In all shapes, sizes and standards

Alfa Laval Installation Material

Alfa Laval is your complete source for specialized fittings and tubing required in food, dairy, beverage, personal care, biotechnology and pharmaceutical process applications. Smooth, crevice-free interiors and secure, self-aligning joints are characteristic for Alfa Laval Fittings. Each offers superior corrosion-resistance and unmatched service life. Alfa Laval fittings are designed and manufactured to ensure dimensional accuracy and structural integrity, making them easy to install. Tubing is manufactured to Alfa Laval's stringent specifications, making it a perfect match for the weld fittings. Choose from a wide range of tube sizes, surface finishes and connect options. All products are labelled with a bar code, product information and manufacturing date. This provides the optimum identification and ensures that the product arrives to the job site in a clean orbital weld condition.

The Alfa Laval tubes and fittings are divided into two product ranges, Sanitary and UltraPure, The Sanitary range is suitable for most standard duties and the UltraPure range is suitable for duties with extra high demands on hygiene and cleanability.

Sanitary range tubes and fittings
The Sanitary product range offers a wide range of tubes and fittings with an internal surface finish from Ra<0,8 µm to Ra< 1,6 µm. The Sanitary range has tubes and fittings according to DIN 11850, ISO 2037, BS 4825, JIS G 3447, and ASME dimension standards.

UltraPure range tubes and fittings
The UltraPure product range offers a wide range of tubes and fittings with an internal surface finish from Ra<0,4 µm to Ra< 0,8 µm, either electro polished or mechanically polished. The UltraPure range has tubes and fittings according to DIN 11850, ISO 1127, and ASME BPE dimension standards. The UltraPure range is manufactured in compliance with the ASME BPE and DIN 11866 standards. All tubes and fittings are internally cleaned and individually capped and bagged. All product wetted st. st. products in the UltraPure range (except products w. H3o finish) are delivered with MTR (Mill Test Report) or with 3.1. certificate in accordance to EN 10204.
Certificates for H3o are available upon request.

The UltraPure range is manufactured under extra strict and through quality control methods. Wall thickness integrity is maintained through the use of fabrication grade minimum wall tubing for all cold-formed tubular products. After cold forming, our tube product is resized to ensure that the ovality falls within the prescribed tolerances. End facing is provided with a machined square-cut method. This allows for the most accurate and consistent orbital weld result. All fittings are put through 100% visual inspection and ovality and squareness tolerances are inspected with calibrated equipment. Surface finish is inspected with a calibrated profilometer to ensure the Roughness average (Ra) maximum is not exceeded.

Surface specification for Alfa Laval Sanitary range

Sanitary tubes

Alfa Laval designation	Surface texture (Ra µm)			Standard designa-tion	According to	Treatment	Dimension ranges			
	Internal Surface	Welded area	External				DIN 11850	ISO 2037	BS 4825	Tri-Clover® Sanitary ASME
BC	< 0.8	< 1.6	pickled	BC	DIN 11850	Annealed	X	X	X	
BD	< 0.8	< 1.6	< 1.0	BD	DIN 11850	Annealed	X	X	X	
CC	< 0.8	< 1.6	pickled	CC	DIN 11850	Not annealed	X			
CD	< 0.8	< 1.6	< 1.0	CD	DIN 11850	Not annealed	X			
Tri-Clover® Sanitary	< 0.8	< 0.8	< 0.8	No. 4 [1)]	3A	Annealed				X

1) According to 3A 33-01 section D1

Sanitary Fittings

Product	Surface designation		Dimension ranges				
	Internal	External	DIN	ISO	BS	JIS G	Tri-Clover® Sanitary ASME
Unions	Mat	Mat	X				
	Semi bright	Semi bright	X	X	X		
	Mirror	Mirror				X	
	3A	3A					X
Bends	Mat	Mat	X				
	Raw	Raw			X		
	Raw	Semi bright	X				
	Raw	Polished	X	X			
	Semi bright	Semi bright		X			
	Polished	Polished			X		
	Mirror	Mirror				X	
	3A	3A					X
Tees	Mat	Mat	X				
	Raw	Raw			X		
	Polished	Polished	X	X	X		
	Mirror	Mirror				X	
	3A	3A					X
Reducers	Mat	Mat	X				
	Raw	Semi bright	X				
	Raw	Polished		X	X		
	Semi bright	Semi bright		X			
	3A	3A					X

Explanation of surface designation for fittings

Alfa Laval designation	Method
Mat	Shot Blasted
Raw	As fabricated or tumbled
Semi bright	As fabricated or tumbled
Polished	Mechanically polished
Mirror	Mechanically polished and buffed for a shiny surface
3A	Mechanically polished or as fabricated

Surface specification for Alfa Laval Tri-Clover® UltraPure range

UltraPure tubes and fittings

Alfa Laval designation	Surface texture (Ra µm)			Standard designation		According to	Treatment	Tri-Clover® UltraPure ASME-BPE	Tri-Clover® UltraPure Series A and Series B
	Internal	Welded / Bended area	External	Turbular	Machined				
PL	< 0.5	< 0.5	< 0.8	SF1	SF1	ASME BPE	Annealed	X	
PM	< 0.4 EP[3)]	< 0.4 EP[3)]	< 0.8	SF4	SF4	ASME BPE	Annealed	X	
H3o/H3	< 0.8	< 0.8	< 1.6	H3o	H3	DIN 11866	Annealed		X
H4o/H4	< 0.4	< 0.4	< 0.8	H4o	H4	DIN 11866	Annealed		X
HE4o/HE4	< 0.4 EP[3)]	< 0.4 EP[3)]	< 0.8	HE4o	HE4	DIN 11866	Annealed		X

[3)] Electro polished

* SF-Surface Finish. SF4: Ra < 0.375 EP

Conversion table - Surface finish

Correlation between Grit and Ra values

Ra (µm)	Ra (µ inch)	US Grit	UK Grit
3	125		120
2	85		180
1.65	70	80	
1.5	50		240
0.75	30		320
0.62	25	180	
0.45	18	240	
0.40	15		500
0.25	10	320	

Material specification for Alfa Laval Sanitary range

Wetted steel parts

Material	Dimension ranges				
	DIN 11850	ISO 2037	BS 4825	JIS G 3447	Tri-Clover® Sanitary ASME
1.4301* (304)	X	X			
1.4307* (304L)	X	X	X	X	
1.4401* (316)			[1)]		
1.4404* (316L)	X	X	X	X	
304**					X
316L**					X

[1)] Reducers and Reducing tees are only available in 1.4401 (316)

* According to DIN EN 10088-1

** According to ASTM A 269 and A 270.

Seal ring material for clamp fittings

Material	Dimension ranges			
	DIN 11850	ISO 2037	BS 4825	Tri-Clover® Sanitary ASME
NBR	X	X	X	
Nitrile (Buna-N)				X
White Nitrile (White Buna-N)				X
EPDM	X	X	X	X
FPM	X	X	X	
Viton®				X
PTFE	X	X	X	X
Silicone (Q)	X	X		X

Material specification for Alfa Laval Tri-Clover® UltraPure range

Wetted steel parts

Material	Dimension ranges		
	Tri-Clover® UltraPure ASME-BPE	Tri-Clover® UltraPure Series A/DIN	Tri-Clover® UltraPure Series B/ ISO
1.4404* (316L)			X
1.4435* (316L)		X	X
316L**	X		

* According to DIN EN 10088-1

** According to ASTM A 269 and A 270 S2. All Tri-Clover® UltraPure ASME BPEweld ends are also according to ASME BPE sulphur content 0.005-0.017%

Series A and B are available in Delta Ferrite class DF-1 and DF-3 according to DIN 11866, see below

Delta Ferrite classes according to DIN 11866

DF-Class	Delta Ferrite value
1	≤ 3,0%
2	≤ 1,0%
3	≤ 0,5%

Gasket material in fittings

Material	Dimension ranges		
	Tri-Clover® UltraPure ASME-BPE	Tri-Clover® UltraPure Series A/ DIN	Tri-Clover® UltraPure Series B/ ISO
Nitrile (Buna-N)	X		
White Nitrile (White Buna-N)	X		
EPDM	X[4)]	X	X
FPM		X	X
Viton®	X[4)]		
White Viton®	X		
PTFE	X	[3)]	[3)]
Silicone (Q)	X[4)]		

[3)] PTFE only available for clamp gasket

[4)] EPDM, Viton and Silicone available with USP Class 6 certificate - please request by order.

Chemical composition table

Material Grade		C	Si	Mn	Chemical composition in % by mass					
Material Number	Standard				P	S	N	Cr	Ni	Mo
1.4404	DIN-EN 10088-1	≤ 0.030	≤ 1.000	≤ 2.00	0.045	≤ 0.015	≤ 0.11	16.50 - 18.50	10.00 - 13.00	2.00 - 2.50
1.4435	DIN-EN 10088-1	≤ 0.030	≤ 1.000	≤ 2.00	0.045	≤ 0.015	≤ 0.11	17.00 - 19.00	12.50 - 15.00	2.50 - 3.00
316L	ASTM A 269	≤ 0.035	≤ 0.750	≤ 2.00	0.040	≤ 0.030		16.00 - 18.00	10.00 - 15.00	2.00 - 3.00
316L*	ASTM BPE / ASTM A 270 S-2	≤ 0.035	≤ 0.075	≤ 2.00	0.040	0.005 - 0.017		16.00 - 18.00	10.00 - 10.00	2.00 - 3.00

*According to ASTM A 269 and A 270 S2. All Tri-Clover® UltraPure ASME BPEweld ends are also according to ASME BPE sulphur content 0.005-0.017%

Pressure ratings (bar) for Alfa Laval Tri-Clover® Sanitary range

Material	Dimension ranges				
	DIN 11850	ISO 2037	BS 4825	JIS G 3447	Tri-Clover® Sanitary ASME
Tubes (20°C)	52-213*	55-130*	56-467*		56-351*
Bends,Tees, Reducers (80/200°C)	25/15	25/15	25/15	25/15	25/15
Nut unions (80/200°C)	25/15	25/15	25/15	25/15	
Flange unions (80/200°C)	25/15	25/15	25/15	25/15	

* Tube pressure ratings depending on size (larger diameter smaller pressure rating)

Pressure ratings (bar) for Alfa Laval Tri-Clover® UltraPure range

Material	Dimension ranges		
	Tri-Clover® UltraPure ASME-BPE	Tri-Clover® UltraPure Series A/ DIN	Tri-Clover® UltraPure Series B/ ISO
Tubes (20°C)	56-351*	52-300*	54-320*
Bends,Tees, Reducers (80/200°C)	25/15	25/15	25/15
Nut unions (80/200°C)		25/15	25/15
Flange unions (80/200°C)		25/15	25/15

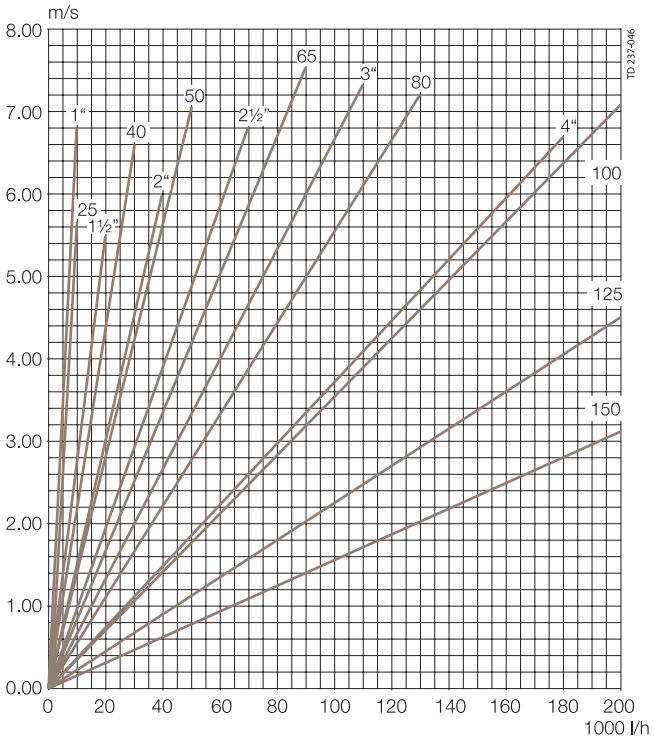
* Tube pressure ratings depending on size (larger diameter smaller pressure rating)

Pressure ratings (bar) of Tri-Clamp® Connections

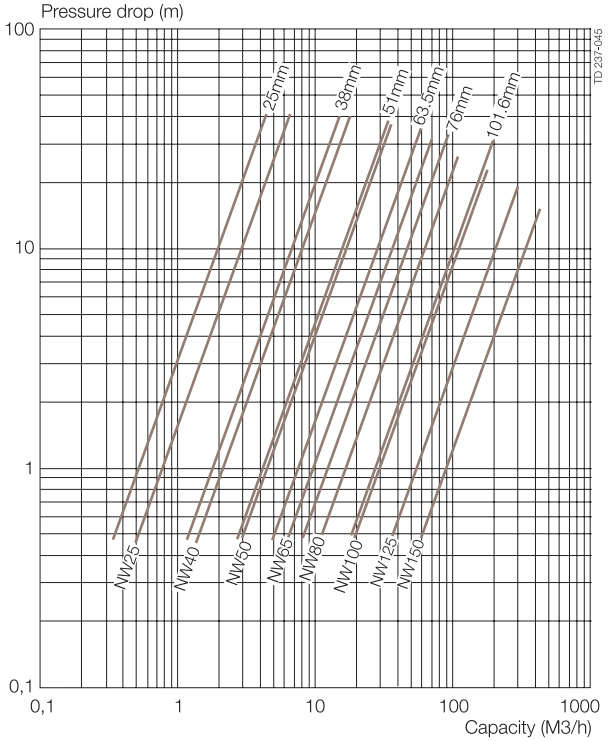
	Service Ratings* (bar)						
Size Tube OD	1/2 & 3/4 inch	1 & 1 1/2 inch	2 inch	2 1/2 inch	3 inch	4 inch	6 inch
13MHLA	(Screw tightened to maximum)						
at 20°C	--	10.3	10.3	10.3	10.3	10.3	--
at 120°C	--	8.6	8.6	8.6	8.6	5.2	--
13MHHM	(Wing nut tightened to 2.8 Nm of torque)						
at 20°C	--	34.5	31.0	27.6	24.1	20.7	10.3
at 120°C	--	20.7	20.7	13.8	13.4	10.3	5.2
13MHHS	(Wing nut tightened to 2.8 Nm of torque)						
at 20°C	151.7	41.4	37.9	31.0	24.1	20.7	--
at 120°C	82.7	20.7	19.0	15.5	12.1	10.3	--
13MHP	(Bolts tightened to 2.71 Nm of torque)						
at 20°C	--	103	68.9	68.9	68.9	85.7	20.7
at 120°C	--	82.7	55.2	55.2	85.2	41.4	13.8
A13MO	(1-3" nuts tightened to 2.3 Nm., 4"-6" 3.4 Nm. of torque)						
at 20°C	--	34.5	24.1	20.7	13.8	10.3	5.2
at 120°C	--	17.2	13.8	10.3	10.3	10.3	3.4
A13MHM	(Wing nut tightened to 2.8 Nm of torque)						
at 20°C	--	34.5	31	27.6	24.1	20.7	10.3
at 120°C	--	20.7	17.2	13.8	12.1	10.3	5.2

* Service ratings are based on hydrostatic tests using standard-molded Buna-N material gaskets, with proper installation of ferrules, assembly of joints and absence of shock pressure. Contact Alfa Laval for service of other type and material gaskets, and for ratings at higher temperatures.
All ratings shown are dependent upon related components within the systems and proper installation. For temperatures above 120° C, we recommend using only 13MHP clamps.

Pressure drop and flow velocity curves



Pressure drop in 100 m ISO 2037 and DIN 11850 tubes



Flow velocity in ISO 2037 and DIN 11850 tubes

ESE00301EN 1001

How to contact Alfa Laval
Contact details for all countries
are continually updated on our website.
Please visit www.alfalaval.com to
access the information direct.