STIRLINGS

PERFORMANCE STEELS

PRODUCT HANDBOOK

FEB 2019



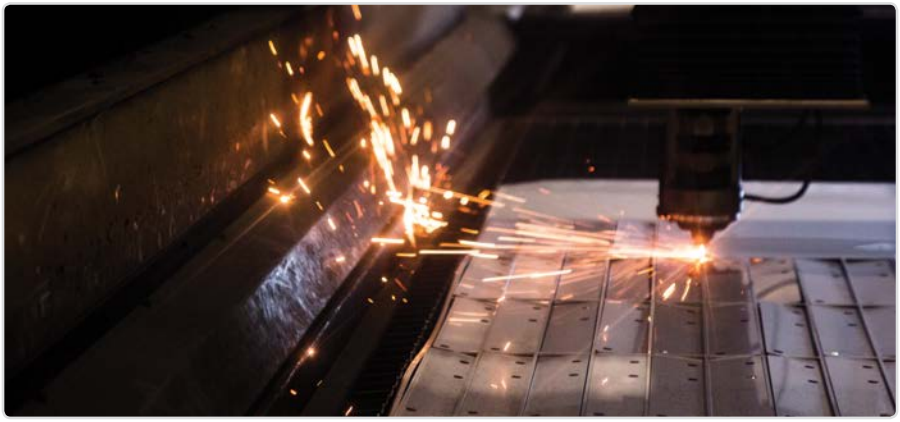


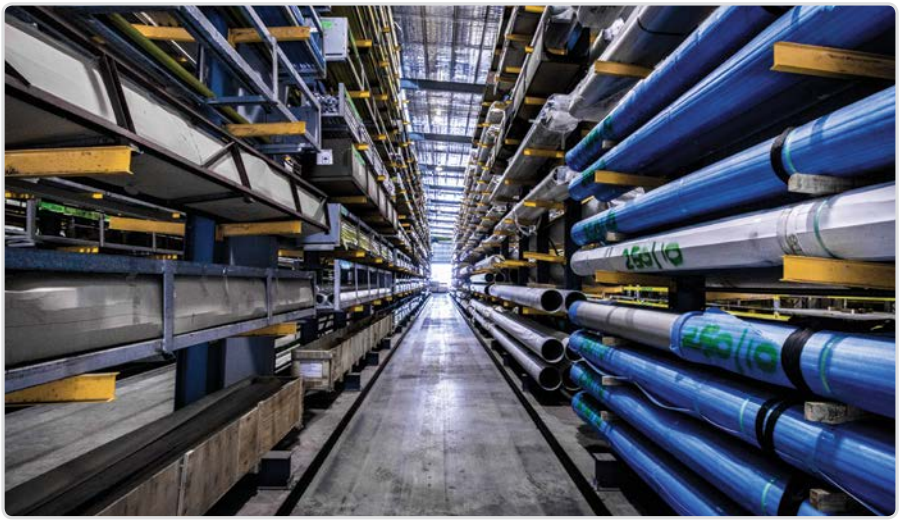







STAINLESS STEEL - DUPLEX - COPPER NICKEL - NICKEL ALLOYS





DISCLAIMER

Whilst care was taken in the preparation of the data contained in this handbook, Stirlings Performance Steels accepts no liability for the accuracy of information supplied and should be used as a guide only.

TERMS & CONDITIONS OF SALE:

A full copy of Stirlings Performance Steels' Terms & Conditions of Sale document is available on: www.stirlingsaustralia.com.au

PRODUCT WARRANTY:

Stirlings Performance Steels warrants the quality of our products. Warranty liability extends to the value of the product supplied or the replacement of only, at Stirlings' option. Stirlings Performance Steels does not accept any claim for consequential loss.

Date: FEB 2019

Company Introduction

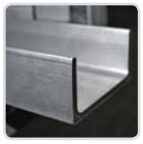
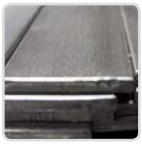
Stirlings Performance Steels has established itself as a highly recognised leading stockholder of Stainless Steel and Copper Nickel products. As an ISO 9001-2015 accredited company, Stirlings strives for continual improvement. We have built our foundations on the commitment to provide integrity, innovation and flexibility to all our local and international customers. As a private company operating for four decades, we have a strong belief in value for the service we provide our customers. With a focus on both domestic and international growth, you can be confident we will successfully provide global supply options for your requirements.

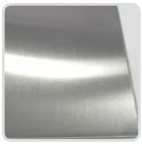
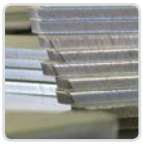
Through continuous improvement and investment, Stirlings has implemented a range of value-added services from our in-house processing to metro delivery solutions. We are committed to providing quality products and innovative supply solutions to cater to each of our customer's needs. Our comprehensive product lines of stainless steel and copper nickel are as diverse as the customers we serve. With an expansive network of suppliers globally, you can be assured we can locate even the hardest "hard to find" products.

Our Main Industries supplied include:

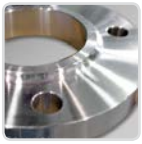
- Building & Architecture
- Engineering & Fabrication
- Food & Beverage
- Marine & Transport
- Resource & Construction

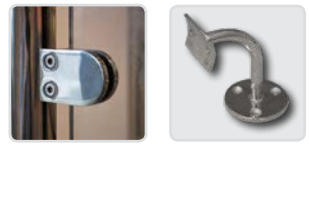
Moving toward the future, Stirlings will continue to strive for excellence in service, embrace & deliver technological improvements and work continuously to meet our customer requirements at all times.

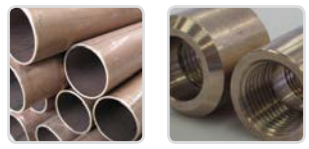








Shop

At Stirlings Performance Steels, we pride ourselves on our dedication to serving customers. Our committed team of sales staff is available Monday to Friday, to take your calls and assist you with any enquiry. Stirlings now has a walk-in shop area located on site*. Stocking a large range of fittings, fasteners, balustrading, bar, pipe and tube, customers have full access to review the quality of stock with the help of our friendly staff.

* Western Australia, Tasmania & Queensland sites

If we don't stock it, we will find it for you! Our Shop Team are there to help you plan and deliver your next big DIY project. For professional advice and assistance visit the shop or call Stirlings for more.

* **No Minimum Orders** - All customers welcome, with no order too small.

* **Public Welcome** - Our shop sales are open to the public. And if you are more of a regular, you can open up an account for trade pricing and credit.

* **Technical Advice** - Our friendly sales team, are able to offer advice on product application and maintenance.

Picture: WA Shop

Project & Indent Supply

Stirlings Performance Steels is a well-established Australian & international supplier of stainless & performance steel products. Supported by an established network of international manufacturers, suppliers, stockists and logistics companies, we are confident of our abilities to assist you in sourcing virtually any specialised material, products & services.

With more than 40 years of experience, we pride ourselves on our reliability, understanding and service in Project & Indent supply. We understand the need to be flexible, and our experience allows us to foresee and prepare for any further requirements for projects. Our expert team of professionals is dedicated to servicing this business and is committed to the success of the industries and the companies that serve them.

Stirlings is a customer-focused company committed to providing our customers with Top Quality Products, Excellent Value and Outstanding Service. Our Projects & Indent team offers door to door packages providing fast response, flexible logistics and strong industry knowledge & experience.

BAR
- Angle 304, 316
- Flat 304, 316, 2205
- Round 304, 316, 630, 2205, 2507, Aquamet 22, Nickel Alloys
- Square 304, 316

PLATE:
- 2205/2507/2101 Duplex
- 304, 304L, 304H, 347
- 316, 316L, 316Ti
- 253MA
- 321, 321H
- 310/S
- N08904 (904L)
- 625
- 825
- Monel 400
- Copper Nickel 90/10 + 70/30
- Titanium
- Carbon Steel Plate
- Plasma & Laser Cutting Service

FLANGES:
- Table: D, E, F, H
- DIN
- ANSI CLASS 150 - 2500

PIPE:
- Welded & Seamless
- Large Bore Specialists
- 304, 316, 310, 321, S30815, 2205, 2507, Nickel Alloys, Carbon Steels

PRESSURE FITTINGS:
- 3000LB +

STRUCTURAL:
- Beams & Special Sections
- Pressed, Laser Welded
- Norsok Approved Product

BUTT-WELD FITTINGS:
- Welded & Seamless

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Jay Walton
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Project & Indent
Pipe Fittings & Flanges
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Heat Exchanger Supply

Stirlings Performance Steels are specialist suppliers of Heat Exchanger Tubes in Australia, New Zealand & South East Asia. Our dedicated Project & Indent team provide years of industry knowledge and service specialising in a range of Heat Exchanger projects. Using globally recognized approved manufacturers, Stirlings can offer a door-door package from custom manufacturing to local delivery.

Stirlings Performance Steels can supply:

- Material Grade: Carbon Steel (A179/A210/A192, PG 235), Stainless Steel (304/316/310S/317/321/347) Duplex 2205 (UNS31803 /UNS32205) & Super duplex 2507 UNS32750 /UNS32760), Nickel Alloy (200/400/601/625 GR1 + GR2 /718/825), + Titanium, Copper Alloy's(UNS71500, C70600, C68700, C44300/C44400/C44500) Chrome Moly & Other special alloys on request
- Straight Tubes
- U - Tubes
- Finning Applied G type, L + K + H, Extruded, Low fin/Integral
- Testing – Heat treatment (standard & custom requirements)
- Complete with material test certificates U tube & fin reports along with Heat treatment & dimensional reports (where applicable)
- Supplied according to the latest Specification Supplementary requirements & Addendum's.

Authorized Agent of Salem Tube International UK (10 Years): (Australia / New Zealand)
www.salemtube.net

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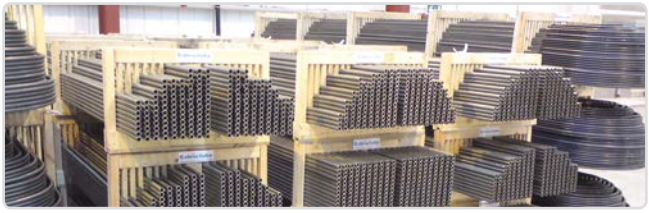


Some reference projects and companies Stirlings has proudly supplied to:

Perth Arena, Fiona Stanley Hospital, Elizabeth Quay, Austal Ships, BHP Billiton, Olympic Dam, Kalgoorlie Nickel Smelter, Kwinana Nickel Refinery, Hismelt, Minara Resources, Joe White Maltings, Downer Energy, Dampier Salt, Woodside, Worsley Alumina, DRI/HBI, BP Kwinana, Dyno Noble, Alcan Gove, CSBP, Stanwell Power Station, Caltex Refinery QLD/NSW, Dalby Ethanol Plant, Exxon Mobile, CB & I, Bechtel, Shell/Vitol Geelong, Methanex, NZ Refining, Chevron Australia, Tronox, Ballance Fertiliser NZ, Incitec Pivot, Orica, Alcoa, Veolia, JGC-Inpex, Santos QLNG, Stanwell Power Station, Clough Engineering, Shell Brunei and many more...

Material Processing

Stirlings Performance Steels offers a range of material processing services. With inventory and machinery all under one roof, Stirlings provides high-quality finished products with fast turnaround. Stirlings can further source processing services including drilling, machining, guillotining & more. See following information for our current range of services.

LASER CUTTING

The LVD Impuls 6020 6KW flying optic laser cutting machine is designed to precision cut sheet and plate. It also facilitates marking and engraving. Capabilities:

- 6KW Laser
- 0.55mm to 20mm thickness
- Plate sizes to 6020mm x 2000mm
- Fast Turnaround (inventory and processing are under one roof)
- Competitive Pricing
- Years of Experience
- Dedicated Stainless Cutting

BAND SAW CUTTING + COLD SAW

Stirlings Performance Steels has introduced a range of quality Bandsaws. From being able to cut 4.76mm Tube to 900NB Large Bore Pipe. Stirlings can cut Stainless Steel, Duplex, Nickel Alloy, Copper Nickel & more. Enquire now for your next cut job.

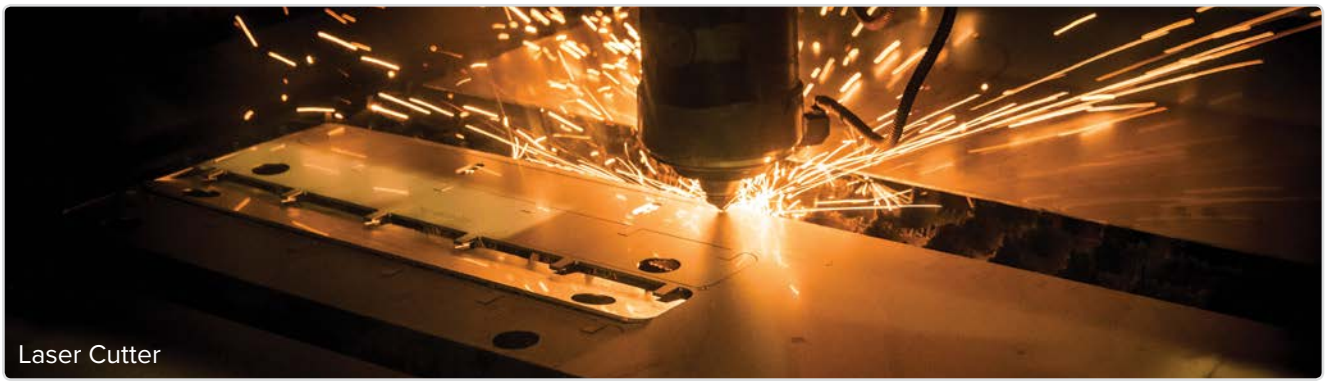
PLASMA CUTTING

Stirlings Performance Steels' high definition plasma cutter. Custom cuts profile shapes to your exact specification with finished edges superior to standard plasma cutters. Plasma cutting for plate 3mm to 65mm:

- Design Development + Nesting
- Estimating
- DXF file communication
- High-Quality edge finish
- Prompt and reliable service
- Plate sizes to 3.2mtr x 14mtr

POLISHING

Stirlings also offers a Round & Oval Tube + Pipe Polishing service. Capable of belt polishing up to #600 grit finish up to 114mm diameter.


Laser Cutter


Polisher


Band Saw


Plasma Cutter

Despatch and Receival

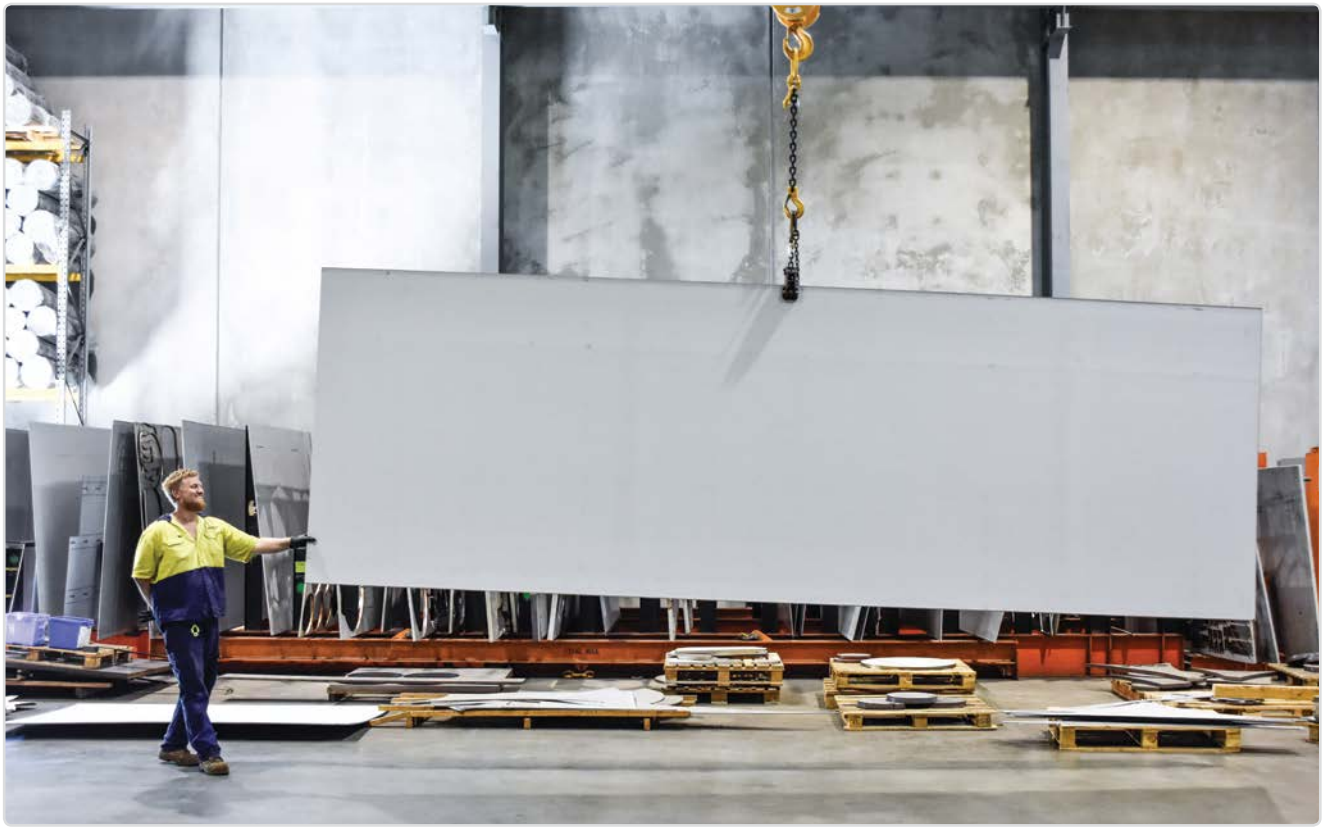
Receival
For product & goods coming into Stirlings Performance Steels, our Receivals Department was established to de-stuff, re-stock and review all products coming in from our vast catalogue of supply. The Receivals team handles each incoming package with care and specially made materials handling equipment. From there, the products are checked for quality purposes and relocated to the stock holding facility of the warehouse.

Despatch
Stirlings' Despatch Department has been established to ensure an efficient and safe means of product handling and transportation. The Despatch Department ensures that every order is checked by quality personnel and despatched through the appropriate form of transport.

Every order is treated with care and is packaged to ensure that all goods are transported safely and securely to the customer. Stirlings' despatch department can also arrange shipment via couriers and our own trucks for one-day delivery.

Delivery
We're proud to offer our reliable, friendly and efficient delivery service to our customers at one of the cheapest rates in the industry. We strive to achieve 100% customer satisfaction for our delivery service.

Our global network of couriers, logistic companies and suppliers also provide distribution and logistics services to wherever you are to ensure you get your order at the right location on time. If you need it, we'll find a way to get it to you.



STAINLESS STEEL

PRODUCT CATALOGUE

Pipe, Fittings & Flange
- Seamless & Welded Pipe
- Buttweld Pipe Fittings
- BSP & NPT Screwed Fittings
- Outlet Fittings
- Socket Weld Fittings
- ANSI Flanges
- Table Flanges
- PN Metric Flanges
- AS 4087 Waterwork Flanges
- Flange Blinds

Tube & Fittings
- Seamless Round Tube
- Welded Round Tube
- Square Tube
- Rectangular Sections
- Oval Tube
- Slotted Tube
- Buttweld Tube Fittings
- Hygienic Fittings

Bar Products
- Angle Bar
- Channel Bar
- Hollow Bar
- Beam Bar & Section
- Square Bar
- Flat Bar
- Round Bar
- Round Bar for Boat Shaft
- Hex Bar

Flat Rolled Products
- Pattern Sheet/Plate
- Coil
- Sheet
- Plate
- Wire Mesh

Valves

Manways

Angle Bar

Manufactured to ASTM A276/484.
Inventory in Equal Angles only.
Hot Rolled Annealed and Pickled finish.
Thicknesses from 3mm to 10mm.
Lengths standard 6.0 metres. * Some sizes 1 & 2 metre lengths
Unequal angles and cold formed angles upon request.

Size (mm)	304	316	Weight (kg/m)
	BA304	BA316	
3 x 20 x 20	●	●	0.90
25 x 25	●	●	1.15
30 x 30	●	●	1.40
40 x 40	●	●	1.85
50 x 50	●	●	2.45
5 x 25 x 25	●	●	1.80
30 x 30	○	●	2.20
40 x 40	●	●	3.00
50 x 50	●	●	3.80
6 x 25 x 25	○	●	2.20
30 x 30	○	●	2.90

Size (mm)	304	316	Weight (kg/m)
6 x 40 x 40	●	●	3.55
50 x 50	●	●	4.50
65 x 65	●	●	5.95
75 x 75	●	●	7.00
100 x 100	●	●	9.90
8 x 50 x 50	○	●	6.00
65 x 65	○	●	7.87
75 x 75	○	●	9.30
10 x 50 x 50	○	●	7.50
75 x75	●	●	11.20
100 x 100	●	●	16.20

Channel Bar

Manufactured to ASTM A276/484 or ASTM A240.
Hot Rolled Annealed Pickled finish and Cold Formed.
Lengths standard 6.0 metres.
Non standard size/grade channels can be formed from plate. Please enquire.

Thickness (T) (mm)	Web (W) (mm)	Leg (L) (mm)	316 BC316	Weight (kg/m)
3	40	20	○	1.61
3	50	25	○	2.09
5	80	40	●	5.53
6	100	50	●	8.34
6	130	65	○	11.19
6	150	75	●	13.08
10	200	100	○	28.44

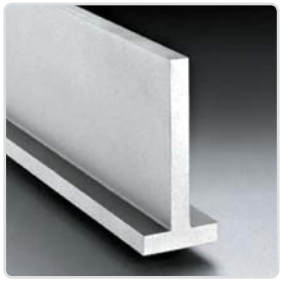
Hollow Bar

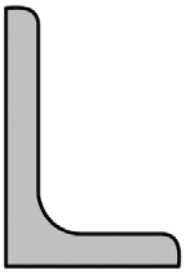
Manufactured to ASTM A511.
Available in grade 316/316L only.
Size: 32mm - 224mm
Market available only, price on application.

● Stocked Item ○ Market Available

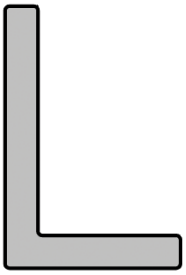
Beam Bar & Section

Stirlings Performance Steels can supply on request stainless steel section: in angle (equal & unequal), beam, channel, t section and profiles.
Shell approved capability.
Hot rolled, pressed, laser welded, cold rolled and form fit.

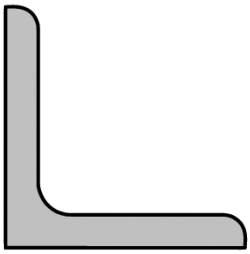




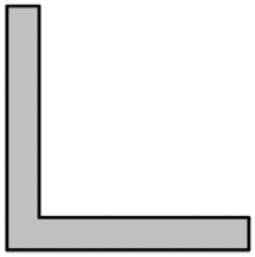
Unequal Angle Section
Internal Radius Round



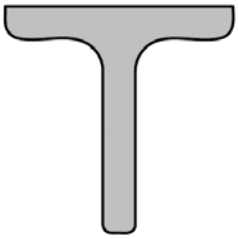
Unequal Angle Section
All Radius Sharp



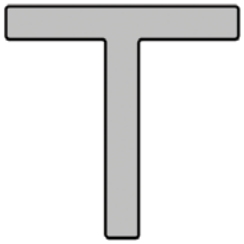
Angle Section
Internal Radius Round



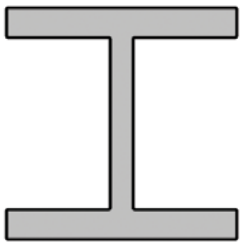
Angle Section
All Radius Sharp



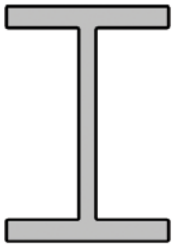
T Section
Internal Radius Round



T Section
All Radius Sharp



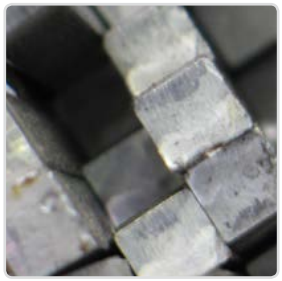
Beam Section 1



Beam Section 2

Square Bar

Manufactured to ASTM A276/484.
Cold drawn 6.0mm - 20mm.
Hot Rolled, Annealed and Pickled 25mm and above.
Lengths are available in 1m and 4m.



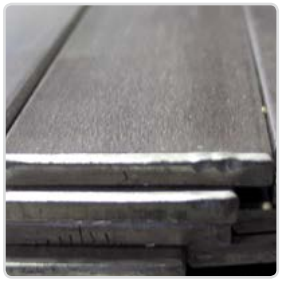
Size (mm)	304	316	Weight (kg/m)
	BS304	BS316	
6.00	○	○	0.25
6.35	○	●	0.31
9.52	○	●	0.71
10.00	○	○	0.78
12.00	○	○	1.13
12.70	○	●	1.27
15.88	○	●	1.98
16.00	○	○	2.01
19.05	○	●	2.85

Size (mm)	304	316	Weight (kg/m)
20.00	○	○	3.15
25.00	○	○	4.92
25.40	○	●	5.08
31.80	○	○	7.94
32.00	○	○	8.00
38.10	○	○	11.43
40.00	●	●	12.60
50.80	○	○	20.33

● Stocked Item ○ Market Available

Flat Bar

Manufactured to ASTM A276/484.
Edge Condition - SRE Slit Rolled Edge (HRAP market available).
Finish - No1, 320#, Mirror Finish
Lengths:4 metres: 3mm to 5mm thick.
6 metres: 6mm to 12mm thick.
5.8 metres: Mirror Finish
* Some sizes available in 1 & 2 metre lengths



Size (mm)	304/L No1	316/L No1	316/L #320 Grit	316/L Mirror	Weight (kg/m)
	BF304	BF316	BFP3316	BFP8316	
3 x 12	○	●	○	○	0.28
3 x 20	○	●	○	○	0.47
3 x 25	●	●	○	○	0.59
3 x 30	●	●	○	○	0.70
3 x 40	●	●	○	○	0.94
3 x 50	●	●	○	○	1.18
3 x 100	●	○	○	○	2.36
5 x 20	●	●	○	○	0.78
5 x 25	●	●	○	○	0.98
5 x 30	○	●	○	○	1.18
5 x 40	●	●	○	○	1.57
5 x 50	●	●	○	○	1.97
5 x 65	●	○	○	○	2.56
5 x 75	●	●	○	○	2.95
5 x 100	○	●	○	○	4.15
6 x 12	○	○	○	○	0.56
6 x 20	○	○	○	○	0.94
6 x 25	●	●	○	○	1.18
6 x 30	○	●	○	○	1.41
6 x 40	●	●	○	○	1.89
6 x 50	●	●	●	○	2.36
6 x 65	●	●	○	○	3.07
6 x 75	●	●	●	○	3.54
6 x 100	●	●	●	○	4.73
6 x 150	○	●	○	○	7.10
6 x 200	○	●	○	○	9.46

Size (mm)	304/L No1	316/L No1	316/L #320 Grit	316/L Mirror	Weight (kg/m)
8 x 40	○	●	○	○	2.50
8 x 50	○	●	●	○	3.15
8 x 65	○	○	○	○	4.10
8 x 75	○	●	○	○	4.73
8 x 100	○	●	○	○	6.31
8 x 150	○	●	○	○	9.46
10 x 20	○	●	○	○	1.57
10 x 25	●	●	○	○	1.97
10 x 30	○	●	○	○	2.36
10 x 40	●	●	●	○	3.15
10 x 50	●	●	●	●	3.94
10 x 65	○	●	○	○	5.12
10 x 75	●	●	●	○	5.91
10 x 100	●	●	●	○	7.88
10 x 150	○	●	○	○	11.83
10 x 200	○	●	○	○	15.77
12 x 25	○	○	○	○	2.36
12 x 40	○	○	○	○	3.78
12 x 50	○	●	●	○	4.73
12 x 65	○	○	○	○	6.15
12 x 75	○	●	○	○	7.09
12 x 100	○	●	○	○	9.46
12 x 150	○	●	○	○	14.19
16 x 75	○	●	○	○	8.83
16 x 100	○	●	○	○	12.62
20 x 50	○	●	○	○	7.88
20 x 100	○	●	○	○	15.70

Stirlings Performance Steels stocks ASTM A276/A484 Mirror Finish Flat Bar. This is the highest polish grade available in the market, and we are sure you will be impressed with its quality and lustre.

● Stocked Item ○ Market Available

Round Bar

Manufactured to ASTM A276/484.
Round Bar stocked in various finishes, including Cold Drawn Polished, Centerless Ground & Peeled. For more information, please contact our sales staff.
Random Lengths.
Other grades available on request.

Size (mm)	304	316	630	253MA *	2205	Weight (kg/m)
	BR304	BR316	BR630	BR253	BR2205	
3.18	●	●	○	○	○	0.06
3.97	○	○	○	○	○	0.09
4.76	●	●	○	○	○	0.14
5.00	○	○	○	○	○	0.15
6.00	●	●	○	●	○	0.22
6.35	●	●	○	○	○	0.25
7.94	●	●	○	○	○	0.39
8.00	●	○	○	●	○	0.39
9.52	●	●	○	○	○	0.56
10.00	●	●	○	●	●	0.61
11.11	○	○	○	○	○	0.76
12.00	●	●	○	●	○	0.89
12.70	●	●	○	○	●	0.99
14.29	●	○	○	○	○	1.26
15.88	●	●	○	○	○	1.56
16.00	●	●	○	●	●	1.58
19.05	●	●	○	○	○	2.24
20.00	●	●	○	●	●	2.47
22.00	○	●	○	○	○	2.99
22.22	○	●	○	○	○	3.05
24.00	○	●	○	○	○	3.56
25.00	○	●	○	●	●	3.86
25.40	●	●	○	○	●	3.99
28.58	○	○	○	○	○	5.05
30.00	○	●	○	○	●	5.57
31.75	●	●	○	○	●	6.23
34.93	○	●	○	○	○	7.55
35.00	○	○	○	○	○	7.58
38.10	○	●	○	○	●	8.98
40.00	●	○	○	●	●	9.90
44.45	○	●	○	○	●	12.23
47.62	○	○	○	○	○	14.03
48.00	○	○	○	○	○	14.26
50.00	○	●	○	●	○	15.47
50.80	●	●	●	○	●	15.97
57.15	○	●	●	○	○	20.21
60.00	●	●	○	○	○	23.02
62.00	○	○	○	○	○	23.79
63.50	○	●	●	○	●	24.95
65.00	○	●	○	○	○	26.32
69.85	○	●	●	○	●	30.20
70.00	●	○	○	○	○	33.01
76.20	●	●	●	○	●	35.94
80.00	○	●	○	○	●	39.70
82.55	○	○	●	○	○	42.18
88.90	○	●	●	○	●	48.92
90.00	○	○	○	○	○	50.14
95.25	○	●	○	○	○	56.52
100.00	○	○	○	○	○	61.90
101.60	●	●	●	○	●	63.89
114.30	○	●	○	○	●	80.86
120.00	●	●	○	○	○	88.73
127.00	○	●	○	○	○	99.83
130.00	●	○	○	○	●	112.41
139.70	○	○	○	○	○	120.80
140.00	○	●	○	○	○	121.50
150.00	●	●	○	○	●	141.50
152.40	○	○	○	○	○	143.76
160.00	○	○	○	○	○	157.83
170.00	●	●	○	○	●	178.08
177.80	○	○	○	○	○	195.70
180.00	○	●	○	○	○	203.28
195.00	○	○	○	○	○	234.44
200.00	●	○	○	○	●	251.50
203.20	○	●	○	○	○	255.60
210.00	○	○	○	○	○	271.89
228.60	○	○	○	○	○	323.50
230.00	○	●	○	○	●	325.97
240.00	○	●	○	○	○	355.13
250.00	○	●	○	○	●	385.13
254.00	○	○	○	○	○	399.90
280.00	○	●	○	○	○	483.10
304.00	○	●	○	○	○	569.47

253MA® is a trademark owned by Outokumpu Stainless AB.
The standard grade designation covering this grade is UNS S30815. Other mills produce grades compliant with UNS S30815.

● Stocked Item ○ Market Available

Round Bar for Boat Shaft

Stirlings Performance Steels is a boat shaft specialist, with the ability to offer long lengths. We have a proven ability to source and supply boat shafts in specific grades.
Grades available include: 316L, 2205, 2507, 630, Aqua 17, 19, 22, and 22 High Strength.

With the capability to provide long length shafts, large diameter, various finishes and conditions, Stirlings are able to provide a personalised package for your requirements.

Grade Available:

Grade	Typical Ultimate Tensile Strength UTS	Yield Strength 0.2% Offset	Elongation	Pitting Resistance PREN
630	860 - 1100 MPa	725 - 900 MPa	16 - 21 %	18
316	515 - 620 MPa	205 - 360 MPa	30 - 60 %	24
2205	620 - 780 MPa	448 - 520 MPa	25 - 40 %	35
2507	730 - 960 MPa	530 - 670 MPa	25 - 40 %	43
Aqua 22 HS	795 - 1050 MPa	515 - 860 MPa	25 - 35 %	38

Hex Bar

Manufactured to ASTM A276/484.
Cold drawn 4.75 - 18.03mm (across the flat).
Hot Rolled, Annealed and Pickled 20.83mm and above (across the flat).
Lengths are 4 - 6 metre randoms

Market Available only. Price on application.

Size (mm)	316	Approx Weight (kg/m)	Size (mm)	316	Approx Weight (kg/m)
4.75	○	0.15	23.37	○	3.72
6.35	○	0.27	25.65	○	4.49
8.23	○	0.46	27.97	○	5.33
11.18	○	0.85	30.51	○	6.35
13.34	○	1.21	33.05	○	7.45
15.27	○	1.59	37.59	○	9.64
18.03	○	2.21	50.00	○	17.06
20.83	○	2.96	63.50	○	27.52

● Stocked Item ○ Market Available

Bar Product Technical Data

Angle Bar
Hot Finished to ASTM A276 / A484

Length of Leg	Length Tolerance
up to 150mm	± 3.0mm
over 150mm	± 5.0/-3.0mm

Flat Bar

Hot-finished (HRAP) to ASTM A276/484

Width (mm)	Thickness Tolerance (mm)			Width Tolerance (mm)
	3.2 to 13	over 13 to 25	over 25 to 50	
up to 25	± 0.20	± 0.25	-	± 0.40
over 25 to 50	± 0.30	± 0.40	± 0.80	± 0.80
over 50 to 100	± 0.40	± 0.50	± 0.80	+ 1.60 - 0.80
over 100 to 150	± 0.40	± 0.50	± 0.80	+ 2.40 - 1.60

Round Bar

		Typical Tolerance of Diameter (x)								
Nominal Diameter		6	7	8	9	10	11	12	13	14
Up to	3	0.006	0.010	0.014	0.025	0.040	0.060	0.100	0.140	0.250
Over	3 to 6	0.008	0.012	0.018	0.030	0.048	0.075	0.120	0.180	0.300
Over	6 to 10	0.009	0.015	0.022	0.036	0.058	0.090	0.150	0.220	0.360
Over	10 to 18	0.011	0.018	0.027	0.043	0.070	0.110	0.180	0.270	0.430
Over	18 to 30	0.013	0.021	0.033	0.052	0.084	0.130	0.210	0.330	0.520
Over	30 to 50	0.016	0.025	0.039	0.062	0.100	0.160	0.250	0.390	0.620
Over	50 to 80	0.019	0.030	0.046	0.074	0.120	0.190	0.300	0.460	0.740
Over	80 to 120	0.022	0.035	0.054	0.087	0.140	0.220	0.350	0.540	0.870
Over	120 to 180	0.025	0.040	0.063	0.100	0.160	0.250	0.400	0.630	1.000
Over	180 to 250	0.029	0.046	0.072	0.115	0.185	0.290	0.460	0.720	1.150
Over	250 to 315	0.032	0.052	0.081	0.130	0.210	0.320	0.520	0.810	1.300
Over	315 to 400	0.036	0.057	0.089	0.140	0.230	0.360	0.570	0.890	1.400
Over	400 to 500	0.040	0.063	0.097	0.155	0.250	0.400	0.630	0.970	1.550

h tolerance = (+0.0mm - x figure) ◆ j tolerance = (+ and -(x) figure) ◆ k tolerance = (+ x figure - 0.0mm)

e.g. Diameter tolerance is +0.0mm - 0.062mm for 38.1mm diameter round bar to h9 specification

Square & Hexagonal Bar
Cold finished to ASTM A276 / A582 / A484

Specified Size (mm)	Size Tolerance (mm)
3.00 to less than 8.00	+ Nil, - 0.05
8.00 to less than 13.00	+ Nil, - 0.08
over 13.00 to 25.00	+ Nil, - 0.10
over 25.00 to 50.00	+ Nil, - 0.15
over 50.00 to 75.00	+ Nil, - 0.20
over 75.00	+ Nil, - 0.25

Sheet Finishes

2B **Mirror** **No4**

Coloured Stainless Steel Sheet

These sheets look stunning and are suitable to be used for architectural decorating in buildings, homes, kitchens, restaurants etc.

Grade 316 Black Satin
0.8mm 1220 x 2440 mm
1.2mm 1220 x 2440 mm
1.2mm 1220 x 3000 mm

Grade 316 Black Mirror
1.2mm 1220 x 2440 mm

Gold
Market Available

Black
In Stock

Brass
Market Available

Stirlings Performance Steels offers a range of 'High Quality' sheet products, developed for architectural, building, marine, food and hospitality industries.

Stirlings' sheet range provides finish options with all the benefits of stainless steel.

Pattern sheets offer benefits over a normal sheet. Besides its high aesthetic appeal, it's increased in strength through the manufacturing process also means you can use thinner gauges (reducing weight) without sacrificing strength. It's very resilient to damage, disguising scratches and dents as well as reducing maintenance costs. These features make it great for use in:

- Bar Tops
- Bench Tops
- Canopies
- Conveyors
- Food chutes
- Interior and exterior cladding
- Lift doors
- Splashbacks
- Shop counters

Ultra Polish stainless steel sheet has a highly reflective mirror finish. It makes a great substitute for glass mirror due to its lightweight, and resistance to shattering.

This makes it ideal for applications such as :

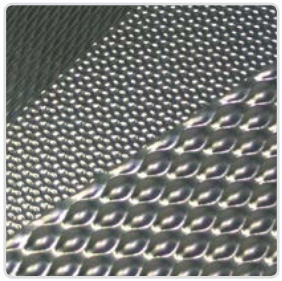
- Displays
- Feature Panels
- Interior and Exterior Cladding
- Lift Doors
- Mirrors

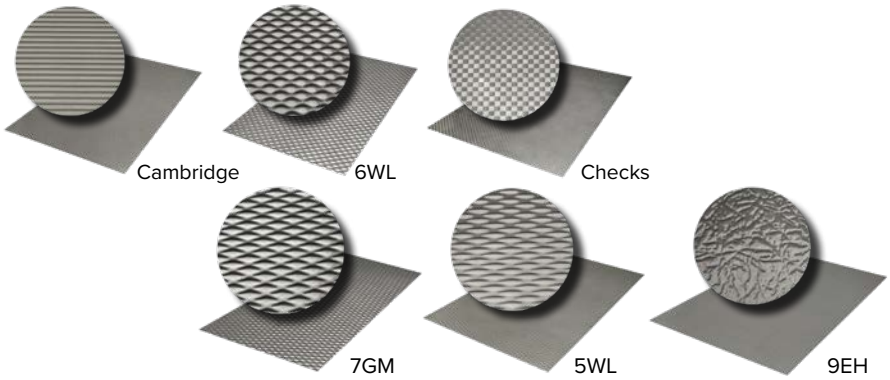
Call and have one of Stirlings' friendly sales teams show you the full range of our stainless steel sheets.

Pattern Sheet/Plate

Manufactured from ASTM A240/480 Sheet.

We can source a wide range of patterned sheets and other finishes for your project (Etched, Acid Etched, Embossed, Mirror, Stained, Coloured, Glass bead etc)





Grade 316 5WL Satin Sheet in stock
1.2mm 1220 x 2440mm
1.2mm 1220 x 3000mm

Coil

Manufactured to ASTM A240/480.
Finished to No. 4 or 2B.
Coil weights approx 1000kg for grade 304 No. 4.
Available through our worldwide range of suppliers and stockists.

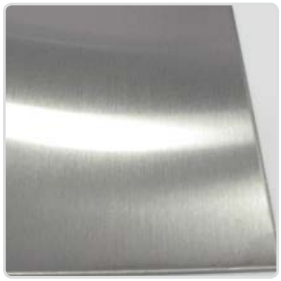
Thickness		Width	Weight	304/L	304/L	316/L	316/L	430
Gauge	(mm)	(mm)	(kg/m²)	2B	No.4 PVC	2B	No.4 PVC	No.4 PVC
				C2MS304	C1SP304	C3MS316	C4SP316	C1SP430
24	0.55	900/915	4.44	○	○	○	○	○
		1200/1219 +		●	○	○	○	○
22	0.70	900/915	5.65	○	○	○	○	○
		1200/1219 +		●	●*	●	●	○
20	0.90	900/915	7.26	○	●	○	○	○
		1200/1219		○	●	○	●	○
18	1.2	750	9.68	○	●	○	○	○
		900/915		○	●	○	○	○
		1200/1219		○	●	○	●	●*
		1500/1524		○	○	○	○	○
16	1.5/1.6	900/915	12.91	○	●	○	○	○
		1200/1219		●	●	○	●	○
		1500/1524		○	○	○	○	○
14	2.0	1200/1219	16.14	●	○	○	○	○
		1500/1524		○	○	○	○	○
12	2.5	1200/1219	20.18	○	○	○	○	○
		1500/1524		○	○	○	○	○
10	3.0	1200/1219	24.21	○	○	○	○	○
		1500/1524		○	○	○	○	○

* Ex Stock Tasmania + Paper Interleave

● Stocked Item ○ Market Available

Sheet

Manufactured to ASTM A240/480. All Sheet are fiber laser PVC
2B - Cold rolled, smooth, dull grey sheen.
No4 - Linished belt polish to Stirlings' specification.
Mirror - Mirror polished to Stirlings' specification.
Finish Protection
- 2B & No4 1xPE (polyethylene) coating suitable for laser fiber & laser CO2 cutting
- Mirror 2xPE (polyethylene)



304

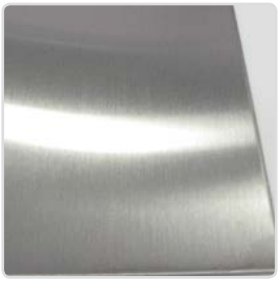
Thickness (mm)	Width (mm)	Length (mm)	304 2B	304 No4	304 Mirror	Approx Weight (kg/sheet)
			C5MS304	C5SP304	C5UP304	
0.45	1219	2438	● *	○		10.63
0.55	1219	2438	● +	● +		13.10
0.70	1219	2438	●	●		16.70
0.80	1219	2438	○	○	●	19.30
0.90	900	1800	○	●		11.80
	900	2438	○	●		15.80
	1219	2438	●	●		21.40
	1219	3000	○	●		26.70
	1219/1200	3600	○	●		32.00
	1500	3000		●		32.40
1.0	1219	2438	○	○	●	24.00
1.2	750	3000	○	●		21.90
	900	1800	○	●		15.80
	900	2438	○	●		21.00
	900	3000	○	●		26.30
	900/914	3600	○	●		31.80
1.2	1219	2438	●	●	●	28.50
	1219	3000	●	●	●	35.60
	1219	3600	○	●		53.22
	1219	4000	○	●		48.00
	1219	5000	○	●		60.00
	1500	2438	○	●		35.00
	1500	3000	●	●		43.80
	1500	3600	○	●		52.50
1.5	1219	2438	●	●	●	35.60
	1219	3000	●	●		44.50
	1500	3000	●	●		55.20
1.6	1500	3600	○	●		70.65
2.0	1219	2438	●	●	●	47.20
	1219	3000	●	●		59.30
	1500	3000	●	○		72.90
2.5	1219	2438	●	○		59.30
3.0	1219	2438	●	●	●	69.80
	1219	3000	●	○		88.90
	1500	3000	●	○		109.40

* Ex stock QLD and TAS
+ Paper Interleaved

● Stocked Item ○ Market Available

Sheet

Manufactured to ASTM A240/480. All Sheet are fiber laser PVC
2B - Cold rolled, smooth, dull grey sheen.
No4 - Linished belt polish to Stirlings' specification.
Mirror - Mirror polished to Stirlings' specification.
Finish Protection
- 2B & No4 1xPE (polyethylene) coating suitable for laser fiber & laser CO2 cutting
- Mirror 2xPE (polyethylene)



316						
Thickness (mm)	Width (mm)	Length (mm)	316 2B	316 No4	316 Mirror	Approx Weight (kg/sheet)
			C7316	C8316	C7UP316	
0.55	1220	2440	●	○		13.80
0.7	1220	2440	●	○		16.30
0.9	1220	2440	●	●		20.94
1.2	1220	2400	○	○	●	27.90
	1220	2440	●	●		28.50
	1220	3000	○	●		36.00
	1500	3000	○	●		43.80
1.5	1220	2438	○	○	●	45.02
1.6	1220	2440	●	●		37.20
	1500	3000	●	●		58.10
	1500	3600	○	●		70.65
2.0	1220	2400	○	○	●	46.50
	1220	2440	●	●		47.20
	1220	3000	●	○		57.70
	1500	3000	●	●		73.59
2.5	1220	2400/2440	●	○		58.20
	1500	3000	●	○		87.20
3.0	1200/1220	1200	●	○		34.90
	1220	2400	○	○	●	69.80
	1220	2438	○	●		69.80
	1220	2440	●	○		69.80
	1220	3000	●	○		87.20
	1500/1524	3000	●	●		110.00

Please refer to "Plate" for thickness 4.0 mm to 50.0 mm

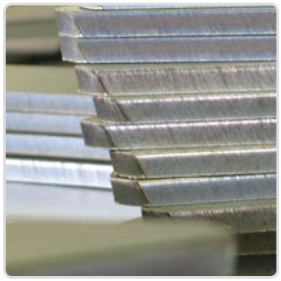
Perforated Sheet

Thickness (mm)	Width (mm)	Length (mm)	316 2B	
			C7P316	
0.9	1219	2438	●	2.06 Holes x 3.1 Centres x 41% Open Area

● Stocked Item ○ Market Available

Plate

Manufactured to ASTM A240/480.
Finished No.1, Hot Rolled Annealed and Pickled (HRAP).
Finished 2B as shown.
Plasma and Laser processing available.
Alternative sizes and grades available upon request.
Duplex plate manufactured to Norsok MDS D45 Rev3
Super Duplex plate manufactured to Norsok MDS D55 Rev3



Thick-ness	Width (mm)	Length (mm)	Weight (kg/m²)	kg Per Plate	304/ 304L No.1	304/ 304L 2B	304 Chequer Tread	310S	316/ 316L No.1	316/ 316L 2B	316 Chequer Tread
					CM304	CM304	CC304	CN310	CP316	CP316	CC316
3.0	1500	3000	24.60	110.70	○	●		○	○	●	
	1500	6000	24.60	221.40	○	●		●	○	○	
	2000	6000	24.60	295.20	○	●		●	○	●	
4.0	1219	2438	32.80	94.40	○	●		○	○	●	
	1500	3000	32.80	147.60	○	●		○	○	●	
	1500	6000	32.80	295.20	○	○		○	○	●	
	2000	6000	32.80	393.60	○	○		○	○	●	
5.0	1219	2438	41.00	118.00	○	●		○	○	●	
	1500	3000	41.00	184.50	○	●		○	●	●	
	1500	6000	41.00	369.00	●	○		○	●	●	
	2000	6000	41.00	492.00	●	○		○	●	○	
6.0	1219	2438	49.20	141.25	○	●		○	○	●	
	1500	3000	49.20	221.40	○	●		○	○	●	
	1524	3048	49.20	230.00	○	○	●	○	○	○	●
	1500	6000	49.20	442.80	○	○		○	●	○	
	2000	6000	49.20	590.40	●	○		●	●	○	
8.0	1219	2438	65.60	187.50	●	○		○	●	○	
	1500	3000	65.60	295.20	●	○		○	●	○	
	1500	6000	65.60	590.40	●	○		○	●	○	
	2000	6000	65.60	787.20	●	○		●	●	○	
10.0	1219	2438	82.00	255.00	●	○		○	●	○	
	1500	3000	82.00	369.00	●	○		○	●	○	
	1500	6000	82.00	738.00	●	○		○	●	○	
	2000	6000	82.00	984.00	●	○		●	●	○	
12.0	1500	6000	98.40	885.60	○	○		○	○	○	
	2000	6000	98.40	1180.80	●	○		●	●	○	
16.0	1500	6000	131.20	1180.80	○	○		○	○	○	
	2000	6000	131.20	1574.40	●	○		●	●	○	
20.0	1500	6000	164.00	1476.00	○	○		○	○	○	
	2000	6000	164.00	1968.00	●	○		○	●	○	
25.0	1500	6000	205.00	1845.00	○	○		○	○	○	
	2000	6000	205.00	2460.00	●	○		○	○	○	
32.0	2000	6000	264.40	3148.80	●	○		○	●	○	
40.0	2000	4000	328.00	2624.00	○	○		○	○	○	
	2000	6000	328.00	3936.00	●	○		○	●	○	
50.0	2000	4000	408.50	3268.00	○	○		○	○	○	
	2000	6000	408.50	4902.00	●	○		○	●	○	
65.0	2350	4000	531.90	5000.00	○	○		○	●	○	

● Stocked Item ○ Market Available

Plate

Manufactured to ASTM A240/480.
Finished No.1, Hot Rolled Annealed and Pickled (HRAP).
Finished 2B as shown.
Plasma and Laser processing available.
Alternative sizes and grades available upon request.
Duplex plate manufactured to Norsok MDS D45 Rev3
Super Duplex plate manufactured to Norsok MDS D55 Rev3

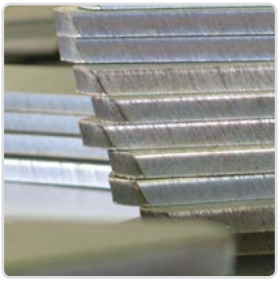


Plate (Continued)

Thick-ness	Width (mm)	Length (mm)	Weight (kg/m²)	kg Per Plate	321	253 MA	Duplex 2205	Super Duplex 2507	904L	A825	A625
					CO321	CQ253MA	CL2205	CK2507	CT904L	-	-
3.0	1500	3000	24.60	110.70	○	○	○	○	○	○	○
	1500	6000	24.60	221.40	○	○	○	●	○	○	○
	2000	6000	24.60	295.20	●	●	●	○	●	○	○
4.0	1500	3000	32.80	147.60	○	○	○	○	○	○	○
	1500	6000	32.80	295.20	○	○	●	○	○	○	○
	2000	6000	32.80	393.60	○	○	●	○	○	○	○
5.0	1500	3000	41.00	184.50	○	○	○	○	○	○	○
	1500	6000	41.00	369.00	○	○	○	○	○	○	○
	2000	6000	41.00	492.00	●	●	●	○	○	○	○
6.0	1500	3000	49.20	221.40	○	○	○	○	○	○	○
	1500	6000	49.20	442.80	○	○	○	○	○	○	○
	2000	6000	49.20	590.40	●	●	●	●	○	○	○
8.0	1500	3000	65.60	295.20	○	○	○	○	○	○	○
	1500	6000	65.60	590.40	○	○	○	○	○	○	○
	2000	6000	65.60	787.20	●	●	●	●	○	○	○
10.0	1500	3000	82.00	369.00	○	○	○	○	○	○	○
	1500	6000	82.00	738.00	○	○	○	○	○	○	○
	2000	6000	82.00	984.00	●	●	●	●	○	○	○
12.0	1500	6000	98.40	885.60	○	○	○	○	○	○	○
	2000	6000	98.40	1180.80	●	●	●	●	○	○	○
13.0	1500	6000	106.60	959.40	○	○	○	○	○	○	○
	2000	6000	106.60	1279.20	○	○	○	○	○	○	○
16.0	1500	6000	131.20	1180.80	○	○	○	○	○	○	○
	2000	6000	131.20	1574.40	●	●	●	●	○	○	○
20.0	1500	6000	164.00	1476.00	○	○	○	○	○	○	○
	2000	6000	164.00	1968.00	●	●	●	●	○	○	○
25.0	1500	6000	205.00	1845.00	○	○	○	○	○	○	○
	2000	6000	205.00	2460.00	●	●	●	●	○	○	○
32.0	2000	4000	264.40	2115.20	○	○	○	○	○	○	○
	2000	6000	264.40	3148.80	●	●	●	●	○	○	○
40.0	2000	4000	328.00	2624.00	○	○	○	○	○	○	○
	2000	6000	328.00	3936.00	●	○	●	●	○	○	○
50.0	2000	3000	408.50	2451.00	○	○	○	●	○	○	○
	2000	4000	408.50	3268.00	○	○	●	○	○	○	○

● Stocked Item ○ Market Available

Woven Mesh

Available through our wide range of suppliers and stockists.
All sizes listed are in mm.
Custom sizes available upon request.

Approx Aperture	Wire Diameter	Open Area %	Availability
22.4	3.15	77	○
16	2.5	75	○
12.7	3.0	65	○
11.1	1.6	77	○
10.6	2.0	70	○
10	2.5	63	○
7	1.6	66	○
6.3	2.0	57	○
5.3	1.0	71	○
4.7	1.6	55	○
3.9	1.2	58	○
3.5	1.6	46	○
3.3	0.91	61	○
3	1.2	51	○
2.7	1.6	38	○
2.5	0.7	60	○
2.3	0.91	51	○
2.1	0.45	67	○
2	1.20	39	○
1.9	0.61	58	○
1.6	0.91	41	○
1.6	0.50	58	○
1.4	0.71	44	○
1.3	0.5	52	○
1.2	0.9	32	○
1.2	0.37	58	○
1.1	0.45	51	○

Approx Aperture	Wire Diameter	Open Area %	Availability
1.0	0.56	42	○
0.9	0.71	31	○
0.9	0.37	50	○
0.81	0.45	41	○
0.745	0.31	49	○
0.71	0.56	31	○
0.6	0.45	32	○
0.57	0.27	46	○
0.53	0.31	39	○
0.415	0.22	40	○
0.31	0.2	38	○
0.26	0.16	35	○
0.21	0.15	34	○
0.19	0.125	34	○
0.15	0.1	36	○
0.13	0.08	37	○
0.11	0.071	37	○
0.1	0.063	37	○
0.09	0.05	42	○
0.075	0.052	36	○
0.063	0.04	38	○
0.053	0.04	32	○
0.045	0.036	31	○
0.040	0.032	31	○
0.034	0.03	27	○
0.025	0.025	25	○

• Stocked Item ○ Market Available

Welded Mesh

Available through our wide range of suppliers and stockists.
All sizes listed are in mm. Custom sizes available upon request.

Aperture	Wire Diameter	Pitch	Grade	Width (coil)	Availability
5.55	0.8	3.35	304	1220	○
9	1	10	304	1530	○
9.2	0.8	10	304	1220	○
11.1	1.6	12.7	304 & 316	1220	○
11.1	1.6	12.7	304	915	○
11.5	1.2	12.7	304	1220	○
16	2	18	304	1220	○
23.4	2	25.4	304 & 316	1220	○
23.8	1.6	25.4	304	1220	○
24.4	1	25.4	316	1220	○
48	2	50	316	1220	○

Aperture	Wire Dia	Pitch	Grade	Size (Panels)	Availability
21.85	3.15	25	304	2000x1000	○
21.85	3.15	25	316	2500x1200	○
46	4	50	304	2000x1000	○
46	4	50	316	2500x1200	○
47	3	50	304	2500x1200	○
94	6	100	304	2500x1200	○
97	3.15	100	304	2500x1200	○
YM					
Wire Mesh	3	50	304	2500x1200	●
Wire Mesh	3	25	304	2500x1200	●
Wire Mesh	3	50	316	2500x1200	●
Wire Mesh	3	25	316	2500x1200	●

● Stocked Item ○ Market Available

Modern Metal Mesh

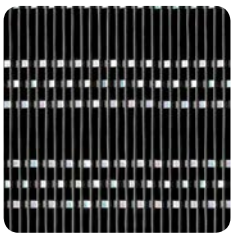
Stirlings can source a wide range Architectural Stainless Mesh panels, belts and sheets. Modern Architectural Mesh can be used in a range of applications including architectural facades, filtering and conveyor systems.

Market Available, please enquire for more information.

Rigid

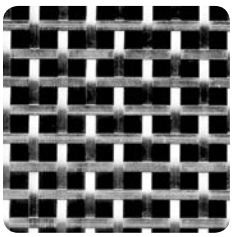
Plain Weave
Max Size: 1.5x3m
Weight: 4.5Kg /SQM
Opening: 43%

Galaxi
Max Size: 1.5x3m
Weight: 5.3Kg /SQM
Opening: 77%



Bambuu
Max Size: 1.5x3m
Weight: 5.6Kg /SQM
Opening: 45%

Tatuu
Max Size: 1.5x3m
Weight: 5.8Kg /SQM
Opening: 32%



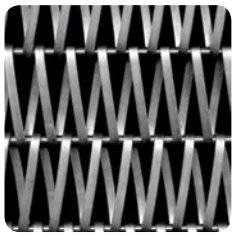
Kross
Max Size: 1.5x3m
Weight: 4.2Kg /SQM
Opening: 25%

Flexible

Arina
Max Size: 2x30m
Weight: 7.1Kg /SQM
Opening: 41%

Taqila
Max Size: 2x30m / 3x5m
Weight: 2.5Kg /SQM
Opening: 56%

Doffy
Max Size: 2x30m / 3x5m
Weight: 6.6Kg /SQM
Opening: 46%



Motiff
Max Size: 2x30m
Weight: 13.2Kg /SQM
Opening: 54%

Virko
Max Size: 3x30m
Weight: 16.5Kg /SQM
Opening: 4%

Product Application Photos

● Stocked Item ○ Market Available

Pipe - Seamless & Welded

Manufactured to ASTM A312
Welded pipe: Annealed, pickled and descaled.
Lengths 6.0 metres.
S31803 Duplex pipe manufactured to ASTM A790
S32750 Super Duplex manufactured to ASTM A790
Pipe Polishing & Bandsaw Cutting service available

	Nominal Bore		Size			Welded			Weight
	inch (NPS)	mm (DN)	O.D. (mm)	W.T. (mm)	I.D (mm)	304/L	316/L	2205	(kg/m)
						PW30405	PW31605	-	
5S	½	15	21.34	1.65	18.04	○	○	○	0.80
	¾	20	26.67	1.65	23.37	○	○	○	1.03
	1	25	33.40	1.65	30.10	○	○	○	1.30
	1¼	32	42.16	1.65	38.86	○	○	○	1.65
	1½	40	48.26	1.65	44.96	○	○	○	1.91
	2	50	60.33	1.65	57.03	○	○	○	2.40
	2½	65	73.03	2.11	68.81	○	○	○	3.69
	3	80	88.90	2.11	84.68	○	○	○	4.52
	4	100	114.30	2.11	110.08	○	●	○	5.84
	5	125	141.30	2.77	135.76	○	○	○	9.47
	6	150	168.28	2.77	162.74	○	●	○	11.31
	8	200	219.08	2.77	213.54	○	●	○	14.79
	10	250	273.05	3.40	266.25	○	●	○	22.63
	12	300	323.85	3.96	315.93	○	●	○	31.25
	14	350	355.60	3.96	347.68	○	●	○	34.36
	16	400	406.40	4.19	398.02	○	●	○	41.56
	18	450	457.20	4.19	448.82	●	●	○	46.81
	20	500	508.00	4.78	498.44	○	●	○	59.25
	22	550	558.80	4.78	549.24	○	○	○	65.24
	24	600	609.60	5.54	598.52	○	●	○	82.47
	30	750	762.00	6.35	749.30	○	○	○	118.33

● Stocked Item ○ Market Available

Pipe - Seamless & Welded

Manufactured to ASTM A312
Welded pipe: Annealed, pickled and descaled.
Lengths 6.0 metres.
S31803 Duplex pipe manufactured to ASTM A790
S32750 Super Duplex manufactured to ASTM A790
Pipe Polishing & Bandsaw Cutting service available

Nominal Bore			Size			Welded			Seamless			Weight
	inch (NPS)	mm (DN)	O.D. (mm)	W.T. (mm)	I.D (mm)	304/L	316/L	2205	304/L	316/L	2205	(kg/m)
						PW3041	PW3161	PW22051	PS304L01	PS316L01	PS220501	
10S	¼	8	13.72	1.65	10.42	○	○	○	○	○	○	0.48
	⅜	10	17.15	1.65	13.85	○	○	○	○	○	○	0.64
	½	15	21.34	2.11	17.12	●	●	○	●	●	●	1.01
	¾	20	26.70	2.11	22.48	●	●	○	●	●	●	1.30
	1	25	33.40	2.77	27.86	●	●	○	●	●	●	2.12
	1¼	32	42.16	2.77	36.62	●	●	○	●	●	●	2.73
	1½	40	48.26	2.77	42.72	●	●	○	●	●	●	3.15
	2	50	60.33	2.77	54.79	●	●	○	●	●	●	3.98
	2½	65	73.03	3.05	66.93	●	●	○	●	●	●	5.34
	3	80	88.90	3.05	82.80	●	●	○	●	●	●	6.54
	3½	90	101.60	3.05	95.50	○	●	○	○	○	○	7.52
	4	100	114.30	3.05	108.20	●	●	○	●	●	●	8.48
	5	125	141.30	3.40	134.50	●	●	○	○	○	●	11.74
	6	150	168.30	3.40	161.50	●	●	○	●	●	●	14.04
	8	200	219.08	3.76	211.56	●	●	○	●	●	●	20.25
	10	250	273.05	4.19	264.67	●	●	○	○	○	○	28.20
	12	300	323.85	4.57	314.71	●	●	○	○	○	○	36.53
	14	350	355.60	4.78	346.44	●	●	○	○	○	○	41.92
	16	400	406.40	4.78	396.84	●	●	○	○	○	○	47.99
	18	450	457.20	4.78	447.64	○	●	○	○	○	○	54.06
	20	500	508.00	5.53	496.94	○	●	○	○	○	○	69.62
	22	550	558.80	5.53	547.74	○	○	○	○	○	○	76.66
	24	600	609.60	6.35	596.90	○	●	○	○	○	○	95.86
	30	750	762.00	7.92	746.16	○	●	○	○	○	○	148.15

Photo courtesy of Austal

● Stocked Item ○ Market Available

Pipe - Seamless & Welded

Manufactured to ASTM A312
Welded pipe: Annealed, pickled and descaled.
Lengths 6.0 metres.
S31803 Duplex pipe manufactured to ASTM A790
S32750 Super Duplex manufactured to ASTM A790
Pipe Polishing & Bandsaw Cutting service available

Nominal Bore			Size			Welded			Seamless							Wgt
	inch (NPS)	mm (DN)	O.D. (mm)	W.T. (mm)	I.D (mm)	304/L	316/L	S30815*	304/L	316/L	2205	321	310	904L	S30815*	(kg/m)
						PW3044	PW3164	PW2534	PS304L04	PS316L04	PS220504	PS32104	PS310	PS904L	PS253MA4	
40S	¼	8	13.72	2.24	9.24	○	●	○	○	●	○	○	○	○	○	0.64
	⅜	10	17.15	2.31	12.53	○	●	○	○	●	○	○	○	○	○	0.86
	½	15	21.34	2.77	15.80	●	●	○	○	●	●	○	○	○	○	1.29
	¾	20	26.70	2.87	20.96	●	●	○	○	●	●	○	○	○	●	1.71
	1	25	33.40	3.38	26.64	●	●	○	●	●	●	●	●	●	●	2.54
	1¼	32	42.16	3.56	35.04	○	●	○	●	●	●	○	○	○	○	3.43
	1½	40	48.26	3.68	40.90	●	●	○	●	●	●	○	○	○	●	4.11
	2	50	60.33	3.91	52.51	●	●	○	●	●	●	●	●	●	●	5.52
	2½	65	73.03	5.16	62.71	●	●	○	●	●	●	○	○	○	●	8.76
	3	80	88.90	5.49	77.92	●	●	○	●	●	●	●	●	●	●	11.45
	3½	90	101.60	5.74	90.12	○	●	○	○	○	○	○	○	○	○	13.77
	4	100	114.30	6.02	102.26	●	●	○	●	●	●	●	●	●	●	16.31
	5	125	141.30	6.55	128.20	○	●	○	○	○	●	○	○	○	○	22.10
	6	150	168.30	7.11	154.08	●	●	●	●	●	●	○	○	○	○	28.68
	8	200	219.08	8.18	202.72	●	●	●	●	●	●	○	○	○	○	43.16
	10	250	273.05	9.27	254.51	●	●	○	○	○	○	○	○	○	○	61.20
	12	300	323.85	9.53	304.79	○	●	○	○	○	○	○	○	○	○	74.92
Standard Wall																
	14	350	355.60	9.53	336.54	○	●	○	○	○	○	○	○	○	○	81.33
	16	400	406.40	9.53	387.34	○	●	○	○	○	○	○	○	○	○	93.27
	18	450	457.20	9.53	438.14	○	●	○	○	○	○	○	○	○	○	105.16
	20	500	508.00	9.53	488.94	○	●	○	○	○	○	○	○	○	○	117.15
	22	550	558.80	9.53	539.74	○	○	○	○	○	○	○	○	○	○	129.13
	24	600	609.60	9.53	590.54	○	●	○	○	○	○	○	○	○	○	141.13
	26	650	660.40	9.53	641.34	○	○	○	○	○	○	○	○	○	○	152.87
	28	700	711.20	9.53	692.14	○	○	○	○	○	○	○	○	○	○	164.85
	30	750	762.00	9.53	742.94	○	○	○	○	○	○	○	○	○	○	176.84
	32	800	812.80	9.53	793.74	○	○	○	○	○	○	○	○	○	○	188.82
	34	850	863.60	9.53	844.54	○	○	○	○	○	○	○	○	○	○	200.31
	36	900	914.40	9.53	895.34	○	○	○	○	○	○	○	○	○	○	212.56
	38	950	965.20	9.53	946.14	○	○	○	-	-	-	-	-	-	-	224.59
	40	1000	1016.00	9.53	996.94	○	○	○	-	-	-	-	-	-	-	236.53

* Known in market as 253MA Outokumpu

● Stocked Item ○ Market Available

Pipe - Seamless & Welded

Manufactured to ASTM A312
Welded pipe: Annealed, pickled and descaled.
Lengths 6.0 metres.
S31803 Duplex pipe manufactured to ASTM A790
S32750 Super Duplex manufactured to ASTM A790
Pipe Polishing & Bandsaw Cutting service available

Schedule - Nominal bore			Size			Seamless				Weight
	inch (NPS)	mm (DN)	O.D. (mm)	W.T. (mm)	I.D (mm)	304/L	316/L	2205	S30815*	(kg/m)
						PS304L08	PS316L08	PS220508	PS253MA8	
80S	¼	8	13.72	3.02	7.68	○	●	○	○	0.81
	⅜	10	17.15	3.20	10.75	○	●	○	●	1.12
	½	15	21.34	3.73	13.88	○	●	○	●	1.64
	¾	20	26.70	3.91	18.88	○	●	○	○	2.23
	1	25	33.40	4.55	24.30	●	●	○	○	3.28
	1¼	32	42.16	4.85	32.46	○	●	○	○	4.53
	1½	40	48.26	5.08	38.10	●	●	○	○	5.49
	2	50	60.33	5.54	49.25	●	●	○	●	7.59
	2½	65	73.03	7.01	59.01	○	●	○	●	11.58
	3	80	88.90	7.62	73.66	●	●	○	○	15.50
	3½	90	101.60	8.08	85.44	○	○	○	○	18.90
	4	100	114.30	8.56	97.18	●	●	○	○	22.65
	5	125	141.30	9.53	122.26	○	○	○	○	31.41
	6	150	168.30	10.97	146.36	●	●	○	○	43.19
	8	200	219.08	12.70	193.68	●	●	○	○	65.59
	10	250	273.05	12.70	247.65	○	○	○	○	81.55
	12	300	323.85	12.70	298.45	○	○	○	○	97.46
XS										
	14	350	355.60	12.70	330.20	○	○	○	○	107.39
	16	400	406.40	12.70	381.00	○	○	○	○	123.30
	18	450	457.20	12.70	431.80	○	○	○	○	139.15
	20	500	508.00	12.70	482.60	○	○	○	○	155.12
	22	550	558.80	12.70	533.40	○	○	○	○	171.09
	24	600	609.60	12.70	584.20	○	○	○	○	187.06

* Known in market as 253MA Outokumpu

● Stocked Item ○ Market Available

Pipe - Seamless & Welded

Manufactured to ASTM A312
Welded pipe: Annealed, pickled and descaled.
Lengths 6.0 metres.
S31803 Duplex pipe manufactured to ASTM A790
S32750 Super Duplex manufactured to ASTM A790
Pipe Polishing & Bandsaw Cutting service available

Schedule - Nominal bore			Size			Seamless			Weight
	inch (NPS)	mm (DN)	O.D. (mm)	W.T. (mm)	I.D (mm)	316/L	2205	321	(kg/m)
						PS316L160	-	-	
160	½	15	21.34	4.78	11.78	●	○	○	1.98
	¾	20	26.70	5.56	15.58	●	○	○	2.94
	1	25	33.40	6.35	20.70	●	○	○	4.30
	1¼	32	42.16	6.35	29.46	○	○	○	5.69
	1½	40	48.26	7.14	33.98	●	○	○	7.34
	2	50	60.33	8.74	42.85	●	○	○	11.28
	2½	65	73.03	9.53	53.97	○	○	○	15.14
	3	80	88.90	11.13	66.64	○	○	○	21.65
	4	100	114.30	13.49	87.32	○	○	○	34.02
	5	125	141.30	15.88	109.54	○	○	○	49.83
	6	150	168.30	18.26	131.78	○	○	○	68.56
	8	200	219.08	23.01	173.06	○	○	○	112.90
	10	250	273.05	28.58	215.89	○	○	○	174.82
	12	300	323.85	33.32	257.21	○	○	○	242.28

Schedule - Nominal bore			Size			Seamless			Weight
	inch (NPS)	mm (DN)	O.D. (mm)	W.T. (mm)	I.D (mm)	316/L	2205	321	(kg/m)
XXS	½	15	21.34	7.47	6.40	○	○	○	1.98
	¾	20	26.70	7.82	11.03	○	○	○	2.94
	1	25	33.40	9.09	15.22	○	○	○	4.30
	1¼	32	42.16	9.70	22.76	○	○	○	5.69
	1½	40	48.26	10.16	27.94	○	○	○	7.34
	2	50	60.33	11.07	38.19	○	○	○	11.28
	2½	65	73.03	14.02	44.99	○	○	○	15.14
	3	80	88.90	15.24	58.42	○	○	○	21.65
	4	100	114.30	17.12	80.06	○	○	○	34.02
	5	125	141.30	19.05	103.20	○	○	○	49.83
	6	150	168.30	21.95	124.38	○	○	○	68.56
	8	200	219.08	22.23	174.62	○	○	○	112.90
	10	250	273.05	25.40	222.25	○	○	○	174.82
	12	300	323.85	25.40	273.05	○	○	○	242.28

● Stocked Item ○ Market Available

Pipe Technical Data - Seamless & Welded

The following tables show the highest permissible internal pressure at 8 temperatures for steel grade 304L calculated according to the rules in ASME B31.3, Chemical Plant and Petroleum Refinery Piping.

The following formula has been used in the pressure calculations.

P	= Internal pressure in ksi
tmin	= Minimum allowable wall thickenss in mm
S	= Allowable stress in bar
OD	= Nominal outside diameter in mm
Ej	= Weld Joint Quality Factor. (Related to the type of joint and amount of examination.)
Y	= 0.4 when tmin < OD/6

$$P = 68.95 \times \frac{2\ S \times Ej \times tmin}{OD - (2Y \times tmin)}$$

Longitudinal Weld Joint Quality Factor (Ej)

ASTM specification	A312	A358	A790	A928
0 % radiographed				
Single butt weld	0.8	-	0.8	-
Double butt weld. Class 2	0.85	0.85	0.85	0.85
Spot radiographed				
Double butt weld. Class 5	-	0.9	-	0.9
100 % radiographed				
Single or double butt weld. Class 1,3,4	1.0	1.0	1.0	1.0

Applicable ASTM-specifications

Steel type	Pipe No Filler	Pipe with Filler	Tube
Austenitic	A312	A358	A269
Duplex	A790	A928	A789

Highest permissible pressure for other grades can be calculated by multiplying the maximum allowable pressure for 304L by the coefficient for the relevant grade and temperature.

Coefficients for obtaining highest permissible pressures for other steel grades.

°F	<=200	300	400	500	600	700	800	900
°C	<=93	149	204	260	316	371	427	482
304L	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
304	1.20	1.20	1.18	1.18	1.17	1.19	1.17	1.23
321	1.20	1.20	1.18	1.17	1.17	1.17	1.19	1.28
316L	1.00	1.00	0.98	0.97	0.96	0.96	0.95	0.99
316	1.20	1.20	1.22	1.21	1.21	1.21	1.22	1.30
2205	1.80	1.73	1.77	1.84	1.92	-	-	-
2507	2.10	1.98	2.02	2.12	2.23	-	-	-
254MA	1.41	1.28	1.26	1.25	1.28	1.30	-	-

Basic Allowable Stress BAS

°F	<=200	300	400	500	600	700	800	900
°C	<=93	149	204	260	316	371	427	482
304L	16.7	16.7	15.8	14.8	14.0	13.5	13.0	11.9
304	20.0	20.0	18.7	17.5	16.4	16.0	15.2	14.6
321	20.0	20.0	18.6	17.3	16.4	15.8	15.5	15.2
316L	16.7	16.7	15.5	14.4	13.5	12.9	12.4	11.8
316	20.0	20.0	19.3	17.9	17.0	16.3	15.9	15.5
2205	30.0	28.9	27.9	27.2	26.9	-	-	-
2507	35.0	33.1	31.9	31.4	31.2	-	-	-
254MA	23.5	21.4	19.9	18.5	17.9	17.5	-	-

Pressure Temperature Chart

	304L ASTM A312	304L ASTM A358
Wall Thickness Tolerance	-12.5%	-0.3mm
Radiologic Test	0%	100%
Joint Quality Factor (Ej)	0.8	1.0

					Max. allowable pressure in bar (1 bar = 14.50 psi)								
OD		Wall			100°F	200°F	300°F	400°F	500°F	600°F	700°F	800°F	900°F
mm	NPS	mm	SCH	ASTM	40°C	93°C	149°C	204°C	260°C	316°C	371°C	427°C	482°C
13.7	1/4	1.65	5S	A 312	212	212	212	201	188	178	171	165	151
17.2	3/8	1.65	5S	A 312	166	166	166	157	147	139	134	129	118
21.3	1/2	1.65	5S	A 312	132	132	132	125	117	111	107	103	94
21.3		2.11	10S	A 312	172	172	172	162	152	144	139	134	122
21.3		2.77	40S	A 312	231	231	231	218	204	193	186	180	164
26.7	3/4	1.65	5S	A 312	104	104	104	99	92	87	84	81	74
26.7		2.11	10S	A 312	135	135	135	128	120	113	109	105	96
26.7		2.87	40S	A 312	187	187	187	177	166	157	151	146	134
33.4	1	1.65	5S	A 312	82	82	82	78	73	69	67	64	59
33.4		2.77	10S	A 312	142	142	142	134	126	119	115	110	101
33.4		3.38	40S	A 312	176	176	176	166	156	147	142	137	125
42.2	1 1/4	1.65	5S	A 312	65	65	65	61	57	54	52	50	46
42.2		2.77	10S	A 312	111	111	111	105	98	93	90	86	79
42.2		3.56	40S	A 312	145	145	145	137	128	121	117	113	103
48.3	1 1/2	1.65	5S	A 312	56	56	56	53	50	47	46	44	40
48.3		2.77	10S	A 312	96	96	96	91	85	81	78	75	69
48.3		3.68	40S	A 312	130	130	130	123	115	109	105	101	92
60.3	2	1.65	5S	A 312	45	45	45	43	40	38	36	35	32
60.3		2.77	10S	A 312	77	77	77	72	68	64	62	60	55
60.3		3.91	40S	A 312	109	109	109	104	97	92	89	85	78
73.0	2 1/2	2.11	5S	A 312	48	48	48	45	42	40	38	37	34
73.0		3.05	10S	A 312	69	69	69	66	61	58	56	54	49
73.0		5.16	40S	A 312	120	120	120	113	106	100	97	93	85
88.9	3	2.11	5S	A 312	39	39	39	37	34	33	31	30	28
88.9		3.05	10S	A 312	57	57	57	54	50	48	46	44	40
88.9		5.49	40S	A 312	104	104	104	98	92	87	84	81	74
101.6	3 1/2	2.11	5S	A 312	34	34	34	32	30	28	27	26	24
101.6		3.05	10S	A 312	49	49	49	47	44	41	40	38	35
101.6		5.74	40S	A 312	95	95	95	90	84	79	77	74	68
114.3	4	2.11	5S	A 312	30	30	30	29	27	25	24	23	21
114.3		3.05	10S	A 312	44	44	44	41	39	37	35	34	31
114.3		6.02	40S	A 312	88	88	88	83	78	74	71	69	63
114.3		8.56	80S	A 358	177	177	177	167	157	148	143	138	126
141.3	5	2.77	5S	A 312	32	32	32	30	28	27	26	25	23
141.3		3.40	10S	A 312	39	39	39	37	35	33	32	31	28
141.3		6.55	40S	A 312	77	77	77	73	68	65	62	60	55
141.3		9.53	80S	A 358	159	159	159	150	141	133	128	124	113
168.3	6	2.77	5S	A 312	27	27	27	25	24	23	22	21	19
168.3		3.40	10S	A 312	33	33	33	31	29	28	27	26	24
168.3		7.11	40S	A 312	70	70	70	66	62	59	57	55	50
168.3		10.97	80S	A 358	154	154	154	146	136	129	124	120	110
219.1	8	2.77	5S	A 312	21	21	21	19	18	17	17	16	15
219.1		3.76	10S	A 312	28	28	28	26	25	23	23	22	20
219.1		6.35	20	A 312	48	48	48	45	42	40	39	37	34
219.1		8.18	40S	A 312	62	62	62	58	55	52	50	48	44
219.1	8	10.31	60	A 358	109	109	109	103	97	92	88	85	78
219.1		12.70	80	A 358	137	137	137	129	121	114	110	106	97
219.1		15.09	100	A 358	164	164	164	155	146	138	133	128	117
219.1		18.26	120	A 358	202	202	202	191	179	169	163	157	144

OD mm	NPS	Wall mm	SCH	ASTM	Max. allowable pressure in bar (1 bar = 14.50 psi) 100°F 40°C	200°F 93°C	300°F 149°C	400°F 204°C	500°F 260°C	600°F 316°C	700°F 371°C	800°F 427°C	900°F 482°C
273.0	10	3.40	5S	A 312	20	20	20	19	18	17	16	16	14
273.0		4.19	10S	A 312	25	25	25	24	22	21	20	19	18
273.0		6.35	20	A 312	38	38	38	36	34	32	31	30	27
273.0		9.27	40S	A 312	56	56	56	53	50	47	45	44	40
273.0	10	12.70	60	A 358	109	109	109	103	96	91	88	84	77
273.0		15.09	80	A 358	130	130	130	123	116	109	105	102	93
273.0		18.26	100	A 358	160	160	160	151	142	134	129	124	114
273.0		21.44	120	A 358	190	190	190	180	168	159	154	148	135
323.9	12	3.96	5S	A 312	20	20	20	19	18	17	16	15	14
323.9		4.57	10S	A 312	23	23	23	22	20	19	19	18	16
323.9		6.35	20	A 312	32	32	32	30	28	27	26	25	23
323.9		9.53	40S	A 312	48	48	48	46	43	41	39	38	35
323.9	12	10.31	40	A 358	73	73	73	69	65	61	59	57	52
323.9		12.70	XS	A 358	91	91	91	86	81	76	74	71	65
323.9		14.27	60	A 358	103	103	103	97	91	86	83	80	73
323.9		17.48	80	A 358	128	128	128	121	113	107	103	99	91
323.9		21.44	100	A 358	159	159	159	150	141	133	128	123	113
323.9		25.40	120	A 358	190	190	190	180	169	159	154	148	136
355.6	14	3.96	5S	A 312	18	18	18	17	16	15	15	14	13
355.6		4.78	10S	A 312	22	22	22	21	19	18	18	17	16
355.6		6.35	10	A 312	29	29	29	28	26	24	24	23	21
355.6	14	7.92	20	A 358	50	50	50	48	44	42	41	39	36
355.6		9.53	30	A 358	61	61	61	58	54	51	49	48	43
355.6		11.13	40	A 358	72	72	72	68	64	60	58	56	51
355.6		12.70	XS	A 358	83	83	83	78	73	69	67	64	59
355.6		15.09	60	A 358	99	99	99	94	88	83	80	77	71
355.6		19.05	80	A 358	127	127	127	120	112	106	102	99	90
355.6		23.83	100	A 358	161	161	161	152	143	135	130	125	115
355.6		27.79	120	A 358	190	190	190	180	168	159	153	148	135
406.4	16	4.19	5S	A 312	17	17	17	16	15	14	14	13	12
406.4		4.78	10S	A 312	19	19	19	18	17	16	15	15	14
406.4		6.35	10	A 312	25	25	25	24	23	21	21	20	18
406.4	16	7.92	20	A 358	44	44	44	41	39	37	35	34	31
406.4		9.53	30	A 358	53	53	53	50	47	45	43	41	38
406.4		12.70	40	A 358	72	72	72	68	64	60	58	56	51
406.4		16.66	60	A 358	96	96	96	91	85	80	77	75	68
406.4		21.44	80	A 358	125	125	125	118	111	105	101	97	89
406.4		26.19	100	A 358	155	155	155	146	137	130	125	120	110
406.4		30.96	120	A 358	185	185	185	175	164	155	149	144	132
457.0	18	4.19	5S	A 312	15	15	15	14	13	12	12	12	11
457.0		4.78	10S	A 312	17	17	17	16	15	14	14	13	12
457.0		6.35	10	A 312	23	23	23	21	20	19	18	18	16
457.0	18	7.92	20	A 358	39	39	39	37	34	33	31	30	28
457.0		9.53	30	A 358	47	47	47	45	42	40	38	37	34
457.0		12.70	XS	A 358	64	64	64	60	57	54	52	50	46
457.0		14.27	40	A 358	72	72	72	68	64	60	58	56	51
457.0		17.48	-	A 358	89	89	89	84	79	75	72	69	64
457.0		19.05	60	A 358	98	98	98	92	87	82	79	76	70
457.0		23.83	80	A 358	124	124	124	117	110	104	100	96	88
508.0	20	4.78	5S	A 312	15	15	15	14	14	13	12	12	11
508.0		5.54	10S	A 358	22	22	22	21	20	19	18	17	16
508.0		6.35	10	A 312	20	20	20	19	18	17	16	16	14

OD		Wall			Max. allowable pressure in bar (1 bar = 14.50 psi)								
					100°F	200°F	300°F	400°F	500°F	600°F	700°F	800°F	900°F
mm	NPS	mm	SCH	ASTM	40°C	93°C	149°C	204°C	260°C	316°C	371°C	427°C	482°C
508.0	20	9.53	20	A 358	42	42	42	40	38	36	34	33	30
508.0		12.70	30	A 358	57	57	57	54	51	48	46	45	41
508.0		15.09	40	A 358	69	69	69	65	61	58	55	53	49
508.0		20.62	60	A 358	95	95	95	90	84	80	77	74	68
508.0		26.19	80	A 358	122	122	122	116	108	103	99	95	87
508.0		32.54	100	A 358	154	154	154	146	136	129	124	120	110
610.0	24	5.54	5S	A 312	15	15	15	14	13	12	12	11	10
610.0		6.35	10S	A 358	21	21	21	20	19	18	17	16	15
610.0		9.53	20	A 358	35	35	35	33	31	30	29	27	25
610.0		12.70	XS	A 358	48	48	48	45	42	40	38	37	34
610.0		14.27	30	A 358	54	54	54	51	48	45	43	42	38
610.0		17.48	40	A 358	66	66	66	63	59	56	54	52	47
610.0		24.59	60	A 358	95	95	95	90	84	79	77	74	67
610.0		30.94	80	A 358	121	121	121	114	107	101	97	94	86
660	26	7.92	10	A 358	27	27	27	25	24	22	22	21	19
660		9.53	STD	A 358	33	33	33	31	29	27	26	25	23
660		12.70	20	A 358	44	44	44	42	39	37	36	34	31
711	28	5.54	-	A 358	17	17	17	16	15	14	14	13	12
711		6.35	-	A 358	20	20	20	19	17	17	16	15	14
711		7.92	10	A 358	25	25	25	24	22	21	20	19	18
711		9.53	STD	A 358	30	30	30	29	27	25	24	24	22
711		12.70	20	A 358	41	41	41	39	36	34	33	32	29
711		15.88	30	A 358	51	51	51	49	46	43	42	40	37
762	30	6.35	5S	A 358	18	18	18	17	16	15	15	14	13
762		7.92	10S	A 358	23	23	23	22	21	19	19	18	17
762		9.53	STD	A 358	28	28	28	27	25	24	23	22	20
762		12.70	20	A 358	38	38	38	36	34	32	31	30	27
762		15.88	30	A 358	48	48	48	45	42	40	39	37	34
813	32	7.92	10	A 358	22	22	22	21	19	18	18	17	15
813		9.53	STD	A 358	26	26	26	25	23	22	21	21	19
813		12.70	20	A 358	36	36	36	34	32	30	29	28	25
864	34	5.54	-	A 358	14	14	14	13	12	12	11	11	10
864		7.92	10	A 358	20	20	20	19	18	17	17	16	15
864		9.53	STD	A 358	25	25	25	23	22	21	20	19	18
864		12.70	20	A 358	33	33	33	32	30	28	27	26	24
914	36	6.35	-	A 358	15	15	15	14	14	13	12	12	11
914		7.92	10	A 358	19	19	19	18	17	16	16	15	14
914		9.53	STD	A 358	23	23	23	22	21	20	19	18	17
914		12.70	20	A 358	32	32	32	30	28	26	26	25	23
965	38	7.92	-	A 358	18	18	18	17	16	15	15	14	13
965		9.53	STD	A 358	22	22	22	21	20	19	18	17	16
965		12.70	XS	A 358	30	30	30	28	26	25	24	23	21
1016	40	6.35	-	A 358	14	14	14	13	12	12	11	11	10
1016		7.92	-	A 358	17	17	17	16	15	15	14	14	12
1016		9.53	STD	A 358	21	21	21	20	19	18	17	16	15
1016		12.70	XS	A 358	28	28	28	27	25	24	23	22	20
1067	42	7.92	-	A 358	17	17	17	16	15	14	13	13	12
1067		9.53	STD	A 358	20	20	20	19	18	17	16	16	14
1067		12.70	XS	A 358	27	27	27	26	24	23	22	21	19

Buttweld Pipe Fittings - Schedule 10S

Manufactured to ASTM A403 WP-W & WP-S ASME B16.9
Finished pickled
Duplex Buttweld Fittings manufactured to A815
Seamless S31803/S32205

	Nominal Bore		90º Elbows Long Radius		90º Elbows Short Radius	90º Elbows Long Radius			45º Elbows		45º Elbows		
			FP9		FP9S	FPS9			FP4		FPS4		
	NPS (inch)	DN (mm)	304L Welded	316L Welded	316L Welded	304L Smls	316L Smls	2205 S31803 Smls	304L Welded	316L Welded	304L Smls	316L Smls	2205 S31803 Smls
10S	½	15	●	●	○	○	○	●	●	●	○	○	●
	¾	20	●	●	○	○	○	●	●	●	○	○	●
	1	25	●	●	○	●	●	●	●	●	●	●	●
	1¼	32	●	●	○	●	○	●	●	●	●	●	○
	1½	40	●	●	○	●	●	●	●	●	●	●	●
	2	50	●	●	●	●	●	●	●	●	●	●	●
	2½	65	●	●	○	●	●	●	●	●	●	●	○
	3	80	●	●	●	●	●	●	●	●	●	●	●
	4	100	●	●	●	●	●	●	●	●	●	●	●
	5	125	○	●	○	○	○	●	●	○	○	○	○
	6	150	●	●	●	●	●	○	●	●	●	●	●
	8	200	●	●	●	●	●	○	●	●	●	●	●
	10	250	●	●	●	○	○	○	●	●	○	○	○
	12	300	●	●	●	○	○	○	●	●	○	○	○
	14	350	○	●	●	○	○	○	○	●	○	○	○
	16	400	○	●	●	○	○	○	○	●	○	○	○
	18	450	○	●	●	○	○	○	○	●	○	○	○
	20	500	○	●	●	○	○	○	○	●	○	○	○
	24	600	○	●	●	○	○	○	○	●	○	○	○

● Stocked Item ○ Market Available

Buttweld Pipe Fittings - Schedule 10S

Manufactured to ASTM A403 WP-W & WP-S ASME B16.9
Finished pickled
Duplex Buttweld Fittings manufactured to A815
Seamless S31803/S32205

	Nominal Bore		Equal Tee		Equal Tee			Stub End	Stub End	Cap	Cap
			FPT		FPST			FPS	FPS	FPC	
	NPS (inch)	DN (mm)	304L Welded	316L Welded	304L Smls	316L Smls	2205 S31803 Smls	316L Welded	316L Smls	316L Welded	316L Smls
10S	½	15	●	●	○	○	●	○	○	○	○
	¾	20	●	●	○	○	●	○	○	○	○
	1	25	●	●	●	○	●	●	○	○	●
	1¼	32	●	●	●	○	●	○	○	○	○
	1½	40	●	●	●	●	●	●	○	○	●
	2	50	●	●	●	●	●	●	○	○	●
	2½	65	●	●	●	○	●	●	○	○	○
	3	80	●	●	●	●	●	●	○	○	●
	4	100	●	●	●	●	●	●	○	○	●
	5	125	●	●	○	○	●	●	○	○	○
	6	150	●	●	●	●	●	●	○	○	●
	8	200	●	●	●	●	●	●	○	○	●
	10	250	●	●	○	○	○	●	○	○	●
	12	300	●	●	○	○	○	○	○	○	●
	14	350	○	●	○	○	○	○	○	○	●
	16	400	○	●	○	○	○	○	○	○	●
	18	450	○	●	○	○	○	○	○	○	●
	20	500	○	●	○	○	○	○	○	○	●
	24	600	○	●	○	○	○	○	○	○	●

● Stocked Item ○ Market Available

Buttweld Pipe Fittings - Schedule 40S & STD

Manufactured to ASTM A403 WP-W & WP-S ASME B16.9
Finished pickled
Duplex Buttweld Fittings manufactured to A815
Seamless S31803/S32205

	Nominal Bore		90º Elbows Long Radius		90º Elbows Short Radius	90º Elbows Long Radius			45º Elbows		45º Elbows		
			FP9		FP9S	FPS9			FP4		FPS4		
	NPS (inch)	DN (mm)	304L Welded	316L Welded	316L Welded	304L Smls	316L Smls	2205 S31803 Smls	304L Welded	316L Welded	304L Smls	316L Smls	2205 S31803 Smls
40S	½	15	●	●	○	○	●	●	●	●	○	●	●
	¾	20	●	●	○	○	●	●	●	●	○	●	●
	1	25	●	●	○	●	●	●	●	●	●	●	●
	1¼	32	○	●	○	●	●	●	●	●	●	●	○
	1½	40	●	●	○	●	●	●	●	●	●	●	●
	2	50	●	●	●	●	●	●	●	●	●	●	●
	2½	65	○	○	○	●	●	●	●	●	●	●	○
	3	80	●	●	●	●	●	●	●	●	●	●	●
	4	100	●	●	●	●	●	●	●	●	●	●	●
	5	125	●	●	○	○	○	●	●	●	○	○	○
	6	150	●	●	●	●	●	●	●	●	●	●	●
	8	200	●	●	●	●	●	●	●	●	●	●	●
	10	250	●	●	●	○	○	○	●	●	○	○	○
	12	300	●	●	●	○	○	○	●	●	○	○	○
Std	14	350	○	●	●	○	○	○	○	●	○	○	○
	16	400	○	●	●	○	○	○	○	●	○	○	○
	18	450	○	●	●	○	○	○	○	●	○	○	○
	20	500	○	●	●	○	○	○	○	●	○	○	○
	22	550	○	○	○	○	○	○	○	○	○	○	○
	24	600	○	●	●	○	○	○	○	●	○	○	○
	26	650	○	○	○	○	○	○	○	○	○	○	○
	28	700	○	○	○	○	○	○	○	○	○	○	○
	30	750	○	○	○	○	○	○	○	○	○	○	○
	32	800	○	○	○	○	○	○	○	○	○	○	○
	34	850	○	○	○	○	○	○	○	○	○	○	○
	36	900	○	○	○	○	○	○	○	○	○	○	○
	38	950	○	○	○	-	-	-	○	○	-	-	-
	40	1000	○	○	○	-	-	-	○	○	-	-	-

● Stocked Item ○ Market Available

Buttweld Pipe Fittings - Schedule 40S & STD

Manufactured to ASTM A403 WP-W & WP-S ASME B16.9
Finished pickled
Duplex Buttweld Fittings manufactured to A815
Seamless S31803/S32205

	Nominal Bore		Equal Tee FPT		Equal Tee FPST			Stub End FPS	Stub End FPS	Cap FPC	Cap
	NPS (inch)	DN (mm)	304L Welded	316L Welded	304L Smls	316L Smls	2205 S31803 Smls	316L Welded	316L Smls	316L Welded	316L Smls
40S	½	15	●	●	○	●	●	○	○	○	○
	¾	20	●	●	○	●	●	○	○	○	○
	1	25	●	●	●	●	●	●	○	○	●
	1¼	32	●	●	●	●	●	○	○	○	○
	1½	40	●	●	●	●	●	●	○	○	●
	2	50	●	●	●	●	●	●	○	○	●
	2½	65	●	●	●	○	●	○	○	○	○
	3	80	●	●	●	●	●	●	○	○	●
	4	100	●	●	●	●	●	●	○	○	●
	5	125	●	●	○	○	●	○	○	○	○
	6	150	●	●	●	●	●	●	○	○	●
	8	200	●	●	●	●	●	●	○	○	●
	10	250	●	●	○	○	○	●	○	○	●
	12	300	●	●	○	○	○	○	○	○	●
Std	14	350	○	○	○	○	○	○	○	○	●
	16	400	○	●	○	○	○	○	○	○	●
	18	450	○	●	○	○	○	○	○	○	●
	20	500	○	●	○	○	○	○	○	○	●
	22	550	○	○	○	○	○	○	○	○	○
	24	600	○	●	○	○	○	○	○	○	●
	26	650	○	○	○	○	○	○	○	○	○
	28	700	○	○	○	○	○	○	○	○	○
	30	750	○	○	○	○	○	○	○	○	○
	32	800	○	○	○	○	○	○	○	○	○
	34	850	○	○	○	○	○	○	○	○	○
	36	900	○	○	○	○	○	○	○	○	○
	38	950	○	○	-	-	-	○	-	○	○
	40	1000	○	○	-	-	-	○	-	○	○

● Stocked Item ○ Market Available

Buttweld Pipe Fittings - Schedule 80S & XS

Manufactured to ASTM A403 WP-W & WP-S ASME B16.9
Finished pickled
Duplex Buttweld Fittings manufactured to A815
Seamless S31803/S32205

	Nominal Bore		90º Elbows Long Radius		90º Elbows Short Radius	90º Elbows Long Radius		45º Elbows		45º Elbows	
			FP9		FP9S	FPS9		FP4		FPS4	
	NPS (inch)	DN (mm)	304L Welded	316L Welded	316L Welded	304L Smls	316L Smls	304L Welded	316L Welded	304L Smls	316L Smls
80S	½	15	○	●	○	○	●	○	○	○	●
	¾	20	○	●	○	○	●	○	○	○	●
	1	25	○	●	○	○	●	○	○	○	●
	1¼	32	○	●	○	○	●	○	○	○	●
	1½	40	○	●	○	○	●	○	○	○	●
	2	50	○	●	○	○	●	○	○	○	●
	2½	65	○	●	○	○	●	○	○	○	●
	3	80	○	●	○	○	●	○	○	○	●
	4	100	○	●	○	○	●	○	○	○	●
	5	125	○	○	○	○	○	○	○	○	○
	6	150	○	●	○	○	●	○	○	○	●
	8	200	○	●	○	○	●	○	○	○	●
	10	250	○	○	○	○	○	○	○	○	○
	12	300	○	○	○	○	○	○	○	○	○
XS	14	350	○	○	○	○	○	○	○	○	○
	16	400	○	○	○	○	○	○	○	○	○
	18	450	○	○	○	○	○	○	○	○	○
	20	500	○	○	○	○	○	○	○	○	○
	22	550	○	○	○	○	○	○	○	○	○
	24	600	○	○	○	○	○	○	○	○	○
	26	650	○	○	○	○	○	○	○	○	○
	28	700	○	○	○	○	○	○	○	○	○
	30	750	○	○	○	○	○	○	○	○	○
	32	800	○	○	○	○	○	○	○	○	○
	34	850	○	○	○	○	○	○	○	○	○
	36	900	○	○	○	○	○	○	○	○	○
	38	950	○	○	○	-	-	○	○	-	-
	40	1000	○	○	○	-	-	○	○	-	-

● Stocked Item ○ Market Available

Buttweld Pipe Fittings - Schedule 80S & XS

Manufactured to ASTM A403 WP-W & WP-S ASME B16.9
Finished pickled
Duplex Buttweld Fittings manufactured to A815
Seamless S31803/S32205

	Nominal Bore		Equal Tee		Equal Tee		Stub End	Stub End	Cap	Cap
			FPT		FPST		FPS	FPS		
	NPS (inch)	DN (mm)	304L Welded	316L Welded	304L Smls	316L Smls	316L Welded	316L Smls	316L Welded	316L Smls
80S	½	15	○	○	○	●	○	○	○	○
	¾	20	○	○	○	●	○	○	○	○
	1	25	○	○	○	●	○	○	○	○
	1¼	32	○	○	○	●	○	○	○	○
	1½	40	○	○	○	●	○	○	○	○
	2	50	○	○	○	●	○	○	○	○
	2½	65	○	○	○	○	○	○	○	○
	3	80	○	○	○	●	○	○	○	○
	4	100	○	○	○	●	○	○	○	○
	5	125	○	○	○	○	○	○	○	○
	6	150	○	○	○	●	○	○	○	○
	8	200	○	○	○	●	○	○	○	○
	10	250	○	○	○	○	○	○	○	○
	12	300	○	○	○	○	○	○	○	○
XS	14	350	○	○	○	○	○	○	○	○
	16	400	○	○	○	○	○	○	○	○
	18	450	○	○	○	○	○	○	○	○
	20	500	○	○	○	○	○	○	○	○
	22	550	○	○	○	○	○	○	○	○
	24	600	○	○	○	○	○	○	○	○
	26	650	○	○	○	○	○	○	○	○
	28	700	○	○	○	○	○	○	○	○
	30	750	○	○	○	○	○	○	○	○
	32	800	○	○	○	○	○	○	○	○
	34	850	○	○	○	○	○	○	○	○
	36	900	○	○	○	○	○	○	○	○
	38	950	○	○	-	-	○	-	○	-
	40	1000	○	○	-	-	○	-	○	-

● Stocked Item ○ Market Available

Buttweld Concentric Reducer

Manufactured to ASTM A403 WP-W & WP-S ASME B16.9
Finished pickled
Duplex Buttweld Fittings manufactured to A815
Seamless S31803/S32205

Nominal Size		Welded				Seamless					
		FPRC				FPSRC					2205
NPS (inch)	DN (mm)	304L 10S	304L 40S	316L 10S	316L 40S	304L 10S	304L 40S	316L 10S	316L 40S	316L 80S	S31803 40S
¾ x ½	20 x 15	●	●	●	●	○	○	○	●	●	○
1 x ½	25 x 15	●	●	●	●	●	●	○	●	●	○
1 x ¾	25 x 20	●	●	●	●	●	●	○	●	●	●
1¼ x ¾	32 x 20	○	○	●	○	●	●	○	○	○	○
1¼ x 1	32 x 25	●	●	●	●	●	●	○	●	●	○
1½ x ¾	40 x 20	○	○	●	●	○	○	○	○	●	○
1½ x 1	40 x 25	●	●	●	●	●	●	○	●	●	○
1½ x 1¼	40 x 32	●	●	●	●	●	●	○	●	●	○
2 x ¾	50 x 20	○	○	○	○	○	○	○	●	○	○
2 x 1	50 x 25	●	●	●	●	●	●	●	●	●	●
2 x 1¼	50 x 32	●	○	●	●	●	●	○	●	●	○
2 x 1½	50 x 40	●	●	●	●	●	●	●	●	●	●
2½ x 1¼	65 x 32	○	○	●	●	○	○	○	○	○	○
2½ x 1½	65 x 40	●	●	●	●	○	○	●	○	○	○
2½ x 2	65 x 50	●	●	●	●	●	●	●	●	●	○
3 x 1	80 x 25	○	○	●	●	○	○	○	○	○	○
3 x 1¼	80 x 32	○	○	●	○	○	○	○	○	○	○
3 x 1½	80 x 40	●	○	●	●	○	○	●	●	○	○
3 x 2	80 x 50	●	●	●	●	●	●	●	●	●	●
3 x 2½	80 x 65	●	●	●	●	●	●	●	●	○	○
4 x 1½	100 x 40	○	○	●	●	○	○	○	○	○	○
4 x 2	100 x 50	●	●	●	●	●	●	●	●	●	●
4 x 2½	100 x 65	●	○	●	●	●	●	○	○	○	○
4 x 3	100 x 80	●	●	●	●	●	●	●	●	●	●
5 x 2½	125 x 65	○	○	●	○	○	○	○	○	○	○
5 x 3	125 x 80	○	○	●	●	○	○	○	○	○	○
5 x 4	125 x 100	●	○	●	○	○	○	○	○	○	○
6 x 2½	150 x 65	○	○	●	○	○	○	○	○	○	○
6 x 3	150 x 80	●	●	●	●	●	●	●	●	●	●
6 x 4	150 x 100	●	●	●	●	●	●	●	●	●	●
6 x 5	150 x 125	●	●	●	●	○	○	○	○	○	○
8 x 4	200 x 100	●	○	●	●	●	●	○	●	○	●
8 x 5	200 x 125	○	○	○	●	○	○	○	○	○	○
8 x 6	200 x 150	●	●	●	●	●	●	○	●	●	●
10 x 4	250 x 100	●	○	●	●	○	○	○	○	○	○
10 x 5	250 x 125	○	○	●	○	○	○	○	○	○	○
10 x 6	250 x 150	●	●	●	●	○	○	○	○	○	○
10 x 8	250 x 200	●	●	●	●	○	○	○	○	○	○
12 x 6	300 x 150	○	○	●	●	○	○	○	○	○	○
12 x 8	300 x 200	●	●	●	●	○	○	○	○	○	○
12 x 10	300 x 250	○	○	○	●	○	○	○	○	○	○

● Stocked Item ○ Market Available

Buttweld Concentric Reducer

Manufactured to ASTM A403 WP-W & WP-S ASME B16.9
Finished pickled
Duplex Buttweld Fittings manufactured to A815
Seamless S31803/S32205

Nominal Size		Welded				Seamless					
		FPRC				FPSRC					2205
NPS (inch)	DN (mm)	304L 10S	304L 40S	316L 10S	316L 40S	304L 10S	304L 40S	316L 10S	316L 40S	316L 80S	S31803 40S
			STD		STD		STD		STD	XS	STD
14 x 8	350 x 200	○	○	●	●	○	○	○	○	○	○
14 x 10	350 x 250	○	○	●	●	○	○	○	○	○	○
14 x 12	350 x 300	○	○	●	●	○	○	○	○	○	○
16 x 8	400 x 200	○	○	●	●	○	○	○	○	○	○
16 x 10	400 x 250	○	○	●	●	○	○	○	○	○	○
16 x 12	400 x 300	○	○	●	●	○	○	○	○	○	○
16 x 14	400 x 350	○	○	●	●	○	○	○	○	○	○
18 x 12	450 x 300	○	○	●	●	○	○	○	○	○	○
18 x 14	450 x 350	○	○	●	●	○	○	○	○	○	○
18 x 16	450 x 400	○	○	●	●	○	○	○	○	○	○
20 x 12	500 x 300	○	○	●	●	○	○	○	○	○	○
20 x 14	500 x 350	○	○	●	●	○	○	○	○	○	○
20 x 16	500 x 400	○	○	●	●	○	○	○	○	○	○
20 x 18	500 x 450	○	○	●	●	○	○	○	○	○	○
24 x 12	600 x 300	○	○	●	●	○	○	○	○	○	○
24 x 14	600 x 350	○	○	●	○	○	○	○	○	○	○
24 x 16	600 x 400	○	○	●	●	○	○	○	○	○	○
24 x 18	600 x 450	○	○	●	●	○	○	○	○	○	○
24 x 20	600 x 500	○	○	●	○	○	○	○	○	○	○

● Stocked Item ○ Market Available

Buttweld Eccentric Reducer & Reducing Tee

Manufactured to ASTM A403 WP-W & WP-S ASME B16.9
Finished pickled
Duplex Buttweld Fittings manufactured to A815
Seamless S31803/S32205

Nominal Size		Welded Eccentric Reducer FPRE				Welded Reducing Tee FPTR		Seamless Eccentric Reducer FPSRE		Seamless Reducing Tee FPSTR	
NPS (inch)	DN (mm)	304L 10S	304L 40S	316L 10S	316L 40S	316L 10S	316L 40S	304L 10S	304L 40S	304L 10S	304L 40S
¾ x ½	20 x 15	●	●	●	●	●	○	○	○	○	○
1 x ½	25 x 15	●	●	●	●	●	○	●	●	●	●
1 x ¾	25 x 20	●	●	●	●	●	○	●	●	●	●
1¼ x ¾	32 x 20	○	○	○	○	○	○	●	●	●	●
1¼ x 1	32 x 25	●	●	●	●	●	○	●	●	●	●
1½ x ¾	40 x 20	○	○	○	●	○	○	○	○	○	○
1½ x 1	40 x 25	●	●	●	●	●	●	●	●	●	●
1½ x 1¼	40 x 32	●	●	●	●	●	○	●	●	●	●
2 x ¾	50 x 20	○	○	○	●	○	○	○	○	○	○
2 x 1	50 x 25	●	●	●	●	●	○	●	●	●	●
2 x 1¼	50 x 32	●	●	●	●	●	○	●	●	●	●
2 x 1½	50 x 40	●	●	●	●	●	○	●	●	●	●
2½ x 1½	65 x 40	●	●	●	●	○	○	○	○	○	○
2½ x 2	65 x 50	●	●	●	●	○	○	●	●	●	●
3 x 1½	80 x 40	●	●	●	●	●	○	○	○	○	○
3 x 2	80 x 50	●	●	●	●	●	○	●	●	●	●
3 x 2½	80 x 65	●	●	●	●	●	○	●	●	●	●
4 x 1½	100 x 40	○	○	●	○	○	○	○	○	○	○
4 x 2	100 x 50	●	●	●	●	●	●	●	●	●	●
4 x 2½	100 x 65	●	●	●	●	●	○	●	●	●	●
4 x 3	100 x 80	●	●	●	●	●	●	●	●	●	●
5 x 3	125 x 80	○	○	○	●	○	○	○	○	○	○
5 x 4	125 x 100	●	●	●	●	●	○	○	○	○	○
6 x 2	150 x 50	○	○	○	○	●	○	○	○	○	○
6 x 3	150 x 80	●	●	●	●	●	●	●	●	●	●
6 x 4	150 x 100	●	●	●	●	●	●	●	●	●	●
6 x 5	150 x 125	●	●	●	●	●	○	○	○	○	○
8 x 3	200 x 80	○	○	○	○	●	○	○	○	○	○
8 x 4	200 x 100	●	●	●	●	●	●	●	●	●	●
8 x 5	200 x 125	○	○	●	●	○	○	○	○	○	○
8 x 6	200 x 150	●	●	●	●	●	●	●	●	●	●
10 x 4	250 x 100	●	○	○	○	●	○	○	○	○	○
10 x 5	250 x 125	○	○	○	●	○	○	○	○	○	○
10 x 6	250 x 150	●	●	●	●	●	●	○	○	○	○
10 x 8	250 x 200	●	●	●	●	●	●	○	○	○	○
12 x 6	300 x 150	○	○	●	●	●	○	○	○	○	○
12 x 8	300 x 200	●	●	●	●	●	●	○	○	○	○
12 x 10	300 x 250	●	●	●	●	●	●	○	○	○	○

● Stocked Item ○ Market Available

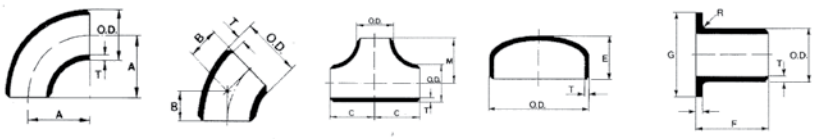
Buttweld Eccentric Reducer & Reducing Tee

Manufactured to ASTM A403 WP-W & WP-S ASME B16.9
Finished pickled
Duplex Buttweld Fittings manufactured to A815
Seamless S31803/S32205

Nominal Size		Welded Eccentric Reducer				Welded Reducing Tee		Seamless Eccentric Reducer		Seamless Reducing Tee	
		FPRE				FPTR		FPSRE		FPSTR	
NPS (inch)	DN (mm)	304L 10S	304L 40S	316L 10S	316L 40S	316L 10S	316L 40S	304L 10S	304L 40S	304L 10S	304L 40S
			STD		STD		STD		STD		STD
14 x 8	350 x 200	○	○	●	●	○	○	○	○	○	○
14 x 10	350 x 250	○	○	●	●	○	○	○	○	○	○
14 x 12	350 x 300	○	○	●	●	○	○	○	○	○	○
16 x 8	400 x 200	○	○	○	○	●	○	○	○	○	○
16 x 10	400 x 250	○	○	○	●	●	○	○	○	○	○
16 x 12	400 x 300	○	○	●	●	●	○	○	○	○	○
16 x 14	400 x 350	○	○	●	●	●	○	○	○	○	○
18 x 10	450 x 250	○	○	●	○	○	○	○	○	○	○
18 x 12	450 x 300	○	○	●	●	●	○	○	○	○	○
18 x 14	450 x 350	○	○	●	●	●	○	○	○	○	○
18 x 16	450 x 400	○	○	●	●	●	○	○	○	○	○
20 x 12	500 x 300	○	○	●	○	○	○	○	○	○	○
20 x 14	500 x 350	○	○	●	○	○	○	○	○	○	○
20 x 16	500 x 400	○	○	●	○	●	○	○	○	○	○
20 x 18	500 x 450	○	○	●	○	●	○	○	○	○	○
24 x 12	600 x 300	○	○	○	○	○	○	○	○	○	○
24 x 16	600 x 400	○	○	●	○	●	○	○	○	○	○
24 x 18	600 x 450	○	○	●	○	●	○	○	○	○	○
24 x 20	600 x 500	○	○	●	○	●	○	○	○	○	○

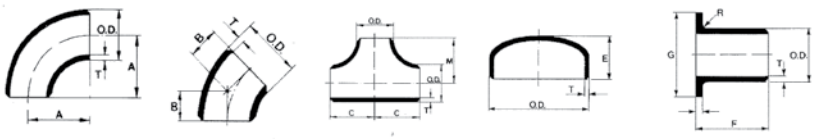
● Stocked Item ○ Market Available

Buttweld Pipe Fittings Technical Data



NPS	DN				90º Elbow Long Radius		90º Elbow Short Radius		45º Elbow		Equal Tee		Cap		Stub End Type B		
inch	mm	Sch	O.D.	Wt	A	Wgt	A	Wgt	B	Wgt	C/M	Wgt	E	Wgt	F	G	Wgt
½	15	10S	21.3	2.11	38.1	0.06	-	-	15.9	0.03	25.4	0.06	25.4	0.03	50.8	34.9	0.07
		40S	21.3	2.77	38.1	0.08	-	-	15.9	0.04	25.4	0.08	25.4	0.04	50.8	34.9	0.09
		80S	21.3	3.73	38.1	0.10	-	-	15.9	0.05	25.4	0.10	25.4	0.05	50.8	34.9	0.11
¾	20	10S	26.7	2.11	38.1	0.08	-	-	19.0	0.04	28.6	0.08	25.4	0.04	50.8	42.9	0.09
		40S	26.7	2.87	38.1	0.10	-	-	19.0	0.05	28.6	0.11	25.4	0.05	50.8	42.9	0.12
		80S	26.7	3.91	38.1	0.13	-	-	19.0	0.07	28.6	0.14	25.4	0.07	50.8	42.9	0.16
1	25	10S	33.4	2.77	38.1	0.13	25	0.10	22.2	0.06	38.1	0.20	38.1	0.09	50.8	50.8	0.13
		40S	33.4	3.38	38.1	0.15	25	0.12	22.2	0.07	38.1	0.24	38.1	0.11	50.8	50.8	0.15
		80S	33.4	4.55	38.1	0.20	25	0.15	22.2	0.09	38.1	0.31	38.1	0.14	50.8	50.8	0.20
1¼	32	10S	42.2	2.77	47.6	0.20	32	0.16	25.4	0.10	47.6	0.33	38.1	0.11	50.8	63.5	0.16
		40S	42.2	3.56	47.6	0.25	32	0.20	25.4	0.12	47.6	0.41	38.1	0.14	50.8	63.5	0.20
		80S	42.2	4.85	47.6	0.33	32	0.26	25.4	0.16	47.6	0.54	38.1	0.18	50.8	63.5	0.26
1½	40	10S	48.3	2.77	57.2	0.28	38	0.22	28.6	0.14	57.2	0.46	38.1	0.13	50.8	73.0	0.22
		40S	48.3	3.68	57.2	0.36	38	0.29	28.6	0.18	57.2	0.60	38.1	0.17	50.8	73.0	0.28
		80S	48.3	5.08	57.2	0.48	38	0.38	28.6	0.24	57.2	0.80	38.1	0.23	50.8	73.0	0.38
2	50	10S	60.3	2.77	76.2	0.47	51	0.36	34.9	0.23	63.5	0.63	38.1	0.17	63.5	92.1	0.29
		40S	60.3	3.91	76.2	0.65	51	0.51	34.9	0.32	63.5	0.87	38.1	0.23	63.5	92.1	0.41
		80S	60.3	5.54	76.2	0.90	51	0.70	34.9	0.44	63.5	1.20	38.1	0.32	63.5	92.1	0.57
2½	65	10S	73.0	3.05	95.3	0.79	64	0.62	44.5	0.39	76.2	1.01	38.1	0.24	63.5	104.8	0.40
		40S	73.0	5.16	95.3	1.29	64	1.02	44.5	0.64	76.2	1.66	38.1	0.39	63.5	104.8	0.66
		80S	73.0	7.01	95.3	1.70	64	1.34	44.5	0.84	76.2	2.19	38.1	0.51	63.5	104.8	0.87
3	80	10S	88.9	3.05	114.3	1.15	76	0.85	50.8	0.58	85.7	1.08	50.8	0.38	63.5	127.0	0.51
		40S	88.9	5.49	114.3	2.02	76	1.50	50.8	1.01	85.7	1.90	50.8	0.66	63.5	127.0	0.89
		80S	88.9	7.62	114.3	2.73	76	2.02	50.8	1.36	85.7	2.57	50.8	0.89	63.5	127.0	1.2
4	100	10S	114.3	3.05	152.4	2.00	102	1.62	63.5	1.00	104.8	2.15	63.5	0.61	76.2	157.2	0.79
		40S	114.3	6.02	152.4	3.84	102	3.12	63.5	1.92	104.8	4.13	63.5	1.17	76.2	157.2	1.51
		80S	114.3	8.56	152.4	5.34	102	4.33	63.5	2.67	104.8	5.74	63.5	1.63	76.2	157.2	2.1
5	125	10S	141.3	3.40	190.5	3.45	127	2.79	79.2	1.72	123.8	3.47	76.2	1.01	76.2	185.7	1.41
		40S	141.3	6.55	190.5	6.51	127	5.28	79.2	3.25	123.8	6.55	76.2	1.91	76.2	185.7	2.66
		80S	141.3	9.52	190.5	9.24	127	7.49	79.2	4.62	123.8	9.30	76.2	2.71	76.2	185.7	3.78
6	150	10S	168.3	3.40	228.6	4.95	152	3.91	95.3	2.47	142.9	4.77	88.9	1.42	88.9	215.9	1.5
		40S	168.3	7.11	228.6	10.1	152	7.94	95.3	5.05	142.9	9.73	88.9	2.90	88.9	215.9	3.02
		80S	168.3	10.97	228.6	15.3	152	12.0	95.3	7.63	142.9	14.7	88.9	4.38	88.9	215.9	4.56
8	200	10S	219.1	3.76	304.8	9.54	203	8.03	127.0	4.77	177.8	8.46	101.6	2.44	101.6	269.9	2.45
		40S	219.1	8.18	304.8	20.3	203	17.1	127.0	10.2	177.8	18.0	101.6	5.19	101.6	269.9	5.22
		80S	219.1	12.70	304.8	30.9	203	26.0	127.0	15.4	177.8	27.4	101.6	7.89	101.6	269.9	7.93
10	250	10S	273.1	4.19	381.0	16.6	254	13.2	159.0	8.3	215.9	14.2	127.0	4.20	127.0	323.9	4.18
		40S	273.1	9.27	381.0	36.0	254	28.6	159.0	18	215.9	30.8	127.0	9.15	127.0	323.9	9.08
		80S	273.1	12.70	381.0	57.2	254	45.5	159.0	28.6	215.9	49.0	127.00	14.5	127.0	323.9	14.43
12	300	10S	323.9	4.57	457.2	26.0	305	17.8	190.5	13.0	254.0	21.7	152.4	6.50	152.4	381.0	6.54
		40S	323.9	9.53	457.2	53.0	305	36.3	190.5	34.0	254.0	53.7	152.4	13.3	152.4	381.0	13.35
		80S	323.9	12.70	457.2	94.9	305	65.0	190.5	44.9	254.0	70.9	152.4	23.8	152.4	381.0	23.90

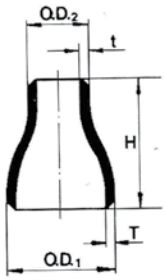
Buttweld Pipe Fittings Technical Data

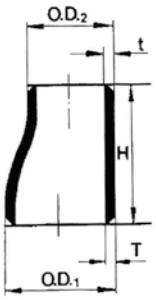


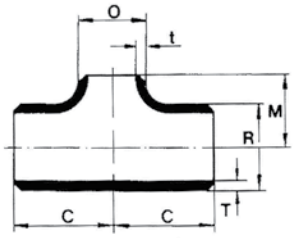
NPS inch	DN mm	Sch	O.D.	Wt	90º Elbow Long Radius A	90º Elbow Long Radius Wgt	90º Elbow Short Radius A	90º Elbow Short Radius Wgt	45º Elbow B	45º Elbow Wgt	Equal Tee C/M	Equal Tee Wgt	Cap E	Cap Wgt	Stub End Type B F	Stub End Type B G	Stub End Type B Wgt
STD/XS																	
14	350	10S	355.6	4.78	533	36.3	356	23.4	222	17.3	279	27.4	165	8.1	152.4	413	7.41
		STD	355.6	9.53	533	68.0	356	45.8	222	34.0	279	53.7	165	15.9	152.4	413	14.53
		XS	355.6	12.70	533	94.0	356	60.5	222	44.9	279	70.9	165	21.0	152.4	413	19.18
16	400	10S	406.4	4.78	610	45.5	406	30.3	254	22.7	305	33.8	178	10.2	152.4	470	8.33
		STD	406.4	9.53	610	89.2	406	59.4	254	44.6	305	66.3	178	20.0	152.4	470	16.34
		XS	406.4	12.70	610	117.7	406	78.4	254	58.9	305	87.5	178	26.4	152.4	470	21.57
18	450	10S	457.0	4.78	686	57.6	457	40.5	286	28.8	343	42.9	203	13.1	152.4	533	9.84
		STD	457.0	9.53	686	113.0	457	79.4	286	56.5	343	84.1	203	25.6	152.4	533	19.30
		XS	457.0	12.70	686	149.2	457	104.8	286	74.6	343	111.0	203	33.8	152.4	533	25.48
20	500	10S	508.0	5.54	762	82.6	508	57.3	318	41.3	381	61.4	229	18.8	152.4	584	12.59
		STD	508.0	9.53	762	140.0	508	97.5	318	70.0	381	104	229	31.9	152.4	584	21.34
		XS	508.0	12.70	762	184.8	508	128.7	318	92.4	381	137.3	229	42.1	152.4	584	28.17
22	550	10S	559.0	5.54	838	98.6	559	-	343	49.3	419	73.1	254	22.5	152.4	-	-
		STD	559.0	9.53	838	170.0	559	-	343	85.0	419	126	254	38.8	152.4	-	-
		XS	559.0	12.70	838	224.4	559	-	343	112.2	419	166.3	254	51.2	152.4	-	-
24	600	10S	610.0	6.35	914	135.3	610	91.8	381	67.7	432	93.8	267	30.2	152.4	692	17.19
		STD	610.0	9.53	914	202.0	610	137.0	381	101.0	432	140	267	45.1	152.4	692	25.65
		XS	610.0	12.70	914	268.7	610	182.2	381	134.3	432	186.2	267	60.0	152.4	692	34.11

Note: Weights and dimensions listed above are a guide only. All dimensions given in mm. All weights given in kg. Please contact our Sales department for any additional data.

Buttweld Reducing Pipe Fittings Technical Data

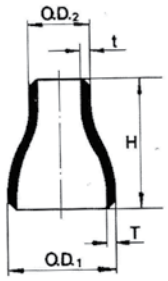


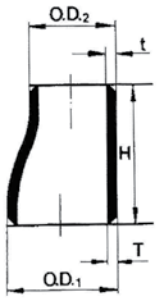


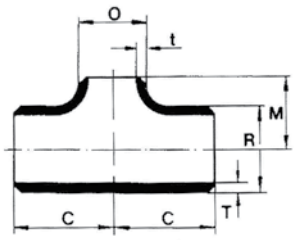


			Conc. & Ecc. Reducers				Reducing Tee		
Imperial	Metric	SCH	O.D. 1	O.D. 2	H	Wgt	C	M	Wgt
¾ x ½	20 x 15	10S	26.7	21.3	39.3	0.05	29	29	0.09
		40S	26.7	21.3	39.3	0.06	29	29	0.12
		80S	26.7	21.3	39.3	0.08	29	29	0.16
1 x ½	25 x 15	10S	33.4	21.3	50.8	0.09	38	38	0.18
		40S	33.4	21.3	50.8	0.11	38	38	0.22
		80S	33.4	21.3	50.8	0.14	38	38	0.29
1 x ¾	25 x 20	10S	33.4	26.7	50.8	0.12	38	38	0.19
		40S	33.4	26.7	50.8	0.14	38	38	0.23
		80S	33.4	26.7	50.8	0.18	38	38	0.30
1¼ x ¾	32 x 20	10S	42.2	26.7	50.8	0.11	49	48	0.30
		40S	42.2	26.7	50.8	0.14	49	48	0.37
		80S	42.2	26.7	50.8	0.18	49	48	0.48
1¼ x 1	32 x 25	10S	42.2	33.4	50.8	0.13	49	49	0.31
		40S	42.2	33.4	50.8	0.16	49	49	0.39
		80S	42.2	33.4	50.8	0.21	49	49	0.51
1½ x ¾	40 x 20	10S	48.3	26.7	63.5	0.15	57	57	0.40
		40S	48.3	26.7	63.5	0.20	57	57	0.52
		80S	48.3	26.7	63.5	0.27	57	57	0.70
1½ x 1	40 x 25	10S	48.3	33.4	63.5	0.17	57	57	0.42
		40S	48.3	33.4	63.5	0.22	57	57	0.55
		80S	48.3	33.4	63.5	0.29	57	57	0.74
1½ x 1¼	40 x 32	10S	48.3	42.2	63.5	0.18	57	57	0.44
		40S	48.3	42.2	63.5	0.24	57	57	0.57
		80S	48.3	42.2	63.5	0.32	57	57	0.76
2 x ¾	50 x 20	10S	60.3	26.7	76.2	0.22	64	44	-
		40S	60.3	26.7	76.2	0.30	64	44	-
		80S	60.3	26.7	76.2	0.41	64	44	-
2 x 1	50 x 25	10S	60.3	33.4	76.2	0.23	64	51	0.53
		40S	60.3	33.4	76.2	0.32	64	51	0.74
		80S	60.3	33.4	76.2	0.44	64	51	1.02
2 x 1¼	50 x 32	10S	60.3	42.2	76.2	0.25	64	57	0.58
		40S	60.3	42.2	76.2	0.35	64	57	0.80
		80S	60.3	42.2	76.2	0.48	64	57	1.10
2 x 1½	50 x 40	10S	60.3	48.3	76.2	0.27	64	60	0.60
		40S	60.3	48.3	76.2	0.37	64	60	0.83
		80S	60.3	48.3	76.2	0.51	64	60	1.15
2½ x 1¼	65 x 32	10S	73.0	42.2	88.9	0.38	76	64	0.84
		40S	73.0	42.2	88.9	0.63	76	64	1.38
		80S	73.0	42.2	88.9	0.83	76	64	1.82
2½ x 1½	65 x 40	10S	73.0	48.3	88.9	0.40	76	67	0.91
		40S	73.0	48.3	88.9	0.66	76	67	1.49
		80S	73.0	48.3	88.9	0.87	76	67	1.97
2½ x 2	65 x 50	10S	73.0	60.3	88.9	0.44	76	70	0.93
		40S	73.0	60.3	88.9	0.72	76	70	1.53
		80S	73.0	60.3	88.9	0.95	76	70	2.02
3 x 1	80 x 25	10S	88.9	33.4	88.9	-	86	-	-
		40S	88.9	33.4	88.9	-	86	-	-
		80S	88.9	33.4	88.9	-	86	-	-

Buttweld Reducing Pipe Fittings Technical Data

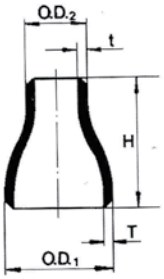


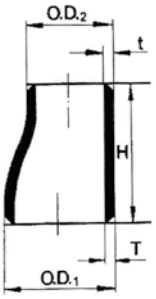


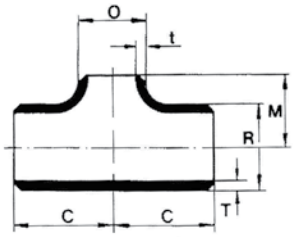


			Conc. & Ecc. Reducers				Reducing Tee		
Imperial	Metric	SCH	O.D. 1	O.D. 2	H	Wgt	C	M	Wgt
3 x 1¼	80 x 32	10S	88.9	42.2	88.9	0.43	86	70	-
		40S	88.9	42.2	88.9	0.76	86	70	-
		80S	88.9	42.2	88.9	1.03	86	70	-
3 x 1½	80 x 40	10S	88.9	48.3	88.9	0.44	86	73	1.17
		40S	88.9	48.3	88.9	0.78	86	73	2.05
		80S	88.9	48.3	88.9	1.05	86	73	2.77
3 x 2	80 x 50	10S	88.9	60.3	88.9	0.48	86	76	1.23
		40S	88.9	60.3	88.9	0.85	86	76	2.16
		80S	88.9	60.3	88.9	1.15	86	76	2.92
3 x 2½	80 x 65	10S	88.9	73.0	88.9	0.53	86	83	1.31
		40S	88.9	73.0	88.9	0.93	86	83	2.29
		80S	88.9	73.0	88.9	1.26	86	83	3.09
4 x 1½	100 x 40	10S	114.3	48.3	101.6	0.61	105	86	1.77
		40S	114.3	48.3	101.6	1.18	105	86	3.41
		80S	114.3	48.3	101.6	1.64	105	86	4.74
4 x 2	100 x 50	10S	114.3	60.3	101.6	0.66	105	89	1.83
		40S	114.3	60.3	101.6	1.27	105	89	3.52
		80S	114.3	60.3	101.6	1.77	105	89	4.89
4 x 2½	100 x 65	10S	114.3	73.0	101.6	0.71	105	95	1.92
		40S	114.3	73.0	101.6	1.37	105	95	3.70
		80S	114.3	73.0	101.6	1.90	105	95	5.14
4 x 3	100 x 80	10S	114.3	88.9	101.6	0.75	105	98	2.50
		40S	114.3	88.9	101.6	1.45	105	98	4.80
		80S	114.3	88.9	101.6	2.02	105	98	6.67
5 x 2½	125 x 65	10S	141.3	73.0	127.0	1.14	124	108	3.02
		40S	141.3	73.0	127.0	2.16	124	108	5.71
		80S	141.3	73.0	127.0	3.07	124	108	8.10
5 x 3	125 x 80	10S	141.3	88.9	127.0	1.20	124	111	3.10
		40S	141.3	88.9	127.0	2.27	124	111	5.85
		80S	141.3	88.9	127.0	3.22	124	111	8.31
5 x 4	125 x 100	10S	141.3	114.3	127.0	1.33	124	117	3.25
		40S	141.3	114.3	127.0	2.50	124	117	6.14
		80S	141.3	114.3	127.0	3.55	124	117	8.72
6 x 2½	150 x 65	10S	168.3	73.0	139.7	-	143	121	-
		40S	168.3	73.0	139.7	-	143	121	-
		80S	168.3	73.0	139.7	-	143	121	-
6 x 3	150 x 80	10S	168.3	88.9	139.7	1.49	143	124	4.17
		40S	168.3	88.9	139.7	3.04	143	124	8.52
		80S	168.3	88.9	139.7	5.94	143	124	12.9
6 x 4	150 x 100	10S	168.3	114.3	139.7	1.62	143	130	4.32
		40S	168.3	114.3	139.7	3.30	143	130	8.81
		80S	168.3	114.3	139.7	4.98	143	130	13.3
8 x 4	200 x 100	10S	219.1	114.3	152.4	2.40	178	156	7.47
		40S	219.1	114.3	152.4	5.10	178	156	15.9
		80S	219.1	114.3	152.4	7.75	178	156	24.2

Buttweld Reducing Pipe Fittings Technical Data

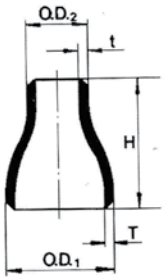


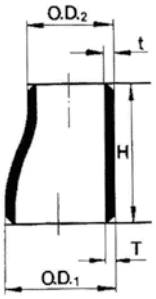


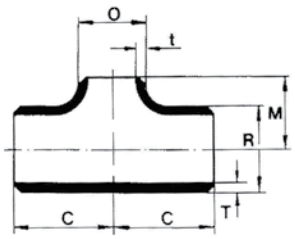


			Conc. & Ecc. Reducers				Reducing Tee		
Imperial	Metric	SCH	O.D. 1	O.D. 2	H	Wgt	C	M	Wgt
8 x 5	200 x 125	10S	219.1	141.3	152.4	2.54	178	162	7.66
		40S	219.1	141.3	152.4	5.40	178	162	16.3
		80S	219.1	141.3	152.4	8.21	178	162	24.8
8 x 6	200 x 150	10S	219.1	168.3	152.4	2.68	178	168	7.90
		40S	219.1	168.3	152.4	5.71	178	168	16.8
		80S	219.1	168.3	152.4	8.68	178	168	25.5
10 x 4	250 x 100	10S	273.1	114.3	177.8	4.73	216	184	-
		40S	273.1	114.3	177.8	10.52	216	184	-
		80S	273.1	114.3	177.8	12.56	216	184	-
10 x 5	250 x 125	10S	273.1	141.3	177.8	3.87	216	191	12.5
		40S	273.1	141.3	177.8	8.42	216	191	27.1
		80S	273.1	141.3	177.8	11.37	216	191	36.6
10 x 6	250 x 150	10S	273.1	168.3	177.8	4.00	216	194	12.7
		40S	273.1	168.3	177.8	8.78	216	194	27.6
		80S	273.1	168.3	177.8	14.0	216	194	43.9
10 x 8	250 x 200	10S	273.1	219.1	177.8	4.40	216	203	13.3
		40S	273.1	219.1	177.8	9.58	216	203	28.9
		80S	273.1	219.1	177.8	15.2	216	203	46.0
12 x 6	300 x 150	10S	323.9	168.3	203.2	5.78	254	216	14.1
		40S	323.9	168.3	203.2	11.8	254	216	18.8
		80S	323.9	168.3	203.2	15.6	254	216	25.3
12 x 8	300 x 200	10S	323.9	219.1	203.2	6.2	254	229	19.7
		40S	323.9	219.1	203.2	12.7	254	229	40.3
		80S	323.9	219.1	203.2	22.7	254	229	72.1
12 x 10	300 x 250	10S	323.9	273.1	203.2	6.70	254	241	20.7
		40S	323.9	273.1	203.2	13.6	254	241	42.3
		80S	323.9	273.1	203.2	24.3	254	241	75.7
	STD / XS								
14 x 8	350 x 200	10S	356	219.1	330	11.1	279	248	24.7
		STD	356	219.1	330	21.8	279	248	48.4
		XS	356	219.1	330	28.8	279	248	63.9
14 x 10	350 x 250	10S	356	273	330	12.0	279	257	25.6
		STD	356	273	330	23.6	279	257	50.2
		XS	356	273	330	31.2	279	257	66.3
14 x 12	350 x 300	10S	356	324	330	13.0	279	270	26.6
		STD	356	324	330	25.4	279	270	52.2
		XS	356	324	330	33.5	279	270	68.9
16 x 8	400 x 200	10S	406	219.1	356	-	305	273	-
		STD	406	219.1	356	-	305	273	-
		XS	406	219.1	356	-	305	273	-
16 x 10	400 x 250	10S	406	273	356	14.2	305	283	31.4
		STD	406	273	356	27.8	305	283	61.6
		XS	406	273	356	36.7	305	283	81.3

Buttweld Reducing Pipe Fittings Technical Data







Imperial	Metric	SCH	Conc. & Ecc. Reducers O.D. 1	O.D. 2	H	Wgt	Reducing Tee C	M	Wgt
16 x 12	400 x 300	10S	406	324	356	15.1	305	295	32.4
		STD	406	324	356	29.6	305	295	63.6
		XS	406	324	356	39.1	305	295	84.0
16 x 14	400 x 350	10S	406	356	356	15.8	305	305	33.2
		STD	406	356	356	31.0	305	305	65.1
		XS	406	356	356	40.9	305	305	85.9
18 x 10	450 x 250	10S	457	273	381	-	343	308	-
		STD	457	273	381	-	343	308	-
		XS	457	273	381	-	343	308	-
18 x 12	450 x 300	10S	457	324	381	17.5	343	321	40.2
		STD	457	324	381	34.3	343	321	78.9
		XS	457	324	381	45.3	343	321	104.1
18 x 14	450 x 350	10S	457	356	381	18.2	343	330	41.0
		STD	457	356	381	35.7	343	330	80.3
		XS	457	356	381	47.1	343	330	106.0
18 x 16	450 x 400	10S	457	406	381	19.3	343	330	41.6
		STD	457	406	381	37.8	343	330	81.5
		XS	457	406	381	49.9	343	330	107.6
20 x 12	500 x 300	10S	508	324	508	-	381	346	34.9
		STD	508	324	508	-	381	346	110.2
		XS	508	324	508	-	381	346	132.5
20 x 14	500 x 350	10S	508	356	508	30.0	381	356	57.5
		STD	508	356	508	50.8	381	356	97.4
		XS	508	356	508	67.1	381	356	128.6
20 x 16	500 x 400	10S	508	406	508	31.6	381	356	58.2
		STD	508	406	508	53.5	381	356	98.6
		XS	508	406	508	70.6	381	356	130.2
20 x 18	500 x 450	10S	508	457	508	33.3	381	368	59.6
		STD	508	457	508	56.4	381	368	101.0
		XS	508	457	508	74.4	381	368	133.3
24 x 12	600 x 300	10S	610	324	508	-	432	397	86.6
		STD	610	324	508	-	432	397	136.1
		XS	610	324	508	-	432	397	163.8
24 x 16	600 x 400	10S	610	406	508	-	432	406	88.9
		STD	610	406	508	-	432	406	139.7
		XS	610	406	508	-	432	406	167.8
24 x 18	600 x 450	10S	610	457	508	42.2	432	419	89.8
		STD	610	457	508	63.0	432	419	134.0
		XS	610	457	508	83.8	432	419	178.2
24 x 20	600 x 500	10S	610	508	508	44.0	432	432	91.8
		STD	610	508	508	65.7	432	432	137.0
		XS	610	508	508	87.4	432	432	182.2

BSP Screwed Fittings & High Pressure Fittings

Cast Fittings Manufactured to ASTM A351
Manufactured from ASTM A312: pipe socket, TBE & TOE
Threads conform with BS 2.1
Pressure Fittings Manufactured to ASTM A182 B16.11
Rated to class 3000

TBE - Threaded both ends.
TOE - Threaded one end.





Size - Nominal		Socket Round		Nipple		Nipple	Nipple		BSP/NPT Hex Cross
NPS	DN			150LB	3000LB	TBE	TOE		3000LB
(inch)	(mm)	316	2205	316	316/316L	316	316	2205	316/316L
		FBSR316	FBSR2205	FBNX316	FB3NX316	FBNB316	FBNO316	FBNO2205	FB3CON316
⅛	6	●	○	●	○	○	○	○	○
¼	8	●	●	●	○	●	●	●	○
⅜	10	●	●	●	○	●	●	●	○
½	15	●	●	●	●	●	●	●	○
¾	20	●	●	●	●	●	●	●	●
1	25	●	●	●	●	●	●	●	●
1¼	32	●	○	●	○	●	●	○	●
1½	40	●	●	●	●	●	●	●	●
2	50	●	●	●	●	●	●	●	●
2½	65	●	○	●	○	●	●	○	○
3	80	●	○	●	○	●	●	○	○
4	100	●	○	●	○	●	●	○	○
5	125	●	○	○	○	●	●	○	○
6	150	●	○	○	○	●	●	○	○




Size - Nominal		Union 3 pce		Elbow 45º Female		Elbow 90º Female		Coupling Full
NPS	DN	150LB	3000LB	150LB	3000LB	150LB	3000LB	3000LB
(inch)	(mm)	316	316/316L	316	316/316L	316	316/316L	316/316L
		FBU316	FB3U316	FBEF4316	FB3E4316	FBEF316	FB3E9316	FB3CF316
⅛	6	○	○	●	○	●	○	○
¼	8	●	○	●	○	●	○	●
⅜	10	●	○	●	○	●	○	●
½	15	●	○	●	●	●	●	●
¾	20	●	●	●	●	●	●	●
1	25	●	●	●	●	●	●	●
1¼	32	●	●	○	○	●	●	●
1½	40	●	●	●	●	●	●	●
2	50	●	●	●	●	●	●	●
2½	65	●	○	○	○	●	○	○
3	80	●	○	○	○	●	○	○
4	100	○	○	○	○	●	○	○

● Stocked Item ○ Market Available

BSP Screwed Fittings & High Pressure Fittings

Cast Fittings Manufactured to ASTM A351
Manufactured from ASTM A312: pipe socket, TBE & TOE
Threads conform with BS 2.1
Pressure Fittings Manufactured to ASTM A182 B16.11
Rated to class 3000





Size - Nominal NPS (inch)	DN (mm)	Cross	Elbow Male/Female	Tee Fem 150LB	Tee Fem 3000LB	Hex Cap 150LB	Hex Cap 3000LB	Hex Plug 150LB	Hex Plug 3000/6000LB
		316	316	316	316/316L	316	316/316L	316	316/316L
		FBCR316	FBEMF316	FBTF316	FB3TE316	FBCX316	FB3HC316	FBP316	FB3P316
⅛	6	○	○	●	○	○	○	●	○
¼	8	○	●	●	○	●	○	●	○
⅜	10	○	●	●	○	●	○	●	○
½	15	●	●	●	●	●	○	●	○
¾	20	●	●	●	●	●	●	●	●
1	25	●	●	●	●	●	●	●	●
1¼	32	●	●	●	○	●	○	●	○
1½	40	●	●	●	●	●	●	●	●
2	50	●	●	●	●	●	●	●	●
2½	65	○	●	●	○	●	○	●	○
3	80	○	○	●	○	●	○	●	○
4	100	○	○	●	○	●	○	●	○





Size - Nominal NPS (inch)	DN (mm)	Tube Adapter	Locknut Fem	Half Sockets / Coupling 150LB	Half Sockets / Coupling 3000LB	Hose Tail	BSP Skin Fitting
		316/316L	316	316	316/316L	316	316
		FBNOT316	FBLX316	FBRSH316	FB3CH316	FBHT316	FBSK316
⅛	6	○	●	○	○	○	○
¼	8	○	●	●	○	●	○
⅜	10	○	●	●	○	●	○
½	15	●	●	●	●	●	●
¾	20	●	●	●	●	●	●
1	25	●	●	●	●	●	●
1¼	32	○	●	○	○	●	●
1½	40	●	●	○	●	●	●
2	50	●	●	○	●	●	●
2½	65	●	○	○	○	●	●
3	80	●	○	○	○	●	●
4	100	●	○	○	○	●	○

● Stocked Item ○ Market Available

BSP Screwed Fittings & High Pressure Fittings

Cast Fittings Manufactured to ASTM A351
Manufactured from ASTM A312: pipe socket, TBE & TOE
Threads conform with BS 2.1
Pressure Fittings Manufactured to ASTM A182 B16.11
Rated to class 3000

Size - Nominal		Reducing Tee	Hex Reducing Bush		Hex Reducing Nipple		Round Reducing Socket
NPS	DN	3000LB	150LB	3000/6000LB	150LB	3000LB	
(inch)	(mm)	316/316L	316	316/316L	316	316/316L	316
		FB3TR316	FBRB316	FB3RB316	FBRN316	FB3RNX316	FBRSR316
¼ x ⅛	8 x 6	○	●	○	●	○	○
⅜ x ⅛	10 x 6	○	●	○	●	○	○
⅜ x ¼	10 x 8	○	●	○	●	○	○
½ x ⅛	15 x 6	○	●	○	●	○	○
½ x ¼	15 x 8	○	●	○	●	○	○
½ x ⅜	15 x 10	○	●	○	●	○	○
¾ x ¼	20 x 8	○	●	○	●	○	○
¾ x ⅛	20 x 10	○	●	○	●	○	○
¾ x ½	20 x 15	●	●	●	●	●	●
1 x ½	25 x 15	○	●	○	●	○	○
1 x ¾	25 x 20	●	●	●	●	●	●
1¼ x ¾	32 x 20	○	●	○	●	○	○
1¼ x 1	32 x 25	●	●	○	●	●	●
1½ x ¾	40 x 20	○	●	○	●	○	○
1½ x 1	40 x 25	●	●	●	●	●	○
1½ x 1¼	40 x 32	●	●	○	●	●	●
2 x 1	50 x 25	●	●	●	●	●	○
2 x 1¼	50 x 32	○	●	○	●	○	○
2 x 1½	50 x 40	●	●	●	●	●	●
2½ x 2	65 x 50	○	●	○	●	○	○
3 x 2	80 x 50	○	●	○	○	○	●
3 x 2½	80 x 65	○	●	○	●	○	○
4 x 2	100 x 50	○	○	○	○	○	●
4 x 3	100 x 80	○	●	○	○	○	●
5 x 4	125 x 100	○	●	○	○	○	○
6 x 4	150 x 100	○	●	○	○	○	○
6 x 5	150 x 125	○	●	○	○	○	○

● Stocked Item ○ Market Available

NPT Screwed Pressure Fittings

Manufactured to ASTM A182 ANSI B16.11
NPT Thread, 3000lb & 6000lb rating.
304 and 316/316L grade.




Size - Nominal NPS (inch)	DN (mm)	Round Coupling 3000lb		Union 3 Pce 3000lb		90º Elbow Female 3000lb		45º Elbow Female 3000lb	
		304	316	304	316	304	316	304	316
		FNCF304	FNCF316	FNUC304	FNUC316	FNE9304	FNE9316	-	-
¼	8	○	●	○	○	○	○	○	○
⅜	10	●	●	○	○	○	○	○	○
½	15	●	●	○	●	●	●	○	○
¾	20	●	●	●	●	●	●	○	○
1	25	○	●	○	●	○	●	○	○
1¼	32	○	●	○	○	○	○	○	○
1½	40	○	●	○	○	○	●	○	○
2	50	○	●	○	○	○	●	○	○





Size - Nominal NPS (inch)	DN (mm)	Tee Female 3000lb		Hex Cap 3000lb		Hex Nipple 3000lb		Hex Nipple 6000lb		Hex Plug 3000lb	
		304	316	304	316	304	316	304	316	304	316
		FNTE304	FNTE316	FNCR304	FNC3316	-	FNNX316	FNNX3046	FNNX3166	-	FNPX316
¼	8	○	○	○	○	○	●	●	○	○	●
⅜	10	●	○	○	○	○	●	●	○	○	○
½	15	○	●	●	●	○	●	●	●	○	●
¾	20	●	●	●	●	○	●	○	○	○	●
1	25	●	●	●	●	○	●	○	○	○	●
1¼	32	○	○	○	○	○	●	○	○	○	○
1½	40	○	●	○	●	○	●	○	○	○	○
2	50	○	●	○	●	○	●	○	○	○	●



Size - Nominal NPS (inch)	DN (mm)	Hex Red Bush 3000lb		Hex Red Nipple 6000lb		Reduced Coupling 3000lb	
		304	316	304	316	304	316
		FNRB		FNRN		FNRC	
⅜ x ⅛	10 x 6	○	●	○	○	○	○
⅜ x ¼	10 x 8	○	○	○	○	○	○
½ x ¼	15 x 8	○	○	●	○	○	○
½ x ⅜	15 x 10	○	●	●	○	○	●
¾ x ¼	20 x 8	○	○	○	○	○	○
¾ x ⅜	20 x 10	○	○	●	○	○	○
¾ x ½	20 x 15	●	●	●	○	●	○
1 x ¼	25 x 10	○	○	○	○	○	○

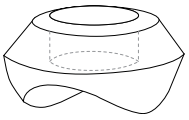


Size - Nominal NPS (inch)	DN (mm)	Hex Red Bush 3000lb		Hex Red Nipple 6000lb		Reduced Coupling 3000lb	
		304	316	304	316	304	316
1 x ½	25 x 15	○	●	○	○	○	●
1 x ¾	25 x 20	○	●	○	●	○	○
1¼ x ¾	32 x 20	○	○	○	○	○	○
1¼ x 1	32 x 25	○	○	○	○	○	○
1½ x ¾	40 x 20	○	○	○	○	○	○
1½ x 1	40 x 25	○	●	○	○	○	○
2 x ¾	50 x 20	○	○	○	○	○	○
2 x 1	50 x 25	○	●	○	○	○	○
2 x 1½	50 x 40	○	●	○	○	○	○

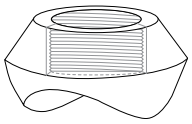
● Stocked Item ○ Market Available

Outlet Fittings

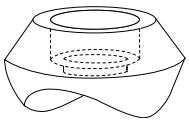
Manufactured to ASTM A182 ANSI B.16.11
BW/Socketweld/NPT/BSP connection, 3000lb rating
Weldolets to Sch 80S only
316 grade only.



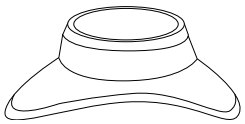
Weldolet



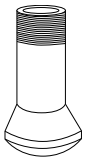
Threadolet



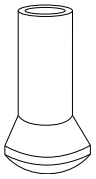
Sockolet



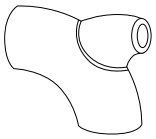
Swept Outlet



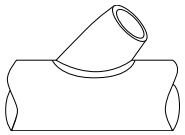
NPT Nipolet



Nipolet



Elbowlet



Latrolet

Size - Nominal				NPT	BSP		Swept		NPT		
NPS (inch)	DN (mm)	Weldolet		Threadolet	Threadolet	Sockolet	Outlet	Nipolet	Nipolet	Elbowlet	Latrolet
		FSW316		FNTH316	FBTH316	FSS316	-	-	-	-	-
⅛	6	○		○	○	○	○	○	○	○	○
¼	8	○		○	○	○	○	○	○	○	○
⅜	10	○		○	○	○	○	○	○	○	○
½	15	●		●	●	●	○	○	○	○	○
¾	20	●		●	●	●	○	○	○	○	○
1	25	●		●	●	●	○	○	○	○	○
1¼	32	●		●	●	●	○	○	○	○	○
1½	40	●		●	●	●	○	○	○	○	○
2	50	●		●	●	●	○	○	○	○	○

Socket Weld Fittings

Manufactured to ASTM A182 ANSI B.16.11
Socketweld connection, 3000lb rating
316 grade only.

NPS (inch)	DN (mm)	Full Coupling	Union	90º Elbow	45º Elbow	Tee	Cap
		FSCF316	FSU316	FSE9316	FSE4316	FSTE316	-
½	15	●	●	●	●	●	○
¾	20	●	●	●	○	○	○
1	25	●	●	●	●	●	○
1¼	32	○	○	○	○	○	○
1½	40	●	○	●	●	●	○
2	50	●	○	●	○	●	○

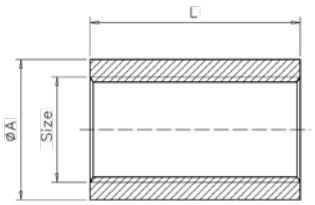
NPS (inch)	DN (mm)	Reducing Socket	Reducing Insert
		FSRS316	FSRI316
¾ x ½	20x15	○	●
1 x ½	25x15	○	○
1 x ¾	25x20	○	●
1½ x 1	40x25	○	●
2 x 1	50x25	○	●
2 x 1½	50x40	○	●

● Stocked Item ○ Market Available

BSP, NPT, Outlet & Socket Weld Technical Data

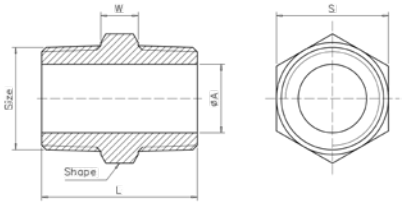
Socket (150LB)

Size	1/8	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
mm												
A	14	18.5	21.3	26.4	31.8	39.5	48.3	54.5	66.3	82	95	122
L	17	25	26	34	36	43	48	48	56	65	71	72



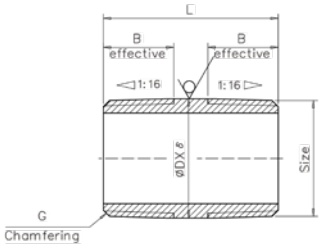
Nipple (150LB)

Size	1/8	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
mm												
L	20	25	27	34	36.5	42	47.5	47.5	57	61	67.5	80
S	11	14.5	18.5	22.5	28	34	44	50	62	78	90.5	116.5
A	5.5	8	11.5	15	20.5	26	34.5	40	51	65.5	77.5	101.5
W	4	4	5	5	5.5	6	6.5	6.5	7	7	7.5	8



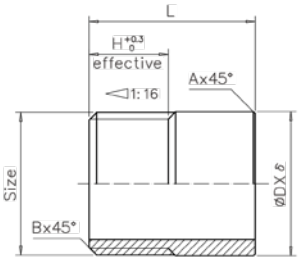
Nipple TBE (150LB)

Size	1/8	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4	5	6
mm														
L	40	40	40	55	60	65	75	74	90	100	110	125	150	180
B	10	10	10	13	15	17	19	19	23	27	30	36	41	41
G	1.2	1.2	1.2	1.2	1.2	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
DX	10.2x 1.5	13.7x 2.24	17.1x 2.31	21.3x 2.3	26.6x 2.3	33.4x 2.8	42.1x 2.8	48.3x 2.8	60.3x 3.3	76.1x 3.3	88.9x 3.8	114.3x 3.8	139.8x 5	165x 6



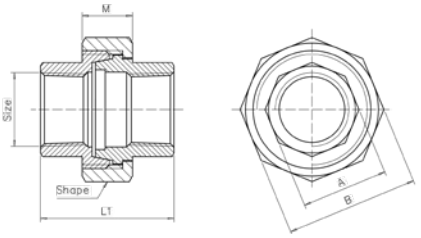
Nipple TOE (150LB)

Size	1/8	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4	5	6
mm														
L	25	25	30	35	40	40	50	50	50	60	70	80	100	120
H	9	11	12	14	16	18	19.5	21	23.5	27	30	36	41	41
A	1	1	1	1	1.2	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
B	1	1	1	1.5	1.5	2	2	2	2	2	2	2	2	2
DX	10.2x 1.5	13.7x 2.24	17.1x 2.31	21.3x 2.3	26.6x 2.3	33.4x 2.8	42.1x 2.8	48.3x 2.8	60.3x 3.3	76.1x 3.3	88.9x 3.8	114.3x 3.8	139.8x 5	165x 6



Union 3 Pce (150LB)

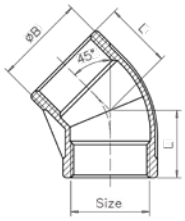
Size	1/8	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
mm												
A	13	16.5	20	24.5	30	37	46.5	53	65	82	95.5	121.5
B	26	29	34	37	44	52.5	63	70	84	101.5	118	148.5
L1	30	33.5	36.5	39.5	42.5	50	54	58	65	75	83	110
M	13	13.5	15	16	17	20	22	24	27	29.5	31	34



• Stocked Item ○ Market Available

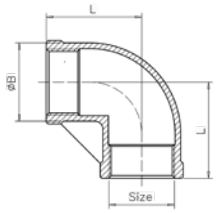
45 Degree Elbow (150LB)

Size	1/8	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
mm												
B	13	16.5	19.7	24.5	30	37.5	46.5	53	65.5	82	95.5	121.5
L	16	17	19	21	25	29	33	37	42	49	54	64



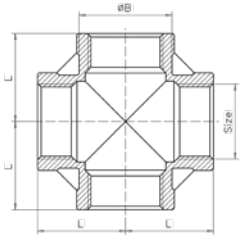
90 Degree Elbow (150LB)

Size	1/8	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
mm												
B	13	16.5	19.7	24.5	30	37.5	46.5	53	65.5	82	95.5	121.5
L	17	19	23	27	32	38	45	48	57	69	78	96



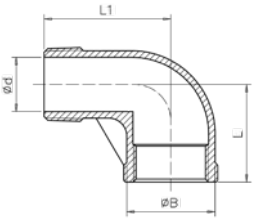
Cross (150LB)

Size	1/8	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
mm												
B	13	16.5	19.7	24.5	30	37.5	46.5	53	65.5	82	95.5	121.5
L	17	19	23	27	32	38	45	48	57	69	78	97



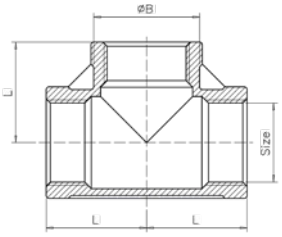
Elbow Female Male (150LB)

Size	1/8	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
mm												
B	13	16.5	19.7	24.5	30	37.5	46.5	53	63.5	82	95.5	121.5
D	5.5	8	11.5	15	20.5	26	34.5	40	51	65.5	77.5	101.5
L	17	19	23	27	32	38	45	48	57	69	78	97
L1	26	27	29	35	40	46	54	57	70	83	94	115



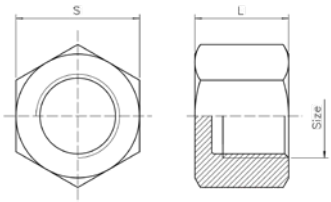
Tee (150LB)

Size	1/8	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
mm												
B	13	16.5	20	24.5	30	37.5	46.5	53	65.5	82	95.5	121.5
L	17	19	23	27	32	38	45	48	57	69	78	96



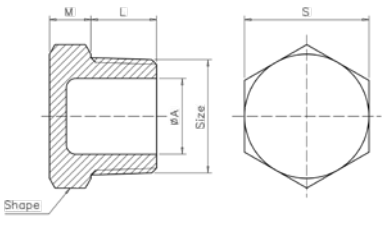
Hex Cap (150LB)

Size	1/8	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
mm												
S	13	16.5	20	24.5	30	37.5	46.5	53	65.5	82	95.5	121.5
L	12.5	16	16.5	21	22.5	26	29	29	33.5	38.5	42	48.5



Hex Plug (150LB)

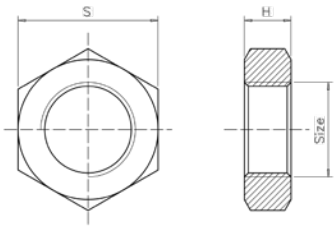
Size	1/8	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
mm												
A	5.5	8	11.5	15	20.5	26	34.5	40	51	65.5	77.5	101.5
S	12.5	15	18.5	22.5	28	35	44	50.5	62.5	78.5	92	118
M	4	4	5	5	5.5	6	6.5	6.5	7	7	7.5	8
L	8	10.5	11	14.5	15.5	18	20.5	20.5	25	27	30	36



• Stocked Item ○ Market Available

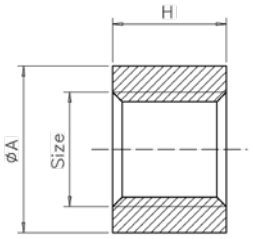
Lock Nut (150LB)

Size	1/8	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
mm												
H	5	6	6	7	7	9	11	11	13	15	17	19
S	16	18	24	30	34	42.5	52	58	72	85	100	125



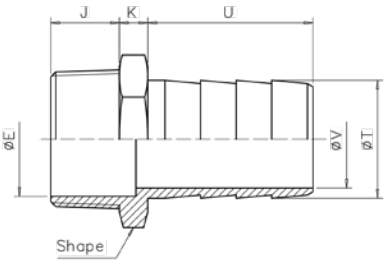
Half Socket (150LB)

Size	1/8	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
mm												
A	14	18.5	21.3	26.4	31.8	39.5	48.3	54.5	66.3	82	95	122
H	8	11	12	15	17	20	22	22	26	30	34	40

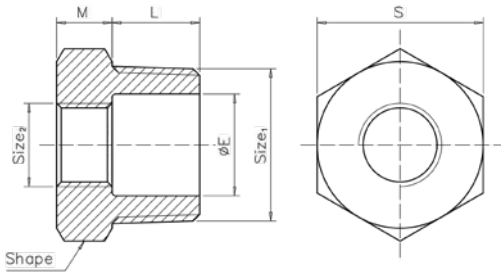


Hose Tail (150LB)

Size	1/8	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
mm												
E	5.5	8	11.5	15	20.5	26	34.5	40	51	66.5	77.5	102
J	8	10.5	11	14.5	15.5	18	20.5	20.5	25	27	30	34.5
K	4	4	5	5	5.5	6	6.5	6.5	7	7	7.5	9.5
U	23	28	33	38	45	52	52	56	60	65	70	73
V	4	5	7	10.5	16	22	27.5	34.5	46	59	71	95
T	8	9	11	15	21	27	33	39.5	52	67	80	105
S	11	15	18	22	28	35	44	50	61.5	78	90	117



Bush (150LB)

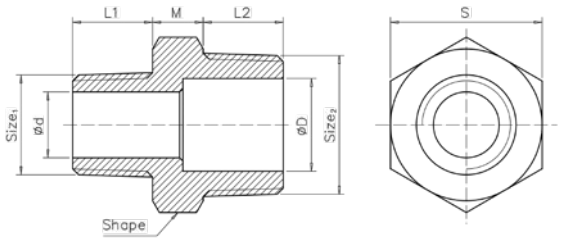


Size	1/4	3/8		1/2			3/4				1					1-1/4			1-1/2				
mm	1/8	1/8	1/4	1/8	1/4	3/8	1/8	1/4	3/8	1/2	1/8	1/4	3/8	1/2	3/4	1/2	3/4	1	1/4	1/2	3/4	1	1-1/4
S	14.5	18.5		22.5			28				35					44			49.5				
E	8	11.5		15			20.5				26					34.5			40				
L	10.5	11		14.5			15.5				18					20.5			20.5				
M	4	5		5			5.5				6					6.5			6.5				

Size	2					2-1/2						3						4			5	6	
mm	1/2	3/4	1	1-1/4	1-1/2	1/2	3/4	1	1-1/4	1-1/2	2	3/4	1	1-1/4	1-1/2	2	2-1/2	2	2-1/2	3	4	4	5
S	61.5					77.5						90.5						116.5			140	165	
E	51					65.5						77.5						101.5			120	145	
L	25					27						30						36			42.4	42.4	
M	7					7						7.5						8			12.6	12.6	

• Stocked Item ○ Market Available

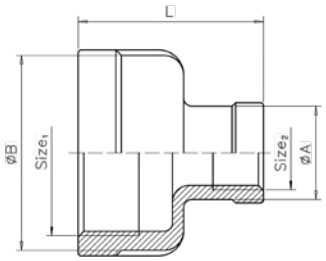
Hex Reducing Nipple (150LB)



Size	1/4	3/8		1/2			3/4			1				1-1/4				1-1/2			
mm	1/8	1/8	1/4	1/8	1/4	3/8	1/4	3/8	1/2	1/4	3/8	1/2	3/4	1/2	3/4	3/4	1	1/2	3/4	1	1-1/4
L1	8	8	10.5	8	10.5	11	10.5	11	14.5	10.5	11	14.5	15.5	14.5	15.5	15.5	18	14.5	15.5	18	20.5
L2	10.5	11	11	14.5	14.5	14.5	14.5	15.5	15.5	14.5	18	18	18	18	18	20.5	20.5	18	18	20.5	20.5
M	4	5	5	5	5	5	5	5.5	5.5	5	6	6	6	6	6	6.5	6.5	6	6	6.5	6.5
d	5.5	5.5	8	5.5	8	8	8	11.5	15	8	11.5	15	20.5	15	20.5	20.5	26	15	20.5	26	34.5
D	8	11.5		15			26			26				34.5				40			

Size	2				2-1/2		3		4	
mm	3/4	1	1-1/4	1-1/2	1-1/2	2	2	2-1/2	2-1/2	3
L1	15.5	18	20.5	20.5	20.5	25	25	27	27	30
L2	18	25	25	25	27	27	30	30	36	36
M	6	7	7	7	7	7	7.5	7.5	8	8
d	20.5	26	34.5	40	40	51	51	65.5	65.5	77.5
D	51				65.5		77.5		101.5	

Round Reducing Socket (150LB)



Size	1/4	3/8		1/2			3/4				1				1-1/4			1-1/2			
mm	1/8	1/8	1/4	1/8	1/4	3/8	1/8	1/4	3/8	1/2	1/4	3/8	1/2	3/4	1/2	3/4	1	1/2	3/4	1	1-1/4
A	13	13	16.5	13	16.5	20	13	16.5	20	24.5	16.5	20	24.5	30	24.5	30	37.5	24.5	30	37.5	46.5
B	16.5	20		24.5			30				46.5				46.5			53			
L	25	26		34			36				48				48			52			

Size	2				2-1/2		3		4	
mm	3/4	1	1-1/4	1-1/2	1-1/2	2	2	2-1/2	2-1/2	3
A	30	37.5	46.5	53	53	65.5	65.5	82	82	95.5
B	65.5				81.5		95.5		121.5	
L	58				65		72		94	

● Stocked Item ○ Market Available

Camlock Fittings

Manufactured from investment castings to ASTM A351-CCF8M (316)
BSP Thread, 150lb rating
BSP Male Tapered
BSP Female Parallel
EPDM or Nitrile seals




Size Nominal NPS (inch)	DN (mm)	Camlock Type A	Camlock Type B	Camlock Type C	Camlock Type D
		FCAA	FCAB	FCAC	FCAD
½	15	○	○	○	○
¾	20	○	○	○	○
1	25	●	●	●	●
1 ¼	32	○	○	○	○
1 ½	40	●	●	●	●
2	50	●	●	●	●
2 ½	65	●	●	●	●
3	80	●	●	●	●
4	100	●	●	●	●



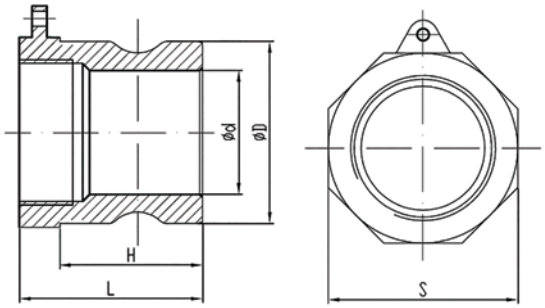

Size Nominal NPS (inch)	DN (mm)	Camlock Type E	Camlock Type F	Camlock Type DC	Camlock Type DP
		FCAE	FCAF	FCADC	FCADP
½	15	○	○	○	○
¾	20	○	○	○	○
1	25	●	●	●	●
1 ¼	32	○	○	○	○
1 ½	40	●	●	●	●
2	50	●	●	●	●
2 ½	65	●	●	●	●
3	80	●	●	●	●
4	100	●	●	●	●

● Stocked Item ○ Market Available

Camlock Technical Data

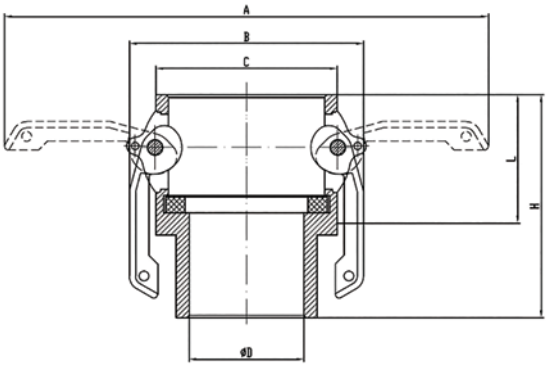
Type A

Size Nominal		L	H	D	d	S	Weight
inch	mm	mm	mm	mm	mm	mm	g
½	15	37	30	32	18.5	33	103
¾	20	37	30	32	23	33	82
1	25	44	32	36.5	26	38	133
1 ¼	32	48	37	45.5	31	46.5	158
1 ½	40	52.5	40	53.3	40	55	250
2	50	59	46	63	48	65	328
2 ½	65	72.5	56	75.5	60	82	553
3	80	67	50	91.5	76	97	656
4	100	67	50	119.5	103	122	924



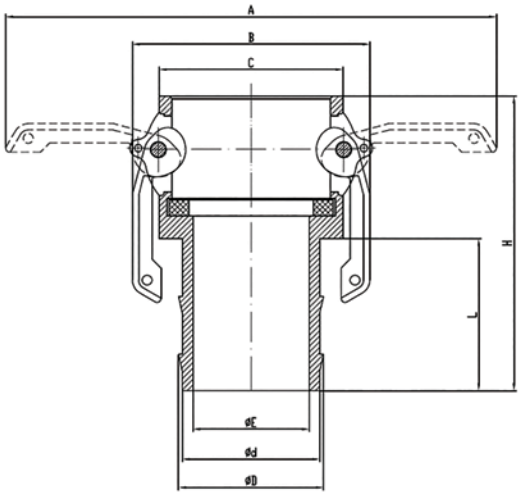
Type B

Size Nominal		D	A	B	C	L	H	Weight
inch	mm	mm	mm	mm	mm	mm	mm	g
½	15	15	112	53	41	31	46	159
¾	20	20	112	53	41	31	47	161
1	25	25	120	60	47	37.5	55	249
1 ¼	32	32	175	79	56	45	66	397
1 ½	40	40	182	85	64	45	67.5	428
2	50	50	191	94	74	51	78.5	539
2 ½	65	65	205	109	88	53	82.5	701
3	80	76.5	230	130	104	55	90	1014
4	100	102	258	160	134	55	91	1384



Type C

Size Nominal		d	D	A	B	C	L	H	E	Weight
inch	mm	mm	mm	mm	mm	mm	mm	mm	mm	g
½	15	18.5	19.7	112	53	41	55	85	15	189
¾	20	18.5	19.7	112	53	41	55	85	15	189
1	25	24	26	120	60	46	61	97.5	20	280
1 ¼	32	32	34	175	79	56	60	105	28	459
1 ½	40	38	39	182	85	64	71	116	33.5	482
2	50	50	52.5	191	95	74	73	125	46.5	696
2 ½	65	63	65	205	109	87	82	134	57	887
3	80	75	77	230	130	104	91	146.5	70	1256
4	100	100	103	258	160	134	106	162	95.5	1719

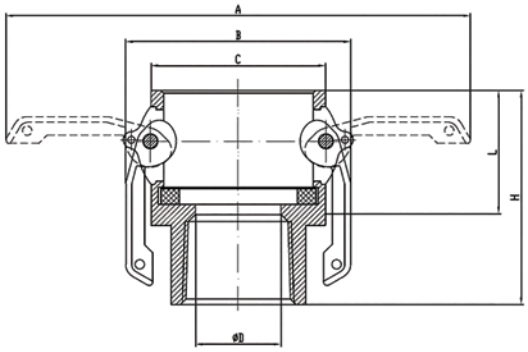


• Stocked Item ○ Market Available

Camlock Technical Data

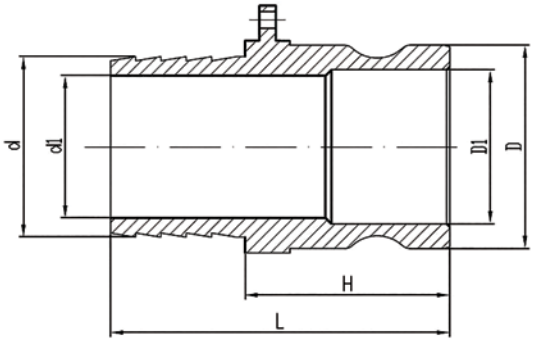
Type D

Size Nominal		D	A	B	C	L	H	Weight
inch	mm	mm	mm	mm	mm	mm	mm	g
½	15	16.5	112	53	41	30	44	167
¾	20	19.5	112	535	41	30	46.5	171
1	25	28	120	60	46	35.5	52.5	248
1 ¼	32	35	175	79	56	43	63	411
1 ½	40	40	182	85	64	45	65	422
2	50	50	191	95	74	51	74	551
2 ½	65	63.5	205	109	87	52.5	81	771
3	80	75	230	130	104	55	86	1072
4	100	102.5	258	160	134	55	86	1381



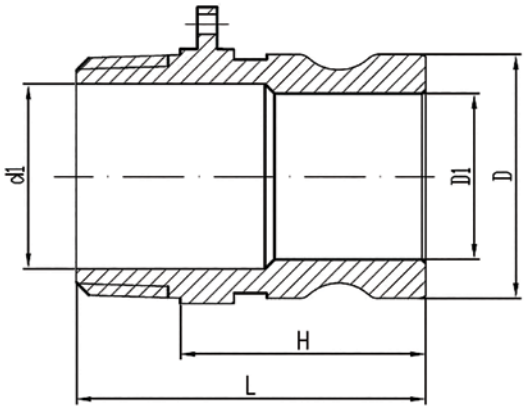
Type E

Size Nominal		L	H	D	D1	d	d1	Weight
inch	mm	mm	mm	mm	mm	mm	mm	g
½	15	97	40	32	21.5	20	15	170
¾	20	97	40	32	21.5	20	15	170
1	25	101	40	36.5	25	27	22	216
1 ¼	32	108	47	45.5	30.5	34	28	339
1 ½	40	117	51	53.3	38	40	33	472
2	50	127	53	63	47	53	46	669
2 ½	65	137	55	75.5	60	64	57	902
3	80	150	60	91.5	76	77	70	1220
4	100	162	60	119.5	103	104	96	1820



Type F

Size Nominal		L	H	D	D1	d1	Weight
inch	mm	mm	mm	mm	mm	mm	g
½	15	48	31.5	32	22.5	15	95
¾	20	48	31.5	32	22.2	20	101
1	25	62	42	36.5	26	26	195
1 ¼	32	72.5	50	45.5	31	34	296
1 ½	40	73	51	53.3	40	40.5	368
2	50	80.3	55	63	48	51	520
2 ½	65	87	60	75.5	60	66	654
3	80	95	65	91.5	76	79	993
4	100	103	69	119.5	102	102	1722



• Stocked Item ○ Market Available

ANSI Flanges

Manufactured to ASTM A182 ANSI B.16.5
Available from stocks in Class 150#, 300# and 600#. Higher rating on Indent basis.

- Slip On Raised Face
- Weld Neck Raised Face
- Blind Raised Face
- Bossed Blind Raised Face (Suitable for machining to Slip On, SocketWeld, Threaded & Standard Blinds)

	Slip On Raised Face						Weld Neck Raised Face									
Size N.B	**304L**	**316L**	**316L**	**316L**	**2205 F51**	**2507 F53**	**304L**	**304L**	**316L**	**316L**	**316L**	**316L**	**316L**	**316L**	**2205 F51**	**2205 F51**
	150lb	150lb	300lb	600lb	150lb	150lb	10S 150lb	40S 150lb	10S 150lb	40S 150lb	80S 150lb	40S 300lb	80S 300lb	80S 600lb	10S 150lb	40S 150lb
15	●	●	●	○	●	○	●	●	●	●	●	●	●	●	○	●
20	●	●	●	○	●	○	●	●	●	●	●	●	●	●	○	●
25	●	●	●	●	●	○	●	●	●	●	●	○	●	●	●	●
32	●	●	○	○	○	○	●	●	○	●	●	○	○	○	○	○
40	●	●	●	●	●	○	●	●	●	●	●	●	●	●	●	●
50	●	●	●	●	●	○	●	●	●	●	●	●	●	●	●	●
65	●	●	●	○	○	○	●	●	●	●	●	●	●	●	○	○
80	●	●	●	●	●	○	●	●	●	●	●	●	●	●	●	●
100	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
125	●	●	○	○	○	○	●	●	●	●	●	○	○	○	○	○
150	●	●	●	○	●	○	●	●	●	●	●	●	●	●	●	●
200	●	●	●	○	●	●	●	●	●	●	●	●	●	●	●	●
250	●	●	○	○	○	○	●	●	●	●	○	○	○	○	○	○
300	●	●	○	○	○	○	●	●	●	●	○	○	○	○	○	○
							Standard Weight / XS									
350	●	●	○	○	○	○	○	○	○	●	○	○	○	○	○	○
400	●	●	○	○	○	●	○	○	○	●	○	○	○	○	○	○
450	●	●	○	○	○	○	○	○	○	●	○	○	○	○	○	○
500	●	●	○	○	○	○	○	○	○	●	○	○	○	○	○	○
550	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
600	●	●	○	○	○	○	○	○	○	●	○	○	○	○	○	○
650	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
700	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
750	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
800	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
850	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
900	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

● Stocked Item ○ Market Available

ANSI Flanges

Manufactured to ASTM A182 ANSI B.16.5
Available from stocks in Class 150#, 300# and 600#. Higher rating on Indent basis.

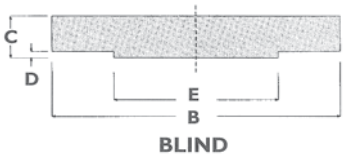
- Slip On Raised Face
- Weld Neck Raised Face
- Blind Raised Face
- Bossed Blind Raised Face (Suitable for machining to Slip On, SocketWeld, Threaded & Standard Blinds)

Suitable for machining to Slip On, SocketWeld, Threaded & Standard Blinds

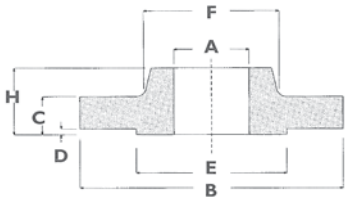
	Blind Raised Face					Bossed Blind Raised Face				Socket Weld	
Size N.B	**304L**	**316L**	**316L**	**316L**	**2205 F51**	**304L**	**316L**	**316L**	**2205 F51**	**316L**	**316L**
	150lb	150lb	300lb	600lb	150lb	150lb	150lb	300lb	150lb	40S 150lb	80S 150lb
	FL1B304	FL1B316	FL3B316	FL6B316	FL1B2205	○	FL1BB316	○	○	FL1SW316	FL1SW316
15	●	●	●	●	●	○	●	○	○	●	●
20	●	●	●	●	●	○	●	○	○	●	●
25	●	●	●	●	●	○	●	○	○	○	○
32	●	●	○	○	○	○	●	○	○	○	○
40	●	●	●	●	●	○	●	○	○	●	●
50	●	●	●	●	●	○	●	○	○	●	●
65	●	●	●	○	○	○	○	○	○	○	○
80	●	●	●	●	●	○	○	○	○	○	○
100	●	●	●	●	●	○	○	○	○	○	○
125	●	●	○	○	○	○	○	○	○	○	○
150	●	●	●	●	●	○	○	○	○	○	○
200	●	●	●	●	●	○	○	○	○	○	○
250	●	●	○	○	○	○	○	○	○	○	○
300	●	●	○	○	○	○	○	○	○	○	○
350	●	●	○	○	○	○	○	○	○	○	○
400	●	●	○	○	○	○	○	○	○	○	○
450	●	●	○	○	○	○	○	○	○	○	○
500	●	●	○	○	○	○	○	○	○	○	○
550	○	○	○	○	○	○	○	○	○	○	○
600	●	●	○	○	○	○	○	○	○	○	○
650	○	○	○	○	○	○	○	○	○	○	○
700	○	○	○	○	○	○	○	○	○	○	○
750	○	○	○	○	○	○	○	○	○	○	○
800	○	○	○	○	○	○	○	○	○	○	○
850	○	○	○	○	○	○	○	○	○	○	○
900	○	○	○	○	○	○	○	○	○	○	○

● Stocked Item ○ Market Available

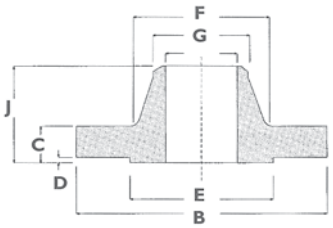
ANSI Flange Dimensions



BLIND



SLIP-ON



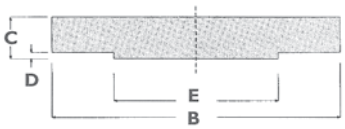
WELDING NECK

SO = Slip-On, WN = Weld Neck, BL = Blind

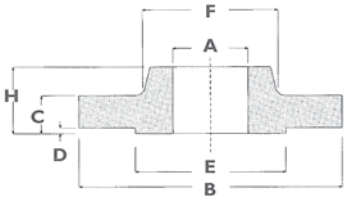
Size	Slipon Bore	O.D. of Flange	Thick-ness of Flange	Raised Face Thick-ness	Raised Face Dia	Hub Dia	Hub Diam. of Chamfer W. Neck	Length/Hub Slip-On Weld Neck		Bolt Circle Dia	Bolt Hole Dia	No of Bolt Holes	SO Wght	WN Wght	BL Wght
150lb															
	A	B	C	D	E	F	G	H	J	K	L	M	kg	kg	kg
15	22.3	89.0	11.1	1.6	35	30.2	21.4	15.9	47.7	60.3	15.8	4	0.5	0.9	0.9
20	27.6	98.5	12.8	1.6	42.9	38.2	26.7	15.9	52.4	69.8	15.8	4	0.7	0.9	0.9
25	34.5	108.0	14.3	1.6	50.9	49.2	33.6	17.5	55.6	79.3	15.8	4	0.9	1.4	0.9
32	43.1	117.5	15.9	1.6	63.6	58.8	42.2	20.7	57.2	88.9	15.8	4	1.1	1.4	1.4
40	49.5	127.1	17.5	1.6	73.1	65.1	48.3	22.3	61.9	98.4	15.8	4	1.4	1.8	1.8
50	61.9	152.5	19.1	1.6	92.0	77.8	60.5	25.5	63.6	120.6	19.0	4	2.3	2.7	2.3
65	74.6	177.9	22.3	1.6	104.8	90.5	73.2	28.6	69.9	139.7	19.0	4	3.2	4.6	3.2
80	90.6	190.6	23.8	1.6	127.1	108.0	89.0	30.2	69.9	152.4	19.0	4	3.6	5.2	4.1
100	116.0	228.7	23.8	1.6	157.2	135.0	114.4	33.4	76.3	190.5	19.0	8	5.9	7.8	7.7
125	143.7	254.1	23.8	1.6	185.8	163.5	141.3	36.5	89.0	215.9	22.2	8	6.8	9.6	9.1
150	170.6	279.5	25.5	1.6	216.0	192.1	168.5	39.7	89.0	241.3	22.2	8	8.0	12.5	12.0
200	221.4	343.0	28.6	1.6	269.9	246.1	219.3	44.5	101.7	298.4	22.2	8	12.8	19.9	21.4
250	276.3	406.5	30.2	1.6	323.9	304.9	273.1	49.2	101.7	361.9	25.4	12	18.0	24.6	30.5
300	327.1	482.7	31.8	1.6	381.1	365.2	323.9	55.6	114.4	431.8	25.4	12	27.7	40.0	50
350	359.1	533.5	35.0	1.6	412.8	400.1	355.7	57.2	127.1	476.2	28.5	12	37.7	52	63
400	410.4	597.0	36.5	1.6	470.0	457.3	406.5	63.6	127.1	539.7	28.5	16	48.2	65	85
450	461.7	635.1	39.7	1.6	533.5	504.9	457.3	68.3	139.8	577.8	31.7	16	59	76	99
500	513.0	698.6	42.9	1.6	584.3	558.9	508.1	73.1	144.5	635.0	31.7	20	67	90	129
600	615.9	812.9	47.7	1.6	692.2	663.6	609.7	82.6	152.5	749.3	34.9	20	96	123	190

Size	Slipon Bore	O.D. of Flange	Thick-ness of Flange	Raised Face Thick-ness	Raised Face Dia	Hub Dia	Hub Diam. of Chamfer W. Neck	Length/Hub Slip-On Weld Neck		Bolt Circle Dia	Bolt Hole Dia	No of Bolt Holes	SO Wght	WN Wght	BL Wght
300lb															
	A	B	C	D	E	F	G	H	J	K	L	M	kg	kg	kg
15	22.3	95.3	14.3	1.6	35.0	38.2	21.4	22.3	52.4	66.6	15.8	4	0.7	0.9	0.9
20	27.6	117.5	15.9	1.6	42.9	47.7	26.7	25.5	57.2	82.5	19.0	4	1.1	1.4	1.4
25	34.5	123.9	17.5	1.6	50.9	54.0	33.6	27.0	61.9	88.9	19.0	4	1.4	1.8	1.8
32	43.1	133.4	19.1	1.6	63.6	63.6	42.2	27.0	65.1	98.4	19.0	4	2.1	2.3	2.7
40	49.5	155.6	20.7	1.6	73.1	69.9	48.3	30.2	68.3	114.3	22.2	4	3.0	3.2	3.2
50	61.9	165.2	22.3	1.6	92.1	84.2	60.5	33.4	69.9	127.0	19.0	8	3.2	3.6	3.6
65	74.6	190.6	25.5	1.6	104.8	100.0	73.2	38.2	76.3	149.2	22.2	8	4.6	5.5	5.5
80	90.6	209.6	28.6	1.6	127.1	117.5	89.0	42.9	79.4	168.2	22.2	8	5.9	6.9	7.3
100	116.0	254.1	31.8	1.6	157.2	146.1	114.4	47.7	85.8	200.0	22.2	8	10.5	12.1	12.7
125	143.7	279.5	35.0	1.6	185.8	177.9	141.3	50.9	98.5	234.9	22.2	8	13.2	16.4	16.8
150	170.6	317.6	36.5	1.6	216.0	206.4	168.5	52.4	98.5	269.8	22.2	12	16.3	21.1	21.8
200	221.4	381.1	41.3	1.6	269.9	260.4	219.3	61.9	111.2	330.2	25.4	12	25.0	31.4	35.9
250	276.3	444.6	47.7	1.6	323.9	320.7	273.1	66.7	117.5	387.3	28.5	16	35.0	44.0	55.0
300	327.1	520.8	50.9	1.6	381.1	374.7	323.9	73.1	130.2	450.8	31.7	16	51.0	65.0	83.0
350	359.1	584.3	54.0	1.6	412.8	425.5	355.7	76.3	142.9	514.3	31.7	20	72	94	110
400	410.4	647.8	57.2	1.6	470.0	482.7	406.5	82.6	146.1	571.5	34.9	20	95	113	143
450	461.7	711.3	60.4	1.6	533.5	533.5	457.3	89.0	158.8	628.6	34.9	24	115	139	188
500	513.0	774.8	63.6	1.6	584.3	587.4	508.1	95.3	162.0	685.8	34.9	24	140	168	234
600	615.9	914.5	69.9	1.6	692.2	701.7	609.7	106.4	168.3	812.8	41.2	24	223	236	364

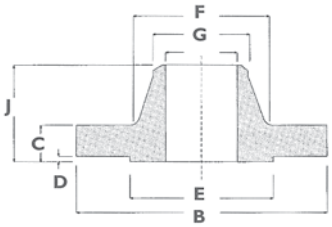
ANSI Flange Dimensions



BLIND



SLIP-ON

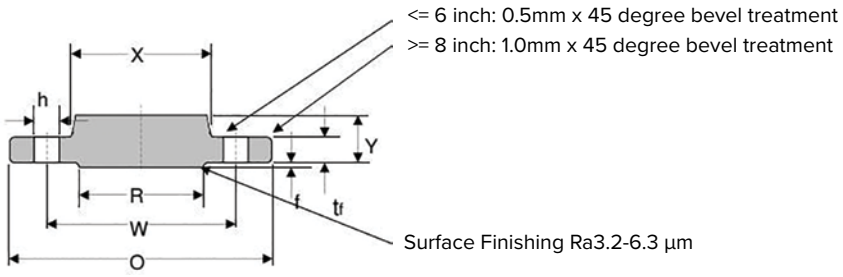


WELDING NECK

Size 600lb	Slipon Bore	O.D. of Flange	Thick-ness of Flange	Raised Face Thick-ness	Raised Face Diameter	Hub diameter	Hub Diam. of Chamfer W. Neck	Length/Hub Slip-On Weld Neck		Bolt Circle Diameter	Bolt Hole Diameter	Number of Bolt Holes
	A	B	C	D	E	F	G	H	J	K	L	M
15	22.3	95.3	14.3	6.4	35.0	38.2	21.4	22.3	52.4	66.6	15.8	4
20	27.6	117.5	15.9	6.4	42.9	47.7	26.7	25.5	57.2	82.5	19.0	4
25	34.5	123.9	17.5	6.4	50.9	34.5	33.6	27.0	61.9	88.9	19.0	4
32	43.1	133.4	20.7	6.4	63.6	63.6	42.2	28.6	66.7	98.4	19.0	4
40	49.5	155.6	22.3	6.4	73.1	69.9	48.3	31.8	69.9	114.3	22.2	4
50	61.9	165.2	25.5	6.4	92.1	84.2	60.5	36.5	73.1	127.0	19.0	8
65	74.6	190.6	28.6	6.4	104.8	100.0	73.2	41.3	79.4	149.3	22.2	8
80	90.6	209.6	31.8	6.4	127.1	117.5	89.0	46.1	82.6	168.2	22.2	8
90	103.3	228.7	35.0	6.4	139.8	133.4	101.7	49.2	85.8	184.1	25.4	8
100	116.0	273.1	38.2	6.4	157.2	152.5	114.4	54.0	101.7	215.9	25.4	8
125	143.7	330.3	44..5	6.4	185.8	188.9	141.3	60.4	114.4	266.7	28.5	8
150	170.6	355.7	47.7	6.4	216.0	222.3	168.5	66.7	117.5	292.1	28.5	12
200	221.4	419.2	55.6	6.4	269.9	273.10	219.3	76.3	133.4	349.2	31.7	12
250	276.3	508.1	63.6	6.4	323.9	343.0	273.1	85.8	152.5	431.8	34.9	16
300	327.1	558.9	66.7	6.4	381.1	400.1	323.9	92.1	155.6	488.9	34.9	20
350	359.1	603.3	69.9	6.4	412.8	431.9	355.7	93.7	165.2	527.0	38.1	20
400	410.4	685.9	76.3	6.4	470.0	495.4	406.5	106.4	177.9	603.2	41.2	20
450	461.7	743.0	82.6	6.4	533.5	546.2	457.3	117.5	184.2	654.0	44.4	20
500	513.0	812.9	89.0	6.4	584.3	609.70	508.1	127.1	190.6	723.9	44.4	24
600	615.9	939.9	101.7	6.4	692.2	717.6	609.7	139.8	203.3	838.2	50.8	24

Size 900lb	Slipon Bore	O.D. of Flange	Thick-ness of Flange	Raised Face Thick-ness	Raised Face Diameter	Hub diameter	Hub Diam. of Chamfer W. Neck	Length/Hub Slip-On Weld Neck		Bolt Circle Diameter	Bolt Hole Diameter	Number of Bolt Holes
	A	B	C	D	E	F	G	H	J	K	L	M
15	22.3	120.7	22.3	6.4	35.0	38.2	21.4	31.8	60.4	82.5	22.2	4
20	27.6	130.2	25.5	6.4	42.9	44.5	26.7	35.0	69.9	88.9	22.2	4
25	34.5	149.3	28.6	6.4	50.9	52.4	33.6	41.3	73.1	101.6	25.4	4
32	43.1	158.8	28.6	6.4	63.6	63.6	42.2	41.3	73.1	111.1	25.4	4
40	49.5	177.9	31.8	6.4	73.1	69.9	48.3	44.5	82.6	123.8	28.5	4
50	61.9	216.0	38.2	6.4	92.1	104.8	60.5	57.2	101.7	165.1	25.4	8
65	74.6	244.5	41.3	6.4	104.8	123.9	73.2	63.6	104.8	190.5	28.5	8
80	90.6	241.4	38.2	6.4	127.1	127.1	89.0	54.0	101.7	190.5	25.4	8
100	116.0	292.2	44.5	6.4	157.2	158.8	114.4	69.9	114.4	234.9	31.7	8
125	143.7	349.3	50.9	6.4	185.8	190.6	141.3	79.4	127.1	279.4	34.9	8
150	170.6	381.1	55.6	6.4	216.0	235.0	168.5	85.8	139.8	317.5	31.7	12
200	221.4	470.0	63.6	6.4	269.9	298.5	219.3	101.7	162.0	393.7	38.1	12
250	276.3	546.2	69.9	6.4	323.9	368.4	273.1	108.0	184.2	469.9	38.1	16
300	327.1	609.7	79.4	6.4	381.1	419.2	323.9	117.5	200.1	533.4	38.1	20
350	359.1	641.4	85.8	6.4	412.8	450.9	355.7	130.2	212.8	558.8	41.2	20
400	410.4	704.9	89.0	6.4	470.0	508.1	406.5	133.4	216.0	615.9	44.4	20
450	461.7	787.5	101.7	6.4	533.5	565.2	457.3	152.5	228.7	685.8	50.8	20
500	513.0	857.3	108.0	6.4	584.3	622.4	508.1	158.8	247.7	749.3	53.9	20
600	615.9	1041.5	139.8	6.4	692.2	749.4	609.7	203.3	292.2	901.7	66.6	20

ANSI Flange Dimensions



150LB Bossed Blind Flange

DN	inch	O	tf	X	Y	W	h	Hole	R	f
15	1/2	90	9.6	30	14	60.3	15.88	4	34.9	2
20	3/4	100	11.2	38	14	69.9	15.88	4	42.9	2
25	1	110	12.7	49	16	79.4	15.88	4	50.8	2
32	1.1/4	115	14.3	59	19	88.9	15.88	4	63.5	2
40	1.1/2	125	15.9	65	21	98.4	15.88	4	73	2
50	2	150	17.5	78	24	120.7	19.05	4	92.1	2
80	3	190.6	22.2	108	28.6	152.4	19.05	4	127.1	2

300LB Bossed Blind Flange

DN	inch	O	tf	X	Y	W	h	Hole	R	f
15	1/2	95	12.7	38	21	66.7	15.88	4	34.9	2
20	3/4	115	14.3	48	24	82.6	19.05	4	42.9	2
25	1	125	15.9	54	25	88.9	19.05	4	50.8	2
32	1.1/4	135	17.5	64	25	98.4	19.05	4	63.5	2
40	1.1/2	155	19.1	70	29	114.3	22.23	4	73	2
50	2	165	20.7	84	32	127	19.05	8	92.1	2

AS 2129 Flange

Manufactured to AS 2129 from ASTM A182 Forgings or ASTM A240 Plate
Available in Table D and Table E.
Gramaphone finish one side.
Available bored for pipe or tube, or Blinds and screwed BSP
BFP: Bore for Pipe
BFT: Bore for Tube

		Table 'D'					Table 'E'					
		Slip On			Blind		Slip On			Blind		Screwed	
Grade	Pipe NB / Tube mm	BFP	BFT	Wgt (kg)		Wgt (kg)	BFP	BFT	Wgt (kg)		Wgt (kg)		Wgt (kg)
		FFDPF304	-		FFDBF304		FFEPF304	FFETF304		FFEBF304		-	
304L	15 / 12.70	●	○	0.3	●	0.3	●	○	0.3	●	0.4	○	0.4
	20 / 19.05	●	○	0.3	●	0.4	●	○	0.4	●	0.4	○	0.5
	25 / 25.40	●	○	0.4	●	0.5	●	○	0.6	●	0.7	○	0.7
	32 / 31.75	○	○	0.5	○	0.6	○	○	0.7	○	0.8	○	0.9
	40 / 38.10	●	○	0.6	●	0.7	●	○	1.0	●	1.2	○	1.2
	50 / 50.80	●	○	1.0	●	1.2	●	●	1.1	●	1.5	○	1.4
	65 / 63.5	○	○	1.1	○	1.4	○	●	1.2	○	1.8	○	1.6
	80 / 76.2	●	○	1.5	●	2.2	●	●	1.9	●	2.8	○	2.4
	100 / 101.6	●	○	2.0	●	3.0	●	●	2.6	●	3.6	○	3.4
	125 / 127.0	○	○	3.1	○	4.3	○	●	4.3	○	5.5	○	5.6
	150 / 152.4	●	○	3.6	●	6.6	●	○	5.2	●	8.1	○	6.8
	200 / 203.2	●	○	5.4	●	9.4	●	○	8.3	●	14.5	○	10.8
	250	●	○	8.8	●	16.9	●	○	11.6	●	21.2	○	15
	300	●	○	13.3	●	26.7	●	○	16.6	●	33.4	○	21.6
		FFDPF316	FFDTF316		FFDBF316		FFEPF316	FFETF316		FFEBF316		FFESF316	
316L	15 / 12.70	●	●	0.3	○	0.3	●	○	0.3	○	0.4	○	0.4
	20 / 19.05	●	●	0.3	○	0.4	●	○	0.4	○	0.4	○	0.5
	25 / 25.40	●	●	0.4	●	0.5	●	●	0.6	●	0.7	○	0.7
	32 / 31.75	●	●	0.5	●	0.6	●	○	0.7	●	0.8	○	0.9
	40 / 38.10	●	●	0.6	●	0.7	●	●	1.0	●	1.2	●	1.2
	50 / 50.80	●	●	1.0	●	1.2	●	●	1.1	●	1.5	●	1.4
	65 / 63.5	●	●	1.1	●	1.4	●	●	1.2	●	1.8	○	1.6
	80 / 76.2	●	●	1.5	●	2.2	●	●	1.9	●	2.8	●	2.4
	100 / 101.6	●	●	2.0	●	3.0	●	●	2.6	●	3.6	●	3.4
	125 / 127.0	●	○	3.1	●	4.3	●	●	4.3	●	5.5	○	5.6
	150 / 152.4	●	●	3.6	●	6.6	●	●	5.2	●	8.1	○	6.8
	200 / 203.2	●	●	5.4	●	9.4	●	●	8.3	●	14.5	○	10.8
	250	●	○	8.8	●	16.9	●	○	11.6	●	21.2	○	15.0
	300	●	○	13.3	●	26.7	●	○	16.6	●	33.4	○	21.6
	350	●	○	19.6	●	36.6	●	○	25.3	●	47.6		
	400	●	○	22.3	●	44.9	●	○	31.3	●	66.0		
	450	●	○	29.9	●	63.0	●	○	40.8	●	87.0		
	500	●	○	39.9	●	86.0	●	○	53.0	●	114.0		
	600	●	○	58.0	●	125.0	●	○	85.0	●	195.0		

2205 Flanges: Please enquire with our sales team for options. Manufactured from Plate, Global sourcing.

AS 2129 Flange Dimensions

TABLE D

Nominal Pipe Size mm	Slip on Bore	Outside diameter of Flange	Thick-ness	Bolt Circle Dia.	No. of Holes	Dia. of Holes
15	22.3	95.0	5	67.0	4	14.0
20	27.6	100.0	5	73.0	4	14.0
25	34.5	115.0	5	83.0	4	14.0
32	43.1	120.0	6	87.0	4	14.0
40	49.5	135.0	6	98.0	4	14.0
50	61.9	150.0	8	114.0	4	18.0
65	74.6	165.0	8	127.0	4	18.0
80	90.6	185.0	10	146.0	4	18.0
90	103.3	205.0	10	165.0	4	18.0
100	116.0	215.0	10	178.0	4	18.0
125	143.7	255.0	13	210.0	8	18.0
150	170.6	280.0	13	235.0	8	18.0
200	221.4	335.0	13	292.0	8	18.0
250	276.3	405.0	16	356.0	8	22.0
300	327.1	455.0	19	406.0	12	22.0
350	359.1	525.0	22	470.0	12	26.0
375	410.4	550.0	22	495.0	12	26.0
400	410.4	580.0	25	521.0	12	26.0
450	461.7	640.0	25	584.0	12	26.0
500	513.0	705.0	29	641.0	16	26.0
550	564.3	760.0	29	699.0	16	30.0
600	615.9	825.0	32	756.0	16	30.0
700	717.5	910.0	35	845.0	20	30.0
750	768.3	995.0	41	927.0	20	33.0
800	819.1	1060.0	41	984.0	20	36.0
850	869.9	1090.0	44	1016.0	20	36.0
900	920.7	1175.0	48	1092.0	24	36.0

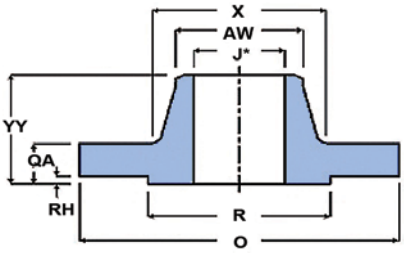
TABLE E

Nominal Pipe Size mm	Slip on Bore	Outside diameter of Flange	Thick-ness	Bolt Circle Dia.	No. of Holes	Dia. of Holes
15	22.3	95.0	6	67.0	4	14.0
20	27.6	100.0	6	73.0	4	14.0
25	34.5	115.0	7	83.0	4	14.0
32	43.1	120.0	8	87.0	4	14.0
40	49.5	135.0	9	98.0	4	14.0
50	61.9	150.0	10	114.0	4	18.0
65	74.6	165.0	10	127.0	4	18.0
80	90.6	185.0	11	146.0	4	18.0
90	103.3	205.0	12	165.0	8	18.0
100	116.0	215.0	13	178.0	8	18.0
125	143.7	255.0	14	210.0	8	18.0
150	170.6	280.0	17	235.0	8	22.0
200	221.4	335.0	19	292.0	8	22.0
250	276.3	405.0	22	356.0	12	22.0
300	327.1	455.0	25	406.0	12	26.0
350	359.1	525.0	29	470.0	12	26.0
375	410.4	550.0	32	495.0	12	26.0
400	410.4	580.0	32	521.0	12	26.0
450	461.7	640.0	35	584.0	16	26.0
500	513.0	705.0	38	641.0	16	26.0
550	564.3	760.0	44	699.0	16	30.0
600	615.9	825.0	48	756.0	16	33.0
700	717.5	910.0	51	845.0	20	33.0
750	768.3	995.0	54	927.0	20	36.0
800	819.1	1060.0	54	984.0	20	36.0
850	869.9	1090.0	57	1016.0	20	36.0
900	920.7	1175.0	64	1092.0	24	36.0

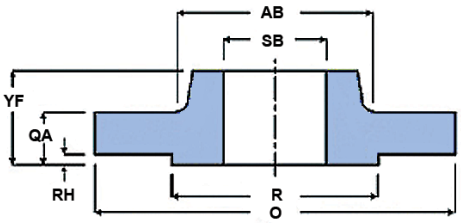
• Stocked Item ○ Market Available

BS EN 1092-1 Flanges

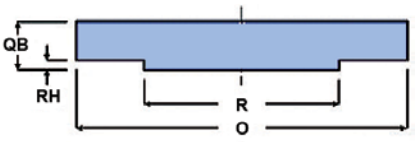
Grade 316/316L, Forging to A182 - alternate grade made to order
Dimension to EN 1092-1
Slip On in stock - other flange type made to order
all dimensions in mm



Welding Neck with Raised Face



Bossed



Blind

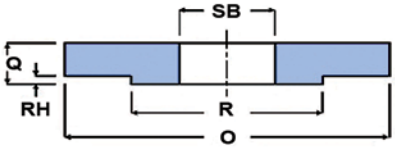


Plate Slip-on Welding

All can be supplied with full face
if required (non standard)

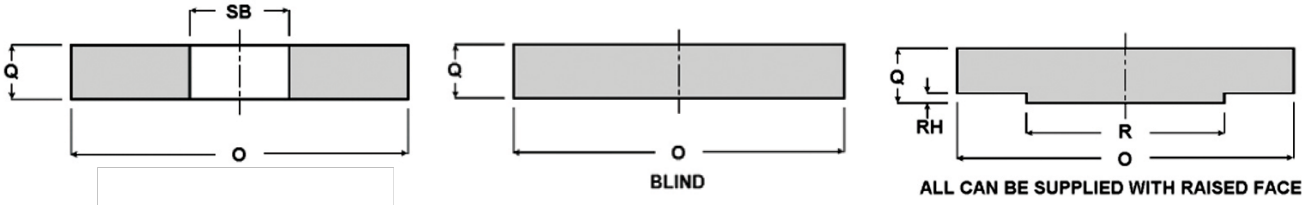
Rating PN 16

Nominal Pipe Size	Slip On Bore	Outside Dia. of Flange	Height of RF	Dia. of RF	Thickness			Overall Height Bossed	Overall Height Weld Neck	Dia. at Large End of Neck	Dia. at Small End of Neck	Dia. at Root of Boss	Bolt Circle Dia.	No. of Holes	Dia. of Holes	Slip On
(mm)	SB	0	RH	R	QB	QA	Q	YF	YW	X	AW	AB	P	N	HD	
15	22.3	95	2	45	16	16	14	22	38	32	21.3	35	65	4	14	○
20	27.6	105	2	58	18	18	16	26	40	39	26.9	45	75	4	14	○
25	34.5	115	2	68	18	18	16	28	40	46	33.7	52	85	4	14	○
32	43.1	140	2	78	18	18	18	30	42	56	42.4	60	100	4	18	○
40	49.5	150	3	88	18	18	18	32	45	64	48.3	70	110	4	18	○
50	61.9	165	3	102	18	18	20	28	45	74	60.3	84	125	4	18	●
65	74.6	185	3	122	18	18	20	32	45	92	76.1	104	145	4 / 8	18	○
76	77.7	185	3	122	18	18	20	32	45	92	76.1	104	145	4	18	○
80	90.6	200	3	138	20	20	20	34	50	110	88.9	118	160	8	18	●
100	116	220	3	158	20	20	22	40	52	130	114.3	140	180	8	18	●
125	143.7	250	3	188	22	22	22	44	55	158	139.7	168	210	8	18	○
150	170.6	285	3	212	22	22	24	44	55	184	168.3	195	240	8	22	●
165	167.6	285	3	212	22	22	24	44	55	184	168.3	195	240	8	22	○
200	221.1	340	3	268	24	24	26	44	62	234	219.1	246	295	12	22	●
250	276.3	405	3	320	26	26	29	46	70	288	273	298	355	12	26	●
300	327.1	460	4	378	28	28	32	46	78	342	323.9	350	410	12	26	●
350	358.6	520	4	438	30	30	35	57	82	390	355.6	400	470	16	26	○
400	409.4	580	4	490	32	32	38	63	85	444	406.4	456	525	16	30	○
450	460	640	4	550	40	34	42	68	87	490	457	502	585	20	30	○
500	511	715	4	610	44	36	46	73	90	546	508	559	650	20	33	○
600	613	840	5	725	54	40	55	83	95	650	610	658	770	20	36	○
700	715	910	5	795	58	40	63	83	100	750	711	760	840	24	36	○
800	816	1025	5	900	62	41	74	90	105	848	813	864	950	24	39	○
900	918	1125	5	1000	64	48	82	94	110	948	914	968	1050	28	39	○
1000	1020	1255	5	1115	68	59	90	100	120	1056	1016	1072	1170	28	42	○
1200	1224	1485	5	1330	76	78			130	1260	1220		1390	32	48	○

● Stocked Item ○ Market Available

AS 4087 Waterwork Flanges

Australian/New Zealand Standard AS/NZS 4087
All dimensions in mm

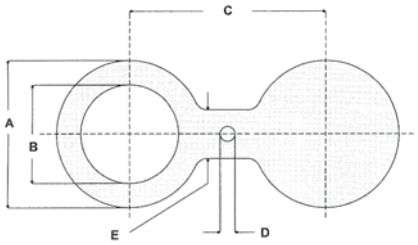


Rating PN 16

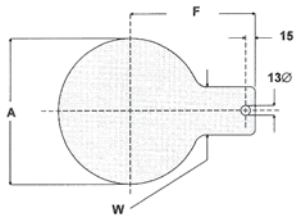
Nominal Pipe Size	Slip On Bore			Outside Diameter of Flange	Height of RF	Diameter of RF	Thickness	Bolt Circle Diameter	Number of Holes	Diameter of Holes
(mm)	SB	Slip On	Blind	O	RH	R	Q	P	N	HD
		FFPNSO316	FFPNBL316							
50	61.9	●	○	150.0	3.0	90.0	11.0	114.0	4	18.0
65	74.6	●	○	165.0	3.0	103.0	11.0	127.0	4	18.0
76	77.7	○	○	165.0	3.0	103.0	11.0	127.0	4	18.0
80	90.6	●	○	185.0	3.0	122.0	11.0	146.0	4	18.0
100	116.0	●	●	215.0	3.0	154.0	13.0	178.0	4	18.0
150	170.6	●	●	280.0	3.0	211.0	13.0	235.0	8	18.0
165	167.6	○	○	280.0	3.0	211.0	13.0	235.0	8	18.0
200	221.1	●	●	335.0	3.0	268.0	19.0	292.0	8	18.0
225		○	○	370.0	3.0	300.0	19.0	324.0	8	18.0
250	276.3	●	●	405.0	3.0	328.0	19.0	356.0	8	22.0
300	327.1	●	●	455.0	4.0	378.0	23.0	406.0	12	22.0
350	358.6	●	●	525.0	4.0	438.0	30.0	470.0	12	26.0
375		○	○	550.0	4.0	463.0	30.0	495.0	12	26.0
400	409.4	●	●	580.0	4.0	489.0	30.0	521.0	12	26.0
450	460.0	●	●	640.0	4.0	552.0	30.0	584.0	12	26.0
500	511.0	○	●	705.0	4.0	609.0	38.0	641.0	16	26.0
600	613.0	○	○	825.0	5.0	720.0	48.0	756.0	16	30.0
700	715.0	○	○	910.0	5.0	809.0	56.0	845.0	20	30.0
750	765.0	○	○	995.0	5.0	888.0	56.0	927.0	20	33.0
800	816.0	○	○	1060.0	5.0	942.0	56.0	984.0	20	36.0
900	918.0	○	○	1175.0	5.0	1050.0	66.0	1092.0	24	36.0
1000	1020.0	○	○	1255.0	5.0	1133.0	66.0	1175.0	24	36.0
1200	1224.0	○	○	1490.0	5.0	1368.0	76.0	1410.0	32	36.0

● Stocked Item ○ Market Available

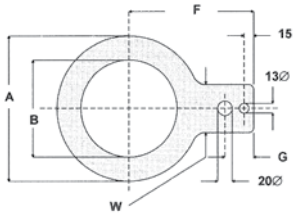
Flange Blinds



SPECTACLE BLIND



PADDLE BLIND



RING SPACER

NB Size	ANSI 150									ANSI 300							
	A	B	C	D	E	W	F	G	T	A	B	C	D	E	W	F	G	T
25	63.0	29.0	79.0	16.0	42.0	32.0	145.0	40.0	6.0	70.0	29.0	89.0	16.0	45.0	32.0	150.0	40.0	6.0
40	82.0	42.0	98.0	16.0	50.0	32.0	155.0	40.0	6.0	92.0	42.0	114.0	22.0	50.0	32.0	170.0	40.0	6.0
50	101.0	54.0	121.0	19.0	60.0	32.0	165.0	40.0	6.0	108.0	54.0	127.0	19.0	60.0	25.0	173.0	40.0	10.0
80	132.0	80.0	152.0	19.0	60.0	32.0	175.0	40.0	6.0	146.0	80.0	168.0	22.0	60.0	32.0	195.0	40.0	10.0
100	171.0	104.0	191.0	19.0	70.0	32.0	205.0	40.0	10.0	177.0	104.0	200.0	22.0	65.0	32.0	215.0	40.0	12.0
150	218.0	156.0	241.0	22.0	80.0	32.0	230.0	40.0	10.0	247.0	156.0	270.0	22.0	80.0	32.0	250.0	40.0	20.0
200	276.0	204.0	298.0	22.0	90.0	40.0	260.0	45.0	16.0	304.0	204.0	330.0	25.0	90.0	40.0	280.0	45.0	22.0
250	336.0	256.0	362.0	25.0	100.0	40.0	295.0	45.0	16.0	358.0	256.0	387.0	29.0	100.0	40.0	312.0	45.0	25.0
300	406.0	306.0	432.0	25.0	110.0	50.0	330.0	45.0	20.0	419.0	306.0				50.0	350.0	45.0	30.0
350	447.0	338.0	476.0	29.0	120.0	50.0	360.0	45.0	22.0	482.0	338.0				40.0	383.0	45.0	32.0
400	510.0	389.0				50.0	390.0	45.0	25.0	535.0	384.0	* Refer to note			50.0	415.0	45.0	36.0
450	545.0	440.0	* Refer to note			50.0	410.0	45.0	25.0	592.0	434.0				40.0	445.0	45.0	42.0
500	600.0	491.0				60.0	440.0	45.0	30.0	650.0	485.0				45.0	447.0	45.0	46.0
600	715.0	593.0				60.0	500.0	50.0	36.0	770.0	578.0				60.0	477.0	45.0	46.0

NB Size	ANSI 600									ANSI 900							
	A	B	C	D	E	W	F	G	T	A	B	C	D	E	W	F	G	T
25	70.0	29.0	89.0	16.0	52.0	32.0	150.0	40.0	6.0	76.0	29.0	102.0	25.0	60.0	32.0	164.0	40.0	10.0
40	92.0	42.0	114.0	22.0	65.0	32.0	170.0	40.0	10.0	95.0	42.0	124.0	29.0	65.0	32.0	179.0	40.0	40.0
50	108.0	52.0	127.0	19.0	65.0	25.0	173.0	40.0	10.0	139.0	52.0	165.0	25.0	70.0	32.0	198.0	40.0	12.0
80	146.0	76.0	168.0	22.0	65.0	32.0	195.0	40.0	16.0	164.0	76.0	191.0	25.0	75.0	32.0	210.0	40.0	16.0
100	190.0	100.0	216.0	25.0	75.0	32.0	225.0	40.0	16.0	202.0	100.0	235.0	32.0	90.0	32.0	235.0	40.0	10.0
150	263.0	149.0	292.0	29.0	85.0	32.0	267.0	40.0	25.0	284.0	149.0	316.0	32.0	100.0	32.0	280.0	40.0	30.0
200	317.0	196.0	349.0	32.0	95.0	40.0	300.0	45.0	30.0	354.0	196.0	394.0	39.0	110.0	40.0	325.0	45.0	36.0
250	397.0	246.0				40.0	345.0	45.0	36.0	430.0	246.0				40.0	363.0	45.0	42.0
300	454.0	292.0				38.0	370.0	45.0	42.0	493.0	292.0				40.0	395.0	45.0	50.0
350	488.0	320.0				40.0	393.0	45.0	46.0	515.0	320.0				40.0	410.0	45.0	55.0
400	561.0	366.0	* Refer to note			50.0	432.0	45.0	50.0	570.0	366.0	* Refer to note			50.0	443.0	45.0	65.0
450	610.0	412.0				50.0	463.0	45.0	60.0	635.0	412.0				50.0	485.0	45.0	70.0
500	680.0	460.0				45.0	500.0	45.0	65.0	695.0	460.0				60.0	520.0	45.0	80.0
600	786.0	552.0				50.0	560.0	50.0	80.0	835.0	552.0				60.0	615.0	50.0	95.0

* Use paddle blinds and ring spacers where no dimensions are shown for spectacle blind.
Dimensions based on sizes designed to suit ANSI B.16.5 flanges. All dimensions given in mm.
T = Thickness

Seamless Round Tube

Manufactured to ASTM A269/213 - Cold Drawn Seamless Annealed & Pickled
Imperial & Metric sizes, Length: 6 mtrs. Plain End & End Caps.
Mechanical polish available with production quantity & lead time

Barlow's Formula: $P = \frac{2 \times (S) \times t}{D}$

P = Pressure, S = Allowable Stress (517 Mpa, Grade 316)
t = Wall Thickness, D = Outside Diameter

Note, the typical safe working pressure figures in the table were calculated on a safety factor of '4'.

Size (mm) W.T.	O.D.	304/304L	316/316L	Weight kg/metre	Burst Pressure PSI	Typical Safe Working Pressure
			TRS316			
0.9	3.18	○	○	0.05	42,433	10,608
	4.76	○	●	0.08	28,348	7,087
	6.35	○	●	0.12	21,249	5,312
	7.94	○	○	0.15	16,994	4,248
	9.52	○	●	0.19	14,174	3,543
	12.70	○	●	0.26	10,624	2,656
1.0	**6.00**	○	●	0.12	24,988	6,247
1.2	6.35	○	●	0.15	28,333	7,083
	7.94	○	●	0.20	22,659	5,664
	9.52	○	●	0.25	18,898	4,724
	12.70	○	●	0.35	14,166	3,541
	15.88	○	●	0.45	11,329	2,832
	19.05	○	●	0.55	9,444	2,361
	25.40	○	●	0.75	7,083	1,770
1.5	**8.00**	○	●	0.25	28,111	7,027
	10.00	○	●	0.32	22,489	5,622
	12.00	○	●	0.40	18,741	4,685
	25.00	○	●	0.88	8,995	2,248
1.6	6.35	○	●	0.19	37,777	9,444
	9.52	○	●	0.32	25,198	6,299
	12.70	○	●	0.45	18,888	4,722
	15.88	○	●	0.58	15,106	3,776
	19.05	○	●	0.71	12,592	3,148
	25.40	○	●	0.98	9,444	2,361
	31.75	○	●	1.24	7,555	1,888
	38.10	○	●	1.51	6,296	1,574
	50.80	○	●	2.03	4,722	1,180
2.0	**16.00**	○	●	0.69	18,741	4,685
	18.00	○	●	0.79	16,658	4,164
	19.05	○	●	0.89	15,740	3,935
	20.00	○	●	0.89	14,993	3,748
	22.00	○	●	1.0	13,630	3,407
	25.40	○	●	1.23	11,805	2,951
	28.00	○	●	1.29	10.709	2,677
	31.75	○	●	1.57	9,444	2,361
	35.00	○	●	1.65	8,567	2,141
	38.10	○	○	1.90	7,870	1,967
2.5	**25.00**	○	●	1.4	14,993	3,748
3.0	25.40	○	●	1.71	17,708	4,427
	30.00	○	●	2.01	14,993	3,748
	31.75	○	●	2.19	14,166	3,541
	38.00	○	●	2.6	11,836	2,959
	42.00	○	●	2.93	10,709	2,677
	38.10	○	●	2.68	11,805	2,951
3.25	50.80	○	●	3.65	9,591	2,397
4.0	**38.00**	○	●	3.41	15,782	3,945

● Stocked Item ○ Market Available

Welded Round Tube

ASTM A554: Mill, #320 Grit, #600 Grit, #1000 Grit (Mirror, HiPol)
ASTM A269: Mill Annealed, #600 Grit Annealed
ASTM A789: 2205 Mill Annealed,
ASTM A249: available from production, AS 1528: #320 Grit, internally smooth
Length: 6 mtrs or 6.1 mtrs (2205)
Note: Other finishes available on request. Alternative specification A249 (welded heat exchanger tube)

Size (mm) W.T.	O.D.	304 Mill	304 #320 Grit	304 #320 Grit Ann	304 #320 Grit AS1528	304 #600 Grit	304 Mirror Finish	Apprx. Wgt. (kg/m)
		-	TR304+HT	TR304+HTA	TR304+HB	TR304+HS	TR304+HP	
1.2	9.52	○	○	○	○	○	○	0.25
	12.70	○	○	○	○	●	○	0.34
	15.88	○	○	○	○	●	○	0.44
	19.05	○	○	○	○	●	○	0.53
	22.22	○	○	○	○	●	○	0.63
	25.40	○	○	●	○	●	○	0.73
	31.75	○	○	○	○	●	○	0.92
	38.10	○	○	○	○	○	○	1.11
	50.80	○	○	○	○	○	○	1.49
1.5	15.90	○	●	○	○	○	○	0.57
	19.05	○	●	○	○	○	○	0.70
1.6	9.52	○	○	○	○	○	○	0.31
	12.70	○	○	○	○	●	○	0.44
	15.88	○	○	○	○	●	○	0.57
	19.05	○	○	○	○	●	●	0.70
	22.22	○	○	○	○	●	●	0.83
	25.40	○	○	○	●	●	●	0.95
	28.58	○	○	○	○	●	○	1.08
	31.75	○	○	○	●	●	●	1.21
	35.00	○	○	○	○	●	○	1.34
	38.10	○	●	●	●	●	●	1.46
	41.28	○	○	○	○	●	○	1.59
	44.45	○	○	○	○	●	○	1.71
	50.80	○	●	●	●	●	●	1.98
	54.00	○	○	○	○	●	○	2.03
	57.00	○	○	○	○	●	○	2.22
	60.00	○	○	○	○	●	○	2.35
	63.50	○	○	○	●	●	●	2.49
	70.00	○	○	○	○	●	○	2.68
	76.20	○	○	○	●	●	●	3.00
	88.90	○	○	○	○	●	○	3.50
	101.6	○	○	○	●	●	○	4.02
	114.3	○	○	○	○	○	○	4.45
	127.0	○	○	○	●	○	○	5.03
	152.4	○	○	○	●	○	○	6.05

Mill

#320 Grit

AS1528 #320 Grit
internally smooth

#600 Grit

#1000 Grit
Mirror Finish
HiPol

● Stocked Item ○ Market Available

Welded Round Tube

ASTM A554: Mill, #320 Grit, #600 Grit, #1000 Grit (Mirror, HiPol)
ASTM A269: Mill Annealed, #600 Grit Annealed
ASTM A789: 2205 Mill Annealed,
ASTM A249: available from production, AS 1528: #320 Grit, internally smooth
Length: 6 mtrs or 6.1 mtrs (2205)
Note: Other finishes available on request. Alternative specification A249 (welded heat exchanger tube)

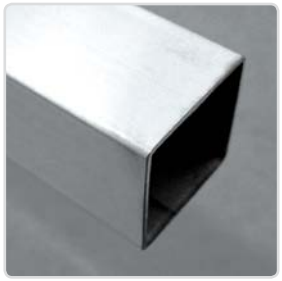
Size (mm) W.T.	O.D.	316 Mill	316 Mill Ann	316 #320 Grit	316 #320 Grit AS1528	316 #600 Grit	316 Mirror Finish*	2205 Mill Ann	Apprx. Weight (kg/m)
		TR316+HM	TR316+HMA	TR316+HT	TR316+HB	TR316+HS	TR316+HP	TR2205+A	
1.2	9.52	○	○	○	○	○	○	○	0.25
	12.70	○	○	○	○	○	○	○	0.34
	15.88	○	○	○	○	○	○	○	0.44
	19.05	○	○	○	○	●	○	○	0.53
	22.22	○	○	○	○	○	○	○	0.63
	25.40	○	○	○	○	○	○	○	0.73
	38.10	○	○	○	○	○	○	○	1.11
1.5	12.70	○	○	●	○	○	○	○	0.45
	15.90	○	○	●	○	○	●	○	0.57
	19.05	○	○	●	○	○	○	○	0.70
1.6	9.52	○	○	○	○	○	○	○	0.31
	12.70	○	○	○	○	●	○	○	0.44
	15.88	○	○	○	○	●	○	○	0.57
	19.05	○	○	○	○	●	●	●	0.70
	22.22	○	○	○	○	●	●	○	0.83
	25.40	○	●	○	●	●	●	●	0.95
	31.75	○	○	○	●	●	●	○	1.21
	38.10	○	●	●	●	●	●	●	1.46
	44.45	○	○	○	○	●	○	○	1.71
	50.80	○	●	●	●	●	●	●	1.98
	57.00	○	○	○	○	○	○	○	2.22
	63.50	○	●	●	●	●	●	○	2.49
	76.20	●	○	○	●	●	●	○	3.00
	88.90	○	○	○	○	●	○	○	3.50
	101.6	●	○	○	●	●	○	○	4.02
	127.0	○	○	●	●	○	○	○	5.03
	152.4	○	○	●	●	○	○	○	6.05
2.0	50.8	●	○	○	○	○	○	○	2.82
	63.5	○	○	○	○	○	○	●	3.08
	76.20	○	●	○	○	○	○	●	3.70
	101.6	○	●	○	○	○	○	●	5.00
	203.0	○	○	●	○	○	○	○	10.00
	254.0	●	○	○	○	○	○	○	13.00
3.0	50.8	○	○	●	○	●	●	○	3.65

* Includes HiPol and polishes #800 grit and higher.

● Stocked Item ○ Market Available

Square Tube

Manufactured to ASTM A554
Available in welded only, polished or mill.
Grades 304 and 316.
180 Grit Polish, # 320 Grit Polish
400 Grit Polish, # 600 Grit Polish & HiPol
1000 Grit, Mirror
Mill

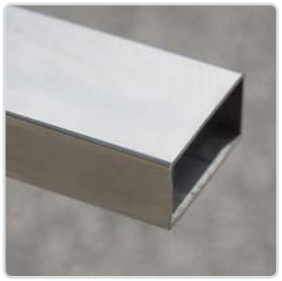


W.T. (mm)	Size (mm)	304 #180 Grit	304 Mirror	316 Mill	316 #180 Grit	316 #320 Grit	316 Mirror	Weight (kg/m)
		TS304	TS304+MP	TS316	TS316+P	TS316+P	TS316+MP	
1.2	12.7 x 12.7	●	○	○	●	○	○	0.441
	15.88 x 15.88	○	○	○	○	○	○	0.631
	19.05 x 19.05	●	○	○	○	○	○	0.673
	22.22 x 22.22	●	○	○	○	○	○	0.883
	25.4 x 25.4	●	○	○	○	○	○	0.824
	31.8 x 31.8	●	○	○	○	○	○	1.085
	38.1 x 38.1	●	○	○	○	○	○	1.440
	50.8 x 50.8	●	○	○	○	○	○	1.900
1.5	12.0 x12.0	○	○	○	○	○	●	0.55
	12.7 x 12.7	○	○	○	●	○	○	0.55
	15.0 x 15.0	○	○	○	○	○	●	0.90
	19.0 x 19.0	○	○	○	○	○	●	1.17
	25.4 x 25.4	○	○	○	○	○	●	1.552
	31.8 x 31.8	○	○	○	○	○	●	1.849
	38.1 x 38.1	○	○	○	○	○	●	1.875
	50.8 x 50.8	○	○	○	○	○	●	2.489
1.6	12.7 x 12.7	●	○	○	○	○	○	0.670
	19.05 x 19.05	●	○	○	○	○	○	1.174
	22.22 x 22.22	○	○	○	○	○	○	1.396
	25.4 x 25.4	●	○	○	●	○	○	1.552
	31.8 x 31.8	●	○	○	●	○	○	1.849
	38.1 x 38.1	●	●	○	●	○	○	1.875
	50.8 x 50.8	●	○	○	●	○	○	2.489
	60.0 x 60.0	●	○	○	○	○	○	3.058
	80.0 x 80.0	●	○	○	○	○	○	4.078
2.0	25.4 x 25.4	●	○	○	○	○	○	1.470
	31.8 x 31.8	●	○	○	○	○	○	1.890
	38.1 38.1	●	○	○	○	○	○	2.350
	50.8 x 50.8	●	○	●	○	○	○	3.400
3.0	25.4 x 25.4	●	○	○	○	○	○	2.100
	38.1 x 38.1	●	○	○	●	○	○	3.300
	50.8 x 50.8	●	○	●	○	●	●	4.480
	60.0 x 60.0	●	○	○	○	○	○	5.491
	80.0 x 80.0	●	○	●	○	●	●	7.300
	100.0 x 100.0	●	○	●	○	●	○	9.600
	150.0 x 150.0	●	○	○	●	○	○	13.760
4.0	50.0 x 50.0	●	○	○	○	○	○	6.000
5.0	80.0 x 80.0	○	○	○	●	○	○	11.700
	100.0 x 100.0	●	○	○	●	○	○	14.820
	150.0 x 150.0	●	○	○	●	○	○	22.620
6.0	200.0 x 200.0	●	○	○	○	○	○	36.320

● Stocked Item ○ Market Available

Rectangular Sections SHS & RHS

Manufactured to ASTM A554
Available in welded only, Polished or Mill.
Grades 304 and 316.
180 Grit polish, # 320 Grit Polish
400 Grit Polish, Mirror Finish, Mill

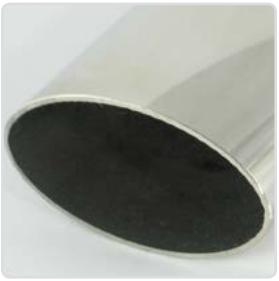


	Size	304 # 180 Grit	304 # 320 Grit	316 # 180 Grit	316 # 320 Grit	316 # 400 Grit	316 Mirror	316 Mill	Weight (kg/m)
		TSB304	TSB304	TSB316	TSB316	TSB316	TSB316	TSB316	
Rectangular	40 x 20 x 1.6	○	●	○	○	○	○	○	1.42
	50 x 25 x 1.5 *	○	○	○	○	○	●	○	1.90
	50 x 25 x 1.6 *	●	○	●	○	○	○	○	1.90
	50 x 25 x 3.0 *	○	○	○	○	●	○	○	3.30
	60 x 40 x 1.5	○	○	○	○	○	●	○	1.90
	60 x 40 x 2.0	○	○	○	○	○	●	○	4.50
	65 x 38 x 3.0	○	○	○	○	○	○	○	5.42
	75 x 25 x 1.6	○	○	○	●	○	○	○	2.42
	80 x 40 x 1.5	○	○	○	○	○	●	○	3.00
	80 x 40 x 1.6	●	○	○	○	○	○	○	3.05
	80 x 40 x 3.0	●	○	○	●	○	○	●	5.58
	100 x 50 x 3.0	○	○	○	●	○	○	●	7.36
	100 x 50 x 5.0	●	○	○	○	○	○	○	10.80
	150 x 75 x 5.0	●	○	○	○	○	○	○	16.77
	150 x 100 x 5.0	●	○	●	○	○	○	○	18.72
	200 x 100 x 3.0	●	○	○	○	○	○	○	13.76
	200 x 100 x 5.0	●	○	●	○	○	○	○	22.62

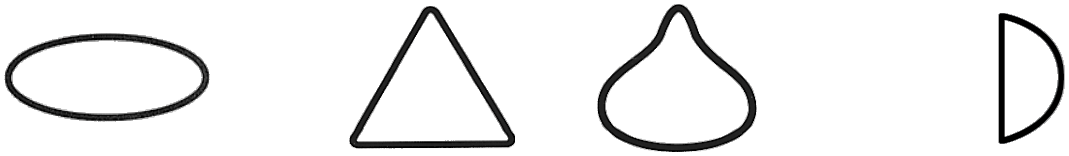
* could be in imperial size

Oval Tube

Manufactured to ASTM A554
Material: 316
Mirror Polish / #1000 Grit
1.5mm wall thickness



Elliptical (Oval)		Triangle		Teardrop		"D" Section			
TR316OV		-		-		TR316D			
38 x 23mmx1.5	●	24mm	○	48 x 25.5mm	○	40 x 19mm	○	55 x 28mm	○
46 x 28mmx1.5	○	37mm	○			47 x 25mm	○	55 x 27mm	○
75 x 42mm x1.5	●	51mm	○			48 x 24mm	○	62 x 34mm	○
		78mm	○			48 x 23mm	○	63 x 33mm	○
62 x 38mm x 1.5 (#1000Grit)	●	105mm	○			50 x 25mm	○	62 x 31mm	●
						55 x 29mm	○		



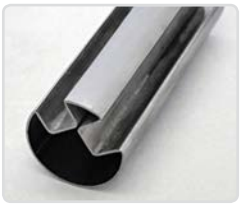
● Stocked Item ○ Market Available

Round Slotted Tube

Manufactured to ASTM A554
Round (Single & Double Slots).
Material: 316. Mirror Finish
Length: 3-6 mtrs.


Single Slot


Double Slot


90 Deg Double Slot

Item No.	Size (mm)	Grade	Slot Size	Wall Thickness	Length	Shape
TR316SS15015025	25.4	316 Mirror polish	14mmx14mm	1.5mm	6m	Single Slot
TR316SS15015038	38.1	316 Mirror polish	15mmx15mm	1.5mm	6m	Single Slot
TR316SS15015050	50.8	316 Mirror polish	15mmx15mm	1.5mm	6m	Single Slot
TR316DS15015050	50.8	316 Mirror polish	15mmx15mm	1.5mm	6m	Double Slot
TR3169D15015050	50.8	316 Mirror polish	15mmx15mm	1.5mm	3m	90 Deg Double Slot

Square & Rectangular Slotted Tube

Manufactured to ASTM A554
Square (Single & Double Slots).
Material: 316.
Length: 3 mtrs.
Mirror polish


Single Slot


Double Slot (Opposite)


Double Slot (90deg)


Single Slot (Flat)


Single Slot Rectangular Tube

Item No.	Size	Grade	Slot Size	Wall Thickness	Length	Shape
TS316SS16015050	50mm x 50mm	316 Mirror Polish	15mm x 15mm	1.5mm	3m	Single Slot
TS316DS16015050	50mm x 50mm	316 Mirror Polish	15mm x 15mm	1.5mm	3m	Double Slot (Opposite)
TS3169DS16015050	50mm x 50mm	316 Mirror Polish	15mm x 15mm	1.5mm	3m	Double Slot 90Deg
TS316SS16020050	50mm x 20mm	316 Mirror Polish	15mm x 15mm	1.5mm	3m	Single Slot Flat
TS316SS12025021	25mm x 21mm	316 Mirror Polish	14mm x 14mm	1.2mm	6m	Single Slot Rectangular Tube
TS316SS15050025	50mm x 25mm	316 Mirror Polish	15mm x 15mm	1.5mm	6m	Single Slot Rectangular Tube

Flat Rectangular Tube Section

Manufactured to ASTM A554

Item No.	Size	Grade	Grit	
TSB31615050010P	50 x 10 x 1.5 mm	316	316 Mirror polish	•
TSB31615070010P	70 x 10 x 1.5 mm	316	# 600	•
TSB31615050010	50 x 10 x 1.5 mm	316	# 320	•

• Stocked Item ○ Market Available

Buttweld Tube Fittings

Manufactured from ASTM AS 1528 stainless steel tube.
Tube bends have a standard centre line radius 1.5 times the diameter.
Other sizes/grades available upon request.
Available Polished or Mill in most sizes.
HiBev #320 Grit (AS 1528) specification also available.
Weights are in kg.

W.T.	O.D.	90º Bend						45º Bend				
(mm)	(mm)	304	304 AS1528	316	316 AS1528	2205	Wgt (kg)	304L	304 AS1528	316 AS1528	2205	Wgt (kg)
		FT9304	FT9P304	FT9316	FT9P316	FT92205		FT4304	FT4P304	FT4P316	FT42205	
1.6	12.70	○	○	●	○	○	0.01	○	○	○	○	0.01
	19.05	○	●	●	●	○	0.02	○	○	●	○	0.02
	25.40	○	●	●	●	●	0.04	○	●	●	○	0.03
	31.75	○	●	●	●	○	0.06	○	○	○	○	0.05
	38.10	○	●	●	●	●	0.08	○	●	●	●	0.07
	50.80	●	●	●	●	●	0.15	●	●	●	●	0.12
	63.50	●	●	●	●	○	0.23	●	●	●	○	0.18
	76.20	●	●	●	●	○	0.34	●	●	●	○	0.27
	88.90	●	○	●	○	○	0.54	●	○	○	○	0.43
	101.6	●	●	●	●	○	0.60	●	●	●	○	0.48
	127.0	○	●	○	●	○	0.95	○	●	○	○	0.75
	152.4	○	●	○	○	○	1.36	○	○	○	○	1.09
	203.0	○	○	○	○	○	2.42	○	○	○	○	1.94
	254.0	○	○	○	○	○	3.50	○	○	○	○	2.90
2.0	25.4	○	○	○	○	○	0.04	○	○	○	○	0.04
	31.75	○	○	○	○	○	0.07	○	○	○	○	0.06
	38.1	○	○	○	○	○	0.10	○	○	○	○	0.08
	50.80	○	○	●	○	○	0.18	○	○	○	○	0.15
	63.50	○	○	●	○	●	0.29	○	○	○	○	0.23
	76.20	○	○	●	○	●	0.42	○	○	○	○	0.33
	101.60	○	○	●	○	●	0.75	○	○	○	○	0.60
	127.00	○	○	●	○	○	1.17	○	○	○	○	0.94
	152.4	○	●	●	○	○	1.70	○	○	○	○	1.36
	203.2	○	○	●	○	○	3.02	○	○	○	○	2.42
	254.0	○	○	●	○	○	4.50	●	○	○	○	3.49

W.T.	O.D.	180º Bend		
(mm)	(mm)	316	316 AS1528	Wgt (kg)
		-	FT18P316	
1.6	12.70	○	○	0.01
	19.05	○	○	0.03
	25.40	○	○	0.05
	31.75	○	○	0.08
	38.10	○	●	0.11
	50.80	○	●	0.20
	63.50	○	●	0.31
	76.20	○	●	0.45
	101.6	○	○	0.80
	127.0	○	○	1.26
	152.4	○	○	1.81
	203.0	○	○	3.23
	254.0	○	○	4.70

● Stocked Item ○ Market Available

Buttweld Tube Fittings

Manufactured from ASTM AS 1528 stainless steel tube.
Tube bends have a standard centre line radius 1.5 times the diameter.
Other sizes/grades available upon request.
Available Polished or Mill in most sizes.
HiBev #320 Grit (AS 1528) specification also available.
Weights are in kg.

W.T.	O.D.	Equal Tee				
(mm)	(mm)	304 AS1528	316	316 AS1528	2205	Wgt (kg)
		FTT304+P	FTT316	FTT316+P	FTT2205	
1.6	12.70	○	○	●	○	0.05
	19.05	●	○	●	○	0.08
	25.40	●	○	●	●	0.13
	31.75	○	○	●	○	0.20
	38.10	●	○	●	●	0.30
	50.80	●	○	●	●	0.50
	63.50	●	○	●	●	0.80
	76.20	●	○	●	●	1.10
	101.6	●	○	●	○	1.60
	127.0	○	○	○	○	1.80
	152.4	○	●	●	○	2.80
	203.0	○	○	○	○	3.50
	254.0	○	○	○	○	4.30
2.0	25.4	○	○	○	○	0.15
	31.75	○	○	○	○	0.25
	38.1	○	○	○	○	0.38
	50.80	○	○	○	○	0.65
	63.50	○	●	○	●	1.10
	76.20	○	●	○	○	1.50
	101.60	○	○	○	●	2.30
	127.00	○	○	○	○	3.80
	152.4	○	○	○	○	5.40
	203.2	○	○	○	○	8.40

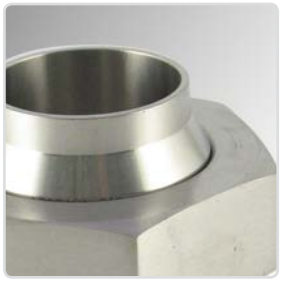
W.T.	O.D.	Y-Piece	Tube Cross	Tube Cap
(mm)	(mm)	316	316	316
1.6	12.70	○	○	○
	19.05	○	○	○
	25.40	○	○	○
	31.75	○	○	○
	38.10	○	○	○
	50.80	○	○	○
	63.50	○	○	○
	76.20	○	○	○
	101.6	○	○	○
	127.0	○	○	○
	152.4	○	○	○
	203.0	○	○	○
	254.0	○	○	○

W.T.	Diameters	Concentric Reducer	Eccentric Reducer	
(mm)	(mm)	316 AS1528	316	Wgt (kg)
		FTRC316		
1.6	25.40 x 12.70	●	○	0.04
	25.40 x 19.05	●	○	0.04
	31.75 x 25.40	●	○	0.05
	38.10 x 12.70	●	○	0.05
	38.10 x 25.40	●	○	0.05
	38.10 x 31.75	●	○	0.05
	50.80 x 25.40	●	○	0.10
	50.80 x 38.10	●	○	0.10
	63.50 x 25.40	○	○	0.10
	63.50 x 38.10	●	○	0.10
	63.50 x 50.80	●	○	0.10
	76.20 x 25.40	○	○	0.25
	76.20 x 38.10	●	○	0.25
	76.20 x 50.80	●	○	0.25
	76.20 x 63.50	●	○	0.25
	101.60 x 38.10	●	○	0.28
	101.60 x 50.80	●	○	0.30
	101.60 x 63.50	●	○	0.30
	101.60 x 76.20	●	○	0.30
	127.00 x 76.20	●	○	0.38
	127.00 x 101.60	●	○	0.45
	152.40 x 50.80	○	○	0.70
	152.40 x 76.20	●	○	0.70
	152.40 x 101.60	●	○	0.70
2	63.50 x 50.80	●	○	0.31
	76.10 x 50.80	●	○	0.38
	76.10 x 63.50	○	○	0.38
	127.00 x 76.2	○	○	0.40
	152.40 x 76.2	●	○	0.61

● Stocked Item ○ Market Available

Hygienic Fittings

Stirlings' hygienic fittings are manufactured from castings, forgings, bar and tube.



CIP/BSM Union

Tri-Clover

Bossed Clamp

Plain Clamp

Hose tails

Code	Type/Size	25mm	38mm	50mm	63mm	76mm	100mm	125mm	150mm
	BSM Fittings								
HFBSMN	Hexagon nut	●	●	●	●	●	●	○	○
HFBSML	Plain liner	●	●	●	●	●	●	○	○
HFBSMM	Male part	●	●	●	●	●	●	○	○
HFBSMOEPDM	Seal - EPDM	●	●	●	●	●	●	○	○
HFBSMOVIT	- Viton	●	●	●	●	●	●	○	○
	- Nitrile	○	○	○	○	○	○	○	○
	- Teflon	○	○	○	○	○	○	○	○
HFBSMC316	Blank cap	●	●	●	●	●	●	○	○
	Blank nut	○	○	○	○	○	○	○	○
	Slotted nut	○	○	○	○	○	○	○	○
	Blank nut c/w chain	○	○	○	○	○	○	○	○
HFBSMSALU	Aluminium spanner	○	●	●	●	●	●	○	○
	S/steel spanner	○	○	○	○	○	○	○	○
	S/steel slotted spanner	○	○	○	○	○	○	○	○
	Hygienic Flat Face Fittings								
HFBSMN	Hexagon Nut	●	●	●	●	●	●	○	○
HFCIPL	Liner	●	●	●	●	●	●	○	○
HFCIPM	Male part	●	●	●	●	●	●	○	○
HFCIPSEPDM	Seal - EPDM	●	●	●	●	●	●	○	○
	- Teflon	○	○	○	○	○	○	○	○
	Triclover fittings								
HFTRIC	Clamp body	●	●	●	●	●	●	○	○
HFTRIF	Ferrule - Standard	●	●	●	●	●	●	○	○
	- Long	○	○	○	○	○	○	○	○
	Blank Cap	○	○	○	○	○	○	○	○
HFTRISEPDM	Seal - EPDM	●	●	●	●	●	●	○	○
	- Buna	○	○	○	○	○	○	○	○
	- Teflon	○	○	○	○	○	○	○	○
HFTRISVIT	- Viton	●	●	●	●	●	●	○	○
	- Flanged Buna	○	○	○	○	○	○	○	○
	Tube Clamps								
HFCLAMPIP	Plain	●	●	●	●	●	●	○	●
HFCLAMPIB	Bossed	●	●	●	●	●	●	○	○
	Hose Tails								
FTHT316	Plain	●	●	●	●	●	●	○	○
	BSM Male	○	○	○	○	○	○	○	○
	BSM Female	○	○	○	○	○	○	○	○

● Stocked Item ○ Market Available

Compression Fittings

Compression Fittings provide a highly reliable, leak proof and torque free seal for annealed seamless tube connections.

Size (inch)	Size (mm)	Female Connector BSP Thread	Male Connector BSP Thread	90 Deg Bend
		FCFC	FCMC	FCUE
¼	6.35	●	●	●
⅜	9.52	●	●	●
½	12.70	●	●	●
¾	19.05	●	●	●

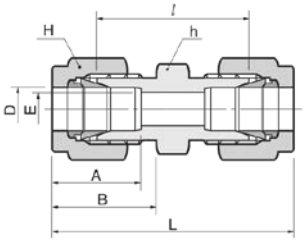
Size (inch)	Size (mm)	Bulkhead Union	Union	Tee
		FCUB	FCU	FCUT
¼	6.35	●	●	●
⅜	9.52	●	●	●
½	12.70	●	●	●
¾	19.05	●	●	●

● Stocked Item ○ Market Available

Compression Fittings Technical Data

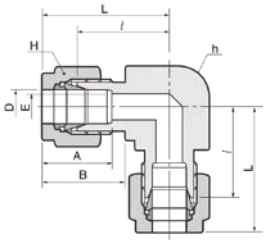
Union

Size inch	Tube OD mm	E min	h mm	H mm	A mm	B mm	l mm	L mm
¼	6.35	4.82	12.70	14.28	15.24	17.78	26.16	40.89
⅜	9.52	7.11	15.87	17.46	16.76	19.30	30.22	44.95
½	12.70	10.41	20.64	22.22	22.86	21.84	30.98	51.30
¾	19.05	15.74	26.98	28.58	24.38	21.84	33.27	53.59



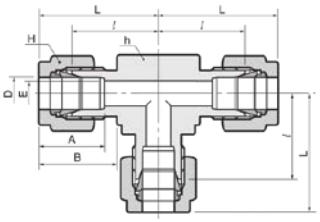
Bend

Size inch	Tube OD mm	E min	h mm	H mm	A mm	B mm	l mm	L mm
¼	6.35	4.82	12.70	14.28	15.24	17.78	19.55	26.92
⅜	9.52	7.11	15.87	17.46	16.76	19.30	23.11	30.48
½	12.70	10.41	20.64	22.22	22.86	21.84	25.90	36.06
¾	19.05	15.74	26.98	28.58	24.38	21.84	29.71	39.87



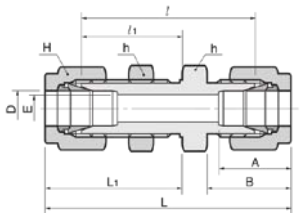
Tee

Size inch	Tube OD mm	E min	h mm	H mm	A mm	B mm	l mm	L mm
¼	6.35	4.82	12.70	14.28	15.24	17.78	19.55	26.92
⅜	9.52	7.11	15.87	17.46	16.76	19.30	23.11	30.48
½	12.70	10.41	20.64	22.22	22.86	21.84	25.90	36.06
¾	19.05	15.74	26.98	28.58	24.38	21.84	29.71	39.87



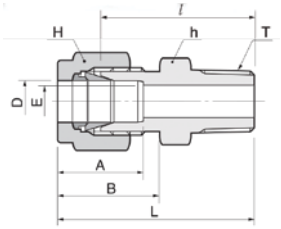
Bulkhead Union

Size inch	Tube OD mm	E min	h mm	H mm	A mm	B mm	l mm	l1 mm	L mm	L1 mm	Panel Hole Drill Size	Panel Max Thickness
¼	6.35	4.82	15.87	14.28	15.24	17.78	42.92	26.16	57.65	33.52	11.50	10.16
⅜	9.52	7.11	19.05	17.46	16.76	19.30	47.49	29.46	62.23	36.83	14.68	11.17
½	12.70	10.41	23.81	22.22	22.86	21.84	50.80	31.75	71.12	41.91	19.44	12.70
¾	19.05	15.74	30.16	28.58	24.38	21.84	58.67	37.33	78.99	47.49	25.79	16.76



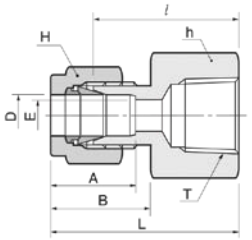
Male Connector

Size inch	Tube OD mm	E min	h mm	H mm	A mm	B mm	l mm	L mm
¼	6.35	4.8	14	14	15.3	17.7	30.2	37.6
⅜	9.52	7.9	18	19	17.2	19.5	33.3	40.9
½	12.70	11.9	24	25	24.4	22.0	38.9	49.0
¾	19.05	15.9	30	32	26.0	22.0	42.2	52.3



Female Connector

Size inch	Tube OD mm	E min	h mm	H mm	A mm	B mm	l mm	L mm
¼	6.35	4.8	14	14	15.3	17.7	28.4	35.8
⅜	9.52	7.9	22	19	17.2	19.5	31.0	38.6
½	12.70	11.9	27	25	24.4	22.0	36.6	46.7
¾	19.05	15.9	35	32	26.0	22.0	39.6	49.7



● Stocked Item ○ Market Available

Hyg. Ball Valve

Body & Disc: Grade 316 S/S
Seat: PTFE
Stem: Grade 316 S/S
Ends: B/Weld - B/Weld

Type	Size (mm) 38.1	50.8	76.2
Ball Valve	○	○	○

Sample Valve

Body & Handle: Grade 316 S/S
Seal: PTFE
Thread: 1/2" BSP

Sample Valve	B/Weld	BSP
15mm	○	●

Relief Valves

V25

V20

112.6

Stainless Steel
316L Stainless Steel
Double Acting Oil Fill 150hl/hr

PVC
Double Acting 500hl/hr

V25 Double Acting

Protects from both pressure and vacuum.
Automatic Action From: Overpressure 0.002 bar / Underpressure 0.005 bar
Materials: Plastic resistant to alimetary corrosion / Cont. working temperature 70 degree
Other components: Stainless Steel
Example to Fill: Decuple-protection Ratio 568,700 ltr Air/ 56,000 ltr liquid
Example to Empty: Decuple-protection Ratio 113,400 ltr Air / 56,000 ltr Liquid

Size	Stainless Steel	PVC
31.75 - 50.8mm	●	●

Hyg. Butterfly Valve

Body & Disc: Grade 316 S/S
Seat: Silicone
Stem: Grade 316 S/S
Pressure Rating: Full Vacuum to 700 KPa
Temp. Rating: Minus 5°C to 95°C

Ends: B/Weld-B/Weld
Lockable Handle

Type	Size (mm) 25.4	38.1	50.8	63.5	76.2	101.6	152.4
Butterfly Valve	●	●	●	○	●	●	○

● Stocked Item ○ Market Available

Industrial Ball Valves

Ball Valves

Body, Ball & Stem	-	Grade 316
Seat and stem seal	-	PTFE
Gland, Handle, Nut & Washer	-	Grade 304

BSP female ends to suit N.B. pipe.

1 Pce Reduced Bore

2 Pce

3 Pce

Nominal Size		1-Pce Reduced Bore		2-Pce Full Bore		3-Pce Full Bore	
NPS (inch)	DN (mm)	800 PSI WOG	Wgt (kg)	1000 PSI WOG	Wgt (kg)	1000 PSI WOG	Wgt (kg)
		VBARB		VBAFB102		VBAFB103	
¼	8	●	0.08	●	0.35	●	0.48
⅜	10	●	0.11	●	0.34	●	0.46
½	15	●	0.17	●	0.36	●	0.58
¾	20	●	0.25	●	0.65	●	0.92
1	25	●	0.45	●	0.93	●	1.19
1¼	32	○	0.74	●	1.65	●	2.07
1½	40	○	0.83	●	2.26	●	2.75
2	50	○	1.25	●	3.62	●	4.07
2½	65	○	-	○	-	●	8.12
3	80	○	-	○	-	●	12.71
4	100	○	-	○	-	●	21.12

Check Valve & Y-Strainer

Spring Check Valves
Body, cap, disc & plug: Grade 316, Seal: Viton
Industrial Swing Check Valves
Body, cap, disc & plug: Grade 316, Seal: PTFE
Y-Strainers 45°
Body & cap: Grade 316, Screen: Grade 304, Seal: PTFE

Size		Spring Check Valve	Swing Check Valve	Y-Strainer
NPS (inch)	DN (mm)	200 PSI W.P.	200 PSI W.P.	45°
¼	8	●	●	●
⅜	10	●	●	●
½	15	●	●	●
¾	20	●	●	●
1	25	●	●	●
1¼	32	●	●	●
1½	40	●	●	●
2	50	●	●	●

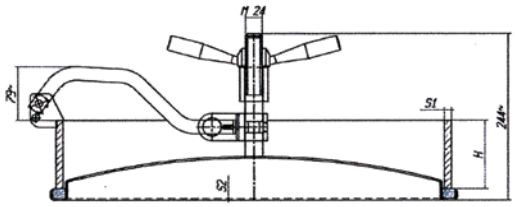
● Stocked Item ○ Market Available

Manway

Stirlings Performance Steels carries Australia's largest range of Manway doors. All doors are European manufactured using high-quality materials and offered at highly competitive prices. Stirlings' Manway doors are suited for a wide range of applications including hygienic environments, concrete & plastic tanks, sweep arm fermenters and more. For additional information on available products, talk to our friendly customer service team for technical assistance.

Stirlings Extra Large Oval

EPDM Seal

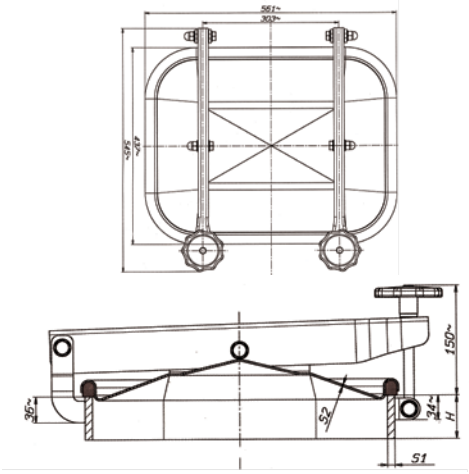


Code	125XLA-4
AISI	304
Access Dia.	550 x 450 mm
Neck Height (H)	100 mm
Neck Thick. (S1)	10.0 mm
Lid Thick. (S2)	2.5 mm
Max P	2.0
Weight	22.5 kg
Arm	Single

Door: In/outward opening, double centralisation

Stirlings Manway Rectangular 115 Short Arm

EPDM Seal

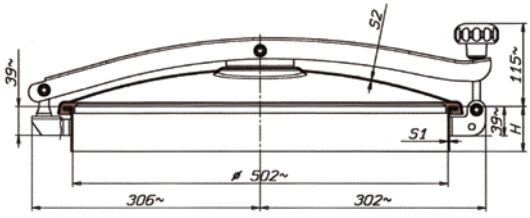


Code	115-6E
AISI	316L
Code	115-4E
AISI	304
Access Dia.	530 x 406 mm
Neck Height (H)	60 mm
Neck Thick. (S1)	10.0 mm
Lid Thick. (S2)	2.0 mm
Max P	1.1
Weight	20.1 kg

Door: Outward opening

Stirlings Manway Round 501P

EPDM Seal

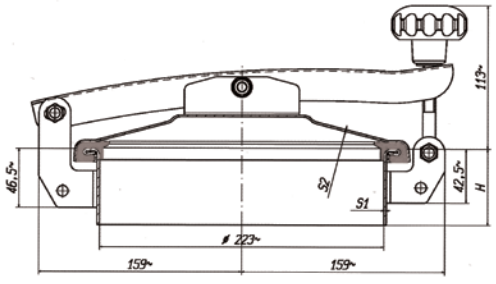


Code	50/1P/A-6
AISI	316L
Access Dia.	502 mm
Neck Height (H)	90 mm
Neck Thick. (S1)	2.0 mm
Lid Thick. (S2)	2.0 mm
Max P	0.07
Weight	8.8 kg
Arm	Single

Door: Outward opening, pivot hinged

Stirlings Manway Round 221S

EPDM Seal

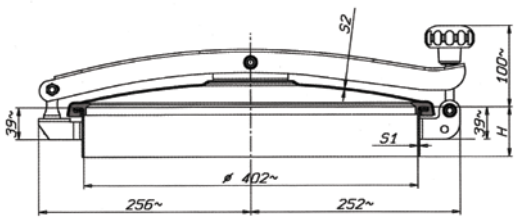


Code	22/1S/A-6
AISI	316L
Access Dia.	223 mm
Neck Height (H)	90 mm
Neck Thick. (S1)	2.0 mm
Lid Thick. (S2)	1.5 mm
Max P	0.1
Weight	3.5 kg
Arm	Single

Door: Outward opening, not pivot hinged

Stirlings Manway Round 401P

EPDM Seal

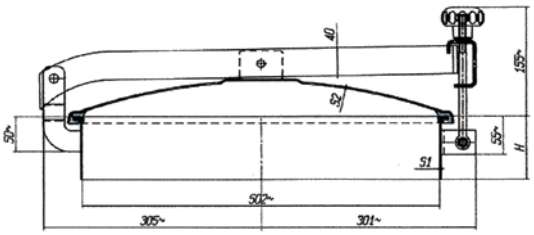


Code	40/1P-6E
AISI	316L
Access Dia.	402 mm
Neck Height (H)	60 mm
Neck Thick. (S1)	2.0 mm
Lid Thick. (S2)	1.5 mm
Max P (Bar)	0.1
Weight	6.0 kg
Arm	Single

Door: Outward opening, pivot hinged

Stirlings Manway Round 501D

EPDM Seal

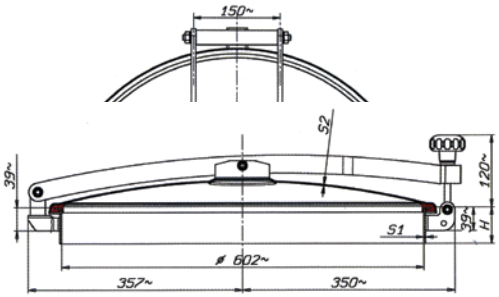


Code	50/1D/A-4
AISI	304
Access Dia.	502 mm
Neck Height (H)	90 mm
Neck Thick. (S1)	2.0 mm
Lid Thick. (S2)	1.5 mm
Max P (Bar)	0.05
Weight	9.8 kg
Arm	Double

Door: Outward opening, fixed hinged

Stirlings Manway Round 601B

EPDM Seal

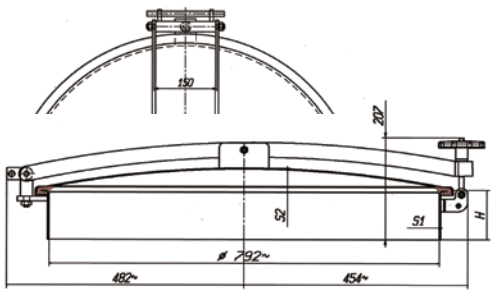


Code	60/1B/A-6E
AISI	316L
Access Dia.	602 mm
Neck Height (H)	90 mm
Neck Thick. (S1)	3.0 mm
Lid Thick. (S2)	2.0 mm
Max P (Bar)	0.05
Weight	14.2 kg
Arm	Double

Door: Outward opening, pivot hinged

Stirlings Manway Round 801B

EPDM Seal

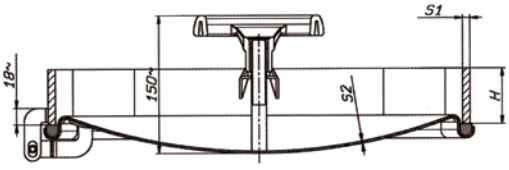


Code	80/1B-6
AISI	316L
Access Dia.	792 mm
Neck Height (H)	100 mm
Neck Thick. (S1)	3.0 mm
Lid Thick. (S2)	2.0 mm
Max P (Bar)	0.05
Weight	32.5 kg
Arm	Double

Door: Outward opening, pivot hinged

Stirlings Manway Oval 127

EPDM Seal

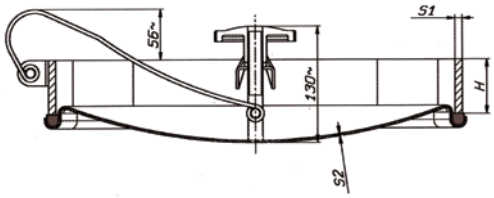


Code	127/1-6
AISI	316L
Access Dia.	444 x 312 mm
Neck Height (H)	60 mm
Neck Thick. (S1)	6.0 mm
Lid Thick. (S2)	2.0 mm
Max P (Bar)	3.0
Weight	6.9 kg

Door: Inward opening, two pin hinge

Stirlings Manway Oval 128

EPDM Seal

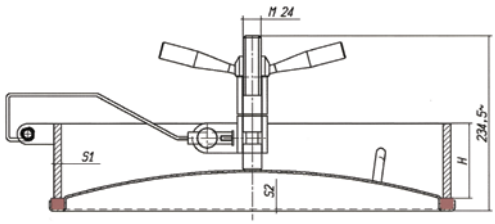


Code	128/1-6
AISI	316L
Access Dia.	444 x 312 mm
Neck Height (H)	60 mm
Neck Thick. (S1)	6.0 mm
Lid Thick. (S2)	2.0 mm
Max P (Bar)	3.0
Weight	7.5 kg
Arm	Single

Door: Inward opening

Stirlings Manway Oval 125A

EPDM Seal

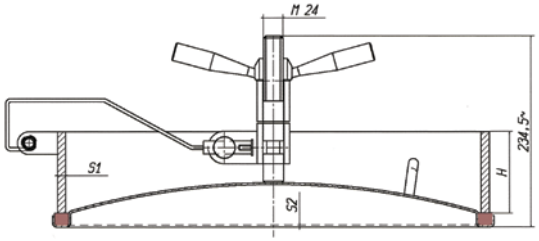


Code	125A-6
AISI	316L
Access Dia.	510 x 410 mm
Neck Height (H)	100 mm
Neck Thick. (S1)	10.0 mm
Lid Thick. (S2)	2.5 mm
Max P (Bar)	2.0
Weight	18.9 kg
Arm	Single

Door: In/outward opening, double centralisation

Stirlings Manway Oval 125B

EPDM Seal

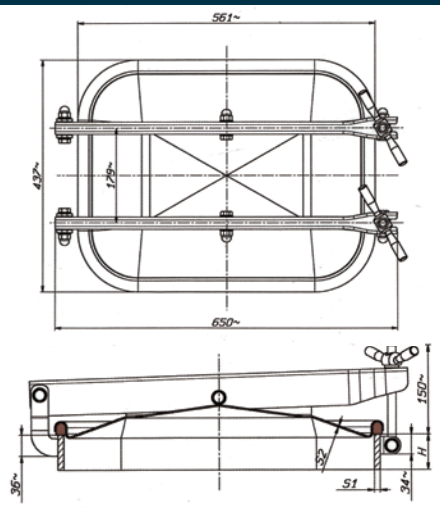


Code	125B-6
AISI	316L
Access Dia.	510 x 410 mm
Neck Height (H)	150 mm
Neck Thick. (S1)	10.0 mm
Lid Thick. (S2)	2.5 mm
Max P (Bar)	2.0
Weight	24.0 kg
Arm	Single

Door: In/outward opening, double centralisation

Stirlings Manway Rectangular 116 Long Arm

EPDM Seal

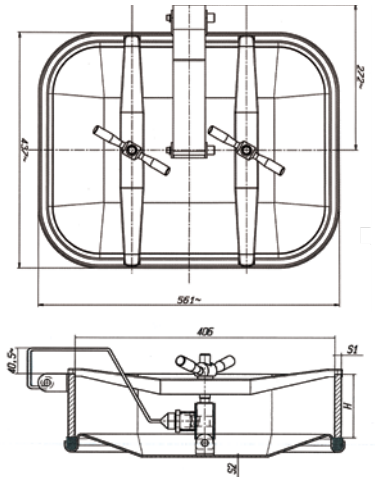


Code	116-6E
AISI	316L
Code	116-4E
AISI	304
Access Dia.	530 x 406 mm
Neck Height (H)	60 mm
Neck Thick. (S1)	10.0 mm
Lid Thick. (S2)	2.0 mm
Max P (Bar)	0.8
Weight	23 kg

Door: Outward opening

Stirlings Manway Rectangular 129

EPDM Seal



Code	129/1A-6
AISI	316L
Access Dia.	530 x 406 mm
Neck Height (H)	100 mm
Neck Thick. (S1)	10.0 mm
Lid Thick. (S2)	2.5 mm
Max P (Bar)	1.8
Weight	23.0 kg

Door: In/Outward opening

Stirlings Manway Pneumatic Sweep Arm Fermenter Door

Code	Pneumatic
AISI	304
Access Dia.	600 x 600 mm
Neck Height	130 mm
Neck Thick.	8.0 mm
Lid Thick.	NA
Max P (Bar)	2.5
Weight	80.0 kg

Door: Vertical Pneumatic opening

Stirlings Pressure Manway

Developed Specifically for the Pressure Vessel Market
Stirlings Performance Steels is now offering pressure rated T.U.V certified manways. Manufactured to AS 1210-1997

Pressure Manway in 316, 450mm, 8-bolt, hinged lid and handle with EPDM seal.

High-Quality Construction
The range is constructed with a keen eye for detail and quality. Each door is made to last and give the user practicality, aesthetic appeal, efficiency and value for money.

Pressure Rated Door
This range of European manufactured doors have been fully T.U.V. certified to ensure they meet the required standards.

Stirlings Pressfit Solutions

For a guaranteed result, just press

Time Savings, Safe and Simple
The Stirlings - Raccorderie Metalliche
Pressfitting solutions will improve your business

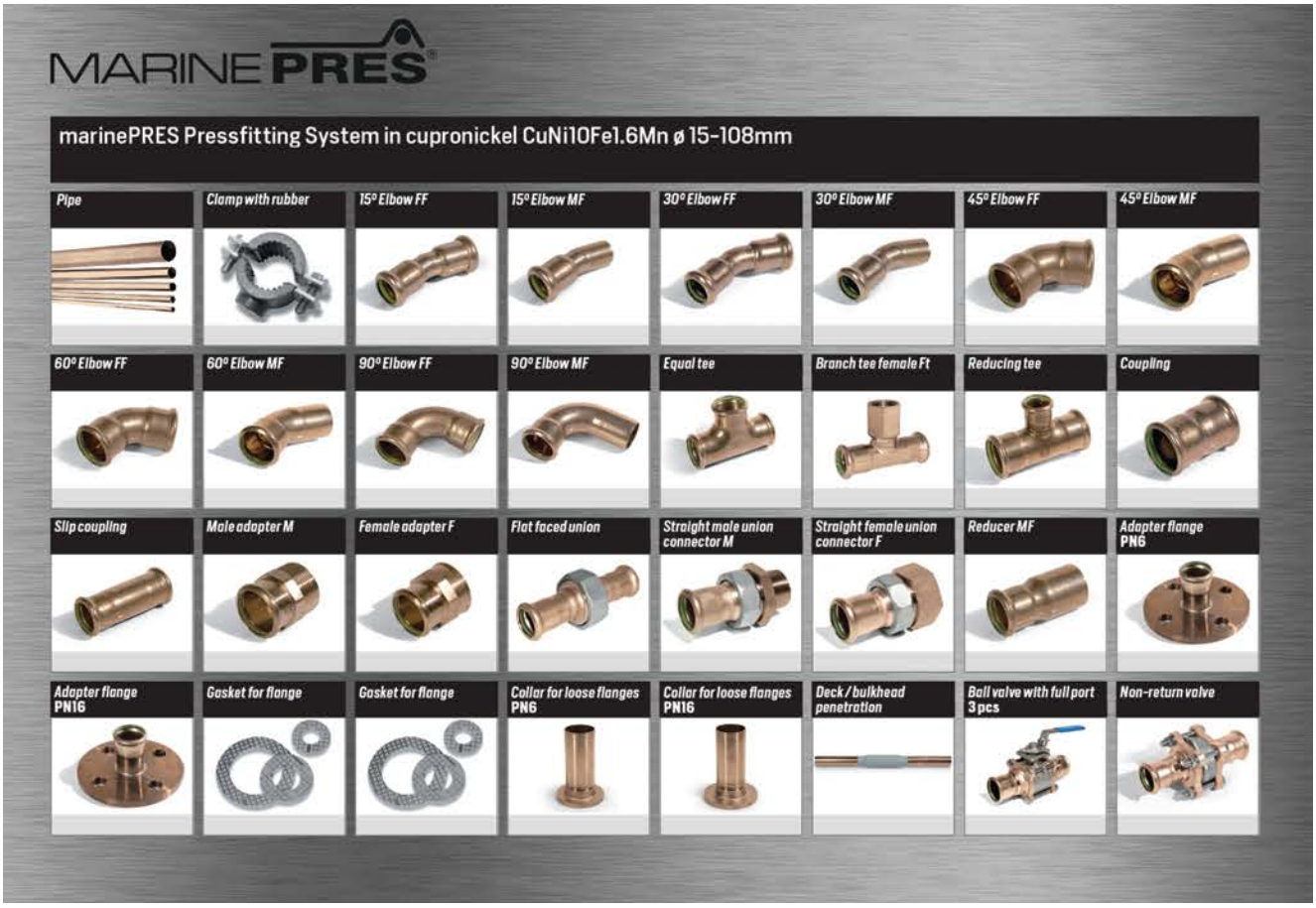
inoxPRES MARINEPRES steelPRES AESPRES

Natural Gas | Fire Protection Systems | Process Water | Nebulisation | Silicone Free | Steam | Potable Water | Brackish Water | Heating | Cooling | Compressed Air

inoxPRES

inoxPRES Pressfitting System in AISI 316L ø15-168.3mm

Pipe AISI 316L	Pipe AISI 316L	Pipe AISI 444	Pipe AISI 304	Pipe AISI 304	Clamp	Clamp with rubber	15° Elbow FF
15° Elbow MF	30° Elbow FF	30° Elbow MF	45° Elbow FF	45° Elbow MF	60° Elbow FF	60° Elbow MF	90° Elbow FF
90° Elbow MF	Elbow adapter	Elbow adapter	90° Elbow BSP	Equal Tee	Branch tee female	Branch tee female	Reducing tee
Coupling	Slip coupling	Valve connector	Stop end	Wall plate elbow 90°FF	Extension wall plate elbow 90°FF	Wall plate elbow MF	Wall plate elbow MF
Extension wall plate elbow MF	Corner tee with wall flange	Male adapter M	Female adapter F	Male reduction socket M	Female reduction socket F	Conical union	Flat faced union
Straight male M	Straight female F	Straight male M	Straight female F	Reducer	Half coupling	Pipe bridge	Pipe compressed air
90° Elbow MM	60° Elbow MM	30° Elbow MM	15° Elbow MM	Adapter flange PN16	Adapter flange PN6	Collars for loose flanges PN6	Collars for loose flanges PN16
Gasket for flange	Gasket for flange	Adapter loose flanges PN10	Deck / Bulkhead penetration	Stopvalve	Bracket	Bracket	Ball valve 2pcs
Ball valve 2pcs	Non-return valve	Expansion compensator PN 10	Flexible pipe PN 10	Flexible pipe PN 10	Adapter flange	Nebulizer connection	Multi tool connection



Stirlings Performance Steels Pressfit Solution Benefits

- Stocked in a range of sizes in 316L Stainless Steel & Copper Nickel 90/10. Can also be supplied in, Steel, Copper.
- Stainless and Copper Nickel are Corrosion Resistant Metals designed for harsh environments.
- Range of O-rings for applications in fluids & gas.
- Temperature range – 20°C to 220°C
- Pressure Rated to 16 Bar (Higher pressures to be confirmed on request)
- Use of thin walled pipe and fittings makes system lighter than conventional welded & threaded systems
- Quick & easy installation in any condition
- Minimum load loss, resulting in faster fluid flows
- Excellent corrosive resistant finish avoiding need for additional painting or external protection costs.
- Stainless Steel grade 316L performs well in chlorinated environments.
- High Strength through out temperature range.

Installation Benefits

- Speed of installation
- Reduced labour costs, can reduce labour time by up to 60%
- Tooling is easy to use and operate
- Can utilize non skilled manpower
- OH&S friendly
- No Welding/No Hot Work
- No fire hazard during installation
- No requirement for hot work permits
- No Consumables
- Extensive range of fittings to meet on site requirements
- Press Fit System is cost effective against threaded piping & welded systems
- Built in – situ, so making alterations more efficient
- Job can be started and completed on site
- Last minute changes are easy to implement

Shipbuilding & Marine

Oil & Gas

Mineral Processing

Water Treatment

Fire Protection

Building & Construction

Food Processing

HOW TO USE PRESSFIT

A Quick & Easy Step by Step Guide on how to use the Stirlings Pressfit System.

Step 1:
Cut the pipe using Stirlings Pipe Cutting tool.

Step 2:
Debur the pipe, ensure you debur both the outside & inside edges.

Step 3:
Measure pipe depth & mark.

Step 4:
Check the O-Ring is in the fitting and carefully insert the pipe fully to depth of the fitting.

Step 5:
Select correct sized jaws and fit to Pressing Tool.

Step 6:
Press fitting to pipe, using Press Tool & thats it!

Round Tube

Base Plate & Cover Set

Heavy Duty Base Plate & Cover Set

Round Tube Cover

Round Tube Cover Plate

Base/Flange

Wall and Floor Flange

Wall and Floor Flange

Long Base/ Flange

Short Base/ Flange

Square Base/ Flange

Oblong Base/ Flange

Wall Stop Base/ Flange

Flush Joiner 90° Bend Radiused

Flush Joiner 90° Bend

Flush Joiner Inline Joiner

Flush Joiner 135° Inline Joiner

Flush Joiner 4-Way Tee

Flush Joiner 90 ° Tee

Flush Joiner Equal Tee

Push Fit Flat End Cap

Dome Push Fit End Cap

Flush Joiner Adjustable Bend

Flush Fit Joiner 90 ° Mitre Bend

Push End Cap

Push End Cap

Domed End Cap

Curved Tube Cap

Perpendicular Joiner FF

Tube Joint

Tube Bend 90D

Tube Bend 180D

Tube Bend 180D C/W Leg

Post Reducer Tapered

Post Reducer Dome

Post Reducer Flat

Railing Converter

Railing Converter

Handrail End 90 °

Adj Rail Support Internal Fit

Tube Clamp

Disc

Saddle Plate

End Cap With M8 Thread Hole

Straight Pin

Adjustable Pin

Square Tube

Bolt Down Adjustable Foot

FF Square Tube Post Reducer

FF Square Tube Post Reducer

Oblong Base/ Flange

Square Tube Base/Flange

Square Tube Cap

Square Tube Cover

Square Railing Converter

FF Square End Cap

FF Square Elbow

FF Square Inline Joiner

FF Square Equal Tee

FF Square 90° Tee

Slotted Square Tube Fittings

Straight Pin

Adjustable Pin

Saddle Plate

Disclosure: Typically all cast stainless steel balustrade fittings are designed for service in onshore, non-harsh environments i.e. non-marine.
Use of cast stainless steel Balustrade fittings in a harsh environments is therefore not recommended.

25 x 21mm Tube

Adjustable Joiner Vertical

Adjustable Joiner Horizontal

End Cap

Wall Flange

Slotted Wall Flange

90D Bend

Inline Joiner

50 x 25mm Tube

Adjustable Joiner Vertical

Adjustable Joiner Horizontal

End Cap

Wall Flange

Slotted Wall Flange

90D Bend

Inline Joiner

Base Plate & Cover

Flat Tube

Adjustable Joiner Vertical

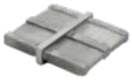
Adjustable Joiner Horizontal

End Cap

Wall Flange

90D Bend

Inline Joiner



25mm Slotted Tube

End Cap

Adjustable Joiner Horizontal

Adjustable Joiner Vertical

90D Bend

Inline Joiner

Wall Flange Solid

Wall Flange Slotted

51 & 38mm Slotted Tube

Tee

End Cap

90 Degree Tee

90 Degree Bend

90 Degree Bend Radiused

145 Degree Bend

Inline Joiner

Glass Clamps, Spigots & Wall Brackets

Glass Clamps 4050R, 4563R

Glass Clamps 4050,4563

Glass Clamps Satin

Glass Clamps 5555R

Glass Clamps 5555

Glass to Wall Standoff

Round Core Drill Spigot

Square Core Drill Spigot

Round Deck Mounted Spigot

Square Deck Mounted Spigot

Handrail Bracket for Glass Panel

Glass Support with M6 Hole

L-Bar

Handrail Support - Radiused

Wall Bracket with M6 Hole

Wall Bracket & Cover

Balustrade Wire

Fork Terminal

Rigging Screw Fork/Fork

Rigging Screw Fork/Swage

Thread Terminal

Eye Screw

Eye Bolt

Button Head Screw

River Nut

CSK SQ Decking Screw

Saddle

Allen Key Tensioner

Dome Head Tensioner

Wire

305 mtr reel available

Terminal Thread/ Swageless

Adjustable Terminal (LS/S)

Adjustable Terminal (T/S)

Adjustable Rigging Screw (T/S)

Adjustable Rigging Screw (L/S)

Rigging Screw (F/W)

Rigging Screw (L/S)

Key

Cleaning & Polish Product

Ferro's Liquid Reflection

Cleaning Pad

Diamond Cote SPRAY N CLEAN

3M SS Cleaner & Polish

Scotch Brite Disc

Backing Pad

Polishing Back Pad

Abrasiflex Calico Mops

Metal Cutting Wheels

Resin Polish Fibre Disc

Zirconia Flap Disc

Satin Finishing Wheels

Polish Compound

Sisal Mops

Stitched Rag Mops

Wet/Dry Sand Paper

Able Inox Paste

Adhesives & Metalworking Fluids

Molytec Molypaste

Threadlock Compound

Delayed Set Epoxy

Molytec Molyslip

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Use of cast stainless steel Balustrade fittings in a harsh environments is therefore not recommended.

Marine Hardware

Wire Rope Sheave

Chain Link

Blue Water Cleat

Low Flat Cleat

Rope Cleat

Cup Hook

Deck Hook Type EL

Deck Hook Type 40

Deck Hook Type 33

Fender Deck Hook

Diamond Pad

Door Hook

Eye Bolt (Nut and Washer)

Eye Bolt Large Flange

Eye Nut

Eye Plate

Square Pad with Eye Ring

Square Pad with Swivel Eye

Flush Pull (Round)

Flush Pull (Square)

Grease Nipple Straight

Butt Hinge

Stainless Steel Hinge

Stainless Steel Hinge

Piano Hinge

Grab Hook Clevis End

Slip Hook Clevis End

Slip Hook Swivel End

Slip Hook Eye End

Key Steel

L Bracket

Toggle Latch

Linch Pin

Mame Swivel Block

Mame Swivel Block with Eye

Mame Swivel Block (Fixed)

Mame Swivel Block Double

Mame Swivel Block Double with Eye

Mame Swivel Block (Nylon)

Quick Link

Seine Block (Hook Top)

Bow Shackle

D Shackle

Long Shackle

Spring Hook

Spring Hook with Nut

Stay-Put

Swivel Eye Snap

Swivel Jaw

U Bolt C/W Nut and Washer

Fasteners

Dome Nut

Hex Nut

Nut Nyloc

Hex Set Screw

CSK Socket Screw

One Way RDS-CSK

Split Pin

Snap Pin

CSK XR Self Tap

PAN XR Self Tap

Spring Washer

Flat Washer

Wing Nut

Vandal Proof Nut

All Thread

Blind Rivet

COPPER NICKEL

PRODUCT CATALOGUE

Indent/Project Supply Capabilities

Availability Specs

- Seamless and Welded
- EEMUA 144 - 16 & 20 Bar
- U.S Standard - Schedule 5S, 10S, 40S, 80S
- US Navy Class - Class 200, 700, 50
- Japanese Maritime - 5K, 10K
- Grade 90/10 and 70/30

Fittings:

- Long and Short Radius Elbows 45D & 90D
- Concentric and Eccentric Reducers
- Equal Tee and Reducing Tee
- Saddles with Equal or Reduced Branch
- End Caps
- Flanges - DIN EEMUA 145, Composite Slip On, Composit Blind Flanges, Solid Welding Neck/ Slip on/Blind/Socket Flanges. ANSI B 16.5 150lb +300lb
- Bulkhead Pieces & Fittings
- Spectable Blind Flange
- Socket Weld Fittings or Capillary Ends - 45D, 90D, Tee, Red Tee, Coupling, Reducing insert, Reducing Coupling, Union Connestions (M & F), sockolet, threadolet, weldolet, swage nipples etc
- Threaded Bosses, Couplets and Threadolets
- Sprinkler Bushes & Plugs, Adaptors
- Concentric Swage Nipple

Mitch Wadsworth
Sales Manager
Marine, Copper Nickel
Direct Line: +61 8 9366 6764
mitchellw@stirlingsps.com

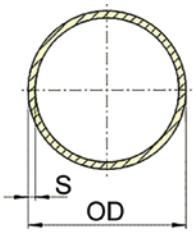
Photo courtesy of Incat

CuNi Pipe

DIN 86019 (DIN 85004-2, WL 2.1972.22)
BS 2871 CN102
10 & 14 Bar
90/10 CuNi

10/14 Bar

Outside Diameter of Pipe			Wall Thickness	Theoretical Weight	Pressure Rating	Availability
Nominal		Actual	Actual			
(inch)	(DN)	(mm)	(mm)	(kg/m)		
						PSCN
0.125		10	1.0	0.26	10	○
0.25		12	1.0	0.31	10	○
0.38	10	16	1.0	0.42	14	●
0.5	15	20	1.0	0.53	14	●
0.75	20	25	1.5	0.99	14	●
1	25	30	1.5	1.20	10	●
1.25	32	38	1.5	1.54	10	●
1.5	40	44.5	1.5	1.81	10	●
2	50	57	1.5	2.34	10	●
2.5	65	76.1	2.0	4.16	14	●
3	80	88.9	2.0	4.88	10	●
4	100	108	2.5	7.41	14	●
5	125	133	2.5	9.16	10	●
6	150	159	2.5	10.99	10	●
7	175	193.7	2.5	13.43	10	○
8	200	219.1	3.0	18.21	10	●
10	250	267	3.0	22.24	10	○
12	300	323.9	4.0	35.94	10	○
14	350	368	4.0	40.9	10	○
16	400	4191	4.0	46.62	10	○
18	450	457.2	4.0	50.91	10	○
20	500	508	4.5	63.63	10	○
24	600	610	5.0	84.96	10	○
28	700	711	6.0	118.80	10	○
32	800	813	6.0	135.99	10	○
36	900	914	8.0	203.57	10	○



● Stocked Item ○ Market Available

CuNi Tees

10 bar & 14 bar
DIN 86088 / EEMUA 146
European Standard
90/10 CuNi

Outside Diameter of Pipe		Wall Thickness			Theoretical Weight	Availability
D		E	A	C		
Nominal (inch)	Actual (mm)	(mm)	(mm)	(mm)	(kg/piece)	
						FPCNST
0.5	20	1	25	25	0.05	○
0.75	25	1.5	29	29	0.07	●
1	30	1.5	38	38	0.10	●
1.25	38	1.5	48	48	0.13	●
1.5	44.5	1.5	57	57	0.19	●
2	57	1.5	64	64	0.29	●
2.5	76.1	2	76	76	0.65	●
3	88.9	2	86	86	0.82	●
4	108	2.5	105	105	1.60	●
5	133	2.5	121	121	3.10	●
6	159	2.5	143	143	4.40	●
7	193.7	2.5	157	157	4.70	○
8	219.1	3	178	178	12.8	●
10	267	3	216	216	16.6	○
12	323.9	4	254	254	31.5	●
14	368	4	279	279	39.4	○
16	419.1	4	305	305	55.1	○
18	457.2	4	343	343	67.65	○
20	508	4.5	381	381	92.8	○
24	610	5	432	432	126.6	○

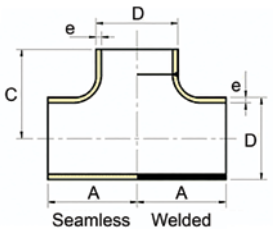
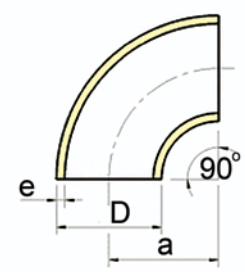


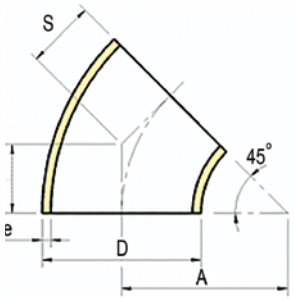
Photo courtesy of Incat

● Stocked Item ○ Market Available

CuNi Elbows

DIN 86090
10 bar & 14 bar
90/10 CuNi





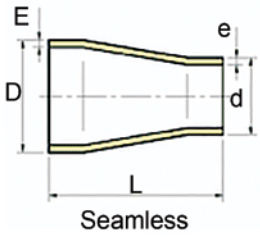
Outside Diameter of Pipe		Wall Thickness	Radius	Theoretical Weight	90 Degree	Radius		Theoretical Weight	45 Degree
ØD		e	a			A	S		
Nominal (inch)	Actual (mm)	(mm)	(mm)	(kg/piece)		(mm)	(mm)	(kg/piece)	
					FPS9CN				FPS4CN
0.5	20	1	25	0.02	○	25	10.4	0.02	○
0.75	25	1.5	27.5	0.04	●	27.5	11.4	0.03	○
1	30	1.5	33.5	0.06	●	30	12	0.03	○
1.25	38	1.5	45	0.10	●	32.5	14	0.04	●
1.5	44.5	1.5	51	0.14	●	40	17	0.06	○
2	57	1.5	72	0.26	●	52.5	22	0.10	●
2.5	76.1	2	95	0.61	●	70	29	0.22	●
3	88.9	2	114.5	0.87	●	82.5	34	0.32	●
4	108	2.5	142.5	1.64	●	100	41	0.58	●
5	133	2.5	181	2.58	●	125	52	0.90	●
6	159	2.5	216	3.70	●	150	62	1.30	○
7	193.7	2.5	270	5.65	○	180	75	1.90	○
8	219.1	3	305	8.66	●	210	87	3.00	○
10	267	3	378	13.10	○	255	106	4.40	○
12	323.9	4	457	25.61	○	305	126	8.60	○
14	368	4	533.5	34.00	○	352.5	146	11.30	○
16	419.1	4	609.5	39.40	○	400	166	16.40	○
18	457.2	4	686	48.40	○	455	188	20.40	○
20	508	4.5	762	75.62	○	505	209	28.10	○
24	610	5	915	121.24	○	610	253	40.90	○

● Stocked Item ○ Market Available

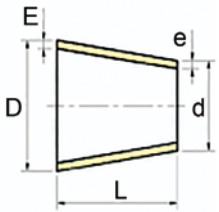
CuNi Reducers

DIN 86089
10 bar & 14 bar
90/10 CuNi

Outside Diameter		Wall Thickness		Length	Theoretical Weight	Availability
ØD x Ød	ØD x Ød	E	e	L		
Nominal (inch)	Actual (mm)	(mm)	(mm)	(mm)	(kg/piece)	
						FPCNSR
0.5 x 0.38	20 x 16	1	1	30	0.01	○
0.75 x 0.38	25 x 16	1.5	1	30	0.02	○
0.75 x 0.5	25 x 20	1.5	1	30	0.03	○
1 x 0.38	30 x 16	1.5	1	35	0.03	○
1 x 0.5	30 x 20	1.5	1	35	0.04	○
1 x 0.75	30 x 25	1.5	1.5	35	0.05	○
1.25 x 0.38	38 x 16	1.5	1	50	0.05	○
1.25 x 0.5	38 x 20	1.5	1	50	0.06	○
1.25 x 0.75	38 x 25	1.5	1.5	50	0.07	●
1.25 x 1	38 x 30	1.5	1.5	50	0.08	●
1.5 x 0.5	44.5 x 20	1.5	1	80	0.09	○
1.5 x 0.75	44.5 x 25	1.5	1.5	80	0.11	●
1.5 x 1	44.5 x 30	1.5	1.5	80	0.12	○
1.5 x 1.25	44.5 x 38	1.5	1.5	80	0.13	○
2 x 0.5	57 x 20	1.5	1.5	80	0.14	○
2 x 0.75	57 x 25	1.5	1.5	80	0.14	●
2 x 1	57 x 30	1.5	1.5	80	0.15	○
2 x 1.25	57 x 38	1.5	1.5	80	0.16	●
2 x 1.5	57 x 44.5	1.5	1.5	80	0.24	●
2.5 x 1	76.1 x 30	2	1.5	90	0.25	○
2.5 x 1.25	76.1 x 38	2	1.5	90	0.25	○
2.5 x 1.5	76.1 x 44.5	2	1.5	90	0.26	●
2.5 x 2.0	76.1 x 57	2	1.5	90	0.29	●
3 x 1.25	88.9 x 38	2	1.5	90	0.29	○
3 x 1.5	88.9 x 44.5	2	1.5	90	0.30	○
3 x 2.0	88.9 x 57	2	1.5	90	0.32	○
3 x 2.5	88.9 x 76	2	2	90	0.40	●
4 x 1.5	108 x 44.5	2.5	1.5	100	0.46	○
4 x 2	108 x 57	2.5	1.5	100	0.48	○
4 x 2.5	108 x 76.1	2.5	2	100	0.57	●
4 x 3	108 x 88.9	2.5	2	100	0.61	●
5 x 2	133 x 57	2.5	1.5	140	0.8	○
5 x 2.5	133 x 76.1	2.5	2	140	0.93	○
5 x 3	133 x 88.9	2.5	2	140	0.98	○
5 x 4	133 x 108	2.5	2.5	140	1.16	●
5 x 2	133 x 57	3	1.5	140	0.86	○
5 x 2.5	133 x 76.1	3	2	140	1.06	○
5 x 4	133 x 108	3	2.5	140	1.34	○
6 x 2.5	159 x 76.1	2.5	2	150	1.13	○
6 x 3	159 x 88.9	2.5	2	150	1.19	○
6 x 4	159 x 108	2.5	2.5	150	1.38	●
6 x 5	159 x 133	2.5	2.5	150	1.51	●



Seamless



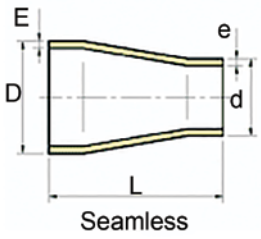
Welded

● Stocked Item ○ Market Available

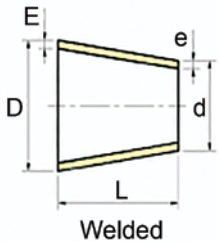
CuNi Reducers

DIN 86089
10 bar & 14 bar
90/10 CuNi

Outside Diameter		Wall thickness		Length	Theoretical Weight	Availability
ØD x Ød	ØD x Ød	E	e	L		
Nominal (inch)	Actual (mm)	(mm)	(mm)	(mm)	(kg/piece)	FPCNSR
7 x 3	193.7 x 88.9	2.5	2	155	1.39	○
7 x 4	193.7 x 108	2.5	2.5	155	1.58	○
7 x 5	193.7 x 133	2.5	2.5	155	1.71	○
7 x 6	193.7 x 159	2.5	2.5	155	1.86	○
7 x 4	193.7 x 108	3.5	2.5	155	2.21	○
8 x 4	219.1 x 108	3	2.5	155	2.47	○
8 x 5	219.1 x 133	3	2.5	155	2.6	●
8 x 6	219.1 x 159	3	2.5	155	2.74	●
8 x 7	219.1 x 193.7	3	2.5	155	2.93	○
8 x 4	219.1 x 108	3.5	2.5	155	2.88	○
10 x 5	267 x 133	3	2.5	210	3.3	○
10 x 6	267 x 159	3	2.5	210	3.49	○
10 x 7	267 x 193.7	3	2.5	210	3.75	○
10 x 8	267 x 219.1	3	3	210	4.25	○
12 x 5	323.9 x 133	4	2.5	210	5.3	○
12 x 6	323.9 x 159	4	2.5	210	5.6	○
12 x 7	323.9 x 193.7	4	2.5	210	6.02	○
12 x 8	323.9 x 219.1	4	3	210	6.3	●
12 x 10	323.9 x 267	4	3	210	6.88	○
14 x 6	368 x 159	4	2.5	300	8.75	○
14 x 7	368 x 193.7	4	2.5	300	9.34	○
14 x 8	368 x 219.1	4	3	300	9.76	○
14 x 10	368 x 267	4	3	300	10.57	○
14 x 12	368 x 323.9	4	4	300	11.53	○
16 x 7	419.1 x 193.7	4	2.5	325	11.04	○
16 x 8	419.1 x 219.1	4	3	325	11.5	○
16 x 10	419.1 x 267	4	3	300	12.38	○
16 x 12	419.1 x 323.9	4	4	300	13.42	○
16 x 14	419.1 x 368.1	4	4	300	14.22	○
18 x 8	457.2 x 219.1	4	3	350	13.14	○
18 x 10	457.2 x 267	4	3	350	14.08	○
18 x 12	457.2 x 323.9	4	4	350	15.2	○
18 x 14	457.2 x 368	4	4	350	16.06	○
18 x 16	457.2 x 419.1	4	4	350	17.07	○



Seamless



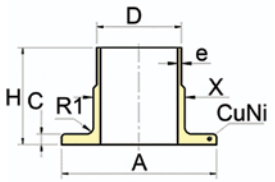
Welded

● Stocked Item ○ Market Available

CuNi Inner Flanges

Composite inner flange
DIN 86037 / EHN9402/150
10 bar /14 bar
90/10 CuNi (70/30 available on request)
Galvanised backing flanges to suit available in stock.

Outside Dia of Pipe		Wall Thick ness						Theoretical Weight		Availability
ØD		e	ØA	H	C	ØX	R1			
Nominal (inch)	Actual (mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(kg/piece)	Spec	FLCNWN
0.5	20	1.5	45	28	5	22	3	0.08	DIN 86037	○
0.75	25	1.5	58	40	5	27	3	0.14	DIN 86037	●
1	30	1.5	68	40	5	32	4	0.24	DIN 86037	●
1.25	38	1.5	78	40	5	40	4	0.26	DIN 86037	●
1.5	44.5	1.5	88	45	6	46.5	4	0.42	DIN 86037	○
2	57	1.5	102	45	6	59	5	0.53	DIN 86037	●
2.5	76.1	2	122	45	6	78	5	0.64	DIN 86037	●
3	88.9	2	138	50	7	91	5	0.86	DIN 86037	●
4	108	2.5	158	50	7	110	5	1.10	DIN 86037	●
5	133	2.5	188	50	7	135.5	5	1.50	DIN 86037	●
6	159	2.5	212	50	9	161.5	5	2.00	DIN 86037	●
7	193.7	2.5	242	50	9	197	5	2.30	DIN 86037	○
8	219.1	3	268	50	9	222	5	2.70	DIN 86037	●
10	267	3	320	50	9	270	5	3.40	DIN 86037	○
12	323.9	4	370	50	11	327	7	4.60	DIN 86037	○
14	368	4	430	50	11	371	7	6.20	DIN 86037	○
16	419.1	4	482	50	12	422	7	7.50	DIN 86037	○
18	457.2	4	530	50	12	460	7	9.00	DIN 86037	○
20	508	4.5	585	50	12	511	7	10.65	DIN 86037	○
24	610	5	685	60	14	613	9	14.90	DIN 86037	○



Galvanised Backing Flanges

Mild Steel Galvanised, Manufactured to Table D/E AS250
Suitable for composite weld neck flanges. Din 86037

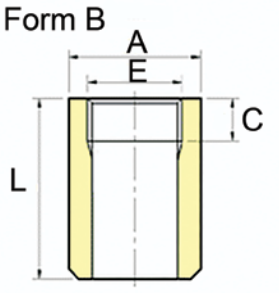
Size Pipe NB/ Tube (mm)	Overall Dia (mm)	Internal Dia (mm)	PCD	Thick ness Standard	Thick ness 86037	Hole Dia	No. of Holes	Weight (kg)	FFADEGAL
20 / 25	102	33	73	6	16	14	4	0.67	●
25 / 30	114	40	83	7	16	14	4	0.85	●
32 / 38	121	48	87	8	16	14	4	0.90	●
40 / 44.5	133	54.5	98	9	16	14	4	1.13	●
50 / 57	152	69	114	10	16	19	4	1.44	●
65 / 76	165	88	127	10	16	19	4	1.51	●
80 / 89	184	101	146	11	18	19	4	1.97	●
100 / 108	216	120	178	13	18	19	8	2.54	●
125 / 133	254	145.5	210	13	18	19	8	2.58	●
150 /159	279	171.5	235	17	18	23	8	4.39	●
200 / 219	337	232	292	19	20	23	8	7.39	●
250 / 267	406	280	356	22	22	23	12	11.57	○
300 /324	457	341	406	25	24	27	12	14.37	○

● Stocked Item ○ Market Available

CuNi Sockets

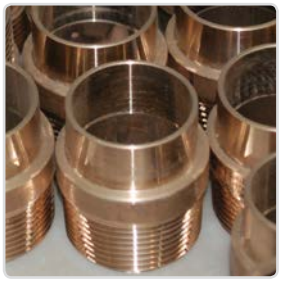
Sockets form B
90/10 CuNi
BSP Thread (Parallel)

Thread (BSP)	Form B			Theoretical Weight	Availability
ØD	ØA	C	L		
(inch)	(mm)	(mm)	(mm)	(kg/piece)	
					FBCNS
0.25	20	12	20	0.03	●
0.38	25	12	20	0.05	○
0.50	30	14	23	0.08	●
0.75	38	16	25	0.14	●
1	45	18	28	0.19	●
1.25	55	20	30	0.29	○
1.5	60	22	32	0.37	●
2	75	23	40	0.68	●

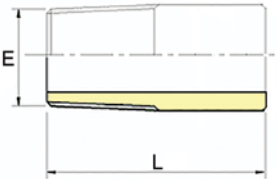


CuNi Nipples

BSP Thread (Tapered)
90/10 CuNi



Outside Diameter of Pipe		Thread		Theoretical Weight	Availability
		ØE	L		
Nominal (inch)	Actual (mm)	(BSP)	(mm)		
					FBCNTN
0.25	12	0.25”	35	0.04	●
0.38	16	0.38”	35	0.04	○
0.5	20	0.5”	35	0.04	○
0.75	25	0.75”	40	0.07	●
1	30	1”	40	0.11	●
1.25	38	1.25”	50	0.14	●
1.5	44.5	1.5”	50	0.21	●
2.0	57	2”	55	0.35	●
2.5	76.1	2.5”	75	0.68	●



● Stocked Item ○ Market Available

Recommended Filler Metals for Dissimilar Metal Joint Welding

Parent Metal ASTM (AISI)	201 202	303(1) 304 304L	309 309S	310 310S	317 316	317L 316L 316Ti	321 347	S30815 (253MA)
201	308	308	308	308	308	308	347	308
202	308L	308L	308L	308L	308L	308L	318	347
		312	347	347	347	318	308	
					318			
304(1)		308	308	308	308	308	347	22.12.HT
304L		308L	308L	308L	308L	308L	308	308
303		347	347	347	347	347	308L	347
							318	
309			309	309	309	309	374	22.12.HT
309S			309L	309L	309L	309L	308	309
				310		316L	308L	347
						318		
310				310	317L	317L	347	22.12.HT
310S				310L	316L	316L	308	310
					318	318	308L	309
					309	309	310	
						309L		
317					317	317L	347	22.12.HT
316					316	316L	318	309
					318	316	316	
						318		
317L						317L	347	22.12.HT
316L						316L	318	309
316Ti						318	308	
							316L	
321							347	22.12.HT
347							318	309
							308	347
S30815								22.12.HT
(253MA)								
409								
410								
430								
446								
S31500								
S31803								
S32304								
NiCrFe(2)								
Alloys								

Notes:
(1) This group includes free-cutting steels. When such a steel is a member of the joint certain precautions have to be taken. Buttering the free-cutting steel with 312 before welding the joint with a filler metal that suits the other part of the joint or welding the whole joint with 312 is normally a safe procedure.

(2) Higher strength can be obtained by using NiCrFe-6 with subsequent heat treatment.

General Notes:
• If the dilution is high, eg. in submerged arc welding, special high ferrite grades are often preferred.

• If the working conditions require heat treatment, the filler metal choice may have to be reconsidered.

Owing to the infinite combinations of materials and working conditions, no general rules can be applied.

• Filler metals are stated in order of preference. Normally, MMA, TIG, sub-arc welding is assumed. For MIG welding grades with higher silicon contents, eg. 308LSi, 308Si are preferred.

• Where 309 is specified 309MoL may be used. Where 309 is specified filler metals 310, 312, NiCr-3 may generally be used, however, care must be exercised with this selection: eg. i) to avoid high ferrite levels (312 consumable) which may lead to sigma phase embrittlement, ii) to avoid high nickel contents (NiCr-3) which can be attacked in sulphur bearing high temperature environments.

409 410 430	446	Duplex S31500 S31803 S32304	NiCrFe(2) Steels	Carbon(1) Steels	Low(1) Alloy Steels	501 502 505	Parent Metal ASTM (AISI)
309	309	22.8.3L	NiCr-3	309	309	309	201
310	310	309	NiCrFe-6				202
309	309	22.8.3L	NiCr-3	309	309	309	304(1)
310	310	309L	NiCrFe-6				304L
		309					303
309	309	22.8.3L	NiCr-3	309	309	309	309
310	310	309	NiCrFe-6				309S
		309L					
309	310	22.8.3L	NiCr-3	310	310	310	310
310	309	309	NiCrFe-6	309	309	309	310S
		309L					
309	309	22.8.3L	NiCr-3	309	309	309	317
310	310	309Mo	NiCrFe-6				316
		309					
309	309	22.8.3L	NiCr-3	309	309	309	317L
310	310	309Mo	NiCrFe-6				316L
		317L					316Ti
		316L					
309	309	22.8.3L	NiCr-3	309	309	309	321
310	310	309	NiCrFe-6				347
22.12.HT	22.12.HT	22.8.3L	NiCr-3	22.12.HT	22.12.HT	22.12.HT	S30815
309	309	309	NiCrFe-6	309		309	(253MA)
310	310	310		310		310	
410	446	22.8.3L	NiCr-3	309	309	309	409
309	310	309	NiCrFe-6				410
	309	309L					430
	446	309	NiCr-3	309	309	309	446
	310	309L	NiCrFe-6				
	309						
		22.8.3L	NiCr-3				S31500
		309Mo	NiCrFe-6				S31803
							S32304
			NiCr-3				NiCrFe(2)
			NiCrFe				Alloys
			Alloys				

• Where designated consumables are not available, more highly alloyed grades may be used. However, due care must be taken with their selection.

• For high temperature transition joints carbon diffusion has to be considered. In such cases, 310 or NiCr-3 is recommended.

• When joining dissimilar but highly corrosion resistant steels, ferrite-free deposits are often demanded. Although each case has to be considered separately, the use of NiCr-3, 20.25.5LCu, or 27.31.4LCu can often be recommended.

• In addition to the grades specified here filler metals with specific properties are available, eg. low ferrite content, high carbon, extra low interstitials, high purity, etc.

• This table is not exhaustive. Other alloys may also be suitable.

Welding Practice

Joint Preparation and Cutting

Cutting or preparation of edges should be carried out by guillotine, machining, grinding or plasma arc. Edges cut by plasma arc should be smooth and free from gutters or notches and shall have oxides removed. All other edges should be deburred. Any cutting or preparation carried out with the carbon arc process or by powder cutting should have 1.5mm dressed from the cut edge. Carbon arc gouging is not recommended for cutting of stainless steels under any circumstances. All spatter is to be removed and the surface of the parent metal dressed smooth.

Electrode Care

Electrodes that have been removed from their packets should be transferred to a holding oven or welder's hot box and maintained at a temperature of 110°C to prevent moisture pick-up until required for use. Electrodes that have become damp should be redried at 250°C for 2 hours prior to use.

General Welding Practice and Technique

Cleaning

Cleaning may be necessary before welding and during welding (interpass) and is usually essential after welding in order to ensure maximum corrosion resistance.

Pre-weld cleaning involves dressing the cut edge and removing all contaminants such as oil, paint, grease, crayon marks, adhesive tapes, etc. The area on both sides of weld should be cleaned before welding by brushing with a clean stainless steel brush and wiped with a solvent moistened cloth. All moisture must be removed and if a flame is used care must be taken to see that any water (a product of combustion) does not remain on the surface or in the weld preparation. Liquid petroleum gas particularly creates a large amount of water when burnt.

Each welding run must be thoroughly cleaned to remove slag and spatter before proceeding with the next run. The cleaning method used (chipping, brushing, grinding) will depend on the welding process, bead shape, etc. but care should be taken to see that the weld area is not contaminated in the process. Any cleaning equipment should be suitable for stainless steel and kept for that purpose.

During welding, a gas purge on the reverse side may be advantageous.

After welding, weld spatter, flux, scale, arc strikes and the overall heat discolouration should be removed. This can involve grinding and polishing, blasting and brushing with a stainless steel wire brush, or use of a descaling solution or paste. The preferred procedure is usually dictated by end use.

Grinding and dressing is to be carried out with iron-free brushes, abrasives, etc. and should not be so heavy as to discolour and overheat the metal. Rubber and resin bonded wheels are satisfactory. Wheels should be dressed regularly to prevent them becoming loaded thereby producing objectionable scratches. In any blasting process steel shot shall not be used.

Welding Procedure

Efficient arc striking is essential in welding all types of stainless steels as indiscriminate arc striking tends to scar or burn the surface of the steel thus providing areas for premature chemical attack. Care and skill are required to obtain satisfactory weld starts and restarts on continuous seams. As both burn-through on light section material and cold lack of penetration starts on heavier material can easily result from imperfect technique, the suggested procedure is to strike the electrode in the joint approximately 8-10mm forward of the actual start point. With the arc established and electrode correctly angled it can then be rapidly taken to the start point for complete fusion of the previous weld and/or the joint root of a new weld.

Efficient tack welding on austenitic steels is essential in controlling distortion. The length of tack welds varies from 12-40mm depending on sheet or plate thickness. Generally tack welds are more closely spaced than when welding mild steel of similar dimensions.

The use of a long arc or excessive current is capable of causing losses of manganese and chromium which can impair the corrosion resistance of the weld joint. Arc length should therefore be kept as short as possible consistent with satisfactory welding performance, ie. minimum spatter, complete fusion, acceptable bead shape.

Welding should be carried out at the lowest current consistent with good fusion at the selected welding speed to minimise heat input and control distortion. Higher welding speeds can be an advantage.

Stringer beads are recommended in preference to weaving in order to keep the heat input to an acceptable level. Where weaving is necessary both the weave width and side dwell time should be kept to a minimum. Interpass temperatures generally should not exceed 150°C except in the case of martensitic alloys.

Breaking the arc in an abrupt manner can result in slag inclusions and shrinkage cracks. Craters should be filled by using a circular motion at the end of the weld followed by a gradual lengthening of the arc to the point of extinguishing it.

Welding conditions and welding technique should be such as to produce a smooth weld surface which requires minimum dressing.

Fillet weld beads shall be of full throat thickness and correct contour, consistent with good operation. Concave fillet welds are to be avoided.

The root side of the weld must be protected against oxidation especially in gas-shielded arc welding. Protection with shielding gas is commonly applied. Back-gouging (grinding) of the root and welding from the reverse side of the joint can also be used when the design so permits.

Forms of Corrosion

Stainless steels are not indestructible materials, nor immune to all corrosive attack. However, the family of stainless steels are excellent combatants of corrosion and provide a wide choice of materials which, with careful selection and proper fabrication, enable the manufacture of cost effective critical components to meet the diverse needs of many industry sectors.

The more common forms of corrosion which affect all metals and alloys, including stainless steel, are briefly outlined.

General corrosion

General corrosion is a uniform attack of the entire metal surface. It is the least dangerous because rates of corrosion can be measured and predicted. Stainless steels have very low general corrosion rates in many aggressive environments.

Galvanic corrosion

Galvanic corrosion occurs when two different metals are in electrical contact and immersed in the same corrosive solution. Stainless steels are noble metals and therefore seldom suffer increased corrosion rates as a result of galvanic corrosion.

Erosion/abrasion corrosion

Erosion/abrasion corrosion is a combination of mechanical and corrosive attack. Abrasive particles in suspension, or high velocities, expose fresh metal surfaces which then suffer high rates of corrosion. Stainless steels offer a high resistance due to the tenacious and stable passive film on their surface.

Intergranular corrosion

Intergranular corrosion is due to the formation of chromium carbides at high temperatures (450°-859°C). These form preferentially at the grain boundaries thus reducing the chromium content and resulting in a path of lower corrosion resistance around the grains. With correct choice of material ("L" or stabilised grades) and care during fabrication this form of corrosion should not occur.

Pitting corrosion

Pitting corrosion is a dangerous, very localised form of corrosion which results in small holes or perforations through the material, but with little measurable general metal loss. Some corrosive environments (commonly those containing the aggressive chloride ion) have the ability to attack localised weak points in the passive film. Due care in the selection of material should be taken if aggressive (eg chloride) ions are present, especially in acidic solutions at elevated temperatures. If conditions which promote pitting corrosion cannot be modified, materials with higher alloy content such as the duplex stainless steels and the stainless alloys will often give a solution to the problem.

Crevice/shielded corrosion

Crevice/shielded corrosion occurs where the surface of stainless steel is shielded or occluded thus preventing the free access and availability of oxygen to the surface. The passive film therefore tends to break down in these areas. Any conditions which give rise to a "crevice" should be avoided.

Microbiologically induced corrosion (MIC)

MIC results from the attraction and adherence of bacteria to the surface of the metal. A condition similar to a crevice is thereby produced. Certain bacteria produce aggressive metabolic products which aggravate the situation.

Stress corrosion cracking (SCC)

Both pitting and crevice corrosion can lead to SCC under certain conditions. Stress corrosion cracking is a brittle fracture occurring in an otherwise ductile material. The austenitic crystal structure is prone to SCC whereas the ferritic crystal structure prevents its development.

SCC requires the following three factors for development:

- The presence of tensile stress. This can be either applied or residual stress as occurring as a result of the metal forming, fabrication and welding procedure.
- A minimum temperature – generally SCC does not occur
under 60°C.
- The presence of a particular ion, eg. the chloride ion. It is often difficult to quantify the exact chloride concentration needed, but localised concentration of chlorides will often initiate SCC.

These three factors are synergistic to a degree. SCC is a process whereby initiation may take considerable time. However, once the pit has developed it acts as a local stress raiser, the pit yawns open and fresh electrolyte reaches the anodic tip of the pit. Corrosion occurs locally at the tip of the pit where further yawning and possible branching occurs.

Eventually, the progress of attack reaches such a degree that the yield stress of the material is exceeded due to the residual of sound material.

High resistance to SCC is obtained by use of duplex stainless steels, stainless alloys and super ferritic stainless steels.

Corrosion Chart

	Stainless Steel 18/8 (304, 304L, 321)			Molybdenum Stainless Steel (316, 316L)			Duplex Stainless Steel (2205)			3CR12 / 5CR12		
Temperature ºC	20º	60º	100º	20º	60º	100º	20º	60º	100º	20º	60º	100º
Aldehydes	R1	R1	R1	R1	R1	R1	R1	R1	R1	R1	R1	R1
Acetic Acid (10%)	R	R	R	R	R	R	R	R	R	R	R	ND
Acetic Acid (glac. & anh.)	R	R	NR	R	R	R	R	R	NR	ND	ND	ND
Acetic anhydride	R2	NR	NR	R	R	NR	R	R	R	R2	NR	ND
Ketones	R	R	R	R	R	R	R	R	R	R	ND	ND
Acetylene	R	R	R	R	R	R	R	R	R	R	ND	ND
Acid Fumes	R3	R3	R3	R3	R3	R3	R4	NR	NR	NR	NR	NR
Alcohols	R	R	R	R	R	R	R	R	R	R	R	R
Alphatic Esters	R	R	R	R	R	R	R	R	R	R	ND	ND
Alkyl Chlorides	R5	R5	R5	R5	R5	R5	R	R	R	R5	ND	ND
Alum	R	R6	NR	R	R	NR	R	R	NR	ND	ND	ND
Ammonia	R	R	R	R	R	R	R	R	R	R	R	R
Amyl Acetate	R	R	R	R	R	R	R	R	R	R	R	R
Aniline	R	R	R	R	R	R	R	R	R	R	R	R
Antimony Trichloride	R5	NR	NR	R5	R5	NR	R	R	NR	NR	NR	NR
Aromatic Solvents	R	R	R	R	R	R	R	R	R	R	R	R
Atmospheric												
Industrial	R7	ND	ND	R	ND	ND	R	ND	ND	R7	ND	ND
Marine	R7	ND	ND	R	ND	ND	R	ND	ND	R7	ND	ND
Rural	R	ND	ND	R	ND	ND	R	ND	ND	R7	ND	ND
Ascorbic Acid	R1	R1	R1	R	R	R	R	R	R	R1	ND	ND
Benzoic Acid	R	R	R	R	R	R	R	R	R	R	R	R
Boric Acid	R	R	R	R	R	R	R	R	R	R	R	R
Brines, saturated	R8	NR	NR	R8	NR	NR	R	R	R	NR	NR	NR
Bromide (K) soln.	R9	NR	NR	R9	R9	R9	R	ND	ND	NR	NR	NR
Bromine (+ aqu.)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Butyl Acetate	R	R	R	R	R	R	R	R	R	R	R	R
Calcium Chloride	NR	NR	NR	R8	NR	NR	R10	R10	R10	NR	NR	NR
Carbon Disulphide	R	R	ND	R	R	ND	R	R	R	R	R	R
Carbonic Acid	R	R	R	R	R	R	R	R	R	R	R9	NR
Carbon Tetrachloride	R	R	R	R	R	R	R	R	R	R	R	R
Caustic Soda & Potash	R	R	R6	R	R	R6	R6	R6	ND	ND	R6	R6
Cellulose Paint	R	R	R	R	R	R	R	R	R	R	R	R
Chlorates of Na, K, Ba	R1	R1	R1	R1	R1	R1	R	R	R	ND	ND	ND
Chlorine, dry	R	R	R	R	R	R	R	R	ND	ND	ND	ND
Chlorine, wet	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Chlorides of Na, K, Mg, Ca, Ni, NH4, Al, Sn, Zn	R10	NR	NR	R9	R11	R11	R	R	ND	R5	NR	NR
Chlorosulphuric Acid	NR	NR	NR	NR10	NR	NR	ND	ND	ND	ND	ND	ND
Chromic Acid (80%)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Citric Acid	R6	R6	R6	R	R	R6	R	R	R	NR	NR	NR
Cresylic Acids (50%)	R	R	R	R	R	R	R	R	R	R	R	R
Detergents, synthetic	R	R	R	R	R	R	R	R	R	R	R	R
Emulsifiers (all conc.)	R	R	R	R	R	R	R	R	R	ND	ND	ND
Esters & Ethers	R	R	R	R	R	R	R	R	R	R	R	R
Fatty Acids (> C6)	R	R	R	R	R	R	R	R	R	R	R	R
Ferric Chloride	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Fluorinated Refrigerants, Aerosols e.g. Freon	R5	R	R	R5	R	R	R	R	R	R6	R	NR
Fluorine, dry	R	ND	ND	R	ND	ND	R	R	ND	ND	ND	ND
Fluorine, wet	NR	NR	NR	R	ND	ND	ND	ND	ND	NR	NR	NR
Formic Acid	R	NR	NR	R	R	ND	R	R	ND	NR	NR	NR
Fruit Juices	R12	R	R	R	R	R	R	R	R	R13	NR	NR
Gelatine	R1	R	R	R1	R	R	R	R	R	R1	R1	ND
Glycols	R	R	R	R	R	R	R	R	R	R	R	R
Hydrobromic Acid (50%)	NR	NR	ND	NR	NR	ND	NR	NR	ND	NR	NR	NR
Hydrochloric Acid (10%)	NR	NR	NR	NR	NR	NR	NR	NR	ND	NR	NR	NR
Hydrochloric Acid (conc.)	NR	NR	NR	NR	NR	NR	NR	NR	ND	NR	NR	NR
Hydrocyanic Acid	R	R	ND	R	R	ND	R	R	ND	R	ND	ND
Hydrofluoric Acid	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Hydrogen Peroxide (30%)	R	R	R	R	R	R	R	R	R	R	R	ND

Corrosion Chart

	Stainless Steel 18/8 (304, 304L, 321)			Molybdenum Stainless Steel (316, 316L)			Duplex Stainless Steel (2205)			3CR12 / 5CR12		
Temperature ºC	20º	60º	100º	20º	60º	100º	20º	60º	100º	20º	60º	100º
Hydrogen Sulphide	R5	R5	R5	R5	R5	R5	R5	R5	R5	R5	R5	R5
Hypochlorite (Na 12-14%)	R14	NR	NR	R14	ND	ND	R14	ND	ND	R14	ND	ND
Lactic Acid (100%)	R	NR	NR	R	R	NR	R	R	ND	NR	NR	NR
Lead Acetate	R	R	R	R	R	R	R	R	R	R	R	R6
Lead Perchlorate	R1	R1	R1	R	R1	ND	ND	ND	ND	NR	NR	NR
Lime (CaO)	R	R	R	R	R	R	R	R	R	R	R	R
Manganate, Potassium (K)	R	R	R	R	R	R	R	ND	ND	R6	ND	ND
Meat Juices	R	R	ND	R	R	ND	R	R	R	R7	NR	NR
Mercuric Chloride	NR	NR	NR	NR	NR	NR	R	R	R	NR	NR	NR
Milk and its products	R	R	R	R	R	R	R	R	R	R	NR	NR
Molasses	R	R	R	R	R	R	R	R	R	R	R	R
Monoethanolamine	R	R	R	R	R	R	R	R	R	R	R	R
Naphthalene	R	R	R	R	R	R	R	R	R	R	R	R
Nitrates of Na, K, NH3, Ag	R	R	R	R	R	R	R	R	R	R	R	R
Nitric Acid (< 25%)	R	R	R	R	R	R	R	R	R	R	R15	NR
Nitric Acid (50%)	R	R	R	R	R	R	R	R	R	R	R15	NR
Nitric Acid (90%)	R	NR	NR	R	NR	NR	R	NR	ND	R	NR	NR
Nitric Acid (Fuming)	R	R2	NR	R	R2	NR	R	NR	NR	R	NR	NR
Oil, Diesel, Petroleum, Spirits	R	R	R	R	R	R	R	R	ND	R	R	R
Oils, essential	R	R	R	R	R	R	R	R	R	R	R	R
Oil, Lube with aromatic adds.	R	R	R	R	R	R	R	R	R	R	R	R
Oils, vegetable and animal	R	R	R	R	R	R	R	R	R	R	R	R
Oxalic Acid	R6	NR	NR	R6	R16	NR	R	R	R	NR	NR	NR
Perchloric Acid	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Phenoll	R	R	R	R	R	R	R	R	R	R	R	R
Phosphoric Acid (20%)	R	R	R	R	R	R	R	R	R	NR	NR	NR
Phosphoric Acid (50%)	R	R	NR	R	R	R	R	R	R	NR	NR	NR
Phosphoric Acid (95%)	R	R	NR	R	R	NR	R17	R17	R17	NR	NR	NR
Phosphorous Pentoxide	R	R	R5	R	R	R5	R	R	R	ND	ND	ND
Pyridine	R	R	R	R	R	R	R	R	R	R	R	R
Sea Water	R9	NR	NR	R9	NR	NR	R	NR	NR	NR	NR	NR
Silicic Acid	R	R	R	R	R	R	R	R	R	R	R	R
Sodium Peroxide	R16	NR	NR	R6	R16	R16	R	R	R	NR	NR	NR
Sodium Silicate	R	R	R	R	R	R	R	R	R	R	R	R
Sodium Sulphide	R	R	NR	R	R	NR	R	R	NR	R6	R6	NR
Starch	R	R	R	R	R	R	R	R	R	R	R	R
Sugar, Syrups, Jams	R12	R	R	R	R	R	R	R	R	R12	R12	R12
Sulphamic Acid	R18	NR	NR	R	R19	NR	R	R	NR	NR	NR	NR
Sulphates (Na, K, Mg, Ca, Al, Fe)	R	R	R	R	R	R	R	R	R	R	R	R
Sulphates	R	R	R	R	R	R	R	R	R	NR	NR	NR
Sulphur Dioxide, dry	R	R	R	R	R	R	R	R	R	R	R	R
Sulphur Dioxide, wet	R	NR	NR	R	R	NR	R	R	NR	NR	NR	NR
Sulphur Dioxide, aqu. soln. (96%)	R	NR	NR	R	R	R	R	R	R	NR	NR	NR
Sulphur Trioxide	NR	NR	NR	R5	R5	R5	R5	R5	R5	NR	NR	NR
Sulphuric Acid (<50%)	NR	NR	NR	R16	NR	NR	R	R	NR	NR	NR	NR
Sulphuric Acid (70%)	NR	NR	NR	NR	NR	NR	R	NR	NR	NR	NR	NR
Sulphuric Acid (95%)	R	NR	NR	R	NR	NR	R	NR	NR	R15	NR	NR
Sulphuric Acid, fuming	R	R2	NR	R	R	NR	R	R	NR	R2	R2	NR
Tannic Acid (10%)	R	R	R	R	R	R	R	R	R	R	R	NR
Tartaric Acid	R	R	R	R	R	R	R	R	R	NR	NR	NR
Trichlorethylene	R5	R5	R5	R5	R5	R5	R5	R5	R5	R5	R5	R5
Urea (30%)	R	R	R	R	R	R	R	R	R	R	R	R
Water, pure	R	R	R	R	R	R	R	R	R	R	R	R
Yeast	R	R	R	R	R	R	R	R	R	R	R	R

R indicates the material is resistant to the named chemical up to the temperature shown, subject to limitations indicated by the footnotes.

NR indicates that the material is not recommended.

ND indicates that no data is available.

1 - not if chlorides present
2 - limited data
3 - depending upon the acid
4 - acid fumes dry, attack may occur if moisture builds up
5 - anhydrous
6 - depending upon concentration
7 - may discolour with time
8 - in strong solutions only when inhibited
9 - pitting possible in stagnant conditions
10 - possibility of pitting
11 - may cause stress corrosion cracking
12 - when free of SO_2
13 - may cause contamination of product
14 - dilute hypochlorites can be used to sterilise some stainless steel with extreme care.
15 - general corrosion may become excessive
16 - 10%
17 - in the absence of impurities
18 - dilute
19 - some attack at high temperatures

Commonly Used Stainless Steels

Grade	Type	UNS No. Related Specification	Typical Chemical Composition								
			C	Mn	Ni	Cr	Mo	P	S	Si	Other
303	Austenitic	S30300	.15 Max	2.0 Max	8-10	17-19	0.6 Max	.20 Max	.15 Min	1.0 Max	
304	Austenitic	S30400	.08 Max	2.0 Max	8-10.5	18-20		.045 Max	.03 Max	1.0 Max	
304L	Austenitic	S30403	.03 Max	2.0 Max	8-12	18-20		.045 Max	.03 Max	1.0 Max	
316	Austenitic	S31600	.08 Max	2.0 Max	10-14	16-18	2-3	.045 Max	.03 Max	1.0 Max	
316L	Austenitic	S31603	.03 Max	2.0 Max	10-14	16-18	2-3	.045 Max	.03 Max	1.0 Max	
316Ti	Austenitic	S31635	.08 Max	2.0 Max	10-14	16-18	2-3	.045 Max	.03 Max	1.0 Max	Ti 0.5
317L	Austenitic	S31703	.03 Max	2.0 Max	13.0	18-20	3-4	.045 Max	.03 Max	1.0 Max	
310	Austenitic	S31000	.25 Max	2.0 Max	19-22	24-26		.045 Max	.03 Max	1.5 Max	
321	Austenitic	S32100	.08 Max	2.0 Max	9-12	17-19		.045 Max	.03 Max	1.0 Max	Ti0.5 Min
253MA	Austenitic	S30815	0.05-0.1	0.8 Max	10-12	20-22		0.04 Max	.03 Max	1.4-2	N .18 Ce .15
904L	Austenitic	N08904	.02 Max	2.0 Max	23-28	19-23	4-5	.045 Max	.03 Max	1.0 Max	Cu 1.5
420C	Martensitic	S42000	.15 Min	1.0 Max		12-14		.04 Max	.03 Max	1.0 Max	
431	Martensitic	S43100	.2 Max	1.0 Max	1.25-2.5	15-17		.04 Max	.03 Max	1.0 Max	
17-4 PH (630)	Martensitic	S17400	.07 Max	1.0 Max	3-5	15-17.5		.04 Max	.03 Max	1.0 Max	Cu 4 Nb + Ta .3
440C	Martensitic	S44004	0.95-1.2	1.0 Max	1.0 Max	16-18	0.75 Max	.04 Max	.03 Max	1.0 Max	
444	Ferritic	S44400	.02 Max	1.0 Max	1.0 Max	17.5-19.5	1.7-2.5	.04 Max	.03 Max	1.0 Max	Ti 0.4
3CR12	Ferritic	S41003	.03 Max	1.5 Max	1.5 Max	10.5-12.5		.04 Max	.03 Max	1.0 Max	Ti 4(C+N)
2205	Duplex	S31803	.03 Max	2.0 Max	4.5-6.5	21-23	2.5-3.5	.03 Max	.02 Max	1.0 Max	N 0.15
2507	Duplex	S32750	.03 Max	1.2 Max	6.0-8.0	24-26	3-5	0.035Max	0.02 Max	0.80 Max	N 0.24-0.32
2304	Duplex	S32304	.03 Max	2.5 Max	3-5.5	21.5-24.5	.05-.6	.04 Max	.03 Max	1.0 Max	N 0.1

Commonly Used Stainless Steels

Typical Yield Strength MPa Min	Mechanical UTS MPa Min	Properties Hardness BHN Max	Rb Max	Elongation %	Condition	Common Applications
240	585	160	84	50	Annealed	Free machining steel used where extensive machining is required. Corrosion resistance and weldability inferior to 302.
205	520	202	92	40	Annealed	General purpose steel with good corrosion resistance for most applications. Used for architecture, food processing, domestic sinks and tubs and deep drawing applications.
170	485	183	88	40	Annealed	Chemical plant and food processing equipment, where freedom from senitisation is required in plate.
205	520	219	95	40	Annealed	Most commonly used s/s main applications ie. marine, chemical, food, mining.
170	485	217	95	40	Annealed	A low carbon modification of 316 where heavy section weldments are required without the risk of intergranular corrosion.
205	520	217	95	40	Annealed	A titanium stabilised version of 316. Excellent high temperature strength.
205	515	217	95	40	Annealed	For chemical plant. Has greater corrosion resistance than 316L notably with brines and halogen salts.
205	520	170	85	40	Annealed	Furnace parts and equipment. Resistant to temperatures 900ºC to 1100ºC.
205	520	217	95	40	Annealed	Heavy weldments in chemical and other industries. Suitable for heat resisting applications to 800ºC. Not suitable for bright polishing.
310	600	-	-	40	Annealed	Furnace parts and equipment. Resistant to temperatures up to 1150ºC.
-	-	-	-	40	Annealed	High resistance to: general corrosion in e.g. sulphuric and actic acids; crevice corrosion; stress corrosion cracking; pitting in chloride bearing solutions. Good weldabilty.
-	S20	192	92		Hardenable	Developed for high hardness after heat treatment. Used for cutting tools, surgical knives, etc.
	965 Max	262	10	-	Hardenable	Used for pump shafts etc. Similar corrosion resistance to T302.
1000	1070	331	-	12	Solution Hardened	Main applications: pump shafts, marine boat shafts, valve stems. Similar corrosion resistance to type 304.
-	-	223	97	-	Hardenable	Capable of being hardened to 60 Rc. Highest hardness and abrasion resistance of all the stainless steels. Corrosion resistance similar to 410.
310	415	200	95	20	Annealed	Heat exchanger and hot water tanks, and in chloride containing waters. Not prone to chloride stress corrosion - superior resistance to pitting, crevice and intergranular corrosion. Possesses excellent deep drawing properties.
340	460	-	160	40	Annealed	Excellent wet abrasion resistance. Used in hoppers, bins, tanks etc.
450	620	290	32RC	25	Annealed	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.
530	730	74	32	20	Annealed	Very high strength, High resistance to pitting, crevice and general corrosion, Very high resistance to chloride stress corrosion cracking, Lower coefficient of thermal expansion than austenitic stainless steels, Higher thermal conductivity than austenitic stainless steels
400	600	290	31RB	25	Annealed	Similar corrosion resistance to 316L. Higher yield strength, corrosion and stress-corrosion crackling resistance is required in marine, mining, chemical, food and power industries. Particularly useful in nitric acid.

Glossary of Terms

Anneal
A heat treatment to fully soften the material and/or to dissolveand take back into equilibrium solution any intermetallic compounds (eg carbides) which may have formed within the crystal structure. For most metals and alloys this involves heating to a specified high temperature and subsequently cooling at a slow rate. However, for austenitic stainless steels the subsequent cooling must be rapidly effected.

Bright annealing
Using a furnace with an inert atmosphere no scale is formed and the resulting surface has a bright finish.

Carbide
A compound formed when an element combines with carbon. The carbides of metals are usually intensely hard.

Carbide precipitation
chemical reaction whereby the intermetallic carbides are formed within the crystal structure. They are hard particles which impart hardness and abrasion resisting properties. However, in stainless steels heating to within a high temperature range (±450°-850°C) causes the formation chromium carbide. This takes place preferentially at the grain boundaries. A small amount of carbon locks up a large amount of chromium. The material is thus “sensitised”. The chromium depleted grain boundaries are therefore prone to suffer preferential and accelerated corrosive attack along the grain boundaries (intergranular corrosion).

Cold drawing
The process is effected without the metal being first heated to high temperatures. Examples of the process are the drawing of a tube through a die and over a mandrel to reduce its OD and/or wall thickness, or drawing wire through successive dies in series to reduce its diameter.

Creep
The slow and continuous deformation of a metal at high temperatures. The deformation (strain) is dependent on the stress, the temperature and time. At the high temperatures creep can occur at very low levels of stress, less than 10MPa.

Ductility
The property of a metal to deform in a plastic manner (ie undergo permanent strain) without fracturing. Elongation and reduction of area (RA) are reported properties which give an indication of the ductility.

Electropolishing
A process whereby the metal surface is actually corroded away under very carefully controlled electrolytic conditions. A smoothing and levelling of the surface takes place. Burrs are also removed from any rough edges. The surface of electropolished stainless steel has a high degree of reflectivity, and the passive film produced on the surface is superior (more corrosion resistant) owing to the formation of oxygen gas at the surface during the process.

Extrusion
Aprocess which confers a given shape on the cross section of a length of metal by pushing the metal, in the solid but plastic state, through a die.

Fatigue
If metals are subjected to repeated fluctuating (reversing) loads at stresses below the tensile strength, a fatigue crack can initiate in the material which, with increasing number of loading cycles, propagates through the material until final failure by fracture of the metal remaining occurs. Fatigue is an interrelationship between stress and the number of load cycles, the lower the stress the greater the number of cycles that can be tolerated (in some metals a stress below a certain limiting stress value will never induce fatigue). Failure by fatigue is very sensitive to any surface defects or imperfections which radically lower the fatigue resistance.

Free machining grades
Brought about the the addition of sulphur or selenium, increases cutting speeds by approximately 75% on stainless steel. Sulphur is preferred for heavy machining because of the large and fairly continuous inclusions. Selenium is better for light work where a good finish is required.

Hardenable
This means that a material can be hardened by heat treatment which involves heating the material to a specified high temperature and subsequently cooling it (quenching) at a rapid rate. Quenching must be followed by tempering in order to develop the correct required combination of strength, hardness, ductility and toughness.

Heat affected zone (HAZ)
This is within the parent metal adjacent to the weld metal (deposit). It is heated through a range of temperatures up to the melting point which occurs at the junction with the weld metal. The actual temperature attained at any point within the HAZ is an interrelated factor of distance from the weld and the amount of heat input. The high temperatures induced cause changes to and within the crystal structure of the parent metal, which in turn affect the mechanical, physical and corrosion properties within the HAZ.

Heat treatment
Any high temperature treatment of a metal or alloy in order to modify (improve) the mechanical properties, (and sometimes the physical properties).

Mechanical properties
A measure of the metal’s response to an applied force or load (ie stress). The commonly reported mechanical properties include yield strength, tensile strength, elongation, reduction of area (RA), hardness, toughness (Charpy V) and fatigue.

Passive film
Chromium contents in excess of ±11% Cr in stainless steels result in the formation of a chromium oxide passive film on the surface, provided there is a sufficient availability of oxygen for its formation. This passive film is extremely thin, continuous, tenacious, stable and self-repairable. It renders the surface inert to many chemical reactions and therefore passive. This is stainless steel’s natural built-in corrosion resistance.

Glossary of Terms

Passivation
The treatment of the surface of stainless steels with dilute solutions (or pastes) of nitric acid HNO3. This, being an oxidising acid, promotes the formation and improves the integrity of the passive film on any freshly created surface (eg through grinding, machining or mechanical damage). The acid treatment also has the secondary beneficial effect of dissolving any free iron or steel contamination which may have been picked up during handling, forming or fabrication operations, and if this were not removed would impair the corrosion resistance. Nitric acid is the only acid which should be used to effect passivation of stainless steels.

Physical properties
Defined as the properties other than mechanical that pertain to the physics of a material, eg density, electrical conductivity, heat conductivity and thermal expansion.

Pickling
The removal of the oxide film from the surface of a metal by chemical means. An exposure to high temperature (eg during welding or heat treatment) will scale the surface. In the case of stainless steel such high temperature scale has inferior corrosion resistance and must be removed. Pickling, using formulations of hydrofluoric (HF) and nitric HNO3 acids, removes the scale and restores the corrosion resistance. For applications in aggressive environments it is advisable to develop full corrosion resistance by a passivation treatment subsequent to the pickling operation.

Solution treatment
A heat treatment which effects the solution of intermetallic compounds or precipitates (eg carbides) at high temperatures. Subsequent cooling must be fast enough to prevent their reformation during the cooling cycle.

Stabilised
This refers to the alloying of titanium (Ti) or niobium (Nb) to the austenitic grades. These elements form stable carbides, thereby locking up the carbon and preventing the formation of chromium carbides. Prevents sensitisation and intergranular corrosion (weld decay) in the region next to the weld in welded components of thicker material (> ±2.5mm).

Tempering
Quenched materials are hard and strong, but extremely brittle and of low ductility. Tempering should immediately follow quenching, and be effected at a temperature necessary to increase the toughness and ductility. This will usually incur a loss of hardness and strength, more so if higher tempering temperatures are used. The tempering is chosen to bring about the correct desired combination of properties. The maximum tempering temperature is below that at which change of crystal structure will be induced.

Tempers
Used to define the levels to which austenitic stainless steels are strengthened by cold rolling or cold rawing, without any subsequent annealing operation. Cold rolled sheet, coil and strip are produced to 1/4, 1/2, 3/4 and full hard tempers; wire is produced to annealed, soft, intermediate and spring tempers.

Tensile strength
The value of the maximum stress in tension that a material will withstand.

Weldability
This is not an exactly quantifiable or precise property, but rather implies the ability of the material to be joined by standard welding processes so that the resultant mechanical, physical and chemical properties of the weld zone (ie both the weld metal and the HAZ) are at least equivalent to those of the parent metal.

Work hardening
Most metals and alloys will exhibit a slight degree of increase in both strength and hardness if subjected to cold work (eg cold rolling, cold drawing, cold bending etc). The austenitic stainless steels show a marked response to work hardening and are therefore termed ‘hardenable by cold work’ or ‘work hardenable’ materials.

Yield strength
At a stress below the tensile strength the material reaches a point at which permanent strain (deformation) occurs. In some steels there is a marked increase of strain for no increase in stress ie yield point. If this does not occur (as in austenitic grades of stainless steel) a stress value for a specified amount of strain (usually 0.2%) is taken. The stress at the yield point or at 0.2% strain is reported as the yield strength.

Pressure Conversion Charts

PSI	MPa	kgf/cm2	BARS	Atmos-pheres	PSI	MPa	kgf/cm2	BARS	Atmos-pheres	PSI	MPa	kgf/cm2	BARS	Atmos-pheres	PSI	MPa	kgf/cm2	BARS	Atmos-pheres
25	.17	1.76	1.72	1.7	2500	17.24	175.77	172.50	170.00	5200	35.85	365.60	358.80	353.60	7900	54.47	555.42	545.10	537.20
50	.34	3.52	3.45	3.4	2600	17.93	182.80	179.40	176.80	5300	36.54	372.63	365.70	360.40	8000	55.16	562.46	552.00	544.00
75	.52	5.27	5.18	5.10	2700	18.62	189.83	186.30	183.60	5400	37.23	379.66	372.60	367.20	8100	55.85	569.49	558.90	550.80
100	.69	7.03	6.90	6.80	2800	19.30	196.86	193.20	190.40	5500	37.92	386.69	379.50	374.00	8200	56.54	576.52	565.80	557.60
200	1.38	14.06	13.8	13.60	2900	19.99	203.89	200.10	197.20	5600	38.61	393.72	386.40	380.80	8300	57.23	583.55	572.70	564.40
300	2.07	21.09	20.7	20.40	3000	20.68	210.92	207.00	204.00	5700	39.30	400.75	393.30	387.60	8400	57.92	590.58	579.60	571.20
400	2.76	28.12	27.6	27.20	3100	21.37	217.95	213.90	210.80	5800	39.99	407.78	400.20	394.40	8500	58.61	597.61	586.50	578.00
500	3.45	35.15	34.5	34.00	3200	22.06	224.98	220.80	217.60	5900	40.68	414.81	407.10	401.20	8600	59.30	604.64	593.40	584.80
600	4.14	42.18	41.40	40.80	3300	22.75	232.01	227.70	224.40	6000	41.37	421.84	414.00	408.00	8700	59.98	611.67	600.30	591.60
700	4.83	49.21	48.30	47.60	3400	23.44	239.04	234.60	231.20	6100	42.06	428.87	420.90	414.80	8800	60.67	618.70	607.20	598.40
800	5.52	56.24	55.20	54.40	3500	24.13	246.07	241.50	238.00	6200	42.75	435.90	427.80	421.60	8900	61.36	625.73	614.10	605.20
900	6.20	63.28	62.10	61.20	3600	24.82	253.10	248.40	244.80	6300	43.44	442.93	434.70	428.40	9000	62.05	632.76	621.00	612.00
1000	6.90	70.31	69.00	68.00	3700	25.51	260.14	255.30	251.60	6400	44.13	449.96	441.60	435.20	9100	62.74	639.79	627.90	618.80
1100	7.58	77.34	75.90	74.80	3800	26.20	267.17	262.20	258.40	6500	44.82	457.00	448.50	442.00	9200	63.43	646.82	634.80	625.60
1200	8.27	84.37	82.80	81.60	3900	26.89	274.20	269.10	265.20	6600	45.51	464.03	455.40	448.80	9300	64.12	653.86	641.70	632.40
1300	8.96	91.40	89.70	88.40	4000	27.58	281.23	276.00	272.00	6700	46.20	471.06	462.30	455.60	9400	64.81	660.89	648.60	639.20
1400	9.65	98.43	96.60	95.20	4100	28.27	288.26	282.90	278.80	6800	46.88	478.09	469.20	462.40	9500	65.50	667.92	655.50	646.00
1500	10.34	105.46	103.50	102.00	4200	28.96	295.29	289.80	285.60	6900	47.57	485.12	476.10	469.20	9600	66.19	674.95	662.40	652.80
1600	11.03	112.49	110.40	108.80	4300	29.65	302.32	296.70	292.40	7000	48.26	492.15	483.00	476.00	9700	66.88	681.98	669.30	659.60
1700	11.72	119.52	117.30	115.60	4400	30.34	309.35	303.60	299.20	7100	48.95	499.18	489.90	482.80	9800	67.57	689.01	676.20	666.40
1800	12.41	126.55	124.20	122.40	4500	31.03	316.38	310.50	306.00	7200	49.64	506.21	496.80	489.60	9900	68.26	696.04	683.10	673.20
1900	13.10	133.58	131.10	129.20	4600	31.72	323.41	317.40	312.80	7300	50.33	513.24	503.70	496.40	10000	68.95	703.07	690.00	680.00
2000	13.79	140.61	138.00	136.00	4700	32.41	330.44	324.30	319.60	7400	51.02	520.27	510.60	503.20	11000	75.84	773.38	759.00	748.00
2100	14.48	147.64	144.90	142.80	4800	33.10	337.47	331.20	326.40	7500	51.71	527.30	517.50	510.00	12000	82.74	843.68	828.00	816.00
2200	15.17	154.68	151.80	149.60	4900	33.78	344.50	338.10	333.20	7600	52.40	534.33	524.40	516.80	13000	89.63	913.99	897.00	884.00
2300	15.86	161.71	158.70	156.40	5000	34.47	351.54	345.00	340.00	7700	53.09	541.36	531.30	523.60	14000	96.53	984.30	966.00	952.00
2400	16.55	168.74	165.60	163.20	5100	35.16	358.57	351.90	346.80	7800	53.78	548.39	538.20	530.40	15000	103.42	1054.6	1035.0	1020.0

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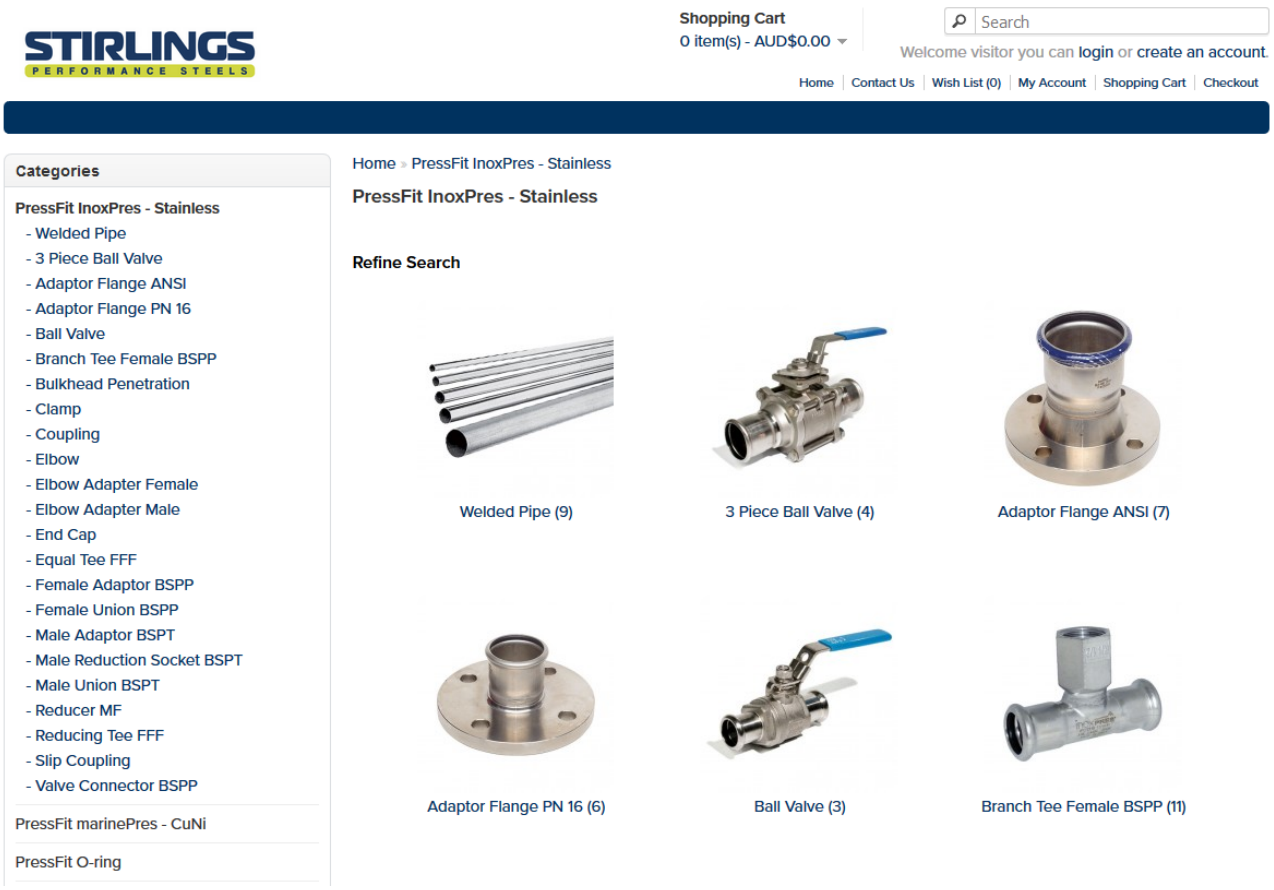

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