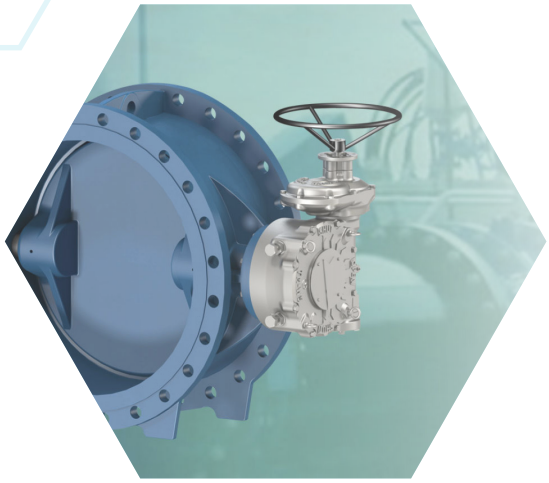
DERWENT
FLOW CONTROL

TECHNICAL CHARTS



TECHNICAL INFORMATION

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PIPE - SIZING CHART

PRESSURE PIPE

NOMINAL DIAMETER

Name	Material	Designation	Standard	50	65	80	100	125	150	175	200	225	250	300	350	375	400	450	500	525	600	675	750	900	1000	1100	1200
ISO	DICL	International	DIS2531E	66	77/82	98	118	144	170	.	222	.	274	326	378	.	429	480	532	.	635	738	842	945	1048	1152	1255
DICL	DICL	Class K9 or K12	AS2280	.	.	96	122	.	177	.	232	259	286	345	.	426	.	507	560	.	667	.	826	.	.	.	.
HOBAS	Hobas	(GRP)	AS1413	.	.	.	122	.	177	.	232	259	286	345	399	426	453	507	560	587	667	747	826	924	1026	.	1229
CICL	CICL	Class B	AS1742-2	.	.	.	122	.	177	.	232	259	286	334	.	413	.	492	545	.	650	.	.	.	.	.	.
CICL	CICL	Class C	AS1544	.	.	96	122	149	177	203	232	259	286	345	.	426	.	507	560	.	667	.	.	.	.	.	.
AC	AC	Class AB	AS1711	.	.	96	122	.	177	.	232	259	286	334	.	413	.	492	.	572	650	.	.	.	.	.	.
AC	AC	Class CD	AS1711	.	.	96	122	.	177	.	232	259	286	345	.	426	.	507	.	587	667	747	826	.	.	.	.
uPVC	uPVC	CIOD (Blue)	AS1477	.	.	.	122	.	177	.	232	259	286	345	.	426	.	507	.	560	667						
uPVC	uPVC	Metric White	AS1477	60	75	89	114	140	160	200	225	250	280	315	355	400	450	500	560	.	630	.	.	.	.	.	.
STEEL	Steel	MSCL	AS1579	.	.	.	114	.	168	.	219	.	273	324	356	.	406	457	508	.	610	.	762	914 960	1016 1050 1067	.	1200 1283 1290
STEEL	Galv.	GWI	AS1074	60	76	89	114	140	165	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
PE	PE	To Actual OD	AS4130	50	63	75 90	110	125	140 160	180	200	225	250	280 315	355		400	450	500	560	630		730 800	900	1000		1200
RC	RC	Class 2-12	AS4058	.	.	.	.	.	197	.	.	279	.	362	.	445	.	533	.	616	699	787	870	946	1029	1105 1194	1270 1354
CU	CU		AS3688	51	64	76	102	127	152	.	203	229	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Note: *These charts should only be used as a guide. Figures are rounded to the closest decimal place - Use actaul pipe measurements for accuracy*

Handy tip: *To get accurate average diameter divide circumference by 3.142 (pi) eg.If circumference is 383mm then diameter = 121.9mm*

Caution: *Steel and reinforced concrete have many intermediate sizes that have not been included here.*

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NON-PRESSURE PIPE

NOMINAL DIAMETER

Pipe	Material	Designation	Standard	50	65	80	100	125	150	175	200	225	250	300	350	375	400	450	500	525	600	675	750
VC	VC		AS1741	.	.	.	138	.	194	.	.	280	.	370	.	450	485	535	.	635	710	.	.
FRC	FRC	Class X		.	.	.	124	.	179	.	.	261	.	345	.	426	.	510	.	594	679	.	.
AC	AC	Class 35	AS1712	.	.	.	120	.	177	.	230	257	283	336	.	419	.	497	.	576	657	.	.
AC	AC	Class 50	AS1712	.	.	.	122	.	183	.	236	262	289	344	.	425	.	505	.	585	664	.	.
CI	Cast Iron	Soil	AS1631	.	.	85	114	140	165	.	.	244	.	323	.	.	.	.	.	.	.	.	.
uPVC	uPVC	SWV	AS1260	59	69	83	110	.	160	.	.	.	.	.	.	.	.	.	.	.	.	.	.
uPVC	uPVC	Sewer	AS1260	.	.	.	110	.	160	.	.	250	.	316	.	401	.	.	.	.	.	.	.
Blac Brute		Internal Diameter	DN16961	.	.	.	.	.	.	.	.	.	.	.	.	365	.	440	.	.	590	..	740

WORKING PRESSURES - WELDED JOINTS

CHS GRADE C250

MASS AND BUNDLING DATA -CALCULATED IN ACCORDANCE WITH AS 1163

DIMENSIONS				BUNDLING				MASS					
Designation			Nominal Size	Bundle Dimensions		Lengths per Bundle	Metres per Bundle	Nominal Mass				Mass Per Bundle	
								kg/m		m/tonne		tonnes	
do	t		DN	mm									
mm	mm		mm	W	H	6.5m	Metres	Black	Galv	Black	Galv	Black	Galv
26.9	2.6	CHS	20M	350	306	127	825.5	1.56	1.6	642	623	1.29	1.32
	3.2	CHS	20H	350	306	127	825.5	1.87	1.92	535	522	1.54	1.58
33.7	3.2	CHS	25M	327	327	91	591.5	2.41	2.46	415	406	1.42	1.46
	4	CHS	25H	327	327	91	591.5	2.93	2.99	341	335	1.73	1.77
42.4	3.2	CHS	32M	383	337	61	396.5	3.09	3.17	323	316	1.23	1.26
	4	CHS	32H	383	337	61	396.5	3.79	3.86	264	259	1.5	1.53
48.3	3.2	CHS	40M	436	384	61	396.5	3.56	3.64	281	274	1.41	1.44
	4	CHS	40H	436	384	61	396.5	4.37	4.45	229	225	1.73	1.77
60.3	3.6	CHS	50M	422	374	37	240.5	5.03	5.14	199	195	1.21	1.24
	4.5	CHS	50H	422	374	37	240.5	6.19	6.3	161	159	1.49	1.51
76.1	3.6	CHS	65M	533	472	37	240.5	6.44	6.57	155	152	1.55	1.58
	4.5	CHS	65H	533	472	37	240.5	7.95	8.08	126	124	1.91	1.94
88.9	4	CHS	80M	445	397	19	123.5	8.38	8.54	119	117	1.03	1.05
	4.9	CHS	80H	445	397	19	123.5	10.15	10.31	99	97	1.25	1.27
101.6	4	CHS	90M	508	454	19	123.5	9.63	9.81	104	102	1.19	1.21
	4.9	CHS	90H	508	454	19	123.5	11.69	11.87	86	84	1.44	1.47
114.3	4.5	CHS	100M	571	509	19	123.5	12.19	12.39	82	81	1.50	1.53
	5.4	CHS	100H	571	509	19	123.5	14.50	14.71	69	68	1.79	1.82
139.7	5	CHS	125M	699	382	13	84.5	16.61	16.86	60	59	1.40	1.42
	5.4	CHS	125H	699	382	13	84.5	17.89	18.14	56	55	1.51	1.53
165.1	5	CHS	150M	660	451	10	65	19.74	20.04	51	50	1.28	1.30
	5.4	CHS	150H	660	451	10	65	21.27	21.57	47	46	1.38	1.40

Notes: M=Medium H=Heavy

WORKING PRESSURES - WELDED JOINTS

Where AS 1074 pipe is used in pressure piping covered by AS 4041, the maximum pressure shall not exceed 1210 kPa for AS 1074 pipe up to and including DN100 and 1030 kPa for AS 1074 pipe exceeding DN100.

SPECIFICATION

C250 Pipe is manufactured and tested to meet the requirement of the following specifications:-

- AS 1074 Steel Tubes and Tubulars for ordinary service.
- AS 1163 Structural steel and hollow sections. (Grade C250 and C25L0).

THREADED PIPE

Screwed on one or both ends in accordance with AS 1074. The tapered Whitworth thread used complies with the requirements of AS 1722, Part 1 and is suitable for both parallel and threaded sockets.

END PROCESSING OPTIONS

C250 Pipe is manufactured and tested to meet the requirement of the following specifications:-

- Plain End
- Shouldered
- Roll Grooved
- Threaded

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WORKING PRESSURES - THREADED JOINTS TAPER/PARALLEL THREAD

TYPE OF SERVICE

Nominal Size	Water & Inert Oil		Nominal	Fuel Oil				Other Applications (including Steam & Compressed Air)			
DN	Med	Med & Heavy	Size	Medium		Heavy		Medium Press	Temp.	m/tonne	Temp.
			DN	Press.	Temp.	Press.	Temp.				
mm	kPa	kPa	kPa	kPa	°C	kPa	°C	kPa	°C	kPa	°C
12	2070	2410	140	1030	100	1210	192	1210	100	1210	192
32	1720	2070	140	1030	100	1030	192	1030	100	1030	192
40	1720	2070	140	1030	100	1030	192	1030	100	1030	192
50	1380	1720	140	860	100	860	192	860	100	860	192
65	1380	1720		860	100	860	192	860	100	860	192
80	1380	1720		860	100	860	192	860	100	860	192
100	1030	1380		690	100	860	192	690	100	690	192
125	1030	1380									
150	860	1030									

SUPPLY CONDITIONS

Surface Finish	Black/Painted/Galvanised
Straightness	Refer to Australian Standards
Thickness Tolerence	
Dimension Tolerence	
Standard Length	6.5m
Length Tolerance	+ 25mm/-0mm

MECHANICAL PROPERTIES

Minimum Yield Strength	250MPa
Minimum Tensile Strength	320MPa
Minimum Elogation in 5.65 √So	20%

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STEEL PIPES TO AMERICAN STANDARD ANSI B36.10

NOMINAL SIZES SHOWN ARE DN : SI METRIC TERM NPS : ANSI TERM

Nominal Size		Outside Diam	NOMINAL WALL THICKNESS FOR WELDED AND SEAMLESS STEEL PIPE												
			ANSI B36.10			All dimensions are shown in millimetres									
DN	NPS	mm	Std	Extra Strong	XX Strong	Sched 10	Sched 20	Sched 30	Sched 40	Sched 60	Sched 80	Sched 100	Sched 1120	Sched 140	Sched 150
6	1/8	10.3	1.73	2.41					1.73		2.41				
8	1/4	13.7	2.24	3.02					2.24		3.02				
10	3/8	17.1	2.31	3.20					2.31		3.20				
15	1/2	21.3	2.77	3.73	7.47				2.77		3.73				4.78
20	3/4	26.7	2.87	3.91	7.82				2.87		3.91				5.56
25	1	33.4	3.38	4.55	9.09				3.38		4.55				6.35
32	1 1/4	42.2	3.56	4.85	9.70				3.56		4.85				6.35
40	1 1/2	48.3	3.68	5.08	10.15				3.68		5.08				7.14
50	2	60.3	3.91	5.54	11.07				3.91		5.54				8.74
65	2 1/2	73.0	5.16	7.01	14.02				5.16		7.01				9.53
80	3	88.9	5.49	7.62	15.24				5.49		7.62				11.13
90	3 1/2	101.6	5.74	8.08					5.74		8.08				
100	4	114.3	6.02	8.56	17.12				6.02		8.56		11.13		13.49
125	5	141.3	6.55	9.53	19.05				6.55		9.53		12.70		15.88
150	6	168.3	7.11	10.97	21.95				7.11		10.97		14.27		18.26
200	8	219.1	8.18	12.70	22.23		6.35	7.04	8.18	10.31	12.70	15.09	18.26	20.62	23.01
250	10	273.1	9.27	12.70	25.40		6.35	7.80	9.27	XS	15.09	18.26	21.44	XXS	28.58
300	12	323.9	9.53	12.70	25.40		6.35	8.38	10.31	14.27	17.48	21.44	XXS	28.58	33.32
350	14	355.6	9.53	12.70		6.35	7.92	Std.W.T.	11.13	15.09	19.05	23.83	27.79	31.75	35.71
400	16	406.4	9.53	12.70		6.35	7.92	Std.W.T.	XS	16.66	21.44	26.19	30.96	36.53	40.49
450	18	457	9.53	12.70		6.35	7.92	11.13	14.27	19.05	23.83	29.36	34.93	39.67	45.24
500	20	508	9.53	12.70		6.35	Std.W.T	XS	15.09	20.62	26.19	32.54	38.10	44.45	50.01
550	22	559	9.53	12.70		6.35	Std.W.T	XS		22.23	28.58	34.93	41.28	47.63	53.98
600	24	610	9.53	12.70		6.35	Std.W.T	14.27	17.48	24.61	30.96	38.89	46.02	52.37	59.54
650	26	660	9.53	12.70		7.92	XS								
700	28	711	9.53	12.70		7.92	XS	15.88							
750	30	762	9.53	12.70		7.92	XS	15.88							
800	32	813	9.53	12.70		7.92	XS	15.88	17.48						
850	34	864	9.53	12.70		7.92	XS	15.88	17.48						
900	36	914	9.53	12.70		7.92	XS	15.88	19.05						
1050	42	1067	9.53	12.70											

Formula to attain approximate mass in kilograms per metre (kg/m) for Steel Round Pipe and Tubing

$m = (D - t)\ t \times 0.02466$

Where:

m= mass to the nearest 0.01 kg/m

D = Outside Diameter in millimetres
(To nearest 0.1 mm for OD up to 406.4mm)
(To nearest 1.0mm for OD 457 mm and above)

t = Wall thickness to nearest 0.01 mm

Example

- Nominal Size DN300 NPS12
- OD = 323.9 mm
- W.T. - 9.53 mm

- Step 1. 323.9 - 9.53 = 314.37
- Step 2. 314.37 x 9.53 =2995.9461
- Step 3. 2995.9461 x 0.024.66
- = 73.88 kg/m

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FLANGE DIMENSION TABLE - AS2129 & AS4087
(AS Standard, AS High Pressure, Table E)

	FLANGE DIMENSIONS	NOMINAL SIZE	50	65	80	100	125	150	175	200	225	250	300	350	375	400	450	500	525	600	700	750
AS Standard Pressure	AS 4087 & AS 2129 Drilling Compatible with Table C & D AS Standard Pressure	Outside Dia.	150	165	185	215	255	280		335	370	405	455	525	550	580	640	705	735	825	910	995
		Pitch Circle Dia	114	127	146	178	210	235		292	324	356	406	470	495	521	584	641	673	756	845	927
		No. of Holes	4	4	4	4	8	8		8	8	8	12	12	12	12	12	16	16	16	20	20
		Dia. of Holes	18	18	18	18	18	18		18	18	22	22	26	26	26	26	26	26	30	30	33
		Bolt Diameter	16	16	16	16	16	16		16	16	20	20	24	24	24	24	24	24	27	27	30
	FLANGE THICKNESS																					
	Class 16	Ductile Iron			18	20		23		23	24	24	30		33		33	35		42		47
	Class 14	Cast Iron			19	22	22	22		25	25	25	29	32	32	32	35	38	38	41	44	48
	Class 14	Steel	11	11	11	11	13	15		19	19	19	23	30	30	30	30	38	41		48	
AS High Pressure	AS 4087 & AS 2129 Drilling Compatible with Table F & H AS High Pressure	Outside Dia.	165	185	205	230		305		370	405	430	490	550	580	610	675	735	760	850		1015
		Pitch Circle Dia	127	146	165	191		260		324	356	381	438	495	521	552	610	673	699	781		940
		No. of Holes	4	8	8	8		12		12	12	12	16	16	16	20	20	24	24	24		28
		Dia. of Holes	18	18	18	18		22		22	26	26	26	30	30	30	33	33	33	36		36
		Bolt Diameter	16	16	16	16		20		20	24	24	24	27	27	27	30	30	30	33		33
	FLANGE THICKNESS																					
	Class 35	Ductile Iron			22	22		27		31	34	34	38		42		46	49		54		59
	Class 21	Cast Iron			19	22		25		29	29	32	32	35	35	35	38	41	41	44		51
	Class 35	Cast Iron			29	32		35		41	41	44	44	48	51	51	54	57	60	64		
	Class 21	Steel	15	15	15	19		24		24	30	30	30	30	38	38	38	48	51	58		58
	Class 35	Steel	19	19	24	24		31		31	38	38	38	48	48	48	58	58	70	68		
Table E	AS 2129 Table E	Outside Dia.	150	165	185	215	255	280		335	370	405	455	525	550	580	640	705	735	825	910	995
		Pitch Circle Dia.	114	127	146	178	210	235		292	324	356	406	470	495	521	584	641	675	756	845	927
		No. of Holes	4	4	4	8	8	8		8	12	12	12	12	12	12	16	16	16	16	20	20
		Dia. of Holes	18	18	18	18	18	22		22	22	22	26	26	26	26	26	26	30	33	33	36
		Bolt Diameter	16	16	16	16	16	20		20	20	20	24	24	24	24	24	24	27	30	30	33
	FLANGE THICKNESS																					
	Class 14	Cast Iron	19	19	19	22	22	22		25	25	25	29	32	32	32	35	38	38	41	44	48

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FLANGE DIMENSION TABLE - (ISO 7005 PN16, ANSI B16.1 125 lb)

	FLANGE DIMENSIONS	NOMINAL SIZE	50	65	80	100	125	150	175	200	225	250	300	350	375	400	450	500	525	600	700	750
ISO 7005 PN 16	ISO 7005 PN 16 Drilling Compatible with BS 4504 PN16 & DIN 2533 PN 16	Outside Dia.	165	185	200	220	250	285	315	340		405	460	520		580	640	715		840	910	
		Pitch Circle Dia	25	145	160	180	210	240	270	295		355	410	470		525	585	650		770	840	
		No. of Holes	4	4	8	8	8	8	8	12		12	12	16		16	20	20		20	24	
		Dia. of Holes	18	18	18	18	18	22	22	22		27	27	27		30	30	33		36	36	
		Bolt Diameter	16	16	16	16	16	20	20	20		24	24	24		27	27	30		33	33	
	FLANGE THICKNESS																					
	Class 16	Ductile Iron	19	19	19	19	19	19		20		22	25	27		28	30	32		36	40	
	Class 16	Cast Iron	20	20	22	24	26	26		30		32	32	36		38	40	42		48	54	

ANSI B16.1 125 lb	ANSI B16.1 125 lb Drilling Compatible with ANSI B16.1 150 lb	Outside Dia.	152	178	191	229	255	280		343		405	483	533		597	635	699		813		984
		Pitch Circle Dia	121	140	152	191	216	241		298		362	432	476		540	578	635		749		914
		No. of Holes	4	4	4	8	8	8		8		12	12	12		16	16	20		20		28
		Dia. of Holes	19	19	19	19	22	22		22		25	25	29		29	32	32		35		35
		Bolt Diameter	16	16	16	16	20	20		20		22	22	25		25	29	29		32	32	
	FLANGE THICKNESS																					
	Class 17	Cast Iron	16	18	2	20	24	25		29		26	32	35		37	40	48		48		54

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FLANGE DIMENSION TABLE - (AS4087 Table C, E & F + Bolt Sizing)

STANDARD PRESSURE FLANGE (AS 4087)
- Table C or E drilling - maximum working pressure 1.6 Mpa.

Nominal Size	Flange Diameter A	Flange Thickness T	Table C			Table E		
			Bolt Circle Dia. P	Number of Bolts	Bolt Size	Bolt Circle Dia. P	Number of Bolts	Bolt Size
80	185	18	146	4	M16 x 65	146	4	M16 x 65
100	215	20	178	4	M16 x 75	178	8	M16 x 75
150	280	23	235	8	M16 x 75	235	8	M20 x 75
200	335	23	292	8	M16 x 75	292	8	M20 x 75
225	370	24	324	8	M16 x 75	324	12	M20 x 75
250	405	24	356	8	M20 x 90	356	12	M20 x 90
300	455	30	406	12	M20 x 100	406	12	M24 x 100
375	550	33	495	12	M24 x 100	495	12	M24 x 100
450	640	33	584	12	M24 x 120	584	16	M24 x 120
500	705	35	641	16	M24 x 120	641	16	M24 x 120
600	825	42	756	16	M27 x 130	756	16	M30 x 140
750	995	47	927	20	M30 x 140	927	20	M33 x 140

HIGH PRESSURE FLANGE (AS 4087)
- Table F drilling - maximum working pressure 3.5 Mpa.

Nominal Size	Flange Diameter A	Flange Thickness T	Table F		
			Bolt Circle Dia. P	Number of Bolts	Bolt Size
80	205	22	165	8	M16 x 75
100	230	22	191	8	M16 x 75
150	305	27	260	12	M20 x 90
200	370	31	324	12	M20x100
225	405	34	356	12	M24 x 120
250	430	34	381	12	M24 x 120
300	490	38	438	16	M24 x 120
375	580	42	521	16	M27 x 130
450	675	46	610	20	M30 x 140
500	735	49	673	24	M30 x 140
600	850	54	781	24	M33 x 160
750	1015	59	940	28	M33 x 160

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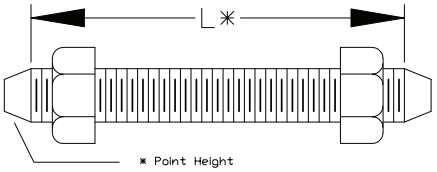
BOLT & STUD DIMENSIONS FOR AMERICAN STANDARD FLANGES

To suit Flange Sizes 15mm to 600mm to ANSI B16.5 (BS.1560) and sizes 750mm & 900mm to BS.3293

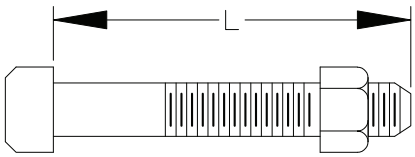
NOMINAL SIZES SHOWN ARE SAA METRIC (MM) & ANSI (INS) NOMINAL SIZE

Nominal Flange Size		Class 150				Class 300				Class 600			Class 900			Class 1500			Class 2500			Nominal Flange Size	
				L				L				L			L			L			L		
		No. Bolts	Dia Bolts	Stud Bolts	Mach Bolts	No. Bolts	Dia Bolts	Stud Bolts	Mach Bolts	No. Bolts	Dia Bolts	Stud Bolts	No. Bolts	Dia Bolts	Stud Bolts	No. Bolts	Dia Bolts	Stud Bolts	No. Bolts	Dia Bolts	Stud Bolts		
mm	inch		inch	mm	mm		inch	mm	mm		inch	mm		inch	mm		inch	mm		inch	mm	mm	inch
15	½	4	½	60	45	4	½	65	55	4	½	80				4	¾	105	4	¾	125	15	½
20	¾	4	½	65	50	4	5/8	75	60	4	5/8	90				4	¾	115	4	¾	125	20	¾
25	1	4	½	65	55	4	5/8	80	65	4	5/8	90	Use Class 1500 dimensions in these sizes			4	7/8	125	4	7/8	140	25	1
32	1¼	4	½	70	55	4	5/8	80	65	4	5/8	100				4	7/8	125	4	1	150	32	1¼
40	1½	4	½	70	60	4	5/8	90	75	4	5/8	105				4	1	140	4	1 1/8	170	40	1½
50	2	4	5/8	80	65	8	5/8	90	75	8	¾	105				8	7/8	145	8	1	175	50	2
65	2½	4	5/8	90	75	8	¾	100	85	8	¾	120				8	1	160	8	1 1/8	195	65	2½
80	3	4	5/8	90	75	8	¾	110	90	8	¾	125	8	7/8	145	8	1 1/8	180	8	1¼	220	80	3
90	3½	8	5/8	90	75	8	¾	110	95	8	7/8	140										90	3½
100	4	8	5/8	90	75	8	¾	110	95	8	7/8	145	8	1 1/8	170	8	1¼	195	8	1½	255	100	4
125	5	8	¾	90	80	8	¾	120	100	8	1	165	8	1¼	190	8	1½	250	8	1¾	300	125	5
150	6	8	¾	100	85	12	¾	125	105	12	1	170	12	1 1/8	195	12	1 3/8	260	8	2	345	150	6
200	8	8	¾	110	90	12	7/8	140	110	12	1 1/8	195	12	1 3/8	220	12	1 5/8	290	12	2	380	200	8
250	10	12	7/8	115	95	16	1	155	130	16	1¼	215	16	1 3/8	235	12	1 7/8	335	12	2½	485	250	10
300	12	12	7/8	120	100	16	1 1/8	170	145	20	1¼	220	20	1 3/8	255	16	2	375	12	2¾	540	300	12
350	14	12	1	130	110	20	1 1/8	175	150	20	1 3/8	235	20	1½	275	16	2¼	405				350	14
400	16	16	1	135	115	20	1¼	190	160	20	1½	255	20	1 5/8	285	16	2½	445				400	16
450	18	16	1 1/8	150	125	24	1¼	195	170	20	1 5/8	275	20	1 7/8	325	16	2¾	495				450	18
500	20	20	1 1/8	160	135	24	1¼	205	180	24	1 5/8	290	20	2	345	16	3	540				500	20
600	24	20	1¼	175	145	24	1½	230	195	24	1 7/8	330	20	2½	435	16	3½	615				600	24
750	30	28	1¼	190	160	28	1¾	290	250	28	2	355	CLASS 900, 1500 & 2500 - Not listed in BS. 3293									750	30
900	36	32	1½	215	180	32	2	325	280	28	2½	400										900	36

NOTE: **Raised face** height of 1.6mm for Class 150 and 300 and 6.4mm for Class 600, 900, 1500 and 2500 is included in dimension L (Bolt Length)



Stud Bolt with Nuts



Machine Bolt with Nut

DIAMETER OF BOLTS

- is shown in inches. For nominal diameters 1 inch and smaller, threads are U.N.C., nominal diameters 1-1/8 inch and larger threads are 8 U.N. (8 T.P.I.)

LENGTH OF BOLTS (L)

- is shown in millimeters rounded to the nearest 5 mm. *Stud Bolt lengths (L) **do not** include the height of point. Machine Bolt lengths (L) include the height of point.

The length shown includes the height of the Raised Face in all cases.

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TEMPERATURE / PRESSURE RATINGS

Carbon Steel Pipe Flanges to ANSI B16.5 (BS1560)
Forgings to ASTM A105 - Prolonged use above 427 deg C is not recommended
Forgings to ASTM A350 - LF2 - Not for use above 343 deg C
Forgings to ASTM A181 Grade 11 for Class 150 & 300 only

TEMPERATURE °C	MAXIMUM WORKING PRESSURE IN kPa BY CLASSES (For the approximate P.S.I. divide by 7)					
	PN 20 150	PN 50 300	PN 100 600	PN 150 900	PN 250 1500	PN 420 2500
-29 to 38	1960	5110	10210	15320	25530	42550
50	1920	5010	10020	15020	25040	41730
100	1770	4640	9280	13910	23190	38650
150	1580	4520	9050	13570	22610	37690
200	1400	4380	8760	13150	21910	36520
250	1210	4170	8340	12520	20860	34770
300	1020	3870	7750	11620	19370	32280
350	840	3700	7390	11090	18480	30800
375	740	3650	7290	10940	18230	30390
400	650	3450	6900	10350	17250	28750
425	560	2880	5750	8630	14380	23960
450	470	2000	4010	6010	10020	16690
475	370	1350	2710	4060	6770	11290
500	280	880	1760	2640	4400	7330
525	190	520	1040	1550	2590	4320
540	130	330	650	980	1630	2720

Flanges above 600NPS are not included in ANSI B16.5 and the Class designations in these large diameters DO NOT IMPLY specific temperature / pressure ratings.

Inch/Metric Bolting interchangeable for A.N.S.I. B16.5 flanges as below	
FOR	USE
½	M14
5/8	M18
¾	M20
7/8	M24
1”	M27
1 1/8	M30
1¼	M33
1 3/8	M36
1½	M39
1 5/8	M42
1¾	M45
1 7/8	M48
2”	M52
2¼	M56
2½	M64
2¾	M72

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CONVERSION FACTORS

LENGTH

mm	cms	Metre	Km	Inch	Foot	Yard	Mile
1	0.1	0.001	..	0.0394	0.0033	..	..
10	1	0.01	..	0.3937	0.0328	0.01093	..
1000	100	1	0.001	39.37	3.2808	1.0936	..
1 000 000	10 000	1000	1	39 370	3280.8	1093.6	0.6214
1 609 300	160 930	1609.3	1.6093	63 360	5280	1760	1
304.8	30.48	0.3048	0.0003048	12	1	0.333	..
25.4	2.54	0.0254	..	1	0.0833	0.02778	..
914.4	91.44	0.9144	..	36	3	1	..

WEIGHT

lbs	oz	gms	Kg	Ton	Tonne	cwt	Stone
1	16	453.6	0.4536	0.0004464	0.0004535	0.008929	0.07143
0.625	1	28.35	0.02836	..	..	..	..
0.0022	0.03527	1	0.001	..	..	..	..
2.205	35.274	1000	1	0.000984	0.001	..	..
2240	35 840	1 016 064	1 016	1	1.016	20	160
2204.6	35 274	1 000 000	1000	0.9842	1	19.684	157.47
112	1792	50 803	50.8	0.05	0.0508	1	..
14	224	6350	6.35	0.00625	0.0064	0.125	1

SQUARE MEASUREMENTS

1 Sq Mile	640 acres	259 hectares	2.59 Sq Km
1 Sq Km	247 acres	100 hectares	
1 Acre	4840 Sq yds	43,560 Sq ft	0.4047 hectares
1 Hectare	10,000 Sq m	2.471 acres	107,640 sq ft
1 Sq Metre	10.764 Sq ft		
10 Sq Feet	0.929 Sq m		

TEMPERATURE

Centigrade =	(F-32) x 5/9
Fahrenheit =	(C x 9/5 + 32)
Water Boils at	100°C, or 212°F
Water Freezes at	0°C, or 32°F

LENGTH EQUIVALENTS

1 league	3 miles	24 furlongs	960 poles
1 mile	8 furlongs	320 poles	5280 feet
1 furlong	40 poles	660 feet	1000 links
1 chain	4 poles	66 feet	100 links
1 fathom	6 feet	9.091 links	

WATER CATCHMENT VOLUME

Sq Metre x 1mm =	1 Litre
Sq Foot x 1 inch =	0.52 Gallon

FLUID EQIVALENTS

1 gallon	4 quarts	10lbs of water
1 quart	2 pints	2.5lbs of water
1 pint	4 gills	1.25lbs of water
1 gill	5 ozs	

VELOCITY OF FLOW

$$\text{Velocity in meters/second} = \frac{1000 \times \text{flow in l/s}}{\text{area of pipe in mm}^2}$$

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PRESSURE AND LIQUID HEAD

psi	Foot of Water	Kilogram per cm²	Atmosphere or Bar	Metre of Water	Foot
1	2.31	6.895	0.0703	0.068	0.704
0.433	1	2.986	0.0305	0.03	0.305
0.145	0.335	1	0.0102	0.01	0.102
14.233	32.85	98.09	1	0.98	10
14.5	33.50	100	1.02	1	10.21
1.42	3.281	9.797	0.1	0.098	1
0.019	0.044	0.131	0.0014	0.0013	0.014
0.491	1.134	3.377	0.034	0.0339	0.345

FLOW

Gallons per Minute	Gallons per Hour	Litres per Second	Litres per Minute	US Gallons per Minute	Cubic Metre per Hour	Cubic Metre per Minute	Cubic Feet per Minute
1	60	0.076	4.546	1.2	0.2728	0.00455	0.1605
0.01667	1	0.00127	0.07578	0.02	0.004547	0.00268	
13.2	792	1	60	15.84	3.6	0.06	2.119
0.22	13.2	0.0167	1	0.264	0.06	0.001	0.0353
0.833	50	0.063	3.787	1	0.0038	0.1337	
3.666	220	0.278	16.667	4.400	1	0.0167	0.5886
220	13200	16.68	1000	264.0	60	1	35.31
6.23	373.8	0.472	28.32	7.48	1.699	0.0283	1

VOLUME

mp.Gallons	Litres	US Gallons	Cubic Feet	Lbs Water	Cubic Metre	Acre Feet	Cubic Inch
1	4.546	1.2	0.1605	10	0.00455		277.34
0.22	1	0.264	0.0353	2.2	0.00100		61.02
0.833	3.785	1	0.1337	8.333	0.00379		231.06
6.23	28,317	7.48	1	62.3	0.02832		1728
0.1	0.4546	0.12	0.0161	1	0.00046		27.820
220	1000	264	35.32	2200	1	0.00081	61.032
271,378		325,828	43,560	2,713,788	1234	1	

FORCE

Newton N	Kg Force kgf	Pound Force lbf	Poundal pdl
1	0.102 0	0.224 8	7.233 0
9.806 7	1	2.204 6	70.931 6
4.448 2	0.453 6	1	32.174 1
0.138 3	0.014 1	0.031 1	1

TORQUE

Newton Metre Nm	Kilogramme Force Metre kgf m	Pound Force Foot lbf ft	Pound Force Inch lbf in
1	0.102.0	0.737.6	8.850.8
9.806 65	1	7.233 0	86.795 7
1.355 8	0.138 3	1	12
0.113 0	0.011 52	0.083 3	1

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MASS CONVERSION CHART

1 to 65			66 to 130			131 to 375			380 to 700			750 to 1500		
lbs	Given Mass	kg	lbs	Given Mass	kg	lbs	Given Mass	kg	lbs	Given Mass	kg	lbs	Given Mass	kg
2.20	1	0.45	145.50	66	29.94	288.80	131	59.42	838	380	172.37	1554	705	319.79
4.41	2	0.91	147.71	67	30.39	291.01	132	59.88	849	385	174.64	1565	710	322.06
6.61	3	1.36	149.91	68	30.84	293.21	133	60.33	860	390	176.90	1576	715	324.32
8.82	4	1.81	152.12	69	31.30	295.42	134	60.78	871	395	179.17	1587	720	326.59
11.02	5	2.27	154.32	70	31.75	297.62	135	61.24	882	400	181.44	1598	725	328.86
13.23	6	2.72	156.53	71	32.21	299.83	136	61.69	893	405	183.71	1609	730	331.13
15.43	7	3.18	158.73	72	32.66	302.03	137	62.14	904	410	185.98	1620	735	333.40
17.64	8	3.63	160.94	73	33.11	304.24	138	62.60	915	415	188.24	1631	740	335.66
19.84	9	4.08	163.35	74	33.57	306.44	139	63.05	926	420	190.51	1642	745	337.93
22.05	10	4.54	165.35	75	34.02	308.64	140	63.50	937	425	192.78	1653	750	340.20
24.25	11	4.99	167.55	76	34.47	310.85	141	63.96	948	430	195.05	1664	755	342.47
26.46	12	5.44	169.75	77	34.93	313.05	142	64.41	959	435	197.32	1676	760	344.74
28.66	13	5.90	171.96	78	35.38	315.26	143	64.87	970	440	199.58	1687	765	347.00
30.86	14	6.35	174.16	79	35.83	317.46	144	65.32	981	445	201.85	1698	770	349.27
33.07	15	6.80	176.37	80	36.29	319.67	145	65.77	992	450	204.12	1709	775	351.54
35.27	16	7.26	178.57	81	36.74	321.87	146	66.23	1003	455	206.39	1720	780	353.81
37.48	17	7.71	180.78	82	37.20	324.08	147	66.68	1014	460	208.66	1731	785	356.08
39.68	18	8.16	182.98	83	37.65	326.28	148	67.13	1025	465	210.92	1742	790	358.34
41.89	19	8.62	185.19	84	38.10	328.49	149	67.59	1036	470	213.19	1753	795	360.61
44.09	20	9.07	187.39	85	38.56	330.69	150	68.04	1047	475	215.46	1764	800	362.88
46.30	21	9.53	189.60	86	39.01	341.71	155	70.31	1058	480	217.73	1775	805	365.15
48.50	22	9.98	191.80	87	39.46	352.74	160	72.58	1069	485	220.00	1786	810	367.42
50.71	23	10.43	194.00	88	39.92	363.76	165	74.84	1080	490	222.26	1797	815	369.68
52.91	24	10.89	196.21	89	40.37	374.78	170	77.11	1091	495	224.53	1808	820	371.95
55.12	25	11.34	198.41	90	40.82	385.80	175	79.38	1102	500	226.80	1819	825	374.22
57.32	26	11.79	200.62	91	41.28	396.83	180	81.65	1113	505	229.07	1830	830	376.49
59.52	27	12.25	202.82	92	41.73	407.85	185	83.92	1124	510	231.34	1841	835	378.76
61.73	28	12.70	205.03	93	42.18	418.87	190	86.18	1135	515	233.60	1852	840	381.02
63.93	29	13.15	207.23	94	42.64	429.90	195	88.45	1146	520	235.87	1863	845	383.29
66.14	30	13.61	209.44	95	43.09	440.92	200	90.72	1157	525	238.14	1874	850	385.56
68.34	31	14.06	211.64	96	43.55	451.94	205	92.99	1168	530	240.41	1885	855	387.83
70.55	32	14.52	213.85	97	44.00	462.97	210	95.26	1179	535	242.68	1896	860	390.10
72.75	33	14.97	216.05	98	44.45	473.99	215	97.52	1190	540	244.94	1907	865	392.36
74.96	34	15.42	218.26	99	44.91	485.01	220	99.79	1202	545	247.21	1918	870	394.63
77.16	35	15.88	220.46	100	45.36	496.04	225	102.06	1213	550	249.48	1929	875	396.90
79.37	36	16.33	222.67	101	45.81	507.06	230	104.33	1224	555	251.75	1940	880	399.17
81.57	37	16.78	224.87	102	46.28	518.08	235	106.60	1235	560	254.02	1951	885	401.44
83.77	38	17.24	227.07	103	46.72	529.10	240	108.86	1246	565	256.28	1962	890	403.70
85.98	39	17.69	229.28	104	47.17	540.13	245	111.13	1257	570	258.55	1973	895	405.97
88.18	40	18.14	231.48	105	47.63	551.15	250	113.40	1268	575	260.82	1984	900	408.24
90.39	41	18.60	233.69	106	48.08	562.17	255	115.67	1279	580	263.09	1995	905	410.51
92.59	42	19.05	235.89	107	48.54	573.2	260	117.94	1290	585	265.36	2006	910	412.78
94.80	43	19.5	238.10	108	48.99	584.22	265	120.20	1301	590	267.62	2017	915	415.04
97.00	44	19.96	240.30	109	49.44	595.24	270	122.47	1312	595	269.89	2028	920	417.31
99.21	45	20.41	242.51	110	49.90	606.27	275	124.74	1323	600	272.16	2039	925	419.58
101.41	46	20.87	244.71	111	50.35	617.30	280	127.01	1334	605	274.43	2050	930	421.85
103.62	47	21.32	246.92	112	50.80	628.31	285	129.28	1345	610	276.70	2061	935	424.12
105.82	48	21.77	249.12	113	51.26	639.33	290	131.54	1356	615	278.96	2072	940	426.38
108.03	49	22.23	251.32	114	51.71	650.36	295	133.81	1367	620	281.23	2083	945	428.65
110.23	50	22.68	253.53	115	52.16	661.38	300	136.08	1378	625	283.50	2094	950	430.92
112.43	51	23.13	255.73	116	52.62	672.4	305	138.35	1389	630	285.77	2105	955	433.19
114.64	52	23.59	257.94	117	53.07	683.43	310	140.62	1400	635	288.04	2116	960	435.46
116.84	53	24.04	260.14	118	53.53	694.45	315	142.88	1411	640	290.30	2127	965	437.72
119.05	54	24.49	262.35	119	53.98	705.47	320	145.15	1422	645	292.57	2138	970	439.99
121.25	55	24.95	264.55	120	54.43	716.50	325	147.42	1433	650	294.84	2149	975	442.26
123.46	56	25.40	266.76	121	54.89	727.52	330	149.69	1444	655	297.11	2161	980	444.53
125.66	57	25.86	268.96	122	55.34	738.54	335	151.96	1455	660	299.38	2172	985	446.8
127.87	58	26.31	271.17	123	55.79	749.56	340	154.22	1466	665	301.64	2183	990	449.06
130.07	59	26.76	273.37	124	56.25	760.59	345	156.49	1477	670	303.91	2194	995	451.33
132.28	60	27.22	275.58	125	56.70	771.61	350	158.76	1488	675	306.18	2205	1000	453.60
134.48	61	27.67	277.78	126	57.15	782.62	355	161.03	1499	680	308.45	2425	1100	498.96
136.69	62	28.12	279.98	127	57.61	793.66	360	163.30	1510	685	310.72	2646	1200	544.32
138.89	63	28.58	282.19	128	58.06	804.68	365	165.56	1521	690	312.98	2866	1300	589.68
141.09	64	29.03	284.39	129	58.51	815.70	370	167.83	1532	695	315.25	3086	1400	635.04
143.3	65	29.48	286.60	130	58.97	826.73	375	170.10	1543	700	317.52	3307	1500	680.40

The **mass** of an object is the quanitiy of matter it contains and is constant irrespective of the location or altitude. The weight of that object is the force exerted on it by gravity and thus varies from place to place and according to height above sea level or the distance from the Earth's centre.

A. To Use, locate "given mass" in the "given mass" column - whether lbs. or kg.

B. If the "given mass' is in pounds (lbs0, read kilograms (kg) in the right hand column.
eg. Given mass 70lbs = 31.75kg

Conversion Factors:- 1 pound (lb) x 0.4536 = kilograms (kg)
1 kilogram (kg) x 2.2046 = pound (lbs)

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TEMPERATURE CONVERSION CHART

CONVERSION FACTORS

Degrees - Celsius to Fahrenheit

$(°C \times \frac{9}{5}) + 32 = °F$

Degrees - Fahrenheit to Celsius

$(°F \times -32) + \frac{5}{9} = °C$

HOW TO USE CONVERSION CHART

(A) Locate "Given Temperature" in the "Given Temperature" Column whether °C or °F.

(B) If "given temperature" is in degrees Celsius (°C) read **degrees Fahrenheit (°F)** in right hand column.

(C) If "given temperature" is in degrees Fahrenheit (°F) read **degrees Celsius (°C)** in left hand column.

(D) Example: a. Given temperature is **35°C= 95°F** from right hand column

b. Given temperature is **35°F= 1.7°C** from left hand column

- 320 to 27			28 to 77			78 to 235			240 to 485			490 to 2400		
°C	Given Mass	°F	°C	Given Mass	°F	°C	Given Mass	°F	°C	Given Mass	°F	°C	Given Mass	°F
-196	-320		-2.2	28	82.4	25.6	78	172.4	116	240	464	254	490	914
-184	-300		-1.7	29	84.2	26.1	79	174.2	118	245	473	257	495	923
-173	-280		-1.1	30	86.0	26.7	80	176	121	250	482	260	500	932
-162	-260	-436	-0.6	31	87.8	27.2	81	177.8	124	255	491	266	510	950
-151	-240	-400	0.0	32	89.6	27.8	82	179.6	127	260	500	271	520	968
-140	-220	-364	0.6	33	91.4	28.3	83	181.4	129	265	509	277	530	986
-129	-200	-328	1.1	34	93.2	28.9	84	183.2	132	270	518	282	540	1004
-115	-175	-283	1.7	35	95.0	29.4	85	185.0	135	275	527	288	550	1022
-101	-150	-238	2.2	36	96.8	30.0	86	186.8	138	280	536	293	560	1040
-90	-130	-202	2.8	37	98.6	30.6	87	188.6	141	285	545	299	570	1058
-84	-120	-184	3.3	38	100.4	31.1	88	190.4	143	290	554	304	580	1076
-79	-110	-166	3.9	39	102.2	31.7	89	192.2	146	295	563	310	590	1094
-73	-100	-148	4.4	40	104.0	32.2	90	194.0	149	300	572	316	600	1112
-68	-90	-130	5.0	41	105.8	32.8	91	195.8	152	305	581	321	610	1130
-62	-80	-112	5.6	42	107.6	33.3	92	197.6	154	310	590	327	620	1148
-57	-70	-94	6.1	43	109.4	33.9	93	199.4	157	315	599	332	630	1166
-51	-60	-76	6.7	44	111.2	34.4	94	201.2	160	320	608	338	640	1184
-46	-50	-58	7.2	45	113.0	35.0	95	203.0	163	325	617	343	650	1202
-40	-40	-40	7.8	46	114.8	35.6	96	204.8	166	330	626	349	660	1220
-34	-30	-22	8.3	47	116.6	36.1	97	206.6	168	335	635	354	670	1238
-29	-20	-4	8.9	48	118.4	36.7	98	208.4	171	340	644	360	680	1256
-23	-10	14	9.4	49	120.2	37.2	99	210.2	174	345	653	366	690	1274
-17.8	0	32	10.0	50	122.0	37.8	100	212.0	177	350	662	371	700	1292
-17.2	1	33.8	10.6	51	123.8	41	105	221	179	355	671	377	710	1310
-16.7	2	35.6	11.1	52	125.6	43	110	230	182	360	680	382	720	1328
-16.1	3	37.4	11.7	53	127.4	46	115	239	185	365	689	388	730	1346
-15.6	4	39.2	12.2	54	129.2	49	120	248	188	370	698	393	740	1364
-15.0	5	41.0	12.8	55	131.0	52	125	257	191	375	707	399	750	1382
-14.4	6	42.8	13.3	56	132.8	54	130	266	193	380	716	404	760	1400
-13.9	7	44.6	13.9	57	134.6	57	135	275	196	385	725	410	770	1418
-13.3	8	46.4	14.4	58	136.4	60	140	284	199	390	734	416	780	1436
-12.8	9	48.2	15.0	59	138.2	63	145	293	202	395	743	421	790	1454
-12.2	10	50.0	15.6	60	140.0	66	150	302	204	400	752	427	800	1472
-11.7	11	51.8	16.1	61	141.8	68	155	311	207	405	761	432	810	1490
-11.1	12	53.6	16.7	62	143.6	71	160	320	210	410	770	438	820	1508
-10.6	13	55.4	17.2	63	145.4	74	165	329	213	415	779	443	830	1526
-10.0	14	57.2	17.8	64	147.2	77	170	338	216	420	788	454	850	1562
-9.4	15	59.0	18.3	65	149.0	79	175	347	218	425	797	468	875	1607
-8.9	16	60.8	18.9	66	150.8	82	180	356	221	430	806	482	900	1652
-8.3	17	62.6	19.4	67	152.6	85	185	365	224	435	815	510	950	1742
-7.8	18	64.4	20.0	68	154.4	88	190	374	227	440	824	538	1000	1832
-7.2	19	66.2	20.6	69	156.2	91	195	383	229	445	833	566	1050	1922
-6.7	20	68.0	21.1	70	158.0	93	200	392	232	450	842	593	1100	2012
-6.1	21	69.8	21.7	71	159.8	96	205	401	235	455	851	621	1150	2102
-5.6	22	71.6	22.2	72	161.6	99	210	410	238	460	860	649	1200	2192
-5.0	23	73.4	22.8	73	163.4	102	215	419	241	465	869	704	1300	2372
-4.4	24	75.2	23.3	74	165.2	104	220	428	243	470	878	760	1400	2552
-3.9	25	77.0	23.9	75	167.0	107	225	437	246	475	887	816	1500	2732
-3.3	26	78.8	24.4	76	168.8	110	230	446	249	480	896	1093	2000	3632
-2.8	27	80.6	25.0	77	170.6	113	235	455	252	485	905	1316	2400	4352

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