	4 1/2	
125	5	**78**	3 1/16		**96**	3 3/4		**124**	4 7/8	
150	6	**78**	3 1/16		**96**	3 3/4		**127**	5	

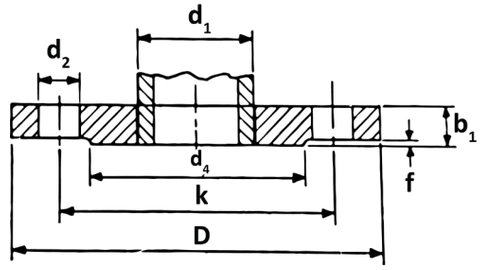
FLANGES

BS 4504; EN 1092-1; SANS 1123 AND BS 10/1962 TABLES D AND E AS AMENDED 1965

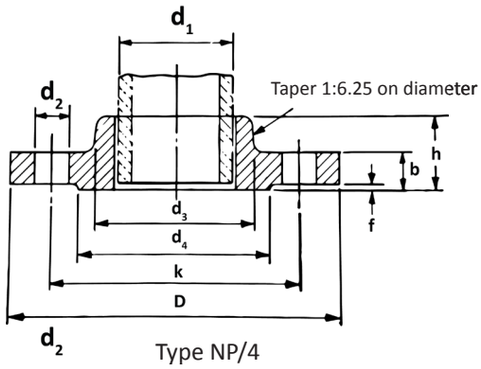
Table BS 4504 Flanges



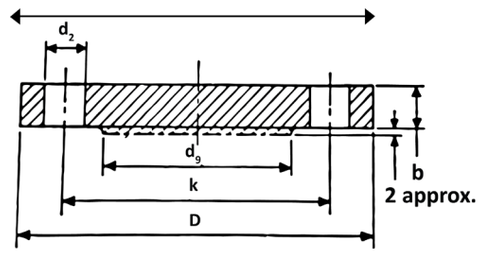
Type NP/2



Type NP/3



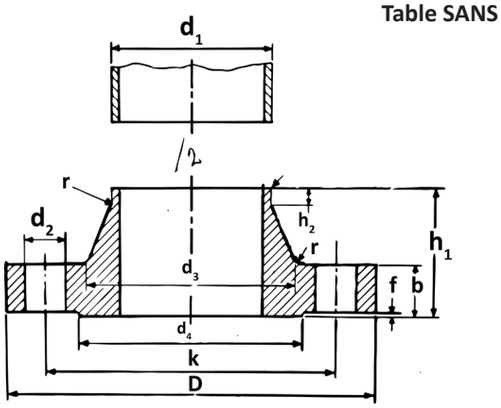
Type NP/4



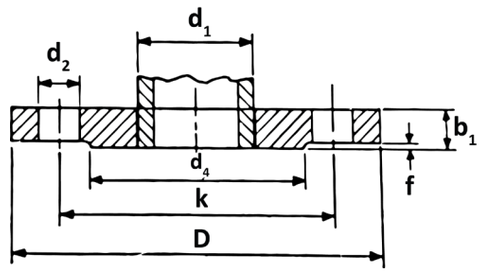
Type NP/8

NP = Nominal Pressure 6, 10, 16, 25, 40
Nominal pressure: 1 bar = 105 N/m²

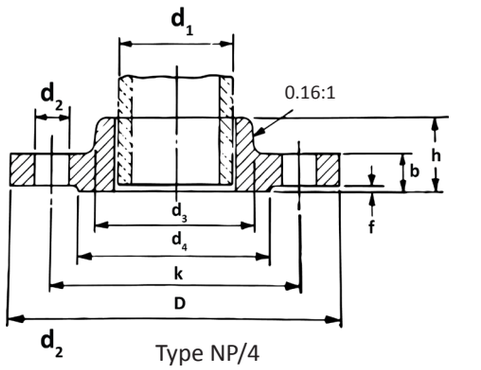
Table SANS 1123 Flanges



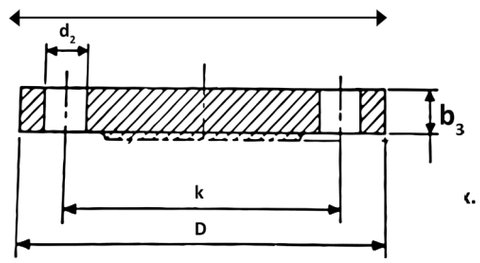
Type NP/2



Type NP/3



Type NP/4



Type NP/8

NP = Nominal Pressure 600 kPa, 1000 kPa, 1600 kPa, 2500 kPa, 4000 kPa
Nominal pressure: 1 bar = 105 N/m²

FLANGES

BS 4504; EN 1092-1; SANS 1123 AND BS 10/1962 TABLES D AND E AS AMENDED 1965

15mm Nominal Bore Pipe OD 21.3 (d1)

Table	Pipe O.D. d_1	Flange					Raised face		Bolting	Drilling			Neck			Spigot	Boss						
		D	b	b_1	h	h_1	d_4	f		No.	d_2	k	d_3	h_2 ≈	r	d_9	ds	/2 (W/N)	/3 (S/O)	/4 (Scrwd)	/8 (Blind)	T/D	T/E
BS 4504	6	80	12	12	20	30	40	2	M10	4	11	55	30	6	4	-	30	0.39	0.40	0.37	0.44	-	-
	10	95	14	14	20	35	45	2	M12	4	14	65	32	6	4	-	35	0.65	0.67	0.61	0.71	-	-
	16	95	14	14	20	35	45	2	M12	4	14	65	32	6	4	-	35	0.65	0.67	0.61	0.71	-	-
	25	95	16	16	22	38	45	2	M12	4	14	65	32	6	4	-	35	0.75	0.76	0.71	0.81	-	-
	40	95	16	16	22	38	45	2	M12	4	14	65	32	6	4	-	35	0.75	0.76	0.71	0.81	-	-
EN 1092-1	6	80	12	12	20	30	40	2	M10	4	11	55	30	6	4	-	30	0.39	0.40	0.37	0.44	-	-
	10	95	14	14	20	35	45	2	M12	4	14	65	32	6	4	-	35	0.65	0.67	0.61	0.71	-	-
	16	95	14	14	20	35	45	2	M12	4	14	65	32	6	4	-	35	0.65	0.67	0.61	0.71	-	-
	25	95	16	14	22	38	45	2	M12	4	14	65	32	6	4	-	35	0.75	0.67	0.71	0.81	-	-
	40	95	16	14	22	38	45	2	M12	4	14	65	32	6	4	-	35	0.75	0.67	0.71	0.81	-	-
SANS 1123	600	80	8	10	16	30	40	2	M10	4	11	55	30	6	4	-	30	0.26	0.33	0.25	0.37	-	-
	1000	95	8	10	14	35	45	2	M12	4	14	65	32	6	4	-	35	0.37	0.48	0.45	0.41	-	-
	1600	95	8	10	14	35	45	2	M12	4	14	65	32	6	4	-	35	0.37	0.48	0.45	0.41	-	-
	2500	95	14	14	17	38	45	2	M12	4	14	65	32	6	4	-	35	0.65	0.76	0.49	0.71	-	-
	4000	95	14	14	20	38	45	2	M12	4	14	65	32	6	4	-	35	0.65	0.76	0.49	0.71	-	-
BS 10/1962	T/D	95.2	-	4.8	-	-	-	-	12	4	-	66.7	-	-	-	-	-	-	-	-	-	0.42	-
	T/E	95.2	-	6.3	-	-	-	-	12	4	-	66.7	-	-	-	-	-	-	-	-	-	-	0.42

20mm Nominal Bore Pipe OD 26.9 (d1)

Table	Pipe O.D. d_1	Flange					Raised face		Bolting	Drilling			Neck			Spigot	Boss						
		D	b	b_1	h	h_1	d_4	f		No.	d_2	k	d_3	h_2 ≈	r	d_9	ds	/2 (W/N)	/3 (S/O)	/4 (Scrwd)	/8 (Blind)	T/D	T/E
BS 4504	6	90	14	14	24	32	50	2	M10	4	11	65	38	6	4	-	40	0.59	0.58	0.59	0.66	-	-
	10	105	15	16	24	38	58	2	M12	4	14	75	40	6	4	-	45	0.95	0.93	0.91	1.00	-	-
	16	105	16	16	24	38	58	2	M12	4	14	75	40	6	4	-	45	0.95	0.93	0.91	1.00	-	-
	25	105	18	18	26	40	58	2	M12	4	14	75	40	6	4	-	45	1.06	1.04	1.03	1.10	-	-
	40	105	18	18	26	40	58	2	M12	4	14	75	40	6	4	-	45	1.06	1.04	1.03	1.10	-	-
EN 1092-1	6	90	14	14	24	32	50	2	M10	4	11	65	38	6	4	-	40	0.59	0.53	0.59	0.66	-	-
	10	105	15	16	24	38	58	2	M12	4	14	75	40	6	4	-	45	0.95	0.93	0.91	1.00	-	-
	16	105	16	16	24	38	58	2	M12	4	14	75	40	6	4	-	45	0.95	0.93	0.91	1.00	-	-
	25	105	16	18	26	40	58	2	M12	4	14	75	40	6	4	-	45	1.06	0.93	1.03	1.10	-	-
	40	105	16	18	26	40	58	2	M12	4	14	75	40	6	4	-	45	1.06	0.93	1.03	1.10	-	-
SANS 1123	600	90	10	10	18	32	50	2	M10	4	11	65	38	6	4	-	40	0.34	0.42	0.33	0.47	-	-
	1000	105	10	10	16	38	58	2	M12	4	14	75	40	6	4	-	45	0.48	0.58	0.55	0.50	-	-
	1600	105	10	10	16	38	58	2	M12	4	14	75	40	6	4	-	45	0.48	0.58	0.55	0.50	-	-
	2500	105	14	14	19	40	58	2	M12	4	14	75	40	6	4	-	45	0.82	1.04	0.63	0.86	-	-
	4000	105	14	14	22	40	58	2	M12	4	14	75	40	6	4	-	45	0.82	1.04	0.63	0.86	-	-
BS 10/1962	T/D	101.6	4.76	-	-	-	-	-	M12	4	14.2	73.0	-	-	-	-	-	-	-	-	-	0.53	-
	T/E	101.6	6.35	-	-	-	-	-	M12	4	14.2	73.0	-	-	-	-	-	-	-	-	-	-	0.53

FLANGES

BS 4504; EN 1092-1; SANS 1123 AND BS 10/1962 TABLES D AND E AS AMENDED 1965

25mm Nominal Bore Pipe OD 33.7 (d1)																							
Table	Pipe O.D. d_1	Flange					Raised face		Bolting	Drilling			Neck			Spigot	Boss						
		D	b	b_1	h	h_1	d_4	f		No.	d_2	k	d_3	h_2 ≈	r	d_9	ds	/2 (W/N)	/3 (S/O)	/4 (Scrwd)	/8 (Blind)	T/D	T/E
BS 4504	6	100	14	14	24	35	60	2	M10	4	11	75	42	6	4	-	50	0.75	0.69	0.74	0.82	-	-
	10	115	16	16	24	38	68	2	M12	4	14	85	46	6	4	-	52	1.14	1.11	1.10	1.20	-	-
	16	115	16	16	24	38	68	2	M12	4	14	85	46	6	4	-	52	1.14	1.11	1.10	1.20	-	-
	25	115	18	18	28	40	68	2	M12	4	14	85	46	6	4	-	-	1.29	1.24	1.28	1.40	-	-
	40	115	18	18	28	40	68	2	M12	4	14	85	46	6	4	-	-	1.29	1.24	1.28	1.40	-	-
EN 1092-1	6	100	14	14	24	35	60	2	M10	4	11	75	42	6	4	-	50	0.75	0.69	0.74	0.82	-	-
	10	115	16	16	24	38	68	2	M12	4	14	85	46	6	4	-	52	1.14	1.11	1.10	1.20	-	-
	16	115	16	16	24	38	68	2	M12	4	14	85	46	6	4	-	52	1.14	1.11	1.10	1.20	-	-
	25	115	18	16	28	40	68	2	M12	4	14	85	46	6	4	-	-	1.29	1.11	1.28	1.40	-	-
	40	115	18	16	28	40	68	2	M12	4	14	85	46	6	4	-	-	1.29	1.11	1.28	1.40	-	-
SANS 1123	600	100	8	10	18	35	60	2	M10	4	11	75	42	6	4	-	50	0.43	0.49	0.43	0.59	-	-
	1000	115	8	10	16	38	68	2	M12	4	14	85	46	6	4	-	52	0.57	0.69	0.67	0.60	-	-
	1600	115	8	10	16	38	68	2	M12	4	14	85	46	6	4	-	52	0.57	0.69	0.67	0.60	-	-
	2500	115	16	16	22	40	68	2	M12	4	14	85	46	6	4	-	52	1.15	1.24	0.85	1.24	-	-
	4000	115	16	16	26	40	68	2	M12	4	14	85	46	6	4	-	52	1.15	1.24	0.85	1.24	-	-
BS 10/1962	T/D	114.3	-	4.8	-	-	-	-	M12	4	14.3	82.6	-	-	-	-	-	-	-	-	-	0.70	-
	T/E	114.3	-	7.1	-	-	-	-	M16	4	14.3	82.6	-	-	-	-	-	-	-	-	-	-	0.70

32mm Nominal Bore Pipe OD 42.4 (d1)																							
Table	Pipe O.D. d_1	Flange					Raised face		Bolting	Drilling			Neck			Spigot	Boss						
		D	b	b_1	h	h_1	d_4	f		No.	d_2	k	d_3	h_2 ≈	r	d_9	ds	/2 (W/N)	/3 (S/O)	/4 (Scrwd)	/8 (Blind)	T/D	T/E
BS 4504	6	120	14	16	26	35	70	2	M12	4	14	90	55	6	6	-	60	1.05	1.14	1.05	1.20	-	-
	10	140	16	16	26	40	78	2	M16	4	18	100	56	6	6	-	60	1.69	1.60	1.60	1.80	-	-
	16	140	16	16	26	40	78	2	M16	4	18	100	56	6	6	-	60	1.69	1.60	1.60	1.80	-	-
	25	140	18	18	30	42	78	2	M16	4	18	100	55	6	6	-	52	1.88	1.80	1.87	2.00	-	-
	40	140	18	18	30	42	78	2	M16	4	18	100	55	6	6	-	52	1.88	1.80	1.87	2.00	-	-
EN 1092-1	6	120	14	16	26	35	70	2	M12	4	14	90	55	6	6	-	60	1.05	1.14	1.05	1.20	-	-
	10	140	16	18	26	40	78	2	M16	4	18	100	56	6	6	-	60	1.69	1.80	1.60	1.80	-	-
	16	140	16	18	26	40	78	2	M16	4	18	100	56	6	6	-	60	1.69	1.80	1.60	1.80	-	-
	25	140	18	18	30	42	78	2	M16	4	18	100	55	6	6	-	52	1.88	1.80	1.87	2.00	-	-
	40	140	18	18	30	42	78	2	M16	4	18	100	55	6	6	-	52	1.88	1.80	1.87	2.00	-	-
SANS 1123	600	120	8	10	20	35	70	2	M12	4	14	90	55	6	6	-	60	0.60	0.71	0.60	0.86	-	-
	1000	140	10	10	20	40	78	2	M16	4	18	100	56	6	6	-	60	1.06	1.01	1.20	1.13	-	-
	1600	140	10	10	20	40	78	2	M16	4	18	100	56	6	6	-	60	1.06	1.01	1.20	1.13	-	-
	2500	140	18	18	26	42	78	2	M16	4	18	100	55	6	6	-	60	1.88	1.80	1.45	2.00	-	-
	4000	140	18	18	30	42	78	2	M16	4	18	100	55	6	6	-	60	1.88	1.80	1.45	2.00	-	-
BS 10/1962	T/D	120.7	-	6.3	-	-	-	-	M12	4	14.2	87.3	-	-	-	-	-	-	-	-	-	0.80	-
	T/E	120.7	-	7.9	-	-	-	-	M16	4	14.2	87.3	-	-	-	-	-	-	-	-	-	-	0.80

FLANGES

BS 4504; EN 1092-1; SANS 1123 AND BS 10/1962 TABLES D AND E AS AMENDED 1965

40mm Nominal Bore Pipe OD 48.3 (d1)

Table	Pipe O.D. d_1	Flange					Raised face		Bolting	Drilling			Neck			Spigot	Boss						
		D	b	b_1	h	h_1	d_4	f		No.	d_2	k	d_3	h_2 ≈	r	d_9	ds	/2 (W/N)	/3 (S/O)	/4 (Scrwd)	/8 (Blind)	T/D	T/E
BS 4504	6	130	14	16	26	38	80	3	M12	4	14	100	62	7	6	-	70	1.18	1.34	1.20	1.40	-	-
	10	150	16	16	26	42	88	3	M16	4	18	110	64	7	6	-	70	1.86	1.84	1.78	2.10	-	-
	16	150	16	16	26	42	88	3	M16	4	18	110	64	7	6	-	70	1.86	1.84	1.78	2.10	-	-
	25	150	18	20	32	45	88	3	M16	4	18	110	64	7	6	-	60	2.33	2.30	2.14	2.40	-	-
	40	150	18	20	32	45	88	3	M16	4	18	110	64	7	6	-	60	2.33	2.30	2.14	2.40	-	-
EN 1092-1	6	130	14	16	26	38	80	3	M12	4	14	100	62	7	6	-	70	1.18	1.34	1.20	1.40	-	-
	10	150	16	18	26	42	88	3	M16	4	18	110	64	7	6	-	70	1.86	2.10	1.78	2.10	-	-
	16	150	16	18	26	42	88	3	M16	4	18	110	64	7	6	-	70	1.86	2.10	1.78	2.10	-	-
	25	150	18	18	32	45	88	3	M16	4	18	110	64	7	6	-	60	2.33	2.10	2.14	2.40	-	-
	40	150	18	18	32	45	88	3	M16	4	18	110	64	7	6	-	60	2.33	2.10	2.14	2.40	-	-
SANS 1123	600	130	8	10	20	38	80	3	M12	4	14	100	62	7	6	-	70	0.67	0.84	0.69	1.00	-	-
	1000	150	10	10	20	42	88	3	M16	4	18	110	64	7	6	-	70	1.16	1.15	1.40	1.31	-	-
	1600	150	10	10	20	42	88	3	M16	4	18	110	64	7	6	-	70	1.16	1.15	1.40	1.31	-	-
	2500	150	18	20	28	45	88	3	M16	4	18	110	64	7	6	-	70	2.33	2.30	1.66	2.67	-	-
	4000	150	18	20	32	45	88	3	M16	4	18	110	64	7	6	-	70	2.33	2.30	1.66	2.67	-	-
BS 10/1962	T/D	133.4	-	6.3	-	-	-	-	M12	4	-	98.4	-	-	-	-	-	-	-	-	-	1.00	-
	T/E	133.4	-	8.7	-	-	-	-	M16	4	-	98.4	-	-	-	-	-	-	-	-	-	-	1.00

50mm Nominal Bore Pipe OD 60.3 (d1)

Table	Pipe O.D. d_1	Flange					Raised face		Bolting	Drilling			Neck			Spigot	Boss						
		D	b	b_1	h	h_1	d_4	f		No.	d_2	k	d_3	h_2 ≈	r	d_9	ds	/2 (W/N)	/3 (S/O)	/4 (Scrwd)	/8 (Blind)	T/D	T/E
BS 4504	6	140	14	16	28	38	90	3	M12	4	14	110	74	8	6	-	80	1.34	1.48	1.37	1.60	-	-
	10	165	18	18	28	45	102	3	M16	4	18	125	75	8	6	-	85	"2.53 i"	2.45	2.43	2.90	-	-
	16	165	18	18	28	45	102	3	M16	4	18	125	75	8	6	-	85	2.53	2.45	2.43	2.90	-	-
	25	165	20	20	34	48	102	3	M16	4	18	125	75	8	6	-	70	2.82	2.72	2.86	3.20	-	-
	40	165	20	20	34	48	102	3	M16	4	18	125	75	8	6	-	70	2.82	2.72	2.86	3.20	-	-
EN 1092-1	6	140	14	16	28	38	90	3	M12	4	14	110	74	8	6	-	80	1.34	1.48	1.37	1.60	-	-
	10	165	18	20	28	45	102	3	M16	4	18	125	75	8	6	-	85	"2.53 i"	2.72	2.43	2.90	-	-
	16	165	18	20	28	45	102	3	M16	4	18	125	75	8	6	-	85	2.53	2.72	2.43	2.90	-	-
	25	165	20	20	34	48	102	3	M16	4	18	125	75	8	6	-	70	2.82	2.72	2.86	3.20	-	-
	40	165	20	20	34	48	102	3	M16	4	18	125	75	8	6	-	70	2.82	2.72	2.86	3.20	-	-
SANS 1123	600	140	8	10	22	38	90	3	M12	4	14	110	74	8	6	-	80	0.77	0.92	0.78	1.14	-	-
	1000	165	12	10	20	45	102	3	M16	4	18	125	75	8	6	-	85	1.69	1.36	1.67	1.93	-	-
	1600	165	12	12	22	45	102	3	M16	4	18	125	75	8	6	-	85	1.69	1.63	1.96	1.93	-	-
	2500	165	20	20	31	48	102	3	M16	4	18	125	75	8	6	-	85	2.82	2.72	2.43	3.20	-	-
	4000	165	20	20	34	48	102	3	M16	4	18	125	75	8	6	-	85	2.82	2.72	2.43	3.20	-	-
BS 10/1962	T/D	152.4	-	7.9	-	-	-	-	M16	4	17.5	114.3	-	-	-	-	-	-	-	-	-	0.88	-
	T/E	152.4	-	9.5	-	-	-	-	M16	4	17.5	114.3	-	-	-	-	-	-	-	-	-	-	1.06

FLANGES

BS 4504; EN 1092-1; SANS 1123 AND BS 10/1962 TABLES D AND E AS AMENDED 1965

65mm Nominal Bore Pipe OD 76.1 (d1)

Table	Pipe O.D. d_1	Flange					Raised face		Bolting	Drilling			Neck			Spigot	Boss							
		D	b	b_1	h	h_1	d_4	f		No.	d_2	k	d_3	h_2 ≈	r	d_9	ds	/2 (W/N)	/3 (S/O)	/4 (Scrwd)	/8 (Blind)	T/D	T/E
BS 4504	6	160	14	16	32	38	110	3	M12	4	14	130	88	9	6	55.00	100.00	1.67	1.85	1.92	2.10	-	-
	10	185	18	18	32	45	122	3	M16	4	18	145	90	10	6	55	105	3.06	2.98	3.18	3.60	-	-
	16	185	18	18	32	45	122	3	M16	4	18	145	90	10	6	55	105	3.06	2.98	3.18	3.60	-	-
	25	185	22	22	38	52	122	3	M16	8	18	145	90	10	6	55	85	3.74	3.64	3.85	4.30	-	-
	40	185	22	22	38	52	122	3	M16	8	18	145	90	10	6	55	85	3.74	3.64	3.85	4.30	-	-
EN 1092-1	6	160	14	16	32	38	110	3	M12	4	14	130	88	9	6	55.00	100.00	1.67	1.85	1.92	2.10	-	-
	10	185	18	20	32	45	122	3	M16	4	18	145	90	10	6	55	105	3.06	3.64	3.18	3.60	-	-
	16	185	18	20	32	45	122	3	M16	4	18	145	90	10	6	55	105	3.06	3.64	3.18	3.60	-	-
	25	185	22	22	38	52	122	3	M16	8	18	145	90	10	6	55	85	3.74	3.64	3.85	4.30	-	-
	40	185	22	22	38	52	122	3	M16	8	18	145	90	10	6	55	85	3.74	3.64	3.85	4.30	-	-
SANS 1123	600	160	8	10	26	38	110	3	M12	4	14	130	88	9	6	-	100	0.95	1.15	1.10	1.50	-	-
	1000	185	12	12	26	45	122	3	M16	4	18	145	90	10	6	-	105	2.04	1.98	2.54	2.40	-	-
	1600	185	12	12	26	45	122	3	M16	4	18	145	90	10	6	-	105	2.04	1.98	2.54	2.40	-	-
	2500	185	22	22	33	52	122	3	M16	8	18	145	90	10	6	-	105	3.74	3.64	2.98	4.30	-	-
	4000	185	22	22	38	52	122	3	M16	8	18	145	90	10	6	-	105	3.74	3.64	2.98	4.30	-	-
BS 10/1962	T/D	165.1	-	7.9	-	-	-	-	M16	4	17.5	127.0	-	-	-	-	-	-	-	-	-	1.3	-
	T/E	165.1	-	10.3	-	-	-	-	M16	4	17.5	127.0	-	-	-	-	-	-	-	-	-	-	1.6

80mm Nominal Bore Pipe OD 88.9 (d1)

Table	Pipe O.D. d_1	Flange					Raised face		Bolting	Drilling			Neck			Spigot	Boss						
		D	b	b_1	h	h_1	d_4	f		No.	d_2	k	d_3	h_2 ≈	r	d_9	ds	/2 (W/N)	/3 (S/O)	/4 (Scrwd)	/8 (Blind)	T/D	T/E
BS 4504	6	190	16	18	34	42	128	3	M16	4	18	150	102	10	8	70	110	2.71	2.95	2.85	3.40	-	-
	10	200	20	20	34	50	138	3	M16	8	18	160	105	10	8	70	118	3.70	3.61	4.12	4.60	-	-
	16	200	20	20	34	50	138	3	M16	8	18	160	105	10	8	70	118	3.70	3.61	4.12	4.60	-	-
	25	200	24	24	40	58	138	3	M16	8	18	160	105	12	8	70	105	4.75	4.33	4.80	5.50	-	-
	40	200	24	24	40	58	138	3	M16	8	18	160	105	12	8	70	105	4.75	4.33	4.80	5.50	-	-
EN 1092-1	6	190	16	18	34	42	128	3	M16	4	18	150	102	10	8	70	110	2.71	2.95	2.85	3.40	-	-
	10	200	20	20	34	50	138	3	M16	8	18	160	105	10	8	70	118	3.70	3.61	4.12	4.60	-	-
	16	200	20	20	34	50	138	3	M16	8	18	160	105	10	8	70	118	3.70	3.61	4.12	4.60	-	-
	25	200	24	24	40	58	138	3	M16	8	18	160	105	12	8	70	105	4.75	4.33	4.80	5.50	-	-
	40	200	24	24	40	58	138	3	M16	8	18	160	105	12	8	70	105	4.75	4.33	4.80	5.50	-	-
SANS 1123	600	190	10	10	28	42	128	3	M16	4	18	150	102	10	8	-	110	1.69	1.64	1.78	2.13	-	-
	1000	200	14	12	26	50	138	3	M16	8	18	160	105	10	8	-	118	2.59	2.17	3.16	3.22	-	-
	1600	200	14	14	28	50	138	3	M16	8	18	160	105	10	8	-	118	2.59	2.64	3.26	3.22	-	-
	2500	200	24	22	34	58	138	3	M16	8	18	160	105	12	8	-	118	4.75	3.95	3.60	5.04	-	-
	4000	200	24	22	40	58	138	3	M16	8	18	160	105	12	8	-	118	4.75	3.95	3.60	5.04	-	-
BS 10/1962	T/D	184.1	-	9.5	-	-	-	-	M16	4	17.5	146.0	-	-	-	-	-	-	-	-	-	1.43	-
	T/E	184.1	-	11.1	-	-	-	-	M16	4	17.5	146.0	-	-	-	-	-	-	-	-	-	-	1.80

FLANGES

BS 4504; EN 1092-1; SANS 1123 AND BS 10/1962 TABLES D AND E AS AMENDED 1965

100mm Nominal Bore Pipe OD 114.3 (d1)

Table	Pipe O.D. d_1	Flange					Raised face		Bolting	Drilling			Neck			Spigot	Boss						
		D	b	b_1	h	h_1	d_4	f		No.	d_2	k	d_3	h_2 ≈	r	d_9	ds	/2 (W/N)	/3 (S/O)	/4 (Scrwd)	/8 (Blind)	T/D	T/E
BS 4504	6	210	16	18	40	45	148	3	M16	4	18	170	130	10	8	90	130	3.24	3.25	3.19	4.20	-	-
	10	220	20	20	40	52	158	3	M16	8	18	180	131	12	8	90	140	4.62	3.99	4.47	5.60	-	-
	16	220	20	20	40	52	158	3	M16	8	18	180	131	12	8	90	140	4.62	3.99	4.47	5.60	-	-
	25	235	24	26	44	65	162	3	M20	8	22	190	134	12	8	90	-	6.52	6.04	6.43	7.60	-	-
	40	235	24	26	44	65	162	3	M20	8	22	190	134	12	8	90	-	6.52	6.04	6.43	7.60	-	-
EN 1092-1	6	210	16	18	40	45	148	3	M16	4	18	170	130	10	8	90	130	3.24	3.25	3.19	4.20	-	-
	10	220	20	22	40	52	158	3	M16	8	18	180	131	12	8	90	140	4.62	4.80	4.47	5.60	-	-
	16	220	20	22	40	52	158	3	M16	8	18	180	131	12	8	90	140	4.62	4.80	4.47	5.60	-	-
	25	235	24	26	44	65	162	3	M20	8	22	190	134	12	8	90	-	6.52	6.04	6.43	7.60	-	-
	40	235	24	26	44	65	162	3	M20	8	22	190	134	12	8	90	-	6.52	6.04	6.43	7.60	-	-
SANS 1123	600	210	10	10	34	45	148	3	M16	4	18	170	130	10	8	-	130	2.00	1.81	1.99	2.63	-	-
	1000	220	14	12	32	52	158	3	M16	8	18	180	131	12	8	-	140	3.23	2.39	3.73	3.92	-	-
	1600	220	14	14	34	52	158	3	M16	8	18	180	131	12	8	-	140	3.23	2.90	3.84	3.92	-	-
	2500	235	24	25	41	65	162	3	M20	8	22	190	134	12	8	-	145	6.52	6.04	5.63	7.92	-	-
	4000	235	24	25	44	65	162	3	M20	8	22	190	134	12	8	-	145	6.52	6.04	5.63	7.92	-	-
BS 10/1962	T/D	215.9	-	9.5	-	-	-	-	M16	4	17.5	177.8	-	-	-	-	-	-	-	-	-	2.00	-
	T/E	215.9	-	12.7	-	-	-	-	M16	8	17.5	177.8	-	-	-	-	-	-	-	-	-	-	2.00

125m Nominal Bore Pipe OD 139.7 (d1)

Table	Pipe O.D. d_1	Flange					Raised face		Bolting	Drilling			Neck			Spigot	Boss						
		D	b	b_1	h	h_1	d_4	f		No.	d_2	k	d_3	h_2 ≈	r	d_9	ds	/2 (W/N)	/3 (S/O)	/4 (Scrwd)	/8 (Blind)	T/D	T/E
BS 4504	6	240	18	20	44	48	178	3	M16	8	18	200	155	10	8	115	160	4.49	4.33	4.47	6.10	-	-
	10	250	22	22	44	55	188	3	M16	8	18	210	156	12	8	115	168	6.30	5.42	6.13	8.10	-	-
	16	250	22	22	44	55	188	3	M16	8	18	210	156	12	8	115	168	6.30	5.42	6.13	8.10	-	-
	25	270	26	28	48	68	188	3	M24	8	26	220	162	12	8	115	118	9.07	8.21	8.77	11.00	-	-
	40	270	26	28	48	68	188	3	M24	8	26	220	162	12	8	115	118	9.07	8.21	8.77	11.00	-	-
EN 1092-1	6	240	18	20	44	48	178	3	M16	8	18	200	155	10	8	115	160	4.49	4.33	4.47	6.10	-	-
	10	250	22	22	44	55	188	3	M16	8	18	210	156	12	8	115	168	6.30	5.42	6.13	8.10	-	-
	16	250	22	22	44	55	188	3	M16	8	18	210	156	12	8	115	168	6.30	5.42	6.13	8.10	-	-
	25	270	26	28	48	68	188	3	M24	8	26	220	162	12	8	115	118	9.07	8.21	8.77	11.00	-	-
	40	270	26	28	48	68	188	3	M24	8	26	220	162	12	8	115	118	9.07	8.21	8.77	11.00	-	-
SANS 1123	600	240	13	12	39	48	178	3	M16	8	18	200	155	10	8	-	160	3.24	2.60	3.23	4.07	-	-
	1000	250	16	14	36	55	188	3	M16	8	18	210	156	12	8	-	168	4.58	3.45	5.26	5.89	-	-
	1600	250	16	15	38	55	188	3	M16	8	18	210	156	12	8	-	168	4.58	4.07	5.36	5.89	-	-
	2500	270	26	28	46	68	188	3	M24	8	26	220	162	12	8	-	170	9.07	8.21	8.1	11.85	-	-
	4000	270	26	28	48	68	188	3	M24	8	26	220	162	12	8	-	170	9.07	8.21	8.1	11.85	-	-
BS 10/1962	T/D	254.0	-	12.7	-	-	-	-	M16	8	-	209.6	-	-	-	-	-	-	-	-	-	3.48	-
	T/E	254.0	-	14.3	-	-	-	-	M20	8	-	209.6	-	-	-	-	-	-	-	-	-	-	3.84

FLANGES

BS 4504; EN 1092-1; SANS 1123 AND BS 10/1962 TABLES D AND E AS AMENDED 1965

150mm Nominal Bore Pipe OD 168.3 or 165.1 (d1)(to be specified)

Table	Pipe O.D. d_1	Flange					Raised face		Bolting	Drilling			Neck			Spigot	Boss						
		D	b	b_1	h	h_1	d_4	f		No.	d_2	k	d_3	h_2 ≈	r	d_9	ds	/2 (W/N)	/3 (S/O)	/4 (Scrwd)	/8 (Blind)	T/D	T/E
BS 4504	6	265	18	20	44	48	202	3	M16	8	18	225	184	12	10	140	185	5.15	4.86	5.30	7.50	-	-
	10	285	22	22	44	55	212	3	M20	8	22	240	184	12	10	140	195	7.75	6.66	7.92	10.50	-	-
	16	285	22	22	44	55	212	3	M20	8	22	240	184	12	10	140	195	7.75	6.66	7.92	10.50	-	-
	25	300	28	30	52	75	218	3	M24	8	26	250	192	12	10	140	145	11.80	10.42	10.50	14.50	-	-
	40	300	28	30	52	75	218	3	M24	8	26	250	192	12	10	140	145	11.80	10.42	10.50	14.50	-	-
EN 1092-1	6	265	18	20	44	48	202	3	M16	8	18	225	184	12	10	140	185	5.15	4.86	5.30	7.50	-	-
	10	285	22	24	44	55	212	3	M20	8	22	240	184	12	10	140	195	7.75	7.50	7.92	10.50	-	-
	16	285	22	24	44	55	212	3	M20	8	22	240	184	12	10	140	195	7.75	7.50	7.92	10.50	-	-
	25	300	28	30	52	75	218	3	M24	8	26	250	192	12	10	140	145	11.80	10.42	10.50	14.50	-	-
	40	300	28	30	52	75	218	3	M24	8	26	250	192	12	10	140	145	11.80	10.42	10.50	14.50	-	-
SANS 1123	600	265	13	12	39	48	202	3	M16	8	18	225	184	12	10	-	185	3.72	2.91	3.83	5.00	-	-
	1000	285	18	16	38	55	212	3	M20	8	22	240	184	12	10	-	195	6.34	4.81	7.14	8.59	-	-
	1600	285	18	18	40	55	212	3	M20	8	22	240	184	12	10	-	195	6.34	5.41	7.40	8.59	-	-
	2500	300	28	30	48	75	218	3	M24	8	26	250	192	12	10	-	200	11.80	10.42	9.00	15.54	-	-
	4000	300	28	30	52	75	218	3	M24	8	26	250	192	12	10	-	200	11.80	10.42	9.00	15.54	-	-
BS 10/1962	T/D	279.4	-	12.7	-	-	-	-	M16	8	17.5	235.0	-	-	-	-	-	-	-	-	-	3.88	-
	T/E	279.4	-	17.5	-	-	-	-	M20	8	22.2	235.0	-	-	-	-	-	-	-	-	-	-	5.36

200mm Nominal Bore Pipe OD 219.1 (d1)

Table	Pipe O.D. d_1	Flange					Raised face		Bolting	Drilling			Neck			Spigot	Boss						
		D	b	b_1	h	h_1	d_4	f		No.	d_2	k	d_3	h_2 ≈	r	d_9	ds	/2 (W/N)	/3 (S/O)	/4 (Scrwd)	/8 (Blind)	T/D	T/E
BS 4504	6	320	20	22	44	55	258	3	M16	8	18	280	236	15	10	190	-	7.78	6.91	-	12.50	-	-
	10	340	24	24	44	62	268	3	M20	8	22	295	235	16	10	190	-	11.30	9.30	-	16.50	-	-
	16	340	24	24	44	62	268	3	M20	12	22	295	235	16	10	190	-	11.00	9.30	-	16.50	-	-
	25	360	30	28	52	80	278	3	M24	12	26	310	244	16	10	190	-	17.00	12.53	-	22.50	-	-
	40	375	34	34	52	88	285	3	M27	12	30	320	244	16	10	190	200	21.50	16.96	-	27.00	-	-
EN 1092-1	6	320	20	22	44	55	258	3	M16	8	18	280	236	15	10	190	-	7.78	6.91	-	12.50	-	-
	10	340	24	24	44	62	268	3	M20	8	22	295	235	16	10	190	-	11.30	9.30	-	16.50	-	-
	16	340	24	26	44	62	268	3	M20	12	22	295	235	16	10	190	-	11.00	10.30	-	16.50	-	-
	25	360	30	32	52	80	278	3	M24	12	26	310	244	16	10	190	-	17.00	14.40	-	22.50	-	-
	40	375	34	36	52	88	285	3	M27	12	30	320	244	16	10	190	200	21.50	18.30	-	27.00	-	-
SANS 1123	600	320	13	14	-	55	258	3	M16	8	18	280	236	15	10	-	-	5.06	4.40	-	8.75	-	-
	1000	340	18	18	-	62	268	3	M20	8	22	295	235	16	10	-	-	8.48	6.97	-	12.38	-	-
	1600	340	22	22	-	62	268	3	M20	12	22	295	235	16	10	-	-	10.08	7.51	-	15.13	-	-
	2500	360	27	28	-	80	278	3	M24	12	26	310	244	16	10	-	-	15.30	12.59	-	21.00	-	-
	4000	375	34	32	-	88	285	3	M24	12	26	320	244	16	10	-	-	21.50	16.96	-	25.41	-	-
BS 10/1962	T/D	336.6	-	12.7	-	-	-	-	M16	8	17.5	292.1	-	-	-	-	-	-	-	-	-	4.91	-
	T/E	336.6	-	19	-	-	-	-	M20	8	22.2	292.1	-	-	-	-	-	-	-	-	-	-	7.59

FLANGES

BS 4504; EN 1092-1; SANS 1123 AND BS 10/1962 TABLES D AND E AS AMENDED 1965

250mm Nominal Bore Pipe OD 273.0 (d1)

Table	Pipe O.D. d_1	Flange					Raised face		Bolting	Drilling			Neck			Spigot	Boss						
		D	b	b_1	h	h_1	d_4	f		No.	d_2	k	d_3	h_2 ≈	r	d_9	ds	/2 (W/N)	/3 (S/O)	/4 (Scrwd)	/8 (Blind)	T/D	T/E
BS 4504	6	375	22	24	44	60	312	3	M16	12	18	335	290	15	12	237	-	10.80	9.03	-	18.50	-	-
	10	395	26	26	46	68	320	3	M20	12	22	350	292	16	12	237	-	14.70	11.95	-	24.00	-	-
	16	405	26	26	46	70	320	3	M24	12	26	355	292	16	12	237	-	15.60	12.86	-	25.00	-	-
	25	425	32	32	60	88	335	3	M27	12	30	370	298	18	12	237	-	24.40	18.57	-	33.50	-	-
	40	450	38	42	60	105	345	3	M30	12	33	384	306	18	12	237	-	34.90	29.44	-	44.50	-	-
EN 1092-1	6	375	22	24	44	60	312	3	M16	12	18	335	290	15	12	237	-	10.80	9.03	-	18.50	-	-
	10	395	26	26	46	68	320	3	M20	12	22	350	292	16	12	237	-	14.70	11.95	-	24.00	-	-
	16	405	26	29	46	70	320	3	M24	12	26	355	292	16	12	237	-	15.60	14.79	-	25.00	-	-
	25	425	32	35	60	88	335	3	M27	12	30	370	298	18	12	237	-	24.40	20.43	-	33.50	-	-
	40	450	38	42	60	105	345	3	M30	12	33	384	306	18	12	237	-	34.90	29.44	-	44.50	-	-
SANS 1123	600	375	16	16	-	60	312	3	M16	12	18	335	290	15	12	-	-	7.85	6.02	-	13.45	-	-
	1000	395	20	20	-	68	320	3	M20	12	22	350	292	16	12	-	-	11.31	9.14	-	18.46	-	-
	1600	405	24	25	-	70	320	3	M24	12	26	355	292	16	12	-	-	14.04	12.36	-	24.04	-	-
	2500	425	30	30	-	88	335	3	M24	12	26	370	298	18	12	-	-	22.88	17.90	-	31.41	-	-
	4000	450	38	38	-	105	345	3	M30	12	33	385	306	18	12	-	-	34.90	29.44	-	44.50	-	-
BS 10/1962	T/D	406.4	-	15.9	-	-	-	-	M20	8	22.2	355.6	-	-	-	-	-	-	-	-	-	8.70	-
	T/E	406.4	-	22.2	-	-	-	-	M20	12	22.2	355.6	-	-	-	-	-	-	-	-	-	-	12.05

300m Nominal Bore Pipe OD 323.9 (d1)

Table	Pipe O.D. d_1	Flange					Raised face		Bolting	Drilling			Neck			Spigot	Boss						
		D	b	b_1	h	h_1	d_4	f		No.	d_2	k	d_3	h_2 ≈	r	d_9	ds	/2 (W/N)	/3 (S/O)	/4 (Scrwd)	/8 (Blind)	T/D	T/E
BS 4504	6	440	22	24	44	62	365	4	M20	12	22	395	342	15	12	285	-	14.00	11.95	-	25.50	-	-
	10	445	26	26	46	68	370	4	M20	12	22	400	344	16	12	285	-	17.60	13.66	-	31.00	-	-
	16	460	28	28	46	78	378	4	M24	12	26	410	344	16	12	285	-	22.00	16.65	-	35.00	-	-
	25	485	34	38	67	92	395	4	M27	16	30	430	352	18	12	285	-	31.20	26.66	-	46.0	-	-
	40	515	42	50	67	115	410	4	M30	16	33	450	362	18	12	285	-	49.70	43.39	-	64.00	-	-
EN 1092-1	6	440	22	24	44	62	365	4	M20	12	22	395	342	15	12	285	-	14.00	11.95	-	25.50	-	-
	10	445	26	26	46	68	370	4	M20	12	22	400	344	16	12	285	-	17.60	13.66	-	31.00	-	-
	16	460	28	32	46	78	378	4	M24	12	26	410	344	16	12	285	-	22.00	19.20	-	35.00	-	-
	25	485	34	38	67	92	395	4	M27	16	30	430	352	18	12	285	-	31.20	26.66	-	46.0	-	-
	40	515	42	52	67	115	410	4	M30	16	33	450	362	18	12	285	-	49.70	45.56	-	64.00	-	-
SANS 1123	600	440	20	20	-	62	365	4	M20	12	22	395	342	15	12	-	-	12.73	9.96	-	23.18	-	-
	1000	445	22	22	-	68	370	4	M20	12	22	400	344	16	12	-	-	14.89	11.65	-	26.23	-	-
	1600	460	28	28	-	78	378	4	M24	12	26	410	344	16	12	-	-	22.00	16.65	-	35.00	-	-
	2500	485	34	32	-	92	395	4	M24	16	26	430	352	18	12	-	-	31.20	23.16	-	43.29	-	-
	4000	515	42	40	-	115	410	4	M30	16	33	450	362	18	12	-	-	49.70	43.39	-	60.95	-	-
BS 10/1962	T/D	457.2	-	19	-	-	-	-	M20	12	22.2	406.4	-	-	-	-	-	-	-	-	-	12.05	-
	T/E	457.2	-	25.4	-	-	-	-	M24	12	25.4	406.4	-	-	-	-	-	-	-	-	-	-	16.07

FLANGES

BS 4504; EN 1092-1; SANS 1123 AND BS 10/1962 TABLES D AND E AS AMENDED 1965

350mm Nominal Bore Pipe OD 355.6 (d1)

Table	Pipe O.D. d_1	Flange					Raised face		Bolting	Drilling			Neck			Spigot	Boss						
		D	b	b_1	h	h_1	d_4	f		No.	d_2	k	d_3	h_2 ≈	r	d_9	ds	/2 (W/N)	/3 (S/O)	/4 (Scrwd)	/8 (Blind)	T/D	T/E
BS 4504	6	490	22	26	-	62	415	4	M20	12	22	445	385	15	12	332	-	16.10	16.88	-	32.00	-	-
	10	505	26	28	-	68	430	4	M20	16	22	460	385	16	12	332	-	21.40	20.42	-	39.50	-	-
	16	520	30	32	-	82	438	4	M24	16	26	470	390	16	12	332	-	28.70	25.76	-	48.00	-	-
	25	555	38	42	-	100	450	4	M30	16	33	490	398	20	12	332	-	45.00	41.48	-	68.00	-	-
	40	580	46	56	-	125	465	4	M33	16	36	510	408	20	12	332	-	68.10	64.43	-	89.00	-	-
EN 1092-1	6	490	22	26	-	62	415	4	M20	12	22	445	385	15	12	332	-	16.10	16.88	-	32.00	-	-
	10	505	26	30	-	68	430	4	M20	16	22	460	385	16	12	332	-	21.40	23.48	-	39.50	-	-
	16	520	30	35	-	82	438	4	M24	16	26	470	390	16	12	332	-	28.70	28.34	-	48.00	-	-
	25	555	38	42	-	100	450	4	M30	16	33	490	398	20	12	332	-	45.00	41.84	-	68.00	-	-
	40	580	46	58	-	125	465	4	M33	16	36	510	408	20	12	332	-	68.10	67.65	-	89.00	-	-
SANS 1123	600	490	22	22	-	62	415	4	M20	12	22	445	385	15	12	-	-	16.10	14.29	-	32.00	-	-
	1000	505	26	25	-	68	430	4	M20	16	22	460	385	16	12	-	-	21.40	18.23	-	37.98	-	-
	1600	520	30	30	-	82	438	4	M24	16	26	470	390	16	12	-	-	28.07	24.15	-	48.00	-	-
	2500	555	38	35	-	100	450	4	M30	16	33	490	398	20	12	-	-	45.00	34.87	-	62.63	-	-
	4000	580	46	45	-	125	465	4	M30	16	33	510	408	18	12	-	-	68.10	64.43	-	87.07	-	-
BS 10/1962	T/D	527.1	-	22.2	-	-	-	-	M20	12	25.4	469.9	-	-	-	-	-	-	-	-	-	19.58	-
	T/E	527.1	-	28.6	-	-	-	-	M24	12	25.4	469.9	-	-	-	-	-	-	-	-	-	-	25.89

400mm Nominal Bore Pipe OD 406.4 (d1)

Table	Pipe O.D. d_1	Flange					Raised face		Bolting	Drilling			Neck			Spigot	Boss						
		D	b	b_1	h	h_1	d_4	f		No.	d_2	k	d_3	h_2 ≈	r	d_9	ds	/2 (W/N)	/3 (S/O)	/4 (Scrwd)	/8 (Blind)	T/D	T/E
BS 4504	6	540	22	28	-	65	465	4	M20	16	22	495	438	15	12	380	-	18.30	19.97	-	38.50	-	-
	10	565	26	32	-	72	482	4	M24	16	26	515	440	16	12	380	-	26.10	27.65	-	49.50	-	-
	16	580	32	36	-	85	490	4	M27	16	30	525	445	16	12	380	-	36.30	33.90	-	63.00	-	-
	25	620	40	46	-	110	505	4	M33	16	36	550	452	20	12	380	-	58.70	56.35	-	90.00	-	-
	40	660	50	64	-	135	535	4	M36	16	39	585	462	20	12	380	-	96.50	95.86	-	125.00	-	-
EN 1092-1	6	540	22	28	-	65	465	4	M20	16	22	495	438	15	12	380	-	18.30	19.97	-	38.50	-	-
	10	565	26	32	-	72	482	4	M24	16	26	515	440	16	12	380	-	26.10	27.65	-	49.50	-	-
	16	580	32	38	-	85	490	4	M27	16	30	525	445	16	12	380	-	36.30	36.40	-	63.00	-	-
	25	620	40	48	-	110	505	4	M33	16	36	550	452	20	12	380	-	58.70	58.60	-	90.00	-	-
	40	660	50	65	-	135	535	4	M36	16	39	585	462	20	12	380	-	96.50	98.00	-	125.00	-	-
SANS 1123	600	540	22	22	-	65	465	4	M20	16	22	495	438	15	12	-	-	18.30	15.69	-	38.50	-	-
	1000	565	26	25	-	72	482	4	M24	16	26	515	400	16	12	-	-	26.10	21.88	-	47.60	-	-
	1600	580	32	35	-	85	490	4	M24	16	26	525	445	16	12	-	-	36.30	34.13	-	59.06	-	-
	2500	620	40	40	-	110	505	4	M30	16	33	550	452	20	12	-	-	58.70	49.00	-	90.00	-	-
	4000	660	50	50	-	135	535	4	M36	16	39	585	462	20	12	-	-	96.50	74.58	-	125.00	-	-
BS 10/1962	T/D	577.9	-	22.2	-	-	-	-	M20	12	25.4	520.7	-	-	-	-	-	-	-	-	-	22.32	-
	T/E	577.9	-	31.8	-	-	-	-	M24	12	25.4	520.7	-	-	-	-	-	-	-	-	-	-	32.59

FLANGES

BS 4504; EN 1092-1; SANS 1123 AND BS 10/1962 TABLES D AND E AS AMENDED 1965

450mm Nominal Bore Pipe OD 457.2 (d1)

Table	Pipe O.D. d_1	Flange					Raised face		Bolting	Drilling			Neck			Spigot	Boss						
		D	b	b_1	h	h_1	d_4	f		No.	d_2	k	d_3	h_2 ≈	r	d_9	ds	/2 (W/N)	/3 (S/O)	/4 (Scrwd)	/8 (Blind)	T/D	T/E
BS 4504	6	595	24	30	-	65	520	4	M20	16	22	550	492	15	12	428	-		25.28	-	52.00	-	-
	10	615	28	36	-	72	532	4	M24	20	26	565	492	16	12	428	-	-	34.16	-	65.00	-	-
	16	640	34	40	-	87	550	4	M27	20	30	585	496	16	12	428	-	-	44.56	-	85.00	-	-
	25	670	42	52	-	110	555	4	M33	20	36	600	505	20	12	425	-	-	68.00	-	115.50	-	-
	40	685		68	-		560	4	M36	20	39	610	-	-	-	-	-	-	95.55	-	155.50	-	-
EN 1092-1	6	595	24	30	-	65	520	4	M20	16	22	550	492	15	12	428	-		25.28	-	52.00	-	-
	10	615	28	36	-	72	532	4	M24	20	26	565	492	16	12	428	-	-	34.16	-	65.00	-	-
	16	640	34	42	-	87	550	4	M27	20	30	585	496	16	12	428	-	-	46.80	-	85.00	-	-
	25	670	42	54	-	110	555	4	M33	20	36	600	505	20	12	425	-	-	70.80	-	115.50	-	-
	40	685		68	-		560	4	M36	20	39	610	-	-	-	-	-	-	95.55	-	155.50	-	-
SANS 1123	600	595	24	25	-	65	520	4	M20	16	22	550	492	15	12	-	-	-	21.07	-	54.17	-	-
	1000	615	28	30	-	72	532	4	M24	20	26	565	492	16	12	-	-	-	28.29	-	69.64	-	-
	1600	640	34	40	-	87	550	4	M24	20	26	585	496	16	12	-	-	-	45.68	-	100.00	-	-
	2500	670	42	45	-	110	555	4	M30	20	33	600	505	20	12	-	-	-	60.00	-	123.75	-	-
	4000	685	52	60	-	140	560	4	M36	20	39	610	510	20	12	-	-	-	95.55	-	149.52	-	-
BS 10/1962	T/D	641.4	-	25.4	-	-	-	-	M20	12	25.4	584.2	-	-	-	-	-	-	-	-	-	30.80	-
	T/E	641.4	-	34.9	-	-	-	-	M20	16	25.4	584.2	-	-	-	-	-	-	-	-	-	-	42.86

500m Nominal Bore Pipe OD 508.0 (d1)

Table	Pipe O.D. d_1	Flange					Raised face		Bolting	Drilling			Neck			Spigot	Boss						
		D	b	b_1	h	h_1	d_4	f		No.	d_2	k	d_3	h_2 ≈	r	d_9	ds	/2 (W/N)	/3 (S/O)	/4 (Scrwd)	/8 (Blind)	T/D	T/E
BS 4504	6	645	24	30	-	68	570	4	M20	20	22	600	538	15	12	475	-	24.60	27.03	-	60.00	-	-
	10	670	28	38	-	75	585	4	M24	20	26	620	542	16	12	-	-	34.70	41.03	-	75.00	-	-
	16	715	34	44	-	90	610	4	M30	20	33	650	548	16	12	475	-	59.30	62.16	-	110.00	-	-
	25	730	44	58	-	125	615	4	M33	20	36	660	558	20	12	475	-	86.10	88.20	-	140.00	-	-
	40	755	52	72	-	140	615	4	M39	20	42	670	562	20	12	475	-	117.00	121.81	-	185.00	-	-
EN 1092-1	6	645	24	30	-	68	570	4	M20	20	22	600	538	15	12	475	-	24.60	27.03	-	60.00	-	-
	10	670	28	38	-	75	585	4	M24	20	26	620	542	16	12	-	-	34.70	41.03	-	75.00	-	-
	16	715	34	46	-	90	610	4	M30	20	33	650	548	16	12	475	-	59.30	65.30	-	110.00	-	-
	25	730	44	58	-	125	615	4	M33	20	36	660	558	20	12	475	-	86.10	88.20	-	140.00	-	-
	40	755	52	-	-	140	615	4	M39	20	42	670	562	20	12	475	-	117.00	120.00	-	185.00	-	-
SANS 1123	600	645	24	25	-	68	570	4	M20	20	22	600	538	15	12	-	-	24.60	22.52	-	62.50	-	-
	1000	670	28	32	-	75	585	4	M24	20	26	620	542	16	12	-	-	34.70	34.65	-	75.00	-	-
	1600	715	34	40	-	90	610	4	M30	20	33	650	548	16	12	-	-	59.30	56.51	-	122.22	-	-
	2500	730	44	50	-	125	615	4	M30	20	33	660	558	20	12	-	-	86.10	77.31	-	155.56	-	-
	4000	755	52	70	-	140	615	4	M36	20	39	670	562	20	12	-	-	117.00	121.81	-	198.21	-	-
BS 10/1962	T/D	704	-	28.6	-	-	-	-	M20	16	25.4	641.4	-	-	-	-	-	-	-	-	-	41.07	-
	T/E	704.9	-	38.1	-	-	-	-	M20	16	25.4	641.1	-	-	-	-	-	-	-	-	-	-	55.80

FLANGES

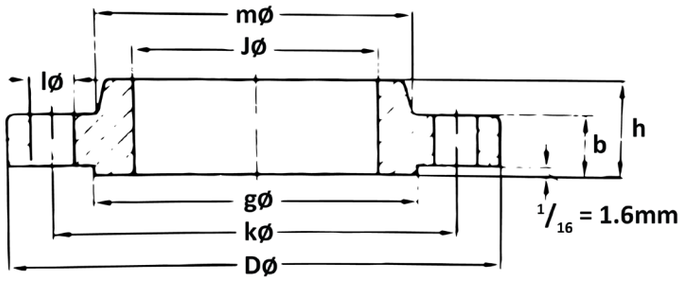
BS 4504; EN 1092-1; SANS 1123 AND BS 10/1962 TABLES D AND E AS AMENDED 1965

600mm Nominal Bore Pipe OD 609.6 (d1)																							
Table	Pipe O.D. d_1	Flange					Raised face		Bolting	Drilling			Neck			Spigot	Boss						
		D	b	b_1	h	h_1	d_4	f		No.	d_2	k	d_3	h_2 ≈	r	d_9	ds	/2 (W/N)	/3 (S/O)	/4 (Scrwd)	/8 (Blind)	T/D	T/E
BS 4504	6	755	24	32	-	70	670	5	M24	20	26	705	640	16	12	-	-	31.50	35.87	-	-	-	-
	10	780	28	42	-	80	685	5	M27	20	30	725	642	18	12	-	-	42.20	55.85	-	-	-	-
	16	840	36	52	-	95	725	5	M33	20	36	770	652	18	12	-	-	73.40	97.74	-	-	-	-
	25	845	46	66	-	125	720	5	M36	20	39	770	660	20	12	-	-	101.00	125.65	-	-	-	-
	40	890	-	84	-	-	735	5	M45	20	48	795	-	-	-	-	-	-	192.21	-	-	-	-
EN 1092-1	6	755	24	32	-	70	670	5	M24	20	26	705	640	16	12	-	-	31.50	35.87	-	-	-	-
	10	780	28	42	-	80	685	5	M27	20	30	725	642	18	12	-	-	42.20	55.85	-	-	-	-
	16	840	36	55	-	95	725	5	M33	20	36	770	652	18	12	-	-	73.40	104.00	-	-	-	-
	25	845	46	68	-	125	720	5	M36	20	39	770	660	20	12	-	-	101.00	129.50	-	-	-	-
	40	890	-	90	-	-	735	5	M45	20	48	795	-	-	-	-	-	-	207.00	-	-	-	-
SANS 1123	600	755	24	30	-	70	670	5	M24	20	26	705	640	16	12	-	-	31.50	33.63	-	-	-	-
	1000	780	28	38	-	80	685	5	M24	20	26	725	642	18	12	-	-	42.20	51.58	-	-	-	-
	1600	840	36	50	-	95	725	5	M30	20	33	770	652	18	12	-	-	73.40	95.26	-	-	-	-
	2500	845	46	60	-	125	720	5	M36	20	39	770	660	20	12	-	-	101.00	114.86	-	-	-	-
	4000	890	-	84	-	-	735	5	M45	20	48	795	-	-	-	-	-	-	192.21	-	-	-	-
BS 10/1962	T/D	825.5	-	31.8	-	-	-	-	M24	16	28.6	755.7	-	-	-	-	-	-	-	-	-	60.27	-
	T/E	825.5	-	47.6	-	-	-	-	M30	16	31.8	755.7	-	-	-	-	-	-	-	-	-	-	89.29

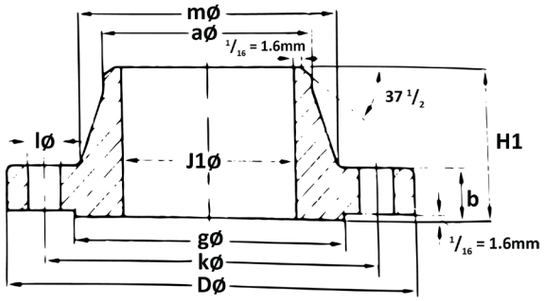
Temperature: Pressure rating for Carbon Steel Flanges													
°C	-17,8 To 232,2	260	287,8	315,6	343,3	371,1	399	427	441	454	468	482	Max. Hyd. Test Press
kPA T/D T/E	689,7 1379,4	655,2 1275,95	586,2 1172,5	551,7 1069	482,8 965,6	448,3 896,6	379,3 793,2	344,85 689,7	- -	- -	- -	- -	1034,6 2069,5

FLANGES

ANSI (ASA) B 16.5 150 LBS.



150 lbs Slip-on Flanges

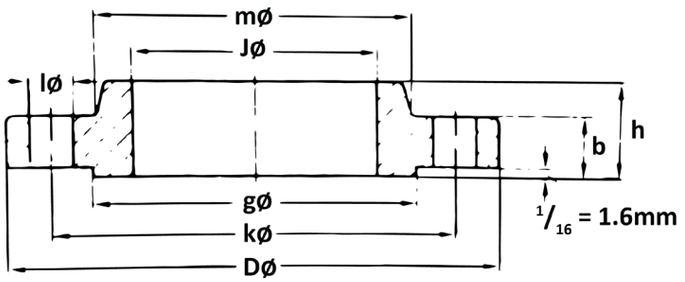


150 lbs Weld Neck Flanges

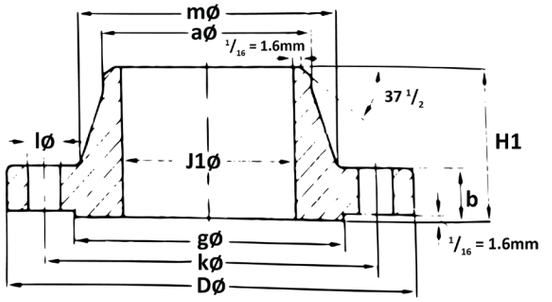
Pipe		Flange						HUB		Raised face	Drilling			Approx. Weight in kg's	
Nom. Size	O.D. mm	D	J	J1	b	h	H1	m	a	g	No.	l	k	S/O	W/N
15	21.3	88.9	22.3	15.7	11.1	15.9	47.6	30.2	21.3	34.9	4	15.9	60.3	0.5	0.9
20	26.7	98.4	27.7	20.8	12.7	15.9	52.4	38.1	26.7	42.9	4	15.9	69.8	0.9	0.9
25	33.4	107.9	34.5	26.7	14.3	17.5	55.6	49.2	33.5	50.8	4	15.9	79.4	0.9	1.4
32	42.2	117.5	43.2	35.1	15.9	20.6	57.1	58.7	42.2	63.5	4	15.9	88.9	1.4	1.4
40	48.3	127.0	49.5	40.9	17.5	22.2	61.9	65.1	48.3	73.0	4	15.9	98.4	1.4	1.8
50	60.3	152.4	62.0	52.6	19.0	25.4	63.5	77.8	60.4	92.1	4	19.0	120.6	2.3	2.7
65	73.0	177.8	74.7	62.7	22.2	28.6	69.8	90.5	73.1	104.8	4	19.0	139.7	3.2	3.6
80	88.9	190.5	90.7	78.0	23.8	30.2	69.8	107.9	88.9	127.0	4	19.0	152.4	3.6	4.5
90	101.6	215.9	103.4	90.2	23.8	31.7	71.4	122.2	101.6	139.7	8	19.0	177.8	5.0	5.4
100	114.3	228.6	116.1	102.4	23.8	33.3	76.2	134.9	114.3	157.2	8	19.0	190.5	5.9	6.8
125	141.3	254.0	143.8	128.3	23.8	36.5	88.9	163.5	141.2	185.7	8	22.2	215.9	6.8	8.6
150	168.3	279.4	170.7	154.2	25.4	39.7	88.9	192.1	168.4	215.9	8	22.2	241.3	8.6	10.9
200	219.1	342.9	221.5	202.7	28.6	44.4	101.6	246.1	219.2	269.9	8	22.2	298.4	13.6	17.7
250	273.0	406.4	276.3	254.5	30.2	49.2	101.6	304.8	273.0	323.8	12	25.4	361.9	19.5	23.6
300	323.8	482.6	327.1	304.8	31.7	55.6	114.3	365.1	323.8	381.0	12	25.4	431.8	29.0	36.3
350	355.6	533.4	359.1	To be specified by purchaser	34.9	57.1	127.0	400.0	355.6	412.9	12	28.6	476.2	41.0	50.0
400	406.4	596.9	410.5		36.5	63.5	127.0	457.2	406.4	469.9	16	28.6	539.7	44.5	64.0
450	457.2	635.0	461.8		39.7	68.3	139.7	504.8	457.2	533.4	16	31.7	577.8	59.0	68.0
500	508.0	698.5	513.1		42.9	73.0	144.5	558.8	508.0	584.2	20	31.7	635.0	75.0	81.6
600	609.6	812.8	615.9		47.6	82.5	152.4	663.6	609.6	692.1	20	34.9	749.3	99.8	118.0

FLANGES

ANSI (ASA) B 16.5 300 LBS.



300 lbs Slip-on Flanges



300 lbs Weld Neck Flanges

Pipe		Flange						HUB		Raised face	Drilling			Approx. Weight in kg's	
Nom. Size	O.D. mm	D	J	J1	b	h	H1	m	a	g	No.	l	k	S/O	W/N
15	21.3	95.2	22.3	15.7	14.3	22.2	52.4	21.3	38.1	34.9	4	15.9	66.7	0.9	0.9
20	26.7	117.5	27.7	20.8	15.9	25.4	57.1	26.7	47.6	42.9	4	19.0	82.5	1.4	1.4
25	33.4	123.8	34.5	26.7	17.5	27.0	61.9	33.5	54.0	50.8	4	19.0	88.9	1.4	1.8
32	42.2	133.3	43.2	35.1	19.0	27.0	65.1	42.2	63.5	63.5	4	19.0	98.4	1.8	2.3
40	48.3	155.6	49.5	40.9	20.6	30.2	68.3	48.3	69.8	73.0	4	19.0	114.3	2.7	3.2
50	60.3	165.1	62.0	52.6	22.2	33.3	69.8	60.4	84.1	92.1	8	22.2	127.0	3.2	4.1
65	73.0	190.5	74.7	62.7	25.4	38.1	76.2	73.1	100.0	104.8	8	22.2	149.2	4.5	5.4
80	88.9	209.5	90.7	78.0	28.6	42.9	79.4	88.9	117.5	127.0	8	22.2	168.3	5.9	6.8
90	101.6	228.6	103.4	90.2	30.2	44.4	81.0	101.6	133.3	139.7	8	22.2	184.1	7.7	8.2
100	114.3	254.0	116.1	102.4	31.7	47.6	85.7	114.3	146.0	157.2	8	22.2	200.0	10.0	11.3
125	141.3	279.4	143.8	128.3	34.9	50.8	98.4	141.2	177.8	185.7	8	22.2	234.9	12.7	14.5
150	168.3	317.5	170.7	154.2	36.5	52.4	98.4	168.4	206.4	215.9	12	22.2	269.9	17.7	19.0
200	219.1	381.0	221.5	202.7	41.3	61.9	111.1	219.2	260.3	269.9	12	25.4	330.2	26.3	30.4
250	273.0	444.5	276.3	254.5	47.6	66.7	117.5	273.0	320.7	323.8	16	28.6	387.3	36.7	41.3
300	323.8	520.7	327.1	304.8	50.8	73.0	130.2	323.8	374.6	381.0	16	31.7	450.8	52.2	63.5
350	355.6	584.2	359.1	To be specified by purchaser	54.0	76.2	142.9	355.6	425.4	412.7	20	31.7	514.3	74.8	81.6
400	406.4	647.7	410.5		57.1	82.5	146.0	406.4	482.6	469.9	20	34.9	571.5	86.2	113.0
450	457.2	711.2	461.8		60.3	88.9	158.7	457.2	533.4	533.4	24	34.9	628.6	113.0	145.0
500	508.0	774.7	513.1		63.5	95.2	161.9	508.0	587.4	584.2	24	34.9	685.8	143.0	181.0
600	609.6	914.4	615.9		69.8	106.4	168.3	609.6	701.7	692.1	24	41.3	812.8	215.0	263.0

STRUCTURAL TUBE

MILD STEEL DIMENTIONS AND MASS

ROUNDS

Outside diameter mm	Wall Thickness mm										
	1.6	2.0	2.2	2.5	2.8	3.0	3.5	4.0	4.5	5.0	6.0
19.05	0.725	0.843	-	-	-	-	-	-	-	-	-
21.40	-	0.951	-	1.158	-	1.364	-	-	-	-	-
25.40	0.938	1.153	-	1.411	-	-	-	-	-	-	-
26.90	-	1.227	1.339	1.503	-	-	-	-	-	-	-
31.80	1.198	1.478	-	1.817	-	2.129	-	-	-	-	-
34.10	-	1.562	1.708	1.922	-	2.269	-	2.740	-	-	-
38.10	1.435	1.774	-	2.187	-	2.790	2.984	-	-	-	-
41.28	1.514	1.873	-	2.310	-	-	-	-	-	-	-
42.86	-	1.991	-	2.458	-	2.912	-	3.785	-	-	-
48.50	1.829	2.267	2.483	2.803	3.118	3.326	-	4.366	4.878	-	-
50.80	1.940	2.405	2.634	2.975	3.312	3.533	-	-	-	-	-
57.15	2.190	2.718	2.979	3.366	3.750	4.003	-	-	-	-	-
60.33	-	2.873	-	3.560	3.967	4.236	4.898	5.551	6.154	-	-
63.50	2.440	3.031	3.323	3.758	4.188	4.472	5.174	5.864	6.541	-	-
73.00	2.815	3.499	3.838	4.343	-	5.174	5.994	6.801	7.595	8.377	-
76.20	2.937	3.652	4.006	4.534	5.057	5.403	6.261	7.106	7.939	8.771	-
80.00	3.090	3.844	4.217	4.774	5.326	5.691	6.597	7.499	8.371	9.239	-
88.90	-	4.282	-	-	-	6.350	7.364	8.368	9.357	10.468	-
95.00	3.710	4.583	5.030	5.698	6.361	6.801	7.891	8.969	10.034	-	-
101.60	-	4.908	-	6.104	6.816	7.288	9.460	9.619	10.766	11.911	14.135
114.30	-	5.534	6.077	6.887	7.692	8.227	9.555	10.871	12.174	13.465	16.011
127.00	-	6.160	6.765	7.669	8.569	9.166	10.650	12.123	13.583	15.030	17.888
139.70	-	-	-	-	9.444	10.105	11.746	13.374	15.003	16.609	19.766
152.40	-	-	-	-	10.351	11.043	12.840	14.626	16.400	18.159	21.643
165.10	-	-	-	-	11.196	11.982	-	15.878	17.807	19.740	23.521

SQUARES

Outside diameter mm	Wall Thickness mm										
	1.6	2.0	2.2	2.5	2.8	3.0	3.5	4.0	4.5	5.0	6.0
12.70	0.564	-	-	-	-	-	-	-	-	-	-
15.90	0.726	-	-	-	-	-	-	-	-	-	-
19.10	0.938	1.153	-	-	-	-	-	-	-	-	-
25.40	1.198	1.478	-	1.817	-	2.129	-	-	-	-	-
31.80	1.514	1.873	-	2.310	-	-	-	-	-	-	-
38.10	1.829	2.267	2.483	2.803	3.118	3.326	-	-	-	-	-
44.50	2.190	2.718	2.979	3.366	3.750	4.003	-	-	-	-	-
50.80	2.440	3.031	3.323	3.758	4.188	4.472	5.174	5.864	6.541	-	-
63.50	3.090	3.844	4.217	4.774	5.326	5.691	6.597	7.499	8.371	-	-
76.20	3.710	4.583	5.030	5.698	6.361	6.801	7.891	8.969	10.034	-	-
80.00	-	4.908	-	6.104	6.816	7.288	9.460	9.619	-	-	-
90.00	-	5.534	6.077	6.887	7.692	8.227	9.555	10.871	12.174	13.465	16.011
101.60	-	6.160	6.765	7.669	8.569	9.166	10.650	12.231	13.583	15.030	17.888
120.00	-	-	-	-	10.351	11.043	12.840	14.626	16.400	18.159	-

STRUCTURAL TUBE

MILD STEEL DIMENTIONS AND MASS

RECTANGLES

Outside diameter mm	Wall Thickness mm										
	1.6	2.0	2.2	2.5	2.8	3.0	3.5	4.0	4.5	5.0	6.0
25.40	12.70	0.938	1.153	-	-	-	-	-	-	-	-
31.80	19.10	1.198	1.478	-	1.817	-	-	-	-	-	-
38.10	19.10	1.435	1.774	-	-	-	-	-	-	-	-
38.10	25.40	1.514	1.873	-	2.310	-	-	-	-	-	-
50.80	25.40	1.829	2.267	2.483	2.803	3.118	3.326	-	-	-	-
50.80	38.10	2.190	2.718	2.979	3.366	3.750	4.003	-	-	-	-
63.50	38.10	-	3.031	-	-	-	4.472	-	-	-	-
76.20	25.40	2.440	3.031	3.323	3.758	4.188	4.472	5.174	5.864	-	-
76.20	38.10	2.815	3.499	3.838	4.343	-	5.174	5.994	6.801	7.595	8.377
76.20	50.80	3.090	3.844	4.217	4.774	5.326	5.691	6.597	7.499	-	-
80.00	40.00	2.937	3.652	4.006	4.534	5.057	5.403	6.261	7.106	7.939	8.771
90.00	50.00	-	4.282	-	-	-	6.350	-	-	-	-
101.60	50.80	3.710	4.583	5.030	5.698	6.361	6.801	7.891	8.969	10.034	-
101.60	76.20	-	5.534	6.077	6.887	7.692	8.227	9.555	10.871	12.174	13.465
127.00	76.20	-	6.160	6.765	7.669	8.569	9.166	10.650	12.123	13.583	15.030
160.00	80.00	-	-	-	-	10.351	11.043	12.840	14.626	16.400	18.159

STRUCTURAL TUBE

SECTIONAL PROPERTIES

The sectional properties in the tables are based on the specified outside dimensions and wall thickness.
For square and rectangular sections the corner radii used in the calculations are:
R Internal = 1.5t and R External = 2.5t where t is the wall thickness.

The masses per unit length are calculated on the basis that steel has a density of 7.85 x 103 kg/mm3.

Torsional constants for most of the sections are available on request.

STEEL QUALITIES

SANS 657 Tubes shall be of steel chemical composition that complies with the following:

- Carbon content at 0.25% maximum
- Sulphur and Phosphorus at 0.05% each, maximum

DIMENSIONS

As per the sizes listed in the properties tables. These are largely in accordance with ISO/DIS4019 and other sizes can be supplied by agreement. The sizes listed are metric and we will be adopting these sizes as standard. All tubing is normally supplied in 6m lengths, but other lengths are available on application. Round tubing from 60mm and bigger; Square tubing from 50mm and bigger; Rectangular tubing 600 x 40mm and bigger. 3mm and thicker are available complying with S355MPa yield strength material.

TOLERANCES

Outside dimensions	± 1% with a minimum of ± 0.5mm
Wall Thickness	± 10% with a minimum of ± 0.2mm otside the weld area
Staightness	0.2% of total lenth

Other and closer tolerances can be supplied on request or on agreement.

WALL THICKNESS

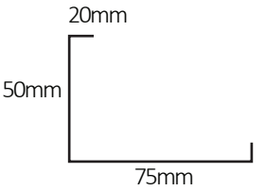
The standard wall thicknesses available in the Republic of South Africa are:
- 1.6 - 2.0 - 2.2 - 2.5 - 2.8 - 3.0 - 3.5 - 4.0 - 4.5 - 5.0 - 6.0

STEEL

COLD FORMED SECTIONS MASS PER METER

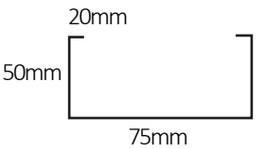
LIPPED ANGLE

Dimensions	2mm	2,5mm	3mm
75 x 50 x 20	2.400	2.940	3.460
100 x 75 x 20	3.190	3.930	4.640



LIPPED CHANNEL

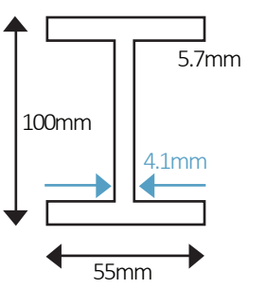
Dimensions	2mm	2,5mm	3mm
75 x 50 x 20	3.120	3.380	4.500
100 x 50 x 20	3.520	4.320	5.090
100 x 64 x 20	3.960	4.870	5.750
100 x 75 x 20	4.300	5.300	6.260
125 x 50 x 20	3.910	4.810	5.680
125 x 64 x 20	4.350	5.360	6.330
125 x 75 x 20	4.690	5.790	6.850
150 x 50 x 20	4.300	5.300	6.260
150 x 64 x 20	4.740	5.850	6.920
150 x 75 x 20	5.090	6.280	7.440
175 x 50 x 20	4.690	5.790	6.850
175 x 64 x 20	5.130	6.340	7.510
175 x 75 x 20	5.480	6.770	8.030
200 x 50 x 20	5.090	6.280	7.440
200 x 75 x 20	5.870	7.260	8.620
250 x 75 x 20	6.660	8.240	9.800



All cold formed sections are normally supplied in 6,0 or 9, 145 metre lenghts, but other lenghts are available on applictation.

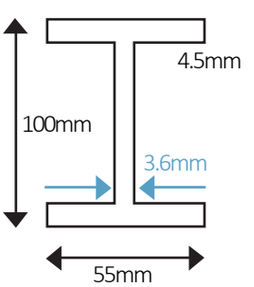
IPE SECTIONS SANS EN10025 GRADE S355JR

Dimensions	Kg/M	Web Dimensions	Flange Dimensions	Height	Width
100 x 55	8.104	4.100	5.700	100.000	55.000
120 x 64	10.370	4.400	6.300	120.000	64.000
140 x 73	12.894	4.700	6.900	140.000	73.000
160 x 82	15.772	5.000	7.400	160.000	82.000
180 x 91	18.799	5.300	8.000	180.000	91.000
200 x 100	22.360	5.600	8.500	200.000	100.000



IPE SECTIONS "AA" SANS EN10025 GRADE S355JR

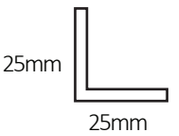
Dimensions	Kg/M	Web Dimensions	Flange Dimensions	Height	Width
100 x 55	6.720	3.600	4.500	97.600	55.000
120 x 64	8.357	3.800	4.800	117.000	64.000
140 x 73	10.054	3.800	5.200	136.600	73.000
160 x 82	12.315	4.000	5.600	156.400	82.000
180 x 91	14.940	4.300	6.200	176.400	91.000
200 x 100	17.954	4.500	6.700	196.400	100.000



STEEL

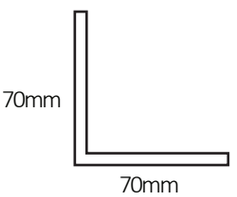
EQUAL ANGLE MILD STEEL MASS PER METER

Dimensions	2,5mm	3mm	4mm	5mm	6mm	8mm	10mm
25 x 25	0.953	1.114		1.773			
30 x 30	1.171	1.363		2.180			
40 x 40	1.582	1.874		2.974	3.516		
45 x 45		2.131		3.378	3.998		
50 x 50		2.367	3.056	3.770	4.469	5.819	
60 x 60			3.696	4.568	5.423	7.088	8.689



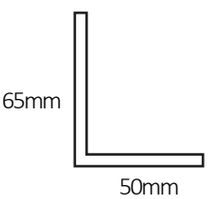
EQUAL ANGLE SANS EN10025 GRADE S355JR MASS PER METER

Dimensions	6mm	8mm	10mm	12mm
70 x 70	6.380	8.358	10.273	
80 x 80	7.338	9.630	11.859	14.026
90 x 90	8.297	10.904	13.447	15.928
100 x 100		12.179	15.036	17.831
120 x 120		14.712	18.197	21.620
150 x 150			22.981	27.345



EQUAL ANGLE SANS EN10025 GRADE S355JR MASS PER METER

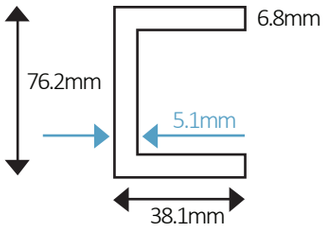
Dimensions	6mm	8mm	10mm	12mm
65 x 50	5.160	6.750		
75 x 50	5.650	7.390		
80 x 60	6.370	8.340		
90 x 65	7.070	9.290	11.400	
100 x 65		9.940		
100 x 75	8.044	10.572	13.370	15.439
125 x 75		12.160	15.017	17.812
150 x 75			16.979	20.167
150 x 90			18.176	21.599



STEEL

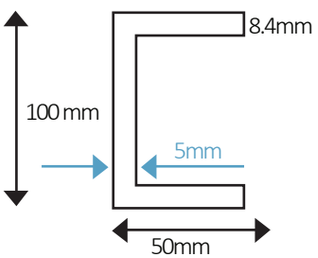
TAPER FLANGE CHANNNEL SANS EN10025 GRADE S355JR

Dimensions	Kg/M	Web Dimensions	Flange Dimensions	Height	Width
57 x 51	6.840	6.100	6.100	57.200	50.800
76 x 38	6.700	5.100	6.800	76.200	38.100
100 x 50	10.727	6.000	8.500	100.000	50.000
120 x 55	13.546	7.000	9.000	120.000	55.000
127 x 64	14.926	6.400	9.200	127.000	63.500
140 x 60	16.223	7.000	10.000	140.000	60.000
152 x 76	17.911	6.400	9.000	152.400	76.200
160 x 65	19.122	7.500	10.500	160.000	65.000
178 x 54	14.546	5.800	8.400	177.800	54.000
180 x 70	22.265	8.000	11.000	180.000	70.000
200 x 75	25.400	8.500	11.500	200.000	75.000



PARALLEL FLANGE CHANNEL SANS EN10025 GRADE S355JR

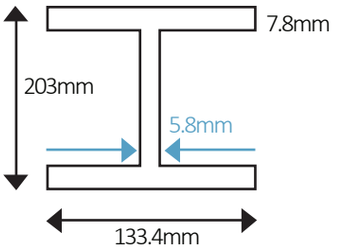
Dimensions	Kg/M	Web Dimensions	Flange Dimensions	Height	Width
100 x 50	10.100	5.000	8.400	100.000	50.000
180 x 70	21.100	7.000	10.900	180.000	70.000
200 x 75	24.300	7.500	11.400	200.000	75.000
230 x 90	32.200	7.500	14.000	230.000	90.000
260 x 90	34.800	8.000	14.000	260.000	90.000
300 x 100	45.400	9.000	16.500	300.000	100.000



STEEL

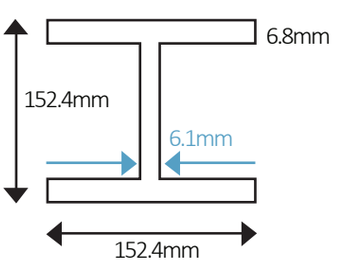
UNIVERSAL BEAMS SANS EN10025 GRADE S355JR

Dimensions	Kg/ M	Web Dimensions	Flange Dimensions	Height	Width
203 x 133	25.100	5.800	7.800	203.200	133.400
203 x 133	30.000	6.300	9.600	206.800	133.800
254 x 146	31.100	6.100	8.600	251.500	146.100
254 x 146	37.000	6.400	10.900	256.000	146.400
254 x 146	43.000	7.300	12.700	259.600	147.300
305 x 102	24.800	5.800	6.800	304.800	101.600
305 x 102	28.200	6.100	8.900	308.900	101.900
305 x 102	32.800	6.600	10.800	312.700	102.400
305 x 165	40.300	6.100	10.200	303.800	165.100
305 x 165	46.100	6.700	11.800	307.100	165.700
305 x 165	54.000	7.700	13.700	310.900	166.800
356 x 171	45.000	6.900	9.700	352.000	171.000
356 x 171	51.000	7.300	11.500	355.600	171.500
356 x 171	57.000	8.000	13.000	358.600	172.100
356 x 171	67.100	9.100	15.700	364.000	173.200
406 x 140	39.000	6.300	8.600	397.300	141.800
406 x 140	46.000	6.900	11.200	402.300	142.400
406 x 140	54.100	7.600	10.900	402.600	177.600
406 x 140	60.100	7.800	12.800	406.400	177.800
406 x 140	67.100	8.800	14.300	409.400	178.800
406 x 140	74.200	9.700	16.000	412.800	179.700
457 x 191	67.100	8.500	12.700	453.600	189.900
457 x 191	74.300	9.100	14.500	457.200	190.500
457 x 191	82.000	9.900	16.000	460.200	191.300
533 x 210	82.200	9.600	13.200	528.300	208.700
533 x 210	92.100	10.200	15.600	533.100	209.300
533 x 210	101.000	10.900	17.400	536.700	210.100



UNIVERSAL COLUMN SANS EN10025 GRADE S355JR

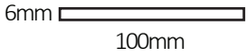
Dimensions	Kg/ M	Web Dimensions	Flange Dimensions	Height	Width
152 x 152	23.000	6.100	6.800	152.400	152.400
152 x 152	30.000	6.600	9.400	157.400	152.900
152 x 152	37.000	8.100	11.500	161.800	154.400
203 x 203	46.100	7.300	11.000	203.200	203.200
203 x 203	52.000	8.000	12.500	206.200	203.900
203 x 203	60.000	9.300	14.200	209.600	205.200
203 x 203	71.000	10.300	17.300	215.900	206.200
203 x 203	86.100	13.000	20.500	222.300	208.800
254 x 254	73.100	8.600	14.200	254.200	254.000
254 x 254	88.900	10.500	17.300	260.400	255.900
254 x 254	107.100	13.000	20.500	266.000	258.000
305 x 305	96.900	9.900	15.400	307.800	304.800
305 x 305	117.900	11.900	18.700	314.500	306.800
305 x 305	136.900	13.800	21.700	320.500	308.700



STEEL

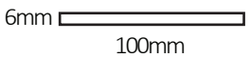
FLAT BAR MILD STEEL MASS PER METER

Dimensions	5mm	6mm	8mm	10mm	12mm	16mm	20mm	25mm
20	0.785	0.942	1.256	1.570	1.880			
25	0.981	1.178	1.570	1.963	2.355			
30	1.178	1.413	1.884	2.355	2.826			
40	1.570	1.884	2.512	3.140	3.768	5.024	6.280	7.850
50	1.963	2.355	3.140	3.925	4.710	6.280	7.850	9.813
60		2.826	3.768	4.710	5.652	7.536	9.420	11.775
65		3.062	4.802	5.103	6.123	8.164	10.205	12.756
70		3.297	4.396	5.495	6.594	8.792	10.990	
80		3.768	5.024	6.280	7.536	10.048	12.560	15.700
90		4.239	5.652	7.065	8.478	11.304	14.130	17.663



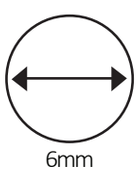
FLAT BAR SANS EN10025 GRADE S355JR MASS PER METER

Dimensions	5mm	6mm	8mm	10mm	12mm	16mm	20mm	25mm
100		4.710	6.280	7.850	9.420	12.560	15.700	19.625
110				8.635				
130			8.164	10.205	12.246	16.328	20.41	25.513
150			9.420	11.775	14.130	18.840	23.550	29.438
180				14.130	16.956	22.608	28.260	35.325
200				15.700	18.840	25.120	31.400	39.250



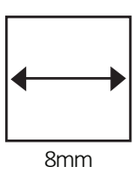
ROUND BAR MILD STEEL

Dimensions	Kg/m
6	0.222
8	0.395
10	0.617
12	0.888
16	1.578
20	2.466
22	2.984
24	3.551
25	3.853
30	5.549
32	6.313
35	7.553
40	9.865
45	12.485
50	15.413



SQUARE BAR MILD STEEL

Dimensions	Kg/m
8	0.502
10	0.785
12	1.130
16	2.010
20	3.140
25	4.910
30	7.070
40	12.600
50	19.600



Note: Larger sizes and different grades also available

STEEL

PLATES AND SHEETS MASS PER PLATE / SHEET

Thickness	Commercial Quality Plates		Hardwearing Plates - SS10/200/ Wearplate 200		SANS EN10025 Grade S275JR (300WA) Plates			
	Dimensions		Dimensions		Dimensions			
	2500 X 1200	3000 X 1500	2500 X 1200	4000 X 2000	2500 X 1200	3000 X 1500	4000 X 2000	10000 X 2400
4.5	106.000							
5.0	118.000	177.000	118.000		118.000	177.000	314.000	942.0000
6.0	141.000	212.000	141.000		141.000	212.000	377.000	1130.000
8.0	188.000	283.000	188.000		188.000	283.000	502.000	1507.000
10.0	236.000	353.000	236.000	628.000	236.000	353.000	628.000	1884.000
12.0	283.000	424.000	283.000		283.000	424.000	754.000	2261.000
16.0	377.000	565.000	377.000		377.000	565.000	1005.000	3014.000
20.0	471.000	707.000	471.000		471.000	707.000	1256.000	3768.000
25.0	589.000	883.000	589.000		589.000	883.000	1570.000	4710.000
30.0					707.000			
32.0					754.000			
40.0					942.000			
50.0					1178.000			

Thickness	Cold Rolled Sheets- Commercial Quality			Hot Rolled Sheets - Commercial Quality					
	Dimensions			Dimensions					
	1850 X 925	2450 X 925	2450 X 1225	1850 X 925	2450 X 925	2450 X 1225	3050 X 1225	3000 X 1500	4000 X 1800
0.5	6.880	9.110	12.060						
0.6	8.250	10.930	14.480						
0.8	11.010	14.570	19.300						
1.0	13.760	18.220	24.130						
1.2	16.510	21.860	28.950						
1.6	22.010	29.150	38.600	122.010	29.150	38.600	48.060		
2.0	27.510	36.440	48.250	27.510	36.440	48.250	60.070	72.351	
2.5				34.390	45.550	60.320	75.090	90.440	
2.8						67.560			
3.0				41.270	54.660	72.380	90.110	108.530	173.640
4.0						69.540		144.700	231.520

Thickness	Galvanised Flat Sheets - Z275			Vastrap Floor Plates
	Dimensions			Dimensions
	1850 X 925	2450 X 925	2450 X 1225	2500 X 1200
0.5	6.880	9.110	12.060	
0.6	8.250	10.930	14.480	
0.8	11.010	14.570	19.300	
1.0	13.760	18.220	24.130	
1.2	16.510	21.860	28.950	
1.6	22.010	29.150	38.600	
1.9	26.140	34.610	45.840	
3.0			732.380	
3.0/4.6				78.000
4.5/6.1				113.000
6.0/7.6				149.000
8.0/9.6				196.000

Note: Different sizes and qualities of plate and sheets also available

STEEL

TECHNICAL DATA - PLATES

Quality	Chemical Composition % (Ladle Analysis)													Tensile Strength (Min) (Mpa)	Yield Stress (Min) (Mpa)	Elongation % (Min) on Guage Length		Charpy V-Notch	
	C Max	Mn Max	P Max	S Max	Si Max	V	Al	Mo Max	Ni Max	Cr Max	Cu Max	B	Nb Max			200mm	5.65 P So	Temp °C	Ave (J)
SANS EN10025 S275JR	0.22	1.50	0.045	0.045	-								0.009	510	275		22*	20	27
S275JO	0.18	1.50	0.045	0.040	-								0.009	510	275		22	0	27
S275JN	0.18	1.50	0.035	0.035	-									430	275		22	-20	27
S355JR	0.24	1.60	0.045	0.045	0.55								0.009	510/680	355		22	20	27
S355JO	0.20	1.60	0.040	0.040	0.55								0.009	510/680	355		22	0	28
SANS EN10025 S355JN	0.20	1.60	0.035	0.035	0.55									510/680	355		22	-20	27
CORROSION RESISTANT	0.12	0.20/	0.07/	0.05	0.25/				0.65	0.30/	0.25/			480/	345	18	22		
WR 50BI CORNTENT A		0.50	0.15		0.75					1.25	0.55			(t<12.7)	(t<12.7)	(t<12.7)	(50mm)		
	0.19	0.20/	0.04	0.05	0.30/	0.02/	0.015/		0.40	0.40/	0.25/			480/	345	18	21		
		1.25			0.65	0.10	0.06			0.70	0.40			(t<100)	(t<100)	(<100)	(50mm)		
	0.19	0.80/	0.04	0.05	0.30/	0.04/	0.015/		0.40	0.40/	0.25/			550/	415	16	21		
		1.35			0.65	0.10	0.06			0.70	0.40			(t<25)	(t<25)	(<25)	(50mm)		
WEAR RESISTANT 10/200	0.40/	0.60/	0.03	0.045	0.35									NOT SPECIFIED					
	0.55	1.00			0.35														

INFORMATION

MATERIAL ANALYSIS AND COMPARISON

Standard	Tensile Strength		Yield Point		Elongation Min.%		C %		Si %		Mn %		P=max, %	S=max %	Mo %	Cr %	Ni %	Size and Tolerance Standard	Technical Spec.	Comparable Standards		
																				A.S.A.	D.I.N.	B.S
German																						
St. 00,29	ca,	35-45	ca,	24	ca,	25	-	-	-	-	-	-	-	-	-	-	-	DIN 2448	DIN 1692/2	-	-	-
St. 35,29	-	35-45	-	24	-	25	≤	0,18	-	-	-	-	0,05	0,05	-	-	-	DIN 2448	DIN 1629/3	A 53 A	-	3601 HFS 22
St. 45,29	-	45-55	-	26	-	21	≤	0,25	-	-	-	-	0,05	0,05	-	-	-	DIN 2448	DIN 1629/3	A 53 B	-	3601 HFS 27
St. 55,29	-	55-65	-	30	-	17	≤	0,36	-	-	-	-	0,05	0,05	-	-	-	DIN 2448	DIN 1629/3	-	-	3601 HFS 35
St. 52,00	-	52-62	-	34	-	22	≤	0,20	<	0,55	<	1,50	0,05	0,05	-	-	-	DIN 2448	DIN 1629/3	-	-	-
St. 35,80	-	35-45	-	24	-	25	≤	0,17	<	0,35	>	0,40	0,05	0,05	-	-	-	DIN 2448	DIN 17175	A 106 A	-	3059/01/02
St. 45,80	-	45-55	-	26	-	21	≤	0,22	-	0,10/0,35	>	0,45	0,05	0,05	-	-	-	DIN 2448	DIN 17175	A 106 B	-	3059/05-06
TT St. 35 N	-	35-45	-	23	-	25	≤	0,16	-	0,10/0,35	-	0,40/0,60	0,045	0,045	-	-	-	DIN 2448	S.E.Werk./Blt.680	A 333 Gr 1	-	3603 LT 27
15 Mo 3	-	45-55	-	29	-	22	-	0,12/0,20	-	0,15/0,35	-	0,50/0,80	0,04	0,04	0,25/0,35	-	-	DIN 2448	DIN 17175	A 335 P1	-	3059/07-08
16 Mo 5	≥	38,7	-	21,1	-	30	-	0,10/0,20	-	0,10/0,50	-	0,30/0,80	0,045	0,045	0,45/0,65	-	-	DIN 2448	DIN 17175	A 335 P1	-	3059/07-08
13 Cr Mo 44	-	45-58	-	30	-	22	-	0,10/0,18	-	0,15/0,35	-	0,40/0,70	0,04	0,04	0,40/0,50	0,70/1,00	-	DIN 2448	DIN 17175	A 335 P12/P11	-	3604 Gr 620
10 Cr Mo 910	-	42-60	-	27	-	20	≤	0,15	-	0,15/0,50	-	0,40/0,60	0,04	0,04	0,90/1,10	2,0/2,50	-	DIN 2448	DIN 17175	A 335 P22	-	3604 Gr 622
12 Cr Mo 195	≤	42	--	18	-	21	≤	0,15	<	0,50	-	0,30/0,60	0,03	0,03	0,45/0,65	4-6	-	DIN 2448	-	-	-	3604 Gr 625
American																						
ASTM A 53 A	≥	33,7		21,1		35	-		-	(0,10-0,30)	-	-	0,048	-	-	-	-	ASA B 36,10		API SL GR A	St. 35,29	3601 HFS 22
A 53 B	≥	42,2		24,6		30	-	0,25	-	(0,10-0,30)	-	-	0,048	-	-	-	-	ASA B 36,10		API SL GR 8	St. 45,29	3601 HFS 27
A 106 A	≥	33,7		21,1		35	≤	0,30	≥	0,10	-	0,27/0,93	0,048	0,058	-	-	-	ASA B 36,10		API 5L GR A	St. 35,8	3059/01/02
A 106 B	≥	42,2		24,6		30	≤	0,30	>	0,10	-	0,29/1,06	0,048	0,058	-	-	-	ASA B 36,10		API 5L GR B	St. 45,8	3059/5-6
ASTM A 333/1	≥	38,7		21,1		35	≤	0,19	-	-	-	0,40/1,06	0,05	0,06	-	-	-	ASA B 36,10		-	TT St. 35 N	3603 LT 27
A 333/3	≥	45,7		24,6		30	≤	0,10/0,20	-	0,18/0,37	-	0,31/0,64	0,05	0,05	-	-	3,18/3,82	ASA B 36,10		-	10 Ni 14	3603 503 LT 100
ASTM A 335 P1	≥	38,7		21,1		30	-	0,10/0,20	-	0,10/0,50	-	0,30/0,80	0,045	0,045	0,44/0,65	-	-	ASA B 36,10		-	16 Mo 5	3059/7-8
P2	≥	38,7		21,1		30	-	0,15	-	0,10/0,30	-	0,30/0,61	0,045	0,045	0,44/0,65	0,50/0,81	-	ASA B 36,10		-	13 Cr Mo 44	-
P11	≥	42,2		21,1		30	≤	0,15	-	0,50/1,00	-	0,30/0,60	0,03	0,03	0,44/0,65	1-1,5	-	ASA B 36,10		-	13 Cr Mo 44	3604 Gr 621
P12	≥	42,2		21,1		30	≤	0,15	<	0,50	-	0,30/0,61	0,045	0,045	0,44/0,65	0,8/1,25	-	ASA B 36,10		-	13 Cr Mo 44	3604 Gr 620
P22	≥	42,2		21,1		30	≤	0,15	<	0,50	-	0,30/0,60	0,03	0,03	0,87/1,13	1,9/2,6	-	ASA B 36,10		-	10 Cr Mo 910	3604 Gr 622
P5	≥	42,2		21,1		30	≤	0,22	<	0,50	-	0,30/0,60	0,03	0,03	0,45/0,65	4-6	-	ASA B 36,10		-	12 Cr Mo 195	3604 Gr 625
API 5 L GR A	≥	37,7		21,1		-	<	0,27	-	-	<	0,90	0,04	0,05	-	-	-	ASA B 36,10		ASTM A 53 A	-	-
L GR B	≥	42,2		24,6		-	<	0,29	-	-	<	1,15	0,04	0,05	-	-	-	ASA B 36,10		ASTM A 53 B	-	-
LX 42	≥	42,2		29,5		-	<	0,31	-	-	<	1,25	0,04	0,05	-	-	-	ASA B 36,10		-	-	-
LX 46	≥	44,3		32,3		-	<	0,26	-	-	<	1,35	0,04	0,05	-	-	-	ASA B 36,10		-	-	-
LX 56	≥	49,9		39,2		-	<	0,26	-	-	<	1,35	0,04	0,05	-	-	-	ASA B 36,10		-	-	-
LX 60	≥	52,7		42,2		-	<	0,26	-	-	<	1,35	0,04	0,05	-	-	-	ASA B 36,10		-	-	-
LX 65	≥	54,1		45,7		-	<		-	-	<	1,40	0,04	0,05	-	-	-	ASA B 36,10		-	-	-
British																						
BS 3601 HFS 22	≥	34,6		21,3			<	0,21		-	<	0,70	0,06	0,06						A 53 A	St. 35,29	
BS 3601 HFS 27	≥	42,5		25,2			<	0,25		-	<	0,70	0,05	0,05						A 53 B	St. 45-29	
BS 3601 HFS 35	≥	55,1		31,5			<	0,40		-	<	1,20	0,05	0,05						-	St. 55,29	
BS 3602 HFS 23	-	36,2-47,2		21,3			<	0,20		-	-	0,30/0,70	0,05	0,05						A 106 A	St. 35-8	
BS 3602 HFS 27	-	42,5-55,1		25,2			<	0,25		(0,10-0,35)	-	0,30/0,70	0,05	0,05						A 106 B	St. 45,8	
BS 3602 HFS 35	-	55,1-67,7		31,5			<	0,35		(0,10-0,35)	-	0,70/1,10	0,05	0,05						A 106 C	-	
BS 3059/3 ERW	-	31,5-44,1		-			-	-		-	-	-	0,05	0,05						-	St.35,8	

INFORMATION

COMPARISON TABLE CHEMICAL ANALYSIS

ASTM A 213, 249, 269, 270, 271, 312, 409, 632

Grade	Composition, per cent																
	Carbon max[7]	Manganese max[7]	Phosphorus max	Sulfur, max	Silicon max	Nickel	Chromium	Molyb-denum	Titanium	Columbium plus Tantalum	Tantalum max	Nitrogen6	Sweden S.I.S	Germany DIN / Werkstoff	Japan J.I.S.	Britain B.S.	America A.I.S.I.
TP 304	0,08	2,0	0,040	0,030	0,75	8,00-11,00	18,0-20,0	-	-	-	-	-	2333	1,4301	SUS 304	304 S15	304
TP 304H	0,04-0,10	2,00	0,040	0,030	0,75	8,00-11,0	18,0-20,0	-	-	-	-	-	-	-	-	-	-
TP 304L	0,0351	2,00	0,040	0,030	0,75	8,00-13,0	18,0-20,0	-	-	-	-	-	2352	1,4306	SUS 304L	304 S12	304L
TP 304N	0,08	2,00	0,040	0,030	0,75	8,00-11,00	18,0-20,0	-	-	-	-	0,10-0,16	-	-	-	-	-
TP 309	0,15	2,00	0,040	0,030	0,75	12,0-15,0	22,0-24,0	-	-	-	-	-	-	-	-	-	-
TP 310	0,15	2,00	0,040	0,030	0,75	19,0-22,0	24,0-26,0	-	-	-	-	-	2361	1,4845	SUS 310 S/309s	310 S24	310
TP 316	0,08	2,00	0,040	0,030	0,75	11,0-14,0	16,0-18,0	2,00-3,00	-	-	-	-	2343	1,14436	SUS 316 J1	316 S16	316
TP 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	-	-	-	-	2353	1,4435	SUS 316 J1L	316 S12	316L
TP 316L	0,0351	2,00	0,040	0,030	0,75	10,0-15,0	16,0-18,0	2,00-3,00	-	-	-	-	2366	1,4449	SUS 317	317 S16	317
TP 316N	0,08	2,00	0,040	0,030	0,75	11,0-14,0	16,0-18,0	2,00-3,00	-	-	-	-	2337	1,4541	SUS 321	321 S12	321
TP 317	0,08	2,00	0,040	0,030	0,75	11,0-14,0	18,0-20,0	3,00-4,00	-	-	-	-	-	-	-	-	-
TP 321	0,08	2,00	0,040	0,030	0,75	9,00-13,0	17,0-20,0	-	2	-	-	-	2338	1,4550	SUS 347	347 S17	347
TP 321H	0,04-0,10	2,00	0,040	0,030	0,75	9,00-13,0	17,0-20,0	-	3	-	-	-	-	-	-	-	-
TP 347	0,08	2,00	0,040	0,030	0,75	9,00-13,0	17,0-20,0	-	-	4	-	-	2302	1,4006	SUS 410 J1	410 S21	410
TP 347H	0,04-0,10	2,00	0,040	0,030	0,75	9,00-13,0	17,0-20,0	-	-	5	-	-	-	-	-	-	-
TP 348	0,08	2,00	0,040	0,030	0,75	9,00-13,0	17,0-20,0	-	-	4	0,10	0,10	2380	1,4005	SUS 416	416 S21	416
TP 348H	0,04-0,10	2,00	0,040	0,030	0,75	9,00-13,0	17,0-20,0	-	-	5	0,10	0,10	2304	1,4028	SUS 420 J2	420 S37	420
TP XM-15	0,08	2,00	0,030	0,030	1,50-2,50	17,50-18,50	17,0-20,0	-	-	-	-	-	2320	1,4016	SUS 430	430 S15	430
TP XM-29	0,060	11,50-14,50	0,040	0,030	1,00	2,25-3,75	17,0-20,0	-	-	-	-	-	2321	1,4057	SUS 431	431 S29	431
TP XM-19[8]	0,060	4,00-6,00	0,040	0,030	1,00	11,50-13,50	20,5-23,50	1,50-3,00	-	0,10-0,30	-	-	-	-	-	-	-

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 TP 304L and TP 316L. 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. (1,2mm) in minimum wall thickness).
2 The titanium content shall be not less than five times the carbon content and not more than 0,60 per cent.
3 The titanium content shall be not less than four times the carbon content and not more than 0,06 per cent.
4 The columbium plus tantalum content shall be not less than ten times the carbon content and not more than 1,00 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.

INFORMATION

CORROSION RESISTANCE DATA

The following table gives the theoretical corrosin resistance of stainless steel types AISI 304, 304L, 316, 316L, 321 and 347; nickel, Monel and Inconel to the most frequently used chemical solutions. These data sheets are compiled from laboratory tests based on commercially pure chemicals under ideal conditions. The symbols A, B, C, D, and E represent approximate corrosion ranges as defined in the table shown. It must be noted that under actual operating conditions there are often present in the system other chemicals which may either inhibit or accelerate the rate of attack. This information is only intended to serve as a general guide; for more specicific details the advice of the basic metal producers should be sought.

A	Fully resistant	▶	Less than .00035" penetration per month
B	Satisfactorily resistant	▶	.00035-.0035" penetration per month
C	Fairly resistant	▶	.0035 -.010" penetration per month
D	Slightly resistant	▶	:010 -.035" penetration per month
E	Non resistant	▶	Over .035" penetration per month
-	Insufficient data to warrant rating		

Product and Condition	Temp. (°F.)	304 304 ELC 321 347	316 316L	Nickel	Monel	Inconel
Acetic Acid						
5% and 10%	70°	A	A	A	A	A
20%	70°	A	A	A	A	A
50%	70°	A	A	B	A	A
50%	Boiling	C	B	B	A	B
80%	70°	A	A	B	A	A
80%	Boiling	D	B	B	A	B
100%	70°	A	A	A	A	A
100%	Boiling	C	B	C	B	B
100%-50 lb. pressure	400°	E	C	-	-	-
Acetic Anhydride	Boiling	A	A	A	A	A
	70°	A	A	A	A	A
Acetic Vapours						
100%	Hot	E	C	C	B	B
30%	Hot	C	B	-	-	-
Acetone	Boiling	A	A	A	A	A
	70°	A	A	A	A	A
Alcohol Ethyl	70°	A	A	A	A	A
	Boiling	A	A	A	A	A
Alcohol methyl	70°	A	A	A	A	A
	150°	C	B	A	A	A
Aluminium Acetate - saturated		A	A	-	-	-
Aluminium Chloride	70°	D	C	B	B	C
Alum (Chrome) 5%	70°	A	A	C	C	A
Aluminium Fluoride	70°	D	C	A	A	B
Aluminium Hydroxide- saturated		A	A	A	A	A
Aluminium	Molten	E	E	E	E	E
Aluminium Potassium Sulphate						
2% (alum.)	70°	A	A	A	A	A
10%	70°	A	A	A	A	A
10%	Boiling	B	A	B	A	B
saturated	Boiling	C	B	C	B	B
Aluminium Sulphate						
10%	70°	A	A	A	A	A
10%	Boiling	B	A	B	A	B
saturated	70°	A	A	A	A	A
saturated	Boiling	B	A	B	A	B
Ammonia						
All concentrations	70°	A	A	-	-	A
Gas	Hot	D	-	-	-	-

Product and Condition	Temp. (°F.)	304 304 ELC 321 347	316 316L	Nickel	Monel	Inconel
Ammonia Liquor	70°	A	A	C	C	A
	Boiling	A	A	C	C	A
Ammonium Bicarbonate	70°	A	A	A	A	A
	Hot	A	A	A	A	A
Ammonium Carbonate						
1% and 5%	70°	A	A	A	A	A
Ammonium Chloride						
1%	70°	A	A	A	A	A
10% Solution	Boiling	A	A	A	A	B
28% Solution	Boiling	B	A	A	A	B
50% Solution	Boiling	B	A	A	A	B
Ammonium Nitrate						
All con. Agitated	70°	A	A	C	C	A
All con. Aerated	70°	A	A	C	C	A
Saturated	Boiling	A	A	E	E	B
Ammonium Oxalate - 5%	70°	A	A	A	A	A
Ammonium Persulphate						
-5%	70°	A	A	E	E	A
Ammonium Phosphate						
-5%	70°	A	A	A	A	A
Ammonium Solphate						
1% and 5% agitated	70°	A	A	A	A	A
1% and 5% aerated	70°	A	A	A	A	A
10%	Boiling	B	A	B	A	B
Saturated	Boiling	B	A	B	A	B
Ammonium Sulphite	Cold	A	A	C	B	B
	Boiling	A	A	E	C	C
Aniline - 3%	70°	A	A	A	A	A
Conc. Crude	70°	A	A	A	A	A
Aniline Hydrochloride	70°	E	D	B	B	C
Antimony Trichloride	70°	E	D	A	A	A
Barium Carbonate	70°	A	A	A	A	A
Barium Chloride						
5%	70°	A	A	A	A	A
Saturated	70°	A	A	A	A	A
Aqueous solution	Hot	B	A	A	A	B
Barium Nitrate - aqueous solution	Hot	A	A	C	C	B
Barium Sulphate Barytes						
- Blanc Fixe	70°	A	A	A	A	A
Benzene	70°	A	A	A	A	A

CORROSION RESISTANCE DATA CONTINUED

Product and Condition	Temp. (°F.)	304 304 ELC 321 347	316 316L	Nickel	Monel	Inconel
Benzoic Acid	70°	A	A	A	A	A
Benzol	Hot	A	A	A	A	A
Boracic Acid - 5%	Hot or Cold	A	A	A	A	A
Borax - 5%	Hot	A	A	A	A	A
Bromide - dry	70°	-	-	A	A	A
Bromine Water	70°	E	D	D	D	D
Butyric Acid						
5%	70°	A	A	A	A	A
5%	150°	A	A	A	A	A
Aqueous solution- sp. g. 0.964	Boiling	A	A	-	-	A
Calcium Carbonate	70°	A	A	A	A	A
Calcium Chlorate						
Dilute Solution	70°	A	A	A	A	A
Dilute Solution	Hot	A	A	A	A	B
Calcium Chloride						
Dilute Solution	70°	B	A	A	A	A
Conc. Solutions	70°	B	A	A	A	A
Calcium Hydroxide						
10%	Boiling	A	A	A	A	A
20%	Boiling	A	A	A	A	A
50%	Boiling	C	B	A	A	A
Caldium Hypochlorite - 2%	70°	B	A	C	C	B
Calcium Sulphate - saturated	70°	A	A	A	A	A
Carbolic Acid						
C.P.	Boiling	A	A	A	A	A
Crude	Boiling	A	A	A	A	A
C.P.	70°	A	A	A	A	A
Carbonated Water		A	A	A	A	A
Carbon Bisulphide	70°	A	A	A	A	A
Carbon Monoxide Gas	1600°	A	A	-	-	-
	1400°	A	A	-	-	-
Carbon Tetrachloride						
Pure	70°	A	A	A	A	A
Aqueous solution- 5-10%	70°	C	-	A	A	A
Chloracetic Acid	70°	D	C	A	A	A
Chlorbenzol Conc. - pure	70°	A	A	A	A	A
Chloric Acid	70°	E	D	D	D	D
Chlorinated Water - saturated	70°	C	B	C	C	B
Chlorine Gas - dry	70°	C	B	C	C	C
Gas- moist	70°	D	C	C	C	C
Gas	212°	E	D	A	A	A
Chloroform	70°	A	A	A	A	A
Chromic Acid						
5%	70°	A	A	A	A	A
10% C.P.	Boiling	C	B	C	B	C
50% Com. (cont. SO_3)	Boiling	D	C	-	-	-
Chromium Plating Bath	70°	A	A	C	C	A
Citric Acid						
5% still	70°	A	A	A	A	A
5% still	150°	A	A	A	A	A

Product and Condition	Temp. (°F.)	304 304 ELC 321 347	316 316L	Nickel	Monel	Inconel
Citric Acid						
15%	70°	A	A	A	A	A
15%	Boiling	B	A	B	A	A
Concentrated	Boiling	B	A	B	A	A
Copper Acetate - situated sol.	70°	A	A	C	C	A
Copper Carbonate sat. solution in 50% NH_3OH		A	A	C	C	A
Copper Chloride						
1% agitated	70°	B	A	B	B	A
1% aerated	70°	B	A	B	B	A
5% agitated	70°	C	B	C	C	C
5% aerated	70°	E	C	C	C	D
Copper Cyanide - saturated solution	Boiling	A	A	B	B	B
Copper Nitrate						
1% and 5%	70°	A	A	C	C	A
50% aqueous solution	Hot	A	A	E	E	C
Copper sulphate						
5%	70°	A	A	B	B	A
saturated solution	Boiling	A	A	C	C	C
Creosotate (Coal Tar)	Hot	A	A	A	A	A
Creosote Oil	Hot	A	A	A	A	A
Cyanogen Gas	70°	A	A	A	A	A
Dinitrochlorbenzol - melted and solidified	70°	A	A	-	-	-
Ether	70°	A	A	A	A	A
Ethyl Chloride	70°	A	A	A	A	A
Ethylene Chloride	70°	A	A	A	A	A
Ferric Chloride						
1% solution, still	70°	B	A	B	C	C
1% solution, still	Boiling	D	C	E	E	E
5% solution, still	70°	D	C	D	D	C
5% agitated	70°	C	C	D	D	C
5% aerated	70°	C	C	D	D	C
Ferric Hydroxide (Hydrated Iron Oxide)	70°	A	A	A	A	A
Ferric Nitrate - 1% and 5%	70°	A	A	D	D	A
Ferric Sulphate - 1% and 5%	70°	A	A	C	C	A
Ferrous Sulphate - dilute sol.	70°	A	A	A	A	A
Flourine	70°	E	E	A	A	A
Formalin - 40% sol.						
Formaldehyde		A	A	A	A	A
Formic Acid						
5%, still	70°	B	A	A	A	A
5%, still	150°	B	A	A	A	A
Fuel Oil	Hot	A	A	B	B	A
Containing sulphuric acid		C	B	B	B	B

CORROSION RESISTANCE DATA CONTINUED

Product and Condition	Temp. (°F.)	304 304 ELC 321 347	316 316L	Nickel	Monel	Inconel
Galic Acid						
5% Solution	70°	A	A	A	A	A
5% Solution	150°	A	A	A	A	A
Glue- dry	70°	A	A	A	A	A
Solution- Acid	70°	B	A	A	A	A
Solution- Acid	140°	B	A	A	A	A
Glycerine	70°	A	A	A	A	A
Hydrochloric Acid						
All concentrations	70°	E	E	B	B	C
Hydrocyanic Acid		A	A	A	A	A
Hydrofluosilicic Acid	70°	E	D	A	A	B
Hydrogen Peroxide	70°	A	A	A	A	A
	Boiling	B	A	-	-	-
Hydrogen Sulphide						
Dry		A	A	A	A	A
Wet		B	A	A	A	A
Hyphosulphite Soda						
(Hypo)		A	A	B	A	A
Iodine		E	D	D	D	D
Iodoform		A	A	-	-	-
Lactic Acid						
5%	70°	A	A	A	A	A
5%	150°	B	A	A	A	A
10%	Boiling	D	B	C	C	D
10%	150°	C	B	B	B	B
Lead	Molten	B	B	D	D	B
Linseed Oil	70°	A	A	A	A	A
Magnesium Chloride						
1% and 5%, still	70°	A	A	A	A	A
1% and 5ş, still	Hot	C	B	A	A	A
Magnesium Sulphate	Hot or Cold	A	A	A	A	A
Malic Acid	Hot or Cold	B	A	A	A	A
Mayonnaise	70°	A	A	B	B	A
Mercuric Chloride Dilute Solutions		E	D	D	D	D
Mercury		A	A	A	A	A
Methanol (Methyl Alcohol)	70°	A	A	A	A	A
Mixed Acids						
53%, H_2SO_4	Cold	A	A	D	D	A
45% HNO_3	Cold	A	A	D	D	A
Molasses		A	A	A	A	A
Muriatic Acid	70°	E	E	B	B	C
Mustard	70°	A	A	A	B	B
Naphtha	70°	A	A	A	A	A
Naphtha- crude	70°	A	A	A	A	A
Nickle Chloride- solution	70°	A	A	B	B	B
Nickel Sulphate	Hot or Cold	A	A	A	A	A

Product and Condition	Temp. (°F.)	304 304 ELC 321 347	316 316L	Nickel	Monel	Inconel
Niter Cake	Fused	B	A	-	-	-
Nitric Acid						
5% solution	70°	A	A	E	E	B
20% solution	70°	A	A	E	E	A
50% solution	70°	A	A	E	E	A
50% solution	Boiling	A	A	E	E	C
65% solution	Boiling	B	B	E	E	D
Concentrated	70°	A	A	E	E	A
Concentrated	Boiling	D	D	E	E	D
Nitrous Acid						
5% solution	70°	A	A	D	D	A
Oils- crude	Hot or Cold	A	A	A	A	A
Oils- vegetable, mineral	Hot or Cold	A	A	A	A	A
Oleic Acid						
Oxalic Acid						
5%	Hot or Cold	A	A	A	A	A
10%	70°	A	A	A	A	A
10%	Boiling	D	C	B	A	B
Paraffin	Hot or Cold	A	A	A	A	A
Petroleum Ether		A	A	A	A	A
Phenol		A	A	A	A	A
Phosphoric Acid						
1%	70°	A	A	A	A	A
5%	70°	A	A	A	A	A
10%, still	70°	C	A	B	A	A
10% agitated	70°	C	B	B	B	B
10% aerated	70°	C	B	C	C	B
Picric Acid	70°	A	A	-	-	-
Potassium Bichromate	70°	A	A	A	A	A
Potassium Bromide	70°	B	A	A	A	A
Potassium Carbonate						
1%	70°	A	A	A	A	A
1%	Hot	A	A	A	A	A
Potassium Chlorate		A	A	A	A	A
Potassium Chloride						
1% and 5%	70°	A	A	A	A	A
1% and 5%	Boiling	A	A	A	A	A
Potassium Ferricyanide						
-5%	70°	A	A	-	-	-
Potassium Ferrocyanide						
-5%	70°	A	A	-	-	-
Potassium Hydroxide						
5%	70°	A	A	A	A	A
27%	Boiling	A	A	A	A	A
50%	Boiling	B	A	A	A	A
Potassium Nitrate						
1% and 5%	70°	A	A	A	A	A
1% and 5%	Hot	A	A	A	A	A
Potassium Oxalate		A	A	A	A	A
Potassium Permanganate						
-5%	70°	A	A	A	A	A
Potassium Sulphate						
1% and 5%	70°	A	A	A	A	A
1% and 5%	Hot	A	A	A	A	A

CORROSION RESISTANCE DATA CONTINUED

Product and Condition	Temp. (°F.)	304 304 ELC 321 347	316 316L	Nickel	Monel	Inconel
Potassium Sulphide (salt)		A	A	A	A	A
Pyrogallic Acid		A	A	A	A	A
Quinine Bisulphate- dry		B	A	A	A	A
Quinine Sulphate- dry		A	A	A	A	A
Rosin	Molten	A	A	A	A	A
Sea Water		A	A	A	A	A
Sewage		A	A	A	A	A
Silver Bromide		B	A	-	-	-
Silver Chloride		E	E	-	-	-
Silver Nitrate		E	E	-	-	-
Soap	70°	A	A	A	A	A
Sodium Acetate- moist		A	A	A	A	A
Sodium Bicarbonate All concentrations 5%,still	 70° 150°	 A A	 A A	 A A	 A A	 A A
Sodium Carbonate 5% 5%	 70° 150°	 A A	 A A	 A A	 A A	 A A
Sodium Chloride 5% still 5% still 20% aerated Saturated Saturated	 70° 150° 70° 70° Boiling	 A A A A B	 A A A A A	 A A A A A	 A A A A A	 A A A A A
Sodium Flouride- 5% solution		B	A	A	A	A
Sodium Hydroxide		A	A	A	A	A
Sodium Hypochlorite- 5% still		B	A	C	C	C
Sodium Hyposulphite	70%	A	A	A	A	A
Sodium Nitrate	Fused	C	B	A	B	A
Sodium Sulphate- 5%, still	70°	A	A	A	A	A
Sodium Sulphate- All concentrations	70°	A	A	A	A	A
Sodium Sulphide- Saturated		B	A	A	A	A
Sodium Sulphite 5% 10%	 70° 150°	 A A	 A A	 A A	 A A	 A A
Stannic Chloride- SP. G. 1.21	Boiling	E	E	B	B	C
Stannic Chloride- solution	70°	D	C	A	B	B
Stannous Chloride- Saturated		C	A	A	B	B
Stearic Acid		A	A	A	A	A
Sulphur Chloride		E	D	A	A	A
Sulphur Dioxide Gas- Moist	 70° 575°	 B A	 A A	 D -	 C -	 C -

Product and Condition	Temp. (°F.)	304 304 ELC 321 347	316 316L	Nickel	Monel	Inconel
Sulphur Dry Wet	 Molten	 A B	 A A	 A B	 A B	 A A
Sulphuric Acid 5% 5% 10% 10% 50% 50% Concentrated Concentrated Concentrated Fuming	 70° Boiling 70° Boiling 70° Boiling 70° Boiling 300° 70°	 C E C E D E A D E C	 B C B D C D A D E B	 A D B C B E B E E C	 A A A A A E B E E B	 A C B C B E B E E B
Sulphurous Acid Saturated Saturated 60 lb. pressure Saturated 70-125 lb. pressure 150 lb. pressure Sulphurous spray	 70° 250° 310° 375° 70°	 C C C C D	 B B B B D	 E E E E E	 E E E E E	 E E E E E
Tannic Acid	70° 150°	A A	A A	A A	A A	A A
Tartaric Acid	70° 150°	A B	A A	A A	A A	A A
Tin	Molten	C	C	E	E	E
Trichloracetic Acid	70°	E	E	B	B	B
Varnish	70°	A	A	A	A	A
	Hot	A	A	A	A	A
Vinegar Fumes		B	A	B	A	A
Vinegar Still Agitated Aerated	 70°	 A A A	 A A A	 A A B	 A A A	 A A A
Zinc	Molten	E	E	E	E	E
Zinc Chloride 5%, still 5%, still	 70° Boiling	 A B	 A B	 A B	 A B	 A B
Zinc Sulphate 5% Saturated 25%	 70° 70° Boiling	 A A A	 A A A	 A A A	 A A A	 A A A

kPa	PSI	Metres Head
1,00	0,15	0,10
2,00	0,29	0,20
3,00	0,44	0,31
4,00	0,58	0,41
5,00	0,73	0,51
6,00	0,87	0,61
6,89	1,00	0,70
7,00	1,02	0,71
8,00	1,16	0,82
9,00	1,31	0,92
10,00	1,45	1,02
13,79	2,00	1,41
20,00	2,90	2,04
20,68	3,00	2,11
27,58	4,00	2,81
30,00	4,35	3,06
34,47	5,00	3,52
40,00	5,80	4,08
41,37	6,00	4,22
48,26	7,00	4,92
50,00	7,25	5,10
55,16	8,00	5,62
60,00	8,70	6,12
62,05	9,00	6,33
68,95	10,00	7,03
70,00	10,15	7,14
80,00	11,60	8,16
90,00	13,05	9,18
100,00	14,50	10,20
103,42	15,00	10,55
110,00	15,95	11,22
120,00	17,40	12,24
130,00	18,85	13,26
137,90	20,00	14,06
140,00	20,31	14,28
150,00	21,76	15,30
160,00	23,21	16,32
172,37	25,00	17,58
180,00	26,11	18,35
190,00	27,56	19,37
200,00	29,01	20,39
206,84	30,00	21,09
210,00	30,46	21,41
220,00	31,91	22,43
230,00	33,36	23,45
240,00	34,81	24,47
241,32	35,00	24,61
250,00	36,26	25,49
260,00	37,71	26,51
270,00	39,16	27,53
275,79	40,00	28,12
280,00	40,61	28,55
290,00	42,06	29,57
300,00	43,51	30,59
310,00	44,96	31,61
310,26	45,00	31,64
320,00	46,41	32,63
330,00	47,86	33,65
340,00	49,31	34,67
344,74	50,00	35,15
350,00	50,76	35,69
360,00	52,21	36,71
370,00	53,66	37,73
379,21	55,00	38,67

kPa	PSI	Metres Head
380,00	55,11	38,75
390,00	56,56	39,77
400,00	58,02	40,79
410,00	59,47	41,81
413,69	60,00	42,18
420,00	60,92	42,83
430,00	62,37	43,85
440,00	63,82	44,87
448,16	65,00	45,70
450,00	65,27	45,89
460,00	66,72	46,91
470,00	68,17	47,93
480,00	69,62	48,95
482,63	70,00	49,21
490,00	71,07	49,97
500,00	72,52	50,99
510,00	73,97	52,01
517,11	75,00	52,73
520,00	75,42	53,03
530,00	76,87	54,04
540,00	78,32	55,06
550,00	79,77	56,08
551,58	80,00	56,25
560,00	81,22	57,10
570,00	82,67	58,12
580,00	84,12	59,14
586,05	85,00	59,76
590,00	85,57	60,16
600,00	87,02	61,18
610,00	88,47	62,20
620,00	89,92	63,22
620,53	90,00	63,28
630,00	91,37	64,24
640,00	92,82	65,26
650,00	94,27	66,28
655,00	95,00	66,79
660,00	95,72	67,30
670,00	97,18	68,32
680,00	98,63	69,34
689,48	100,00	70,31
690,00	100,08	70,36
700,00	101,53	71,38
710,00	102,98	72,40
720,00	104,43	73,42
723,95	105,00	73,82
730,00	105,88	74,44
740,00	107,33	75,46
750,00	108,78	76,48
758,42	110,00	77,34
760,00	110,23	77,50
770,00	111,68	78,52
780,00	113,13	79,54
790,00	114,58	80,56
792,90	115,00	80,85
800,00	116,03	81,58
810,00	117,48	82,60
820,00	118,93	83,62
827,37	120,00	84,37
830,00	120,38	84,64
840,00	121,83	85,66
850,00	123,28	86,68
860,00	124,73	87,70
861,84	125,00	87,88
870,00	126,18	88,72

kPa	PSI	Metres Head
880,00	127,63	89,73
890,00	129,08	90,75
896,32	130,00	91,40
900,00	130,53	91,77
910,00	131,98	92,79
920,00	133,43	93,81
930,00	134,89	94,83
930,79	135,00	94,91
940,00	136,34	95,85
950,00	137,79	96,87
960,00	139,24	97,89
965,27	140,00	98,43
970,00	140,69	98,91
980,00	142,14	99,93
990,00	143,59	100,95
999,74	145,00	101,95
1 000,00	145,04	101,97
1 034,21	150,00	105,46
1 378,95	200,00	140,61
1 500,00	217,56	152,96
1 723,69	250,00	175,77
2 000,00	290,08	203,94
2 068,43	300,00	210,92
2 413,16	350,00	246,07
2 500,00	362,59	254,93
2 757,90	400,00	281,23
3 000,00	435,11	305,91
3 102,64	450,00	316,38
3 447,38	500,00	351,53
3 500,00	507,63	356,90
3 792,12	550,00	386,69
4 000,00	580,15	407,89
4 136,85	600,00	421,84
4 481,59	650,00	457,00
4 500,00	652,67	458,87
4 826,33	700,00	492,15
5 000,00	725,19	509,86
5 171,07	750,00	527,30
5 500,00	797,71	560,84
5 515,81	800,00	562,46
5 860,54	850,00	597,61
6 000,00	870,23	611,83
6 205,28	900,00	632,76
6 500,00	942,75	662,82
6 550,00	950,00	667,91
6 894,76	1000,00	703,07
7 000,00	1015,26	713,80
7 239,49	1050,00	738,22
7 500,00	1087,78	764,79
7 584,23	1100,00	773,38
7 928,97	1150,00	808,53
8 000,00	1160,30	815,77
8 273,71	1200,00	843,68
8 500,00	1232,82	866,76
8 618,45	1250,00	878,84
8 963,18	1300,00	913,99
9 000,00	1305,34	917,74
9 307,92	1350,00	949,14
9 500,00	1377,86	968,73
9 652,66	1400,00	984,30
9 997,40	1450,00	1 019,45
1 0000,00	1450,38	1 019,72

TABULATION SHEET - USEFUL CONVERSION FACTORS AND FORMULAE

To convert from	to	multiply by
Atmospheres	pounds per sq. inch	14,70
Centimeters Cubic centimetres	inches cubic inches	0,3937 0,06103
Cubic feet Cubic feet	cubic metres gallons	0,02832 6,228
Cubic inches Cubic inches	cubic centimetres litres	16,3871 0,01639
Cubic metres Cubic metres	cubic feet cubic yards	35,32 1,308
Cubic yards	cubic metres	0,7645
Feet	metres	0,3048
Gallons Gallons	litres cubic feet	4,546 0,1605
Grams	pounds	0,00220
Inches Inches	centimetres millimetres	2,540 25,40
Kilograms Kilograms	pounds tons	2,205 0,00098
Kilometres	miles	0,6214
Kilograms per metre	pounds per foot	0,672
Kilograms per sq. mm Kilograms per sq. mm	tons per sq. in. pounds per sq. in.	0,635 1422,34
Kilograms per sq.cm.	pounds per sq. in.	14,223
Kilograms per sq. mm	newtons per sq. mm.	9,8115
Litres Litres	cubic inches gallons	61,03 0,2205
Litres of water at 62°F	pounds	2,205
Metres Metres	feet yards	3,281 1,094
Miles Milimetres	kilometres inches	1,609 0,0394
Newtons per sq.mm. Newtons per sq.mm.	Kilograms per sq. mm. pounds per sq. inch	0,1019 145,0677
Pounds Pounds	grams kilograms	453,60 0,4536
Pounds per foot	kilograms per metre	1,488
Pounds per sq. in Pounds per sq. in	Kpa atmospheres	6,895 0,06803
Pounds per sq. in Pounds per sq. in Pounds per sq. in	kilograms per sq. cm. kilograms per sq. mm. newtons per sq. mm.	0,07031 0,0007031 0,0069
Square centimetres	square inches	0,1550
Square feet	square metres	0,09296
Square inches	square centimetres	6,452
Square kilometres	square miles	0,3861
Square metres Square metres	square feet square yards	10,76 1,196
Square miles Square yards	square kilometres square metres	2,590 0,8367
Temperature conversion:	F° to C° = 5/9 (F°-32) C° to F° = X 9/5 + 32	
Tons per sq. in.	kilograms per sq. mm.	1,575
Tons Yards	kilograms metres	1016,0 0,9144

INFORMATION

USEFUL DATA - IMPERIAL WIRE AND SHEET METAL GAUGE

No.	Imperial Standard (swg)		Birmingham Wire (bwg)		No.	Imperial Standard (swg)		Birmingham Wire (bwg)	
	ins.	mm	ins.	mm		ins.	mm	ins.	mm
7/0	0.500	12.70			18	0.048	1.220	0.049	1.240
6/0	0.464	11.78			19	0.040	1.020	0.042	1.070
5/0	0.432	10.97			20	0.036	0.914	0.035	0.888
4/0	0.400	10.16	0.454	11.53	21	0.032	0.813	0.032	0.813
3/0	0.372	9.45	0.425	10.79	22	0.028	0.711	0.028	0.711
2/0	0.348	8.84	0.380	9.65	23	0.024	0.610	0.025	0.635
0	0.324	8.23	0.340	8.63	24	0.0220	0.559	0.022	0.559
1	0.300	7.62	0.300	7.62	25	0.0200	0.508	0.020	0.508
2	0.276	7.01	0.284	7.21	26	0.0180	0.457	0.018	0.457
3	0.252	6.40	0.259	6.58	27	0.0164	0.417	0.016	0.417
4	0.232	5.89	0.238	6.05	28	0.0148	0.376	0.014	0.376
5	0.212	5.38	0.220	5.59	29	0.0136	0.345	0.013	0.345
6	0.192	4.88	0.203	5.16	30	0.0124	0.315	0.012	0.305
7	0.176	4.47	0.180	4.57	31	0.0116	0.295	0.010	0.254
8	0.160	4.06	0.165	4.19	32	0.0108	0.274	0.009	0.228
9	0.144	3.65	0.148	3.76	33	0.0100	0.254	0.008	0.203
10	0.128	3.25	0.134	3.40	34	0.0092	0.234	0.007	0.178
11	0.116	2.95	0.120	3.04	35	0.0084	0.213	0.005	0.127
12	0.104	2.64	0.109	2.77	36	0.0076	0.193	0.004	0.102
13	0.092	2.34	0.095	2.41	37	0.0068	0.173		
14	0.080	2.03	0.083	2.11	38	0.0060	0.152		
15	0.072	1.83	0.072	1.83	39	0.0052	0.132		
16	0.064	1.63	0.065	1.63	40	0.0048	0.122		
17	0.056	1.42	0.058	1.42					

STEEL PIPE COMPARISONS (ANSI, JIS, BS AND DIN)

Nominal Pipe Size	Outside Diameter (Inches)				Outside Diameter (Metric)			
	ANSI	JIS	BS	DIN	ANSI	JIS	BS	DIN
1/2	0.840	0.854	-	0.838	21.34	21.7	-	21.3
3/4	1.050	1.071	-	1.059	26.67	27.2	-	26.9
1	1.315	1.339	1.344	1.326	33.40	34.0	34.1	33.7
1 1/4	1.660	1.681	1.688	1.669	42.16	42.7	42.8	42.4
1 1/2	1.900	1.913	1.906	1.902	48.26	48.6	48.4	48.3
2	2.375	2.382	2.375	2.374	60.32	60.5	60.3	60.3
2 1/2	2.875	3.004	3.000	2.996	73.02	76.3	76.2	76.1
3	3.500	3.508	3.500	3.500	88.90	89.1	88.9	88.9
3 1/2	4.000	4.000	4.000	4.000	101.60	101.6	101.6	101.6
4	4.500	4.500	4.500	4.500	114.30	114.3	114.3	114.3
5	5.563	5.504	5.500	5.500	141.30	139.8	139.7	139.7
6	6.625	6.504	6.625	6.625	168.27	165.2	168.3	168.3
8	8.625	8.516	8.625	8.625	219.07	216.3	219.07	219.1
10	10.75	10.528	10.7500	10.750	273.05	267.4	273.05	273.0
12	12.75	12.539	12.7500	12.750	323.85	318.5	323.85	323.9
14	14.000	14.000	14.000	14.000	355.60	355.6	355.6	355.6
16	16.000	16.000	16.000	16.000	406.40	406.4	406.4	406.4
18	18.000	18.000	-	18.000	457.20	457.2	-	457.2
20	20.000	20.000	-	20.000	508.00	508.0	-	508.0
22	22.000	22.000	-	-	558.80	558.8	-	-
24	24.000	24.000	-	-	609.60	609.6	-	-

USEFUL FORMULAE

AREAS AND VOLUMES

Area	
Circle	$p r^2$
Rhomboid	base x height
Triangle	1/2 base x height
Parabola	2/5 base x height
Ellipse	0,7854 x short axis x long axis
Cube	Sum of areas of sides
Sphere	$4 p r^2$
Cylinder	$2 p r^2 \pm 2 p rh = 2 p r (r \pm h)$
Volume	
Sphere	4/3 p r3
Cylinder	$p r^2 h$
Cube	side3

VALUES OF SINGLE DEGREES

°C	°F	°F	°C
1	= 1.8	1	= 0.56
2	= 3.6	2	= 1.11
3	= 5.4	3	= 1.67
4	= 7.2	4	= 2.22
5	= 9.0	5	= 2.78
6	= 10.8	6	= 3.33
7	= 12.6	7	= 3.89
8	= 14.4	8	= 4.44
9	= 16.2	9	= 5.00
°C = 5/9 (°F- 32°)		°F = (9/5°C) + 32°	

FRACTIONS TO DECIMALS AND MILLIMETRES

Fractions	1/32	1/16	3/32	1/8	5/32	3/16	7/32	1/4	9/32	5/16	11/32	3/8	13/32	7/16	15/32	1/2
Decimals	0.03125	0.0625	0.09375	0.125	0.15625	0.1875	0.21875	0.250	0.28125	0.3125	0.34375	0.375	0.40625	4375	46875	0.500
Millimetres	0.7937	1.5875	2.3812	3.1750	3.9687	4.7025	5.5562	6.3500	7.1437	7.9375	8.7312	9.5250	10.3187	11.1125	11.9062	12.7000
Fractions	17/32	9/16	19/32	5/8	21/32	11/16	23/32	3/4	25/32	13/16	27/32	7/8	29/32	15/16	31/32	1
Decimals	0.53125	0.5625	0.53975	0.625	0.65625	0.6875	0.71875	0.750	0.78125	0.8125	0.84375	0.875	0.90625	0.9375	96875	1.000
Millimetres	13.4937	14.2875	15.0812	15.8750	16.6687	17.4625	18.2562	19.0500	19.8437	20.6375	21.4312	22.2250	23.0187	23.8125	24.6062	25.4000