

Stainless Steel Tube and Fittings



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Stainless steel tube is typically specified by OD (outside diameter) or A/F (across flat) dimensions, WT (wall thickness), grade, condition and surface finish.

It is resistant to many forms of corrosion, has hygienic sterile properties, high quality aesthetic appeal and exceptional strength.

Tube is manufactured in round, square and rectangular sections in a variety of wall thicknesses and usually by the processes of longitudinal welding, hot and cold drawing (seamless) or spiral welding.

Finishes or appearance range from unpolished to very highly polished. Unpolished has a 2B mill finish, standard polished is a finely grit polished finish and there is a finer buffed finish giving close to a mirror appearance. Finishes are selected to suit application and aesthetic appeal.

Stainless steel tube can be joined by welding, which facilitates rigidity in construction, or by the use of mechanical fittings which enables dismantling for hygienic cleaning.

The tubular products system incorporates a comprehensive range of stainless steel fittings in the form of elbows, tees, reducers and flanges in various sizes, wall thickness, grades and finishes to suit tube dimensions and tolerances.

As-Welded (AW) Tube

Decorative & Structural Tube – This tubing is produced direct off the continuous tube welding mill, using cold rolled stainless steel strip made to ASTM standards, with tube produced to commercial limits of straightness in standard or specific customer lengths.

AW tube is generally used for structural and decorative applications in mildly corrosive conditions. It is not suitable for applications requiring significant flaring, expanding or bending, nor for fluid transfer or pressure applications.

AW tube is also available with one or two rebate slots for support of architectural glass panels.

SupaBrite Mirror Polished Tube – This As-Welded tube is ideal for decorative structural applications **where a highly reflective appearance is desired, such as prestigious hand rails. The bright finish is not** only aesthetically attractive but also gives high corrosion resistance and ease of maintenance.

Manufacturing specification: ASTM A554.

Food Quality Tube – As-welded food quality tube is stocked by Atlas Steels. This tube at the point of manufacture goes through a process where the internal weld bead is rolled to blend in with the surrounding tube wall profile. The result is an improved internal finish along the weld, reducing the chance of a crevice where liquid or food product may be trapped. This assists with 'clean in place' (CIP) of food and beverage process lines and other applications such as the pharmaceutical industry. Further assurance of reliability of food tube comes from the 100% weld NDT mandatory for this product.

Complimenting the food quality tube is an extensive range of fittings, also intended for hygienic applications. These are also covered by AS 1528 and include butt welding, screwed and clamp fittings.

Manufacturing specification: AS 1528

As-Welded Annealed (AWA) Tube

This tube is produced by the same process as AW tube but is then annealed to relieve stresses and improve ductility. Bright annealing is carried out in a controlled-atmosphere furnace, so that no oxide or scale is formed on the surface.

Annealing both increases the corrosion resistance and softens the tube which allows severe manipulation such as bending, expanding and forming.

Manufacturing specification: ASTM A269M

Cold Worked Annealed (CWA) Tube

This tube is typically destined for heat exchanger applications and is produced in a similar way to AWA product except that the internal bead is rolled flush with the inside tube surface prior to annealing. Because of the critical end use this tube undergoes extensive testing as part of the manufacturing process.

Manufacturing specification: ASTM A249M

Cold Drawn Seamless (CDS) Tube

This tube is produced by drawing from hollow billets. It is usually supplied in the annealed and pickled condition and used where service conditions involve high pressure and corrosive conditions and where good surface finish and close tolerances are required, e.g. heat exchanger and condenser tubing, instrumentation tubing and some refinery applications. Seamless tubing is always recommended for applications using compression fittings sealing on the inside surface.

Manufacturing specification: ASTM A269M for general service. ASTM A213M for heat exchanger service and A268M for ferritic and martensitic tubes.

Spiral Welded Tube

This tube is produced by the helical forming and automatic welding of a continuous strip of stainless steel.

Typical applications include water and pulp in paper mills, product and effluent lines in chemical processing, water lines for brewing, dust fume extraction, furnace and boiler flues, stormwater down-pipes in high-rise applications and ventilation ducts and condensation lines for air-conditioning.

Manufacturing specification: generally to ASTM A778M, except mechanical properties are not generally tested or reported.

Grades:

Austenitic	304, 304L, 316, 316L, 321
Ferritic	409
Duplex	2205

Table Flanges are available bored for tube. These flanges are covered in the section of this Atlas Product Reference Manual on Stainless Steel Pipe.

A note on product weights

This product Reference Manual gives weights and weights per metre for many products. These are intended to be useful, but please note that standard dimensional tolerances mean these weights will always be approximate only.

Stainless Steel Round Tube – Specifications refer pages 3 – 4

OD		WT	Weight	Type of Tube				
				A554 320 Grit	AS 1528	A554 600 Grit	A554 Mirror	Seamless
mm	inch	mm	kg/m					
4.76	3/16	0.50	0.05					
		0.70	0.07					
		0.90	0.09					
6.35	1/4	0.50	0.07					
		0.70	0.10					
		0.90	0.12					✓
		1.20	0.15					✓
		1.60	0.19					✓
7.94	5/16	0.50	0.09					
		0.70	0.13					
		0.90	0.16					✓
		1.20	0.20					✓
		1.60	0.25					✓
9.52	3/8	0.50	0.11					
		0.70	0.15					
		0.90	0.19	✓				✓
		1.20	0.25	✓				✓
12.70	1/2	0.50	0.15					
		0.70	0.21					✓
		0.90	0.26					✓
15.88	5/8	0.50	0.19					
		0.70	0.26					
		0.90	0.33					
19.05	3/4	0.50	0.23					
		0.70	0.32					
		0.90	0.41					
		1.20	0.53	✓				✓
		1.60	0.69	✓	✓	✓	✓	✓
22.22	7/8	0.90	0.48					
		1.20	0.63	✓				
		1.60	0.82	✓			✓	
25.40	1	0.50	0.31					
		0.70	0.43					
		0.90	0.55					
		1.20	0.72	✓				
		1.60	0.94	✓	✓	✓	✓	✓
		2.00	1.16					✓
		2.50	1.42					
31.75	1 1/4	0.90	0.69					
		1.20	0.91	✓				
		1.60	1.20	✓	✓	✓	✓	
		2.00	1.48					
		2.50	1.81					

OD		WT	Weight	Type of Tube				
				A554 320 Grit	AS 1528	A554 600 Grit	A554 Mirror	Seamless
mm	inch	mm	kg/m					
38.10	1 1/2	0.90	0.83					
		1.20	1.10	✓				
		1.60	1.45	✓	✓	✓	✓	
		2.00	1.79					
		2.50	2.21					
		3.00	2.61	✓			✓	
		3.20	2.77					
44.45	1 3/4	0.90	0.97					
		1.20	1.29					
		1.60	1.70	✓				
		2.00	2.11					
		2.50	2.60					
50.80	2	0.90	1.11					
		1.20	1.48	✓				
		1.60	1.95	✓	✓	✓	✓	
		2.00	2.42					
		2.50	3.00					
		3.00	3.56	✓			✓	
63.50	2 1/2	1.20	1.85					
		1.60	2.46	✓	✓	✓	✓	
		2.00	3.05					
		2.50	3.78					
76.20	3	1.20	2.23					
		1.60	2.96	✓	✓	✓		
		2.00	3.68					
		2.50	4.57					
		3.20	5.79					
88.90	3 1/2	1.60	3.46					
		2.00	4.31					
		2.50	5.36					
		3.20	6.80					
101.60	4	1.60	3.97	✓	✓	✓		
		2.00	4.94					
		2.50	6.15					
127.00	5	3.20	7.81					
		1.60	4.98		✓			
		2.00	6.20					
152.40	6	2.50	7.72					
		3.20	9.83					
		1.60	5.99	✓	✓			
		2.00	7.46					
204	8	2.50	9.30					
		3.20	11.84					
		1.60	8.00					
		2.00	9.98	✓				

- **A554 320 GRIT** = as-welded mechanical tube
- **AS 1528** = Food Grade as-welded tube typically in 320 grit polish finish
- **A554 600 Grit** = bright finish polished tube
- **Mirror Finish** = mirror-polished tube
- **Seamless** = Cold-Drawn Seamless Tube

- Tubes are available in 304 and a lesser range of 316 grade.
- AWA annealed welded tube (ASTM A269M) is available subject to special enquiry.
- Most tube is 320 grit external polished; some also available in SupaBrite, 600 grit and unpolished.
- Slotted tube is also obtainable in 600 grit or 320 grit polished finish – single slot or double slots at 90° or 180°.

Stainless Steel Square Tube – Specifications refer pages 3 - 4

Mostly stocked in 304, more common sizes in both 304 and 316. Finish: polished for all stock.

Product Size Range and Weight (kg/m)							
A/F Dimensions		Wall Thickness (mm)					
mm	inches	1.2	1.6	2.0	3.0	5.0	6.0
12.70	½	0.44					
19.05	¾	0.68	0.88				
25.40	1	0.92	1.20	1.48			
31.75	1 ¼	1.16	1.52	1.88			
38.10	1 ½	1.40	1.85	2.28			
40.00	-				3.51		
50.00	-				4.46		
50.80	2		2.49	3.08			
80.00	-			4.93	7.30		
100.00	-				9.20	15.00	17.82
150.00	-				13.94	22.91	

Stainless Steel Rectangular Tube

Mostly stocked in 304, more common sizes in both 304 and 316. Finish: polished for all stock.

Product Size Range and Weight (kg/m)							
Dimensions		Wall Thickness (mm)					
mm	inches	1.2	1.6	2.0	3.0	5.0	6.0
50.0 x 25.0	-		1.82		3.27		
50.8 x 25.4	2 x 1	1.40	1.85				
60.0 x 40.0	-				4.46		
80.0 x 40.0	-			3.67	5.40		
100.0 x 50.0	-			4.61	6.83	11.1	13.1
150.0 x 100.0	-				12.0	19.0	22.6
200.0 x 100.0	-						27.3

SupaBrite Mirror Polished Tube

OD or A/F Size (mm)	Wall thickness (mm)	Length (mm)	Shape	PE protected
19.05	1.6	6000	Round	✓
22.23	1.6	6000	Round	✓
25.4	1.6	6000	Round	✓
31.75	1.6	6000	Round	✓
38.1	1.6	6000	Round	✓
38.1	3.0	6000	Round	✓
50.8	1.6	6000	Round	✓
50.8	3.0	6000	Round	✓
63.5	1.6	6000	Round	✓
50.8 x 50.8	1.6	6000	Square	✓
50.8 x 50.8	3.0	6000	Square	✓
38.1 x 38.1	1.6	6000	Square	✓
38.1 x 38.1	3.0	6000	Square	✓
50 x 25	1.6	6000	Rectangular	✓
50 x 10	1.6	6000	Rectangular	✓
60 x 10	1.6	6000	Rectangular	✓

Special non-standard sizes are available on request.

Grade 304 and 316 Stainless Steel Spiral Welded Tube – Specification refer pages 3 - 4

Product Size Range and Weight (kg/m)							
Dimensions		Wall thickness (mm)					
mm	Inches	1.6	2	2.5	3	3.5	4
76.20	3	3.00	3.80				
101.6	4	4.00	5.00	6.30			
127.0	5	5.00	6.30	7.90	9.50		
152.4	6	6.10	7.60	9.50	11.40	13.20	
203.2	8	8.10	10.10	12.60	15.10	17.70	20.20
254.0	10	10.10	12.60	15.80	18.90	22.10	25.20
304.8	12	12.10	15.10	18.90	22.70	26.50	30.30
355.6	14	14.10	17.70	22.10	26.50	30.90	35.30
406.4	16	16.10	20.20	25.20	30.30	35.30	40.40
457.2	18	18.20	22.70	28.40	34.10	39.70	45.40
508.0	20	20.20	25.20	31.50	37.80	44.10	50.50
538.8	22	22.20	27.70	34.70	41.60	48.60	55.50
609.6	24		30.30	37.80	45.40	53.00	60.50
762.0	30		37.80	47.30	56.80	66.20	75.70
1016.0	40				75.70	88.30	100.90

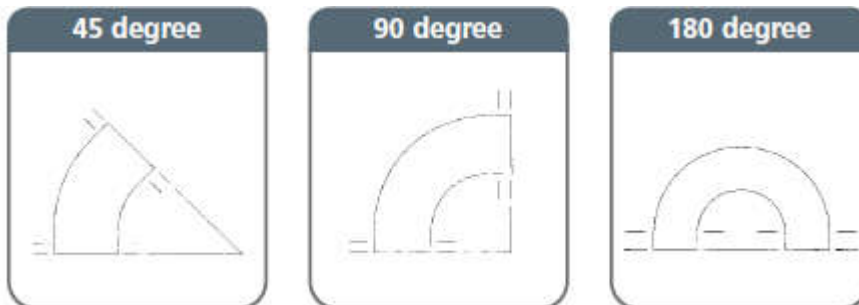
- Grades 304, 304L, 316, 316L, 321, 409 and 2205 can be produced in spiral welded tube.
- Also available in 5mm wall thickness from 355.5 mm diameter.
- Larger sizes up to 1500mm diameter can be manufactured.
- Pipe sizes DN80/NPS3 and above can be manufactured.
- Special sizes can also be manufactured.
- Lobster back bends, fabricated tees, angle neck rings and galvanized or stainless steel backing flanges are also available to match spiral welded tube.

Tube Fittings

Complementing our stock of round tube is a range of tube fittings. The more common tube fittings include bends, tees, reducing tees, eccentric and concentric reducers, BSM unions and tube clamps.

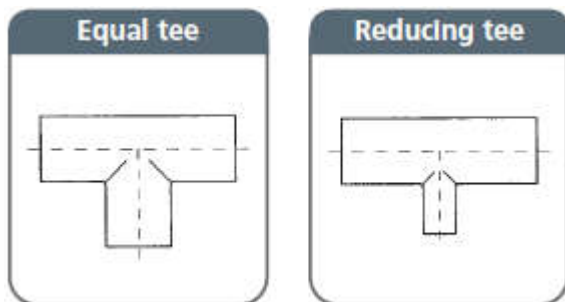
Tube bends – Bends are generally stocked as 45, 90 or 180 degree. Three common manufacturing processes are pulled bends (cold drawn bend), pressed bends and lobster back bends. The process of manufacturing often relates to the diameter of the tube and thickness of material used. Up to and including 152.4mm the bends are generally pulled, by far the most commonly supplied bends. Pressed bends can be from 101.6 to 305mm OD. Lobster back bends are generally supplied in diameters 101.6mm and above and these bends are used generally to suit spiral welded tube.

To maintain a level of quality and consistency Atlas stocks pulled bends with an extended leg. The importance of this style of bend ensures each end of the bend is finished off true and accurate. The extended leg gives the ability to maintain the original circularity of the tube and a precise 45 or 90 degree radius measured from across the end face of the bends.



Tees – Two common processes of manufacturing are welded or pulled tees. To maintain product quality and consistency welded tees are stocked as opposed to pulled tees.

Tees are stocked in two forms; equal or reducing. An equal tee has all three branches of the tee equal in diameter. A reducing tee has a reduced diameter of tube on the branch section of the tee.



As tube fittings are often used in the food industry and both aesthetics and hygiene are important many of these fittings are stocked in an externally polished finish.

Stainless Steel Butt Welding Tube Fittings

Commonly stocked as 304 and 316. Finish: polished or unpolished.

Product size range and weight (kg/m)									
Dimensions OD		Bends 45 degree		Bends 90 degree		Bends 180 degree		Equal tee	
		Wall thickness (mm)		Wall thickness (mm)		Wall thickness (mm)		Wall thickness (mm)	
mm	Inches	1.6	2	1.6	2	1.6	2	1.6	2
9.52	$\frac{3}{8}$	0.01		0.01		0.01		0.03	
12.70	$\frac{1}{2}$	0.01		0.01		0.01		0.05	
19.05	$\frac{3}{4}$	0.02		0.02		0.03		0.08	
25.40	1	0.03		0.04		0.05		0.13	
31.75	1 $\frac{1}{4}$	0.05		0.06		0.08		0.20	
38.10	1 $\frac{1}{2}$	0.07		0.08		0.11		0.30	
50.80	2	0.12		0.15		0.20		0.50	
63.50	2 $\frac{1}{2}$	0.18		0.23		0.31		0.80	
76.20	3	0.27		0.34		0.45		1.10	
101.6	4	0.48		0.60		0.80		1.60	
127.0	5	0.75		0.95		1.26		1.80	
152.4	6		1.36		1.70		2.26		5.40
203.2	8		2.42		3.02		4.03		8.40
254.0	10		3.49		4.50		5.05		9.90

- Usual stock range is 1.6mm wall thickness up to 127mm diameter, and 2.0mm wall thickness for larger sizes.
- Specification: AS 1528.3. Sizes over 127mm are usually to EN 10253-3 or EN 10253-4.
- Standard stock includes a straight “extended leg” on all bends.
- Other fittings do not have the extended leg.

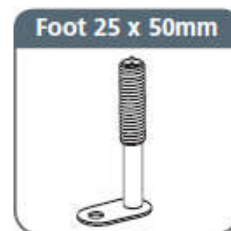
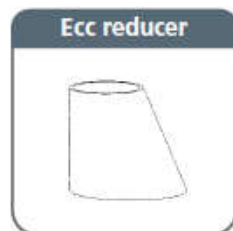
Stainless Steel Reducing Tube Fittings

Commonly stocked as 316. Finish: polished.

Product size range and weight (kg/m)									
Dimensions OD		Con reducer	Ecc reducer	Reducing tees	Dimensions OD		Con reducer	Ecc reducer	Reducing tees
		Wall thickness (mm)					Wall thickness (mm)		
mm	mm	1.6	1.6	1.6	mm	mm	1.6	1.6	1.6
19.05	12.70	0.02	0.02	0.08	76.20	50.80	0.25	0.25	1.10
25.40	12.70	0.04	0.04	0.13	76.20	63.50	0.25	0.25	1.10
25.40	19.05	0.04	0.04	0.13	101.6	25.40	0.30	0.30	1.60
31.75	12.70	0.05	0.05	0.20	101.6	38.10	0.30	0.30	1.60
31.75	25.40	0.05	0.05	0.20	101.6	50.80	0.30	0.30	1.60
38.10	12.70	0.05	0.05	0.30	101.6	63.50	0.30	0.30	1.60
38.10	19.05	0.05	0.05	0.30	101.6	76.20	0.30	0.30	1.60
38.10	25.40	0.05	0.05	0.30	127.0	50.80	0.60	0.60	1.80
38.10	31.75	0.05	0.05	0.30	127.0	63.50	0.60	0.60	1.80
50.80	12.70	0.10	0.10	0.50	127.0	76.20	0.60	0.60	1.80
50.80	19.05	0.10	0.10	0.50	127.0	101.6	0.60	0.60	1.80
50.80	25.40	0.10	0.10	0.50	152.4	50.80	0.70	0.70	2.80
50.80	31.75	0.10	0.10	0.50	152.4	63.50	0.70	0.70	2.80
50.80	38.10	0.10	0.10	0.50	152.4	76.20	0.70	0.70	2.80
63.50	25.40	0.10	0.10	0.80	152.4	101.6	0.70	0.70	2.80
63.50	38.10	0.10	0.10	0.80	152.4	127.0	0.70	0.70	2.80
63.50	50.80	0.10	0.10	0.80	203.2	101.6	1.60	1.60	3.50
76.20	25.40	0.25	0.25	1.10	203.2	127.0	1.60	1.60	3.50
76.20	31.75	0.25	0.25	1.10	203.2	152.4	*	*	*
76.20	38.10	0.25	0.25	1.10	254.0	203.2	*	*	

* Large size reducing fittings stocked in 2.0mm wall thickness.

- Specification: AS 1528.3.
- Reducers and tees have no extended leg.



Stainless Steel Plain Tube Clamps

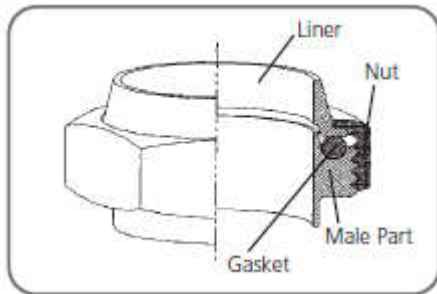
(mm)	25.40	31.75	38.10	50.80	63.50	76.20	88.90	101.6	127.0	152.4	203.2
(inches)	1	1¼	1½	2	2½	3	3½	4	5	6	8

Stainless Steel Feet and Plastic Inserts

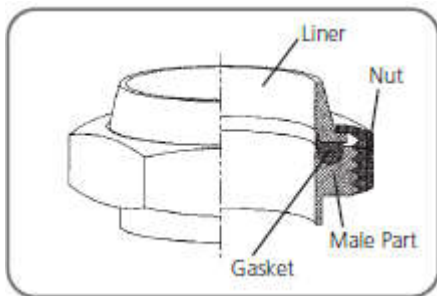
- Plastic end inserts to suit square tube 25.40, 31.75, 38.10mm A/F.
- Stainless steel feet machine adjust tread with base 50mm or 63.5mm.
- Clamps and feet are grade 304 as standard.

BSM Unions

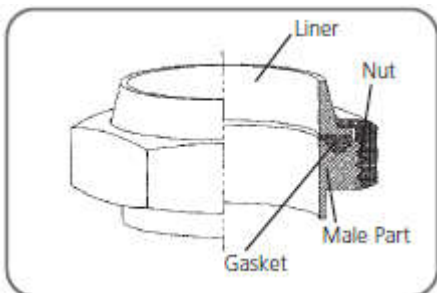
British Standard Milk (BSM) stainless steel unions were designed specifically for tube installation in the dairy industry, but they are now commonly used in food and beverage processing and the pharmaceutical industries where crevice-free hygienic conditions are required. A commonly used term is 'CIP' which comes from the phrase **Clean In Place**



RJT (Ring Joint Type) – often referred to as a standard union comprises an 'O' ring style gasket. This leaves a small crevice internally where the liner and male part of the union overlap, this is not suitable for permanent CIP.



CIP (Australian style) – developed from an RJT union, features a shaped gasket completely filling the crevice between the liner and male part and allows a small lip to give a flush finish on the ID of the fitting. This gives the desirable characteristics for CIP installation.



CIPFF – the FF stands for 'Flat Face' and refers to a BSM modified union supporting CIP installations and also enabling easy disassembly from process lines – once the nut is undone the union and attached tube line can be slid sideways.

Like the Australian style CIP union the gasket completely fills the crevice between the liner and male part to give a flush finish on the ID of the fitting. The liner and male parts of this union have been modified to create a flat face style sealed with a flat face gasket. A flat faced liner and male part used in a CIPFF union are shaped differently to that used in an RJT or CIP union.

Note: Temperature rating of EPDM "E" gasket material is -51° to 148°C.

Specification: AS 1528.2

BSM Unions

Union (complete) RJT, CIP and CIPFF							
(mm)	25.40	38.10	50.80	63.50	76.20	101.6	152.4
(inches)	1	1½	2	2½	3	4	6
Weight (kg)	0.41	0.45	0.61	0.71	1.01	1.41	1.71

Liners – Grade 316 RJT, CIP and CIPFF							
(mm)	25.40	38.10	50.80	63.50	76.20	101.6	152.4
(inches)	1	1½	2	2½	3	4	6
Weight (kg)	0.10	0.10	0.15	0.20	0.30	0.40	0.50

Male parts – Grade 316 RJT, CIP and CIPFF							
(mm)	25.40	38.10	50.80	63.50	76.20	101.6	152.4
(inches)	1	1½	2	2½	3	4	6
Weight (kg)	0.10	0.10	0.15	0.20	0.30	0.40	0.50

Gaskets – EPDM rubber – RJT, CIP and CIPFF							
(mm)	25.40	38.10	50.80	63.50	76.20	101.6	152.4
(inches)	1	1½	2	2½	3	4	6
Weight (kg)	0.01	0.01	0.01	0.01	0.01	0.01	0.01

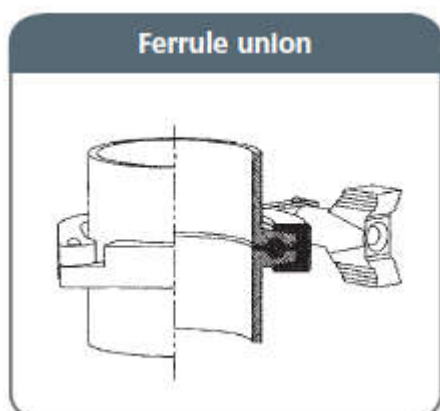
Blank caps – Grade 316							
(mm)	25.40	38.10	50.80	63.50	76.20	101.6	152.4
(inches)	1	1½	2	2½	3	4	6
Weight (kg)	0.10	0.10	0.20	0.25	0.30	0.40	0.60

Blank nuts – Grade 304							
(mm)	25.40	38.10	50.80	63.50	76.20	101.6	152.4
(inches)	1	1½	2	2½	3	4	6
Weight (kg)	0.20	0.20	0.30	0.30	0.40	0.60	0.70

Hex nut – Grade 304							
(mm)	25.40	38.10	50.80	63.50	76.20	101.6	152.4
(inches)	1	1½	2	2½	3	4	6
Weight (kg)	0.20	0.20	0.30	0.30	0.40	0.60	0.70

A range of spanners and valves (ball and butterfly) is also available to match nominal tube dimensions.

Tri-clamp Stainless Steel Tube Fittings



A tri-clamp is used to eliminate the need for a threaded joining system, employing a hinged clamp instead. The joint is common in CIP installation where the seal fills the crevice completely.

A range of spanners and valves (ball and butterfly) is also available to match nominal tube dimensions.

Specification: AS 1528.4

Tri-clamp Unions Complete							
(mm)	25.40	38.10	50.80	63.50	76.20	101.6	152.4
(inches)	1	1½	2	2½	3	4	6
Weight (kg)	0.4	0.4	0.7	1.1	1.1	1.5	2.4

Tri-clamp Ferrule – 316							
(mm)	25.40	38.10	50.80	63.50	76.20	101.6	152.4
(inches)	1	1½	2	2½	3	4	6
Weight (kg)	0.1	0.1	0.2	0.3	0.3	0.4	0.7

Tri-clamp Gaskets – EPDM rubber							
(mm)	25.40	38.10	50.80	63.50	76.20	101.6	152.4
(inches)	1	1½	2	2½	3	4	6
Weight (kg)	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Tri-clamp Clamp - 316							
(mm)	25.40	38.10	50.80	63.50	76.20	101.6	152.4
(inches)	1	1½	2	2½	3	4	6
Weight (kg)	0.2	0.2	0.3	0.5	0.5	0.7	1.0

Tri-clamp Cap - 316						
(mm)	25.40	38.10	50.80	63.50	76.20	101.6
(inches)	1	1½	2	2½	3	4
Weight (kg)	0.1	0.1	0.2	0.25	0.3	0.40

Note: Temperature rating of EPDM “E” gasket material is -51° to +148°C