



In all shapes, sizes and standards

Fittings from Alfa Laval - Tri-Clover®

Application

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 of 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. Tri-Clover Tri-Clamp® and Tri-Weld® Fittings are part of Alfa Laval's product line. Tubing is manufactured to Alfa Laval's stringent specifications, making it a perfect match for the Weld Fittings. Choose from a complete range of tube sizes, surface finishes and connection options. All BPE items are individually capped and bagged in clear 6 mil. Poly bags. All product is labeled 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.

UltraPure Fittings

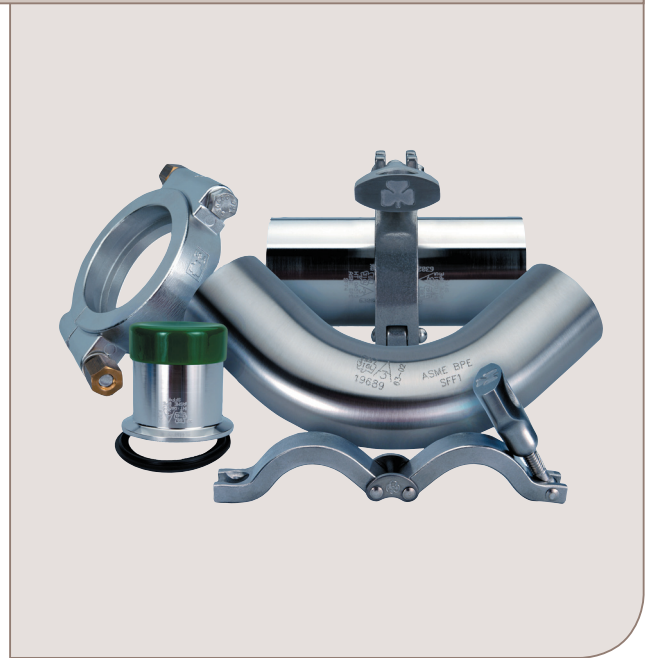
Alfa Laval is proud to present their line of Fittings designed for use in the Pharmaceutical and Bio-Technologies Industries. This line consists of Tri-Clover® parts with either Tri-Weld® ends suitable for use with Orbital Welding Equipment or self-aligning Tri-Clamp® end connections. Alfa Laval offers a full line of UltraPure Fittings that are manufactured in compliance with the current ASME BPE Standard.

All BPE items are individually capped and bagged in clear 6 mil. Poly bags. All product is labeled 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.

Technical Data

Wide Range of Surface Finish offering - Alfa Laval offers a range of Mechanical Polish as well as Electropolish finishes. Mechanical polishing is achieved by using a progressive series of abrasives, from low to high grit. This allows a consistent internal finish and both optimal and economical cleaning. Electropolishing is a further process that promotes a chromium-enriched surface layer that maximizes corrosion resistance as well as minimizing bacterial buildup on surface cavities.

Metallurgy - Incoming raw material goes through a stringent inspection process to ensure its chemistry will be ideal for both weldability and electropolishing



Quality Control Methods - Our manufacturing facilities operate under an approved ISO 9001 quality standard. Wall thickness integrity is maintained through the use of fabrication grade minimum wall tubing for all cold-formed tubular products. Our BPE fittings are designed for use with all current orbital welding equipment. After cold forming, our tube product is resized to ensure that the ovality falls within the prescribed BPE 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.

Hygienic fittings identified with this symbol on the following pages are accepted as meeting the 3A Hygienic standards by the appropriate committees of the International Association of Milk, Food and Environmental Sanitarians, U.S. Public Health Service, and Dairy Industry Committee.

Finish code	ID or Product Contact Surface				Polishing Method	OD or Product Non-contact Surface
	Maximum Surface Roughness (Ra)			ASME BPE Finish Code		
	Microinches (μ-inch)	Micrometers (μm)				
#1					Unpolished	Unpolished
#3	32	0.8	----		Mechanical polished	Unpolished
#7	32	0.8	----		Mechanical polished	Polished to Ra, 32 μ-inch/0.8 μm
PC	20	0.5	SF1		Mechanical polished	Unpolished
PD	15	0.4	SF4		Mechanical polished and electropolished	Unpolished
PL	20	0.5	SF1		Mechanical polished	Polished to Ra, 32 μ-inch/0.8 μm
PM	15	0.4	SF4		Mechanical polished and electropolished	Polished to Ra, 32 μ-inch/0.8 μm

Service Rating of Tri-Clamp® Connections

Size Tube OD	Service Ratings* (PSI)						
	½ & ¾ inch	1 & 1½ inch	2 inch	2½ inch	3 inch	4 inch	6 inch
13MHLA	(Screw tightened to maximum)						
at 70°F	--	150	150	150	150	100	--
at 250°F	--	125	125	125	125	75	--
13MHMM	(Wing nut tightened to 25 in. lb. of torque)						
at 70°F	--	500	450	400	350	300	150
at 250°F	--	300	300	200	195	150	75
13MHHS	(Wing nut tightened to 25 in. lb. of torque)						
at 70°F	2200	600	550	450	350	300	--
at 250°F	1200	300	275	225	175	150	--
13MHP	(Bolts tightened to 20 ft. lb. of torque)						
at 70°F	--	1500	1000	1000	1000	800	300
at 250°F	--	1200	800	800	800	600	200
A13MO	(1-3" nuts tightened to 20 in. lb., 4" to 30 in. lb.)						
at 70°F	--	500	350	300	200	100	75
at 250°F	--	250	200	150	100	100	50
A13MHM	(Wing nut tightened to 25 in. lb. of torque)						
at 70°F	--	500	450	400	350	300	150
at 250°F	--	300	250	200	175	150	75

* 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 Tri-Clover® 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 250° F, we recommend using only 13MHP clamps. This information is only valid if Tri-Clover® clamps, ferrules, and gaskets are used.

Tri-Clamp® Gasket Materials

Characteristic		Buna-N (U)	EPDM (E)	Fluoro- elastomer (SFY)	Silicone (X)	PTFE (G)
Original Physical Properties	Hardness, Shore A	70	70	70	70	---
	Tensile Strength, psi	1875	1650	1212	1340	---
	Elongation, %	340	317	272	260	---
Temperature Range		-65 to 200° F	-60 to 300° F	-20 to 350° F	-40 to 400° F	-40 to 200° F *
Resistance	Acid Resistance	Good	Good to Excel.	Good to Excel.	Poor to Good	Good to Excel.
	Alkali Resistance	Fair to Good	Good to Excel.	Poor to Good	Poor to Fair	Excellent
	Resistance to Fats/Oils	Good to Excel.	Poor	Good to Excel.	Poor to Good	Excellent
	Abrasion Resistance	Excellent	Good	Good to Excel.	Poor	Fair
	Compression Set Resistance	Good	Fair	Good to Excel.	Good to Excel.	Cold Flows

* Note: PTFE materials tendency to "cold flow" and incompressibility, limit its max. temperature to 200° F due to possible leaking problems.

Basic Dimensions of Tri-Clamp ®

Connection for Hygienic OD-Tubing			
OD Outer Diameter (Inches)	ID Inner Diameter (Inches)	Wall Thickness (Inches/Gauge)	A Ferrule Face (Inches)
½	0.37	0.065 / 16 ga.	0.984
¾	0.62	0.065 / 16 ga.	0.984
1	0.87	0.065 / 16 ga.	1.984
1½	1.37	0.065 / 16 ga.	1.984
2	1.87	0.065 / 16 ga.	2.516
2½	2.37	0.065 / 16 ga.	3.047
3	2.87	0.065 / 16 ga.	3.579
4	3.87	0.083 / 14 ga.	4.682

Hygienic Tube Information

Tube OD Inches	Tube ID Inches	Wall Thickness Inches	Volume Gal/100 ft	Weight Dry Lbs/100 ft	Weight with Water Lbs/100 ft	Flow (GPM) at a Mean Velocity		
						5 fps	7 fps	10 fps
½	0.37	0.065	0.56	30.6	35.3	1.7	2.3	3.4
¾	0.62	0.065	1.57	48.2	61.3	4.7	6.6	9.4
1	0.87	0.065	3.09	65.8	91.5	9.3	13	19
1½	1.37	0.065	7.66	100.9	164.8	23	32	46
2	1.87	0.065	14.27	136.1	255.1	43	60	86
2½	2.37	0.065	22.92	171.2	362.4	69	96	138
3	2.87	0.065	33.6	206.4	486.7	101	141	202
4	3.834	0.083	59.97	351.8	851.9	180	252	360
6	5.782	0.109	136.39	694.7	1832.2	409	573	818
8	7.782	0.109	247.07	930.6	2991.1	741	1038	1482

Technical Information

Pipe Schedule and Chemical Composition

Schedule 5 Pipe			
Size	OD Inches	ID Inches	Wall Thickness
⅛	0.405	0.335	0.035
¼	0.540	0.442	0.049
⅜	0.675	0.577	0.049
½	0.840	0.710	0.065
¾	1.500	0.920	0.065
1	1.315	1.185	0.065
1¼	1.660	1.530	0.065
1½	1.900	1.770	0.065
2	2.375	2.245	0.065
2½	2.875	2.790	0.083
3	3.500	3.334	0.083
3½	4.000	3.834	0.083
4	4.500	4.334	0.083
5	5.563	5.345	0.109
6	6.625	6.407	0.109
8	8.625	8.407	0.109

	Chemical Composition %	
	304	316L
C	0.080	0.030
MN	2.000	2.000
P	0.045	0.045
S	0.030	0.030*
Si	1.000	1.000
Cr	18.0-20.0	16.0-18.0
Ni	8.0-13.0	10.0-14.0
Mo	-	2.0-3.0

* The sulfur content for 316L ASME BPE fittings is 0.005-0.017% for all weld ends.

Material Test Reports (MTRs)

Easy Online Access to Comprehensive Fittings Information



A 5-alpha character serial ID is stenciled on to each new 316SS fitting

As one of the most comprehensive and technologically advanced reports in the market, our new Material Test Reports (MTRs) provide detailed information that takes traceability and validation to a new level. Alfa Laval has established a new standard as all MTRs are available 24 hours a day, 7 days a week online at www.alfalaval.us.

Simply type a 5-alpha character code (e.g. AAABC) called the serial ID, which you can find stenciled on each new 316SS fitting, to access the following information:

- All heat certification numbers used to manufacture the fitting
- Date the fitting was manufactured
- The fitting's part number and description
- View and print any MTR and the above information

This web site will even allow you to print the MTR or original heat certification from the raw material supplier. If you do not know the actual number, MTRs can be searched by either MTR serial ID or heat certification number.

Go to www.alfalaval.us and follow these simple steps to access MTRs:

Step 1. Once at our website, click on the MTR link

The screenshot shows the Alfa Laval website homepage. The 'Material Test Reports' link is highlighted in red in the 'Links' section. Other sections include 'Alfa Laval in the USA', 'About Alfa Laval', 'News', 'Parts and Service', 'Case stories', 'Press Releases', and 'Tools'.

Step 2. On the MTR page, click "View Material Test Reports"


The screenshot shows the Material Test Reports page. It features a search form for the MTR serial ID (AAABC) and a 'View Material Test Report's on-line' link highlighted in red. The page also includes a 'What's new and improved' section and a 'Traceability' section.

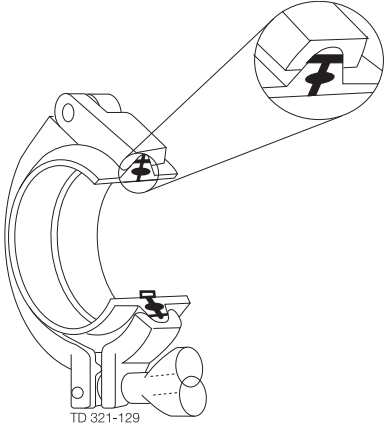
Step 3. Enter or search for the Serial ID

The screenshot shows the MTRWEB search interface. It includes a search form for the MTR Serial ID (AAABC) and a 'Search' button. The 'MTRWEB Instructions' section lists search options: 'Search For MTR Serial ID Documents', 'Print A Copy Of An MTR Serial ID Document', 'Search For Heat Certifications', and 'Create an Ad Hoc MTR Serial Document'. The 'Ad Hoc MTR Serial Document' link is highlighted in red.


Connection Types

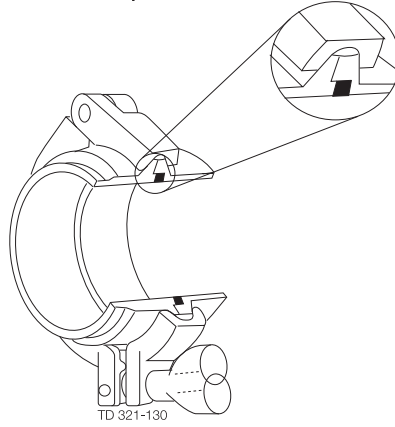
Clamp Fittings

 Authorized to carry the 3A symbol




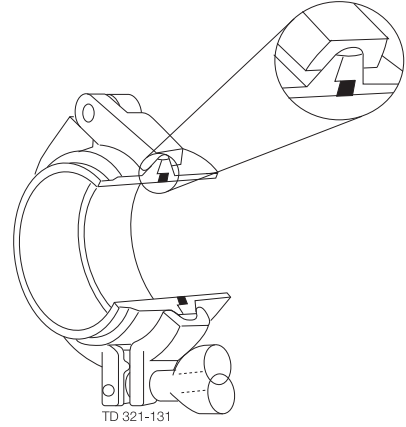
Tri-Clamp

 Authorized to carry the 3A symbol



HDI-Line

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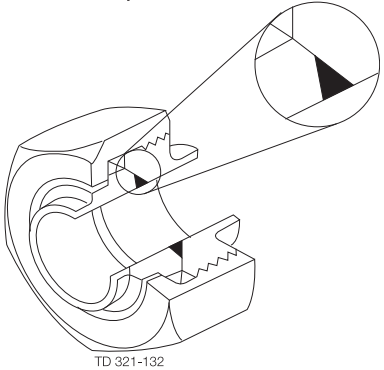
H-Line

A connection is made up of a plain ferrule, a clamp, and a gasket. Tees, elbows and reducers are available with Tri-Clamp connections. All three styles are in compliance with 3A standards for C.I.P. (clean in place). The three types of clamp fittings are designed for use in Food, Dairy, Pharmaceutical and Chemical Industries.


- Tri-Clamp connections are the industry standard, having nueter-style ferrules to simplify design and installation.
- H-Line and HDI-Line male/female ferrules self-align during tightening so joints are quick and easy to assemble or take apart.
- H-Line uses the same series of clamps as the Tri-Clamp.

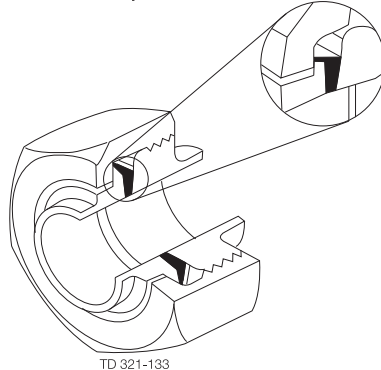
Threaded Fittings

 Authorized to carry the 3A symbol




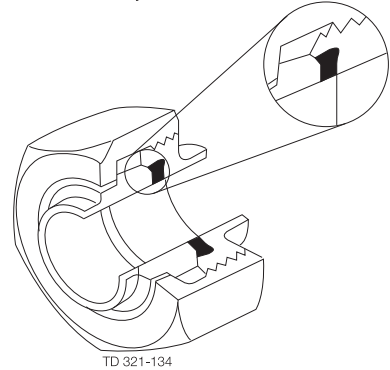
Bevel Seat

 Authorized to carry the 3A symbol



John Perry

 Authorized to carry the 3A symbol



DC

A connection is made up of a plain ferrules, a threaded ferrule, a nut and a gasket. The faces on Bevel Seat fittings are angled to create a metal to metal sealing surface. A John Perry fitting consists of a flat-faced threaded ferrule, a flat-faced plain ferrule and a profiled gasket. These joints are particularly useful with swing connections and flow diverter panels. A DC fitting utilizes the Bevel Seat plain ferrule and a threaded ferrule with a grooved face to retain a gasket. The three types of threaded fittings are designed for use in the Food, Dairy, and Beverage processing industries. Bevel Seat Joints are in compliance with 3A standards for manual cleaning. Both John Perry and DC fittings are in compliance with 3A standards for C.I.P. (clean-in-place).

- Bevel Seat
- John Perry
- DC

Loss of head pressure due to friction. Loss is shown in feet of head. Loss through tubing is for 1ft.of tube

Capacity in U.S. G.P.M.	O.D. 1" I.D.		O.D. 1 1/2" I.D.		O.D. 2" I.D.		O.D. 2 1/2" I.D.		O.D. 3" I.D.		O.D. 4" I.D.							
	Tee	Elbow	Tee	Elbow	Tee	Elbow	Tee	Elbow	Tee	Elbow	Tee	Elbow						
2	0.01	0.01	0.1															
4	0.025	0.02	0.2															
5	0.035	0.025	0.25															
10	0.12	0.06	0.4	0.02	0.01	0.15	0.005	0.015	0.1									
15	0.25	0.1	0.8	0.04	0.02	0.25	0.013	0.02	0.15									
20	0.43	0.22	1.5	0.06	0.03	0.3	0.02	0.025	0.2	0.005	0.02	0.1	0.003	0.02	0.06			
25	0.66	0.4	2.3	0.08	0.04	0.4	0.025	0.03	0.25	0.006	0.03	0.15	0.004	0.03	0.08			
30	0.93	0.7	3.3	0.105	0.06	0.55	0.035	0.05	0.3	0.008	0.05	0.2	0.005	0.04	0.1			
35	1.22	1.25	5.2	0.135	0.09	0.8	0.04	0.06	0.4	0.011	0.06	0.25	0.006	0.05	0.13			
40				0.17	0.11	1.0	0.05	0.08	0.5	0.015	0.07	0.3	0.007	0.06	0.15			
45				0.21	0.16	1.3	0.063	0.1	0.6	0.02	0.09	0.35	0.008	0.065	0.18			
50				0.25	0.2	1.6	0.073	0.12	0.7	0.022	0.1	0.4	0.01	0.07	0.2			
60				0.34	0.35	2.2	0.1	0.18	0.9	0.03	0.12	0.45	0.015	0.08	0.25			
80				0.57	0.76	3.7	0.16	0.3	1.5	0.05	0.15	0.55	0.02	0.1	0.4			
100				0.85	1.35	5.8	0.23	0.44	2.3	0.075	0.18	0.6	0.03	0.11	0.5	0.008	0.04	0.1
120				1.18	2.05	9.1	0.32	0.64	3.3	0.105	0.21	1.0	0.04	0.13	0.6	0.01	0.05	0.15
140							0.42	0.85	4.5	0.14	0.23	1.25	0.05	0.16	0.8	0.013	0.06	0.2
160							0.54	1.13	5.8	0.17	0.28	1.6	0.07	0.2	1.1	0.015	0.07	0.25
180							0.67	1.45	7.4	0.205	0.31	2.0	0.08	0.21	1.3	0.02	0.08	0.3
200							0.81	1.82	9.0	0.245	0.35	2.5	0.1	0.26	1.6	0.025	0.09	0.4
220							0.95	2.22	11.0	0.29	0.41	3.0	0.12	0.3	1.9	0.028	0.1	0.5
240							1.10	2.63	13.5	0.34	0.48	3.7	0.14	0.33	2.2	0.035	0.11	0.55
260										0.39	0.53	4.5	0.165	0.39	2.5	0.04	0.115	0.6
280										0.45	0.61	5.3	0.19	0.42	2.8	0.045	0.12	0.65
300										0.515	0.7	6.2	0.22	0.5	3.1	0.05	0.13	0.7
350										0.68	1.05	8.5	0.28	0.67	4.1	0.07	0.15	0.9
400										0.86	1.55	11.0	0.36	0.88	5.2	0.085	0.18	1.2
450										1.05	2.25	13.5	0.44	1.1	6.6	0.105	0.2	1.5
500													0.54	1.4	8.0	0.13	0.23	1.75
550													0.64	1.7	9.5	0.15	0.27	2.1
600													0.75	2.05	10.2	0.175	0.3	2.5
650													0.87	2.41	13.0	0.2	0.34	2.8
700													1.0	2.8	15.0	0.23	0.4	3.4
750																0.26	0.43	3.8
800																0.3	0.5	4.4
850																0.33	0.56	5.0
900																0.37	0.62	5.7
950																0.41	0.7	6.3
1000																0.45	0.8	7.0
1100																0.53	1.06	8.6

- NOTES: 1. For elbows - R/D=1.5
2. Flow thru tees
Flow A to B
Port C capped off
3. Test medium - water at 70° F

Prepared by members of the hygenic pump subgroup
of the natl. assn. of dairy equipment manufacturers.

Alfa Laval reserves the right to change specifications without prior notification. ALFA LAVAL is a trademark registered and owned by Alfa Laval Corporate AB.

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