PROCHEM

Your Source for Local Supply and Support

REFERENCE MANUAL

PIPING PRODUCTS

PART 1

PIPING PRODUCTS

INSTRUMENTATION & CONTROL

SPECIALTY VALVES

MANUFACTURING

INDENT SERVICE

HYDRAULIC

PROCHEM
PIPELINE PRODUCTS

The World of Prochem

PIPING PRODUCTS

INSTRUMENTATION & CONTROL

SPECIALTY VALVES

MANUFACTURING

INDENT SERVICE

HYDRAULIC

Certified Quality
Management System
(Australia & Singapore)

PROCHEM
PIPELINE PRODUCTS

Piping Products

PART 1

BSP Fittings

ISO 4144 Threaded in accordance with ISO 7-1 (CL150) and ANSI/ASME B16.11 CL3000 and CL6000 Threaded ISO 7-1

NOTE: ISO 4144 Fittings are generally supplied in 316 or CF8M materials CL3000 and CL6000 are generally supplied in dual grade 316/L material.

Prochem manufactures a complete range (from 6 (1⁄8") – 100 (4") NB) of BSP tapered, BSP parallel sealing and BSP fastening threads for a variety of applications, in Class 150 and 3000. All of our BSP threaded fittings are checked with calibrated gauges during manufacture. Each batch is further confirmed as being in compliance with the international standard before they are released into the market.
Materials used comply with ASTM A403, A182 or A351.

Fittings can be specially manufactured to suit customers' requirements in a variety of stainless and special alloys including CL6000 and 68,948 kPa (10,000 psi) fittings.

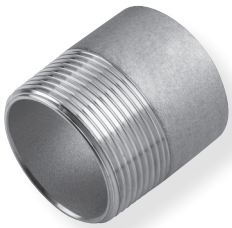
NIPPLES

Hexagon Nipple

Reducing Nipple

Barrel Nipple

Plain Nipple
Fastening Thread



Taper Nipple

Tube Nipple

SOCKETS

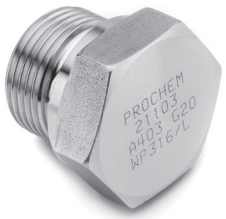
Standard Socket

Tank Socket

Reducing Socket

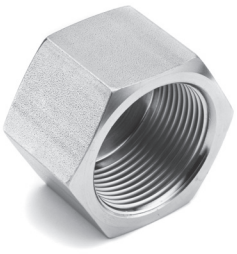
PLUGS

Hexagon Head Plug



Hexagon Head Flanged Plug
Fastening Thread

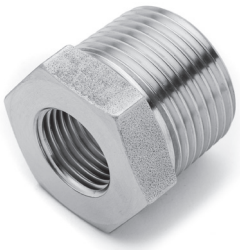
CAPS



Cap Hexagon Head

Cap Square Head

BUSH



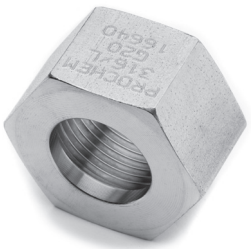
Reducing Bush

UNION

Union

NUTS

Locknut
Fastening Thread



Hosetail Nut Only
Fastening Thread

Prochem manufactures a complete range (from 6 (1⁄8") to 100 (4") NB) of BSP tapered male (R), BSP tapered female (Rc), BSP parallel female (Rp) sealing thread and BSP parallel male and female (G) fastening threads.

BENDS/ELBOWS/TEES/CROSSES

Prochem manufactures a complete range (from 6 (1⁄8") to 100 (4") NB) of BSP tapered male (R), BSP tapered female (Rc), BSP parallel female (Rp) sealing thread and BSP parallel male and female (G) fastening threads.

Male Bend

45° Elbow

90° Elbow

Male x Female Elbow

Equal Tee

Cross
(Available on Request)

HOSETAILS – NB TO TUBE SIZE

Male Thread Hosetail

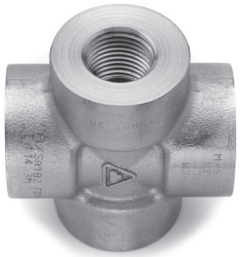
Female Thread Nut and Hosetail

BSP CLASS 3000

Full Coupling – CL3000

Half Coupling – CL3000

Reducing Coupling – CL3000

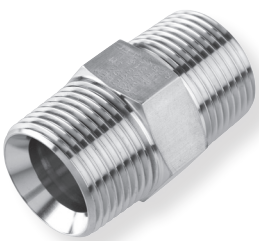


Cross – CL3000
(Available on Request)

Equal Tee – CL3000

Reducing Tee – CL3000

Hexagon Nipple – CL3000



Hexagon Nipple – CL3000 x 60° Cone

NPT Fittings

ASME B16.11, MSS-SP-83,
THREADS TO ANSI B1.20.1

Covering the complete size range (from 6 (1⁄8") to 50 (2") NPT) in stainless steel with sizes up to 100 (4") NPT available on request. Prochem offers only the highest quality fittings, and by utilising a reduced tolerance, ensures fittings will go together every time. This is the Prochem Standard and our stock throughout Australia conforms to the reduced tolerance to ensure customer safety.

Our NPT fittings are designed for high-pressure (Class 3000 – Class 6000) applications, and have a distinctive profile for maximum strength.

As with our BSP range, all NPT products are checked with calibrated gauges during the manufacturing process and each batch is further confirmed as being in compliance with the international thread standard. Materials used comply with ASTM A403, A479 or A182 and are generally grade 316/L.

Fittings can be specially designed in accordance with ISO 9001 accreditation and manufactured to suit customers' requirements in a variety of stainless and special alloys.
68,948 kPa (10,000 psi) NPT fittings are now available from Prochem.

CONVERSIONS AVAILABLE
• NIPPLE • BUSH • ADAPTOR • CROSS • UNION
Contact your local Prochem Stockist for further information.

NIPPLES

Hexagon Nipple – CL3000

Reducing Nipple – CL3000

BSP/NPT Conversion Nipple – CL3000

BUSH

Reducing Bush

COUPLINGS

Full Coupling – CL3000

Half Coupling – CL3000

Reducing Coupling – CL3000

UNION

Union – CL3000

PLUGS

Hexagon Head Plug

CROSS

Cross – CL3000
(Available on Request)

CAPS

Cap Hexagon Head – CL3000

Cap Round Head – CL3000

ELBOWS

45° Elbow – CL3000

90° Elbow – CL3000

TEES

Equal Tee – CL3000

Reducing Tee – CL3000

Socketweld Fittings

NOTE: ASME B16.11, MSS-SP-79, MSS-SP-83

Prochem manufactures and supplies an extensive range of the highest quality socketweld fittings, all thoroughly inspected to ensure complete dimensional compatibility with the requirements of the ASME B16.11 manufacturing standards.

Socketweld fittings are available in Class 3000 though can be made or supplied in Class 6000 and Class 9000. Stocked in 316/316L, socketweld fittings can be manufactured in other material grades by Prochems' Manufacturing Department.

Fittings can be specially manufactured to suit customers' requirements in a variety of stainless and special alloys.

COUPLINGS

Full Coupling – CL3000

Half Coupling – CL3000

Reducing Coupling – CL3000

ELBOWS

45° Elbow – CL3000

90° Elbow – CL3000

TEE

Equal Tee – CL3000

Reducing Tee – CL3000

UNION

Union – CL3000

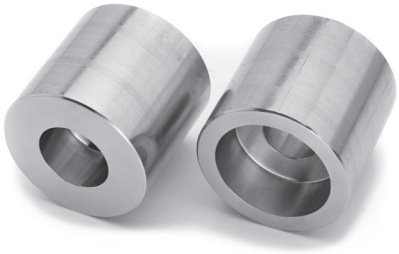
CROSS

Cross – CL3000
(Available on Request)

CAP

Cap – CL3000

REDUCING INSERTS



Reducing Insert – CL3000

Buttweld Pipe Fittings

NOTE: ANSI B16.9, MSS-SP-43

Buttweld fittings in duplex and other special alloys are available from stock and throughout our worldwide network of suppliers.

Concentric and eccentric reducers, equal and reducing tees, 45° and 90° elbows, caps and stub ends are all part of the comprehensive range of buttweld fittings carried by Prochem.

Stocks include dual grades 304/304L, 316/316L and 321/321H austenitic stainless steel, as well as other material grades in sizes 15 NB (1⁄2") to 400 NB (16") in SCH 10S, SCH 40S and SCH 80S. Larger sizes and heavier schedules, such as SCH 160 or XXS, are readily available through our worldwide network.

All our buttweld fittings conform to relevant material and dimensional specifications and can be supplied complete with material certificates to EN 10204 3.1.

ELBOWS

45° Long Radius Elbow

90° Long Radius Elbow

180° Long Radius Elbow

90° Short Radius Elbow

TEES

Equal Tee

Reducing Tee

STUB ENDS

ASA Stub End

MSS Stub End

REDUCERS

Concentric Reducer

Eccentric Reducer

CAP

Cap

Buttweld Fittings

A pipe fitting is defined as a part used in a piping system, to change direction or function, which is mechanically joined to the system.

Probably the simplest way to achieve this would be to bend the pipe in the direction required, but this process will stretch and thin the outer wall whilst thickening and wrinkling the inner wall. This results in flow resistance and accelerated wall erosion.

A second method sometimes used is a mitre joint, where pipes are cut to the correct angle and welded together to achieve the desired change. Whilst the cross-sectional area and wall thickness are maintained, a great deal of efficiency is lost due to friction and turbulence resulting from the severe changes in direction. For example, a single-mitre bend offers about six times the resistance of a swept elbow.

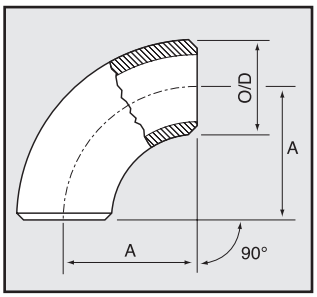
For these reasons swept fittings are preferred on most piping systems, particularly where internal pressure, flow and corrosion are of major consideration.

TYPES AND APPLICATIONS OF BUTTWELD FITTINGS

A piping system using buttweld fittings has many inherent advantages over other forms.

- Welding a fitting to the pipe means it is permanently leakproof.
- The continuous metal structure formed between pipe and fitting adds strength to the system.
- Smooth inner surface and gradual directional changes reduce pressure losses and turbulence and minimise the action of corrosion and erosion.
- A welded system utilises a minimum of space.

90° ELBOWS



The function of a 90° elbow is to change direction or flow in a piping system.

Elbows are split into three groups which define the distance over which they change direction, expressed as a function of the distance from the centre line of one end to the opposite face. This is known as the centre to face distance and is equivalent to the radius through which the elbow is bent.

Long Radius Elbow

The most common is the long radius (LR) elbow where the centre to face dimension is always 1-1⁄2 times the nominal pipe size of the elbow.

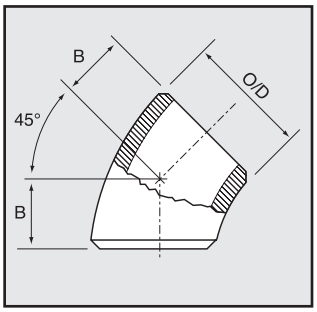
Short Radius Elbow

In this case the centre to face dimension is the same as the nominal pipe size of the elbow.

Extra Long Radius

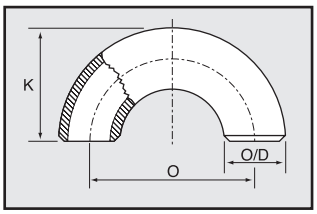
This is where the centre to face dimension is longer than the standard long radius type. The most common of these is where the centre to face dimension is three times the nominal size. i.e. 3D.

45° ELBOWS



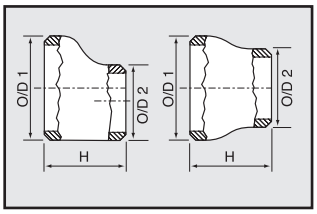
The function of a 45° elbow is the same as a 90° elbow, but the measurement of dimensions, however, is different to that of the 90° elbow. The radius of a 45° elbow is the same as the radius of the 90° LR elbow where ‘R’ equals 1-1⁄2 x D. However, the centre to face dimension is not equivalent to the radius as in 90° LR elbows. This is measured from each face to the point of intersection of the centre lines perpendicular to each other. This is due to the smaller degree of bend.

180° RETURN BENDS



The function of a 180° return bend is to change direction of flow through 180° and there are two basic types, long radius and short radius. Both types have a centre to centre dimension double the matching 90° elbows. The primary application for these fittings is in heater coils and heat exchangers, boilers etc.

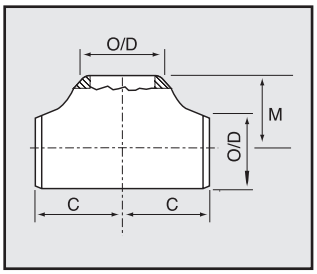
ECCENTRIC AND CONCENTRIC REDUCERS



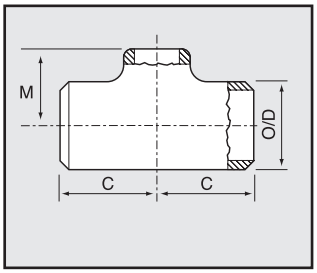
The function of both types of reducer is to reduce the line from a larger to a smaller pipe size, this obviously results in an increased flow pressure. With the eccentric reducer the smaller outlet end is off centre to the larger end enabling it to line up with one side of the inlet and not with the other.

The concentric reducer is so manufactured that both inlet and outlet ends are on a common centre line. The concentric reducer is easier and less expensive to produce but does not allow quite the same versatility as the eccentric reducer. The lengths of both types are fixed by manufacturing standards.

EQUAL AND REDUCING TEES

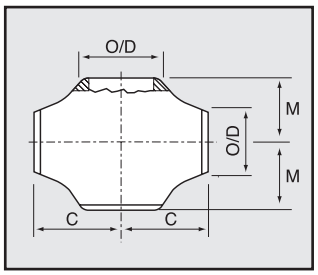


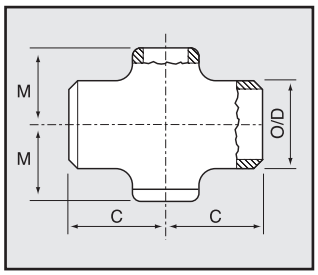
The function of a tee is to permit flow at 90° to the main direction of flow. The main flow passes through the 'run' whilst the 90° outlet is known as the 'branch'. The equal tee is manufactured with all three outlets being the same size.



The reducing tee is manufactured with the branch outlet smaller than the run to obtain the desired flow and pressure through the system.

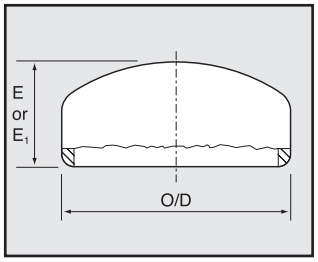
EQUAL AND REDUCING CROSSES





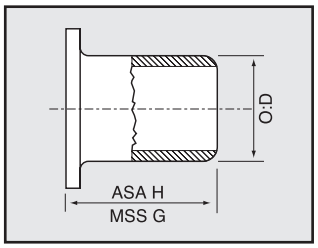
The function of a cross is similar to that of a tee with the exception of providing two 90° outlets opposite each other. Equal crosses have all four outlets of equal size. Reducing crosses have branches that are smaller in size to that of the run to obtain the desired flow and pressure through the system.

CAPS



The function of an end cap is to block off the end of a line in piping systems. This is achieved by placing the end cap over the open line and welding around the joint.

STUB ENDS

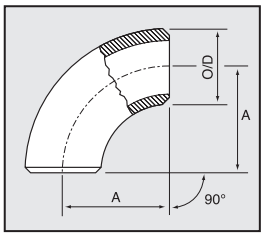


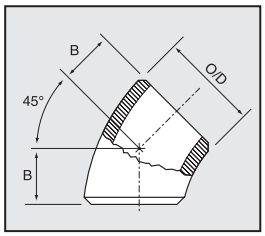
A stub end and its associated slip-on flange allows quick disconnection of the particular section involved as well as easy alignment of mating flanges. Stub ends are installed in pairs and mated together with two slip-on flanges. The surface of the stub end has a phonographic serrated gasket surface which prevents leakage at the joint.

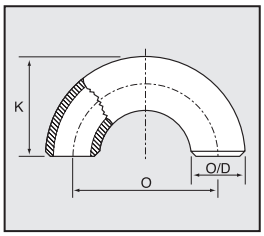
There are two basic types of stub end, ANSI types A & B long barrel, and M.S.S. types short barrel. Under certain design criteria such as temperature or pressure, it is not acceptable to have the joint between stub end and pipe in close proximity with the flange joint, in these applications ANSI types are used.

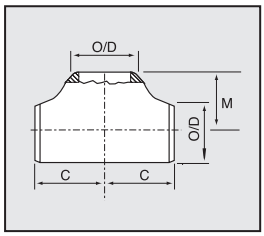
Type A stub ends are used with lap joint flanges.
Type B stub ends are used with slip-on flanges.

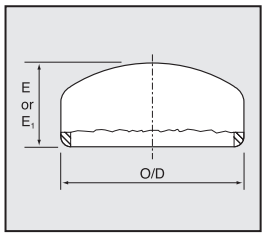
BUTTWELD FITTINGS WEIGHTS & DIMENSIONS











Nominal Size		WT SCH	90° LR ELBOW		45° LR ELBOW		90° SR ELBOW		180° LR ELBOW			Equal Tee		Caps			
mm	inch		A	Weight	B	Weight	A	Weight	O	K	Weight	C and M	Weight	E†	Limiting Wall	E_1‡	Weight
15	1/2	5S	38	0.05	16	0.03		-	76	48	0.11	25	0.09	25	4.57	25	0.04
		10S		0.06		0.03		-			0.12		0.10				0.04
		40S		0.08		0.04		-			0.15		0.10				0.05
		80S		0.10		0.05		-			0.19		0.14				0.05
		160		0.13		0.07		-			0.24		0.17				0.06
		XXS		0.21		0.11		-			0.34		0.27				0.10
20*	3/4*	5S	38	0.06	19	0.03		-	76	51	0.14	29	0.10	25	3.81	25	0.05
		10S		0.07		0.03		-			0.18		0.13				0.05
		40S		0.09		0.04		-			0.20		0.17				0.06
		80S		0.11		0.05		-			0.22		0.20				0.06
		160		0.16		0.07		-			0.30		0.29				0.09
		XXS		0.23		0.11		-			0.40		0.41				0.13
25	1	5S	38	0.09	22	0.05	25	0.08	76	56	0.22	38	0.18	38	4.57	38	0.08
		10S		0.14		0.09		0.10			0.27		0.29				0.09
		40S		0.16		0.11		0.12			0.30		0.30				0.13
		80S		0.22		0.14		0.17			0.42		0.39				0.13
		160		0.30		0.20		0.24			0.60		0.54				0.18
		XXS		0.44		0.28		0.35			0.78		0.77				0.26
32	1-1/4	5S	48	0.14	25	0.09	32	0.14	95	70	0.34	48	0.34	38	4.83	38	0.09
		10S		0.23		0.11		0.17			0.45		0.50				0.13
		40S		0.25		0.17		0.20			0.60		0.60				0.17
		80S		0.40		0.23		0.29			0.70		0.68				0.18
		160		0.52		0.39		0.37			0.90		0.90				0.23
		XXS		0.80		0.45		0.57			1.28		1.36				0.35
40	1-1/2	5S	57	0.17	29	0.11	38	0.20	114	83	0.48	57	0.43	38	5.08	38	0.10
		10S		0.31		0.17		0.22			0.60		0.68				0.14
		40S		0.40		0.23		0.29			0.81		0.86				0.23
		80S		0.51		0.29		0.40			1.02		1.02				0.25
		160		0.72		0.40		0.56			1.40		1.43				0.34
		XXS		1.03		0.57		0.80			1.80		2.05				0.49
50	2	5S	76	0.29	35	0.14	51	0.29	152	106	0.80	64	0.55	38	5.59	44	0.16
		10S		0.51		0.25		0.37			1.05		0.85				0.17
		40S		0.71		0.40		0.51			1.32		1.29				0.27
		80S		0.91		0.51		0.70			1.92		1.59				0.34
		160		1.43		0.80		1.10			2.80		2.50				0.53
		XXS		1.82		1.03		1.41			3.40		3.18				0.68
65	2-1/2	5S	95	0.68	44	0.34	64	0.57	190	132	1.20	76	0.98	38	7.11	51	0.23
		10S		0.85		0.48		0.62			1.59		1.41				0.25
		40S		1.36		0.77		1.02			2.52		2.20				0.45
		80S		1.82		1.00		1.31			3.42		3.14				0.51
		160		2.47		1.34		1.76			4.60		4.26				0.67
		XXS		3.64		1.99		2.62			6.20		6.27				1.02

NOTE: Weights and dimensions listed above are a guide only. Dimensions in mm. Weights in kg.

* There are 2 possible dimensions for this size, refer to ANSI B16.9

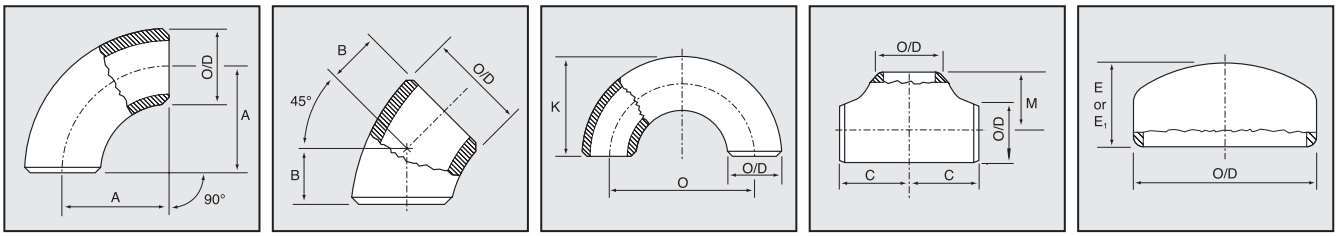
† Length E applies for thickness not exceeding that given in column "Limiting Wall Thickness"

‡ Length E1 applies for thickness greater than that given in column "Limiting Wall Thickness"

Weights and dimensions of larger Buttweld Fittings are available from your local Prochem office.

WOR: Weight on request

BUTTWELD FITTINGS WEIGHTS & DIMENSIONS



Nominal Size		WT SCH	90° LR ELBOW		45° LR ELBOW		90° SR ELBOW		180° LR ELBOW			Equal Tee		Caps			
mm	inch		A	Weight	B	Weight	A	Weight	O	K	Weight	C and M	Weight	E†	Limiting Wall	E_1‡	Weight
80	3	5S	114	0.91	51	0.48	76	0.80	229	159	2.00	86	1.55	51	7.62	64	0.39
		10S		1.22		0.63		0.99			2.40		1.77				0.40
		40S		2.19		1.08		1.50			4.50		3.32				0.71
		80S		2.98		1.50		1.91			5.88		4.45				0.85
		160		4.35		2.18		2.77			8.20		6.50				1.23
		XXS		5.96		3.01		3.82			11.00		8.91				1.70
90	3 - 1/2	5S	133	1.19	57	0.53	89	1.07	267	184	3.20	95	2.50	64	8.13	76	0.55
		10S		1.70		0.75		1.39			4.00		2.67				0.57
		40S		2.84		1.42		2.06			5.80		4.09				1.02
		80S		4.00		2.00		2.43			7.92		5.45				1.14
		160		-		-		-			-		-				-
		XXS		8.00		4.00		4.86			WOR		10.91				2.27
100	4	5S	152	1.50	64	0.75	102	1.42	305	210	3.68	105	3.27	64	8.64	76	0.57
		10S		2.16		1.08		1.72			4.44		3.47				0.65
		40S		4.18		2.09		3.13			6.00		5.29				1.22
		80S		6.20		3.10		4.12			12.36		7.73				1.61
		160		9.79		4.94		6.46			19.80		12.21				2.52
		XXS		12.39		6.20		8.24			24.80		15.45				3.22
127	5	5S	190	2.95	79	1.48	127	2.25	381	262	7.60	124	5.91	76	9.65	89	0.91
		10S		3.64		1.82		2.78			8.52		6.11				1.02
		40S		6.88		3.44		5.29			15.00		9.43				1.85
		80S		9.60		4.80		7.32			18.90		11.36				2.56
		160		16.04		7.96		12.15			30.00		18.98				4.26
		XXS		19.21		9.60		14.64			37.00		22.73				5.12
150	6	5S	229	4.55	95	2.27	152	3.52	457	313	980	143	7.82	89	10.92	102	1.25
		10S		5.45		2.73		4.16			12.00		8.09				1.36
		40S		10.91		5.45		7.95			18.00		11.02				3.24
		80S		16.36		8.18		11.82			33.60		13.64				4.55
		160		27.16		9.49		19.62			52.00		22.64				7.27
		XXS		32.73		16.36		23.64			60.00		27.27				9.09
200	8	5S	305	7.86	127	3.93	203	7.02	610	414	16.00	178	14.09	102	12.70	127	2.05
		10S		10.68		5.34		8.01			21.48		15.68				2.50
		40S		21.59		10.80		17.09			40.80		20.95				5.68
		80S		33.18		16.59		24.91			71.40		28.18				7.45
		160		60.00		29.20		45.08			118.00		50.91				13.47
		XXS		57.73		29.03		49.55			122.00		49.09				10.35
250	10	5S	381	14.55	159	7.27	254	12.45	762	518	36.00	216	25.00	127	12.70	152	4.32
		10S		19.55		9.77		15.91			51.28		26.82				4.91
		40S		38.64		19.32		28.64			79.80		35.45				9.23
		80S		51.82		25.91		45.36			104.00		50.00				12.41
		160		116.36		57.73		101.82			220.00		112.27				27.92
		XXS		-		-		-			-		-				-

NOTE: Weights and dimensions listed above are a guide only. Dimensions in mm. Weights in kg.

WOR: Weight on request

* There are 2 possible dimensions for this size, refer to ANSI B16.9

† Length E applies for thickness not exceeding that given in column “Limiting Wall Thickness”

‡ Length E1 applies for thickness greater than that given in column “Limiting Wall Thickness”

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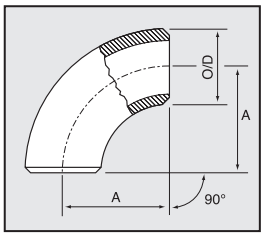
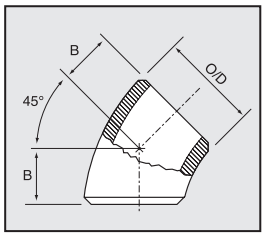
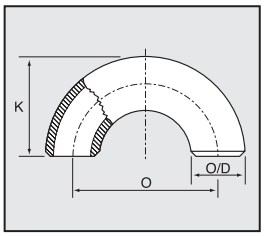
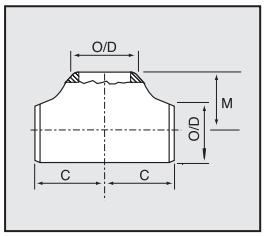
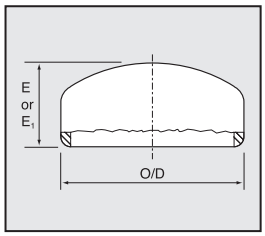
BUTTWELD FITTINGS WEIGHTS & DIMENSIONS











Nominal Size		WT SCH	90° LR ELBOW		45° LR ELBOW		90° SR ELBOW		180° LR ELBOW			Equal Tee		Caps			
mm	inch		A	Weight	B	Weight	A	Weight	O	K	Weight	C and M	Weight	E†	Limiting Wall	E_1‡	Weight
300	12	5S	457	23.18	190	11.59	305	15.91	914	619	52.00	254	37.73	152	12.70	178	6.36
		10S		27.27		13.64		18.18			59.04		39.55				6.55
		40S		59.55		29.77		36.36			121.00		62.27				13.09
		80S		79.55		39.77		56.82			151.00		84.09				16.64
		160		208.18		104.09		148.64			348.00		220.00				43.18
		XXS		-		-		-			-		-				-
350	14	5S	533	30.91	222	15.45	356	20.00	1067	711	72.00	279	40.45	165	12.70	191	7.73
		10S		36.36		18.18		23.64			81.00		48.64				8.18
		40S		70.45		35.23		45.91			164.00		79.55				16.23
		80S		93.64		46.82		61.36			264.00		95.45				21.82
		160		-		-		-			-		-				-
		XXS		-		-		-			-		-				-
400	16	5S	610	45.45	254	22.73	406	29.55	1219	813	94.00	305	52.27	178	12.70	203	13.64
		10S		47.73		23.86		30.91			105.00		59.09				14.55
		40S		91.82		45.91		59.55			224.00		100.00				22.05
		80S		122.27		60.91		79.55			400.00		120.45				29.55
		160		-		-		-			-		-				-
		XXS		-		-		-			-		-				-
450	18	5S	686	56.82	286	28.41	457	36.82	1372	914	WOR	343	67.73	203	12.70	229	17.27
		10S		60.00		30.00		39.09			WOR		76.82				18.00
		40S		122.27		59.55		79.55			WOR		130.00				27.00
		80S		159.09		79.55		103.64			WOR		156.36				36.00
		160		-		-		-			-		-				-
		XXS		-		-		-			-		-				-
500	20	5S	762	75.00	318	37.50	508	48.64	1524	1016	WOR	381	77.73	229	12.70	254	25.00
		10S		100.00		50.00		65.00			WOR		103.64				27.27
		40S		150.00		75.00		97.73			WOR		162.73				34.09
		80S		199.55		99.55		129.55			WOR		195.45				40.00
		160		-		-		-			-		-				-
		XXS		-		-		-			-		-				-
550	22	5S	838	99.40	343	49.70	559	61.06	1676	1118	WOR	419	84.72	254	12.70	254	WOR
		10S		163.03		81.13		73.02			WOR		101.35				WOR
		40S		163.03		81.13		120.83			WOR		170.07				WOR
		80S		210.83		104.87		156.29			WOR		217.46				WOR
		160		-		-		-			-		-				-
		XXS		-		-		-			-		-				-
600	24	5S	919	127.27	381	63.64	610	82.73	1829	1219	WOR	432	135.45	267	12.70	305	34.09
		10S		140.91		70.45		91.82			WOR		155.91				34.55
		40S		210.91		105.45		137.27			WOR		226.36				44.55
		80S		280.45		140.00		182.27			WOR		272.73				61.36
		160		-		-		-			-		-				-
		XXS		-		-		-			-		-				-

NOTE: Weights and dimensions listed above are a guide only. Dimensions in mm. Weights in kg.

* There are 2 possible dimensions for this size, refer to ANSI B16.9

† Length E applies for thickness not exceeding that given in column “Limiting Wall Thickness”

‡ Length E1 applies for thickness greater than that given in column “Limiting Wall Thickness”

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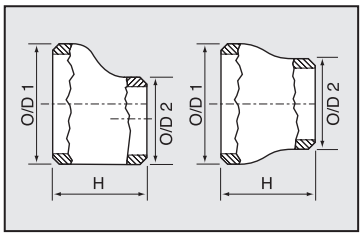
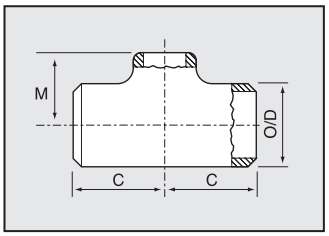
WOR: Weight on request

BUTTWELD FITTINGS WEIGHTS & DIMENSIONS





Nominal Size		WT SCH	Concentric and Eccentric Reducers		Reducing Tees		
mm OD1 X OD2	inch OD1 X OD2		H	Weight	C	M	Weight
20 X 15	3/4 X 1/2	5S	38	0.08	29	29	0.09
		10S		0.10			0.11
		40S		0.14			0.15
		80S		0.18			0.18
		160		0.25			0.26
		XXS		0.36			0.37
25 X 15	1 X 1/2	5S	51	0.07	38	38	0.16
		10S		0.12			0.25
		40S		0.15			0.26
		80S		0.20			0.34
		160		0.26			0.47
		XXS		0.40			0.68
25 X 20	1 X 3/4	5S	51	0.08	38	38	0.16
		10S		0.13			0.25
		40S		0.16			0.27
		80S		0.22			0.35
		160		0.28			0.49
		XXS		0.45			0.70
32 X 20	1-1/4 X 3/4	5S	51	0.30	48	48	0.10
		10S		0.44			0.18
		40S		0.52			0.22
		80S		0.60			0.25
		160		0.79			0.33
		XXS		1.20			0.51
32 X 25	1-1/4 X 1	5S	51	0.10	48	48	0.31
		10S		0.18			0.45
		40S		0.22			0.53
		80S		0.27			0.61
		160		0.37			0.80
		XXS		0.54			1.23
40 X 20	1-1/2 X 3/4	5S	64	0.11	57	57	0.37
		10S		0.18			0.59
		40S		0.24			0.74
		80S		0.32			0.88
		160		0.45			1.23
		XXS		0.65			1.76

Nominal Size		WT SCH	Concentric and Eccentric Reducers		Reducing Tees		
mm OD1 X OD2	inch OD1 X OD2		H	Weight	C	M	Weight
40 X 25	1-1/2 X 1	5S	64	0.11	57	57	0.38
		10S		0.20			0.60
		40S		0.26			0.76
		80S		0.34			0.90
		160		0.47			1.26
		XXS		0.67			1.80
40 X 32	1-1/2 X 1-1/4	5S	64	0.12	57	57	0.39
		10S		0.21			0.61
		40S		0.28			0.78
		80S		0.36			0.92
		160		0.51			1.29
		XXS		0.73			1.84
50 X 20	2 X 3/4	5S	76	0.15	64	44	0.46
		10S		0.25			0.72
		40S		0.36			1.09
		80S		0.50			1.35
		160		0.79			2.12
		XXS		1.01			2.70
50 X 25	2 X 1	5S	76	0.17	64	51	0.47
		10S		0.28			0.73
		40S		0.40			1.10
		80S		0.54			1.37
		160		0.84			2.15
		XXS		1.07			2.74
50 X 40	2 X 1-1/2	5S	76	0.19	64	60	0.49
		10S		0.31			0.76
		40S		0.45			1.15
		80S		0.59			1.43
		160		0.93			2.25
		XXS		1.18			2.86
65 X 25	2-1/2 X 1	5S	89	0.25	76	57	0.83
		10S		0.38			1.20
		40S		0.65			1.87
		80S		0.87			2.66
		160		1.18			3.62
		XXS		1.75			5.33

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* There are 2 possible dimensions for this size, refer to ANSI B16.9

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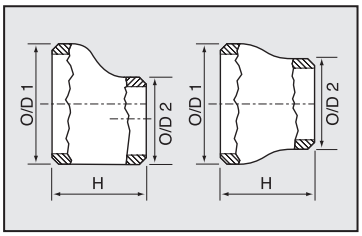
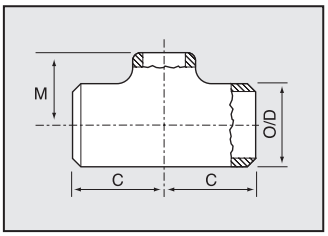
BUTTWELD FITTINGS WEIGHTS & DIMENSIONS





Nominal Size		WT SCH	Concentric and Eccentric Reducers		Reducing Tees		
mm OD1 X OD2	inch OD1 X OD2		H	Weight	C	M	Weight
65 X 40	2-1/2 X 1-1/2	5S	89	0.30	76	67	0.86
		10S		0.45			1.24
		40S		0.76			1.94
		80S		0.94			2.76
		160		1.27			3.75
		XXS		1.88			5.52
64 X 50	2-1/2 X 2	5S	89	0.32	76	70	0.88
		10S		0.47			1.27
		40S		0.80			1.98
		80S		1.03			2.82
		160		1.39			3.84
		XXS		2.05			5.65
80 X 40	3 X 1-1/2	5S	89	0.35	86	73	1.33
		10S		0.51			1.52
		40S		0.94			2.85
		80S		1.21			3.83
		160		1.75			5.59
		XXS		2.42			7.66
80 X 50	3 X 2	5S	89	0.38	86	76	1.36
		10S		0.55			1.56
		40S		1.00			2.92
		80S		1.30			3.92
		160		1.88			5.72
		XXS		2.59			7.84
80 X 65	3 X 2-1/2	5S	89	0.41	86	83	1.39
		10S		0.59			1.60
		40S		1.08			2.99
		80S		1.49			4.01
		160		2.16			5.85
		XXS		2.98			8.02
100 X 40	4 X 1-1/2	5S	102	0.48	105	86	2.75
		10S		0.68			2.91
		40S		1.36			4.44
		80S		1.90			6.49
		160		2.98			10.25
		XXS		3.80			12.98

Nominal Size		WT SCH	Concentric and Eccentric Reducers		Reducing Tees		
mm OD1 X OD2	inch OD1 X OD2		H	Weight	C	M	Weight
100 X 50	4 X 2	5S	102	0.55	105	89	2.78
		10S		0.79			2.95
		40S		1.58			4.49
		80S		1.96			6.57
		160		3.07			10.38
		XXS		3.92			13.14
100 X 65	4 X 2-1/2	5S	102	0.58	105	95	2.81
		10S		0.83			2.98
		40S		1.66			4.55
		80S		2.20			6.65
		160		3.45			10.50
		XXS		4.39			13.29
100 X 80	4 X 3	5S	102	0.61	105	98	2.88
		10S		0.87			3.05
		40S		1.75			4.65
		80S		2.34			6.80
		160		3.67			10.74
		XXS		4.67			13.60
125 X 080	5 X 3	5S	127	1.20	124	111	5.08
		10S		1.45			5.25
		40S		2.86			8.11
		80S		3.89			9.77
		160		6.45			16.32
		XXS		7.77			19.55
125 X 100	5 X 4	5S	127	1.25	124	117	5.32
		10S		1.50			5.50
		40S		2.99			8.49
		80S		4.14			10.23
		160		6.87			17.08
		XXS		8.28			20.45
150 X 80	6 X 3	5S	140	1.51	143	124	6.65
		10S		1.82			6.88
		40S		3.99			11.96
		80S		5.52			11.59
		160		9.17			19.24
		XXS		11.05			23.18

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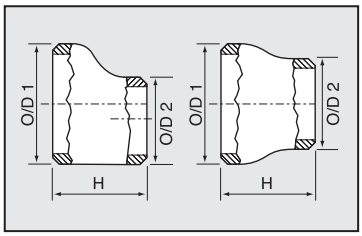
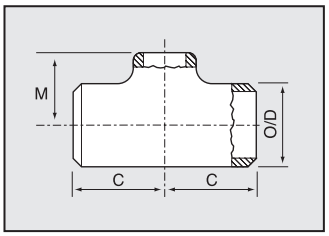
BUTTWELD FITTINGS WEIGHTS & DIMENSIONS





Nominal Size		WT SCH	Concentric and Eccentric Reducers		Reducing Tees		
mm OD1 X OD2	inch OD1 X OD2		H	Weight	C	M	Weight
150 X 100	6 X 4	5S	140	1.55	143	130	6.88
		10S		1.96			7.12
		40S		4.09			9.70
		80S		5.97			12.00
		160		9.91			19.92
		XXS		11.95			24.00
150 X 125	6 X 5	5S	140	1.64	143	137	7.04
		10S		2.02			7.28
		40S		4.31			9.92
		80S		6.27			12.27
		160		10.40			20.37
		XXS		12.54			24.55
200 X 100	8 X 4	5S	152	2.16	178	156	12.12
		10S		3.02			13.49
		40S		6.56			18.02
		80S		9.25			24.24
		160		16.75			43.77
		XXS		16.20			42.23
200 X 125	8 X 5	5S	152	2.21	178	162	12.40
		10S		3.09			13.80
		40S		6.72			18.44
		80S		9.69			24.80
		160		17.50			44.77
		XXS		16.96			43.18
200 X 150	8 X 6	5S	152	2.30	178	168	12.68
		10S		3.20			14.11
		40S		6.96			18.86
		80S		10.15			25.36
		160		18.32			45.91
		XXS		17.75			44.18
250 X 100	10 X 4	5S	178	3.79	216	184	21.25
		10S		4.74			23.25
		40S		10.54			30.14
		80S		12.58			42.50
		160		28.32			95.45
		XXS		-			-

Nominal Size		WT SCH	Concentric and Eccentric Reducers		Reducing Tees		
mm OD1 X OD2	inch OD1 X OD2		H	Weight	C	M	Weight
250 X 125	10 X 5	5S	178	3.92	216	191	21.50
		10S		4.90			23.06
		40S		10.89			30.49
		80S		14.27			43.00
		160		32.09			96.36
		XXS		-			-
250 X 150	10 X 6	5S	178	4.01	216	194	22.00
		10S		5.01			23.60
		40S		11.15			31.20
		80S		14.82			44.00
		160		33.32			98.64
		XXS		-			-
250 x 200	10 x 8	5S	178	4.17	216	194	22.50
		10S		5.21			24.14
		40S		11.58			31.91
		80S		15.61			45.00
		160		35.05			100.91
		XXS		-			-
300 X 150	12 X 6	5S	203	6.37	254	219	32.45
		10S		7.45			34.01
		40S		15.51			53.64
		80S		20.19			72.27
		160		52.73			189.09
		XXS		-			-
300 X 200	12 X 8	5S	203	6.57	254	229	33.20
		10S		7.69			34.80
		40S		16.02			54.55
		80S		20.94			74.09
		160		54.55			193.64
		XXS		-			-
300 X 250	12 X 10	5S	203	6.83	254	241	33.95
		10S		8.00			35.59
		40S		16.67			55.91
		80S		21.68			75.45
		160		56.36			197.73
		XXS		-			-

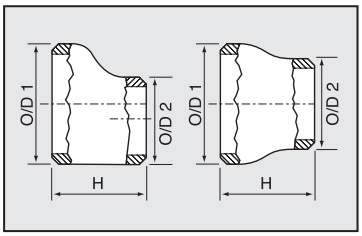
NOTE: Weights and dimensions listed above are a guide only. Dimensions in mm. Weights in kg.

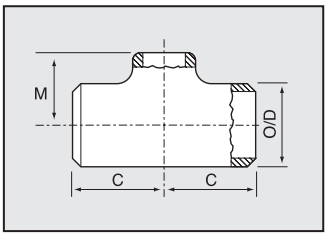
* There are 2 possible dimensions for this size, refer to ANSI B16.9

Weights and dimensions of larger Buttweld Fittings are available from your local Prochem office.

WOR: Weight on request

BUTTWELD FITTINGS WEIGHTS & DIMENSIONS





Nominal Size		WT SCH	Concentric and Eccentric Reducers		Reducing Tees		
mm OD1 X OD2	inch OD1 X OD2		H	Weight	C	M	Weight
350 X 150	14 X 6	5S	330	10.81	279	238	34.39
		10S		13.18			41.34
		40S		26.36			67.27
		80S		35.37			80.91
		160		-			-
		XXS		-			-
350 X 200	14 X 8	5S	330	11.41	279	248	34.79
		10S		13.91			41.83
		40S		27.83			68.18
		80S		36.92			81.82
		160		-			-
		XXS		-			-
350 X 250	14 X 10	5S	330	11.84	279	257	35.60
		10S		14.44			42.80
		40S		28.89			70.00
		80S		38.82			84.09
		160		-			-
		XXS		-			-
350 X 300	14 X 12	5S	330	12.56	279	270	36.41
		10S		15.32			43.77
		40S		30.65			71.36
		80S		40.44			85.91
		160		-			-
		XXS		-			-
400 X 200	16 X 8	5S	356	14.72	305	273	44.43
		10S		16.73			50.00
		40S		33.46			85.00
		80S		44.31			102.27
		160		-			-
		XXS		-			-
400 X 250	16 X 10	5S	356	15.62	305	283	44.95
		10S		17.75			50.91
		40S		35.51			85.91
		80S		46.36			103.64
		160		-			-
		XXS		-			-

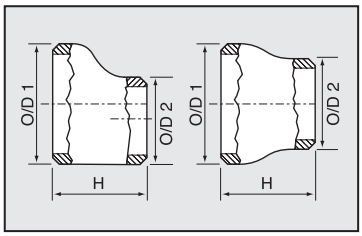
Nominal Size		WT SCH	Concentric and Eccentric Reducers		Reducing Tees		
mm OD1 X OD2	inch OD1 X OD2		H	Weight	C	M	Weight
400 X 300	16 X 12	5S	356	16.18	305	295	45.91
		10S		18.39			51.82
		40S		36.78			87.73
		80S		47.73			105.91
		160		-			-
		XXS		-			-
400 X 350	16 X 14	5S	356	16.58	305	305	46.82
		10S		18.85			53.18
		40S		37.69			90.00
		80S		49.09			108.18
		160		-			-
		XXS		-			-
450 X 250	18 X 10	5S	381	18.54	343	308	57.27
		10S		21.06			65.00
		40S		42.13			110.45
		80S		54.55			132.73
		160		-			-
		XXS		-			-
450 X 300	18 X 12	5S	381	18.94	343	321	58.18
		10S		21.52			65.91
		40S		43.05			111.82
		80S		57.27			134.55
		160		-			-
		XXS		-			-
450 X 350	18 X 14	5S	381	19.31	343	330	59.55
		10S		21.95			67.27
		40S		43.89			114.09
		80S		57.73			137.73
		160		-			-
		XXS		-			-
450 X 400	18 X 16	5S	381	19.84	343	330	60.91
		10S		22.55			69.09
		40S		45.09			116.82
		80S		59.09			140.45
		160		-			-
		XXS		-			-

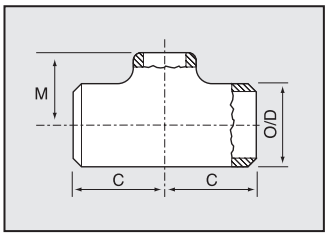
NOTE: Weights and dimensions listed above are a guide only. Dimensions in mm. Weights in kg. **WOR:** Weight on request

* There are 2 possible dimensions for this size, refer to ANSI B16.9

Weights and dimensions of larger Buttweld Fittings are available from your local Prochem office.

BUTTWELD FITTINGS WEIGHTS & DIMENSIONS





Nominal Size		WT SCH	Concentric and Eccentric Reducers		Reducing Tees		
mm OD1 X OD2	inch OD1 X OD2		H	Weight	C	M	Weight
500 X 300	20 X 12	5S	508	32.50	381	346	65.91
		10S		32.50			87.73
		40S		65.00			138.18
		80S		85.91			165.91
		160		-			-
		XXS		-			-
500 X 350	20 X 14	5S	508	32.95	381	356	66.82
		10S		38.23			89.09
		40S		65.91			140.00
		80S		87.27			168.18
		160		-			-
		XXS		-			-
500 X 400	20 X 16	5S	508	33.18	381	356	68.18
		10S		38.49			90.91
		40S		66.36			143.18
		80S		88.64			171.82
		160		-			-
		XXS		-			-
500 X 450	20 X 18	5S	508	34.32	381	368	70.00
		10S		26.17			93.18
		40S		68.64			146.36
		80S		90.00			175.91
		160		-			-
		XXS		-			-
550 X 350	22 X 14	5S	508	WOR	419	381	WOR
		10S		36.01			WOR
		40S		59.08			WOR
		80S		76.97			WOR
		160		-			-
		XXS		-			-
550 X 400	22 X 16	5S	508	WOR	419	381	78.00
		10S		38.01			130.23
		40S		62.40			130.23
		80S		81.25			169.22
		160		-			-
		XXS		-			-

Nominal Size		WT SCH	Concentric and Eccentric Reducers		Reducing Tees		
mm OD1 X OD2	inch OD1 X OD2		H	Weight	C	M	Weight
550 X 450	22 X 18	5S	508	WOR	419	394	78.47
		10S		WOR			131.14
		40S		WOR			131.14
		80S		WOR			170.74
		160		-			-
		XXS		-			-
550 X 500	22 X 20	5S	508	WOR	419	406	78.94
		10S		42.01			132.06
		40S		68.94			132.06
		80S		89.80			172.88
		160		-			-
		XXS		-			-
600 X 400	24 X 16	5S	508	44.55	432	406	116.36
		10S		44.55			134.09
		40S		76.82			194.55
		80S		102.73			234.55
		160		-			-
		XXS		-			-
600 X 450	24 X 18	5S	508	45.45	432	419	119.09
		10S		45.45			137.27
		40S		78.64			199.09
		80S		104.55			240.00
		160		-			-
		XXS		-			-
600 X 500	24 X 20	5S	508	46.82	432	432	121.82
		10S		46.82			140.00
		40S		81.36			203.64
		80S		106.36			245.45
		160		-			-
		XXS		-			-
600 X 550	24 X 22	5S	508	WOR	432	432	98.59
		10S		52.91			141.16
		40S		75.53			141.16
		80S		98.36			184.53
		160		-			-
		XXS		-			-

NOTE: Weights and dimensions listed above are a guide only. Dimensions in mm. Weights in kg.

* There are 2 possible dimensions for this size, refer to ANSI B16.9

Weights and dimensions of larger Buttweld Fittings are available from your local Prochem office.

WOR: Weight on request

Swage Nipples

MSS-SP-95

Concentric Swage Nipple

Eccentric Swage Nipple

Prochem manufactures, stocks and supplies a range of plain, bevelled and threaded concentric and eccentric swage nipples, from 8 (1⁄4") NB to 100 (4") NB, with other sizes available on request. All swage nipples are either manufactured from seamless pipe or bar material and have an available working pressure equivavlent to straight seamless pipe.

These fittings are available in ASTM A403 WP316/316L with other materials available on request.

Plain and Threaded Swage Nipples

Pipe Nipples

AVAILABLE IN PLAIN, BEVELLED AND THREADED BSP & NPT

Plain Pipe Nipples

Threaded One End Pipe Nipples

Threaded Both Ends Pipe Nipples

Pipe nipples are available in ASTM A403 WP316/316L or 304/304L materials, from 6 (1⁄8") NB upwards, threaded BSP or NPT, bevelled or plain ended.

Prochem has the ability to manufacture pipe nipples up to 6000 mm (6 m) in length in sizes 6 NB to 80 NB.

Other materials available on request.

Branch Outlet Fittings

MSS-SP-97

Prochem manufactures, stocks and supplies a range of Buttweld, Socketweld, Threaded and Flanged reinforced branch fittings from 8 (1⁄4") NB upwards to suit any size run pipe. These fittings are available in Class 3000 and Class 6000 and all pipe schedules in a variety of materials. The fittings are manufactured to conform to American and British design specifications.

Buttweld Branches

Socketweld Branches

Threaded Branches

Elbow and Lateral Branches

Flanged Buttweld Outlets and Flanged Buttweld Nipple Outlets

Pipe and Tube

SEAMLESS AND WELDED PIPE – Is available throughout Prochem in accordance with material specification ASTM A312 and dimensional specification ANSI/ASME B36.19M and ANSI/ASME B36.10M.

Comprehensive stocks of seamless and welded pipe includes 6 NB (1⁄8") to 600 NB (16") in SCH 10S and SCH 40S. Seamless pipe is also available ex-stock in heavier schedules such as SCH 80S, SCH 160 and XXS.

Larger sizes of both seamless and welded pipe are readily available through our worldwide network of suppliers. All pipe is fully traceable and available in 6 m lengths.

SEAMLESS TUBE – Prochem leads the field in the supply of high quality instrument tube which is stocked throughout Australia and South East Asia specifically for use with compression fittings. The tube is dual graded, 316/316L and dual specified A269/A213 to not only cover instrumentation applications, but boiler, superheater and heat exchanger applications as well. All tube in sizes 4.76 (3⁄16") to 25.40 mm (1") OD inclusive are dual specified, contain 2.5% minimum molybdenum to provide maximum corrosion protection and are produced to a maximum hardness of RB 80.

Sizes from 25.4 (1") to 50.8 mm (2") are supplied to ASTM A269 TP316. High quality seamless tube from Prochem is fully certifiable and available in standard 6 m lengths. Tube from 3.2 (1/8") to 12.7 mm (1/2") is available in coiled form with other sizes available on request.

Prochem also holds stock of Monel® 400, Duplex UNS S31803, 904L UNS N08904 and 6Mo UNS S31254 tube for applications where enhanced corrosion resistance is required.

WELDED TUBE – Prochem stock welded tube in a variety of finishes to suit market needs. These include “as welded”, “as welded polished”, “welded bright annealed”, “welded annealed polished”, and others on request. Our standard size range covers 12.7 (1⁄2") to 152.4 mm (6") OD in 1.6 mm WT (16 SWG) and 203.2 mm (8") OD in 2.00 mm WT (14 SWG).

Materials in stock include 304 and 316 stainless steel to ASTM A269, ASTM A554 and AS1528.1 with other grades, standards or sizes available on request.

HEAT EXCHANGER TUBE – Through our extensive network of overseas suppliers, Prochem offers a comprehensive selection of heat exchanger and condenser tubes in a range of stainless and special alloys.

Whether you require finned tube, u-tube or straight tube, please give us a call. We will be pleased to source your requirements.

Monel is a registered trademark.

Pipe and Tube

COMMON PIPE AND TUBE TERMS USED IN THE AUSTRALIAN INDUSTRY

Tube: Tube is usually defined by an outside dimension “OD” and a wall thickness.

Section Tube: Section tubing is initially rolled and welded as round tube and then rolled or drawn to its new non-circular cross section. Typical forms are square, rectangular and oval. Many other forms are available. Section tubing is used extensively in architectural and structural applications.

Pipe: Pipe can be defined by nominal pipe size (NPS) under American standards classifications. Alternatively nominal bore (NB) may be specified under British standards classifications along with a schedule (wall thickness). In Australia these terms are usually mixed, with all stock being available to the American system, although enquiries are usually made under the British system, i.e. 50 NB schedule 40S pipe, rather than 50 NPS Pipe. It should also be noted there are dimensional differences between the American and the British systems. Under the American system size 65 pipe measures 73 mm OD and under the British system it measures 76.2 mm OD European and Japanese manufacturers may define the pipe by its actual outside diameter and wall thickness, in mm, rather than by nominal size and schedule.

AS WELDED (AW): Tubing produced directly off a continuous tube welding mill.

AS WELDED ANNEALED (AWA): Tubing produced in the same process as for ‘As-Welded’ but annealed as a final operation.

COLD WORKED (CW) AND COLD WORKED ANNEALED (CWA): Cold worked tubing is produced in the same process as for ‘As-Welded’ and then the weld area is subjected to a mechanical cold working process for removal of the weld bead to produce a smooth internal surface. An annealing process is then performed to produce cold worked annealed tube.

WELDED DRAWN (WD) AND WELDED DRAWN ANNEALED (WDA): Welded Drawn tube is produced under AWA or CWA conditions and then redrawn through sizing dies and mandrels to achieve close tolerances on outside diameter and wall thickness. An annealing process is then performed to produce welded drawn annealed tube.

ANNEALED: The tube is subjected to heat treatment by either an ‘oxygen enriched’ furnace or by bright annealing in a ‘oxygen deficient’ furnace.

POLISHING: Usually for tubing where the quality of the surface finish of the tubing is to be improved. This can be achieved by the use of an abrasive sanding belt or by electropolishing the tube surface. A variety of surface finishes are available e.g. hairline, buff or mirror. Either internal or extermal surfaces can be polished. External polishing is more common for decorative applications while internal polishing is usually used in analytical applications.

PICKLING: The material is immersed in an acid solution for the purpose of removing the oxide scale which is formed after annealing or heat treatment in an ‘oxygen enriched environment furnace’. A mixture of nitric and hydrofluoric acid in water is widely used. Where tenacious oxides are present, sulphuric acid can be used to soften the scale prior to dipping the material in the nitric/hydrofluoric acid bath.

PASSIVATING: The stainless steel is treated by immersion in a dilute solution of acid, which has the effect of eliminating many types of surface contamination which may cause discolouration or superficial corrosive attack in service. A solution of nitric acid in water is widely used. The removal of residues such as particles of steel from cutting tools from the surface permits the material to re-generate its invisible, protective oxide film as a continuous permanent covering.

Information obtained from the Australian Stainless Steel Development Association.

Manufacturing Methods

Pipes and tubes are manufactured by either the seamless or welded process. These processes can be broken down into a number of manufacturing subgroups.

SEAMLESS MANUFACTURING PROCESSES

Hot Finished

Prior to extrusion, a short round billet is pierced or bored to form a hollow billet. The billet is then heated and a mandrel is pushed through. The mandrel is then concentrically positioned to a circular die. Elongation is carried out by squeezing the billet through the annular space formed by the die and the mandrel. Elongation of the material then takes place to attain the required dimensions.

Cold Finished

Stainless steel pipe and tube made by the hot finishing process may have some limitations which might create the need for further cold finishing operations. Cold finishing is desirable to achieve:

(i) closer tolerances of material,
(ii) cleaner and smoother surfaces,
(iii) more readily controlled mechanical properties,
(iv) a far greater range of sizes, particularly small diameters and thin wall thicknesses,
(v) an almost limitless range of non-circular shapes.

Cold finishing is obtained by drawing a tube with larger outside diameter and wall thickness than the finished product through an external sizing die. The internal size can be controlled by the use of a plug or mandrel.

Centrifugal Cast

The cast tube or pipe is formed by centrifugal force generated as the metal becomes entrained on the inside of a spinning cylindrical metal mould. This gives a tubular casting with the outside diameter and length determined by the mould size and the inside diameter determined by the amount of metal poured. Centrifugal cast materials come in a range of sizes and these are generally limited to a minimum of 65 mm OD and a maximum of 650 mm OD. Lengths to 5 metres are available although 2-4 metres is more common.

Forged and Bored

An ingot or bloom is forged and brought as nearly as practicable to the finished size and shape by hot working. The material is adequately worked under a tool of sufficient capacity to refine the structure in the wall of the finished pipe. After heat treatment the inside and outside diameters are machined to final size.

WELDED MANUFACTURING PROCESSES

Continuously Longitudinal Welded

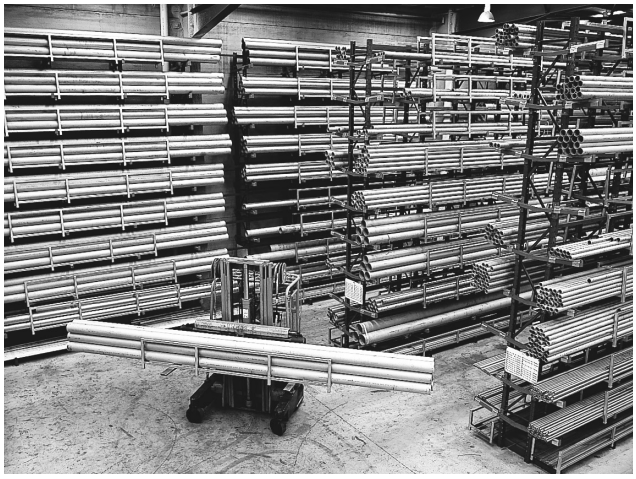
A coil of stainless steel strip is fed into the tube mill. The strip passes through forming rolls which progressively form the material ready for welding. The welding process is then carried out, usually tungsten inert gas (TIG). The product passes under a sanding belt which removes the weld bead on the outside diameter. The product can then be subjected to the proper post-weld treatment to bring it to specification.

Fabricated Welded

This method utilises sheets or plates of the required thickness and developed width, to manufacture the pipe or tube. The plate is pressed into shape with a press brake, which is equipped with the appropriate tooling. Following the forming operation the product is fed through a series of rolls to ensure the correct cross sectional form during the welding operation which follows. After welding, the product can be subjected to the proper post-weld treatment required to bring it to specification.

Spirally Welded

Spirally welded tube is produced by driving coil strip from a de-coiler, through drive rollers, and into a cylindrical former (or shoe), at a pre-determined angle. The edges of the resulting “spring-like” profile are arc welded as they feed past a fixed welding torch. This process is particularly suitable for making large diameter tubes, with relatively thin wall thicknesses, to close tolerances of straightness and ovality.



Information obtained from the Australian Stainless Steel Development Association.

NOMINAL WORKING PRESSURES

Figures shown in this Table are the nominal working pressures for seamless stainless steel pipe under constant operating conditions; these include a typical factor of safety.

Nominal working pressures for welded pipe can be calculated by multipying the figure in the tables by the weld joint efficieny factor, typically 0.85.

The tables have been formulated by using the figures obtained by the Australian Pressure Piping Standard AS 4041. Detailed design calculations should be in accordance with the applicable design standard.

The information is provided as a guide, it is recommended that professional engineering advice be sought on all pressure-related design.

SEAMLESS PIPE NOMINAL WORKING PRESSURES (MPa) FOR DUAL GRADE 316/316L

NOMINAL BORE SIZE		SCHEDULE 5S (1) TEMPERATURE DEG C								SCHEDULE 10S (1) TEMPERATURE DEG C								SCHEDULE 40S TEMPERATURE DEG C							
mm	inch	50	100	150	200	250	300	350	400	50	100	150	200	250	300	350	400	50	100	150	200	250	300	350	400
6	1/8									32.49	32.49	32.49	31.31	29.43	28.02	26.84	26.13	47.55	47.55	47.55	45.82	43.07	41.00	39.28	38.24
8	1/4									32.51	32.51	32.51	31.33	29.44	28.03	26.85	26.15	46.07	46.07	46.07	44.40	41.73	39.73	38.06	37.06
10	3/8									25.45	25.45	25.45	24.52	23.05	21.94	21.02	20.47	36.99	36.99	36.99	35.65	33.51	31.90	30.56	29.75
15	1/2	20.06	20.06	20.06	19.34	18.17	17.30	16.57	16.14	26.19	26.19	26.19	25.24	23.72	22.58	21.63	21.06	35.43	35.43	35.43	34.15	32.10	30.55	29.27	28.50
20	3/4	15.77	15.77	15.77	15.20	14.29	13.60	13.03	12.69	20.50	20.50	20.50	19.75	18.57	17.67	16.93	16.49	28.65	28.65	28.65	27.61	25.95	24.70	23.67	23.04
25	1	12.46	12.46	12.46	12.01	11.29	10.75	10.30	10.02	21.59	21.59	21.59	20.81	19.56	18.62	17.83	17.37	26.81	26.81	26.81	25.84	24.28	23.12	22.15	21.56
32	1-1/4	9.77	9.77	9.77	9.42	8.85	8.43	8.07	7.86	16.81	16.81	16.81	16.20	15.23	14.50	13.89	13.52	21.99	21.99	21.99	21.19	19.92	18.96	18.17	17.69
40	1-1/2	8.50	8.50	8.50	8.19	7.70	7.33	7.02	6.84	14.58	14.58	14.58	14.05	13.20	12.57	12.04	11.72	19.71	19.71	19.71	19.00	17.85	17.00	16.28	15.85
50	2	6.77	6.77	6.77	6.52	6.13	5.83	5.59	5.44	11.55	11.55	11.55	11.13	10.46	9.96	9.54	9.29	16.60	16.60	16.60	15.99	15.03	14.31	13.71	13.35
65	2-1/2	7.16	7.16	7.16	6.90	6.48	6.17	5.91	5.76	10.47	10.47	10.47	10.09	9.48	9.03	8.65	8.42	18.19	18.19	18.19	17.53	16.48	15.69	15.03	14.63
80	3	5.85	5.85	5.85	5.64	5.30	5.04	4.83	4.70	8.54	8.54	8.54	8.23	7.73	7.36	7.05	6.87	15.76	15.76	15.76	15.19	14.28	13.59	13.02	12.68
90	3-1/2	5.10	5.10	5.10	4.92	4.62	4.40	4.21	4.10	7.44	7.44	7.44	7.17	6.74	6.42	6.15	5.98	14.35	14.35	14.35	13.83	13.00	12.37	11.85	11.54
100	4	4.53	4.53	4.53	4.36	4.10	3.90	3.74	3.64	6.59	6.59	6.59	6.35	5.97	5.68	5.45	5.30	13.33	13.33	13.33	12.85	12.07	11.49	11.01	10.72
125	5	4.81	4.81	4.81	4.64	4.36	4.15	3.97	3.87	5.93	5.93	5.93	5.72	5.37	5.11	4.90	4.77	11.66	11.66	11.66	11.24	10.56	10.06	9.63	9.38
150	6	4.03	4.03	4.03	3.88	3.65	3.47	3.33	3.24	4.96	4.96	4.96	4.78	4.49	4.28	4.10	3.99	10.59	10.59	10.59	10.21	9.59	9.13	8.75	8.52
200	8	3.08	3.08	3.08	2.97	2.79	2.66	2.55	2.48	4.20	4.20	4.20	4.05	3.81	3.62	3.47	3.38	9.32	9.32	9.32	8.98	8.44	8.03	7.69	7.49
250	10	3.03	3.03	3.03	2.92	2.75	2.62	2.51	2.44	3.75	3.75	3.75	3.61	3.40	3.23	3.10	3.02	8.44	8.44	8.44	8.14	7.65	7.28	6.97	6.79
300	12	2.98	2.98	2.98	2.87	2.70	2.57	2.46	2.40	3.44	3.44	3.44	3.32	3.12	2.97	2.84	2.77	7.29	7.29	7.29	7.02	6.60	6.28	6.02	5.86
350	14	2.71	2.71	2.71	2.61	2.45	2.34	2.24	2.18	3.28	3.28	3.28	3.16	2.97	2.83	2.71	2.64	6.62	6.62	6.62	6.38	6.00	5.71	5.47	5.33
400	16	2.51	2.51	2.51	2.42	2.27	2.16	2.07	2.02	2.87	2.87	2.87	2.76	2.59	2.47	2.37	2.30	5.78	5.78	5.78	5.57	5.23	4.98	4.77	4.65
450	18	2.23	2.23	2.23	2.15	2.02	1.92	1.84	1.79	2.54	2.54	2.54	2.45	2.30	2.19	2.10	2.05	5.12	5.12	5.12	4.94	4.64	4.42	4.23	4.12
500	20	2.29	2.29	2.29	2.20	2.07	1.97	1.89	1.84	2.65	2.65	2.65	2.56	2.40	2.29	2.19	2.13	4.60	4.60	4.60	4.43	4.17	3.97	3.80	3.70
550	22	2.08	2.08	2.08	2.00	1.88	1.79	1.71	1.67	2.41	2.41	2.41	2.32	2.18	2.08	1.99	1.94								
600	24	2.21	2.21	2.21	2.13	2.00	1.90	1.82	1.77	2.53	2.53	2.53	2.44	2.29	2.18	2.09	2.04	3.82	3.82	3.82	3.68	3.46	3.29	3.15	3.07
750	30	2.02	2.02	2.02	1.95	1.83	1.74	1.67	1.63	2.53	2.53	2.53	2.44	2.29	2.18	2.09	2.03								

FIGURES PRINTED IN THIS STYLE MEET THE DIMENSIONAL REQUIREMENTS OF BOTH ANSI/ASME B36.19M-2004 & B36.10M-2004

FIGURES PRINTED IN THIS STYLE & UNDERLINED DO NOT CONFORM DIMENSIONALLY WITH ANSI/ASME B36.10M-2004

FIGURES PRINTED IN THIS STYLE ONLY MEET THE DIMENSOINAL REQUIREMENTS OF ANSI/ASME B36.10M-2004

(1) Schedule 5S and 10S Wall Thicknesses do not permit threading in accordance with ANSI/ASME B1.20.1, ISO 7-1 or ISO 228-1

NOMINAL WORKING PRESSURES

Figures shown in this Table are the nominal working pressures for seamless stainless steel pipe under constant operating conditions; these include a typical factor of safety.

Nominal working pressures for welded pipe can be calculated by multipying the figure in the tables by the weld joint efficieny factor, typically 0.85.

The tables have been formulated by using the figures obtained by the Australian Pressure Piping Standard AS 4041. Detailed design calculations should be in accordance with the applicable design standard.

The information is provided as a guide, it is recommended that professional engineering advice be sought on all pressure-related design.

SEAMLESS PIPE NOMINAL WORKING PRESSURES (Mpa) FOR DUAL GRADE 316/316L

NOMINAL BORE SIZE		SCHEDULE 80S TEMPERATURE DEG C								SCHEDULE 160 TEMPERATURE DEG C								SCHEDULE XXS TEMPERATURE DEG C							
mm	inch	50	100	150	200	250	300	350	400	50	100	150	200	250	300	350	400	50	100	150	200	250	300	350	400
6	1/8	71.05	71.05	71.05	68.47	64.35	61.27	58.69	57.15																
8	1/4	65.95	65.95	65.95	63.56	59.74	56.87	54.48	53.05																
10	3/8	54.04	54.04	54.04	52.08	48.95	46.60	44.64	43.46																
15	1/2	49.94	49.94	49.94	48.13	45.23	43.06	41.25	40.17	***67.43***	***67.43***	***67.43***	***64.99***	***61.08***	***58.15***	***55.70***	***54.24***	***122.19***	***122.19***	***122.19***	***117.76***	***110.68***	***105.36***	***100.94***	***98.28***
20	3/4	40.56	40.56	40.56	39.09	36.74	34.97	33.50	32.62	***61.49***	***61.49***	***61.49***	***59.26***	***55.70***	***53.02***	***50.80***	***49.46***	***95.10***	***95.10***	***95.10***	***91.65***	***86.14***	***82.01***	***78.56***	***76.49***
25	1	37.35	37.35	37.35	35.99	33.83	32.20	30.85	30.04	***55.07***	***55.07***	***55.07***	***53.08***	***49.88***	***47.49***	***45.49***	***44.30***	***86.26***	***86.26***	***86.26***	***83.14***	***78.14***	***74.39***	***71.26***	***69.39***
32	1-1/4	30.85	30.85	30.85	29.74	27.95	26.60	25.49	24.82	***41.84***	***41.84***	***41.84***	***40.33***	***37.90***	***36.08***	***34.57***	***33.66***	***69.48***	***69.48***	***69.48***	***66.96***	***62.94***	***59.91***	***57.40***	***55.89***
40	1-1/2	27.97	27.97	27.97	26.96	25.33	24.12	23.10	22.50	***41.00***	***41.00***	***41.00***	***39.51***	***37.14***	***35.35***	***33.87***	***32.98***	***62.18***	***62.18***	***62.18***	***59.93***	***56.32***	***53.62***	***51.36***	***50.01***
50	2	24.12	24.12	24.12	23.25	21.85	20.80	19.93	19.40	***40.08***	***40.08***	***40.08***	***38.63***	***36.31***	***34.56***	***33.11***	***32.24***	***52.81***	***52.81***	***52.81***	***50.90***	***47.84***	***45.54***	***43.63***	***42.48***
65	2-1/2	25.31	25.31	25.31	24.40	22.93	21.83	20.91	20.36	***35.59***	***35.59***	***35.59***	***34.30***	***32.24***	***30.69***	***29.40***	***28.62***	***55.74***	***55.74***	***55.74***	***53.72***	***50.49***	***48.07***	***46.05***	***44.84***
80	3	22.37	22.37	22.37	21.56	20.27	19.29	18.48	18.00	***33.95***	***33.95***	***33.95***	***32.72***	***30.75***	***29.27***	***28.04***	***27.31***	***48.70***	***48.70***	***48.70***	***46.94***	***44.11***	***42.00***	***40.23***	***39.17***
90	3-1/2	20.64	20.64	20.64	19.89	18.69	17.80	17.05	16.60																
100	4	19.35	19.35	19.35	18.65	17.53	16.68	15.98	15.56	***31.78***	***31.78***	***31.78***	***30.63***	***28.79***	***27.40***	***26.25***	***25.56***	***41.62***	***41.62***	***41.62***	***40.11***	***37.70***	***35.89***	***34.38***	***33.48***
125	5	17.30	17.30	17.30	16.68	15.67	14.92	14.29	13.92	***30.10***	***30.10***	***30.10***	***29.01***	***27.26***	***25.95***	***24.86***	***24.21***	***36.91***	***36.91***	***36.91***	***35.57***	***33.43***	***31.83***	***30.49***	***29.69***
150	6	16.69	16.69	16.69	16.08	15.12	14.39	13.79	13.42	***28.95***	***28.95***	***28.95***	***27.90***	***26.22***	***24.96***	***23.91***	***23.28***	***35.55***	***35.55***	***35.55***	***34.26***	***32.20***	***30.65***	***29.37***	***28.59***
200	8	14.74	14.74	14.74	14.21	13.35	12.71	12.18	11.86	***27.92***	***27.92***	***27.92***	***26.91***	***25.29***	***24.08***	***23.07***	***22.46***	***26.88***	***26.88***	***26.88***	***25.91***	***24.35***	***23.18***	***22.21***	***21.62***
250	10	11.70	11.70	11.70	11.28	10.60	10.09	9.67	9.41	***27.82***	***27.82***	***27.82***	***26.81***	***25.19***	***23.99***	***22.98***	***22.37***	***24.45***	***24.45***	***24.45***	***23.56***	***22.14***	***21.08***	***20.19***	***19.66***
300	12	9.80	9.80	9.80	9.45	8.88	8.45	8.10	7.88	***27.30***	***27.30***	***27.30***	***26.31***	***24.72***	***23.54***	***22.55***	***21.95***	***20.33***	***20.33***	***20.33***	***19.59***	***18.41***	***17.53***	***16.79***	***16.35***
350	14	8.90	8.90	8.90	8.58	8.06	7.67	7.35	7.16	***26.58***	***26.58***	***26.58***	***25.62***	***24.08***	***22.92***	***21.96***	***21.38***								
400	16	7.75	7.75	7.75	7.47	7.02	6.69	6.40	6.24	***26.35***	***26.35***	***26.35***	***25.40***	***23.87***	***22.72***	***21.77***	***21.20***								
450	18	6.87	6.87	6.87	6.62	6.23	5.93	5.68	5.53	***26.17***	***26.17***	***26.17***	***25.22***	***23.70***	***22.57***	***21.62***	***21.05***								
500	20	6.17	6.17	6.17	5.94	5.59	5.32	5.09	4.96	***26.01***	***26.01***	***26.01***	***25.07***	***23.56***	***22.43***	***21.49***	***20.92***								
550	22	***12.92***	***12.92***	***12.92***	***12.45***	***11.70***	***11.14***	***10.67***	***10.39***	***25.47***	***25.47***	***25.47***	***24.54***	***23.07***	***21.96***	***21.04***	***20.48***								
600	24	5.12	5.12	5.12	4.93	4.63	4.41	4.23	4.11	***25.77***	***25.77***	***25.77***	***24.83***	***23.34***	***22.22***	***21.29***	***20.73***								
750	30																								

FIGURES PRINTED IN THIS STYLE MEET THE DIMENSIONAL REQUIREMENTS OF BOTH ANSI/ASME B36.19M-2004 & B36.10M-2004

FIGURES PRINTED IN THIS STYLE & UNDERLINED DO NOT CONFORM DIMENSIONALLY WITH ANSI/ASME B36.10M-2004

FIGURES PRINTED IN THIS STYLE ONLY MEET THE DIMENSOINAL REQUIREMENTS OF ANSI/ASME B36.10M-2004

(1) Schedule 5S and 10S Wall Thicknesses do not permit threading in accordance with ANSI/ASME B1.20.1, ISO 7-1 or ISO 228-1

NOMINAL WORKING PRESSURES

Figures shown in this Table are the nominal working pressures for seamless stainless steel pipe under constant operating conditions; these include a typical factor of safety.

Nominal working pressures for welded pipe can be calculated by multipying the figure in the tables by the weld joint efficieny factor, typically 0.85.

The tables have been formulated by using the figures obtained by the Australian Pressure Piping Standard AS 4041. Detailed design calculations should be in accordance with the applicable design standard.

The information is provided as a guide, it is recommended that professional engineering advice be sought on all pressure-related design.

SEAMLESS PIPE NOMINAL WORKING PRESSURES (MPa) FOR GRADE 316L

NOMINAL BORE SIZE		SCHEDULE 5S (1) TEMPERATURE DEG C								SCHEDULE 10S (1) TEMPERATURE DEG C								SCHEDULE 40S TEMPERATURE DEG C							
mm	inch	50	100	150	200	250	300	350	400	50	100	150	200	250	300	350	400	50	100	150	200	250	300	350	400
6	1/8									27.08	27.08	27.08	25.43	23.78	22.37	21.42	20.48	39.62	39.62	39.62	37.21	34.80	32.73	31.35	29.97
8	1/4									27.09	27.09	27.09	25.44	23.79	22.38	21.43	20.49	38.39	38.39	38.39	36.06	33.72	31.72	30.38	29.04
10	3/8									21.20	21.20	21.20	19.91	18.62	17.52	16.78	16.04	30.83	30.83	30.83	28.95	27.07	25.46	24.39	23.32
15	1/2	16.72	16.72	16.72	15.70	14.68	13.81	13.23	12.65	21.82	21.82	21.82	20.49	19.17	18.03	17.27	16.51	29.53	29.53	29.53	27.73	25.93	24.39	23.36	22.34
20	3/4	13.14	13.14	13.14	12.34	11.54	10.86	10.40	9.94	17.08	17.08	17.08	16.04	15.00	14.11	13.51	12.92	23.87	23.87	23.87	22.42	20.97	19.72	18.89	18.06
25	1	10.39	10.39	10.39	9.75	9.12	8.58	8.22	7.86	17.99	17.99	17.99	16.90	15.80	14.86	14.24	13.61	22.34	22.34	22.34	20.98	19.62	18.45	17.68	16.90
32	1-1/4	8.14	8.14	8.14	7.65	7.15	6.73	6.44	6.16	14.01	14.01	14.01	13.16	12.30	11.57	11.09	10.60	18.33	18.33	18.33	17.21	16.09	15.14	14.50	13.86
40	1-1/2	7.08	7.08	7.08	6.65	6.22	5.85	5.60	5.36	12.15	12.15	12.15	11.41	10.67	10.03	9.61	9.19	16.42	16.42	16.42	15.42	14.42	13.57	13.00	12.42
50	2	5.64	5.64	5.64	5.29	4.95	4.66	4.46	4.26	9.63	9.63	9.63	9.04	8.45	7.95	7.62	7.28	13.83	13.83	13.83	12.99	12.15	11.42	10.94	10.46
65	2-1/2	5.96	5.96	5.96	5.60	5.24	4.92	4.72	4.51	8.72	8.72	8.72	8.19	7.66	7.20	6.90	6.60	15.16	15.16	15.16	14.24	13.31	12.52	11.99	11.47
80	3	4.87	4.87	4.87	4.58	4.28	4.02	3.85	3.69	7.11	7.11	7.11	6.68	6.25	5.88	5.63	5.38	13.13	13.13	13.13	12.33	11.53	10.85	10.39	9.93
90	3-1/2	4.25	4.25	4.25	3.99	3.73	3.51	3.36	3.22	6.20	6.20	6.20	5.82	5.44	5.12	4.90	4.69	11.96	11.96	11.96	11.23	10.50	9.88	9.46	9.04
100	4	3.77	3.77	3.77	3.54	3.31	3.11	2.98	2.85	5.49	5.49	5.49	5.16	4.82	4.54	4.35	4.15	11.11	11.11	11.11	10.43	9.75	9.17	8.79	8.40
125	5	4.01	4.01	4.01	3.76	3.52	3.31	3.17	3.03	4.94	4.94	4.94	4.64	4.34	4.08	3.91	3.74	9.72	9.72	9.72	9.13	8.53	8.03	7.69	7.35
150	6	3.36	3.36	3.36	3.15	2.95	2.77	2.65	2.54	4.13	4.13	4.13	3.88	3.63	3.41	3.27	3.13	8.82	8.82	8.82	8.29	7.75	7.29	6.98	6.67
200	8	2.57	2.57	2.57	2.41	2.25	2.12	2.03	1.94	3.50	3.50	3.50	3.29	3.07	2.89	2.77	2.65	7.76	7.76	7.76	7.29	6.82	6.41	6.14	5.87
250	10	2.53	2.53	2.53	2.37	2.22	2.09	2.00	1.91	3.12	3.12	3.12	2.93	2.74	2.58	2.47	2.36	7.04	7.04	7.04	6.61	6.18	5.81	5.57	5.32
300	12	2.48	2.48	2.48	2.33	2.18	2.05	1.96	1.88	2.87	2.87	2.87	2.69	2.52	2.37	2.27	2.17	6.07	6.07	6.07	5.70	5.33	5.02	4.80	4.59
350	14	2.26	2.26	2.26	2.12	1.98	1.86	1.79	1.71	2.73	2.73	2.73	2.57	2.40	2.26	2.16	2.07	5.52	5.52	5.52	5.18	4.85	4.56	4.37	4.17
400	16	2.09	2.09	2.09	1.96	1.83	1.72	1.65	1.58	2.39	2.39	2.39	2.24	2.10	1.97	1.89	1.80	4.81	4.81	4.81	4.52	4.23	3.98	3.81	3.64
450	18	1.86	1.86	1.86	1.74	1.63	1.53	1.47	1.40	2.12	2.12	2.12	1.99	1.86	1.75	1.68	1.60	4.27	4.27	4.27	4.01	3.75	3.53	3.38	3.23
500	20	1.90	1.90	1.90	1.79	1.67	1.57	1.51	1.44	2.21	2.21	2.21	2.08	1.94	1.83	1.75	1.67	3.83	3.83	3.83	3.60	3.37	3.17	3.03	2.90
550	22	1.73	1.73	1.73	1.62	1.52	1.43	1.37	1.31	2.01	2.01	2.01	1.88	1.76	1.66	1.59	1.52								
600	24	1.84	1.84	1.84	1.73	1.61	1.52	1.45	1.39	2.11	2.11	2.11	1.98	1.85	1.74	1.67	1.59	3.18	3.18	3.18	2.99	2.79	2.63	2.52	2.41
750	30	1.68	1.68	1.68	1.58	1.48	1.39	1.33	1.27	2.11	2.11	2.11	1.98	1.85	1.74	1.67	1.59								

FIGURES PRINTED IN THIS STYLE MEET THE DIMENSIONAL REQUIREMENTS OF BOTH ANSI/ASME B36.19M-2004 & B36.10M-2004

FIGURES PRINTED IN THIS STYLE & UNDERLINED DO NOT CONFORM DIMENSIONALLY WITH ANSI/ASME B36.10M-2004

FIGURES PRINTED IN THIS STYLE ONLY MEET THE DIMENSOINAL REQUIREMENTS OF ANSI/ASME B36.10M-2004

(1) Schedule 5S and 10S Wall Thicknesses do not permit threading in accordance with ANSI/ASME B1.20.1, ISO 7-1 or ISO 228-1

NOMINAL WORKING PRESSURES

Figures shown in this Table are the nominal working pressures for seamless stainless steel pipe under constant operating conditions; these include a typical factor of safety.

Nominal working pressures for welded pipe can be calculated by multipying the figure in the tables by the weld joint efficieny factor, typically 0.85.

The tables have been formulated by using the figures obtained by the Australian Pressure Piping Standard AS 4041. Detailed design calculations should be in accordance with the applicable design standard.

The information is provided as a guide, it is recommended that professional engineering advice be sought on all pressure-related design.

SEAMLESS PIPE NOMINAL WORKING PRESSURES (Mpa) FOR GRADE 316L

NOMINAL BORE SIZE		SCHEDULE 80S TEMPERATURE DEG C								SCHEDULE 160 TEMPERATURE DEG C								SCHEDULE XXS TEMPERATURE DEG C							
mm	inch	50	100	150	200	250	300	350	400	50	100	150	200	250	300	350	400	50	100	150	200	250	300	350	400
6	1/8	59.21	59.21	59.21	55.60	52.00	48.91	46.85	44.79																
8	1/4	54.96	54.96	54.96	51.61	48.27	45.40	43.49	41.58																
10	3/8	45.03	45.03	45.03	42.29	39.55	37.20	35.63	34.06																
15	1/2	41.61	41.61	41.61	39.08	36.55	34.38	32.93	31.48	***56.19***	***56.19***	***56.19***	***52.77***	***49.35***	***46.42***	***44.46***	***42.51***	***101.82***	***101.82***	***101.82***	***95.62***	***89.43***	***84.11***	***80.57***	***77.03***
20	3/4	33.80	33.80	33.80	31.74	29.68	27.92	26.74	25.57	***51.24***	***51.24***	***51.24***	***48.12***	***45.00***	***42.33***	***40.55***	***38.76***	***79.25***	***79.25***	***79.25***	***74.42***	***69.60***	***65.47***	***62.71***	***59.95***
25	1	31.12	31.12	31.12	29.23	27.33	25.71	24.63	23.54	***45.89***	***45.89***	***45.89***	***43.10***	***40.30***	***37.91***	***36.31***	***34.72***	***71.89***	***71.89***	***71.89***	***67.51***	***63.13***	***59.38***	***56.88***	***54.38***
32	1-1/4	25.71	25.71	25.71	24.15	22.58	21.24	20.34	19.45	***34.87***	***34.87***	***34.87***	***32.75***	***30.62***	***28.80***	***27.59***	***26.38***	***57.90***	***57.90***	***57.90***	***54.38***	***50.85***	***47.83***	***45.82***	***43.80***
40	1-1/2	23.31	23.31	23.31	21.89	20.47	19.25	18.44	17.63	***34.16***	***34.16***	***34.16***	***32.08***	***30.00***	***28.22***	***27.03***	***25.85***	***51.82***	***51.82***	***51.82***	***48.66***	***45.51***	***42.80***	***41.00***	***39.20***
50	2	20.10	20.10	20.10	18.88	17.65	16.60	15.90	15.21	***33.40***	***33.40***	***33.40***	***31.37***	***29.33***	***27.59***	***26.43***	***25.27***	***44.01***	***44.01***	***44.01***	***41.33***	***38.65***	***36.36***	***34.83***	***33.29***
65	2-1/2	21.09	21.09	21.09	19.81	18.52	17.42	16.69	15.96	***29.66***	***29.66***	***29.66***	***27.85***	***26.05***	***24.50***	***23.47***	***22.43***	***46.45***	***46.45***	***46.45***	***43.63***	***40.80***	***38.37***	***36.76***	***35.14***
80	3	18.64	18.64	18.64	17.51	16.37	15.40	14.75	14.10	***28.29***	***28.29***	***28.29***	***26.57***	***24.85***	***23.37***	***22.39***	***21.40***	***40.58***	***40.58***	***40.58***	***38.11***	***35.64***	***33.52***	***32.11***	***30.70***
90	3 -1/2	17.20	17.20	17.20	16.15	15.10	14.21	13.61	13.01																
100	4	16.12	16.12	16.12	15.14	14.16	13.32	12.76	12.20	***26.48***	***26.48***	***26.48***	***24.87***	***23.26***	***21.88***	***20.95***	***20.03***	***34.68***	***34.68***	***34.68***	***32.57***	***30.46***	***28.65***	***27.45***	***26.24***
125	5	14.42	14.42	14.42	13.54	12.66	11.91	11.41	10.91	***25.08***	***25.08***	***25.08***	***23.55***	***22.03***	***20.72***	***19.84***	***18.97***	***30.76***	***30.76***	***30.76***	***28.88***	***27.01***	***25.41***	***24.34***	***23.27***
150	6	13.91	13.91	13.91	13.06	12.21	11.49	11.00	10.52	***24.12***	***24.12***	***24.12***	***22.65***	***21.18***	***19.92***	***19.09***	***18.25***	***29.62***	***29.62***	***29.62***	***27.82***	***26.02***	***24.47***	***23.44***	***22.41***
200	8	12.28	12.28	12.28	11.54	10.79	10.15	9.72	9.29	***23.27***	***23.27***	***23.27***	***21.85***	***20.44***	***19.22***	***18.41***	***17.60***	***22.40***	***22.40***	***22.40***	***21.04***	***19.68***	***18.51***	***17.73***	***16.95***
250	10	9.75	9.75	9.75	9.16	8.56	8.05	7.71	7.38	***23.18***	***23.18***	***23.18***	***21.77***	***20.36***	***19.15***	***18.34***	***17.53***	***20.37***	***20.37***	***20.37***	***19.13***	***17.89***	***16.83***	***16.12***	***15.41***
300	12	8.17	8.17	8.17	7.67	7.17	6.75	6.46	6.18	***22.75***	***22.75***	***22.75***	***21.36***	***19.98***	***18.79***	***18.00***	***17.21***	***16.94***	***16.94***	***16.94***	***15.91***	***14.88***	***13.99***	***13.40***	***12.81***
350	14	7.41	7.41	7.41	6.96	6.51	6.12	5.87	5.61	***22.15***	***22.15***	***22.15***	***20.80***	***19.45***	***18.30***	***17.53***	***16.76***								
400	16	6.46	6.46	6.46	6.07	5.67	5.34	5.11	4.89	***21.96***	***21.96***	***21.96***	***20.62***	***19.29***	***18.14***	***17.38***	***16.61***								
450	18	5.73	5.73	5.73	5.38	5.03	4.73	4.53	4.33	***21.81***	***21.81***	***21.81***	***20.48***	***19.15***	***18.01***	***17.25***	***16.50***								
500	20	5.14	5.14	5.14	4.83	4.51	4.24	4.07	3.89	***21.67***	***21.67***	***21.67***	***20.35***	***19.04***	***17.90***	***17.15***	***16.40***								
550	22	***10.77***	***10.77***	***10.77***	***10.11***	***9.45***	***8.89***	***8.52***	***8.14***	***21.22***	***21.22***	***21.22***	***19.93***	***18.64***	***17.53***	***16.79***	***16.05***								
600	24	4.26	4.26	4.26	4.00	3.74	3.52	3.37	3.22	***21.47***	***21.47***	***21.47***	***20.17***	***18.86***	***17.74***	***16.99***	***16.24***								
750	30																								

FIGURES PRINTED IN THIS STYLE MEET THE DIMENSIONAL REQUIREMENTS OF BOTH ANSI/ASME B36.19M-2004 & B36.10M-2004

FIGURES PRINTED IN THIS STYLE & UNDERLINED DO NOT CONFORM DIMENSIONALLY WITH ANSI/ASME B36.10M-2004

FIGURES PRINTED IN THIS STYLE ONLY MEET THE DIMENSOINAL REQUIREMENTS OF ANSI/ASME B36.10M-2004

(1) Schedule 5S and 10S Wall Thicknesses do not permit threading in accordance with ANSI/ASME B1.20.1, ISO 7-1 or ISO 228-1

NOMINAL WORKING PRESSURES

Figures shown in this Table are the nominal working pressures for seamless stainless steel pipe under constant operating conditions; these include a typical factor of safety.

Nominal working pressures for welded pipe can be calculated by multipying the figure in the tables by the weld joint efficieny factor, typically 0.85.

The tables have been formulated by using the figures obtained by the Australian Pressure Piping Standard AS 4041. Detailed design calculations should be in accordance with the applicable design standard.

The information is provided as a guide, it is recommended that professional engineering advice be sought on all pressure-related design.

SEAMLESS PIPE NOMINAL WORKING PRESSURES (MPa) FOR DUAL GRADE 304/304L

NOMINAL BORE SIZE		SCHEDULE 5S (1) TEMPERATURE DEG C								SCHEDULE 10S (1) TEMPERATURE DEG C								SCHEDULE 40S TEMPERATURE DEG C							
mm	inch	50	100	150	200	250	300	350	400	50	100	150	200	250	300	350	400	50	100	150	200	250	300	350	400
6	1/8									32.49	32.49	32.49	30.61	28.72	27.08	26.13	25.19	47.55	47.55	47.55	44.79	42.03	39.62	38.24	36.86
8	1/4									32.51	32.51	32.51	30.62	28.74	27.09	26.15	25.20	46.07	46.07	46.07	43.40	40.73	38.39	37.06	35.72
10	3/8									25.45	25.45	25.45	23.97	22.50	21.20	20.47	19.73	36.99	36.99	36.99	34.85	32.70	30.83	29.75	28.68
15	1/2	20.06	20.06	20.06	18.90	17.74	16.72	16.14	15.55	26.19	26.19	26.19	24.67	23.15	21.82	21.06	20.30	35.43	35.43	35.43	33.38	31.33	29.53	28.50	27.47
20	3/4	15.77	15.77	15.77	14.86	13.94	13.14	12.69	12.23	20.50	20.50	20.50	19.31	18.12	17.08	16.49	15.89	28.65	28.65	28.65	26.99	25.33	23.87	23.04	22.21
25	1	12.46	12.46	12.46	11.74	11.02	10.39	10.02	9.66	21.59	21.59	21.59	20.34	19.09	17.99	17.37	16.74	26.81	26.81	26.81	25.25	23.70	22.34	21.56	20.79
32	1-1/4	9.77	9.77	9.77	9.21	8.64	8.14	7.86	7.58	16.81	16.81	16.81	15.84	14.86	14.01	13.52	13.04	21.99	21.99	21.99	20.72	19.44	18.33	17.69	17.05
40	1-1/2	8.50	8.50	8.50	8.01	7.51	7.08	6.84	6.59	14.58	14.58	14.58	13.73	12.89	12.15	11.72	11.30	19.71	19.71	19.71	18.57	17.42	16.42	15.85	15.28
50	2	6.77	6.77	6.77	6.37	5.98	5.64	5.44	5.24	11.55	11.55	11.55	10.88	10.21	9.63	9.29	8.96	16.60	16.60	16.60	15.63	14.67	13.83	13.35	12.87
65	2-1/2	7.16	7.16	7.16	6.74	6.33	5.96	5.76	5.55	10.47	10.47	10.47	9.86	9.25	8.72	8.42	8.12	18.19	18.19	18.19	17.14	16.08	15.16	14.63	14.10
80	3	5.85	5.85	5.85	5.51	5.17	4.87	4.70	4.53	8.54	8.54	8.54	8.04	7.55	7.11	6.87	6.62	15.76	15.76	15.76	14.85	13.93	13.13	12.68	12.22
90	3-1/2	5.10	5.10	5.10	4.81	4.51	4.25	4.10	3.96	7.44	7.44	7.44	7.01	6.58	6.20	5.98	5.77	14.35	14.35	14.35	13.52	12.68	11.96	11.54	11.12
100	4	4.53	4.53	4.53	4.26	4.00	3.77	3.64	3.51	6.59	6.59	6.59	6.21	5.83	5.49	5.30	5.11	13.33	13.33	13.33	12.56	11.78	11.11	10.72	10.33
125	5	4.81	4.81	4.81	4.53	4.25	4.01	3.87	3.73	5.93	5.93	5.93	5.59	5.24	4.94	4.77	4.60	11.66	11.66	11.66	10.99	10.31	9.72	9.38	9.04
150	6	4.03	4.03	4.03	3.79	3.56	3.36	3.24	3.12	4.96	4.96	4.96	4.67	4.39	4.13	3.99	3.85	10.59	10.59	10.59	9.97	9.36	8.82	8.52	8.21
200	8	3.08	3.08	3.08	2.90	2.72	2.57	2.48	2.39	4.20	4.20	4.20	3.96	3.71	3.50	3.38	3.26	9.32	9.32	9.32	8.78	8.24	7.76	7.49	7.22
250	10	3.03	3.03	3.03	2.86	2.68	2.53	2.44	2.35	3.75	3.75	3.75	3.53	3.32	3.12	3.02	2.91	8.44	8.44	8.44	7.95	7.46	7.04	6.79	6.55
300	12	2.98	2.98	2.98	2.81	2.63	2.48	2.40	2.31	3.44	3.44	3.44	3.24	3.04	2.87	2.77	2.67	7.29	7.29	7.29	6.87	6.44	6.07	5.86	5.65
350	14	2.71	2.71	2.71	2.55	2.40	2.26	2.18	2.10	3.28	3.28	3.28	3.09	2.90	2.73	2.64	2.54	6.62	6.62	6.62	6.24	5.85	5.52	5.33	5.13
400	16	2.51	2.51	2.51	2.36	2.22	2.09	2.02	1.94	2.87	2.87	2.87	2.70	2.53	2.39	2.30	2.22	5.78	5.78	5.78	5.44	5.11	4.81	4.65	4.48
450	18	2.23	2.23	2.23	2.10	1.97	1.86	1.79	1.73	2.54	2.54	2.54	2.40	2.25	2.12	2.05	1.97	5.12	5.12	5.12	4.83	4.53	4.27	4.12	3.97
500	20	2.29	2.29	2.29	2.15	2.02	1.90	1.84	1.77	2.65	2.65	2.65	2.50	2.35	2.21	2.13	2.06	4.60	4.60	4.60	4.33	4.07	3.83	3.70	3.57
550	22	2.08	2.08	2.08	1.96	1.83	1.73	1.67	1.61	2.41	2.41	2.41	2.27	2.13	2.01	1.94	1.87								
600	24	2.21	2.21	2.21	2.08	1.95	1.84	1.77	1.71	2.53	2.53	2.53	2.39	2.24	2.11	2.04	1.96	3.82	3.82	3.82	3.60	3.38	3.18	3.07	2.96
750	30	2.02	2.02	2.02	1.90	1.79	1.68	1.63	1.57	2.53	2.53	2.53	2.38	2.23	2.11	2.03	1.96								

FIGURES PRINTED IN THIS STYLE MEET THE DIMENSIONAL REQUIREMENTS OF BOTH ANSI/ASME B36.19M-2004 & B36.10M-2004

FIGURES PRINTED IN THIS STYLE & UNDERLINED DO NOT CONFORM DIMENSIONALLY WITH ANSI/ASME B36.10M-2004

FIGURES PRINTED IN THIS STYLE ONLY MEET THE DIMENSOINAL REQUIREMENTS OF ANSI/ASME B36.10M-2004

(1) Schedule 5S and 10S Wall Thicknesses do not permit threading in accordance with ANSI/ASME B1.20.1, ISO 7-1 or ISO 228-1

NOMINAL WORKING PRESSURES

Figures shown in this Table are the nominal working pressures for seamless stainless steel pipe under constant operating conditions; these include a typical factor of safety.

Nominal working pressures for welded pipe can be calculated by multipying the figure in the tables by the weld joint efficieny factor, typically 0.85.

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The information is provided as a guide, it is recommended that professional engineering advice be sought on all pressure-related design.

SEAMLESS PIPE NOMINAL WORKING PRESSURES (Mpa) FOR DUAL GRADE 304/304L

NOMINAL BORE SIZE		SCHEDULE 80S TEMPERATURE DEG C								SCHEDULE 160 TEMPERATURE DEG C								SCHEDULE XXS TEMPERATURE DEG C							
mm	inch	50	100	150	200	250	300	350	400	50	100	150	200	250	300	350	400	50	100	150	200	250	300	350	400
6	1/8	71.05	71.05	71.05	66.93	62.81	59.21	57.15	55.09																
8	1/4	65.95	65.95	65.95	62.13	58.31	54.96	53.05	51.14																
10	3/8	54.04	54.04	54.04	50.90	47.77	45.03	43.46	41.90																
15	1/2	49.94	49.94	49.94	47.04	44.15	41.61	40.17	38.72	***67.43***	***67.43***	***67.43***	***63.52***	***59.61***	***56.19***	***54.24***	***52.28***	***122.19***	***122.19***	***122.19***	***115.10***	***108.02***	***101.82***	***98.28***	***94.74***
20	3/4	40.56	40.56	40.56	38.21	35.86	33.80	32.62	31.45	***61.49***	***61.49***	***61.49***	***57.92***	***54.36***	***51.24***	***49.46***	***47.68***	***95.10***	***95.10***	***95.10***	***89.59***	***84.07***	***79.25***	***76.49***	***73.74***
25	1	37.35	37.35	37.35	35.18	33.02	31.12	30.04	28.96	***55.07***	***55.07***	***55.07***	***51.88***	***48.69***	***45.89***	***44.30***	***42.70***	***86.26***	***86.26***	***86.26***	***81.26***	***76.26***	***71.89***	***69.39***	***66.89***
32	1-1/4	30.85	30.85	30.85	29.06	27.28	25.71	24.82	23.92	***41.84***	***41.84***	***41.84***	***39.42***	***36.99***	***34.87***	***33.66***	***32.44***	***69.48***	***69.48***	***69.48***	***65.45***	***61.42***	***57.90***	***55.89***	***53.87***
40	1-1/2	27.97	27.97	27.97	26.35	24.73	23.31	22.50	21.69	***41.00***	***41.00***	***41.00***	***38.62***	***36.24***	***34.16***	***32.98***	***31.79***	***62.18***	***62.18***	***62.18***	***58.57***	***54.97***	***51.82***	***50.01***	***48.21***
50	2	24.12	24.12	24.12	22.72	21.32	20.10	19.40	18.70	***40.08***	***40.08***	***40.08***	***37.76***	***35.43***	***33.40***	***32.24***	***31.08***	***52.81***	***52.81***	***52.81***	***49.75***	***46.69***	***44.01***	***42.48***	***40.95***
65	2-1/2	25.31	25.31	25.31	23.85	22.38	21.09	20.36	19.63	***35.59***	***35.59***	***35.59***	***33.52***	***31.46***	***29.66***	***28.62***	***27.59***	***55.74***	***55.74***	***55.74***	***52.51***	***49.28***	***46.45***	***44.84***	***43.22***
80	3	22.37	22.37	22.37	21.08	19.78	18.64	18.00	17.35	***33.95***	***33.95***	***33.95***	***31.98***	***30.01***	***28.29***	***27.31***	***26.32***	***48.70***	***48.70***	***48.70***	***45.88***	***43.05***	***40.58***	***39.17***	***37.76***
90	3-1/2	20.64	20.64	20.64	19.44	18.24	17.20	16.60	16.00																
100	4	19.35	19.35	19.35	18.23	17.11	16.12	15.56	15.00	***31.78***	***31.78***	***31.78***	***29.94***	***28.09***	***26.48***	***25.56***	***24.64***	***41.62***	***41.62***	***41.62***	***39.21***	***36.80***	***34.68***	***33.48***	***32.27***
125	5	17.30	17.30	17.30	16.30	15.30	14.42	13.92	13.42	***30.10***	***30.10***	***30.10***	***28.35***	***26.61***	***25.08***	***24.21***	***23.33***	***36.91***	***36.91***	***36.91***	***34.77***	***32.63***	***30.76***	***29.69***	***28.62***
150	6	16.69	16.69	16.69	15.72	14.75	13.91	13.42	12.94	***28.95***	***28.95***	***28.95***	***27.27***	***25.59***	***24.12***	***23.28***	***22.44***	***35.55***	***35.55***	***35.55***	***33.49***	***31.43***	***29.62***	***28.59***	***27.56***
200	8	14.74	14.74	14.74	13.89	13.03	12.28	11.86	11.43	***27.92***	***27.92***	***27.92***	***26.30***	***24.69***	***23.27***	***22.46***	***21.65***	***26.88***	***26.88***	***26.88***	***25.33***	***23.77***	***22.40***	***21.62***	***20.84***
250	10	11.70	11.70	11.70	11.02	10.34	9.75	9.41	9.07	***27.82***	***27.82***	***27.82***	***26.20***	***24.59***	***23.18***	***22.37***	***21.57***	***24.45***	***24.45***	***24.45***	***23.03***	***21.61***	***20.37***	***19.66***	***18.95***
300	12	9.80	9.80	9.80	9.23	8.66	8.17	7.88	7.60	***27.30***	***27.30***	***27.30***	***25.71***	***24.13***	***22.75***	***21.95***	***21.16***	***20.33***	***20.33***	***20.33***	***19.15***	***17.97***	***16.94***	***16.35***	***15.76***
350	14	8.90	8.90	8.90	8.38	7.87	7.41	7.16	6.90	***26.58***	***26.58***	***26.58***	***25.04***	***23.50***	***22.15***	***21.38***	***20.61***								
400	16	7.75	7.75	7.75	7.30	6.85	6.46	6.24	6.01	***26.35***	***26.35***	***26.35***	***24.83***	***23.30***	***21.96***	***21.20***	***20.43***								
450	18	6.87	6.87	6.87	6.47	6.08	5.73	5.53	5.33	***26.17***	***26.17***	***26.17***	***24.65***	***23.13***	***21.81***	***21.05***	***20.29***								
500	20	6.17	6.17	6.17	5.81	5.45	5.14	4.96	4.78	***26.01***	***26.01***	***26.01***	***24.50***	***22.99***	***21.67***	***20.92***	***20.17***								
550	22	***12.92***	***12.92***	***12.92***	***12.17***	***11.42***	***10.77***	***10.39***	***10.02***	***25.47***	***25.47***	***25.47***	***23.99***	***22.51***	***21.22***	***20.48***	***19.75***								
600	24	5.12	5.12	5.12	4.82	4.52	4.26	4.11	3.97	***25.77***	***25.77***	***25.77***	***24.27***	***22.78***	***21.47***	***20.73***	***19.98***								
750	30																								

FIGURES PRINTED IN THIS STYLE MEET THE DIMENSIONAL REQUIREMENTS OF BOTH ANSI/ASME B36.19M-2004 & B36.10M-2004

FIGURES PRINTED IN THIS STYLE & UNDERLINED DO NOT CONFORM DIMENSIONALLY WITH ANSI/ASME B36.10M-2004

FIGURES PRINTED IN THIS STYLE ONLY MEET THE DIMENSOINAL REQUIREMENTS OF ANSI/ASME B36.10M-2004

(1) Schedule 5S and 10S Wall Thicknesses do not permit threading in accordance with ANSI/ASME B1.20.1, ISO 7-1 or ISO 228-1

NOMINAL WORKING PRESSURES

Figures shown in this Table are the nominal working pressures for seamless stainless steel pipe under constant operating conditions; these include a typical factor of safety.

Nominal working pressures for welded pipe can be calculated by multipying the figure in the tables by the weld joint efficieny factor, typically 0.85.

The tables have been formulated by using the figures obtained by the Australian Pressure Piping Standard AS 4041. Detailed design calculations should be in accordance with the applicable design standard.

The information is provided as a guide, it is recommended that professional engineering advice be sought on all pressure-related design.

SEAMLESS PIPE NOMINAL WORKING PRESSURES (MPa) FOR GRADE 304L

NOMINAL BORE SIZE		SCHEDULE 5S (1) TEMPERATURE DEG C								SCHEDULE 10S (1) TEMPERATURE DEG C								SCHEDULE 40S TEMPERATURE DEG C							
mm	inch	50	100	150	200	250	300	350	400	50	100	150	200	250	300	350	400	50	100	150	200	250	300	350	400
6	1/8									27.08	27.08	27.08	25.66	24.25	23.07	22.13	21.66	39.62	39.62	39.62	37.55	35.49	33.76	32.38	31.70
8	1/4									27.09	27.09	27.09	25.67	24.26	23.08	22.14	21.67	38.39	38.39	38.39	36.39	34.39	32.72	31.38	30.71
10	3/8									21.20	21.20	21.20	20.10	18.99	18.07	17.33	16.96	30.83	30.83	30.83	29.22	27.61	26.27	25.20	24.66
15	1/2	16.72	16.72	16.72	15.85	14.97	14.25	13.66	13.37	21.82	21.82	21.82	20.68	19.55	18.60	17.84	17.46	29.53	29.53	29.53	27.99	26.45	25.16	24.13	23.62
20	3/4	13.14	13.14	13.14	12.46	11.77	11.20	10.74	10.51	17.08	17.08	17.08	16.19	15.30	14.55	13.96	13.66	23.87	23.87	23.87	22.63	21.38	20.34	19.51	19.10
25	1	10.39	10.39	10.39	9.84	9.30	8.85	8.49	8.31	17.99	17.99	17.99	17.05	16.11	15.33	14.71	14.39	22.34	22.34	22.34	21.17	20.01	19.04	18.26	17.87
32	1-1/4	8.14	8.14	8.14	7.72	7.29	6.94	6.65	6.51	14.01	14.01	14.01	13.28	12.55	11.94	11.45	11.21	18.33	18.33	18.33	17.37	16.41	15.62	14.98	14.66
40	1-1/2	7.08	7.08	7.08	6.71	6.34	6.03	5.79	5.66	12.15	12.15	12.15	11.51	10.88	10.35	9.93	9.72	16.42	16.42	16.42	15.57	14.71	14.00	13.42	13.14
50	2	5.64	5.64	5.64	5.34	5.05	4.80	4.61	4.51	9.63	9.63	9.63	9.12	8.62	8.20	7.87	7.70	13.83	13.83	13.83	13.11	12.39	11.78	11.30	11.06
65	2-1/2	5.96	5.96	5.96	5.65	5.34	5.08	4.87	4.77	8.72	8.72	8.72	8.27	7.81	7.43	7.13	6.98	15.16	15.16	15.16	14.37	13.58	12.92	12.39	12.13
80	3	4.87	4.87	4.87	4.62	4.36	4.15	3.98	3.90	7.11	7.11	7.11	6.74	6.37	6.06	5.81	5.69	13.13	13.13	13.13	12.45	11.76	11.19	10.73	10.51
90	3-1/2	4.25	4.25	4.25	4.03	3.81	3.62	3.47	3.40	6.20	6.20	6.20	5.88	5.55	5.28	5.07	4.96	11.96	11.96	11.96	11.33	10.71	10.19	9.77	9.56
100	4	3.77	3.77	3.77	3.57	3.38	3.21	3.08	3.02	5.49	5.49	5.49	5.21	4.92	4.68	4.49	4.39	11.11	11.11	11.11	10.53	9.95	9.46	9.08	8.88
125	5	4.01	4.01	4.01	3.80	3.59	3.42	3.28	3.21	4.94	4.94	4.94	4.68	4.43	4.21	4.04	3.95	9.72	9.72	9.72	9.21	8.70	8.28	7.94	7.77
150	6	3.36	3.36	3.36	3.18	3.01	2.86	2.74	2.68	4.13	4.13	4.13	3.92	3.70	3.52	3.38	3.31	8.82	8.82	8.82	8.36	7.90	7.52	7.21	7.06
200	8	2.57	2.57	2.57	2.43	2.30	2.19	2.10	2.05	3.50	3.50	3.50	3.32	3.14	2.98	2.86	2.80	7.76	7.76	7.76	7.36	6.95	6.61	6.34	6.21
250	10	2.53	2.53	2.53	2.40	2.26	2.15	2.07	2.02	3.12	3.12	3.12	2.96	2.80	2.66	2.55	2.50	7.04	7.04	7.04	6.67	6.30	5.99	5.75	5.63
300	12	2.48	2.48	2.48	2.35	2.22	2.11	2.03	1.98	2.87	2.87	2.87	2.72	2.57	2.44	2.34	2.29	6.07	6.07	6.07	5.76	5.44	5.17	4.96	4.86
350	14	2.26	2.26	2.26	2.14	2.02	1.92	1.84	1.81	2.73	2.73	2.73	2.59	2.45	2.33	2.23	2.18	5.52	5.52	5.52	5.23	4.94	4.70	4.51	4.41
400	16	2.09	2.09	2.09	1.98	1.87	1.78	1.71	1.67	2.39	2.39	2.39	2.26	2.14	2.03	1.95	1.91	4.81	4.81	4.81	4.56	4.31	4.10	3.93	3.85
450	18	1.86	1.86	1.86	1.76	1.66	1.58	1.52	1.48	2.12	2.12	2.12	2.01	1.90	1.81	1.73	1.69	4.27	4.27	4.27	4.05	3.82	3.64	3.49	3.41
500	20	1.90	1.90	1.90	1.80	1.71	1.62	1.56	1.52	2.21	2.21	2.21	2.10	1.98	1.88	1.81	1.77	3.83	3.83	3.83	3.63	3.43	3.27	3.13	3.07
550	22	1.73	1.73	1.73	1.64	1.55	1.47	1.41	1.38	2.01	2.01	2.01	1.90	1.80	1.71	1.64	1.60								
600	24	1.84	1.84	1.84	1.74	1.65	1.57	1.50	1.47	2.11	2.11	2.11	2.00	1.89	1.80	1.72	1.69	3.18	3.18	3.18	3.02	2.85	2.71	2.60	2.55
750	30	1.68	1.68	1.68	1.60	1.51	1.43	1.38	1.35	2.11	2.11	2.11	2.00	1.89	1.79	1.72	1.68								

FIGURES PRINTED IN THIS STYLE MEET THE DIMENSIONAL REQUIREMENTS OF BOTH ANSI/ASME B36.19M-2004 & B36.10M-2004

FIGURES PRINTED IN THIS STYLE & UNDERLINED DO NOT CONFORM DIMENSIONALLY WITH ANSI/ASME B36.10M-2004

FIGURES PRINTED IN THIS STYLE ONLY MEET THE DIMENSOINAL REQUIREMENTS OF ANSI/ASME B36.10M-2004

(1) Schedule 5S and 10S Wall Thicknesses do not permit threading in accordance with ANSI/ASME B1.20.1, ISO 7-1 or ISO 228-1

NOMINAL WORKING PRESSURES

Figures shown in this Table are the nominal working pressures for seamless stainless steel pipe under constant operating conditions; these include a typical factor of safety.

Nominal working pressures for welded pipe can be calculated by multipying the figure in the tables by the weld joint efficieny factor, typically 0.85.

The tables have been formulated by using the figures obtained by the Australian Pressure Piping Standard AS 4041. Detailed design calculations should be in accordance with the applicable design standard.

The information is provided as a guide, it is recommended that professional engineering advice be sought on all pressure-related design.

SEAMLESS PIPE NOMINAL WORKING PRESSURES (Mpa) FOR GRADE 304L

NOMINAL BORE SIZE		SCHEDULE 80S TEMPERATURE DEG C								SCHEDULE 160 TEMPERATURE DEG C								SCHEDULE XXS TEMPERATURE DEG C							
mm	inch	50	100	150	200	250	300	350	400	50	100	150	200	250	300	350	400	50	100	150	200	250	300	350	400
6	1/8	59.21	59.21	59.21	56.12	53.03	50.45	48.39	47.36																
8	1/4	54.96	54.96	54.96	52.09	49.22	46.83	44.92	43.97																
10	3/8	45.03	45.03	45.03	42.68	40.33	38.37	36.81	36.02																
15	1/2	41.61	41.61	41.61	39.44	37.27	35.46	34.01	33.29	***56.19***	***56.19***	***56.19***	***53.26***	***50.33***	***47.89***	***45.93***	***44.95***	***101.82***	***101.82***	***101.82***	***96.51***	***91.20***	***86.77***	***83.23***	***81.46***
20	3/4	33.80	33.80	33.80	32.03	30.27	28.80	27.63	27.04	***51.24***	***51.24***	***51.24***	***48.57***	***45.89***	***43.67***	***41.88***	***40.99***	***79.25***	***79.25***	***79.25***	***75.11***	***70.98***	***67.53***	***64.78***	***63.40***
25	1	31.12	31.12	31.12	29.50	27.87	26.52	25.44	24.90	***45.89***	***45.89***	***45.89***	***43.50***	***41.10***	***39.11***	***37.51***	***36.71***	***71.89***	***71.89***	***71.89***	***68.14***	***64.38***	***61.26***	***58.76***	***57.51***
32	1-1/4	25.71	25.71	25.71	24.37	23.03	21.91	21.01	20.57	***34.87***	***34.87***	***34.87***	***33.05***	***31.23***	***29.71***	***28.50***	***27.89***	***57.90***	***57.90***	***57.90***	***54.88***	***51.86***	***49.34***	***47.33***	***46.32***
40	1-1/2	23.31	23.31	23.31	22.09	20.87	19.86	19.05	18.64	***34.16***	***34.16***	***34.16***	***32.38***	***30.60***	***29.11***	***27.93***	***27.33***	***51.82***	***51.82***	***51.82***	***49.11***	***46.41***	***44.15***	***42.35***	***41.45***
50	2	20.10	20.10	20.10	19.05	18.00	17.13	16.43	16.08	***33.40***	***33.40***	***33.40***	***31.66***	***29.92***	***28.46***	***27.30***	***26.72***	***44.01***	***44.01***	***44.01***	***41.71***	***39.42***	***37.50***	***35.97***	***35.21***
65	2-1/2	21.09	21.09	21.09	19.99	18.89	17.97	17.24	16.87	***29.66***	***29.66***	***29.66***	***28.11***	***26.56***	***25.27***	***24.24***	***23.72***	***46.45***	***46.45***	***46.45***	***44.03***	***41.61***	***39.59***	***37.97***	***37.16***
80	3	18.64	18.64	18.64	17.67	16.70	15.89	15.24	14.91	***28.29***	***28.29***	***28.29***	***26.81***	***25.34***	***24.11***	***23.12***	***22.63***	***40.58***	***40.58***	***40.58***	***38.47***	***36.35***	***34.58***	***33.17***	***32.47***
90	3-1/2	17.20	17.20	17.20	16.30	15.40	14.65	14.06	13.76																
100	4	16.12	16.12	16.12	15.28	14.44	13.74	13.18	12.90	***26.48***	***26.48***	***26.48***	***25.10***	***23.72***	***22.57***	***21.65***	***21.18***	***34.68***	***34.68***	***34.68***	***32.87***	***31.07***	***29.56***	***28.35***	***27.75***
125	5	14.42	14.42	14.42	13.67	12.91	12.29	11.79	11.53	***25.08***	***25.08***	***25.08***	***23.77***	***22.46***	***21.37***	***20.50***	***20.06***	***30.76***	***30.76***	***30.76***	***29.15***	***27.55***	***26.21***	***25.14***	***24.60***
150	6	13.91	13.91	13.91	13.18	12.45	11.85	11.37	11.12	***24.12***	***24.12***	***24.12***	***22.86***	***21.60***	***20.55***	***19.71***	***19.30***	***29.62***	***29.62***	***29.62***	***28.08***	***26.53***	***25.24***	***24.21***	***23.70***
200	8	12.28	12.28	12.28	11.64	11.00	10.47	10.04	9.83	***23.27***	***23.27***	***23.27***	***22.05***	***20.84***	***19.83***	***19.02***	***18.61***	***22.40***	***22.40***	***22.40***	***21.23***	***20.07***	***19.09***	***18.31***	***17.92***
250	10	9.75	9.75	9.75	9.24	8.73	8.31	7.97	7.80	***23.18***	***23.18***	***23.18***	***21.97***	***20.76***	***19.75***	***18.95***	***18.54***	***20.37***	***20.37***	***20.37***	***19.31***	***18.24***	***17.36***	***16.65***	***16.30***
300	12	8.17	8.17	8.17	7.74	7.31	6.96	6.67	6.53	***22.75***	***22.75***	***22.75***	***21.56***	***20.37***	***19.38***	***18.59***	***18.20***	***16.94***	***16.94***	***16.94***	***16.06***	***15.17***	***14.43***	***13.85***	***13.55***
350	14	7.41	7.41	7.41	7.03	6.64	6.32	6.06	5.93	***22.15***	***22.15***	***22.15***	***21.00***	***19.84***	***18.88***	***18.11***	***17.72***								
400	16	6.46	6.46	6.46	6.12	5.79	5.51	5.28	5.17	***21.96***	***21.96***	***21.96***	***20.81***	***19.67***	***18.71***	***17.95***	***17.57***								
450	18	5.73	5.73	5.73	5.43	5.13	4.88	4.68	4.58	***21.81***	***21.81***	***21.81***	***20.67***	***19.53***	***18.58***	***17.82***	***17.44***								
500	20	5.14	5.14	5.14	4.87	4.60	4.38	4.20	4.11	***21.67***	***21.67***	***21.67***	***20.54***	***19.41***	***18.47***	***17.72***	***17.34***								
550	22	***10.77***	***10.77***	***10.77***	***10.20***	***9.64***	***9.17***	***8.80***	***8.61***	***21.22***	***21.22***	***21.22***	***20.11***	***19.01***	***18.08***	***17.35***	***16.98***								
600	24	4.26	4.26	4.26	4.04	3.82	3.63	3.48	3.41	***21.47***	***21.47***	***21.47***	***20.35***	***19.23***	***18.30***	***17.55***	***17.18***								
750	30																								

FIGURES PRINTED IN THIS STYLE MEET THE DIMENSIONAL REQUIREMENTS OF BOTH ANSI/ASME B36.19M-2004 & B36.10M-2004

FIGURES PRINTED IN THIS STYLE & UNDERLINED DO NOT CONFORM DIMENSIONALLY WITH ANSI/ASME B36.10M-2004

FIGURES PRINTED IN THIS STYLE ONLY MEET THE DIMENSOINAL REQUIREMENTS OF ANSI/ASME B36.10M-2004

(1) Schedule 5S and 10S Wall Thicknesses do not permit threading in accordance with ANSI/ASME B1.20.1, ISO 7-1 or ISO 228-1

PIPE DIMENSIONS & WEIGHTS

DIMENSIONS AND WEIGHTS OF SEAMLESS AND WELDED STAINLESS STEEL PIPE IN ACCORDANCE WITH ANSI/ASME B36.19M-2004 AND PIPE SUPPLIED DIMENSIONALLY IN ACCORDANCE WITH ASME B36.10M-2004

Nominal Bore Size		Outside Diameter	Schedule 5S (1)			Schedule 10S (1)			Schedule 40S			Schedule 80S			Schedule 160			Schedule XXS		
mm	inch		Wall Thickness	Inside Diameter	Theoretical Weight (kg/m)	Wall Thickness	Inside Diameter	Theoretical Weight (kg/m)	Wall Thickness	Inside Diameter	Theoretical Weight (kg/m)	Wall Thickness	Inside Diameter	Theoretical Weight (kg/m)	Wall Thickness	Inside Diameter	Theoretical Weight (kg/m)	Wall Thickness	Inside Diameter	Theoretical Weight (kg/m)
6	1/8	10.3				1.24	7.82	0.29	1.73	6.84	0.38	2.41	5.48	0.48						
8	1/4	13.7				1.65	10.40	0.50	2.24	9.22	0.65	3.02	7.66	0.82						
10	3/8	17.1				1.65	13.80	0.65	2.31	12.48	0.86	3.20	10.70	1.12						
15	1/2	21.3	1.65	18.00	0.82	2.11	17.08	1.02	2.77	15.76	1.30	3.73	13.84	1.65	***4.78***	***11.74***	***1.99***	***7.47***	***6.36***	***2.60***
20	3/4	26.7	1.65	23.40	1.04	2.11	22.48	1.31	2.87	20.96	1.72	3.91	18.88	2.25	***5.56***	***15.58***	***2.96***	***7.82***	***11.06***	***3.72***
25	1	33.4	1.65	30.10	1.32	2.77	27.86	2.14	3.38	26.64	2.56	4.55	24.30	3.31	***6.35***	***20.70***	***4.32***	***9.09***	***15.22***	***5.56***
32	1-1/4	42.2	1.65	38.90	1.69	2.77	36.66	2.75	3.56	35.08	3.46	4.85	32.50	4.56	***6.35***	***29.50***	***5.73***	***9.70***	***22.80***	***7.93***
40	1-1/2	48.3	1.65	45.00	1.94	2.77	42.76	3.18	3.68	40.94	4.13	5.08	38.14	5.52	***7.14***	***34.02***	***7.39***	***10.15***	***28.00***	***9.74***
50	2	60.3	1.65	57.00	2.44	2.77	54.76	4.01	3.91	52.48	5.55	5.54	49.22	7.63	***8.74***	***42.82***	***11.33***	***11.07***	***38.16***	***13.71***
65	2-1/2	73.0	2.11	68.78	3.77	3.05	66.90	5.37	5.16	62.68	8.81	7.01	58.98	11.63	***9.53***	***53.94***	***15.21***	***14.02***	***44.96***	***20.79***
80	3	88.9	2.11	84.68	4.61	3.05	82.80	6.59	5.49	77.92	11.52	7.62	73.66	15.58	***11.13***	***66.64***	***21.77***	***15.24***	***58.42***	***28.23***
90	3-1/2	101.6	2.11	97.38	5.28	3.05	95.50	7.56	5.74	90.12	13.84	8.08	85.44	19.00						
100	4	114.3	2.11	110.08	5.96	3.05	108.20	8.54	6.02	102.26	16.39	8.56	97.18	22.76	***13.49***	***87.32***	***34.19***	***17.12***	***80.06***	***41.83***
125	5	141.3	2.77	135.76	9.65	3.40	134.50	11.79	6.55	128.20	22.19	9.53	122.24	31.58	***15.88***	***109.54***	***50.08***	***19.05***	***103.20***	***58.55***
150	6	168.3	2.77	162.76	11.53	3.40	161.50	14.10	7.11	154.08	28.82	10.97	146.36	43.39	***18.26***	***131.78***	***68.88***	***21.95***	***124.40***	***80.76***
200	8	219.1	2.77	213.56	15.07	3.76	211.58	20.36	8.18	202.74	43.38	12.70	193.70	65.90	***23.01***	***173.08***	***113.44***	***22.23***	***174.64***	***110.03***
250	10	273.1	3.40	266.30	23.06	4.19	264.72	28.33	9.27	254.56	61.49	12.70	247.70	83.14	***28.58***	***215.94***	***175.69***	***25.40***	***222.30***	***158.18***
300	12	323.9	3.96	315.98	31.86	4.57	314.76	36.69	9.53	304.84	75.32	12.70	298.50	99.36	***33.32***	***257.26***	***243.41***	***25.40***	***273.10***	***190.61***
350	14	355.6	3.96	347.68	35.01	4.78	346.04	42.16	9.53	336.54	82.92	12.70	330.20	109.49	***35.71***	***284.18***	***287.19***			
400	16	406.4	4.19	398.02	42.37	4.78	396.84	48.27	9.53	387.34	95.09	12.70	381.00	125.70	***40.49***	***325.42***	***372.47***			
450	18	457.0	4.19	448.62	47.70	4.78	447.44	54.35	9.53	437.94	107.21	12.70	431.60	141.86	***45.24***	***366.52***	***468.31***			
500	20	508.0	4.78	498.44	60.48	5.54	496.92	69.99	9.53	488.94	119.43	12.70	482.60	158.14	***50.01***	***407.98***	***575.81***			
550	22	559.0	4.78	549.44	66.61	5.54	547.92	77.09				***28.58***	***501.84***	***381.11***	***53.98***	***451.04***	***685.35***			
600	24	610.0	5.54	598.92	84.19	6.35	597.30	96.37	9.53	590.94	143.87	12.70	584.60	190.71	***59.54***	***490.92***	***823.95***			
750	30	762.0	6.35	749.30	120.64	7.92	746.16	150.15												

ALL DIMENSIONS IN MILLIMETRES

FIGURES PRINTED IS THIS STYLE MEET THE DIMENSOINAL REQUIREMENTS OF BOTH ANSI/ASME B36.19M-2004 & ASME B36.10M-2004

FIGURES PRINTED IN THIS STYLE & UNDERLINED DO NOT CONFORM DIMENSIONALLY WITH ASME B36.10M-2004

FIGURES PRINTED IN THIS STYLE ONLY MEET THE DIMENSOINAL REQUIREMENTS OF ASME B36.10M-2004.

(1) Schedules 5S and 10S wall thicknesses do not permit threading in accordance with ANSI/ASME B1.20.1, AS ISO 7-1 or ISO 228-1

Mass is given in kilograms per metre and is for 316 Stainless Steel pipe with plain ends. The different grades of Stainless Steel permit considerable variation in mass

Other Austenitic Stainless Steels may be between 1%-2.6% less in mass, and the Ferritic Stainless Steels about 3%-4% less than the mass values as shown in the table

For details of dimensional tolerances, refer to the applicable standards such as ASTM A312/312M. This table is a guide only and should not be used to determine availability of product

THEORETICAL WORKING PRESSURE FOR SEAMLESS TUBE TP316/316L

316 (Seamless) -253 to 38°C

			Wall Thickness						
Size		Inch	0.028	0.036	0.048	0.064	0.083	0.109	0.128
mm	Inch	mm	0.71	0.91	1.22	1.63	2.11	2.77	3.25
3.18	1/8"	psi	8,579	12,083	19,185				
		kPa	59,110	83,254	132,188				
4.76	3/16"	psi	5,883	7,153	10,389				
		kPa	40,534	49,282	71,581				
6.35	1/4"	psi	4,311	5,682	7,199	10,464	15,363		
		kPa	29,700	39,150	49,603	72,097	105,848		
7.94	5/16"	psi	3,401	4,460	6,129	7,836	11,060		
		kPa	23,436	30,730	42,229	53,990	76,205		
9.53	3/8"	psi		3,671	5,017	6,274	8,679		
		kPa		25,290	34,566	43,230	59,797		
12.7	1/2"	psi		2,711	3,681	5,031	6,726	8,539	
		kPa		18,678	25,362	34,667	46,343	58,834	
15.88	5/8"	psi		2,149	2,907	3,953	5,249	6,474	
		kPa		14,806	20,029	27,233	36,166	44,604	
19.05	3/4"	psi		1,780	2,402	3,255	4,304	5,809	***5,887***
		kPa		12,264	16,549	22,424	29,654	40,023	***40,562***
25.4	1"	psi			1,781	2,403	3,161	4,235	***4,741***
		kPa			12,269	16,555	21,780	29,181	***32,665***
31.75	1-1/4"	psi				***1,906***	***2,500***	***3,335***	***3,726***
		kPa				***13,131***	***17,224***	***22,980***	***25,673***
38.1	1-1/2"	psi				***1,574***	***2,060***	***2,741***	***3,058***
		kPa				***10,844***	***14,196***	***18,886***	***21,072***
50.8	2"	psi				***1,173***	***1,532***	***2,032***	***2,263***
		kPa				***8,083***	***10,556***	***13,997***	***15,593***

TUBE WORKING PRESSURE NOTES:

Tube working pressures have been calculated in accordance with ASME B31.3
Where Thickness < Diameter/6, the formula 304.1.2 3a has been used. Where Thickness ≥ Diameter/6, the formula K304.1.2 35c has been used.

For TP316
- S = 20,000 psi
- Y = 0.4
- W = 1
- E = 1
- c0 has been neglected

Tube Outside Diameter and Wall Thickness Tolerances have been considered when calculating the working pressures.

Numbers in standard text have been calculated based on ASTM A269/213 tolerances.

Numbers in bold italic text have been calculated based on ASTM A269 tolerances.

The Allowable Working Pressures calculated are a guide only. As there are variables that will alter the Allowable Working Pressure of the tube, it is the ultimate responsibility of the customer to verify that the tube is suitable for the application.

This table does not advise suitability for use with compression fittings. The purchaser must refer to the compression fitting manufacturers' tubing data charts for size and wall thickness suitability.

Flanges

A flange is designed to connect sections of pipe or tube, or to join the pipe or tube to an assembly such as a pressure vessel, valve or pump. Flanges are joined by bolting, and sealing is completed with the use of gaskets and other sealing methods, and fixed to the piping system by welding or threading.

A comprehensive range of Table D and E flanges to AS 2129, and forged flanges to ASME standards in ratings of class, are stocked by Prochem throughout Australia in sizes DN 15 (NPS 1/2") though to DN 400 (NPS 16").

Larger sizes to DN 1500 (NPS 60") and ratings to Class 2500 are also available through our worldwide network of quality approved mills and stockists.

Standard stocks include 304L and 316L stainless steels, with many other materials available on request including Cr-Mo, low temperature alloys, nickel based alloys and duplex grades. All flanges can be supplied complete with material certificates in strict accordance with the applicable standards, under the control of Prochem's ISO 9001:2008 quality assurance program.

FLANGE FACINGS

The most common types of flange facings are:-

- Flat Face (commonly used on AS 2129 Flanges) and
- Raised Face (commonly used on ASME Flanges)

Other facings include:-

- Ring-Joint (RTJ)
- Tongue and Groove
- Male and Female (Spigot and Recess)
- O-Ring Groove (O-Ring Spigot and O-Ring Groove)

MANUFACTURING STANDARDS

In Australia, flanges are commonly manufactured to the following standards:

1. AS 2129 – Flanges for Pipes, Valves and Fittings

They are commonly known as “Table” flanges, (e.g. Table D) and are usually made from plate or forgings, hence the pipe bore and tube bore slip-on or blind are the most common forms.

The standard covers nominal sizes DN 15 (NPS 1/2") to DN 3000 (NPS 120") in Table D, and DN 1200 (NPS 48") in Table E, but flanges up to DN 400 (NPS 16") are normally available off the shelf, in 304(L) or 316(L) grades. The F and Table H flanges are also reasonably popular and a range is carried off the shelf. The other rating classes of Table A, J, K, R, S and T are less common usage than Table D or E.

2. AS 4087 – Metallic Flanges for Waterworks Purposes

Formerly included in AS 2129, this standard covers nominal sizes of DN 15 (NPS 1/2") to DN 1200 (NPS 48") in various materials and pressure ratings designated by their allowable operating pressure (AOP) – PN Rating – but the nominal size range is limited to DN 50 (NPS 2") to DN 1200 (NPS 48") with pressure ratings of PN 16, PN 21 and PN 35 for stainless steel grades of material. These flanges are generally stocked in sizes DN 50 (NPS 2") to DN 600 (NPS 24") with a PN 16 pressure rating. The other sizes and pressure ratings are available with a lead time.

3. ASME B16.5 - Pipe Flanges and Fittings

These are commonly referred to by their pressure rating class, (e.g. ANSI 150 or 150lb). This standard specifies that for the standard 304(L) and 316(L) grades, the flanges must be forged, (except for blind flanges which can be made from plate).

The most commonly stocked flanges are slip-on, weld neck and blind. (Note that the slip-on flange has a hub similar to the lap joint flange and they should not be misinterpreted).

The standard covers sizes up to DN 15 (NPS 1/2") to DN 600 (NPS 24"), in Class ratings of 150, 300, 400, 600, 900, 1500 and 2500.

4. ASME B16.47 - Large Diameter Steel Flanges

This standard covers the size range of DN 650 (NPS 26") to DN 1500 (NPS 60"). In Series A, Class ratings of 150, 300, 400, 600 and 900 are covered. In Series B, Class ratings of 150, 300, 400, 600 and 900 are covered. These flanges are not commonly stocked, but are available on a lead time.

5. ASME B16.36 - Orifice Flanges

This standard covers DN 25 (NPS 1") to DN 600 (NPS 24") in Class ratings of 300, 400, 600, 900, 1500 and 2500. These flanges are not commonly stocked, but are available on a lead time.

6. ASME B16.48 – Line Blanks

The standard covers a range of line blanks in nominal sizes DN 15 (NPS 1/2") to DN 600 (NPS 24") for installation between ASME B16.5 flanges in Class ratings of 150, 300, 600, 900, 1500 and 2500 and replaces the API 590 Standard. The facing finishes are in accordance with ASME B16.5 and are listed as raised face, male ring-joint and female ring-joint.

The Line Blanks come in different configurations and they are defined as:-

Figure-8 Blank - A figure-8 blank (also known as a spectacle blank or blind) is a pressure retaining plate with one solid end and the other end is open. The two ends are connected with a web or tie bar.

Paddle Blank - A paddle blank (also known as a spade blind) is similar to the solid end of a figure-8 blank. It has a plain radial handle and it is generally used in conjunction with a paddle spacer in larger sizes.

Paddle Spacer - A paddle spacer (also known as a ring spacer) is similar to the open end of a figue-8 blank. It has a plain radial handle and it is generally used in conjunction with a paddle blank in larger sizes.

7. EN 1092-1 Flanges and their Joints – Circular Flanges for Pipes, Valves, Fittings and Accessories, PN Designated – Part 1: Steel Flanges

The flanges listed in this standard have been derived from various other standards around the world. This standard encompasses flanges that were listed in BS 4504-3.1 and ISO 7005-1 and the opportunity was taken to revise some of the technical requirements applicable to DIN origin flanges.

The standard covers nominal sizes DN 10 (NPS 3/8") to DN 4000 (NPS 160") with pressure designations PN 2.5 to PN 400. These flanges are generally stocked in sizes DN 25 (NPS 1") to DN 300 (NPS 12") with a pressure designation of PN 16 in pipe bore and tube bore slip-on, along with blind flanges.

Other standards in less common use or that may appear on old specifications include:

BS 1560 Section 3.1 – Circular Flanges for Pipes, Valves and Fittings (class designated). This has been now superseded by EN 1759-1.

BS 4504-3.1 – Circular flanges for pipes, valves and fittings (PN designated). Steel, cast iron and copper alloy flanges. Specification for steel flanges. This standard has been now superseded by EN 1092-1.

EN 1759-1 – Flanges and their Joints. Circular Flanges for Pipes, Valves, Fittings and Accessories, class-designated. Steel Flanges, NPS 1/2 to 24.

ISO 7005-1 – Pipe Flanges – Part 1: Steel Flanges for Industrial and General Service Piping Systems

DIN – There are a range of DIN standards which cover flanges and these include but are not limited to the DIN 2500 and DIN 2600 series of standards. The DIN 2500 and DIN 2600 series of standards have been replaced by EN 1092-1.

Table Flanges

Raised Face Weld Neck Flanges

Threaded Flanges

Raised Face Slip-On (left)
and Socketweld Flanges

Raised Face Blind Flanges

Blind Plate Flanges

TYPES AND APPLICATIONS

Slip-On Weld Flange – The flange is slipped over the pipe or tube and welded (usually both inside and outside) to provide strength and to prevent leaks. These flanges are at the low cost end of the scale, and do not require high accuracy when cutting the pipe or tube to length. They can sometimes have a boss or hub, and can be made with a bore to suit pipe or tube.

Weld Neck Flange – This flange is designed to be joined to a piping system by butt welding. It is relatively expensive because of its long neck, but is preferred for high stress applications. The neck transmits stresses to the pipe, reducing stress concentrations at the base of the flange. The gradual transition of thickness from the base to the neck to the wall thickness at the butt weld provides important reinforcement of the flange. The bore of the flange matches the bore of the pipe, reducing turbulence and erosion.

Threaded Flange – This is similar to the slip-on flange in outline, but the bore is threaded, thus enabling assembly without welding. This obviously limits its application to relatively low pressure piping systems. The flange may be welded around the joint after assembly, but this is not considered a satisfactory method of increasing its use in pressure applications.

Socketweld Flange – This is similar to a slip-on flange in outline, but the bore is counter-bored to accept the pipe. The diameter of the remaining bore is the same as the inside diameter of the pipe. The flange is attached to the pipe by a fillet weld around the hub of the flange. An optional internal weld may be applied in high stress applications. Its biggest use is in high pressure systems such as hydraulic and steam lines.

Lap Joint Flange – This is again similar to a slip-on flange, but it has a radius at the intersection of the bore and the flange face, and no raised face, to accommodate a lap joint stub end. The face of the stub end forms the gasket face of the flange. This type of flange is used in applications where sections of the piping system need to be dismantled quickly and easily for inspection or replacement, because the stub end is welded to the pipe, not the flange. As the flange is not welded to the pipe, this allows for easy alignment to the mating flange.

Blind Flange – This is a flange without a bore and is used to shut off a piping system or vessel opening. It also permits easy access to vessels or piping systems for inspection purposes.

Loose Flange – This is usually used with a pressed collar, where the flange is placed behind the collar before the collar is welded to the pipe or tube. The flange is not welded, and thus allows for easy alignment. As the flange is not in direct contact with the liquid, alternative materials can be used for the flange.

Lap Joint

Flanged Buttweld Outlets and Flanged Buttweld Nipple Outlets

Forged Flanges Class 150 – Class 2500

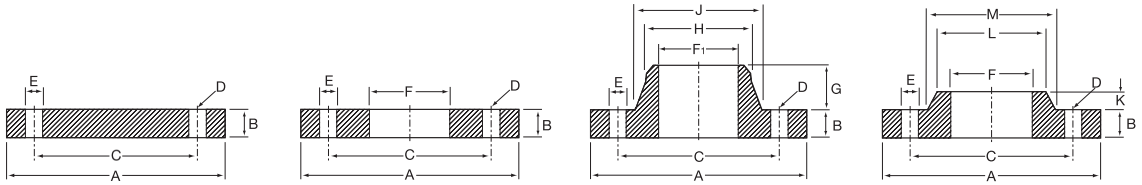
Spectacle Blind

AS 2129 TABLE FLANGES TABLE D

Size				Bolting Details				Bolting Details		Welding Neck			Boss Details		
DN mm	Nominal Pipe Size inch	Outside Diameter of Flange A	Forged or Plate; Thickness of Flange Min. B	Pitch Circle Diameter C	Number of Holes D	Diameter of Holes E	Diameter of Bolts Metric	Slip-On or Bossed F	Welding Neck F1	Total Length of Neck G	Diameter at Small End of Neck H	Diameter at Large End of Neck J	Length of Boss Details K	Diameter of Boss at Small End Min. L	Diameter at Root of Boss Max. M
15	1/2	95	5*	67	4	14	M12	BORE OF FLANGES TO SUIT EITHER PIPE OR TUBE OD – REFER PIPE & TUBE DIMENSIONS ON PAGES 36 & 37	BORE TO SUIT PIPE SCHEDULE – TO BE SPECIFIED BY THE PURCHASER	22	22	27	10	33	38
20	3/4	100	5*	73	4	14	M12			22	27	33	11	38	44
25	1	115	5*	83	4	14	M12			22	34	43	11	48	52
32	1-1/4	120	6*	87	4	14	M12			25	43	49	11	56	58
40	1-1/2	135	6*	98	4	14	M12			29	49	59	13	62	70
50	2	150	8*	114	4	18	M16			29	61	70	13	75	79
65	2-1/2	165	8*	127	4	18	M16			32	76	83	16	90	93
80	3	185	10*	146	4	18	M16			35	89	102	16	106	112
100	4	215	10*	178	4	18	M16			41	115	130	19	133	140
125	5	255	13	210	8	18	M16			44	142	152	19	160	171
150	6	280	13	235	8	18	M16			48	169	184	19	186	197
200	8	335	13	292	8	18	M16			51	220	241	22	241	254
250	10	405	16	356	8	22	M20			64	274	292	27	298	310
300	12	455	19	406	12	26	M24			70	324	343	29	349	360
350	14	525	22	470	12	26	M24			73	356	387	-	-	-
400	16	580	22	521	12	26	M24			-	-	-	-	-	-
450	18	640	25	584	12	26	M24			-	-	-	-	-	-
500	20	705	29	641	16	26	M24			-	-	-	-	-	-
600	24	825	32	756	16	30	M27			-	-	-	-	-	-

**Flanges less than 12 mm thickness may suffer unacceptable distortion after welding to pipe.*

Size		Approximate piece weight in Kilograms		
DN mm	NPS inch	Blind	Pipe Slip-On	Tube Slip-On
15	1/2	0.26	0.24	0.25
20	3/4	0.29	0.27	0.28
25	1	0.39	0.36	0.37
32	1-1/4	0.51	0.45	0.48
40	1-1/2	0.66	0.57	0.60
50	2	1.1	0.88	0.94
65	2-1/2	1.3	1.0	1.1
80	3	2.1	1.6	1.7
100	4	2.8	2.0	2.2
125	5	5.1	3.5	3.8
150	6	6.2	3.9	4.3
200	8	9.0	5.0	5.6
250	10	16.1	8.6	9.6
300	12	24.0	11.5	12.9
350	14	37.0	19.5	19.5
400	16	45.4	22.5	22.5
450	18	63.1	30.3	30.2
500	20	88.6	41.6	41.6
600	24	134.0	59.1	59.2



Notes:

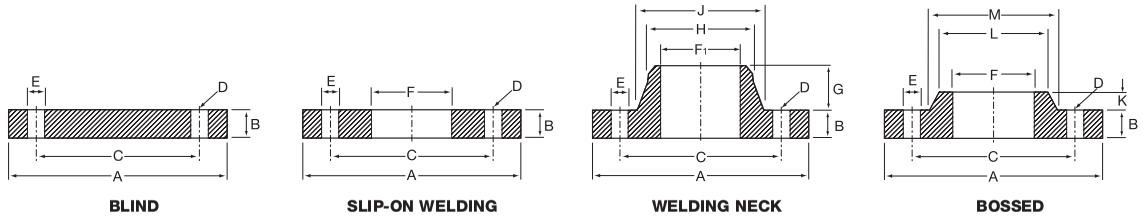
1. All dimensions are in millimetres.
2. Only the Flat Face variant of each type of flange has been illustrated as they are the most commonly available. Other variants available are Raised Face, Flat with O-Ring Groove or Spot-Faced and other flange facing types may change the “B” dimension, please contact your local Prochem office for more information.
3. For Threaded Flanges a Boss Flange is used to accommodate the thread. The Thread Form and Thread Type are not specified in the Standard, please contact your local Prochem office for more information.
4. All weights are appoximates only.

AS 2129 TABLE FLANGES TABLE E

Size				Bolting Details				Bolting Details		Welding Neck			Boss Details		
DN mm	Nominal Pipe Size inch	Outside Diameter of Flange A	Forged or Plate; Thickness of Flange Min. B	Pitch Circle Diameter C	Number of Holes D	Diameter of Holes E	Diameter of Bolts Metric	Slip-On or Bossed F	Welding Neck F1	Total Length of Neck G	Diameter at Small End of Neck H	Diameter at Large End of Neck J	Length of Boss Details K	Diameter of Boss at Small End Min. L	Diameter at Root of Boss Max. M
15	1/2	95	6*	67	4	14	M12	BORE OF FLANGES TO SUIT EITHER PIPE OR TUBE OD – REFER PIPE & TUBE DIMENSIONS ON PAGES 36 & 37	TO BE SPECIFIED BY THE PURCHASER	22	22	27	10	33	38
20	3/4	100	6*	73	4	14	M12			22	27	33	11	38	44
25	1	115	7*	83	4	14	M12			22	34	43	11	48	52
32	1-1/4	120	8*	87	4	14	M12			25	43	49	11	56	58
40	1-1/2	135	9*	98	4	14	M12			29	49	59	13	62	70
50	2	150	10*	114	4	18	M16			29	61	70	13	75	79
65	2-1/2	165	10*	127	4	18	M16			32	76	83	16	90	93
80	3	185	11*	146	4	18	M16			35	89	102	16	106	112
100	4	215	13	178	8	18	M16			41	102	130	19	133	140
125	5	255	14	210	8	18	M16			44	142	152	19	160	171
150	6	280	17	235	8	22	M20			48	169	184	19	186	191
200	8	335	19	292	8	22	M20			51	220	241	22	241	249
250	10	405	22	356	12	22	M20			64	274	292	27	298	310
300	12	455	25	406	12	26	M24			70	324	343	29	349	354
350	14	525	29	470	12	26	M24			73	356	387	-	-	-
400	16	580	32	521	12	26	M24			-	-	-	-	-	-
450	18	640	35	584	16	26	M24			-	-	-	-	-	-
500	20	705	38	641	16	26	M24			-	-	-	-	-	-
600	24	8025	48	756	16	33	M30			-	-	-	-	-	-

**Flanges less than 12 mm thickness may suffer unacceptable distortion after welding to pipe.*

Size		Approximate piece weight in Kilograms		
DN mm	NPS inch	Blind	Pipe Slip-On	Tube Slip-On
15	1/2	0.31	0.29	0.30
20	3/4	0.35	0.32	0.33
25	1	0.55	0.50	0.52
32	1-1/4	0.68	0.59	0.63
40	1-1/2	0.99	0.85	0.90
50	2	1.3	1.1	1.2
65	2-1/2	1.6	1.3	1.4
80	3	2.3	1.7	1.9
100	4	3.6	2.5	2.7
125	5	5.5	3.7	4.1
150	6	8.0	4.9	5.5
200	8	12.9	7.2	8.0
250	10	21.9	11.6	13.0
300	12	31.2	14.8	16.7
350	14	48.7	25.7	25.7
400	16	66.0	32.8	32.8
450	18	87.7	41.8	41.7
500	20	116.1	54.5	54.5
600	24	200.0	87.8	87.9



Notes:

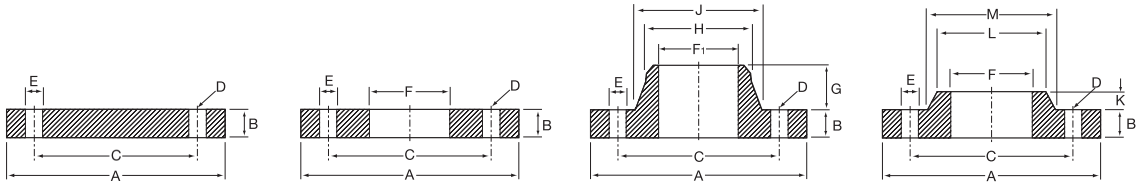
1. All dimensions are in millimetres.
2. Only the Flat Face variant of each type of flange has been illustrated as they are the most commonly available. Other variants available are Raised Face, Flat with O-Ring Groove or Spot-Faced and other flange facing types may change the “B” dimension, please contact your local Prochem office for more information.
3. For Threaded Flanges a Boss Flange is used to accommodate the thread. The Thread Form and Thread Type are not specified in the Standard, please contact your local Prochem office for more information.
4. All weights are appoximates only.

AS 2129 TABLE FLANGES TABLE F

Size				Bolting Details				Bolting Details		Welding Neck			Boss Details		
DN mm	Nominal Pipe Size inch	Outside Diameter of Flange A	Forged or Plate; Thickness of Flange Min. B	Pitch Circle Diameter C	Number of Holes D	Diameter of Holes E	Diameter of Bolts Metric	Slip-On or Bossed F	Welding Neck F1	Total Length of Neck G	Diameter at Small End of Neck H	Diameter at Large End of Neck J	Length of Boss Details K	Diameter of Boss at Small End Min. L	Diameter at Root of Boss Max. M
15	1/2	95	10*	67	4	14	M12	BORE OF FLANGES TO SUIT EITHER PIPE OR TUBE OD – REFER PIPE & TUBE DIMENSIONS ON PAGES 36 & 37	TO BE SPECIFIED BY THE PURCHASER	22	22	27	10	33	38
20	3/4	100	10*	73	4	14	M12			22	27	33	11	38	44
25	1	120	10*	87	4	18	M16			29	34	43	11	48	52
32	1-1/4	135	13	98	4	18	M16			35	43	52	11	56	64
40	1-1/2	140	13	105	4	18	M16			35	49	59	13	62	70
50	2	165	16	127	4	18	M16			35	61	70	13	75	93
65	2-1/2	185	16	146	8	18	M16			38	76	86	16	90	112
80	3	205	16	165	8	18	M16			44	89	102	16	106	130
100	4	230	19	191	8	18	M16			51	115	130	19	133	152
125	5	280	22	235	8	22	M20			57	142	159	19	160	191
150	6	305	22	260	12	22	M20			57	169	184	19	186	216
200	8	370	25	324	12	22	M20			67	220	241	22	241	279
250	10	430	29	381	12	26	M24			73	274	298	27	298	329
300	12	490	32	438	16	26	M24			79	324	352	29	349	386
350	14	550	35	495	16	30	M27			86	356	387	-	-	-
400	16	610	41	552	20	30	M27			-	-	-	-	-	-
450	18	675	44	610	20	33	M30			-	-	-	-	-	-
500	20	735	51	673	24	33	M30			-	-	-	-	-	-
600	24	850	57	781	24	36	M30			-	-	-	-	-	-

**Flanges less than 12 mm thickness may suffer unacceptable distortion after welding to pipe.*

Size		Approximate piece weight in Kilograms		
DN mm	NPS inch	Blind	Pipe Slip-On	Tube Slip-On
15	1/2	0.52	0.49	0.51
20	3/4	0.58	0.53	0.56
25	1	0.82	0.75	0.78
32	1-1/4	1.4	1.2	1.3
40	1-1/2	1.5	1.3	1.4
50	2	2.6	2.2	2.3
65	2-1/2	3.2	2.6	2.8
80	3	4.0	3.2	3.4
100	4	6.0	4.4	4.8
125	5	10.3	7.5	8.1
150	6	12.1	8.1	8.8
200	8	20.6	13.1	14.1
250	10	32.2	18.6	20.5
300	12	46.1	25.0	27.4
350	14	63.4	35.5	35.5
400	16	91.2	48.7	48.7
450	18	119.9	62.2	62.2
500	20	164.7	82.0	82.0
600	24	247.6	114.4	114.5



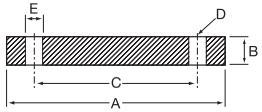
Notes:

1. All dimensions are in millimetres.
2. Only the Flat Face variant of each type of flange has been illustrated as they are the most commonly available. Other variants available are Raised Face, Flat with O-Ring Groove or Spot-Faced and other flange facing types may change the “B” dimension, please contact your local Prochem office for more information.
3. For Threaded Flanges a Boss Flange is used to accommodate the thread. The Thread Form and Thread Type are not specified in the Standard, please contact your local Prochem office for more information.
4. All weights are appoximates only.

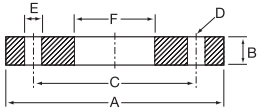
AS 2129 TABLE FLANGES TABLE H

Size				Bolting Details				Bolting Details		Welding Neck			Boss Details		
DN (metric)	Nominal Pipe Size (inch)	Outside Diameter of Flange A	Forged or Plate; Thickness of Flange Min. B	Pitch Circle Diameter C	Number of Holes D	Diameter of Holes E	Diameter of Bolts Metric	Slip-On or Bossed F	Welding Neck F1	Total Length of Neck G	Diameter at Small End of Neck H	Diameter at Large End of Neck J	Length of Boss Details K	Diameter of Boss at Small End Min. L	Diameter at Root of Boss Max. M
15	1/2	115	13	83	4	18	M16	BORE OF FLANGES TO SUIT EITHER PIPE OR TUBE OD – REFER PIPE & TUBE DIMENSIONS ON PAGES 36 & 37	TO BE SPECIFIED BY THE PURCHASER	29	22	30	10	33	48
20	3/4	115	13	83	4	18	M16			29	27	35	11	38	48
25	1	120	14	87	4	18	M16			29	34	43	11	48	52
32	1-1/4	135	17	98	4	18	M16			35	43	52	11	56	64
40	1-1/2	140	17	105	4	18	M16			35	49	59	13	62	70
50	2	165	19	127	4	18	M16			35	61	70	13	75	93
65	2-1/2	185	19	146	8	18	M16			38	76	86	16	90	112
80	3	205	22	165	8	18	M16			44	89	102	16	106	130
100	4	230	25	191	8	18	M16			51	115	130	19	133	152
125	5	280	29	235	8	22	M20			57	142	159	19	160	191
150	6	305	29	260	12	22	M20			57	169	184	19	186	216
200	8	370	32	324	12	22	M20			67	220	241	22	241	279
250	10	430	35	381	12	26	M24			73	274	298	27	298	329
300	12	490	41	438	16	26	M24			79	324	352	29	349	386
350	14	550	48	495	16	30	M27			86	356	387	-	-	-
400	16	610	54	552	20	30	M27			-	-	-	-	-	-
450	18	675	60	610	20	33	M30			-	-	-	-	-	-
500	20	735	67	673	24	33	M30			-	-	-	-	-	-
600	24	850	76	781	24	36	M33			-	-	-	-	-	-

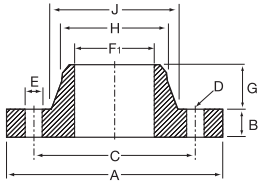
Size		Approximate piece weight in Kilograms		
DN mm	NPS inch	Blind	Pipe Slip-On	Tube Slip-On
15	1/2	0.97	0.94	0.96
20	3/4	0.97	0.92	0.94
25	1	1.2	1.1	1.1
32	1-1/4	1.8	1.6	1.7
40	1-1/2	2.0	1.7	1.8
50	2	3.1	2.7	2.8
65	2-1/2	3.8	3.1	3.3
80	3	5.5	4.4	4.6
100	4	7.9	5.9	6.3
125	5	13.6	9.9	10.6
150	6	15.9	10.7	11.7
200	8	26.4	16.7	18.1
250	10	38.9	22.5	24.7
300	12	59.1	32.0	35.1
350	14	86.9	48.8	48.8
400	16	120.1	64.1	64.1
450	18	163.6	84.8	84.8
500	20	216.4	107.8	107.8
600	24	330.2	152.5	152.7



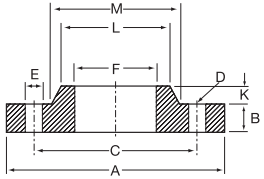
BLIND



SLIP-ON WELDING



WELDING NECK



BOSSED

Notes:

1. All dimensions are in millimetres.
2. Only the Flat Face variant of each type of flange has been illustrated as they are the most commonly available. Other variants available are Raised Face, Flat with O-Ring Groove or Spot-Faced and other flange facing types may change the “B” dimension, please contact your local Prochem office for more information.
3. For Threaded Flanges a Boss Flange is used to accommodate the thread. The Thread Form and Thread Type are not specified in the Standard, please contact your local Prochem office for more information.
4. All weights are appoximates only.

TEMPERATURE/PRESSURE RATINGS FOR STAINLESS STEEL TABLE FLANGES

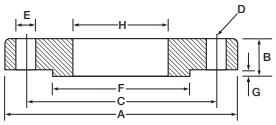
Temperature = °C and Pressure = kPa

	TABLE D		TABLE E		TABLE F		TABLE H	
Temperature	**316, 304**	**316L, 304L**	**316, 304**	**316L, 304L**	**316, 304**	**316L, 304L**	**316, 304**	**316L, 304L**
-200 to 50	700	700	1400	1400	2100	2100	3500	3500
100	700	700	1400	1400	2100	2100	3500	3500
150	700	650	1400	1300	2100	1900	3500	3200
200	650	600	1300	1200	2000	1800	3300	2900
250	650	550	1300	1100	1900	1700	3200	2800
275	600	550	1200	1100	1800	1600	3100	2800
300	570	550	1100	1100	1700	1600	2900	2800
325	550	550	1000	1000	1600	1600	2600	2600
350	500	500	950	950	1400	1400	2400	2400
375	450	450	900	900	1300	1300	2200	2200
400	400	400	800	800	1200	1200	2000	2000
425	350	350	700	700	1000	1000	1700	1700
450	-	-	-	-	-	-	1300	1300
475	-	-	-	-	-	-	900	900

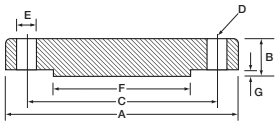
Notes:

1. The Temperature/Pressure information was obtained from AS 2129-2000. For full details regarding Temperature/Pressure ratings of other materials, refer to the standard.
2. Pressure Ratings are maximum allowable working gauge pressures in kPa at the temperatures shown for the applicable material and Table designation.

EN 1092-1 DIN FLANGES



Slip-On – Type 01



Blind – Type 05

PN 06

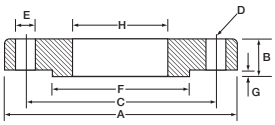
Size					Bolting Details						Bore	Masses of flanges	
DN mm	Nominal Pipe Size inch	Outside Diam. of Flange A	Forged or Plate; Thickness of Flange Min. B1-Type01	Forged or Plate; Thickness of Flange Min. B2-Type05	Pitch Circle Diam. C	Number of Holes D	Diam. of Holes E	Diam. of Bolts Bolts Metric	Diam. of Raised Face F	Height of Raised Face G	Slip-On H	Type 01 (kg)	Type 05 (kg)
10	3/8	75	12	12	50	4	11	M10	35	2	BORE OF FLANGES TO SUIT EITHER PIPE OR TUBE OD - REFER PIPE & TUBE DIMENSIONS ON PAGES 36 & 37	0.36	0.38
15	1/2	80	12	12	55	4	11	M10	40	2		0.40	0.44
20	3/4	90	14	14	65	4	11	M10	50	2		0.59	0.66
25	1	100	14	14	75	4	11	M10	60	2		0.72	0.82
32	1-1/4	120	16	14	90	4	14	M12	70	2		1.16	1.18
40	1-1/2	130	16	14	100	4	14	M12	80	3		1.35	1.39
50	2	140	16	14	110	4	14	M12	90	3		1.48	1.62
65	2-1/2	160	16	14	130	4	14	M12	110	3		1.86	2.14
80	3	190	18	16	150	4	18	M16	128	3		2.95	3.43
100	4	210	18	16	170	4	18	M16	148	3		3.26	4.22
125	5	240	20	18	200	8	18	M16	178	3		4.31	6.10
150	6	265	20	18	225	8	18	M16	202	3		4.76	7.51
200	8	320	22	20	280	8	18	M16	258	3		6.88	12.30
250	10	375	24	22	335	12	18	M16	312	3		8.92	18.50
300	12	440	24	22	395	12	22	M20	365	4		11.90	25.50
350	14	490	26	22	445	12	22	M20	415	4		16.80	31.80
400	16	540	28	22	495	16	22	M20	465	4		19.80	38.50
450	18	595	30	24	550	16	22	M20	520	4		24.60	51.20
500	20	645	30	24	600	20	22	M20	570	4		26.40	60.10
600	24	755	32	30	705	20	26	M24	670	5		34.80	103.00

PN 10

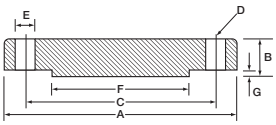
Size					Bolting Details						Bore	Masses of flanges	
DN mm	Nominal Pipe Size inch	Outside Diam. of Flange A	Forged or Plate; Thickness of Flange Min. B1-Type01	Forged or Plate; Thickness of Flange Min. B2-Type05	Pitch Circle Diam. C	Number of Holes D	Diam. of Holes E	Diam. of Bolts Bolts Metric	Diam. of Raised Face F	Height of Raised Face G	Slip-On H	Type 01 (kg)	Type 05 (kg)
10	3/8	90	14	16	60	4	14	M12	40	2	BORE OF FLANGES TO SUIT EITHER PIPE OR TUBE OD - REFER PIPE & TUBE DIMENSIONS ON PAGES 36 & 37	0.60	0.72
15	1/2	95	14	16	65	4	14	M12	45	2		0.67	0.81
20	3/4	105	16	18	75	4	14	M12	58	2		0.94	1.14
25	1	115	16	18	85	4	14	M12	68	2		1.11	1.38
32	1-1/4	140	18	18	100	4	18	M16	78	2		1.82	2.03
40	1-1/2	150	18	18	110	4	18	M16	88	3		2.08	2.35
50	2	165	20	18	125	4	18	M16	102	3		2.73	2.88
65	2-1/2	185	20	18	145	8	18	M16	122	3		3.16	3.51
80	3	200	20	20	160	8	18	M16	138	3		3.60	4.61
100	4	220	22	20	180	8	18	M16	158	3		4.39	5.65
125	5	250	22	22	210	8	18	M16	188	3		5.41	8.13
150	6	285	24	22	240	8	22	M20	212	3		7.14	10.5
200	8	340	24	24	295	8	22	M20	268	3		9.27	16.5
250	10	395	26	26	350	12	22	M20	320	3		11.8	24.1
300	12	445	26	26	400	12	22	M20	370	4		13.6	30.8
350	14	505	30	26	460	16	22	M20	430	4		20.4	39.6
400	16	565	32	26	515	16	26	M24	482	4		27.5	49.4
450	18	615	36	28	565	20	26	M24	532	4		33.6	63.0
500	20	670	38	28	620	20	26	M24	585	4		40.2	75.2
600	24	780	42	34	725	20	30	M27	685	5		54.5	124

Notes:
1. All dimensions are in millimetres.
2. Only the Raised Face variant of each type of flange has been illustrated. Other variants available are Flat Face, Flat with O-Ring Groove or Spot-Faced and other flange facing types may change the “B” dimension, please contact your local Prochem office for more information.
3. For Threaded Flanges a Boss Flange is used to accommodate the thread. The Thread Form and Thread Type are not specified in the Standard, please contact your local Prochem office for more information.
4. All weights are appoximates only.

EN 1092-1 DIN FLANGES



Slip-On – Type 01



Blind – Type 05

PN 16

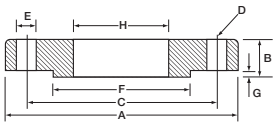
Size					Bolting Details						Bore	Masses of flanges	
DN mm	Nominal Pipe Size inch	Outside Diam. of Flange A	Forged or Plate; Thickness of Flange Min. B1-Type01	Forged or Plate; Thickness of Flange Min. B2-Type05	Pitch Circle Diam. C	Number of Holes D	Diam. of Holes E	Diam. of Bolts Bolts Metric	Diam. of Raised Face F	Height of Raised Face G	Slip-On H	Type 01 (kg)	PN 16 (kg)
10	3/8	90	14	16	60	4	14	M12	40	2	BORE OF FLANGES TO SUIT EITHER PIPE OR TUBE OD - REFER PIPE & TUBE DIMENSIONS ON PAGES 36 & 37	0.60	0.72
15	1/2	95	14	16	65	4	14	M12	45	2		0.67	0.81
20	3/4	105	16	18	75	4	14	M12	58	2		0.94	1.14
25	1	115	16	18	85	4	14	M12	68	2		1.11	1.38
32	1-1/4	140	18	18	100	4	18	M16	78	2		1.82	2.03
40	1-1/2	150	18	18	110	4	18	M16	88	3		2.08	2.35
50	2	165	20	18	125	4	18	M16	102	3		2.73	2.88
65	2-1/2	185	20	18	145	8	18	M16	122	3		3.16	3.51
80	3	200	20	20	160	8	18	M16	138	3		3.60	4.61
100	4	220	22	20	180	8	18	M16	158	3		4.39	5.65
125	5	250	22	22	210	8	18	M16	188	3		5.41	8.13
150	6	285	24	22	240	8	22	M20	212	3		7.14	10.5
200	8	340	26	24	295	12	22	M20	268	3		9.73	16.2
250	10	405	29	26	355	12	26	M24	320	3		14.2	25.0
300	12	460	32	28	410	12	26	M24	378	4		19.0	35.1
350	14	520	35	30	470	16	26	M24	438	4		28.2	48.0
400	16	580	38	32	525	16	30	M27	490	4		35.9	63.5
450	18	640	42	40	585	20	30	M27	550	4		46.1	96.6
500	20	715	46	44	650	20	33	M30	610	4		64.0	133
600	24	840	55	54	770	20	36	M33	725	5		102	226

PN 25

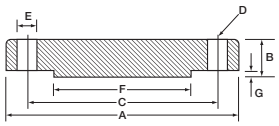
Size					Bolting Details						Bore	Masses of flanges	
DN mm	Nominal Pipe Size inch	Outside Diam. of Flange A	Forged or Plate; Thickness of Flange Min. B1-Type01	Forged or Plate; Thickness of Flange Min. B2-Type05	Pitch Circle Diam. C	Number of Holes D	Diam. of Holes E	Diam. of Bolts Bolts Metric	Diam. of Raised Face F	Height of Raised Face G	Slip-On H	Type 01 (kg)	Type 05 (kg)
10	3/8	90	14	16	60	4	14	M12	40	2	BORE OF FLANGES TO SUIT EITHER PIPE OR TUBE OD - REFER PIPE & TUBE DIMENSIONS ON PAGES 36 & 37	0.60	0.72
15	1/2	95	14	16	65	4	14	M12	45	2		0.67	0.81
20	3/4	105	16	18	75	4	14	M12	58	2		0.94	1.14
25	1	115	16	18	85	4	14	M12	68	2		1.11	1.38
32	1-1/4	140	18	18	100	4	18	M16	78	2		1.82	2.03
40	1-1/2	150	18	18	110	4	18	M16	88	3		2.08	2.35
50	2	165	20	20	125	4	18	M16	102	3		2.73	3.20
65	2-1/2	185	22	22	145	8	18	M16	122	3		3.48	4.29
80	3	200	24	24	160	8	18	M16	138	3		4.32	5.54
100	4	235	26	24	190	8	22	M20	162	3		6.07	7.60
125	5	270	28	26	220	8	26	M24	188	3		8.19	10.8
150	6	300	30	28	250	8	26	M24	218	3		10.3	14.6
200	8	360	32	30	310	12	26	M24	278	3		14.3	22.5
250	10	425	35	32	370	12	30	M27	335	3		20.1	33.5
300	12	485	38	34	430	16	30	M27	395	4		26.6	46.3
350	14	555	42	38	490	16	33	M30	450	4		41.8	68.1
400	16	620	48	40	550	16	36	M33	505	4		57.6	89.7
450	18	670	54	50	600	20	36	M33	555	4		69.8	130
500	20	730	58	51	660	20	36	M33	615	4		87.0	159
600	24	845	68	66	770	20	39	M36	720	5		127	278

Notes:
1. All dimensions are in millimetres.
2. Only the Raised Face variant of each type of flange has been illustrated. Other variants available are Flat Face, Flat with O-Ring Groove or Spot-Faced and other flange facing types may change the "B" dimension, please contact your local Prochem office for more information.
3. For Threaded Flanges a Boss Flange is used to accommodate the thread. The Thread Form and Thread Type are not specified in the Standard, please contact your local Prochem office for more information.
4. All weights are appoximates only.

EN 1092-1 DIN FLANGES



Slip-On – Type 01



Blind – Type 05

PN 40

Size					Bolting Details						Bore	Masses of flanges	
DN mm	Nominal Pipe Size inch	Outside Diam. of Flange A	Forged or Plate; Thickness of Flange Min. B1-Type01	Forged or Plate; Thickness of Flange Min. B2-Type05	Pitch Circle Diam. C	Number of Holes D	Diam. of Holes E	Diam. of Bolts Bolts Metric	Diam. of Raised Face F	Height of Raised Face G	Slip-On H	Type 01 (kg)	Type 05 (kg)
10	3/8	90	14	16	60	4	14	M12	40	2	BORE OF FLANGES TO SUIT EITHER PIPE OR TUBE OD - REFER PIPE & TUBE DIMENSIONS ON PAGES 36 & 37	0.60	0.72
15	1/2	95	14	16	65	4	14	M12	45	2		0.67	0.81
20	3/4	105	16	18	75	4	14	M12	58	2		0.94	1.14
25	1	115	16	18	85	4	14	M12	68	2		1.11	1.38
32	1-1/4	140	18	18	100	4	18	M16	78	2		1.82	2.03
40	1-1/2	150	18	18	110	4	18	M16	88	3		2.08	2.35
50	2	165	20	20	125	4	18	M16	102	3		2.73	3.20
65	2-1/2	185	22	22	145	8	18	M16	122	3		3.48	4.29
80	3	200	24	24	160	8	18	M16	138	3		4.32	5.54
100	4	235	26	24	190	8	22	M20	162	3		6.07	7.60
125	5	270	28	26	220	8	26	M24	188	3		8.19	10.8
150	6	300	30	28	250	8	26	M24	218	3		10.3	14.6
200	8	375	36	36	320	12	30	M27	285	3		17.9	28.8
250	10	450	42	38	385	12	33	M30	345	3		29.3	44.4
300	12	515	52	42	450	16	33	M30	410	4		45.1	64.2
350	14	580	58	46	510	16	36	M33	465	4		66.7	89.5
400	16	660	65	50	585	16	39	M36	535	4		97.1	127
450	18	685		57	610	20	39	M36	560	4		-	154
500	20	755		57	670	20	42	M39	615	4		-	188
600	24	890		72	795	20	48	M45	735	5		-	331

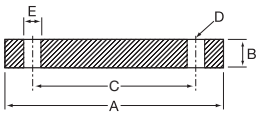
Notes:
1. All dimensions are in millimetres.
2. Only the Raised Face variant of each type of flange has been illustrated. Other variants available are Flat Face, Flat with O-Ring Groove or Spot-Faced and other flange facing types may change the “B” dimension, please contact your local Prochem office for more information.
3. For Threaded Flanges a Boss Flange is used to accommodate the thread. The Thread Form and Thread Type are not specified in the Standard, please contact your local Prochem office for more information.
4. All weights are appoximates only.

TEMPERATURE/PRESSURE ratings for austenitic and austenitic-ferritic steels.

Max. allowable temperature TS °C	PN 6		PN 10		PN 16		PN 25		PN40	
	304	316	304	316	304	316	304	316	304	316
	304 L	316 L	304 L	316 L	304 L	316 L	304 L	316 L	304 L	316 L
Max. allowable pressure PS bar										
RT (-10 to 50)	6	6	10	10	16	16	25.0	25.0	40.0	40.0
100	5.1	6	8.6	10	13.7	16	21.5	25.0	34.4	40.0
150	4.6	5.4	7.7	9	12.3	14.5	19.2	22.7	30.8	36.3
200	4.2	5	7	8.4	11.2	13.4	17.5	21.0	28.0	33.7
250	3.9	4.7	6.5	7.9	10.4	12.7	16.3	19.8	26.0	31.8
300	3.6	4.4	6	7.4	9.6	11.8	15.1	18.5	24.1	29.7
350	3.4	4.2	5.7	7.1	9.2	11.4	14.4	17.8	23.0	28.5
400	3.3	4.1	5.5	6.8	8.8	10.9	13.8	17.1	22.0	27.4
450	3.2	4	5.3	6.7	8.5	10.7	13.3	16.8	21.4	26.9
500	3.1	3.9	5.1	6.6	8.3	10.5	12.9	16.5	20.7	26.4
550	2.6	3.9	4.3	6.5	7	10.4	10.9	16.3	17.5	26.0
560	2.4	3.8	4	6.4	6.4	10.3	10.1	16.0	16.1	25.7
570	2.2	3.8	3.7	6.3	5.9	10.1	9.2	15.8	14.8	25.4
580	2	3.7	3.4	6.2	5.4	10.0	8.5	15.6	13.7	25.0
590	1.8	3.7	3	6.1	4.9	9.9	7.7	15.4	12.3	24.7
600	1.6	3.3	2.8	5.6	4.4	8.9	7.0	14.0	11.2	22.4

Note 1: groupe 10E0 material based on ASME SA 240 and grades 304, 304 L, 304 H
Note 2: groupe 14E0 material based on ASME SA 240 and grades 316, 316 L, 316 H.

AS 4087 WATER FLANGES



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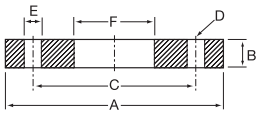


SLIP-ON WELDING

PN 16

Size				Bolting Details				Bore	Masses of flanges	
DN mm	Nominal Pipe Size inch	Outside Diameter of Flange A	Forged or Plate; Thickness of Flange Min. B	Pitch Circle Diameter C	Number of Holes D	Diameter of Holes E	Diameter of Bolts Bolts Metric	Slip-On F	Blind (kg)	Slip-On (kg)
50	2	150	11	114	4	18	M16	BORE OF FLANGES TO SUIT PIPE OD - REFER PIPE DIMENSIONS ON PAGE 36	1.5	1.4
65	2-1/2	165	11	127	4	18	M16		1.8	1.7
80	3	185	11	146	4	18	M16		2.3	2.2
100	4	215	13	178	4	18	M16		3.7	3.5
150	6	280	13	235	8	18	M16		6.2	4.0
200	8	335	19	292	8	18	M16		13.1	7.2
225	9	370	19	324	8	18	M16		16.0	8.7
250	10	405	19	356	8	22	M20		19.1	9.9
300	12	455	23	406	12	22	M20		29.1	13.5
350	14	525	30	470	12	26	M24		50.4	26.0
375	15	550	30	495	12	26	M24		55.5	28.0
400	16	580	30	521	12	26	M24		61.9	30.0
450	18	640	30	584	12	26	M24		75.7	38.0
500	20	705	38	641	16	26	M24		116.1	54.0
600	24	825	48	756	16	30	M27		200.9	87.0

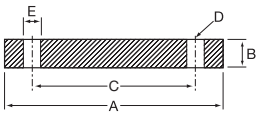
All dimensions are in millimetres.

PN 21

Size				Bolting Details				Bore	Masses of flanges	
DN mm	Nominal Pipe Size inch	Outside Diameter of Flange A	Forged or Plate; Thickness of Flange Min. B	Pitch Circle Diameter C	Number of Holes D	Diameter of Holes E	Diameter of Bolts Bolts Metric	Slip-On F	Blind (kg)	Slip-On (kg)
50	2	165	15	127	4	18	M16	BORE OF FLANGES TO SUIT PIPE OD - REFER PIPE DIMENSIONS ON PAGE 36	2.4	2.4
65	2-1/2	185	15	146	8	18	M16		3.0	2.9
80	3	205	15	165	8	18	M16		3.7	3.6
100	4	230	19	191	8	18	M16		6.0	5.8
150	6	305	24	260	12	22	M20		13.2	12.8
200	8	370	24	324	12	22	M20		19.8	19.2
225	9	405	30	356	12	26	M24		29.4	28.4
250	10	430	30	381	12	26	M24		33.3	31.8
300	12	490	30	438	16	26	M24		43.2	40.8
350	14	550	30	495	16	30	M27		54.3	50.5
375	15	580	38	521	16	30	M27		76.9	70.1
400	16	610	38	552	20	30	M27		84.5	73.1
450	18	675	38	610	20	33	M30		103.6	85.8
500	20	735	48	673	24	33	M30		155.0	123.4
600	24	850	58	781	24	36	M33		252.0	205.9

All dimensions are in millimetres.

AS 4087 WATER FLANGES



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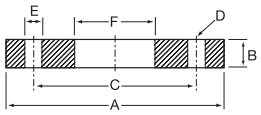


SLIP-ON WELDING

PN 35

Size				Bolting Details				Bore	Masses of flanges	
DN mm	Nominal Pipe Size inch	Outside Diameter of Flange A	Forged or Plate; Thickness of Flange Min. B	Pitch Circle Diameter C	Number of Holes D	Diameter of Holes E	Diameter of Bolts Bolts Metric	Slip-On F	Blind (kg)	Slip-On (kg)
50	2	165	19	127	4	18	M16	BORE OF FLANGES TO SUIT PIPE OD - REFER PIPE DIMENSIONS ON PAGE 36	3.1	3.0
65	2-1/2	185	19	146	8	18	M16		3.8	3.7
80	3	205	24	165	8	18	M16		5.9	5.8
100	4	230	24	191	8	18	M16		7.6	7.3
150	6	305	31	260	12	22	M20		17.0	16.5
200	8	370	31	324	12	22	M20		25.5	24.8
225	9	405	38	356	12	26	M24		37.2	36.0
250	10	430	38	381	12	26	M24		42.2	40.3
300	12	490	38	438	16	26	M24		54.7	51.6
350	14	550	48	495	16	30	M27		86.9	80.9
375	15	580	48	521	16	30	M27		97.1	88.6
400	16	610	48	552	20	30	M27		106.8	92.3
450	18	675	58	610	20	33	M30		158.1	130.9
500	20	735	58	673	24	33	M30		187.3	149.1
600	24	850	68	781	24	36	M33		295.4	241.4

All dimensions are in millimetres.

ALLOWABLE PRESSURE TABLE FOR 316/316L and 304/304L DUAL GRADE FLANGES

Pressure Class	AOP	MAOP	ASTP	MATTP
PN	kPa	kPa	kPa	kPa
16	1600	1920	2000	2400
21	2100	2520	2625	3150
35	3500	4200	4375	5250

AOP The allowable internal pressure, excluding surge, that a component can safely withstand in service.

MAOP Maximum internal pressure, including surge, that a component can safely withstand in service.

ASTP Maximum pressure applied on site in a newly installed pipeline (including a safety factor and allowances for surge).

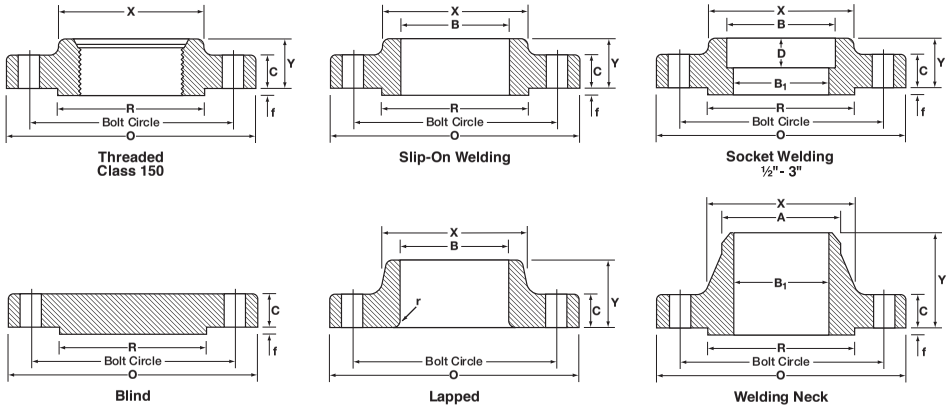
MATTP The maximum allowable hydrostatic pressure applied to a flange for the purpose of proof or type testing an associated appurtenance.

The fluid contained by these flanges, is water, recycled water, sewerage or wastewater at temperatures not exceeding 80°C.

ANSI CLASS 150

Size							Length Through Hub			Bore							Bolt Information					
DN mm	Nominal Pipe Size inch	Outside Diameter of Flange O	Thickness of Flange Min. C	Thickness of Lap Joint Min. C	Diameter of Hub X	Hub Diameter Beginning of Chamfer Welding Neck A	Threaded/ Slip-On/ Socket Welding Y	Lapped Y	Welding Neck Y	Slip-On/ Socket Welding Min. B	Lapped Min. B	Welding Neck/ Socket Welding B1	Diameter of Raised Face R	Height of Raised Face f	Corner Radius of Bore of Lapped Flange and Pipe r	Depth of Socket D	Diameter of Bolt Circle	Diameter of Bolt Holes	Number of Bolts	Diameter of Bolts (inch)	Length of Stud Bolts 1.6mm Raised Face	Length of Machine Bolts 1.6mm Raised Face
15	1/2	88.9	9.7	11.2	30.2	21.3	14.2	15.7	46.0	22.4	22.9		35.1	1.6	3.0	9.7	60.5	15.9	4	1/2	57.2	50.8
20	3/4	98.6	11.2	12.7	38.1	26.7	14.2	15.7	50.8	27.7	28.2		42.9	1.6	3.0	11.2	69.9	15.9	4	1/2	63.5	50.8
25	1	108.0	12.7	14.2	49.3	33.5	15.7	17.5	53.8	34.5	35.1		50.8	1.6	3.0	12.7	79.2	15.9	4	1/2	63.5	57.2
32	1-1/4	117.3	14.2	15.7	58.7	42.2	19.1	20.6	55.6	43.2	43.7		63.5	1.6	4.8	14.2	88.9	15.9	4	1/2	69.9	57.2
40	1-1/2	127.0	15.7	17.5	65.0	48.3	20.6	22.4	60.5	49.5	50.0		73.2	1.6	6.4	15.7	98.6	15.9	4	1/2	69.9	63.5
50	2	152.4	17.5	19.1	77.7	60.5	23.9	25.4	62.0	62.0	62.5		91.9	1.6	7.9	17.5	120.7	19.1	4	5/8	82.6	69.9
65	2-1/2	177.8	20.6	22.4	90.4	73.2	26.9	28.4	68.3	74.7	75.4		104.6	1.6	7.9	19.1	139.7	19.1	4	5/8	88.9	76.2
80	3	190.5	22.4	23.9	108.0	88.9	28.4	30.2	68.3	90.7	91.4		127.0	1.6	9.7	20.6	152.4	19.1	4	5/8	88.9	76.2
90	3-1/2	215.9	22.4	23.9	122.2	101.6	30.2	31.8	69.9	103.4	104.1	To be	139.7	1.6	9.7		177.8	19.1	8	5/8	88.9	76.2
100	4	228.6	22.4	23.9	134.9	114.3	31.8	33.3	74.7	116.1	116.8	specified	157.2	1.6	11.2		190.5	19.1	8	5/8	88.9	76.2
125	5	254.0	22.4	23.9	163.6	141.2	35.1	36.6	87.4	143.8	144.5	by the	185.7	1.6	11.2		215.9	22.2	8	3/4	95.3	82.6
150	6	279.4	23.9	25.4	192.0	168.4	38.1	39.6	87.4	170.7	171.5	purchaser	215.9	1.6	12.7		241.3	22.2	8	3/4	101.6	82.6
200	8	342.9	26.9	28.4	246.1	219.2	42.9	44.5	100.1	221.5	222.3		269.7	1.6	12.7		298.5	22.2	8	3/4	108.0	88.9
250	10	406.4	28.4	30.2	304.8	273.1	47.8	49.3	100.1	276.4	277.4		323.9	1.6	12.7		362.0	25.4	12	7/8	114.3	101.6
300	12	482.6	30.2	31.8	365.3	323.9	53.8	55.6	112.8	327.2	328.2		381.0	1.6	12.7		431.8	25.4	12	7/8	120.7	101.6
350	14	533.4	33.3	35.1	400.1	355.6	55.6	79.2	125.5	359.2	360.2		412.8	1.6	12.7		476.3	28.6	12	1	133.4	114.3
400	16	596.9	35.1	36.6	457.2	406.4	62.0	87.4	125.5	410.5	411.2		469.9	1.6	12.7		539.8	28.6	16	1	133.4	114.3
450	18	635.0	38.1	39.6	505.0	457.2	66.5	96.8	138.2	461.8	462.3		533.4	1.6	12.7		577.9	31.8	16	1-1/8	146.1	127.0
500	20	698.5	41.1	42.9	558.8	508.0	71.4	103.1	142.7	513.1	514.4		584.2	1.6	12.7		635.0	31.8	20	1-1/8	158.8	139.7
600	24	812.8	46.0	47.8	663.4	609.6	81.0	111.3	150.9	616.0	616.0		692.2	1.6	12.7		749.3	34.9	20	1-1/4	171.5	152.4

Size		Approximate piece weight in Kilograms					
DN	NPS	Blind	Weld Neck	Slip-On	Lap Joint	Socket Weld	Threaded
15	1/2	0.47	0.51	0.47	0.51	0.47	0.47
20	3/4	0.63	0.73	0.58	0.64	0.59	0.58
25	1	0.94	1.07	0.86	0.93	0.87	0.86
32	1-1/4	1.23	1.40	1.08	1.16	1.11	1.08
40	1-1/2	1.62	1.81	1.41	1.51	1.45	1.41
50	2	2.64	2.59	2.26	2.38	2.33	2.26
65	2-1/2	4.06	4.28	3.43	3.60	3.55	3.43
80	3	4.90	5.18	3.87	4.04	4.02	3.87
90	3-1/2	5.90	5.45	4.99	4.99		4.99
100	4	7.41	7.32	5.75	5.96		5.75
125	5	8.76	8.91	6.22	6.44		6.22
150	6	11.31	11.26	7.38	7.59		7.38
200	8	19.92	17.68	12.36	12.66		12.36
250	10	29.39	24.79	17.10	16.78		17.10
300	12	43.70	38.98	27.68	28.30		27.68
350	14	59.42	51.71	35.20	41.50		35.20
400	16	77.11	64.41	42.18	52.98		42.18
450	18	94.80	74.84	49.71	59.00		49.71
500	20	123.38	89.36	65.50	72.12		65.50
600	24	188.24	119.66	90.50	99.02		90.50



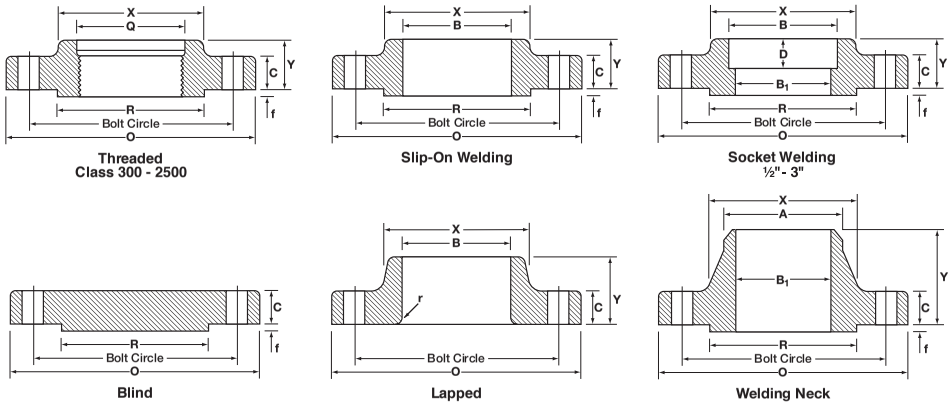
Notes:

1. Flange Raised Face Diameter and Height are based on a standard Raised Face, other flange facing types will change the “R” and “f” dimensions
2. For Threaded Flanges in this Class a counterbore is not required.
3. All dimensions are converted from the ASME B16.5 inch system to millimetres using 1" = 25.4 mm and rounded to one decimal point, except where noted.
4. All weights are approximate only.

ANSI CLASS 300

Size							Length Through Hub			Bore								Bolt Information					
DN mm	Nominal Pipe Size inch	Outside Diameter of Flange O	Thickness of Flange Min. C	Thickness of Lap Joint Min. C	Diameter of Hub X	Hub Diameter Beginning of Chamfer Welding Neck A	Threaded/ Slip-On/ Socket Welding Y	Lapped Y	Welding Neck Y	Slip-On/ Socket Welding Min. B	Lapped Min. B	Welding Neck/ Socket Welding B1	Diameter of Raised Face R	Height of Raised Face f	Corner Radius of Bore of Lapped Flange and Pipe r	Depth of Socket D	Counter-bore Diameter Threaded Flange Min. Q	Diameter of Bolt Circle	Diameter of Bolt Holes	Number of Bolts	Diameter of Bolts (inch)	Length of Stud Bolts 1.6mm Raised Face	Length of Machine Bolts 1.6mm Raised Face
15	1/2	95.3	12.7	14.2	38.1	21.3	20.6	22.4	50.8	22.4	22.9		35.1	1.6	3.0	23.6	9.7	66.5	15.9	4	1/2	63.5	57.2
20	3/4	117.3	14.2	15.7	47.8	26.7	23.9	25.4	55.6	27.7	28.2		42.9	1.6	3.0	29.0	11.2	82.6	19.1	4	5/8	76.2	63.5
25	1	124.0	15.7	17.5	53.8	33.5	25.4	26.9	60.5	34.5	35.1		50.8	1.6	3.0	35.8	12.7	88.9	19.1	4	5/8	76.2	63.5
32	1-1/4	133.4	17.5	19.1	63.5	42.2	25.4	26.9	63.5	43.2	43.7		63.5	1.6	4.8	44.5	14.2	98.6	19.1	4	5/8	82.6	69.9
40	1-1/2	155.4	19.1	20.6	69.9	48.3	28.7	30.2	66.8	49.5	50.0		73.2	1.6	6.4	50.3	15.7	114.3	22.2	4	3/4	88.9	76.2
50	2	165.1	20.6	22.4	84.1	60.5	31.8	33.3	68.3	62.0	62.5		91.9	1.6	7.9	63.5	17.5	127.0	19.1	8	5/8	88.9	76.2
65	2-1/2	190.5	23.9	25.4	100.1	73.2	36.6	38.1	74.7	74.7	75.4		104.6	1.6	7.9	76.2	19.1	149.4	22.2	8	3/4	101.6	82.6
80	3	209.6	26.9	28.4	117.3	88.9	41.4	42.9	77.7	90.7	91.4		127.0	1.6	9.7	92.2	20.6	168.1	22.2	8	3/4	108.0	88.9
90	3-1/2	228.6	28.4	30.2	133.4	101.6	42.9	44.5	79.5	103.4	104.1	To be	139.7	1.6	9.7	104.9		184.2	22.2	8	3/4	108.0	95.3
100	4	254.0	30.2	31.8	146.1	114.3	46.2	47.8	84.3	116.1	116.8	specified	157.2	1.6	11.2	117.6		200.2	22.2	8	3/4	114.3	95.3
125	5	279.4	33.3	35.1	177.8	141.2	49.3	50.8	97.0	143.8	144.5	by the	185.7	1.6	11.2	144.5		235.0	22.2	8	3/4	120.7	108.0
150	6	317.5	35.1	36.6	206.2	168.4	50.8	52.3	97.0	170.7	171.5	purchaser	215.9	1.6	12.7	171.5		269.7	22.2	12	3/4	120.7	108.0
200	8	381.0	39.6	41.1	260.4	219.2	60.5	62.0	109.7	221.5	222.3		269.7	1.6	12.7	222.3		330.2	25.4	12	7/8	139.7	120.7
250	10	444.5	46.0	47.8	320.5	273.1	65.0	95.3	115.8	276.4	277.4		323.9	1.6	12.7	276.4		387.4	28.6	16	1	158.8	139.7
300	12	520.7	49.3	50.8	374.7	323.9	71.6	101.6	128.5	327.2	328.2		381.0	1.6	12.7	328.7		450.9	31.8	16	1-1/8	171.5	146.1
350	14	584.2	52.3	53.8	425.5	355.6	74.7	111.3	141.2	359.2	360.2		412.8	1.6	12.7	360.4		514.4	31.8	20	1-1/8	177.8	158.8
400	16	647.7	55.6	57.2	482.6	406.4	81.0	120.7	144.5	410.5	411.2		469.9	1.6	12.7	411.2		571.5	34.9	20	1-1/4	190.5	165.1
450	18	711.2	58.7	60.5	533.4	457.2	87.4	130.0	157.2	461.8	462.3		533.4	1.6	12.7	462.0		628.7	34.9	24	1-1/4	196.9	171.5
500	20	774.7	62.0	63.5	587.2	508.0	93.7	139.7	160.5	513.1	514.4		584.2	1.6	12.7	512.8		685.8	34.9	24	1-1/4	203.2	184.2
600	24	914.4	68.3	69.9	701.5	609.6	104.9	152.4	166.6	616.0	616.0		692.2	1.6	12.7	614.4		812.8	41.3	24	1-1/2	228.6	203.2

Size		Approximate piece weight in Kilograms					
DN	NPS	Blind	Weld Neck	Slip-On	Lap Joint	Socket Weld	Threaded
15	1/2	0.62	0.78	0.62	0.61	0.62	0.62
20	3/4	1.16	1.34	1.15	1.15	1.19	1.15
25	1	1.42	1.64	1.39	1.38	1.44	1.39
32	1-1/4	1.79	2.06	1.67	1.66	1.73	1.67
40	1-1/2	2.68	3.06	2.53	2.52	2.62	2.53
50	2	3.09	3.40	2.80	2.79	2.94	2.80
65	2-1/2	4.75	5.31	4.25	4.22	4.49	4.25
80	3	6.79	7.32	5.81	5.78	6.20	5.81
90	3-1/2	9.53	8.17	7.72	7.72		7.72
100	4	12.00	11.30	10.13	10.07		10.13
125	5	15.96	15.12	12.58	12.52		12.58
150	6	21.20	19.68	16.04	15.95		16.04
200	8	34.60	30.48	24.50	24.37		24.50
250	10	55.34	43.74	34.16	39.92		34.16
300	12	78.90	64.41	51.26	58.70		51.26
350	14	107.05	88.30	72.12	83.46		72.12
400	16	139.25	112.94	90.40	106.14		90.40
450	18	176.90	138.34	109.00	133.95		109.00
500	20	223.17	167.37	136.00	157.65		136.00
600	24	342.00	235.41	204.00	240.40		204.00



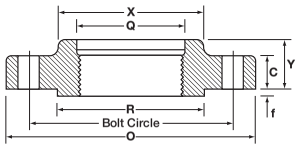
Notes:

1. Flange Raised Face Diameter and Height are based on a standard Raised Face, other flange facing types will change the “R” and “f” dimensions
2. For Threaded Flanges in this Class a counterbore is required. NPS Sizes 50 and smaller will have a 6.4 counterbore and NPS sizes 65 and larger will have a 9.5 counterbore.
3. All dimensions are converted from the ASME B16.5 inch system to millimetres using 1" = 25.4 mm and rounded to one decimal point, except where noted.
4. All weights are approximate only.

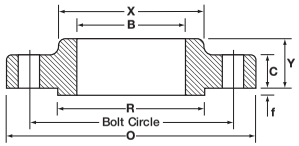
ANSI CLASS 600

Size						Length Through Hub			Bore								Bolt Information				
DN mm	Nominal Pipe Size inch	Outside Diameter of Flange O	Thickness of Flange Min. C	Diameter of Hub X	Hub Diameter Beginning of Chamfer Welding Neck A	Threaded/ Slip-On/ Socket Welding Y	Lapped Y	Welding Neck Y	Slip-On/ Socket Welding Min. B	Lapped Min. B	Welding Neck/ Socket Welding B1	Diameter of Raised Face R	Height of Raised Face f	Corner Radius of Bore of Lapped Flange and Pipe r	Counter-bore Diameter Threaded Flange Min. Q	Depth of Socket D	Diameter of Bolt Circle	Diameter of Bolt Holes	Number of Bolts	Diameter of Bolts (inch)	Length of Stud Bolts 6.4mm Raised Face
15	1/2	95.3	14.2	38.1	21.3	22.4	22.4	52.3	22.4	22.9		35.1	6.4	3.0	23.6	9.7	66.5	15.9	4	1/2	76.2
20	3/4	117.3	15.7	47.8	26.7	25.4	25.4	57.2	27.7	28.2		42.9	6.4	3.0	29.0	11.2	82.6	19.1	4	5/8	88.9
25	1	124.0	17.5	53.8	33.5	26.9	26.9	62.0	34.5	35.1		50.8	6.4	3.0	35.8	12.7	88.9	19.1	4	5/8	88.9
32	1-1/4	133.4	20.6	63.5	42.2	28.4	28.4	66.5	43.2	43.7		63.5	6.4	4.8	44.5	14.2	98.6	19.1	4	5/8	95.3
40	1-1/2	155.4	22.4	69.9	48.3	31.8	31.8	69.9	49.5	50.0		73.2	6.4	6.4	50.5	15.7	114.3	22.2	4	3/4	108.0
50	2	165.1	25.4	84.1	60.5	36.6	36.6	73.2	62.0	62.5		91.9	6.4	7.9	63.5	17.5	127.0	19.1	8	5/8	108.0
65	2-1/2	190.5	28.4	100.1	73.2	41.1	41.1	79.2	74.7	75.4		104.6	6.4	7.9	76.2	19.1	149.4	22.2	8	3/4	120.7
80	3	209.6	31.8	117.3	88.9	46.0	46.0	82.6	90.7	91.4		127.0	6.4	9.7	92.2	20.6	168.1	22.2	8	3/4	127.0
90	3-1/2	228.6	35.1	133.4	101.6	49.3	49.3	85.9	103.4	104.1	To be	139.7	6.4	9.7	104.9		184.2	25.4	8	7/8	139.7
100	4	273.1	38.1	152.4	114.3	53.8	53.8	101.6	116.1	116.8	specified	157.2	6.4	11.2	117.6		215.9	25.4	8	7/8	146.1
125	5	330.2	44.5	189.0	141.2	60.5	60.5	114.3	143.8	144.5	by the	185.7	6.4	11.2	144.5		266.7	28.6	8	1	165.1
150	6	355.6	47.8	222.3	168.4	66.5	66.5	117.3	170.7	171.5	purchaser	215.9	6.4	12.7	171.5		292.1	28.6	12	1	171.5
200	8	419.1	55.6	273.1	219.2	76.2	76.2	133.4	221.5	222.3		269.7	6.4	12.7	222.3		349.3	31.8	12	1-1/8	190.5
250	10	508.0	63.5	342.9	273.1	85.9	111.3	152.4	276.4	277.4		323.9	6.4	12.7	276.4		431.8	34.9	16	1-1/4	215.9
300	12	558.8	66.5	400.1	323.9	91.9	117.3	155.4	327.2	328.2		381.0	6.4	12.7	328.7		489.0	34.9	20	1-1/4	222.3
350	14	603.3	69.9	431.8	355.6	93.7	127.0	165.1	359.2	360.2		412.8	6.4	12.7	360.4		527.1	38.1	20	1-3/8	235.0
400	16	685.8	76.2	495.3	406.4	106.4	139.7	177.8	410.5	411.2		469.9	6.4	12.7	411.2		603.3	41.3	20	1-1/2	254.0
450	18	743.0	82.6	546.1	457.2	117.3	152.4	184.2	461.8	462.3		533.4	6.4	12.7	462.0		654.1	44.5	20	1-5/8	273.1
500	20	812.8	88.9	609.6	508.0	127.0	165.1	190.5	513.1	514.4		584.2	6.4	12.7	512.8		723.9	44.5	24	1-5/8	285.8
600	24	939.8	101.6	717.6	609.6	139.7	184.2	203.2	616.0	616.0		692.2	6.4	12.7	614.4		838.2	50.8	24	1-7/8	330.2

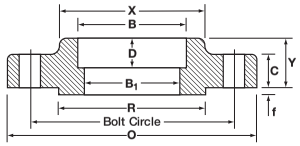
Size		Approximate piece weight in Kilograms					
DN	NPS	Blind	Weld Neck	Slip-On	Lap Joint	Socket Weld	Threaded
15	1/2	0.91	0.90	0.91	0.80	0.91	0.91
20	3/4	1.40	1.59	1.40	1.36	1.36	1.40
25	1	1.81	1.90	1.70	1.59	1.81	1.70
32	1-1/4	2.40	2.49	2.27	2.04	2.60	2.27
40	1-1/2	3.40	3.63	3.10	2.96	3.18	3.10
50	2	4.40	4.54	3.63	3.63	3.90	3.63
65	2-1/2	6.80	6.35	5.44	4.99	5.90	5.44
80	3	8.90	8.10	7.26	6.35	7.40	7.26
90	3-1/2	13.17	11.80	9.53	9.08		9.53
100	4	18.60	16.78	14.97	14.06		14.97
125	5	30.84	30.87	28.50	27.50		28.50
150	6	38.00	36.77	36.32	35.38		36.32
200	8	62.20	50.80	44.00	50.80		44.00
250	10	102.00	86.26	76.20	74.00		76.20
300	12	132.00	102.51	97.52	108.56		97.52
350	14	158.00	121.56	102.00	111.00		102.00
400	16	224.73	177.06	149.82	165.71		149.82
450	18	285.00	215.65	180.10	194.00		180.10
500	20	365.00	267.86	231.54	258.78		231.54
600	24	533.45	372.00	330.00	362.00		330.00



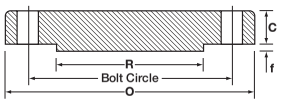
Threaded
Class 300 - 2500



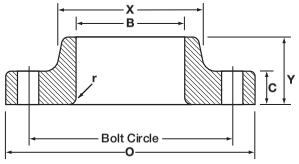
Slip-On Welding



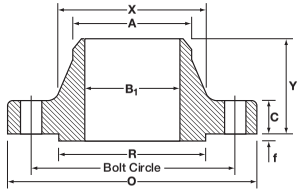
Socket Welding
½"- 3"



Blind



Lapped



Welding Neck

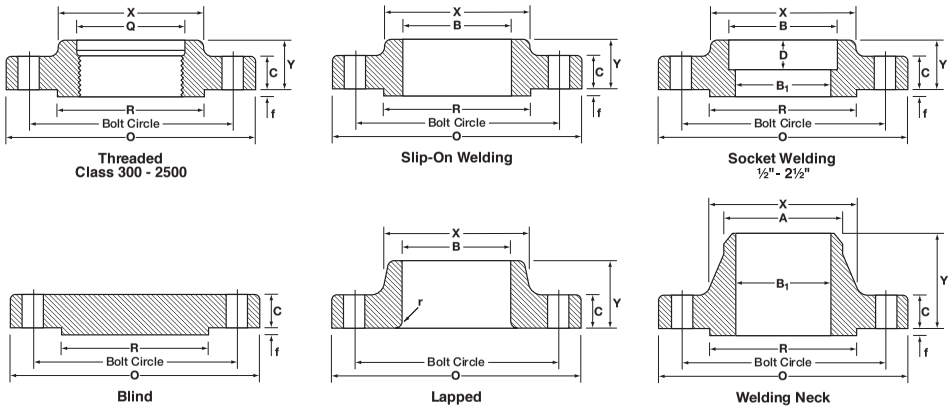
Notes:

1. Flange Raised Face Diameter and Height are based on a standard Raised Face, other flange facing types will change the “R” and “f” dimensions
2. For Threaded Flanges in this Class a counterbore is required. NPS Sizes 50 and smaller will have a 6.4 counterbore and NPS sizes 65 and larger will have a 9.5 counterbore.
3. All dimensions are converted from the ASME B16.5 inch system to millimetres using 1" = 25.4 mm and rounded to one decimal point, except where noted.
4. All weights are approximate only.

ANSI CLASS 900

Size						Length Through Hub			Bore								Bolt Information				
DN mm	Nominal Pipe Size inch	Outside Diameter of Flange O	Thickness of Flange Min. C	Diameter of Hub X	Hub Diameter Beginning of Chamfer Welding Neck A	Threaded/ Slip-On/ Socket Welding Y	Lapped Y	Welding Neck Y	Slip-On/ Socket Welding Min. B	Lapped Min. B	Welding Neck B1	Diameter of Raised Face R	Height of Raised Face f	Corner Radius of Bore of Lapped Flange and Pipe r	Counter-bore Diameter Threaded Flange Min. Q	Depth of Socket D	Diameter of Bolt Circle	Diameter of Bolt Holes	Number of Bolts	Diameter of Bolts (inch)	Length of Stud Bolts 6.4mm Raised Face
15	1/2	120.7	22.4	38.1	21.3	31.8	31.8	60.5	22.4	22.9		35.1	6.4	3.0	23.6	9.7	82.6	22.2	4	3/4	108.0
20	3/4	130.0	25.4	44.5	26.7	35.1	35.1	69.9	27.7	28.2		42.9	6.4	3.0	29.0	11.2	88.9	22.2	4	3/4	114.3
25	1	149.4	28.4	52.3	33.5	41.1	41.1	73.2	34.5	35.1		50.8	6.4	3.0	35.8	12.7	101.6	25.4	4	7/8	127.0
32	1-1/4	158.8	28.4	63.5	42.2	41.1	41.1	73.2	43.2	43.7		63.5	6.4	4.8	44.5	14.2	111.3	25.4	4	7/8	127.0
40	1-1/2	177.8	31.8	69.9	48.3	44.5	44.5	82.6	49.5	50.0		73.2	6.4	6.4	50.5	15.7	124.0	28.6	4	1	139.7
50	2	215.9	38.1	104.6	60.5	57.2	57.2	101.6	62.0	62.5		91.9	6.4	7.9	63.5	17.5	165.1	25.4	8	7/8	146.1
65	2-1/2	244.3	41.1	124.0	73.2	63.5	63.5	104.6	74.7	75.4		104.6	6.4	7.9	76.2	19.1	190.5	28.6	8	1	158.8
80	3	241.3	38.1	127.0	88.9	53.8	53.8	101.6	90.7	91.4		127.0	6.4	9.7	92.2		190.5	25.4	8	7/8	146.1
100	4	292.1	44.5	158.8	114.3	69.9	69.9	114.3	116.1	116.8	To be	157.2	6.4	11.2	117.6		235.0	31.8	8	1-1/8	171.5
125	5	349.3	50.8	190.5	141.2	79.2	79.2	127.0	143.8	144.5	specified	185.7	6.4	11.2	144.5		279.4	34.9	8	1-1/4	190.5
150	6	381.0	55.6	235.0	168.4	85.9	85.9	139.7	170.7	171.5	by the	215.9	6.4	12.7	171.5		317.5	31.8	12	1-1/8	190.5
200	8	469.9	63.5	298.5	219.2	101.6	114.3	162.1	221.5	222.3	purchaser	269.7	6.4	12.7	222.3		393.7	38.1	12	1-3/8	222.3
250	10	546.1	69.9	368.3	273.1	108.0	127.0	184.2	276.4	277.4		323.9	6.4	12.7	276.4		469.9	38.1	16	1-3/8	235.0
300	12	609.6	79.2	419.1	323.9	117.3	142.7	200.2	327.2	328.2		381.0	6.4	12.7	328.7		533.4	38.1	20	1-3/8	254.0
350	14	641.4	85.9	450.9	355.6	130.0	155.4	212.9	359.2	360.2		412.8	6.4	12.7	360.4		558.8	41.3	20	1-1/2	273.1
400	16	704.9	88.9	508.0	406.4	133.4	165.1	215.9	410.5	411.2		469.9	6.4	12.7	411.2		616.0	44.5	20	1-5/8	285.8
450	18	787.4	101.6	565.2	457.2	152.4	190.5	228.6	461.8	462.3		533.4	6.4	12.7	462.0		685.8	50.8	20	1-7/8	323.9
500	20	857.3	108.0	622.3	508.0	158.8	209.6	247.7	513.1	514.4		584.2	6.4	12.7	512.8		749.3	54.0	20	2	349.3
600	24	1041.4	139.7	749.3	609.6	203.2	266.7	292.1	616.0	616.0		692.2	6.4	12.7	614.4		901.7	66.7	20	2-1/2	438.2

Size		Approximate piece weight in Kilograms					
DN	NPS	Blind	Weld Neck	Slip-On	Lap Joint	Socket Weld	Threaded
15	1/2	1.90	2.10	1.80	1.80	1.81	1.80
20	3/4	2.72	2.72	2.27	2.27	2.81	2.27
25	1	4.08	3.86	3.40	3.40	3.61	3.40
32	1-1/4	4.30	4.54	4.10	4.09	4.99	4.10
40	1-1/2	5.90	5.90	5.45	5.40	6.76	5.45
50	2	11.30	10.89	10.50	9.53	10.89	10.50
65	2-1/2	16.00	16.34	15.80	13.15	16.34	15.80
80	3	13.17	15.00	11.80	11.34		11.80
100	4	24.50	23.13	23.20	22.60		23.20
125	5	39.46	38.50	37.65	36.74		37.65
150	6	51.50	49.89	48.30	47.50		48.30
200	8	89.00	79.45	75.00	86.00		75.00
250	10	131.54	118.04	111.13	125.64		111.13
300	12	187.00	157.00	146.00	167.00		146.00
350	14	224.07	181.60	172.36	180.07		172.36
400	16	272.40	224.73	192.95	211.11		192.95
450	18	385.90	308.72	272.40	295.10		272.40
500	20	488.00	376.82	331.42	367.74		331.42
600	24	905.00	685.00	632.00	700.00		632.00



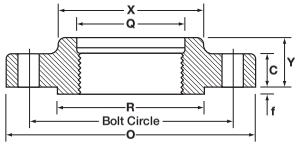
Notes:

1. Flange Raised Face Diameter and Height are based on a standard Raised Face, other flange facing types will change the “R” and “f” dimensions
2. For Threaded Flanges in this Class a counterbore is required. NPS Sizes 50 and smaller wiil have a 6.4 counterbore and NPS sizes 65 and larger will have a 9.5 counterbore.
3. All dimensions are converted from the ASME B16.5 inch system to millimetres using 1" = 25.4 mm and rounded to one decimal point, except where noted.
4. All weights are approximate only.

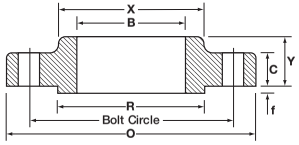
ANSI CLASS 1500

Size						Length Through Hub			Bore								Bolt Information				
DN mm	Nominal Pipe Size inch	Outside Diameter of Flange O	Thickness of Flange Min. C	Diameter of Hub X	Hub Diameter Beginning of Chamfer Welding Neck A	Threaded/ Slip-On/ Socket Welding Y	Lapped Y	Welding Neck Y	Slip-On/ Socket Welding Min. B	Lapped Min. B	Welding Neck/ Socket Welding B1	Diameter of Raised Face R	Height of Raised Face f	Corner Radius of Bore of Lapped Flange and Pipe r	Counter-bore Diameter Threaded Flange Min. Q	Depth of Socket D	Diameter of Bolt Circle	Diameter of Bolt Holes	Number of Bolts	Diameter of Bolts (inch)	Length of Stud Bolts 6.4mm Raised Face
15	1/2	120.7	22.4	38.1	21.3	31.8	31.8	60.5	22.4	22.9		35.1	6.4	3.0	23.6	9.7	82.6	22.2	4	3/4	108.0
20	3/4	130.0	25.4	44.5	26.7	35.1	35.1	69.9	27.7	28.2		42.9	6.4	3.0	29.0	11.2	88.9	22.2	4	3/4	114.3
25	1	149.4	28.4	52.3	33.5	41.1	41.1	73.2	34.5	35.1		50.8	6.4	3.0	35.8	12.7	101.6	25.4	4	7/8	127.0
32	1-1/4	158.8	28.4	63.5	42.2	41.1	41.1	73.2	43.2	43.7		63.5	6.4	4.8	44.5	14.2	111.3	25.4	4	7/8	127.0
40	1-1/2	177.8	31.8	69.9	48.3	44.5	44.5	82.6	49.5	50.0		73.2	6.4	6.4	50.5	15.7	124.0	28.6	4	1	139.7
50	2	215.9	38.1	104.6	60.5	57.2	57.2	101.6	62.0	62.5		91.9	6.4	7.9	63.5	17.5	165.1	25.4	8	7/8	146.1
65	2-1/2	244.3	41.1	124.0	73.2	63.5	63.5	104.6	74.7	75.4		104.6	6.4	7.9	76.2	19.1	190.5	28.6	8	1	158.8
80	3	266.7	47.8	133.4	88.9	73.1	73.2	117.3		91.4	To be	127.0	6.4	9.7			203.2	31.8	8	1-1/8	177.8
100	4	311.2	53.8	162.1	114.3	90.5	90.5	124.0		116.8	specified	157.2	6.4	11.2			241.3	34.9	8	1-1/4	196.9
125	5	374.7	73.2	196.9	141.2	104.8	104.8	155.4		144.5	by the	185.7	6.4	11.2			292.1	41.3	8	1-1/2	247.7
150	6	393.7	82.6	228.6	168.4	119.1	119.2	171.5		171.5	purchaser	215.9	6.4	12.7			317.5	38.1	12	1-3/8	260.4
200	8	482.6	91.9	292.1	219.2	142.9	142.9	212.9		222.3		269.7	6.4	12.7			393.7	44.5	12	1-5/8	292.1
250	10	584.2	108.0	368.3	273.1	158.8	177.9	254.0		277.4		323.9	6.4	12.7			482.6	50.8	12	1-7/8	336.6
300	12	673.1	124.0	450.9	323.9	181.0	219.1	282.4		328.2		381.0	6.4	12.7			571.5	54.0	16	2	374.7
350	14	749.3	133.4	495.3	355.6		241.3	298.5		360.2		412.8	6.4	12.7			635.0	60.3	16	2-1/4	406.4
400	16	825.5	146.1	552.5	406.4		260.4	311.2		411.2		469.9	6.4	12.7			704.9	66.7	16	2-1/2	444.5
450	18	914.4	162.1	596.9	457.2		276.4	327.2		462.3		533.4	6.4	12.7			774.7	73.0	16	2-3/4	495.3
500	20	984.3	177.8	641.4	508.0		292.1	355.6		514.4		584.2	6.4	12.7			831.9	79.4	16	3	539.8
600	24	1168.4	203.2	762.0	609.6		330.2	406.4		616.0		692.2	6.4	12.7			990.6	92.1	16	3-1/2	616.0

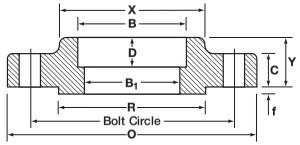
Size		Approximate piece weight in Kilograms					
DN	NPS	Blind	Weld Neck	Slip-On	Lap Joint	Socket Weld	Threaded
15	1/2	1.90	2.10	1.80	1.80	1.81	1.80
20	3/4	2.72	2.72	2.27	2.27	2.81	2.27
25	1	4.08	3.86	3.40	3.40	3.61	3.40
32	1-1/4	4.30	4.54	4.10	4.09	4.99	4.10
40	1-1/2	5.90	5.90	5.45	5.40	6.76	5.45
50	2	11.30	10.89	10.50	9.53	10.89	10.50
65	2-1/2	16.00	16.34	15.80	13.15	16.34	15.80
80	3	21.79	21.79		17.24		
100	4	33.11	31.30		29.00		
125	5	60.00	59.02		54.00		
150	6	75.00	74.91		62.00		
200	8	136.98	123.83		129.73		
250	10	229.97	205.93		220.19		
300	12	316.00	306.00		286.02		
350	14	421.00	416.00		404.06		
400	16	559.00	567.50		522.10		
450	18	761.00	736.00		669.65		
500	20	967.00	929.00		805.85		
600	24	1568.00	1504.00		1285.55		



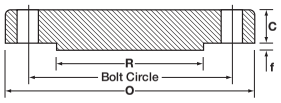
Threaded
Class 300 - 2500



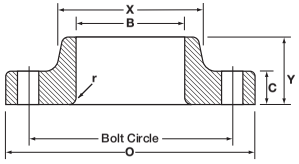
Slip-On Welding



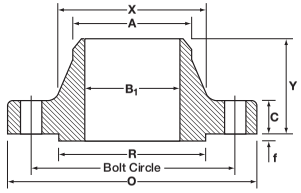
Socket Welding
½"- 2½"



Blind



Lapped



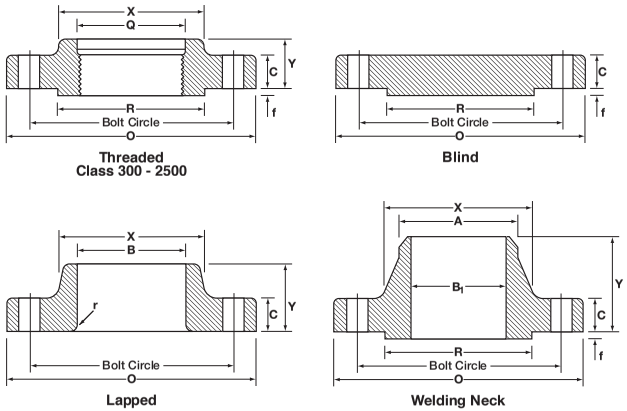
Welding Neck

Notes:

1. Flange Raised Face Diameter and Height are based on a standard Raised Face, other flange facing types will change the “R” and “f” dimensions
2. For Threaded Flanges in this Class a counterbore is required. NPS Sizes 50 and smaller will have a 6.4 counterbore and NPS sizes 65 and larger will have a 9.5 counterbore.
3. All dimensions are converted from the ASME B16.5 inch system to millimetres using 1" = 25.4 mm and rounded to one decimal point, except where noted.
4. All weights are approximate only.

Size						Length Through Hub			Bore						Bolt Information				
DN mm	Nominal Pipe Size inch	Outside Diameter of Flange O	Thickness of Flange Min. C	Diameter of Hub X	Hub Diameter Beginning of Chamfer Welding Neck A	Threaded Y	Lapped Y	Welding Neck Y	Lapped Min. B	Welding Neck/ Socket Welding B1	Diameter of Raised Face R	Height of Raised Face f	Corner Radius of Bore of Lapped Flange and Pipe r	Counter-bore Diameter Threaded Flange Min. Q	Diameter of Bolt Circle	Diameter of Bolt Holes	Number of Bolts	Diameter of Bolts (inch)	Length of Stud Bolts 6.4mm Raised Face
15	1/2	133.4	30.2	42.9	21.3	39.6	39.6	73.2	22.9		35.1	6.4	3.0	23.6	88.9	22.2	4	3/4	120.7
20	3/4	139.7	31.8	50.8	26.7	42.9	42.9	79.2	28.2		42.9	6.4	3.0	29.0	95.3	22.2	4	3/4	127.0
25	1	158.8	35.1	57.2	33.5	47.8	47.8	88.9	35.1		50.8	6.4	3.0	35.8	108.0	25.4	4	7/8	139.7
32	1-1/4	184.2	38.1	73.2	42.2	52.3	52.3	95.3	43.7		63.5	6.4	4.8	44.5	130.0	28.6	4	1	152.4
40	1-1/2	203.2	44.5	79.2	48.3	60.5	60.5	111.3	50.0		73.2	6.4	6.4	50.5	146.1	31.8	4	1-1/8	171.5
50	2	235.0	50.8	95.3	60.5	69.9	69.9	127.0	62.5	To be	91.9	6.4	7.9	63.5	171.5	28.6	8	1	177.8
65	2-1/2	266.7	57.2	114.3	73.2	79.2	79.2	142.7	75.4	specified	104.6	6.4	7.9	76.2	196.9	31.8	8	1-1/8	196.9
80	3	304.8	66.5	133.4	88.9		91.9	168.1	91.4	by the	127.0	6.4	9.7		228.6	34.9	8	1-1/4	222.3
100	4	355.6	76.2	165.1	114.3		108.0	190.5	116.8	purchaser	157.2	6.4	11.2		273.1	41.3	8	1-1/2	254.0
125	5	419.1	91.9	203.2	141.2		130.0	228.6	144.5		185.7	6.4	11.2		323.9	47.6	8	1-3/4	298.5
150	6	482.6	108.0	235.0	168.4		152.4	273.1	171.5		215.9	6.4	12.7		368.3	54.0	8	2	342.9
200	8	552.5	127.0	304.8	219.2		177.8	317.5	222.3		269.7	6.4	12.7		438.2	54.0	12	2	381.0
250	10	673.1	165.1	374.7	273.1		228.6	419.1	277.4		323.9	6.4	12.7		539.8	66.7	12	2-1/2	489.0
300	12	762.0	184.2	441.5	323.9		254.0	463.6	328.2		381.0	6.4	12.7		619.3	73.0	12	2-3/4	539.8

Size		Approximate piece weight in Kilograms			
DN	NPS	Blind	Weld Neck	Lap Joint	Threaded
15	1/2	3.18	3.18	3.00	3.18
20	3/4	4.54	4.08	3.63	4.08
25	1	5.44	5.45	4.99	5.44
32	1-1/4	8.16	9.07	7.26	8.16
40	1-1/2	10.44	11.35	9.99	11.00
50	2	17.71	19.07	16.80	17.25
65	2-1/2	25.42	23.61	24.06	24.97
80	3	39.04	42.68	36.32	
100	4	60.38	64.00	54.48	
125	5	101.15	110.68	92.53	
150	6	156.63	176.46	143.01	
200	8	240.62	261.27	213.38	
250	10	465.36	484.43	408.60	
300	12	664.06	692.35	572.95	



Notes:

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2. For Threaded Flanges in this Class a counterbore is required. NPS Sizes 50 and smaller wiil have a 6.4 counterbore and NPS sizes 65 and larger will have a 9.5 counterbore.
3. All dimensions are converted from the ASME B16.5 inch system to millimetres using 1" = 25.4 mm and rounded to one decimal point, except where noted.
4. All weights are approximate only.

PRESSURE TEMPERATURE RATINGS BAR

	Class 150			Class 300			Class 600			Class 900			Class 1500			Class 2500		
Temp °C	304	316	304L 316L	304	316	304L 316L	304	316	304L 316L	304	316	304L 316L	304	316	304L 316L	304	316	304L 316L
-29 to 38	19.0	19.0	15.9	49.6	49.6	41.4	99.3	99.3	82.7	148.9	148.9	124.1	248.2	248.2	206.8	413.7	413.7	344.7
50	18.3	18.4	15.3	47.8	48.1	40.0	95.6	96.2	80.0	143.5	144.3	120.1	239.1	240.6	200.1	398.5	400.9	333.5
100	15.7	16.2	13.3	40.9	42.2	34.8	81.7	84.4	69.6	122.6	126.6	104.4	204.3	211.0	173.9	340.4	351.6	289.9
150	14.2	14.8	12.0	37.0	38.5	31.4	74.0	77.0	62.8	111.0	115.5	94.2	185.0	192.5	157.0	308.4	320.8	261.6
200	13.2	13.7	11.2	34.5	35.7	29.2	69.0	71.3	58.3	103.4	107.0	87.5	172.4	178.3	145.8	287.3	297.2	243.0
250	12.1	12.1	10.5	32.5	33.4	27.5	65.0	66.8	54.9	97.5	100.1	82.4	162.4	166.9	137.3	270.7	278.1	228.9
300	10.2	10.2	10.0	30.9	31.6	26.1	61.8	63.2	52.1	92.7	94.9	78.2	154.6	158.1	130.3	257.6	263.5	217.2
325	9.3	9.3	9.3	30.2	30.9	25.5	60.4	61.8	51.0	90.7	92.7	76.4	151.1	154.4	127.4	251.9	257.4	212.3
350	8.4	8.4	8.4	29.6	30.3	25.1	59.3	60.7	50.1	88.9	91.0	75.2	148.1	151.6	125.4	246.9	252.7	208.9
375	7.4	7.4	7.4	29.0	29.9	24.8	58.1	59.8	49.5	87.1	89.6	74.3	145.2	149.4	123.8	241.9	249.0	206.3
400	6.5	6.5	6.5	28.4	29.4	24.3	56.9	58.9	48.6	85.3	88.3	72.9	142.2	147.2	121.5	237.0	245.3	202.5
425	5.5	5.5	5.5	28.0	29.1	23.9	56.0	58.3	47.7	84.0	87.4	71.6	140.0	145.7	119.3	233.3	242.9	198.8
450	4.6	4.6	4.6	27.4	28.8	23.4	54.8	57.7	46.8	82.2	86.5	70.2	137.0	144.2	117.1	228.4	240.4	195.1
475	3.7	3.7		26.9	28.7		53.9	57.3		80.8	86.0		134.7	143.4		224.5	238.9	
500	2.8	2.8		26.5	28.2		53.0	56.5		79.5	84.7		132.4	140.9		220.7	235.0	
538	1.4	1.4		24.4	25.2		48.9	50.0		73.3	75.2		122.1	125.5		203.6	208.9	
550				23.6	25.0		47.1	49.8		70.7	74.8		117.8	124.9		196.3	208.0	
575				20.8	24.0		41.7	47.9		62.5	71.8		104.2	119.7		173.7	199.5	
600				16.9	19.9		33.8	39.8		50.6	59.7		84.4	99.5		140.7	165.9	
625				13.8	15.8		27.6	31.6		41.4	47.4		68.9	79.1		114.9	131.8	
650				11.3	12.7		22.5	25.3		33.8	38.0		56.3	63.3		93.8	105.5	
675				9.3	10.3		18.7	20.6		28.0	31.0		46.7	51.6		77.9	86.0	
700				8.0	8.4		16.1	16.8		24.1	25.1		40.1	41.9		66.9	69.8	
725				6.8	7.0		13.5	14.0		20.3	21.0		33.8	34.9		56.3	58.2	
750				5.8	5.9		11.6	11.7		17.3	17.6		28.9	29.3		48.1	48.9	
775				4.6	4.6		9.0	9.0		13.7	13.7		22.8	22.8		38.0	38.0	
800				3.5	3.5		7.0	7.0		10.5	10.5		17.4	17.4		29.2	29.2	
816				2.8	2.8		5.9	5.9		8.6	8.6		14.1	14.1		23.8	23.8	

Notes:

1. The Pressure-Temperature information was obtained from ASME B16.5-2009. For full details regarding the Pressure-Temperature ratings of other materials refer to the standard.
2. Pressure Ratings are maximum allowable working gauge pressures in bar at the temperatures shown for the applicable material.
3. For ASTM A182 and ASTM A240 material grades 304 and 316, where the temperature exceeds 538°C the Carbon (C) content must be ≥ 0.04%.
4. For ASTM A182 and ASTM A240 material grade 304L, it is not to be used when the temperature exceeds 425°C.

Stainless Steel Shim

Grade 316 shim, annealed and with a hardness rating of HV200, is available in coiled 305 mm (12") wide rolls, in various thicknesses and sold by the linear metre.

PART NUMBER	THICKNESS
SHIM305X051A	0.051 mm (0.002")
SHIM305X076A	0.076 mm (0.003")
SHIM305X100A	0.1 mm (0.004")
SHIM305X120A	0.12 mm (0.005")
SHIM305X150A	0.15 mm (0.006")
SHIM305X203A	0.203 mm (0.008")
SHIM305X254A	0.254 mm (0.010")
SHIM305X305A	0.305 mm (0.012")
SHIM305X376A	0.376 mm (0.015")
SHIM305X390A	0.39 mm (0.015")
SHIM305X500A	0.5 mm (0.020")

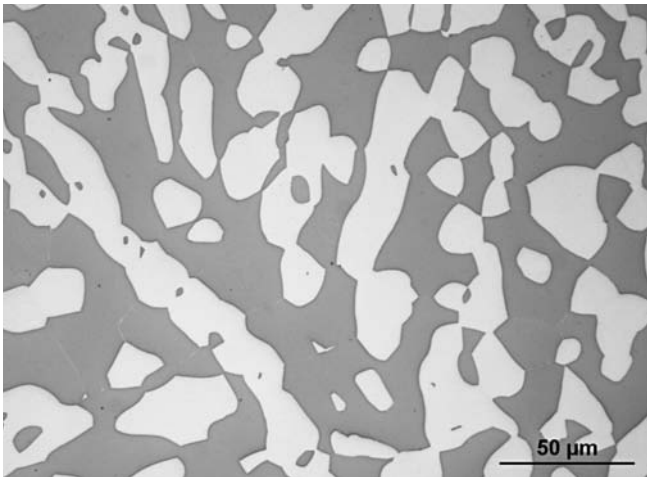
Duplex

Prochem Pipeline Products, offer a comprehensive range of Duplex UNS 31803 & Super Duplex UNS S32750 / UNS S32760 TUBE, PIPE, FITTINGS and FLANGES to suit global industry.

Duplex in these forms are available either through stocks held in Australia and Singapore or through our worldwide network of stockists and mill manufacturers.

Duplex Stainless Steels are unlike the 300 (Austenitic) and 400 (Ferritic) series of stainless steels in that they have a structure consisting of approximately equal amounts of both ferrite and austenite. Therefore, they are often referred to as ferritic-austenitic stainless steels.

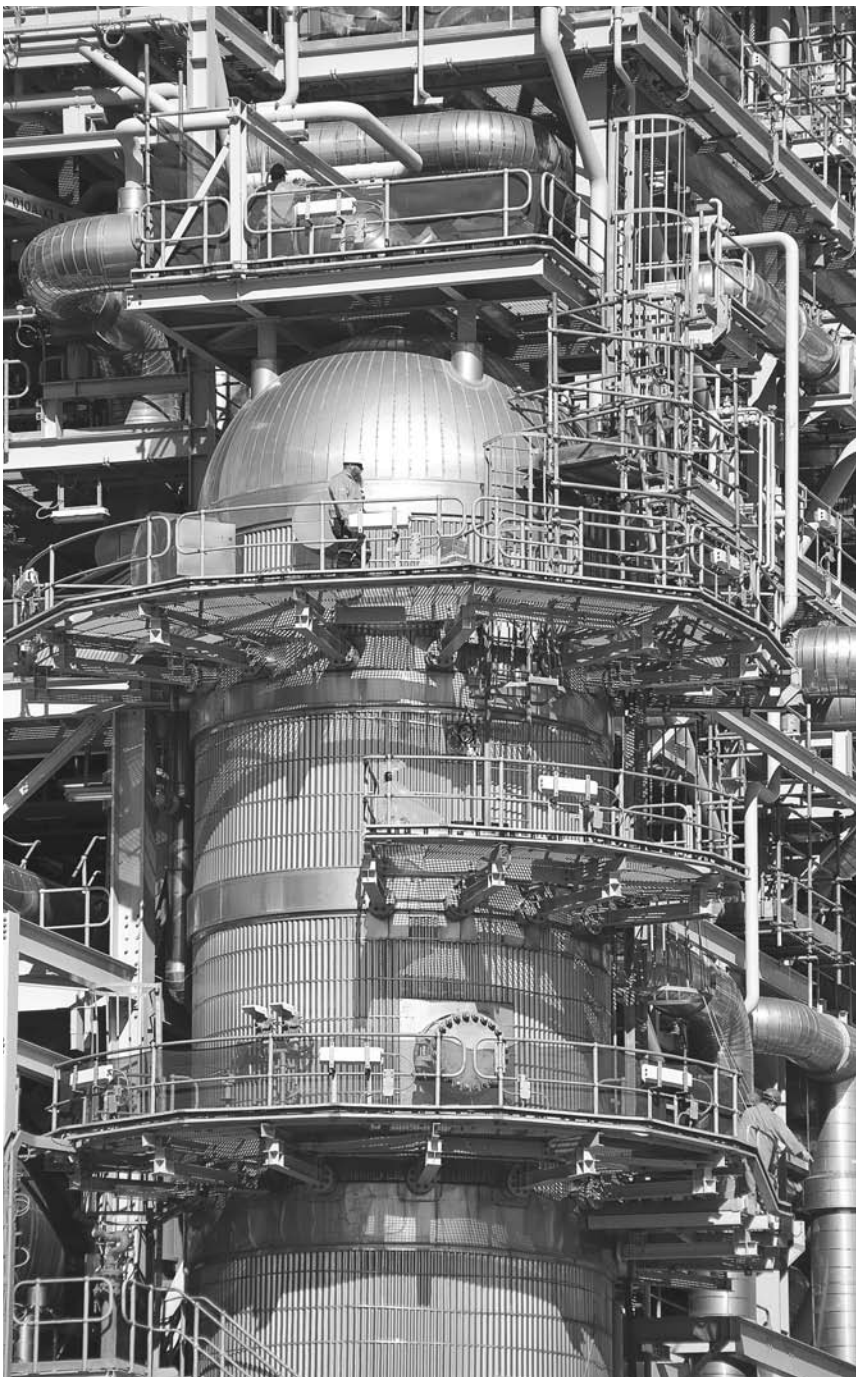
Typical Duplex Microstructure



With a chromium content ranging from 18 to 28%, they have **improved passivity** compared to standard grades. The nickel content ranges from 4.5 to 8% which is insufficient to promote a complete austenitic crystal structure, hence the mixed ferrite-austenite structure. Most grades contain molybdenum in the range of 2.5 to 4% plus small amounts of nitrogen – enhancing both strength and pitting resistance.

We have a Duplex piping product to suit your particular application – **so please contact our staff at your nearest Prochem office.**

Left: Typical micrograph of Duplex Stainless Steel showing approximately equal proportions of austenite and ferrite. The darker phase is ferrite and the lighter phase is austenite.



Basic properties of Duplex stainless steels include:

- Duplex crystal structure of ferrite and austenite resulting in a high resistance to stress corrosion cracking.
- Increased passivity due to the higher Chromium, Molybdendum and Nitrogen contents.
- Good weldability and formability.
- Higher tensile and yield strength compared with the austenitic and ferritic stainless steels.
- Improved uniform corrosion resistance.

Typical Applications:

- Shell and tube heat exchangers offshore.
- Heat exchangers and pipes in desalination plants.
- Offshore process systems.
- Offshore seawater systems.
- Pressure vessels, pipes, tanks and heat exchangers for processing and transport of various chemicals.
- Pressure vessels, tanks and pipes in process industries handling solutions containing chlorides or sulphur.
- Mechanical and structural components demanding high strength coupled with high corrosion resistance.

DUPLEX GRADES, COMPOSITIONS AND FORMS

UNS No.	Forms Available*	Typical Compositions (%) C	Cr	Ni	Mo	N	Cu	W	Typical Applications
S31803 S32205	Plate, Pipe, Bar, Fittings	0.03	22.0	5.5	3.0	0.14	-	-	Superior corrosion resistance to 316L and 317L, combined with high strength. Excellent stress corrosion and abrasion resistance. Typically used in heat exchangers, gas scrubbers, fans, chemical tanks, flowlines, marine and refinery applications.
S32750	Plate, Pipe, Bar, Fittings	0.03	25.0	7.0	4.0	0.3	-	-	Extremely high resistance to corrosion in severe marine, chloride and acid environments. Suitable for heat exchangers, reactors, pipework, etc.
S32760	Plate, Pipe, Bar, Fittings	0.02	25.0	7.0	3.5	0.25	0.7	0.7	Extremely high resistance to corrosion in severe marine, chloride and acid environments. Suitable for heat exchangers, reactors, pipework, etc.

*Compatible or equivalent grades also available in castings.

Resistance to SCC

With much of Australian industry being coastal, Stress Corrosion Cracking or Chloride Stress Corrosion Cracking is prominent due to the chloride contained in the salt spray from the ocean.

Typically with austenitic stainless steels cracking can proceed uninhibited once the first crack forms.

While a crack may form in the austenitic phase of Duplex stainless steels, due to the hard nature of the ferrite, the crack is blunted and the crack is stopped when the crack reaches the ferrite phase. This gives Duplex stainless steels an inherent resistance to Stress Corrosion Cracking and Chloride Stress Corrosion Cracking.

Strength of Duplex Stainless Steels

The strength of Duplex stainless steels is increased when compared to that of austenitic stainless steels. While the increased alloying elements of Duplex stainless steels would tend to increase the cost, in some applications the wall thickness required can reduce significantly and hence the overall cost can be only slightly higher than that of austenitic stainless steels.

Comparison of Typical Strengths for Different Materials

Material	Yield Strength (MPa)	Tensile Strength (MPa)
Super Duplex	550	750
Duplex	450	620
316/316L	205	515

Duplex Stainless Steels and Temperature

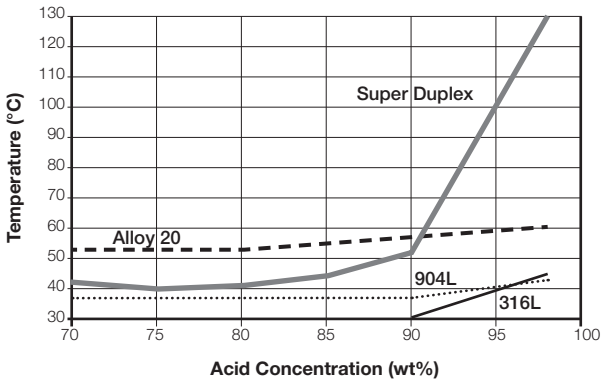
Due to the higher alloying elements used and the inherent resistance to SCC, Duplex materials can resist general corrosion to higher temperatures than 300 series austenitic stainless steels.

Coupled with increased strengths to handle high pressures, it is common to find Duplex stainless steels in offshore applications up to 120°C.

Sulphuric Acid Resistance

As well as being resistant to Chloride attack, Duplex stainless steels can be used successfully in Sulphuric Acid applications when typically industry has turned to high Nickel alloys. For applications where Duplex materials are suitable, substantial cost savings can be achieved relative to alternate materials.

Iso-corrosion curve (0.1 mm/y) for some alloys in concentrated Sulphuric Acid



Low Temperature and Cryogenic Applications

Care must be taken when using Duplex materials in low temperature applications. Duplex materials undergo a Ductile to Brittle Transformation meaning the impact required to fracture the material is significantly reduced. It is common to have Duplex materials Impact Tested to ensure the material is fit for purpose. Contact Prochem's metallurgical team for more information on how the properties of Duplex materials suit your application.

Manufacturing

With the higher strengths of Duplex materials, working with them can be difficult. Prochem's Manufacturing Facility is ISO 9001:2008 certified to design and manufacture your Duplex threaded and machined fittings up to pressures of 10,000 psi or higher. Contact your local branch with your requirement for a customised and fully traceable solution.

Welded Duplex Tube

PART NO	DESCRIPTION
T019.1DJAW	19.1OD X 1.6WT AW TUBE ASTM A789 UNS S31803
T025.4DJAW	25.4OD X 1.6WT AW TUBE ASTM A789 UNS S31803
T038.1DJAW	38.1OD X 1.6WT AW TUBE ASTM A789 UNS S31803
T050.8DJAW	50.8OD X 1.6WT AW TUBE ASTM A789 UNS S31803
T063.5DJAW	63.5OD X 1.6WT AW TUBE ASTM A789 UNS S31803
T076.2EJAW	76.2OD X 2.1WT AW TUBE ASTM A789 UNS S31803
T101.6EJAW	101.6OD X 2.1WT AW TUBE ASTM A789 UNS S31803

Welded Duplex Tube to:
ASTM SA789/A789 UNS S31803/S32205

Applications

- Desalination
- Chemical Processing
- Pulp and Paper
- Power Generation
- Boat Building

CONVERSION TABLES

VOLUME

Convert	into…	multiply by:
cc	ft^3	0.00003531
	in^3	0.06102
	litre	0.001
	m^3	0.000001
	US quart	0.0010567
	US gallon	0.0002642
ft^3	cc	28,317
	in^3	1728
	litre	28.317
	m^3	0.028317
	US quart	29.92
	US gallon	7.4805
in^3	cc	16.387
	ft^3	0.0005787
	litre	0.016387
	m^3	0.0000163
	US quart	0.01732
	US gallon	0.004329
litre	cc	1,000
	ft^3	0.03531
	in^3	61.023
	m^3	0.001
	US quart	1.057
	US gallon	0.2642
m^3	cc	1,000,000
	ft^3	35.31
	in^3	61,023
	litre	1,000
	US quart	1056.8
	US gallon	264.2
US quart	cc	946.25
	ft^3	0.03342
	in^3	57.75
	litre	0.9463
	m^3	0.0009463
	US gallon	0.25
US gallon	cc	3,785
	ft^3	0.1337
	in^3	231
	litre	3.785
	m^3	0.003785
	US quart	4

TEMPERATURE

degree F = (degree C x 1.8) + 32
degree C = (degree F – 32) / 1.8

Certified Quality
Management System
(Australia & Singapore)

AREA

Convert	into…	multiply by:
cm^2	ft^2	0.0010764
	in^2	0.155
	m^2	0.0001
	mm^2	100
ft^2	cm^2	929.0304
	in^2	144
	m^2	0.092903
	mm^2	92903.04
in^2	cm^2	6.4516
	ft^2	0.006944
	m^2	0.0006451
	mm^2	645.16
m^2	cm^2	10,000
	ft^2	10.76391
	in^2	1,550
	mm^2	1,000,000
mm^2	cm^2	0.01
	ft^2	0.000010764
	in^2	0.00155
	m^2	0.000001

PRESSURE

Convert	into…	multiply by:
atm	bar	1.01325
	kg/cm^2	1.0332
	PSI	14.696
	MPa	0.101325
	KPa	101.325
bar	atm	0.98692
	kg/cm^2	1.01971
	PSI	14.504
	MPa	0.1
	KPa	100
kg/cm^2	atm	0.96784
	bar	0.98067
	PSI	14.223
	MPa	0.098067
	KPa	98.0665
MPa	atm	9.869232
	bar	10
	kg/cm^2	10.1971
	PSI	145.04
	KPa	1,000
KPa	atm	0.009869
	bar	0.01
	kg/cm^2	0.010197
	PSI	0.145037
	MPa	0.001
PSI	atm	0.068046
	bar	0.068947
	kg/cm^2	0.070307
	MPa	0.0068948
	KPa	6.89475

FLOW

Convert	into…	multiply by:
cc/min	ft^3/min	0.0000353145
	gal/min US	0.0002642
	in^3/min	0.061
	L/min	0.001
ft^3/min	cc/min	28,320
	gal/min US	7.48
	in^3/min	1728
	L/min	28.32
gal/min US	cc/min	3785.4
	ft^3/min	0.1337
	in^3/min	231
	L/min	3.7854
in^3/min	cc/min	16.39
	ft^3/min	0.00057
	L/min	0.016
	gal/min US	0.004
L/min	cc/min	1,000
	ft^3/min	0.03531
	in^3/min	61.02
	gal/min US	0.26417

LINEAR

Convert	into…	multiply by:
cm	ft	0.032808
	in	0.3937
	metres	0.01
	microns	10,000
	mm	10
ft	cm	30.48
	in	12
	metres	0.3048
	microns	304,800
	mm	304.8
in	cm	2.54
	ft	0.08333
	metres	0.0254
	microns	25,400
	mm	25.4
metres	cm	100
	ft	3.28083
	in	39.37
	microns	1,000,000
	mm	1,000
microns	cm	0.0001
	ft	0.000003281
	in	0.00003937
	metres	0.000001
	mm	0.001
mm	cm	0.1
	ft	0.003281
	in	0.03937
	metres	0.001
	microns	1000

PROCHEM
PIPELINE PRODUCTS

FOR FURTHER DETAILS PLEASE CONTACT YOUR LOCAL PROCHEM OFFICE

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