



A Full Line of Stainless Steel Flow Control Equipment for the Pharmaceutical, Biotechnology, and Personal Care Processing Industries



PUMPS · VALVES · FITTINGS · TUBING · CUSTOM FABRICATIONS

Active members: ISPE
Active Committee Participants: ASME BPE

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TOP LINE

PROCESS EQUIPMENT COMPANY

Top Line Process Equipment Company is a leading supplier of sanitary stainless steel process equipment.

For over 50 years we've provided our customers with exceptional customer service and quality products. We market through a world-wide network of distributors and large OEM's. Top Line's involvement with its distributors includes not only providing competitively priced products but to support an ongoing line of communication between ourselves and the ultimate end user of the product. We provide full factory and technical support to our customers along with both customer and project leads.

Our modern, well equipped facilities are staffed by our skilled and dedicated craftsmen. Consistently meeting important tolerances and finish specifications is of primary concern to us. Before any products leave our plant, they are subjected to rigid quality assurance checks. Top Line should always be considered your first choice for both standard and custom fabricated stainless steel products.

We are committed to meeting the fastest delivery, new product development and application engineering to meet all our customer's needs with our extensive inventory and expert sales team.

BPE Products

This publication is designed to provide the biopharm industry with the most current information on high purity equipment. Top Line Process Equipment Company and Allegheny Bradford Corporation have been contributing members to the BPE standards since its first publication in 1997 and have worked closely with end users and engineering firms long before this date in developing the most appropriate standards for bioprocessing.

BPE Fittings

Top Line provides BPE fittings manufactured to BPE standards in sizes ranging from 1/2" through 4" in both automatic weld and hygienic clamp ends. 6" fittings also available. These fittings are manufactured in exact compliance with BPE dimensions, tolerances, surface finish specifications, and metallurgy. All BPE fittings are protected with end caps, sealed in transparent bags or shrink wrapped and provided with material test reports.



BPE Certified Tubing

Top Line provides BPE certified tubing in sizes ranging from 1/2" though 6". This domestic product is manufactured from 316L stainless steel in exact compliance with BPE dimensional and surface finish specifications. All BPE tubing is protected with end caps, sealed in 6 mil protective sleeves, and shipped in wood boxes or tri-wall corrugated cartons for maximum protection.

BPE Surface Finish

Surface finish preparation is a mechanical process (polishing) that reduces or eliminates material surface finish imperfections and allows increased clean-ability and reduced coefficient of friction. Surface finish can be further enhanced by electropolishing, a controlled electrochemical process to further smooth the surface by removal of metal. R_a ($\mu\text{in.}$) (microinches) or (μm) (micrometers) is a numerical expression of measured surface roughness or texture of a polished metal surface. Measurements are taken with a profilometer across the lay where possible. Clearly defined surface designations have been developed to describe an acceptable surface finish for the bioprocessing industry.

Surface	R_a Max. I.D.		Polishing
Designation	$\mu\text{in.}$	μm	Criteria
SF0	No Finish Requirement		
SF1	20	0.51	Mechanically Polished
SF2	25	0.64	Mechanically Polished
SF3	30	0.76	Mechanically Polished
SF4	15	0.38	Mechanically Polished and Electropolished
SF5	20	0.51	Mechanically Polished and Electropolished
SF6	25	0.64	Mechanically Polished and Electropolished

BPE Dimensions and Tolerances

Top Line BPE fittings are manufactured to BPE standards for stainless steel tube automatic weld fittings, hygienic clamp fittings and other process components. Fittings are made with nominal outside diameter (O.D.) tubing type 316L stainless steel. Tolerances stated are after heat and surface treatment. Automatic weld ends are supplied cut and squared.

Nominal Size	OD	OD	Wall	Wall	Wall
Inches	Inches	Tolerances	Inches	Polished Tolerance	Polished & EP Tolerance
1/2	0.500	±0.005	0.065	+0.005/-0.008	+0.005/-0.010
3/4	0.750	±0.005	0.065	+0.005/-0.008	+0.005/-0.010
1	1.000	±0.005	0.065	+0.005/-0.008	+0.005/-0.010
1-1/2	1.500	±0.008	0.065	+0.005/-0.008	+0.005/-0.010
2	2.000	±0.008	0.065	+0.005/-0.008	+0.005/-0.010
2-1/2	2.500	±0.010	0.065	+0.005/-0.008	+0.005/-0.010
3	3.000	±0.010	0.065	+0.005/-0.008	+0.005/-0.010
4	4.000	±0.015	0.083	+0.008/-0.010	+0.008/-0.012
6	6.000	±0.030	0.109	+0.015/-0.015	+0.015/-0.017

Website URL Shortening

This catalog includes website URLs on every page to give you immediate access to the most up-to-date and detailed information available specific to the product you are reviewing. The website addresses (URLs) in this catalog have been shortened for your convenience and will direct you to information about the products you are viewing on the catalog page. For example, the C-Series pumps page includes topln.co/curves, which you can type into your web browser to immediately view the pump curves for the C-Series pumps. Please call 1-800-458-6095 if you have any questions.

Glossary of Terms

Automatic weld - Uses equipment which welds without the constant adjusting of controls by the welder or operator. Equipment controls joint alignment by using an automatic sensing device.

Bioprocessing - Specific process that uses complete living cells or their components (e.g., bacteria, enzymes, chloroplasts) to obtain desired products.

Borescope - An optical device consisting of a rigid or flexible tube with an eyepiece on one end, an objective lens on the other, linked together by a relay optical system in between. Used for the inspection of difficult access locations.

Clean-in-place (CIP) - A method of cleaning the interior surfaces of pipes, vessels, process equipment, typically with acid, caustic or a combination of both, without disassembly.

Compendial water - Water that complies with USP and/or other acknowledged body related to the quality, manufacture or distribution of high purity water.

Dead leg - An area of entrapment in a vessel or piping run that could lead to contamination of the product.

Electropolishing - An electrochemical process that removes material from a metallic workpiece. It is used to polish, passivate, and deburr metal parts.

Fixture mark - An area on an electropolished component where the electrical connection was made for processing the component.

Full penetration weld - A weld joint where the depth of the weld extends from its face into the weld joint so that the joint is fully fused.

Gasket - A static seal which fills the space between two or more mating surfaces, generally to prevent leakage from or into the joined objects while under compression.

Heat number - The identification number that is stamped on a material plate after it is removed from the ladle and rolled at a steel mill.

Hydrotest - A pressure test of vessels, piping or components performed by pressurizing the internal volume with water at a pressure defined by applicable code.

Hygienic - Term used to describe equipment and piping systems that, by their design, construction and operation provide for cleanliness so that the products produced will not adversely affect human or animal health.

Lay - One of the three components of surface finish. Lay is the direction of the predominant surface pattern ordinarily determined by the production method used.

Manual welding - Welding in which the entire welding operation is performed and controlled by hand.

Maximum working temperature/pressure - The temperature/pressure at which the system is capable of operating for a sustained period of time.

Mechanical seal - A device used for sealing fluids with rotating shafts.

Orbital welding - Automatic welding whereby the arc is rotated mechanically through 360° (180° in double up welding) around a static work piece, an object such as a pipe, in a continuous process, with or without filler material.

O-ring - A static seal of circular cross section.

Passivation - The removal of free iron from the surface of stainless steel by means of a chemical dissolution usually by acid which enhance the formation of the passive layer.

Product contact surface - Any surface that contacts raw materials, process materials and/or product.

Profilometer - A measuring instrument used to measure a surface's profile, in order to quantify its roughness.

R_a - Log of the arithmetic mean of the surface profile.

Steam-in-place (SIP) - The use of steam to sterilize a piece of equipment without the use of an autoclave.

Sterile - Free from living organisms.

Surface finish - The description of the surface expressed in R_a.

Validation - Documented evidence that the system does what it purports to do.

WFI - A classification of compendial water suitable for human injection.

Other useful links

topln.co/conversiontables

topln.co/glossary

BPE Fittings

YOUR CHOICE:

We offer:

- BPE Compliant Made in the USA
- BPE Certified Manufacturing

It's easy!

Just specify which
option when ordering!



BPE Fittings Specifications

Size Range: 1/2" OD - 6" OD

Materials: 316L (Stock No. Prefix 40) for weld connections

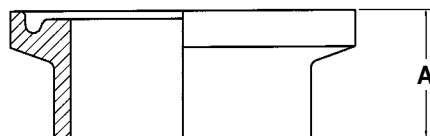
316L (Stock No. Prefix 48) for clamp connections

Finish: No. 7 - 20R_a ID (SF1)/32R_a OD (BPE SF1)

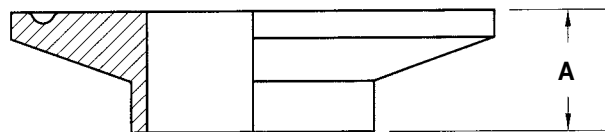
No. 7EP - 15R_a ID electropolish/32R_a OD (BPE SF4)

10R_a ID available

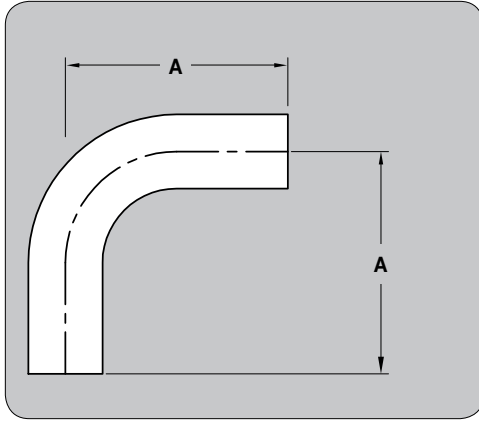
Ferrule Type:



TYPE "A" FERRULE



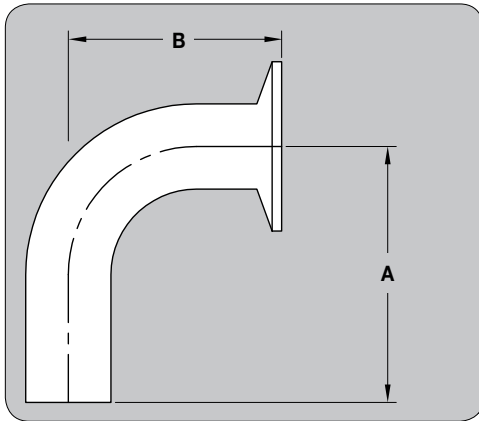
TYPE "B" FERRULE



TL2S – Elbow 90° Weld Ends BPE 316L

BPE# DT-4.1.1-1

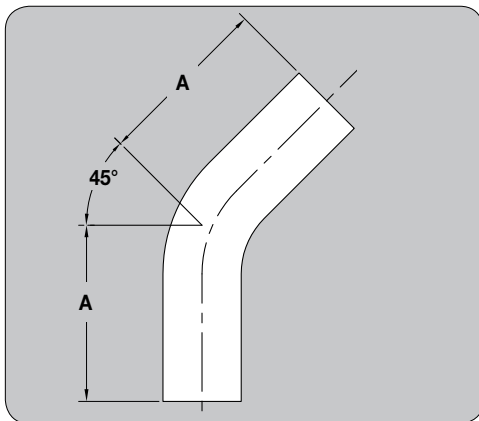
SIZE (TUBE O.D.)	A	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
1/2	3	40705-7	40705-7EP
3/4	3	40707-7	40707-7EP
1	3	40710-7	40710-7EP
1-1/2	3-3/4	40715-7	40715-7EP
2	4-3/4	40720-7	40720-7EP
2-1/2	5-1/2	40725-7	40725-7EP
3	6-1/4	40730-7	40730-7EP
4	8	40740-7	40740-7EP
6	11-1/2	40760-7	40760-7EP



TL2CMS – Elbow 90° Weld X Clamp BPE 316L

BPE# DT-4.1.1-2

SIZE (TUBE O.D.)	TYPE	A	B	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
1/2	A	3	1-5/8	407MS05-7	407MS05-7EP
3/4	A	3	1-5/8	407MS07-7	407MS07-7EP
1	A	3	2	–	–
1	B	3	2	407MS10-7	407MS10-7EP
1-1/2	B	3-3/4	2-3/4	407MS15-7	407MS15-7EP
2	B	4-3/4	3-1/2	407MS20-7	407MS20-7EP
2-1/2	B	5-1/2	4-1/4	407MS25-7	407MS25-7EP
3	B	6-1/4	5	407MS30-7	407MS30-7EP
4	B	8	6-5/8	407MS40-7	407MS40-7EP
6	B	11-1/2	10-1/2	407MS60-7	–



TL2KS – Elbow 45° Weld Ends BPE 316L

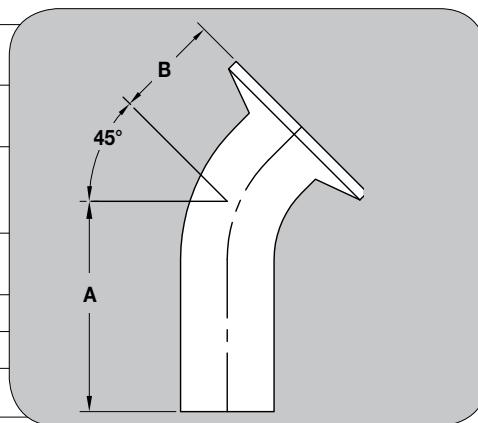
BPE# DT-4.1.1-4

SIZE (TUBE O.D.)	A	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
1/2	2-1/4	40805-7	40805-7EP
3/4	2-1/4	40807-7	40807-7EP
1	2-1/4	40810-7	40810-3EP
1-1/2	2-1/2	40815-7	40815-7EP
2	3	40820-7	40820-7EP
2-1/2	3-3/8	40825-7	40825-7EP
3	3-5/8	40830-7	40830-7EP
4	4-1/2	40840-7	40840-7EP
6	6-1/4	40860-7	–

BPE# DT-4.1.1-5

TL2KMS – Elbow 45° Weld X Clamp BPE 316L

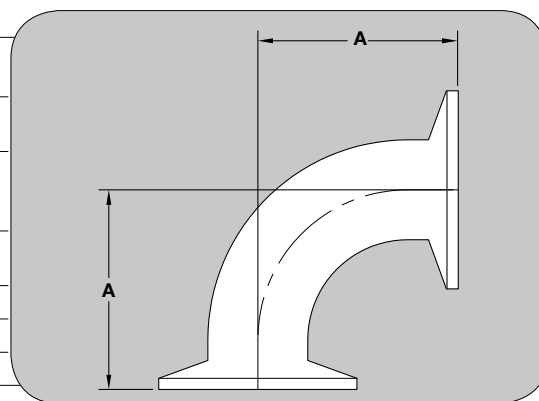
SIZE (TUBE O.D.)	TYPE	A	B	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
1/2	A	2-1/4	1	408MS05-7	408MS05-7EP
3/4	A	2-1/4	1	408MS07-7	408MS07-7EP
1	A	2-1/4	1-1/8	–	–
1	B	2-1/4	1-1/8	408MS10-7	408MS10-7EP
1-1/2	B	2-1/2	1-7/16	408MS15-7	408MS15-7EP
2	B	3	1-3/4	408MS20-7	408MS20-7EP
2-1/2	B	3-3/8	2-1/16	408MS25-7	408MS25-7EP
3	B	3-5/8	2-3/8	408MS30-7	408MS30-7EP
4	B	4-1/2	3-1/8	408MS40-7	408MS40-7EP
6	B	6-1/4	5-1/4	408MS60-7	–



BPE# DT-4.1.1-3

2CMP – Elbow 90° Clamp Ends BPE 316L

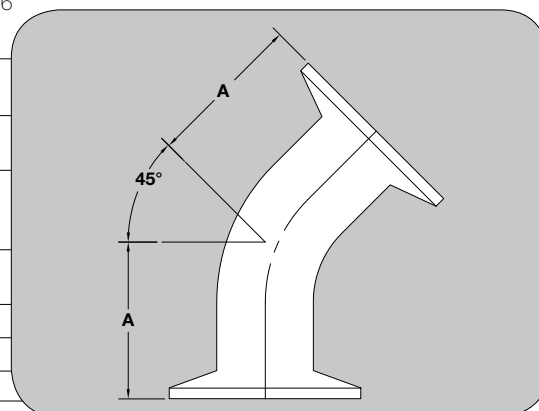
SIZE (TUBE O.D.)	TYPE	A	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
1/2	A	1-5/8	48705-7	48705-7EP
3/4	A	1-5/8	48707-7	48707-7EP
1	A	2	–	–
1	B	2	48710-7	48710-7EP
1-1/2	B	2-3/4	48715-7	48715-7EP
2	B	3-1/2	48720-7	48720-7EP
2-1/2	B	4-1/4	48725-7	48725-7EP
3	B	5	48730-7	48730-7EP
4	B	6-5/8	48740-7	48740-7EP
6	B	10-1/2	48760-7	48760-7EP

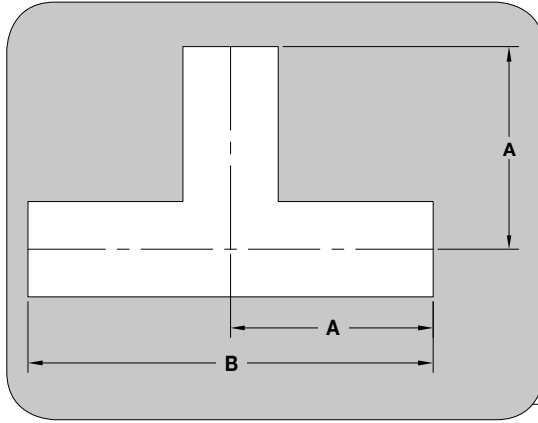


BPE# DT-4.1.1-6

2KMP – Elbow 45° Clamp Ends BPE 316L

SIZE (TUBE O.D.)	TYPE	A	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
1/2	A	1	48805-7	48805-7EP
3/4	A	1	48807-7	48807-7EP
1	A	1-1/8	–	–
1	B	1-1/8	48810-7	48810-7EP
1-1/2	B	1-7/16	48815-7	48815-7EP
2	B	1-3/4	48820-7	48820-7EP
2-1/2	B	2-1/16	48825-7	48825-7EP
3	B	2-3/8	48830-7	48830-7EP
4	B	3-1/8	48840-7	48840-7EP
6	B	5-1/4	48860-7	–

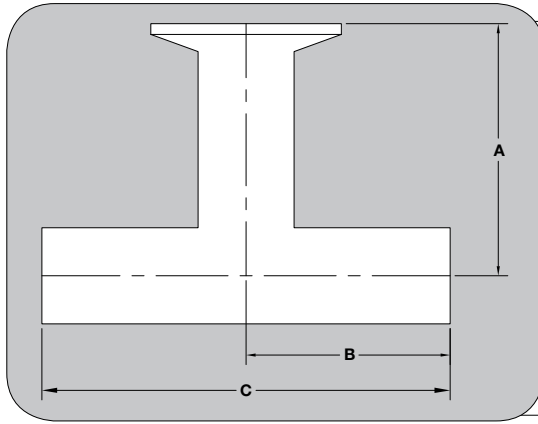




TL7WWW – Tee Weld Ends BPE 316L

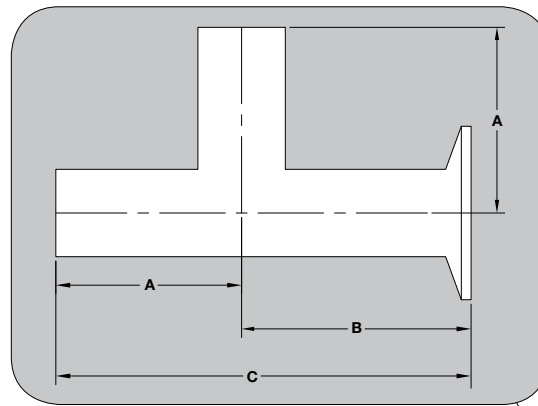
BPE# DT-4.1.2-1

SIZE (TUBE O.D.)	A	B	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
1/2	1-7/8	3-3/4	401105-7	401105-7EP
3/4	2-3/8	4	401107-7	401107-7EP
1	2-1/8	4-1/4	401110-7	401110-7EP
1-1/2	2-3/8	4-3/4	401115-7	401115-7EP
2	2-7/8	5-3/4	401120-7	401120-7EP
2-1/2	3-1/8	6-1/4	401125-7	401125-7EP
3	3-3/8	6-3/4	401130-7	401130-7EP
4	4-1/8	8-1/4	401140-7	401140-7EP
6	5-5/8	11-1/4	401160-7	401160-7EP



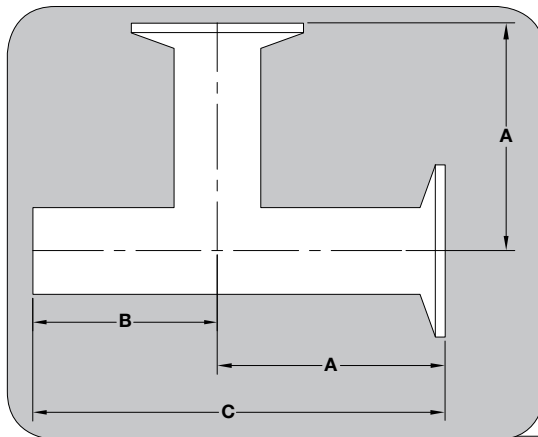
TL7WWW – Tee Weld X Weld X Clamp 316L

SIZE (TUBE O.D.)	TYPE	A	B	C	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
1/2	A	2-1/4	1-7/8	3-3/4	4011MB05-7	4011MB05-7EP
3/4	A	2-3/8	2	4	4011MB07-7	4011MB07-7EP
1	A	2-5/8	2-1/8	4-1/4	–	–
1	B	2-5/8	2-1/8	4-1/4	4011MB10-7	4011MB10-7EP
1-1/2	B	2-7/8	2-3/8	4-3/4	4011MB15-7	4011MB15-7EP
2	B	3-3/8	2-7/8	5-3/4	4011MB20-7	4011MB20-7EP
2-1/2	B	3-5/8	3-1/8	6-1/4	4011MB25-7	4011MB25-7EP
3	B	3-7/8	3-3/8	6-3/4	4011MB30-7	4011MB30-7EP
4	B	4-3/4	4-1/8	8-1/4	4011MB40-7	4011MB40-7EP
6	B	7-1/8	5-5/8	11-1/4	–	–



TL7WMW – Tee Weld X Clamp X Weld 316L

SIZE (TUBE O.D.)	TYPE	A	B	C	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
1/2	A	1-7/8	2-3/8	4-1/4	4011M05-7	4011M05-7EP
3/4	A	2	2-1/2	4-1/2	4011M07-7	4011M07-7EP
1	A	2-1/8	2-5/8	4-3/4	–	–
1	B	2-1/8	2-5/8	4-3/4	4011M10-7	4011M10-7EP
1-1/2	B	2-3/8	2-7/8	5-1/4	4011M15-7	4011M15-7EP
2	B	2-7/8	3-3/8	6-1/4	4011M20-7	4011M20-7EP
2-1/2	B	3-1/8	3-5/8	6-3/4	4011M25-7	4011M25-7EP
3	B	3-3/8	3-7/8	7-1/4	4011M30-7	4011M30-7EP
4	B	4-1/8	4-3/4	8-7/8	4011M40-7	4011M40-7EP
6	B	5-5/8	7-1/8	12-3/4	–	–



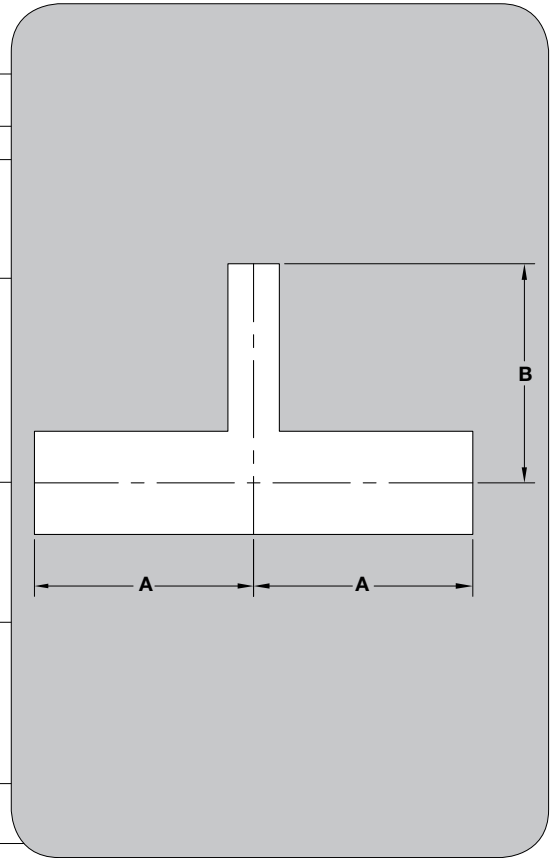
TL7WMM – Tee Weld X Clamp X Clamp 316L

SIZE (TUBE O.D.)	TYPE	A	B	C	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
1/2	A	2-3/8	1-7/8	4-1/4	4011MMB05-7	4011MMB05-7EP
3/4	A	2-1/2	2	4-1/2	4011MMB07-7	4011MMB07-7EP
1	A	2-5/8	2-1/8	4-3/4	–	–
1	B	2-5/8	2-1/8	4-3/4	4011MMB10-7	4011MMB10-7EP
1-1/2	B	2-7/8	2-3/8	5-1/4	4011MMB15-7	4011MMB15-7EP
2	B	3-3/8	2-7/8	6-1/4	4011MMB20-7	4011MMB20-7EP
2-1/2	B	3-5/8	3-1/8	6-3/4	4011MMB25-7	4011MMB25-7EP
3	B	3-7/8	3-3/8	7-1/4	4011MMB30-7	4011MMB30-7EP
4	B	4-3/4	4-1/8	8-7/8	4011MMB40-7	4011MMB40-7EP
6	B	7-1/8	5-5/8	12-3/4	–	–

BPE# DT-4.1.2-6

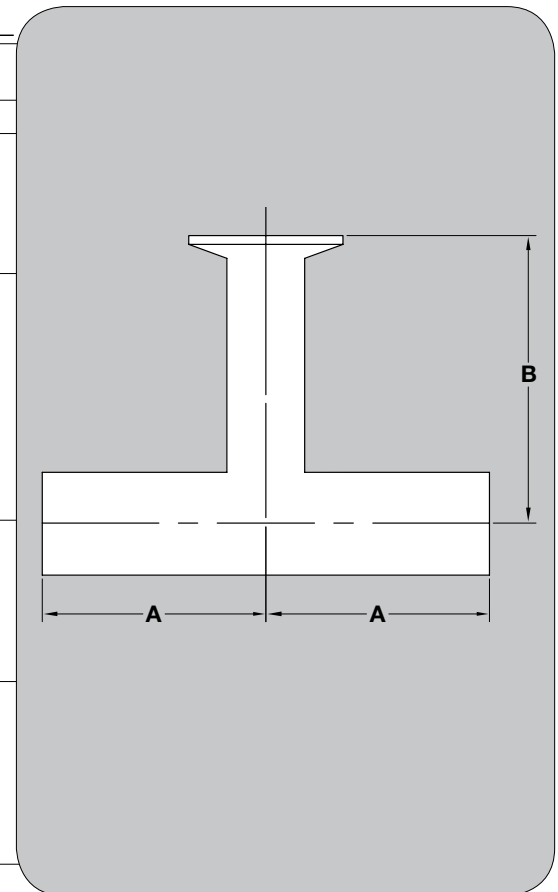
TL7RWWW – Tee Reducing Weld Ends BPE 316L

SIZE	A	B	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
3/4 X 1/2	2	2	401107R05-7	401107R05-7EP
1 X 1/2	2-1/8	2-1/8	401110R05-7	401110R05-7EP
1 X 3/4	2-1/8	2-1/8	401110R07-7	401110R07-7EP
1-1/2 X 1/2	2-3/8	2-3/8	401115R05-7	401115R05-7EP
1-1/2 X 3/4	2-3/8	2-3/8	401115R07-7	401115R07-7EP
1-1/2 X 1	2-3/8	2-3/8	401115R10-7	401115R10-7EP
2 X 1/2	2-7/8	2-5/8	401120R05-7	401120R05-7EP
2 X 3/4	2-7/8	2-5/8	401120R07-7	401120R07-7EP
2 X 1	2-7/8	2-5/8	401120R10-7	401120R10-7EP
2 X 1-1/2	2-7/8	2-5/8	401120R15-7	401120R15-7EP
2-1/2 X 1/2	3-1/8	2-7/8	401125R05-7	401125R05-7EP
2-1/2 X 3/4	3-1/8	2-7/8	401125R07-7	401125R07-7EP
2-1/2 X 1	3-1/8	2-7/8	401125R10-7	401125R10-7EP
2-1/2 X 1-1/2	3-1/8	2-7/8	401125R15-7	401125R15-7EP
2-1/2 X 2	3-1/8	2-7/8	401125R20-7	401125R20-7EP
3 X 1/2	3-3/8	3-1/8	401130R05-7	401130R05-7EP
3 X 3/4	3-3/8	3-1/8	401130R07-7	401130R07-7EP
3 X 1	3-3/8	3-1/8	401130R10-7	401130R10-7EP
3 X 1-1/2	3-3/8	3-1/8	401130R15-7	401130R15-7EP
3 X 2	3-3/8	3-1/8	401130R20-7	401130R20-7EP
3 X 2-1/2	3-3/8	3-1/8	401130R25-7	401130R25-7EP
4 X 1/2	4-1/8	3-5/8	401140R05-7	401140R05-7EP
4 X 3/4	4-1/8	3-5/8	401140R07-7	–
4 X 1	4-1/8	3-5/8	401140R10-7	401140R10-7EP
4 X 1-1/2	4-1/8	3-5/8	401140R15-7	401140R15-7EP
4 X 2	4-1/8	3-7/8	401140R20-7	401140R20-7EP
4 X 2-1/2	4-1/8	3-7/8	401140R25-7	401140R25-7EP
4 X 3	4-1/8	3-7/8	401140R30-7	401140R30-7EP
6 X 3	5-5/8	4-7/8	401160R30-7	–
6 X 4	5-5/8	5-1/8	401160R40-7	401160R40-7EP



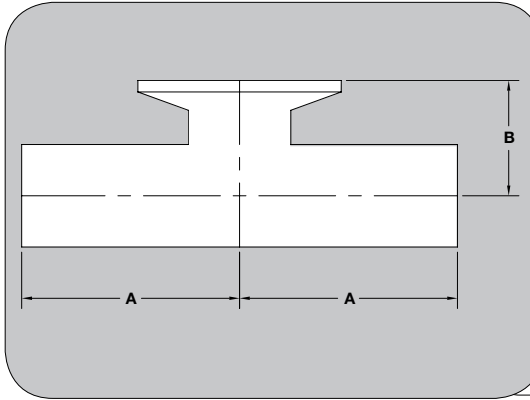
TL7RWWW – Tee Reducing Weld X Weld X Clamp 316L

SIZE	TYPE	A	B	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
3/4 X 1/2	A	2	2-1/2	401107MB05-7	–
1 X 1/2	A	2-1/8	2-5/8	401110MB05-7	–
1 X 3/4	A	2-1/8	2-5/8	401110MB07-7	–
1-1/2 X 1/2	A	2-3/8	2-7/8	401115MB05-7	–
1-1/2 X 3/4	A	2-3/8	2-7/8	401115MB07-7	–
1-1/2 X 1	A	2-3/8	2-7/8	–	–
1-1/2 X 1	B	2-3/8	2-7/8	401115MB10-7	401115MB10-7EP
2 X 1/2	A	2-7/8	3-1/8	–	–
2 X 3/4	A	2-7/8	3-1/8	401120MB07-7	–
2 X 1	A	2-7/8	3-1/8	–	–
2 X 1	B	2-7/8	3-1/8	401120MB10-7	–
2 X 1-1/2	B	2-7/8	3-1/8	401120MB15-7	401120MB15-7EP
2-1/2 X 1/2	A	3-1/8	3-3/8	–	–
2-1/2 X 3/4	A	3-1/8	3-3/8	–	–
2-1/2 X 1	A	3-1/8	3-3/8	–	–
2-1/2 X 1	B	3-1/8	3-3/8	–	–
2-1/2 X 1-1/2	B	3-1/8	3-3/8	401125MB15-7	–
2-1/2 X 2	B	3-1/8	3-3/8	401125MB20-7	–
3 X 1/2	A	3-3/8	3-5/8	–	–
3 X 3/4	A	3-3/8	3-5/8	–	–
3 X 1	A	3-3/8	3-5/8	–	–
3 X 1	B	3-3/8	3-5/8	401130MB10-7	–
3 X 1-1/2	B	3-3/8	3-5/8	401130MB15-7	–
3 X 2	B	3-3/8	3-5/8	401130MB20-7	–
3 X 2-1/2	B	3-3/8	3-5/8	401130MB25-7	–
4 X 1/2	A	4-1/8	4-1/8	401140MB05-7	–
4 X 3/4	A	4-1/8	4-1/8	401140MB07-7	–
4 X 1	A	4-1/8	4-1/8	–	–
4 X 1	B	4-1/8	4-1/8	401140MB10-7	–
4 X 1-1/2	B	4-1/8	4-1/8	401140MB15-7	–
4 X 2	B	4-1/8	4-3/8	401140MB20-7	–
4 X 2-1/2	B	4-1/8	4-3/8	401140MB25-7	–
4 X 3	B	4-1/8	4-3/8	401140MB30-7	–
6 X 4	B	5-5/8	5-3/4	–	–



BPE# DT-4.1.2-2

TL7WWMS – Tee Weld X Weld X Short Outlet Clamp BPE 316L

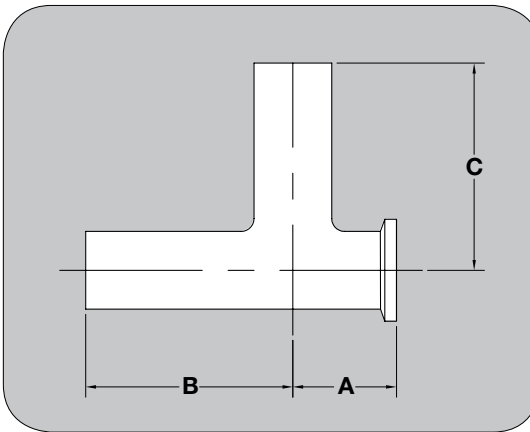


SIZE (TUBE O.D.)	TYPE	A	B	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
1/2	A	1-7/8	1	401105S-7*	401105S-7EP*
3/4	A	2	1-1/8	401107S-7	401107S-7EP
1	A	2-1/8	1-1/8	401110S-7*	401110S-7EP*
1	B	2-1/8	1-1/8	401110S-7*	401110S-7EP*
1-1/2	B	2-3/8	1-3/8	401115S-7*	401115S-7EP*
2	B	2-7/8	1-5/8	401120S-7	401120S-7EP
2-1/2	B	3-1/8	1-7/8	401125S-7	401125S-7EP
3	B	3-3/8	2-1/8	401130S-7*	401130S-7EP*
4	B	4-1/8	2-3/4	401140S-7*	401140S-7EP*
6	B	5-5/8	4-5/8	401160S-7*	–

*DOES NOT MEET MINIMUM TANGENT LENGTHS IN BPE TABLE DT-4.1.1

BPE# DT-4.1.2-3

TL7WMSW – Tee Weld X Short Outlet Clamp X Weld BPE 316L

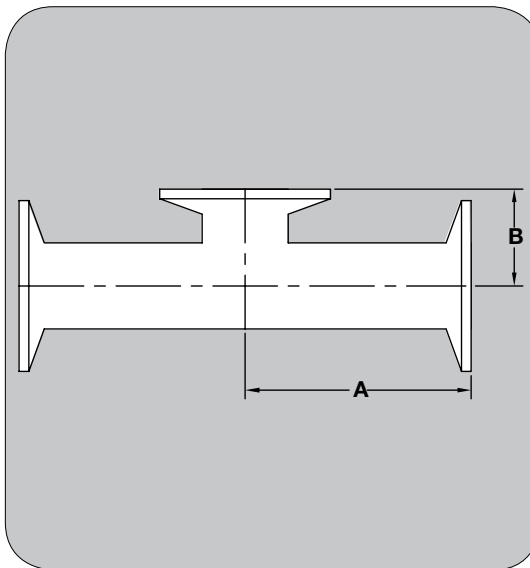


SIZE (TUBE O.D.)	TYPE	A	B	C	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
1/2	A	7/8	1-7/8	1-7/8	4011MS05-7	4011MS05-7EP
3/4	A	1	2	2	4011MS07-7	4011MS07-7EP
1	A	1-1/8	2-1/8	2-1/8	–	–
1	B	1-1/8	2-1/8	2-1/8	4011MS10-7*	4011MS10-7EP*
1-1/2	B	1-3/8	2-3/8	2-3/8	4011MS15-7*	4011MS15-7EP*
2	B	1-5/8	2-7/8	2-7/8	4011MS20-7	4011MS20-7EP
2-1/2	B	1-7/8	3-1/8	3-1/8	4011MS25-7	4011MS25-7EP
3	B	2-1/8	3-3/8	3-3/8	4011MS30-7*	4011MS30-7EP*
4	B	2-3/4	4-1/8	4-1/8	4011MS40-7*	4011MS40-7EP*
6	B	4-5/8	5-5/8	5-5/8	–	–

*DOES NOT MEET MINIMUM TANGENT LENGTHS IN BPE TABLE DT-4.1.1

BPE# DT-4.1.2-5

7MPS – Tee Camp X Clamp X Short Outlet Clamp BPE 316L



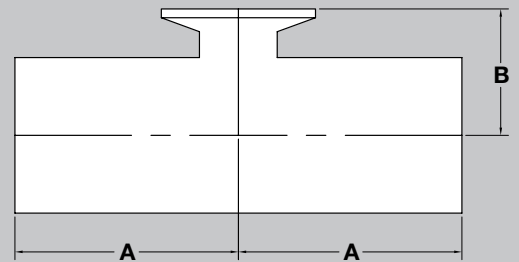
SIZE (TUBE O.D.)	TYPE	A	B	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
1/2	A	2-1/4	1	481105S-7	481105S-7EP
3/4	A	2-3/8	1-1/8	481107S-7	481107S-7EP
1	A	2-5/8	1-1/8	–	–
1	B	2-5/8	1-1/8	481110S-7	481110S-7EP
1-1/2	B	2-7/8	1-3/8	481115S-7	481115S-7EP
2	B	3-3/8	1-5/8	481120S-7	481120S-7EP
2-1/2	B	3-5/8	1-7/8	481125S-7	481125S-7EP
3	B	3-7/8	2-1/8	481130S-7	481130S-7EP
4	B	4-3/4	2-3/4	481140S-7	481140S-7EP
6	B	7-1/8	4-5/8	–	–

BPE# DT-4.1.2-7

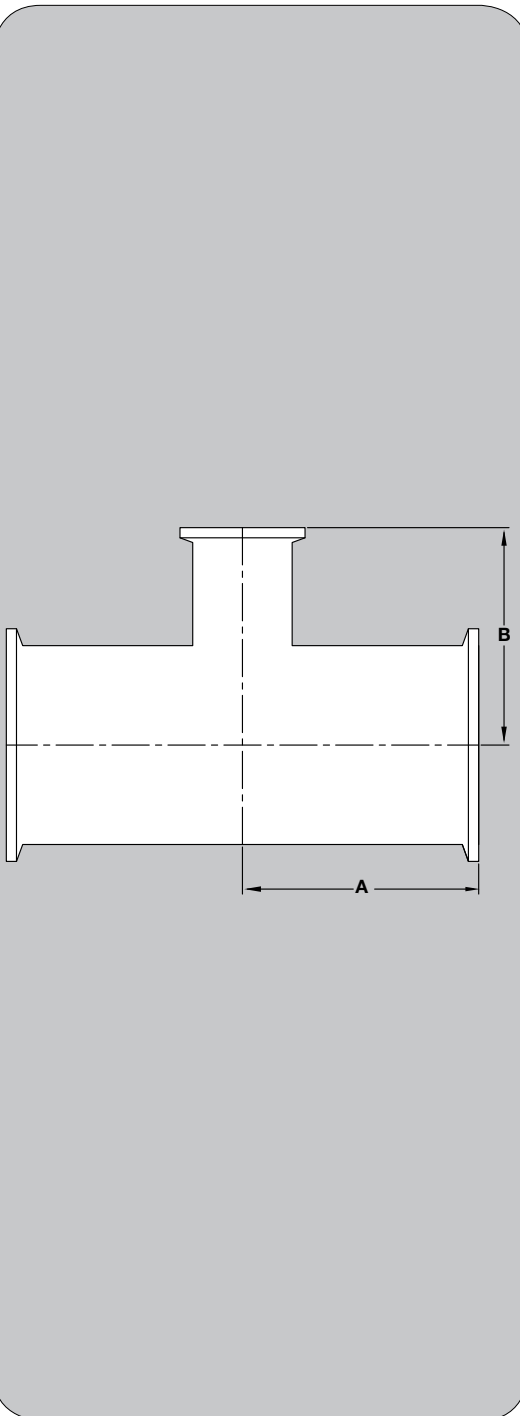
TL7RWWMS – Tee Reducing Weld Ends BPE 316L

SIZE (TUBE O.D.)	TYPE	A	B	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
3/4 X 1/2	A	2	1	401107RS05-7	401107RS05-7EP
1 X 1/2	A	2-1/8	1-1/8	401110RS05-7	401110RS05-7EP
1 X 3/4	A	2-1/8	1-1/8	401110RS07-7	401110RS07-7EP
1-1/2 X 1/2	A	2-3/8	1-3/8	401115RS05-7	401115RS05-7EP
1-1/2 X 3/4	A	2-3/8	1-3/8	401115RS07-7	401115RS07-7EP
1-1/2 X 1	A	2-3/8	1-3/8	–	–
1-1/2 X 1	B	2-3/8	1-3/8	401115RS10-7*	401115RS10-7EP*
2 X 1/2	A	2-7/8	1-5/8	401120RS05-7	401120RS05-7EP
2 X 3/4	A	2-7/8	1-5/8	401120RS07-7	401120RS07-7EP
2 X 1	A	2-7/8	1-5/8	–	–
2 X 1	B	2-7/8	1-5/8	401120RS10-7	401120RS10-7EP
2 X 1-1/2	B	2-7/8	1-5/8	401120RS15-7	401120RS15-7EP
2-1/2 X 1/2	A	3-1/8	1-7/8	401125RS05-7	401125RS05-7EP
2-1/2 X 3/4	A	3-1/8	1-7/8	401125RS07-7	401125RS07-7EP
2-1/2 X 1	A	3-1/8	1-7/8	–	–
2-1/2 X 1	B	3-1/8	1-7/8	401125RS10-7	401125RS10-7EP
2-1/2 X 1-1/2	B	3-1/8	1-7/8	401125RS15-7	401125RS15-7EP
2-1/2 X 2	B	3-1/8	1-7/8	401125RS20-7	401125RS20-7EP
3 X 1/2	A	3-3/8	2-1/8	401130RS05-7	401130RS05-7EP
3 X 3/4	A	3-3/8	2-1/8	401130RS07-7	401130RS07-7EP
3 X 1	A	3-3/8	2-1/8	–	–
3 X 1	B	3-3/8	2-1/8	401130RS10-7	401130RS10-7EP
3 X 1-1/2	B	3-3/8	2-1/8	401130RS15-7	401130RS15-7EP
3 X 2	B	3-3/8	2-1/8	401130RS20-7	401130RS20-7EP
3 X 2-1/2	B	3-3/8	2-1/8	401130RS25-7	401130RS25-7EP
4 X 1/2	A	4-1/8	2-5/8	401140RS05-7	401140RS05-7EP
4 X 3/4	A	4-1/8	2-5/8	401140RS07-7	–
4 X 1	A	4-1/8	2-5/8	–	–
4 X 1	B	4-1/8	2-5/8	401140RS10-7	401140RS10-7EP
4 X 1-1/2	B	4-1/8	2-5/8	401140RS15-7	401140RS15-7EP
4 X 2	B	4-1/8	2-5/8	401140RS20-7	401140RS20-7EP
4 X 2-1/2	B	4-1/8	2-5/8	401140RS25-7	401140RS25-7EP
4 X 3	B	4-1/8	2-5/8	401140RS30-7	401140RS30-7EP
6 X 3	B	5-5/8	3-5/8	401160RS30-7	–
6 X 4	B	5-5/8	3-3/4	401160RS40-7	–

*DOES NOT MEET MINIMUM TANGENT LENGTHS IN BPE TABLE DT-4.1.1



7RMP – Tee Reducing Clamp Ends BPE 316L BPE# DT-4.1.2-8

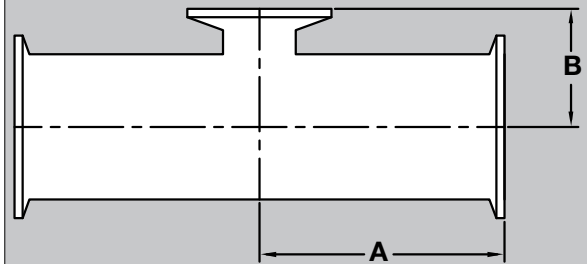


SIZE (TUBE O.D.)	TYPE	A	B	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
3/4 X 1/2	A/A	2-1/2	2-1/2	481107R05-7	481107R05-7EP
1 X 1/2	A/A	2-5/8	2-5/8	–	–
1 X 1/2	B/A	2-5/8	2-5/8	481110R05-7	481110R05-7EP
1 X 3/4	A/A	2-5/8	2-5/8	–	–
1 X 3/4	B/A	2-5/8	2-5/8	481110R07-7	481110R07-7EP
1-1/2 X 1/2	B/A	2-7/8	2-7/8	481115R05-7	481115R05-7EP
1-1/2 X 3/4	B/A	2-7/8	2-7/8	481115R07-7	481115R07-7EP
1-1/2 X 1	B/A	2-7/8	2-7/8	–	–
1-1/2 X 1	B/B	2-7/8	2-7/8	481115R10-7	481115R10-7EP
2 X 1/2	B/A	3-3/8	3-1/8	481120R05-7	481120R05-7EP
2 X 3/4	B/A	3-3/8	3-1/8	481120R07-7	481120R07-7EP
2 X 1	B/A	3-3/8	3-1/8	–	–
2 X 1	B/B	3-3/8	3-1/8	481120R10-7	481120R10-7EP
2 X 1-1/2	B/B	3-3/8	3-1/8	481120R15-7	481120R15-7EP
2-1/2 X 1/2	B/A	3-5/8	3-3/8	481125R05-7	481125R05-7EP
2-1/2 X 3/4	B/A	3-5/8	3-3/8	481125R07-7	481125R07-7EP
2-1/2 X 1	B/A	3-5/8	3-3/8	–	–
2-1/2 X 1	B/B	3-5/8	3-3/8	481125R10-7	481125R10-7EP
2-1/2 X 1-1/2	B/B	3-5/8	3-3/8	481125R15-7	481125R15-7EP
2-1/2 X 2	B/B	3-5/8	3-3/8	481125R20-7	481125R20-7EP
3 X 1/2	B/B	3-7/8	3-5/8	481130R05-7	481130R05-7EP
3 X 3/4	B/A	3-7/8	3-5/8	481130R07-7	481130R07-7EP
3 X 1	B/A	3-7/8	3-5/8	–	–
3 X 1	B/B	3-7/8	3-5/8	481130R10-7	481130R10-7EP
3 X 1-1/2	B/B	3-7/8	3-5/8	481130R15-7	481130R15-7EP
3 X 2	B/B	3-7/8	3-5/8	481130R20-7	481130R20-7EP
3 X 2-1/2	B/B	3-7/8	3-5/8	481130R25-7	481130R25-7EP
4 X 1/2	B/A	4-3/4	4-1/8	481140R05-7	481140R05-7EP
4 X 3/4	B/A	4-3/4	4-1/8	481140R07-7	481140R07-7EP
4 X 1	B/A	4-3/4	4-1/8	–	–
4 X 1	B/B	4-3/4	4-1/8	481140R10-7	481140R10-7EP
4 X 1-1/2	B/B	4-3/4	4-1/8	481140R15-7	481140R15-7EP
4 X 2	B/B	4-3/4	4-3/8	481140R20-7	481140R20-7EP
4 X 2-1/2	B/B	4-3/4	4-3/8	481140R25-7	481140R25-7EP
4 X 3	B/B	4-3/4	4-3/8	481140R30-7	481140R30-7EP
6 X 4	B/B	7-1/8	5-3/4	–	–

BPE# DT-4.1.2-9

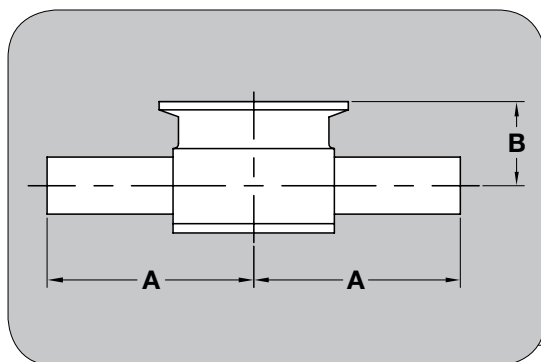
7RMPS – Tee Reducing Clamp X Clamp X Short Outlet Clamp BPE 316L

SIZE (TUBE O.D.)	TYPE	A	B	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
3/4 X 1/2	A/A	2-1/2	1	481107RS05-7	481107RS05-7EP
1 X 1/2	A/A	2-5/8	1-1/8	–	–
1 X 1/2	B/A	2-5/8	1-1/8	481110RS05-7	481110RS05-7EP
1 X 3/4	A/A	2-5/8	1-1/8	–	–
1 X 3/4	B/A	2-5/8	1-1/8	481110RS07-7	481110RS07-7EP
1-1/2 X 1/2	B/A	2-7/8	1-3/8	481115RS05-7	481115RS05-7EP
1-1/2 X 3/4	B/A	2-7/8	1-3/8	481115RS07-7	481115RS07-7EP
1-1/2 X 1	B/A	2-7/8	1-3/8	–	–
1-1/2 X 1	B/B	2-7/8	1-3/8	481115RS10-7	481115RS10-7EP
2 X 1/2	B/A	3-3/8	1-5/8	481120RS05-7	481120RS05-7EP
2 X 3/4	B/A	3-3/8	1-5/8	481120RS07-7	481120RS07-7EP
2 X 1	B/A	3-3/8	1-5/8	–	–
2 X 1	B/B	3-3/8	1-5/8	481120RS10-7	481120RS10-7EP
2 X 1-1/2	B/B	3-3/8	1-5/8	481120RS15-7	481120RS15-7EP
2-1/2 X 1/2	B/A	3-5/8	1-7/8	481125RS05-7	481125RS05-7EP
2-1/2 X 3/4	B/A	3-5/8	1-7/8	481125RS07-7	481125RS07-7EP
2-1/2 X 1	B/A	3-5/8	1-7/8	–	–
2-1/2 X 1	B/B	3-5/8	1-7/8	481125RS10-7	481125RS10-7EP
2-1/2 X 1-1/2	B/B	3-5/8	1-7/8	481125RS15-7	481125RS15-7EP
2-1/2 X 2	B/B	3-5/8	1-7/8	481125RS20-7	481125RS20-7EP
3 X 1/2	B/A	3-7/8	2-1/8	481130RS05-7	481130RS05-7EP
3 X 3/4	B/A	3-7/8	2-1/8	481130RS07-7	481130RS07-7EP
3 X 1	B/A	3-7/8	2-1/8	–	–
3 X 1	B/B	3-7/8	2-1/8	481130RS10-7	481130RS10-7EP
3 X 1-1/2	B/B	3-7/8	2-1/8	481130RS15-7	481130RS15-7EP
3 X 2	B/B	3-7/8	2-1/8	481130RS20-7	481130RS20-7EP
3 X 2-1/2	B/B	3-7/8	2-1/8	481130RS25-7	481130RS25-7EP
4 X 1/2	B/A	4-3/4	2-5/8	481140RS05-7	481140RS05-7EP
4 X 3/4	B/A	4-3/4	2-5/8	481140RS07-7	481140RS07-7EP
4 X 1	B/A	4-3/4	2-5/8	–	–
4 X 1	B/B	4-3/4	2-5/8	481140RS10-7	481140RS10-7EP
4 X 1-1/2	B/B	4-3/4	2-5/8	481140RS15-7	481140RS15-7EP
4 X 2	B/B	4-3/4	2-5/8	481140RS20-7	481140RS20-7EP
4 X 2-1/2	B/B	4-3/4	2-5/8	481140RS25-7	481140RS25-7EP
4 X 3	B/B	4-3/4	2-5/8	481140RS30-7	481140RS30-7EP
6 X 4	B/B	7-1/8	3-3/4	–	–



BPE# DT-4.1.2-10

TL71WWMS – Tee Clamp X Weld Ends BPE 316L

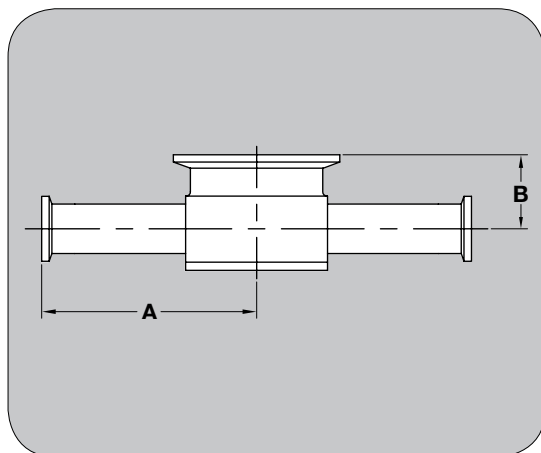


SIZE (TUBE O.D.)	TYPE	A	B	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
1/2 X 1-1/2	B	2-1/2	7/8	407105W15C-7	407105W15C-7EP
1/2 X 2	B	2-3/4	1	407105W20C-7	407105W20C-7EP
3/4 X 1-1/2	B	2-1/2	1	407107W15C-7	407107W15C-7EP
3/4 X 2	B	2-3/4	1-1/8	407107W20C-7	407107W20C-7EP
1 X 1-1/2	B	2-1/2	1-1/8	407110W15C-7	407110W15C-7EP
1 X 2	B	2-3/4	1-1/4	407110W20C-7	407110W20C-7EP
1-1/2 X 2	B	2-3/4	1-1/2	407115W20C-7	407115W20C-7EP

TL71MPS – Tee Instrument Type

Clamp Ends BPE 316L

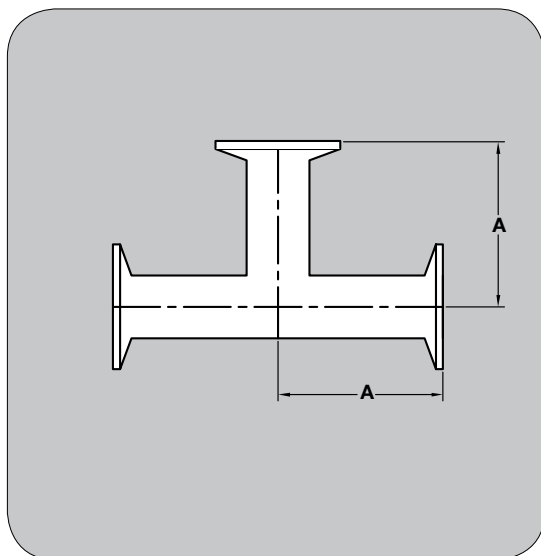
BPE# DT-4.1.2-11



SIZE (TUBE O.D.)	TYPE	A	B	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
1/2 X 1-1/2	A/B	3	7/8	487105C15C-7	487105C15C-7EP
1/2 X 2	A/B	3-1/4	1	487105C20C-7	487105C20C-7EP
3/4 X 1-1/2	A/B	3	1	487107C15C-7	487107C15C-7EP
3/4 X 2	A/B	3-1/4	1-1/8	487107C20C-7	487107C20C-7EP
1 X 1-1/2	A/B	3	1-1/8	–	–
1 X 1-1/2	B/B	3	1-1/8	487110C15C-7	487110C15C-7EP
1 X 2	A/B	3-1/4	1-1/4	–	–
1 X 2	B/B	3-1/4	1-1/4	487110C20C-7	487110C20C-7EP
1-1/2 X 2	B/B	3-1/4	1-1/2	487115C20C-7	487115C20C-7EP

7MP – Tee Clamp Ends BPE 316L

BPE# DT-4.1.2-4

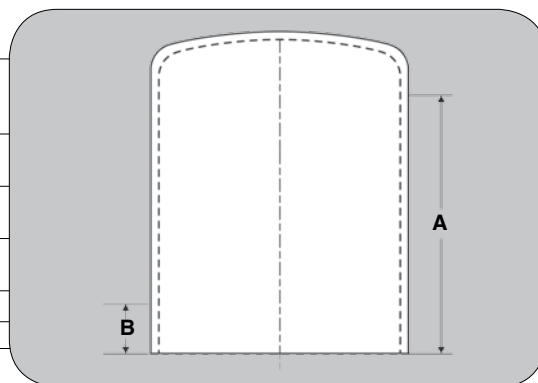


SIZE (TUBE O.D.)	TYPE	A	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
1/2	A	2-1/4	481105-7	481105-7EP
3/4	A	2-3/8	481107-7	481107-7EP
1	A	2-5/8	–	–
1	B	2-5/8	481110-7	481110-7EP
1-1/2	B	2-7/8	481115-7	481115-7EP
2	B	3-3/8	481120-7	481120-7EP
2-1/2	B	3-5/8	481125-7	481125-7EP
3	B	3-7/8	481130-7	481130-7EP
4	B	4-3/4	481140-7	481140-7EP
6	B	7-1/8	481160-7	481160-7EP

TL16W – Cap Weld Ends BPE 316L

BPE# DT-4.1.5-1

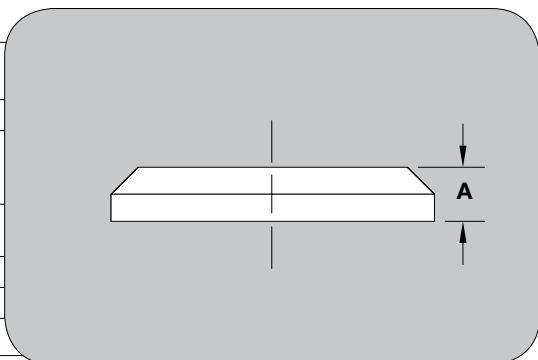
SIZE (TUBE O.D.)	A MINIMUM O.D. TANGENT LENGTH	B MINIMUM I.D. CONTROL PORTION	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
1/2	1-1/2	3/8	4031605-7	4031605-7EP
3/4	1-1/2	3/8	4031607-7	4031607-7EP
1	1-1/2	3/8	4031610-7	4031610-7EP
1-1/2	1-1/2	3/8	4031615-7	4031615-7EP
2	1-1/2	3/8	4031620-7	4031620-7EP
2-1/2	1-1/2	3/8	4031625-7	4031625-7EP
3	1-3/4	3/8	4031630-7	4031630-7EP
4	2	3/8	4031640-7	4031640-7EP



16AMP – Cap Solid End Clamp End BPE 316L

BPE# DT-4.1.5-2

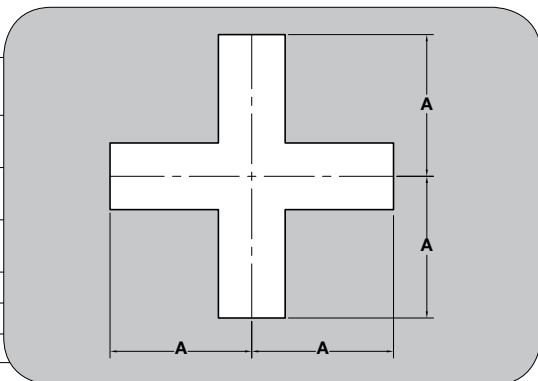
SIZE (TUBE O.D.)	A	TYPE	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
1/2 & 3/4	3/16	A	489807-7	489807-7EP
1	1/4	A	—	—
1	1/4	B	489810-7	489810-7EP
1-1/2	1/4	B	—	—
2	1/4	B	489820-7	489820-7EP
2-1/2	1/4	B	489825-7	489825-7EP
3	1/4	B	489830-7	489830-7EP
4	5/16	B	489840-7	489840-7EP
6	7/16	B	489860-7	489860-7EP



TL9WWWW – Cross Weld Ends BPE 316L

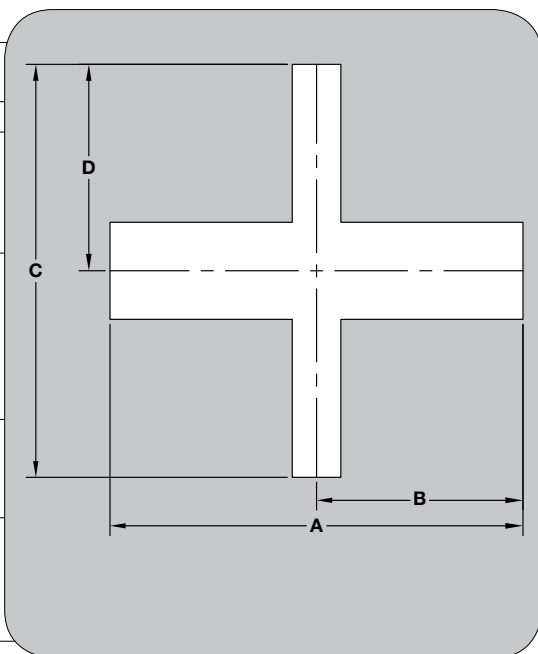
BPE# DT-4.1.2-1

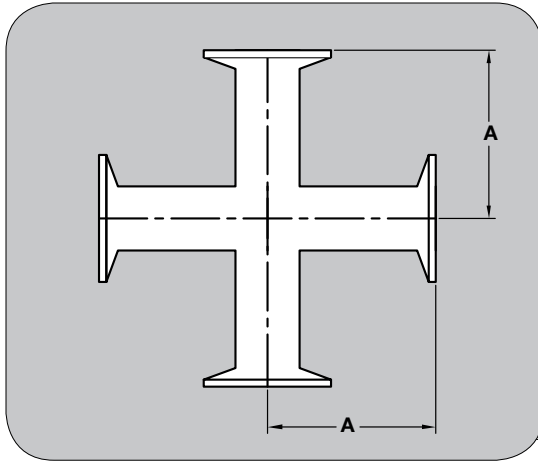
SIZE (TUBE O.D.)	A	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
1/2	1-7/8	4011405-7	4011405-7EP
3/4	2	4011407-7	4011407-7EP
1	2-1/8	4011410-7	4011410-7EP
1-1/2	2-3/8	4011415-7	4011415-7EP
2	2-7/8	4011420-7	4011420-7EP
2-1/2	3-1/8	4011425-7	4011425-7EP
3	3-3/8	4011430-7	4011430-7EP
4	4-1/8	4011440-7	4011440-7EP
6	5-5/8	—	—



TL9RWWWW – Cross Reducing Weld Ends 316L

SIZE (TUBE O.D.)	A	B	C	D	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
3/4 X 1/2	4-1/4	2-1/8	4-1/4	2-1/8	4011407R05-7	4011407R05-7EP
1 X 1/2	4-1/4	2-1/8	4-1/4	2-1/8	4011410R05-7	4011410R05-7EP
1 X 3/4	4-1/4	2-1/8	4-1/4	2-1/8	4011410R07-7	4011410R07-7EP
1-1/2 X 1/2	4-3/4	2-3/8	4-3/4	2-3/8	4011415R05-7	4011415R05-7EP
1-1/2 X 3/4	4-3/4	2-3/8	4-3/4	2-3/8	4011415R07-7	4011415R07-7EP
1-1/2 X 1	4-3/4	2-3/8	4-3/4	2-3/8	4011415R10-7	4011415R10-7EP
2 X 1/2	5-3/4	2-7/8	5-1/4	2-5/8	4011420R05-7	4011420R05-7EP
2 X 3/4	5-3/4	2-7/8	5-1/4	2-5/8	4011420R07-7	4011420R07-7EP
2 X 1	5-3/4	2-7/8	5-1/4	2-5/8	4011420R10-7	4011420R10-7EP
2 X 1-1/2	5-3/4	2-7/8	5-1/4	2-5/8	4011420R15-7	4011420R15-7EP
2-1/2 X 1	6-1/4	3-1/8	5-3/4	2-7/8	4011425R10-7	4011425R10-7EP
2-1/2 X 1-1/2	6-1/4	3-1/8	5-3/4	2-7/8	4011425R15-7	4011425R15-7EP
2-1/2 X 2	6-1/4	3-1/8	5-3/4	2-7/8	4011425R20-7	4011425R20-7EP
3 X 1	6-3/4	3-3/8	6-1/4	3-1/8	4011430R10-7	4011430R10-7EP
3 X 1-1/2	6-3/4	3-3/8	6-1/4	3-1/8	4011430R15-7	4011430R15-7EP
3 X 2	6-3/4	3-3/8	6-1/4	3-1/8	4011430R20-7	4011430R20-7EP
3 X 2-1/2	6-3/4	3-3/8	6-1/4	3-1/8	4011430R25-7	4011430R25-7EP
4 X 1	8-1/4	4-1/8	7-1/4	3-5/8	4011440R10-7	4011440R10-7EP
4 X 1-1/2	8-1/4	4-1/8	7-1/4	3-5/8	4011440R15-7	4011440R15-7EP
4 X 2	8-1/4	4-1/8	7-3/4	3-7/8	4011440R20-7	4011440R20-7EP
4 X 2-1/2	8-1/4	4-1/8	7-3/4	3-7/8	4011440R25-7	4011440R25-7EP
4 X 3	8-1/4	4-1/8	7-3/4	3-7/8	4011440R30-7	4011440R30-7EP



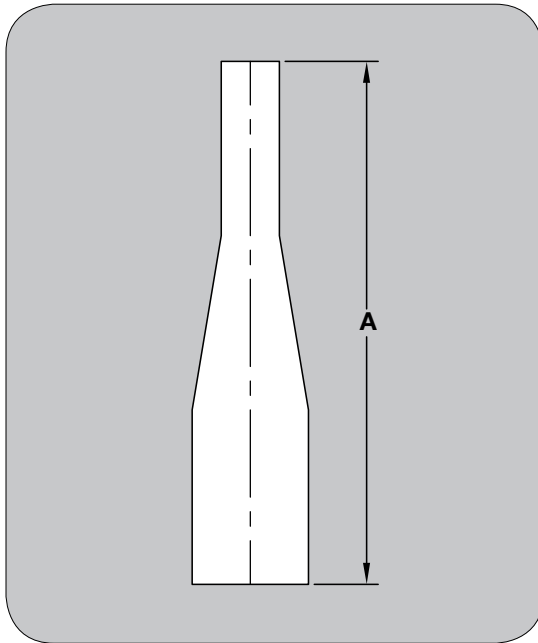


9MP – Cross Clamp Ends BPE 316L

BPE# DT-4.1.2-4

SIZE (TUBE O.D.)	TYPE	A	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
1/2	A	2-1/4	4810105-7	4810105-7EP
3/4	A	2-3/8	4810107-7	4810107-7EP
1	A	2-5/8	–	–
1	B	2-5/8	4810110-7	4810110-7EP
1-1/2	B	2-7/8	4810115-7	4810115-7EP
2	B	3-3/8	4810120-7	4810120-7EP
2-1/2	B	3-5/8	4810125-7	4810125-7EP
3	B	3-7/8	4810130-7	4810130-7EP
4	B	4-3/4	4810140-7	4810140-7EP
6	B	7-1/8	–	–

BPE# DT-4.1.3-1(a)

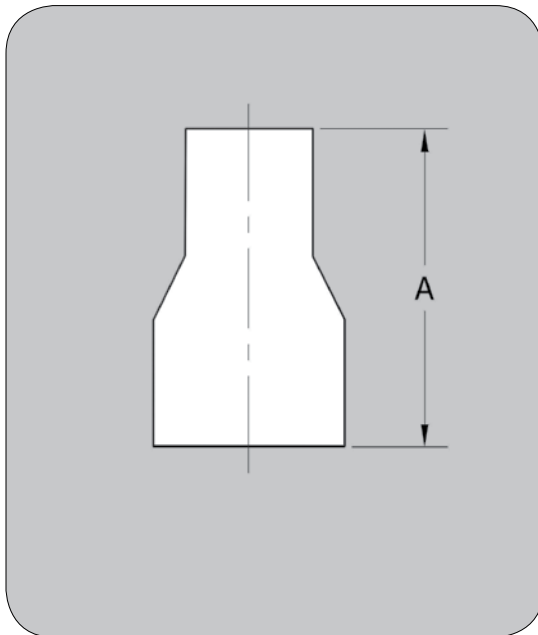


TL31 – Reducer Concentric Weld Ends BPE 316L

SIZE (TUBE O.D.)	A	STOCK NO. 20RA ID (SF1)	STOCK NO. 15RA EP ID (SF4)
3/4 X 1/2	4	401160705-7	401160705-7EP
1 X 1/2	4-1/2	401161005-7	401161005-7EP
1 X 3/4	4	401161007-7	401161007-7EP
1-1/2 X 3/4	5	401161507-7	401161507-7EP
1-1/2 X 1	5	401161510-7	401161510-7EP
2 X 1	7-1/4	401162010-7	401162010-7EP
2 X 1-1/2	5-1/4	401162015-7	401162015-7EP
2-1/2 X 1-1/2	7-1/4	401162515-7	401162515-7EP
2-1/2 X 2	5-1/2	401162520-7	401162520-7EP
3 X 1-1/2	9-1/4	401163015-7	401163015-7EP
3 X 2	7-1/2	401163020-7	401163020-7EP
3 X 2-1/2	5-1/2	401163025-7	401163025-7EP
4 X 2	11-3/4	401164020-7	401164020-7EP
4 X 2-1/2	9-3/4	401164025-7	401164025-7EP
4 X 3	7-3/4	401164030-7	401164030-7EP
6 X 3	10	401166030-7	401166030-7EP
6 X 4	10	401166040-7	401166040-7EP

OTHER SIZES AVAILABLE UPON REQUEST

BPE# DT-4.1.3-1(b)



TL31 – Reducer Concentric Weld Ends BPE 316L

SIZE (TUBE O.D.)	A	STOCK NO. 20 RA ID (SF1)	STOCK NO. 15RA EP ID (SF4)
3/4 X 1/2	2-1/8	401160705N-7	401160705N-7EP
1 X 1/2	2-1/2	401161005N-7	401161005N-7EP
1 X 3/4	2-1/8	401161007N-7	401161007N-7EP
1- 1/2 X 3/4	3	401161507N-7	401161507N-7EP
1- 1/2 X 1	2-1/2	401161510N-7	401161510N-7EP
2 X 1	3-3/8	401162010N-7	401162010N-7EP
2 X 1-1/2	2-1/2	401162015N-7	401162015N-7EP
2- 1/2 X 1-1/2	3-3/8	401162515N-7	401162515N-7EP
2- 1/2 X 2	2-1/2	401162520N-7	401162520N-7EP
3 X 1-1/2	4-1/4	401163015N-7	401163015N-7EP
3 X 2	3-3/8	401163020N-7	401163020N-7EP
3 X 2-1/2	2-5/8	401163025N-7	401163025N-7EP
4 X 2	5-1/8	401164020N-7	401164020N-7EP
4 X 2-1/2	4-1/4	401164025N-7	401164025N-7EP
4 X 3	3-7/8	401164030N-7	401164030N-7EP
6 X 3	7-1/4	401166030N-7	401166030N-7EP
6 X 4	5-5/8	401166040N-7	401166040N-7EP

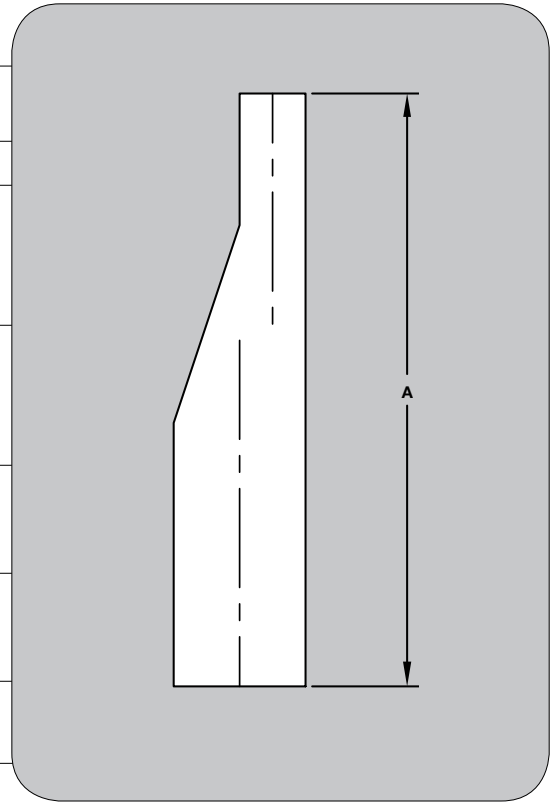
OTHER SIZES AVAILABLE UPON REQUEST

BPE# DT-4.1.3-1 (a)

TL32 – Reducer Eccentric Weld Ends BPE 316L

SIZE (TUBE O.D.)	A	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
3/4 X 1/2	4	401220705-7	401220705-7EP
1 X 1/2	4-1/2	401221005-7	401221005-7EP
1 X 3/4	4	401221007-7	401221007-7EP
1-1/2 X 3/4	5	401221507-7	401221507-7EP
1-1/2 X 1	5	401221510-7	401221510-7EP
2 X 1	7-1/4	401222010-7	401222010-7EP
2 X 1-1/2	5-1/4	401222015-7	401222015-7EP
2-1/2 X 1-1/2	7-1/4	401222515-7	401222515-7EP
2-1/2 X 2	5-1/2	401222520-7	401222520-7EP
3 X 1-1/2	9-1/4	401223015-7	401223015-7EP
3 X 2	7-1/2	401223020-7	401223020-7EP
3 X 2-1/2	5-1/2	401223025-7	401223025-7EP
4 X 2	11-3/4	401224020-7	401224020-7EP
4 X 2-1/2	9-3/4	401224025-7	401224025-7EP
4 X 3	7-3/4	401224030-7	401224030-7EP
6 X 3	10	401226030-7	401226030-7EP
6 X 4	10	401226040-7	401226040-7EP

OTHER SIZES AVAILABLE UPON REQUEST

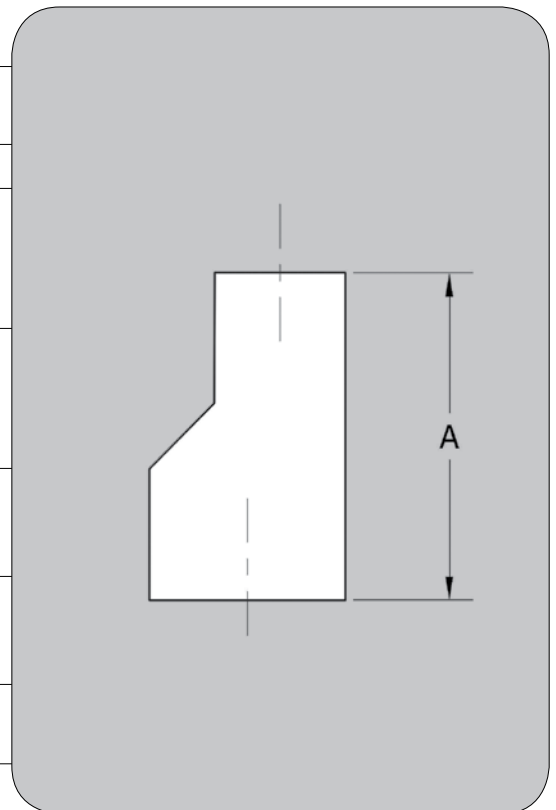


BPE# DT-4.1.3-1 (b)

TL32 – Reducer Eccentric Weld Ends BPE 316L

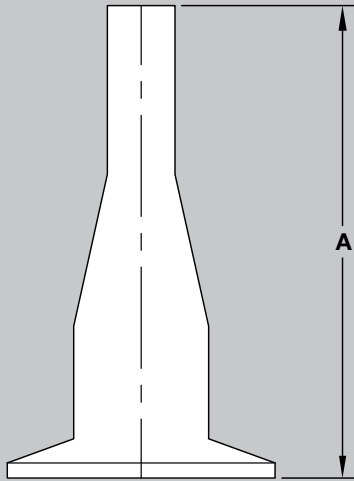
SIZE (TUBE O.D.)	A	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
3/4 X 1/2	2-1/8	401220705N-7	401220705N-7EP
1 X 1/2	2-1/2	401221005N-7	401221005N-7EP
1 X 3/4	2-1/8	401221007N-7	401221007N-7EP
1- 1/2 X 3/4	3	401221507N-7	401221507N-7EP
1- 1/2 X 1	2-1/2	401221510N-7	401221510N-7EP
2 X 1	3-3/8	401222010N-7	401222010N-7EP
2 X 1-1/2	2-1/2	401222015N-7	401222015N-7EP
2- 1/2 X 1-1/2	3-3/8	401222515N-7	401222515N-7EP
2- 1/2 X 2	2-1/2	401222520N-7	401222520N-7EP
3 X 1-1/2	4-1/4	401223015N-7	401223015N-7EP
3 X 2	3-3/8	401223020N-7	401223020N-7EP
3 X 2-1/2	2-5/8	401223025N-7	401223025N-7EP
4 X 2	5-1/8	401224020N-7	401224020N-7EP
4 X 2-1/2	4-1/4	401224025N-7	401224025N-7EP
4 X 3	3-7/8	401224030N-7	401224030N-7EP
6 X 3	7-1/4	401226030N-7	401226030N-7EP
6 X 4	5-5/8	401226040N-7	401226040N-7EP

OTHER SIZES AVAILABLE UPON REQUEST



BPE# DT-4.1.3-2 (a)

TL31M – Reducer Concentric Clamp X Weld BPE 316L

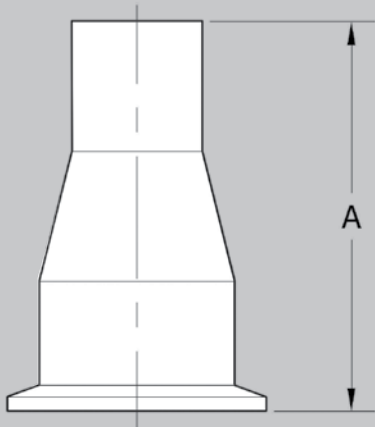


SIZE (TUBE O.D.)	TYPE	A	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
3/4 X 1/2	A	3	40116M0705-7	40116M0705-7EP
1 X 1/2	A	3-1/2	40116M1005A-7	40116M1005A-7EP
1 X 1/2	B	3-1/2	40116M1005-7	40116M1005-7EP
1 X 3/4	A	3	40116M1007A-7	40116M1007A-7EP
1 X 3/4	B	3	40116M1007-7	40116M1007-7EP
1-1/2 X 3/4	B	4	40116M1507-7	40116M1507-7EP
1-1/2 X 1	B	4	40116M1510-7	40116M1510-7EP
2 X 1	B	6	40116M2010-7	40116M2010-7EP
2 X 1-1/2	B	4	40116M2015-7	40116M2015-7EP
2-1/2 X 1-1/2	B	6	40116M2515-7	40116M2515-7EP
2-1/2 X 2	B	4-1/4	40116M2520-7	40116M2520-7EP
3 X 1-1/2	B	8	40116M3015-7	40116M3015-7EP
3 X 2	B	6-1/4	40116M3020-7	40116M3020-7EP
3 X 2-1/2	B	4-1/4	40116M3025-7	40116M3025-7EP
4 X 2	B	10-3/8	40116M4020-7	40116M4020-7EP
4 X 2-1/2	B	8-3/8	40116M4025-7	40116M4025-7EP
4 X 3	B	6-3/8	40116M4030-7	40116M4030-7EP
6 X 3	B	9	—	—
6 X 4	B	9	40116M6040-7	40116M6040-7EP

OTHER SIZES AVAILABLE UPON REQUEST

BPE# DT-4.1.3-2 (b)

TL31M – Reducer Concentric Clamp X Weld BPE 316L



SIZE (TUBE O.D.)	TYPE	A	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
3/4 X 1/2	A	2-5/8	40116M0705N-7	40116M0705N-7EP
1 X 1/2	A	3	40116M1005AN-7	40116M1005AN-7EP
1 X 1/2	B	3	40116M1005N-7	40116M1005N-7EP
1 X 3/4	A	2-5/8	—	40116M1007AN-7EP
1 X 3/4	B	2-5/8	40116M1007N-7	40116M1007N-7EP
1-1/2 X 3/4	B	3-1/2	40116M1507N-7	40116M1507N-7EP
1-1/2 X 1	B	3	40116M1510N-7	40116M1510N-7EP
2 X 1	B	3-7/8	40116M2010N-7	40116M2010N-7EP
2 X 1-1/2	B	3	40116M2015N-7	40116M2015N-7EP
2-1/2 X 1-1/2	B	3-7/8	40116M2515N-7	40116M2515N-7EP
2- 1/2 X 2	B	3	40116M2520N-7	40116M2520N-7EP
3 X 1-1/2	B	4-3/4	40116M3015N-7	40116M3015N-7EP
3 X 2	B	3-7/8	40116M3020N-7	40116M3020N-7EP
3 X 2-1/2	B	3-1/8	40116M3025N-7	40116M3025N-7EP
4 X 2	B	5-3/4	40116M4020N-7	40116M4020N-7EP
4 X 2-1/2	B	4-7/8	40116M4025N-7	40116M4025N-7EP
4 X 3	B	4-1/2	40116M4030N-7	40116M4030N-7EP
6 X 3	B	8	40116M6030N-7	40116M6030N-7EP
6 X 4	B	6-3/8	40116M6040N-7	40116M6040N-7EP

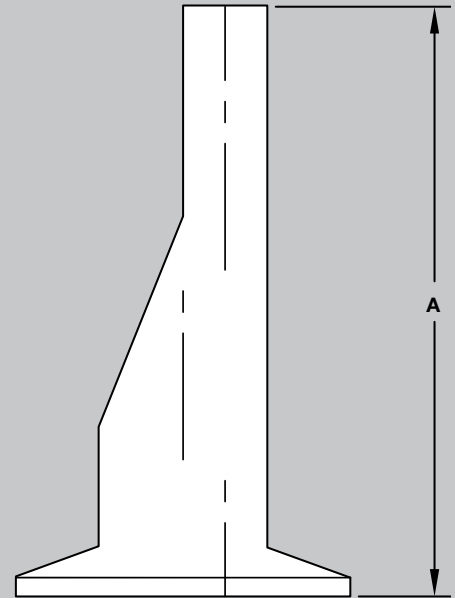
OTHER SIZES AVAILABLE UPON REQUEST

BPE# DT-4.1.3-2(a)

TL32M – Reducer Eccentric Clamp X Weld BPE 316L

SIZE (TUBE O.D.)	TYPE	A	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
3/4 X 1/2	A	3	40122M0705-7	40122M0705-7EP
1 X 1/2	A	3-1/2	–	–
1 X 1/2	B	3-1/2	40122M1005-7	40122M1005-7EP
1 X 3/4	A	3	–	40122M1007A-7EP
1 X 3/4	B	3	40122M1007-7	40122M1007-7EP
1-1/2 X 3/4	B	4	40122M1507-7	40122M1507-7EP
1-1/2 X 1	B	4	40122M1510-7	40122M1510-7EP
2 X 1	B	6	40122M2010-7	40122M2010-7EP
2 X 1-1/2	B	4	40122M2015-7	40122M2015-7EP
2-1/2 X 1-1/2	B	6	40122M2515-7	40122M2515-7EP
2-1/2 X 2	B	4-1/4	40122M2520-7	40122M2520-7EP
3 X 1-1/2	B	8	40122M3015-7	40122M3015-7EP
3 X 2	B	6-1/4	40122M3020-7	40122M3020-7EP
3 X 2-1/2	B	4-1/4	40122M3025-7	40122M3025-7EP
4 X 2	B	10-3/8	40122M4020-7	40122M4020-7EP
4 X 2-1/2	B	8-3/8	40122M4025-7	40122M4025-7EP
4 X 3	B	6-3/8	40122M4030-7	40122M4030-7EP
6 X 4	B	9	40122M6040-7	40122M6040-7EP

OTHER SIZES AVAILABLE UPON REQUEST

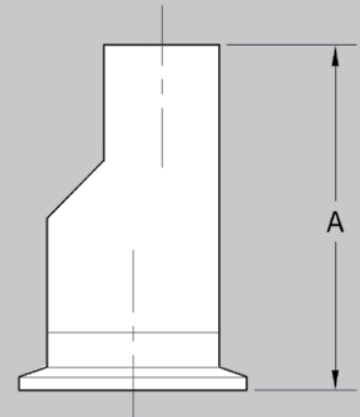


BPE# DT-4.1.3-2(b)

TL32M – Reducer Eccentric Clamp X Weld BPE 316L

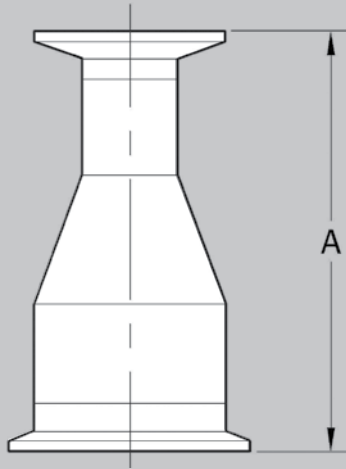
SIZE (TUBE O.D.)	TYPE	A	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
3/4 X 1/2	A	2-5/8	40122M0705N-7	40122M0705N-7EP
1 X 1/2	A	3	–	–
1 X 1/2	B	3	40122M1005N-7	40122M1005N-7EP
1 X 3/4	A	2-5/8	–	40122M1007AN-7EP
1 X 3/4	B	2-5/8	40122M1007N-7	40122M1007N-7EP
1-1/2 X 3/4	B	3-1/2	40122M1507N-7	40122M1507N-7EP
1-1/2 X 1	B	3	40122M1510N-7	40122M1510N-7EP
2 X 1	B	3-7/8	40122M2010N-7	40122M2010N-7EP
2 X 1-1/2	B	3	40122M2015N-7	40122M2015N-7EP
2-1/2 X 1-1/2	B	3-7/8	40122M2515N-7	40122M2515N-7EP
2-1/2 X 2	B	3	40122M2520N-7	40122M2520N-7EP
3 X 1-1/2	B	4-3/4	40122M3015N-7	40122M3015N-7EP
3 X 2	B	3-7/8	40122M3020N-7	40122M3020N-7EP
3 X 2-1/2	B	3-1/8	40122M3025N-7	40122M3025N-7EP
4 X 2	B	5-3/4	40122M4020N-7	40122M4020N-7EP
4 X 2-1/2	B	4-7/8	40122M4025N-7	40122M4025N-7EP
4 X 3	B	4-1/2	40122M4030N-7	40122M4030N-7EP
6 X 3	B	8	40122M6030N-7	40122M6030N-7EP
6 X 4	B	6-3/8	40122M6040N-7	40122M6040N-7EP

OTHER SIZES AVAILABLE UPON REQUEST



BPE# DT-4.1.3-7 (a)

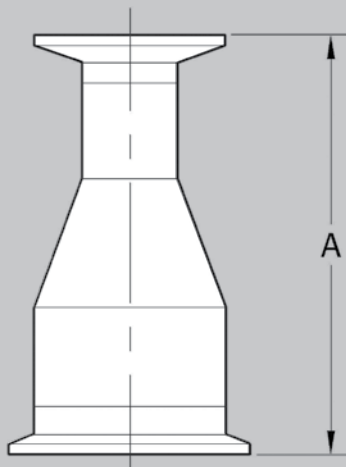
31-14MP – Reducer Concentric Clamp Ends BPE 316L



SIZE (TUBE O.D.)	TYPE	A	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
3/4 X 1/2	A/A	2	4884-0705A-7	4884-0705A-7EP
3/4 X 1/2	B/A	2	4884-0705-7	4884-0705-7EP
1 X 1/2	A/A	2-1/2	—	—
1 X 1/2	B/A	2-1/2	4884-1005-7	4884-1005-7EP
1 X 3/4	A/A	2	4884-1007A-7	4884-1007A-7EP
1 X 3/4	B/A	2	4884-1007-7	4884-1007-7EP
1-1/2 X 3/4	B/A	3	4884-1507-7	4884-1507-7EP
1-1/2 X 1	B/A	3	4884-1510A-7	4884-1510A-7EP
1-1/2 X 1	B/B	3	4884-1510-7	4884-1510-7EP
2 X 1	B/A	5	4884-2010A-7	4884-2010A-7EP
2 X 1	B/B	5	4884-2010-7	4884-2010-7EP
2 X 1 1/2	B/B	3	4884-2015-7	4884-2015-7EP
2-1/2 X 1-1/2	B/B	5	4884-2515-7	4884-2515-7EP
2-1/2 X 2	B/B	3	4884-2520-7	4884-2520-7EP
3 X 1-1/2	B/B	7	4884-3015-7	4884-3015-7EP
3 X 2	B/B	5	4884-3020-7	4884-3020-7EP
3 X 2-1/2	B/B	3	4884-3025-7	4884-3025-7EP
4 X 2	B/B	9-1/8	4884-4020-7	4884-4020-7EP
4 X 2-1/2	B/B	7-1/8	4884-4025-7	4884-4025-7EP
4 X 3	B/B	5-1/8	4884-4030-7	4884-4030-7EP
6 X 3	B/B	7-1/2	4884-6030-7	4884-6030-7EP
6 X 4	B/B	7-5/8	4884-6040-7	4884-6040-7EP

BPE# DT-4.1.3-7 (b)

31-14MP – Reducer Concentric Clamp Ends BPE 316L

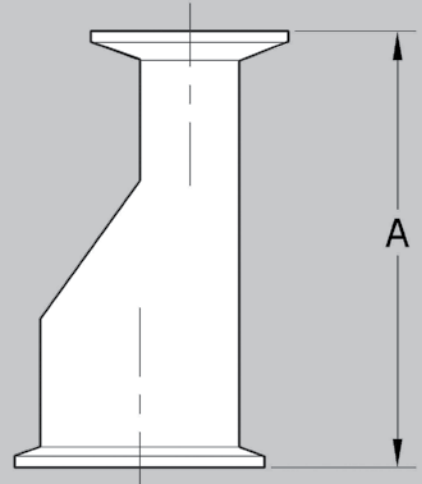


SIZE (TUBE O.D.)	TYPE	A	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
3/4 X 1/2	A/A	3-1/8	4884-0705AN-7	4884-0705AN-7EP
3/4 X 1/2	B/A	3-1/8	4884-0705N-7	4884-0705N-7EP
1 X 1/2	A/A	3-1/2	4884-1005AN-7	4884-1005AN-7EP
1 X 1/2	B/A	3-1/2	4884-1005N-7	4884-1005N-7EP
1 X 3/4	A/A	3-1/8	4884-1007AN-7	4884-1007AN-7EP
1 X 3/4	B/A	3-1/8	4884-1007N-7	4884-1007N-7EP
1-1/2 X 3/4	B/A	4	4884-1507N-7	4884-1507N-7EP
1-1/2 X 1	B/A	3-1/2	4884-1510AN-7	4884-1510AN-7EP
1-1/2 X 1	B/B	3-1/2	4884-1510N-7	4884-1510N-7EP
2 X 1	B/A	4-3/8	4884-2010AN-7	4884-2010AN-7EP
2 X 1	B/B	4-3/8	4884-2010N-7	4884-2010-7EP
2 X 1-1/2	B/B	3-1/2	4884-2015N-7	4884-2015N-7EP
2-1/2 X 1-1/2	B/B	4-3/8	4884-2515N-7	4884-2515-7EP
2-1/2 X 2	B/B	3-1/2	4884-2520N-7	4884-2520N-7EP
3 X 1-1/2	B/B	5-1/4	4884-3015N-7	4884-3015N-7EP
3 X 2	B/B	4-3/8	4884-3020N-7	4884-3020N-7EP
3 X 2-1/2	B/B	3-5/8	4884-3025N-7	4884-3025N-7EP
4 X 2	B/B	6-1/4	4884-4020N-7	4884-4020N-7EP
4 X 2-1/2	B/B	5-3/8	4884-4025N-7	4884-4025N-7EP
4 X 3	B/B	5	4884-4030N-7	4884-4030N-7EP
6 X 3	B/B	8-1/2	4884-6030N-7	4884-6030N-7EP
6 X 4	B/B	7	4884-6040N-7	4884-6040N-7EP

BPE# DT-4.1.3-7 (a)

32-14MP – Reducer Eccentric Clamp Ends BPE 316L

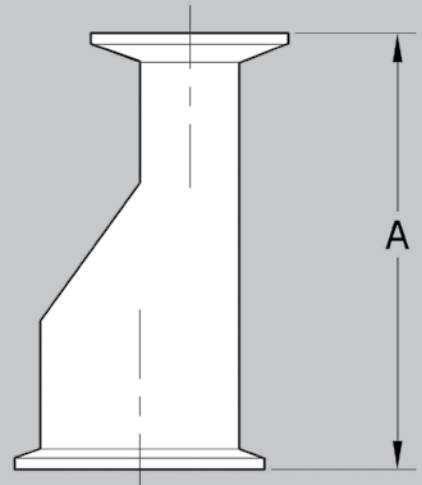
SIZE (TUBE O.D.)	TYPE	A	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
3/4 X 1/2	A/A	2	4885-0705A-7	4885-0705A-7EP
3/4 X 1/2	B/A	2	4885-0705-7	4885-0705-7EP
1 X 1/2	A/A	2-1/2	4885-1005A-7	4885-1005A-7EP
1 X 1/2	B/A	2-1/2	4885-1005-7	4885-1005-7EP
1 X 3/4	A/A	2	4885-1007A-7	4885-1007A-7EP
1 X 3/4	B/A	2	4885-1007-7	4885-1007-7EP
1-1/2 X 3/4	B/A	3	4885-1507-7	4885-1507-7EP
1-1/2 X 1	B/A	3	—	4885-1510A-7EP
1-1/2 X 1	B/B	3	4885-1510-7	4885-1510-7EP
2 X 1	B/A	5	4885-2010A-7	4885-2010A-7EP
2 X 1	B/B	5	4885-2010-7	4885-2010-7EP
2 X 1 1/2	B/B	3	4885-2015-7	4885-2015-7EP
2-1/2 X 1-1/2	B/B	5	4885-2515-7	4885-2515-7EP
2-1/2 X 2	B/B	3	4885-2520-7	4885-2520-7EP
3 X 1-1/2	B/B	7	4885-3015-7	4885-3015-7EP
3 X 2	B/B	5	4885-3020-7	4885-3020-7EP
3 X 2-1/2	B/B	3	4885-3025-7	4885-3025-7EP
4 X 2	B/B	9-1/8	4885-4020-7	4885-4020-7EP
4 X 2-1/2	B/B	7-1/8	4885-4025-7	4885-4025-7EP
4 X 3	B/B	5-1/8	4885-4030-7	4885-4030-7EP
6 X 3	B/B	7-5/8	4885-6030-7	4885-6030-7EP
6 X 4	B/B	7-5/8	4885-6040-7	4885-6040-7EP



BPE# DT-4.1.3-7 (b)

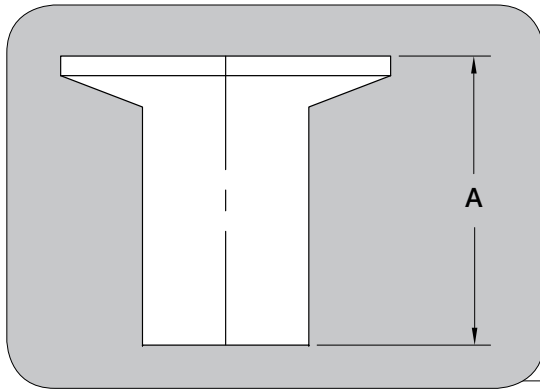
32-14MP – Reducer Eccentric Clamp Ends BPE 316L

SIZE (TUBE O.D.)	TYPE	A	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
3/4 X 1/2	A/A	3-1/8	—	—
3/4 X 1/2	B/A	3-1/8	4885-0705N-7	4885-0705N-7EP
1 X 1/2	A/A	3-1/2	4885-1005AN-7	4885-1005AN-7EP
1 X 1/2	B/A	3-1/2	4885-1005N-7	4885-1005N-7EP
1 X 3/4	A/A	3-1/8	4885-1007AN-7	4885-1007AN-7EP
1 X 3/4	B/A	3-1/8	4885-1007N-7	4885-1007N-7EP
1-1/2 X 3/4	B/A	4	4885-1507N-7	4885-1507N-7EP
1-1/2 X 1	B/A	3-1/2	4885-1510AN-7	4885-1510AN-7EP
1-1/2 X 1	B/B	3-1/2	4885-1510N-7	4885-1510N-7EP
2 X 1	B/A	4-3/8	4885-2010AN-7	4885-2010AN-7EP
2 X 1	B/B	4-3/8	4885-2010N-7	4885-2010N-7EP
2 X 1-1/2	B/B	3-1/2	4885-2015N-7	4885-2015N-7EP
2-1/2 X 1-1/2	B/B	4-3/8	4885-2515N-7	4885-2515N-7EP
2-1/2 X 2	B/B	3-1/2	4885-2520N-7	4885-2520N-7EP
3 X 1-1/2	B/B	5-1/4	4885-3015N-7	4885-3015N-7EP
3 X 2	B/B	4-3/8	4885-3020N-7	4885-3020N-7EP
3 X 2-1/2	B/B	3-5/8	4885-3025N-7	4885-3025N-7EP
4 X 2	B/B	6-1/4	4885-4020N-7	4885-4020N-7EP
4 X 2-1/2	B/B	5-3/8	4885-4025N-7	4885-4025N-7EP
4 X 3	B/B	5	4885-4030N-7	4885-4030N-7EP
6 X 3	B/B	8-1/2	4885-6030N-7	4885-6030N-7EP
6 X 4	B/B	7	4885-6040N-7	—



BPE# DT-4.1.4-1

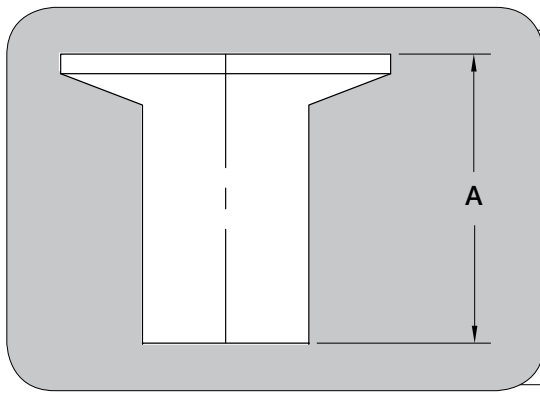
TL14AM7 – Ferrule Clamp End X Weld End BPE 316L



SIZE (TUBE O.D.)	TYPE	A	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
1/2	A	1-3/4	407505S	407505S-7EP
3/4	A	1-3/4	407507S	407507S-7EP
1	A	1-3/4	407510SA	407510SA-7EP
1	B	1-3/4	407510S	407510S-7EP
1-1/2	B	1-3/4	407515S	407515S-7EP
2	B	2-1/4	407520S	407520S-7EP
2-1/2	B	2-1/4	407525S	407525S-7EP
3	B	2-1/4	407530S	407530S-7EP
4	B	2-1/4	407540S	407540S-7EP
6	B	3	407560S	407560S-7EP

BPE# DT-4.1.4-1

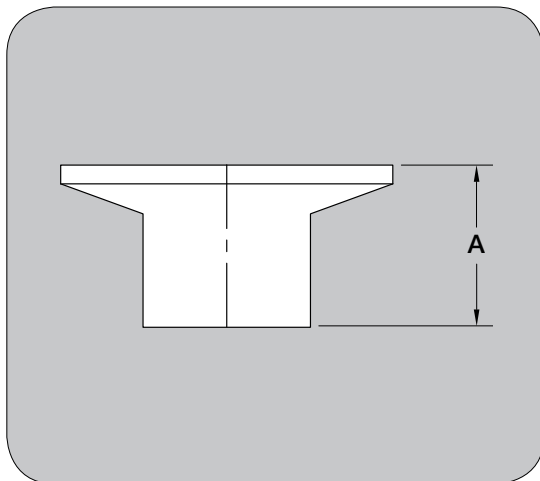
L14AM7 – Ferrule Clamp End X Weld End BPE 316L



SIZE (TUBE O.D.)	TYPE	A	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
1/2	A	1-1/8	487505-7	487505-7EP
3/4	A	1-1/8	487507-7	487507-7EP
1	A	1-1/8	–	487510A-7EP
1	B	1-1/8	487510-7	487510-7EP
1-1/2	B	1-1/8	487515-7	487515-7EP
2	B	1-1/8	487520-7	487520-7EP
2-1/2	B	1-1/8	487525-7	487525-7EP
3	B	1-1/8	487530-7	487530-7EP
4	B	1-1/8	487540-7	487540-7EP
6	B	1-1/2	487560-7	487560-7EP

BPE# DT-4.1.4-1

14WMP – Ferrule Short Clamp End X Weld End BPE 316L

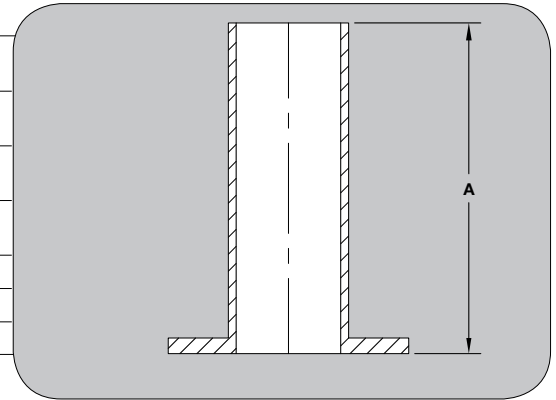


SIZE (TUBE O.D.)	TYPE	A	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
1/2	A	1/2	48205-7	48205-7EP
3/4	A	1/2	48207-7	48207-7EP
1	A	1/2	48210A-7	–
1	B	1/2	48210-7	48210-7EP
1-1/2	B	1/2	48215-7	48215-7EP
2	B	1/2	48220-7	48220-7EP
2-1/2	B	1/2	48225-7	48225-7EP
3	B	1/2	48230-7	48230-7EP
4	B	5/8	48240-7	48240-7EP
6	B	3/4	48260-7	48260-7EP

TL14VB – Stub End Lap Joint 316L*

SIZE (TUBE O.D.)	A	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
1/2	2	4030705-3LS	4030705-3LSEP
3/4	2	4030707-3LS	4030707-3LSEP
1	2-3/4	4030710-3LS	4030710-3LSEP
1-1/2	2-3/4	4030715-3LS	4030715-3LSEP
2	2-3/4	4030720-3LS	4030720-3LSEP
2-1/2	2-3/4	4030725-3LS	4030725-3LSEP
3	2-3/4	4030730-3LS	4030730-3LSEP
4	2-3/4	4030740-3LS	4030740-3LSEP
6	4	4030760-3LS	–

Flange face is phonographed * Not a BPE fitting

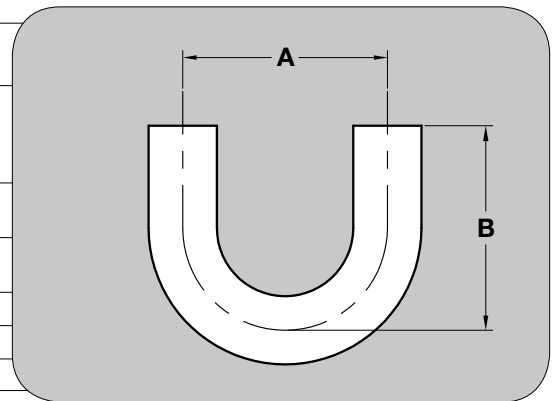


BPE# DT-4.1.1-7

2WUL – U-Bend 180° Weld Ends BPE 316L

SIZE (TUBE O.D.)	A	B	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
1/4*	4-1/2	2-5/8	–	–
3/8*	4-1/2	2-5/8	–	–
1/2*	4-1/2	3	–	–
3/4*	4-1/2	3	–	–
1	3	3	–	–
1-1/2	4-1/2	4-1/2	–	40915-7EP
2	6	5	40920-7	40920-7EP
2-1/2	7-1/2	5-3/4	–	–
3	9	6-1/2	40930-7	–
4	12	8-1/2	–	–
6	18	11-1/2	–	–

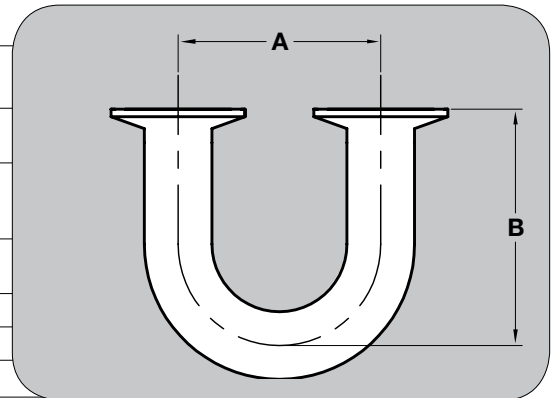
* DOES NOT MEET MINIMUM TANGENT LENGTHS IN BPE TABLE DT-4.1.1



BPE# DT-4.1.1-8

2WUMP – U-Bend 180° Clamp Ends BPE 316L

SIZE (TUBE O.D.)	TYPE	A	B	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
1/2	A	4-1/2	3-1/2	48U05-7	–
3/4	A	4-1/2	3-1/2	48U07-7	–
1	A	3	3-1/2	–	–
1	B	3	3-1/2	48U10-7	48U10-7EP
1-1/2	B	4-1/2	5	48U15-7	48U15-7EP
2	B	6	5-1/2	48U20-7	48U20-7EP
2-1/2	B	7-1/2	6-1/4	48U25-7	–
3	B	9	7	48U30-7	48U30-7EP
4	B	12	9-1/8	48U40-7	48U40-7EP
6	B	18	13	–	–

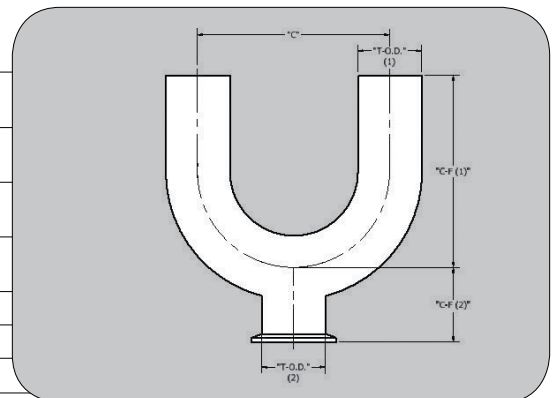


POU - U-Bend 180° Weld X

BPE# DT-4.1.1-8

Clamp Short Bottom Outlet BPE 316L

SIZE (TUBE O.D.)	C	T-O.D.(1)	T-O.D.(2)	C-F(1)	C-F(2)	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
1/2	4-1/2	1/2	1/2	3	1-1/8	40U05B05-7	–
3/4	4-1/2	3/4	3/4	3	1-1/8	40U07B07-7	–
1	3	1	1	3	1-1/8	40U10B10-7	40U10B10-7EP
1-1/2	4-1/2	1-1/2	1-1/2	4-1/2	1-3/8	40U15B15-7	40U15B15-7EP
2	6	2	2	5	1-5/8	40U20B20-7	40U20B20-7EP
2-1/2	7-1/2	2-1/2	2-1/2	5-3/4	1-7/8	40U25B25-7	40U25B25-7EP
3	9	3	3	6-1/2	2-1/8	40U30B30-7	40U30B30-7EP
4	12	4	4	8-1/2	2-5/8	40U40B40-7	40U40B40-7EP
6	18	6	6	11-1/2	3-3/4	–	–



TOP-FLO® Diaphragm Valves

TOP-FLO® hygienic diaphragm valves compete with the leaders in the industry and we can provide many innovative process solutions. Top Line offers standard 2-way, ZERODL™ Divert, ZERODL™ Point of Use, ZERODL™ T-pattern, L-pattern, Sterile Access, actuation and accessories, forged or cast, 316L SS bodies.



2-Way Bodies

BIOPRO® Forged



The **BIOPRO® Forged** bodies are manufactured in 316L SS from wrought bar with minimal levels of ferrite to eliminate concerns for contamination or rouging commonly experienced within a hygienic piping system.

- Sizes available 1/2" - 6"

BIOPRO® Cast



The **BIOPRO® Cast** valves are commonly used for hygienic consumer products industries and select pharmaceutical applications.

BIOPRO® Cast bodies are manufactured in 316L SS (A351 CF3M).

- Sizes available 1-1/2" - 4"

BIOFLO® II Compact



The **BIOFLO® II Compact** valve body is specifically designed for the prevention of media contamination in ultra pure applications within the bioprocessing industry.

BIOFLO® II Compact valve bodies are available with 1/2", 3/8", 1/4" clamp or weld end connections.

ALL TOP-FLO® DIAPHRAGM VALVES FEATURE

- Full traceability
- Self draining
- 316L SS bodies (1.4435)
- Stainless steel bonnets
- Pneumatic actuators
- FDA/USP compliant diaphragms

Specialty Valve Assemblies

Top Line for years has specialized in manufacturing custom fabricated products designed specifically to meet our customers requirements.

Our primary objective has always been to design and manufacture these specialty products by using state-of-the-art manufacturing practices and technologies.

Top Line and its affiliates employ engineers with a vast range of expertise and knowledge in the bioprocessing and pharmaceutical industries. We can provide quick and accurate solutions to even the most complicated problems that occur in the field.

All specialty products are manufactured using good manufacturing practices and are put through a very rigid quality control inspection before leaving our facility. These practices ensure that our customers receive quality parts ready for immediate installation.

In addition to the standard 2-way valve bodies,

TOP-FLO® diaphragm valves offer various configurations and assembly types.

- Tank Bottom
- Access
- T-Pattern
- Point-of-Use
- L-Pattern



TOP-FLO® T-Pattern Diaphragm Valves

T-pattern type valves improve drainability and greatly eliminate dead leg. Typically installed in a horizontal position, this valve also provides for excellent sampling or diverting of critical process fluids throughout the process system.

ZERODL™ T-pattern valves are available in sizes ranging from 1/4" through 6". These valves are machined from a solid block of 316L SS with T characteristics through 6". A wide variety of end connections and surface finishes are offered to meet your specifications.

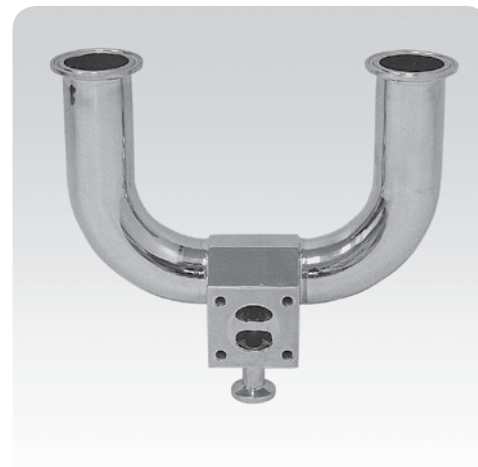
Integral sample valves available upon request.



TOP-FLO® ZERODL™ Point of Use Diaphragm Valves

The ZERODL™ Point-of-Use Valve utilizes the T-pattern design to promote efficient installation when used on clean water loops. The main valve body is machined from a solid block of 316L SS. Its design improves drainability and eliminates dead legs within a processing system. Available in valve sizes 1/2" through 6" with tubing run sizes through 6" in clamp, butt weld ends, and other specialty connections.

Integral sample valves and downstream purge ports available upon request.



Tandem Valve Assemblies

TOP-FLO® Sterile Access Diaphragm Valves

The Sterile Access Valve assembly provides access to the horizontal valve body at the lowest cross sectional point. The access port can be used for sampling, steam sterilization, purging or condensate drainage. Ports are furnished with butt weld tube ends, clamp ends, or the utilization of a secondary valve.



TOP-FLO® L-Pattern Diaphragm Valves

The L-pattern type diaphragm valve, due to its unique design, minimizes dead legs in point-of-use outlets. The valve, while installed in a vertical position, serves as a 90° elbow. As fluid passes through the body, the valve can be opened to allow provision

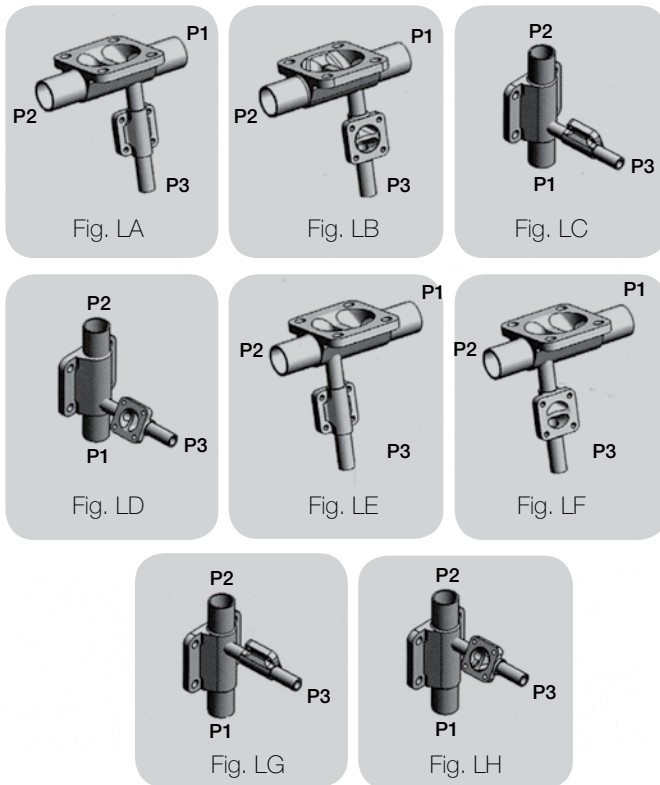


of uncontaminated samples. The outlet can also serve as a drain or a divert port.

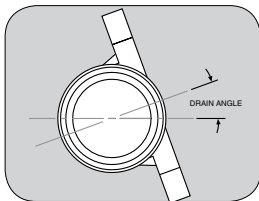
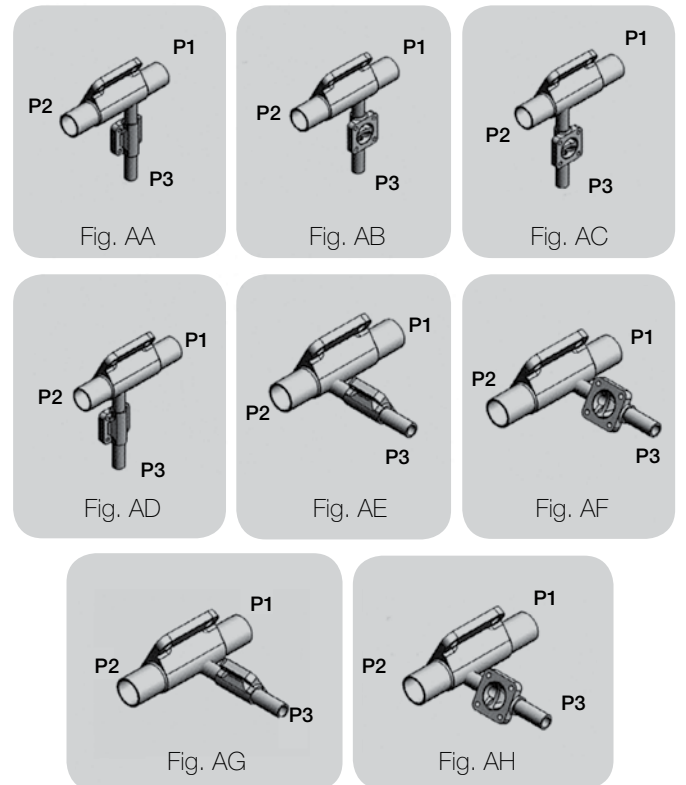
Manufactured from forged 316L SS in sizes ranging from 1/4" through 6". The L-pattern type can be supplied with butt weld or clamp end connections and a wide variety of finish options.

Tandem Valve Assemblies

Sterile L-Pattern Configurations



Sterile Access Configurations



Drain Angle

Size	1/4	3/8	1/2	3/4	1	1-1/2	2	2-1/2	3	4	6
BIOFLO® II	35°	30°	25°	-	-	-	-	-	-	-	-
BIOPRO®	-	-	30°	25°	28°	20°	20°	18°	20°	15°	15°

Flow Data - Forged & Cast 2-Way Valves

CV Values USGPM At One PSI

Size % Open	BIOFLO® II			BIOPRO®							
	1/4	3/8	1/2	1/2	3/4	1	1-1/2	2	2-1/2	3	4
12.5	0.47	0.49	0.50	0.52	1.75	2.60	9.80	13.50	29.00	38.30	49.00
25	0.61	0.68	0.71	0.87	3.28	5.65	18.60	35.00	54.00	68.90	120.00
50	0.67	1.56	1.66	1.87	5.47	12.50	35.50	54.30	77.60	136.40	270.00
75	0.69	1.84	2.23	2.48	6.78	16.70	44.60	68.00	88.60	167.00	376.00
100	0.78	1.90	2.45	3.32	7.60	18.70	46.80	71.00	91.90	177.60	404.00

KV Values Cubic Meter per Hour per At One Bar

Size % Open	BIOFLO® II			BIOPRO®							
	1/4	3/8	1/2	1/2	3/4	1	1-1/2	2	2-1/2	3	4
12.5	0.41	0.42	0.43	0.45	1.51	2.25	8.48	11.68	25.09	33.13	42.39
25	0.53	0.59	0.61	0.75	2.84	4.89	16.09	30.28	46.71	59.60	96.88
50	0.58	1.35	1.44	1.62	4.73	10.81	30.71	46.97	67.12	117.99	233.55
75	0.60	1.59	1.93	2.15	5.86	14.45	38.58	58.82	76.64	144.46	325.24
100	0.67	1.64	2.12	2.87	6.57	16.18	40.48	61.42	79.49	153.62	349.46

TOP-FLO® Divert Diaphragm Valves

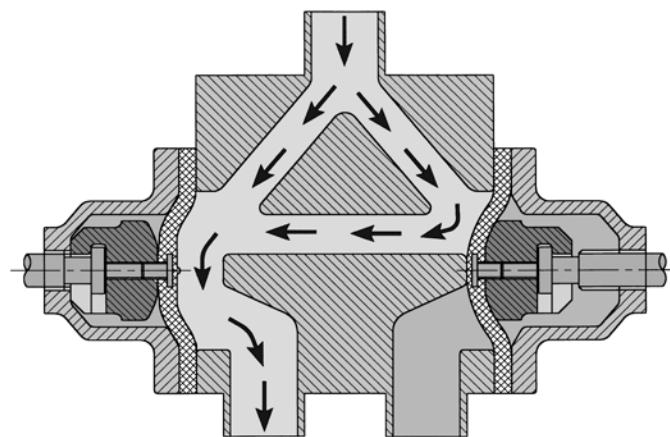


Features and Benefits

- Manufactured from 316L SS or other alloys.
- Wide variety of inlet and outlet tubing configurations and polish combinations are available.
- Design eliminates dead leg inherent in typical mixing or diverting applications.
- Available with actuated or manual bonnets.
- Significantly reduces overall spacing requirements.

Top Line also offers a line of multi-ported divert valves that are very popular in process applications where space considerations are critical. These valves are compact and will significantly reduce the piping requirements and number of connections associated with more complex designs.

TOP-FLO® Divert Valves are available in 2-way through 8-way configurations and can be supplied with actuated or manual bonnets. Bodies that make up the valve are machined from 316L SS. Other material grades available provided upon request. These valves are supplied with a clamp or weld end connection in sizes ranging from 1/4" through 4". This patented design can be used to divert flow or as a mixing valve. The inlet flow passage with the divided flow prevents abrupt directional change and fluid impact, minimizing cell deterioration. **The TOP-FLO® 2-Way Divert Valve** will drain in either the horizontal or vertical position. All other combinations will fully drain in the vertical position.



The flow pattern on the closed side of the valve will allow for a continuous flow to the open side providing zero dead leg.

TOP-FLO® Bonnet Assemblies For Diaphragm Valves

TOP-FLO® manual bonnets offer many features that have been carefully designed with the user in mind. The advanced bonnet design takes into account environmental stresses such as cleanability, reliability, autoclave use, adjustment, and ease of maintenance.

TOP-FLO® stainless steel bonnets are produced using the investment casting process resulting in a durable and lightweight valve operator. Stainless steel bonnets are electropolished externally providing a bright and sanitary exterior that also enhance its corrosion resistance. Ergonomically designed thermoplastic hand wheel and highly visible yellow indicator are standard on stainless steel bonnets sizes 1/2" through 2". Bonnet sizes 2-1/2" through 4" have electropolished stainless steel bodies with stainless steel handwheels. All **TOP-FLO®** manual bonnet versions have sanitary internals as standard.

#09 Bonnet

Sizes 2-1/2" - 4"

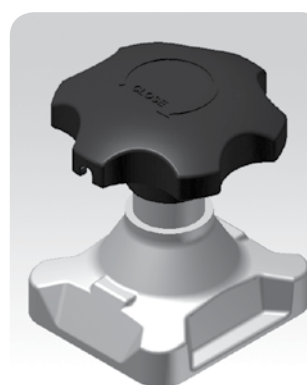
- 304 SS base with 304 SS hand wheel
- Dual FKM O-ring sealed
- Sanitary internals



#12 Bonnet

Sizes 1/2" - 2"

- Non-adjustable low profile
- 304 SS base with PPS hand wheel
- Dual FKM O-ring sealed
- Sanitary internals



#10 Bonnet

Sizes 1/2" - 2"

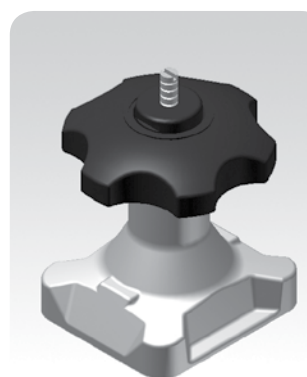
- Adjustable close stop
- 304 SS base with 304 SS hand wheel
- Dual FKM O-ring sealed
- Sanitary internals



#15 Bonnet

Sizes 1/2" - 2"

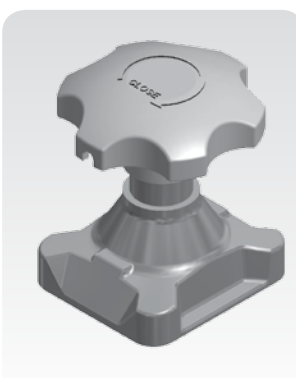
- Adjustable open stop
- 304 SS base with PPS hand wheel
- Brass visual indicator with position gradient



#60 Bonnet

Sizes 1/2" - 2"

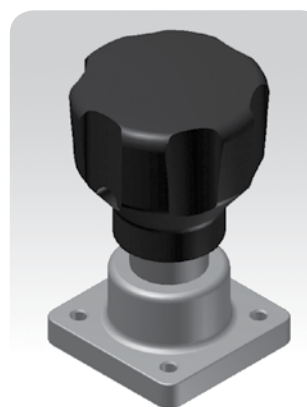
- Non-Adjustable low profile
- 304 SS base with 304 SS hand wheel
- Dual FKM O-ring sealed
- Sanitary internals



#18A Bonnet

Sizes 1/4" - 3/8" - 1/2"

- Adjustable close stop
- 304 SS base with PPS hand wheel
- Dual FKM O-ring sealed
- Sanitary internals



Actuation

SRS 50 Actuators

The **TOP-FLO®** pneumatic actuator is highly suited for today's modern space-saving environment within the high purity industry. Simplicity of design and robust structure ensures long service life and economical operation. Molded from a high performance polymer to withstand the rigors of cleaning and sterilization temperatures, this lightweight actuator has no corrosive components exposed to atmosphere. All internal and external components are corrosion resistant. In-line retrofitting is easily achieved without the use of special tooling. Available in size ranging from 1/4" through 4".

Features and Benefits

- **Compact/Lightweight**

Space-saving. Ease of installation and maintenance and mounts without additional support.

- **Fully Sealed**

Prevents contaminants from entering the housing while minimizing the risk of leakage between chambers.

- **Durability**

Longer life expectancy. Higher cycle performance.

- **Air Connections**

Perpendicular to piping system
- 1/8" BSPP thread (Compact valves)
- 1/4" BSPP thread (Standard size valves)

- **Visual Indicator**

Identifies valve position.

- **Material of construction**

Molded from a high performance thermoplastic capable of withstanding elevated temperatures common to cleaning protocols.

- **Accessories**

Stroke Limiter
Electropneumatic 4-20MA positioner
Mechanical switch package
Proximity switch package

SRS 20-30-40 Actuators

Designed to be economical, featuring a rugged cast iron housing and steel diaphragm plates, **TOP-FLO®** actuators are ideally suited for automatic and remote control of sanitary weir type diaphragm valves.

Features and Benefits

- **Epoxy Coated Cast Iron Housing**

Highly durable in demanding environments.

- **Steel Diaphragm Plates**

Superior performance in high pressure service.

- **Positive Stop**

Provides added safety when manual override is used.

- **Actuator Diaphragm**

Highly flexible for repeated cycling.

- **Bonnet**

Compact and integral to the actuator providing better alignment to insure exceptional cycling. This unique design allows for easy field installation and adapts to most diaphragm valve bodies.

- **Stem Guide**

Unique seal arrangement prevents lateral stem movement.

- **Position Indicator**

Indicates valve position

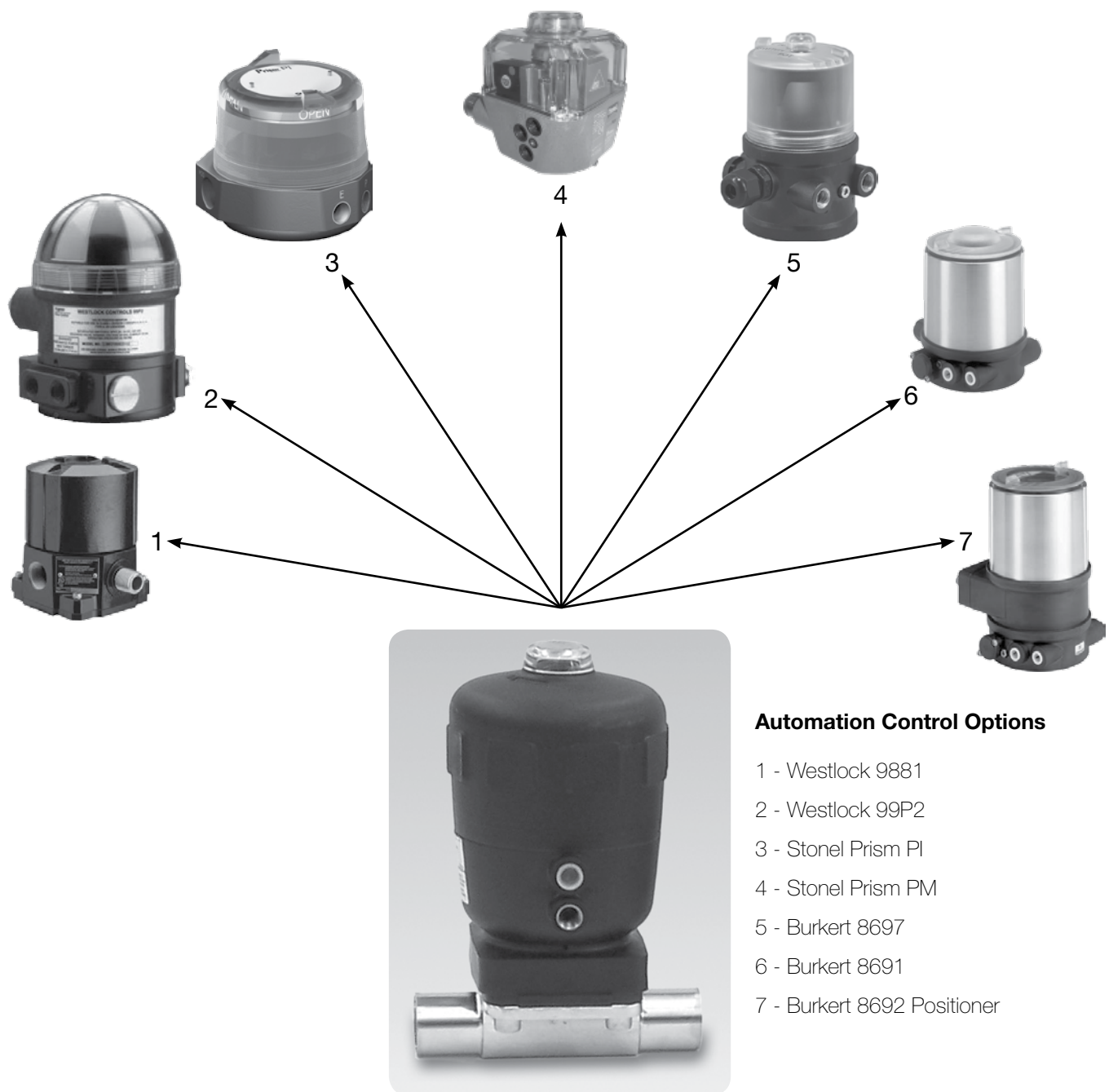
- **Spring Adjustment**

Spring tension can be externally adjusted to provide optimum performance to compensate for high internal line pressures.

TOP-FLO® SRS 50 actuators provide the perfect solution to any valve automation requirement.



Automation Accessories



Many options exist within the product ranges shown.

Consult factory for specific control requirement and solutions.

TOP-FLO® FDA & USP Weir Diaphragms

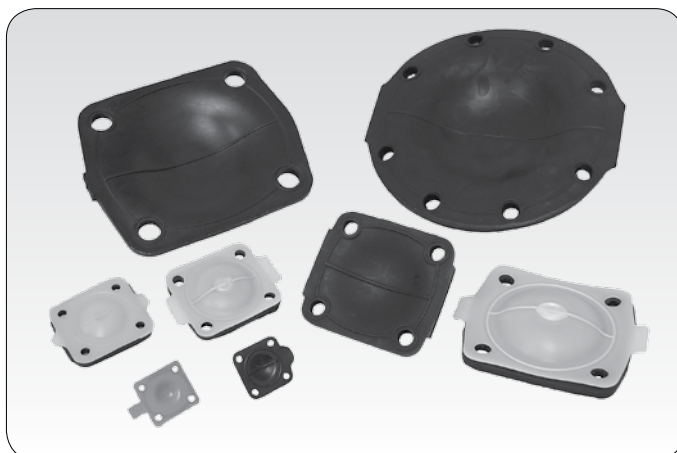
Top Line understands that the most important factor of diaphragm valve reliability is the diaphragm itself. To achieve optimum diaphragm performance, only the highest-grade specially engineered materials are used in our diaphragm production.

All diaphragms are produced and controlled in the United States and Canada under a compliant and registered ISO 9001-2000 Quality Management System (QMS).

TOP-FLO® replacement diaphragms are interchangeable with key industry manufacturers when a threaded or bayonet type connection is required.

Each **TOP-FLO®** diaphragm valve can be supplied with a variety of elastomer or MPTFE faced materials. All diaphragms are compliant with FDA codes and USP Class VI standards and are fully traceable.

Diaphragms are molded in both the open and closed position dependent on type. All elastomer type diaphragms are attached to the compressor by a threaded stud. MPTFE diaphragms are attached by a bayonet type fixture that eliminates point loading, thus providing constant diaphragm compression across the weir resulting in a more uniform and reliable seal.



EPDM elastomer diaphragm features:

- Proprietary low extractable steam grade material
- Superior cycle life
- FDA compliant & USP Class VI certified by NAMSA

FKM elastomer diaphragm features:

- High chemical resistance with the life cycle benefits of an elastomer
- FDA compliant material

MPTFE faced high-pressure molded diaphragm features:

- Steam grade material
- Superior cycle life
- Better density
- Virtually non-permeable
- FDA compliant & USP Class VI certified by NAMSA

CROSS REFERENCE CHART		DIAPHRAGM GRADES			
TOP LINE DIAPHRAGM - MATERIAL OF CONSTRUCTION	CONNECTION TYPE	TOP LINE	SAUNDERS	ITT	BURKERT
PEROXIDE CURED EPDM*	THREADED	2E	E2 (425)	17 E1	AB
FKM FLUOROELASTOMER*	THREADED	2V	226 (NON-FDA)	-	FF
MPTFE FACED/EPDM BACKED - STEAM GRADE	BAYONET	1KS	P2 (214/425)	-	EA
			S5 (214S/425C)	-	EU
MPTFE FACED/FKM BACKED - STEAM GRADE	BAYONET	1PS	P3 (214/226)	-	-
			P3S (214S/226)	-	-

*SIZES 1" (DN25) & ABOVE FOR SAUNDERS HC4 & BURKERT TYPE ONLY
ALL TOP LINE DIAPHRAGM FACES AND BACKING MATERIALS ARE FDA CONFORMING
ALL TOP LINE DIAPHRAGMS ARE USP CLASS VI CERTIFIED - EXCLUDING GRADE 2V

TOP-FLO® Sample Valves

Standard Features:

- 316L SS wetted part construction
- Standard finish:
20R_a ID (SF1)/32R_a OD
- Replaceable tapered
FDA/USP Class VI PTFE
stem for positive closure.
- FDA/USP Class VI FKM
O-rings stem seal.
- Positive open stop to
prevent accidental stem
removal during operation.
- Fully autoclaveable
without disassembly.
- Thermoplastic black operator nut
- Full material traceability

Optional Features:

- Upgraded internal finish to 20R_a
W/EP (SF5) or 15R_a W/EP (SF4)
- Other material grades
available upon request.
- FDA/USP class VI EPDM
O-ring stem seal.
- Alternative end connections
upon request.
- Eccentric

Service Conditions:

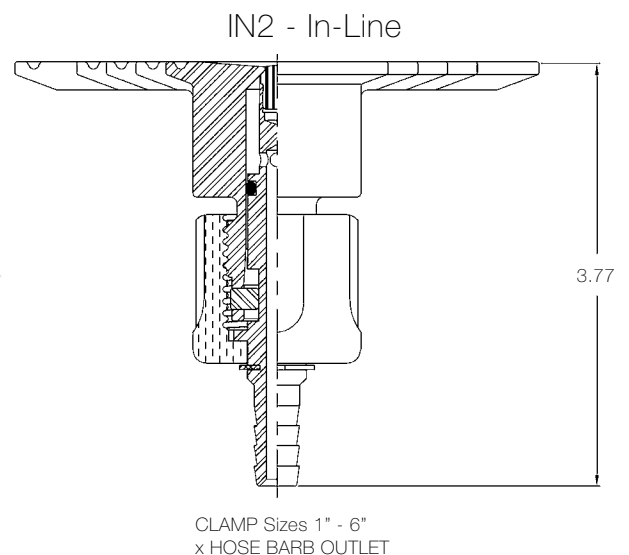
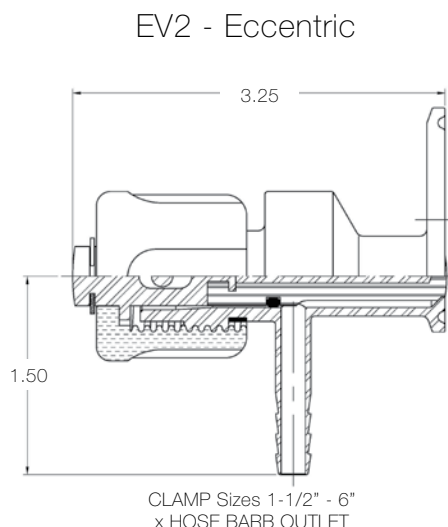
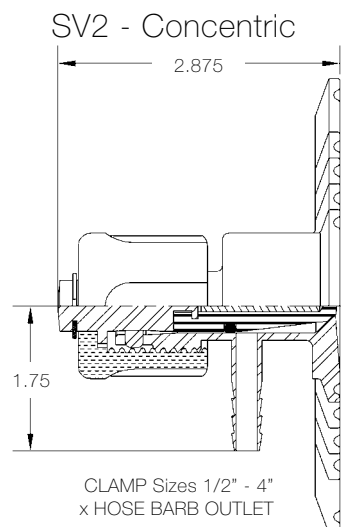
- Maximum operating
temperature: 300°F
- Maximum operating
pressure: 400 PSIG
- Maximum SWP: 35
PSIG SWP @ 280°F



Part Number Matrix						
TYPE	MATERIAL	INTERNAL STEM	STEM O-RING	MAIN VALVE CONNECTION	OUTLET CONNECTION	ID SURFACE FINISH
SV2 RIGHT ANGLE CONCENTRIC	6 316L	T FDA/USP PTFE	E FDA/USP EPDM	50 1/2	A 1/4 HOSE BARB	SF1 20R _a
			V FDA/USP FKM	75 3/4	B 3/8 HOSE BARB	SF4 15R _a W/EP
EV2* RIGHT ANGLE ECCENTRIC				10 1	C 1/2 HOSE BARB	SF5 20R _a W/EP
				15 1-1/2	D 1/2 CLAMP	
IN2** IN-LINE				20 2		
				25 2-1/2		
				30 3		
				40 4		
				60 6		

* EV2 VALVES ONLY AVAILABLE WITH MAIN CONNECTION SIZE 1-1/2" - 6"

** IN2 VALVES ONLY AVAILABLE WITH HOSE BARB OUTLET CONNECTION



TOP-FLO® Series 77 Ball Valves

Series 77 Ball Valves feature a high quality 316L investment casting. They are available with sanitary clamp or orbital tube OD ends. Select the cavity filled or non-cavity filled design. Superior leak protection is accomplished by using a patented live-loaded packing system featuring Bellville washers and double "V" ring packing. An ISO 5211 mounting pad is provided for easy automation.



Features:

- Ideal for clean steam applications
- Patented pyramidal self-centering stem design
- Integral ISO 5211 direct mounting pad
- 3-piece construction allows for easy "In-line" servicing
- Internal surface finish: 15R_a with optional electropolish
- Full traceability (MTR's) on all wetted parts
- MPTFE seats & seals are FDA & USP Class VI
- Extended butt weld ends conform to BPE minimum tangent length requirements.

Optional Features:

V-Port control balls – 30° & 60°

Seat Materials:

- 50-50 SS/PTFE
- UHMWPE
- PEEK
- Cavity filled PTFE

Automation Options:

- Pneumatic actuators
- Electric actuators (on/off & modulating)
- Stem extensions

Switch Packages:

- Westlock
- Stonel
- Moniteur
- IFM Efector
- Triac

Positioners:

- Triac
- Siemens
- Westlock

Mechanical Specifications:

Sizes:

1/2", 3/4", 1", 1 1/2", 2", 2 1/2", 3", 4"

Materials:

- Center body and ends: CF3M (316L) with controlled sulfur content per BPE.
- Ball and stem: 316L SS
- Standard seats and seals: Modified PTFE (MPTFE)

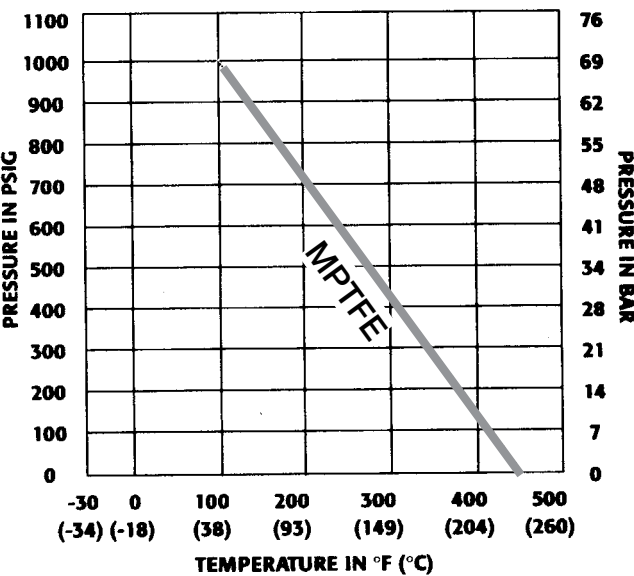
Connections:

- Hygienic clamp & extended butt weld per BPE

Full port to ID of tubing for reduced pressure drop

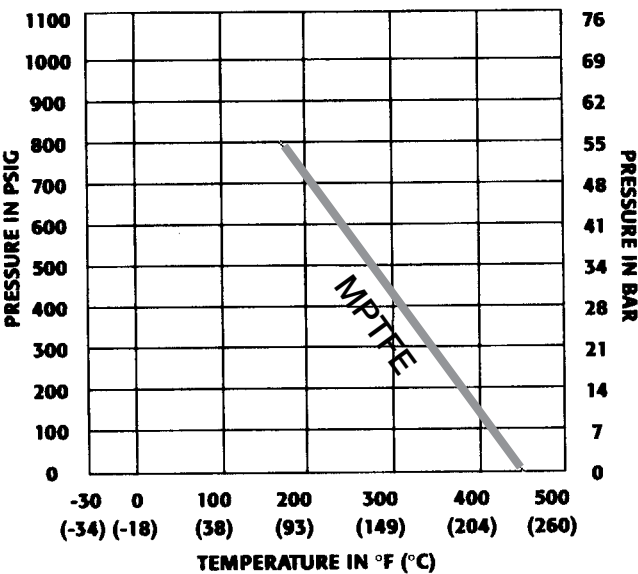
Manual lockable handle with vinyl sleeve

Pressure vs. Temperature Chart
for valve 1/2" - 2"



NOTE: Use of sanitary clamp ends will affect pressure ratings.

Pressure vs. Temperature Chart
for valve 2-1/2" - 4"



TOP-FLO® Air Operated Flow Control Valves

Aseptic options available

TOP-FLO® DCX3 – Single
Sealing Shut-Off

TOP-FLO® DCX4 – Single
Sealing Divert

Features:

- Patented PFA floating plug seal that is easily cleaned during CIP and offers outstanding sealing at high temperatures and excellent chemical resistance.
- Heavy duty stainless steel pneumatic actuator that is capable of function changes:
NO (Normally Open) – NC (Normally Closed) – DA (Double Acting)
- Clamp style operator connection (manual and automated) for easy inspection and maintenance.
- Heavy wall machined spherical bodies guarantee excellent resistance to thermal expansion and contraction.
- Wide variety of body configurations: DCX3 (L) - (T) - (X) / DCX4 (L/L) - (L/T) – (T/L)



Specifications:

Size Range 1/2", 3/4", 1", 1-1/2", 2",
 2-1/2", 3", 4", 6"

Surface Finish:

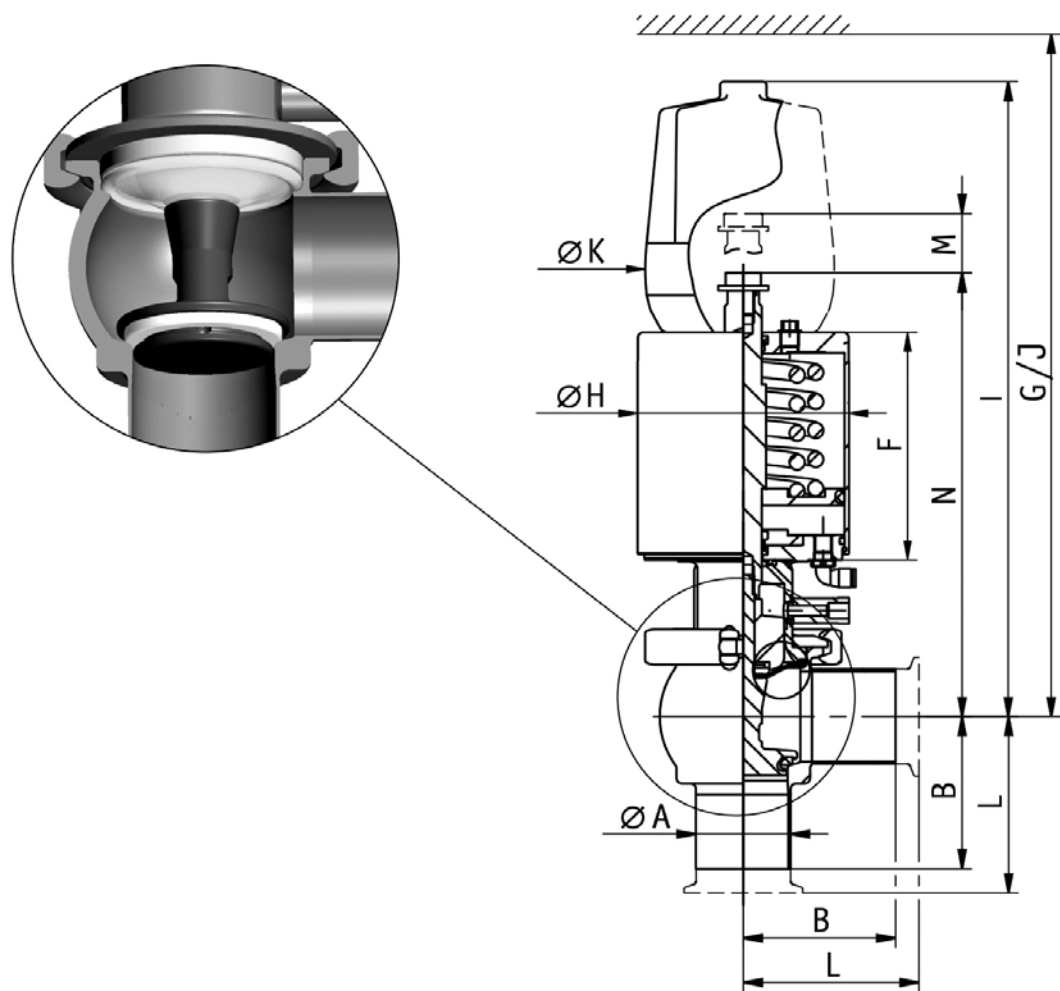
R_a Interior = 32 R_a

R_a Exterior = 40-50 R_a

Materials:

Body/Stem: 316L SS
Operator: 304 SS
Valve seals: PFA floating plug seal
 FKM stem seal & body seal

Dimensions Diaphragm DCX3/DCX4



Tube A	B	F	G	H	I	J	K	L	M	N	Weight in lbs.
1	2.01	4.33	11.02	3.50	11.89	16.93	4.09	2.52	0.472	8.07	13.23
1-1/2	2.24	4.33	11.81	3.50	12.17	16.93	4.09	2.76	0.472	8.07	13.23
2	2.99	4.84	13.78	4.49	13.31	18.50	4.09	3.50	0.669	9.41	20.94
2-1/2	2.99	6.26	16.54	6.57	13.31	20.47	4.09	3.50	1.02	11.50	40.79
3	3.23	6.26	16.93	6.57	15.51	20.47	4.09	3.74	1.02	11.50	40.79
4	5.12	7.23	21.26	8.5	18.15	23.23	5.51	5.75	1.38	13.46	79.37

TOP-FLO® T45MP Check Valves (3-A)

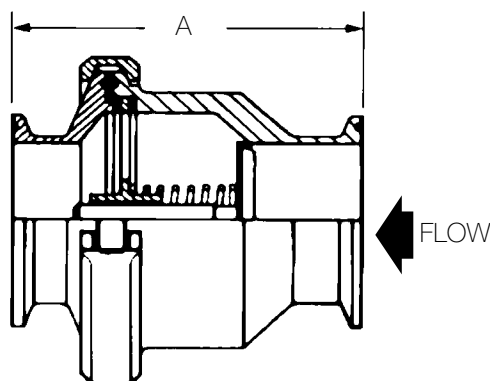
This finely crafted 316L SS check valve offers maximum quality with USP Class VI elastomers. With a unique clamp design, a simple twist of the wing nut permits quick disassembly without tools. The stainless steel spring in this superior valve assures positive closure and smooth operation. This valve is designed for vertical as well as horizontal applications. Made in U.S.A.



Features:

- Suitable for Process & C.I.P.
 - Operating pressure to 150 psi
 - Temperature from 30°F min. to 225°F max.
 - Standard end connection - clamp type (butt weld upon request).
 - Standard seals - FDA/USP Class VI FKM (EPDM & other elastomers upon request).
 - Internal finish – 20R_a (SF1) (other finishes available upon request).
- Material test reports provided upon request.
- Eccentric type available upon request.

For clean steam applications consult factory.



T45MP Standard Disc Type Check Valves

SIZE	A	STOCK NO.
1/2	3-1/2	384505VA-6
3/4	3-1/2	384507VA-6
1	4-1/8	384510VA-6
1-1/2	4-9/16	384515VA-6
2	5-1/16	384520VA-6
2-1/2	5-3/8	384525VA-6
3	6-1/8	384530VA-6
4	8-1/8	384540VA-6
6	8-1/8	384560VA-6

T45MP Guide Finger Disc Type Check Valves

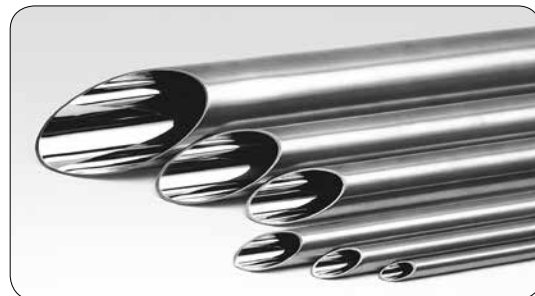
SIZE	A	STOCK NO.
1/2	3-1/2	N/A
3/4	3-1/2	N/A
1	4-1/8	384510GFE
1-1/2	4-9/16	384515GFE
2	5-1/16	384520GFE
2-1/2	5-3/8	384525GFE
3	6-1/8	384530GFE
4	8-1/8	384540GFE
6	8-1/8	384560GFE
8	11.00	384580GFV-6

topIn.co/checkvi

Pharmaceutical Grade Tubing (BPE)

Top Line electropolished tubing sets the standard for service in applications requiring finishes to 15R_a maximum.

20R_a ID/30R_a OD and 15R_a EP ID/30R_a OD tubing available in sizes from 1/2" through 6" OD. This full finished stainless steel tubing is available from stock or direct from the mill in 20' lengths. All electropolished tubing is fully tested and marked per ASTM A450 requirements.



FINISH: Electropolished tubing is standard with a 15R_a max ID and 30 R_a OD (BPE surface finish code SF4). The same product is available with a 10R_a max. surface finish ID.

ANNEALING: All tubing is bright annealed to a minimum of 1900°F (1040°C) and rapidly quenched.

CLEANING: All Top Line electropolished tubing is rinsed with low TOC de-ionized water. The tubing is then dry purged with 99.998% pure nitrogen which is filtered to .003 micron at the point of use. The cleaning and packaging is done in a class 100 cleanroom. The SF4 tubing meets the O2 cleaning specifications. Certification must be asked for at time of order.

PACKAGING: All Top Line electropolished tubing is packaged using protective 6 mil poly sleeving with air tight end caps. The tubing is then packaged in wood or tri-wall corrugated cartons for maximum protection during shipment.

Materials:

Manufactured from 316L SS, produced to ASTM A270 supplementary #2 pharmaceutical grade tubing. Other alloys available upon request.

CHEMICAL COMPOSITION	PERCENTAGE	316L	CHEMICAL COMPOSITION	PERCENTAGE	316L
ELEMENTS	SPECIFICATION	TYPICAL	ELEMENTS	SPECIFICATION	TYPICAL
(C) CARBON	0.035 max.	.020	(Si) SILICON	1.00	.50
(Mn) MANGANESE	2.00 max.	1.70	(Ni) NICKEL	10.0 - 15.0	10.2
(P) PHOSPHORUS	0.045	.029	(Cr) CHROMIUM	16.0 - 18.0	16.4
(S) SULFUR	0.005 - .017 max.	.013	(Mo) MOLYBDENUM	2.0 - 3.0	2.10

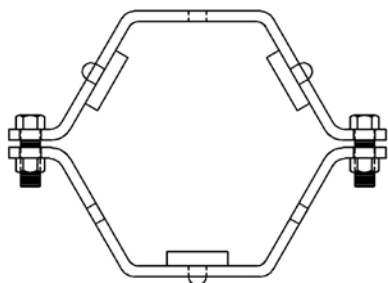
Dimensional Tolerances

OUTSIDE DIAMETER		GAUGE	OUTSIDE DIAMETER	LENGTH	WALL THICKNESS
INCH	MILLIMETER				
1/2	12.70	16 (.065")	+0.005/-0.005	+2.00/-0	+/-10%
3/4	19.05	16 (.065")	+0.005/-0.005	+2.00/-0	+/-10%
1	25.40	16 (.065")	+0.005/-0.005	+2.00/-0	+/-10%
1-1/2	38.10	16 (.065")	+0.008/-0.008	+2.00/-0	+/-10%
2	50.80	16 (.065")	+0.008/-0.008	+2.00/-0	+/-10%
2-1/2	63.50	16 (.065")	+0.010/-0.010	+2.00/-0	+/-10%
3	76.20	16 (.065")	+0.010/-0.010	+2.00/-0	+/-10%
4	101.60	14 (.083")	+0.015/-0.015	+2.00/-0	+/-10%
6	152.4	12 (.109)	+0.030/-0.030	+2.00/-0	+/-10%

SIZE (TUBE O.D.)	GAUGE	WALL	LBS/FT	316L STOCK NO.	
				15R _a ID/30R _a OD	20R _a ID/30R _a OD
1/2	16	.065	.3020	3105656-7EP	3105656-7BPE
3/4	16	.065	.4755	3107656-7EP	3107656-7BPE
1	18	.049	.4980	*N.S.	*N.S.
1	16	.065	.6490	3110656-7EP	3110656-7BPE
1-1/2	18	.049	.7593	*N.S.	*N.S.
1-1/2	16	.065	.9962	3115656-7EP	3115656-7BPE
2	18	.049	1.0210	*N.S.	*N.S.
2	16	.065	1.3430	3120656-7EP	3120656-7BPE
2-1/2	16	.065	1.6900	3125656-7EP	3125656-7BPE
3	16	.065	2.0370	3130656-7EP	3130656-7BPE
4	14	.083	3.4720	3140836-7EP	3140836-7BPE
6	12	.109	6.9000	3160196T-7EP	—

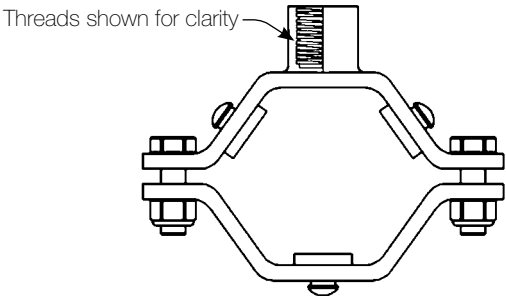
Hangers

Top Line hangers install easily and provide secure mounting for a wide variety of tubing sizes.



B24W Tubing Hanger

SIZE (TUBE O.D.)	STOCK NO.	HANGER W/POLY PRO
1/2	32D-05	32D-05PP
3/4	32D-07	32D-07PP
1	32D-10	32D-10PP
1-1/2	32D-15	32D-15PP
2	32D-20	32D-20PP
2-1/2	32D-25	32D-25PP
3	32D-30	32D-30PP
4	32D-40	32D-40PP
6	32D-60	32D-60PP
8	32D-80	—
10	—	—
12	—	—

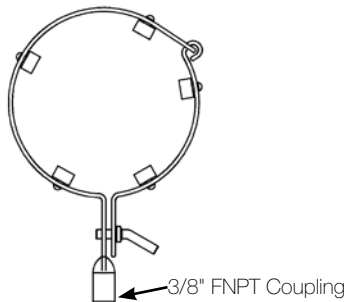


C24T Tubing Hanger

3/8" FNPT Coupling

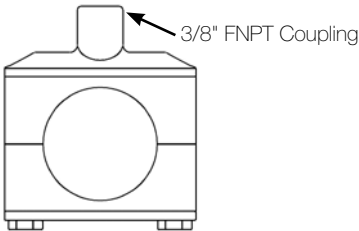
SIZE (TUBE O.D.)	STOCK NO.	HANGER W/POLY PRO
1/2	32C-05	—
3/4	32C-07	—
1	32C-10	32C-10PP
1-1/2	32C-15	32C-15PP
2	32C-20	32C-20PP
2-1/2	32C-25	32C-25PP
3	32C-30	32C-30PP
4	32C-40	32C-40PP
6	32C-60	32C-60PP
8	—	—
10	—	—
12	—	—

3/8" or 1/2" standard threads available upon request



A24FCF Tubing Hanger

SIZE (TUBE O.D.)	STOCK NO.
1	32A2410
1-1/2	32A2415
2	32A2420
2-1/2	32A2425
3	32A2430
4	32A2440



Many new sizes and styles available

topln.co/hangerscast

topln.co/hangersdual

topln.co/hangersquad

Rotary Lobe Pumps (3-A)



SteriLobe®

The SteriLobe® series offers the ultimate in modular, flexible design to ensure that the appropriate feature set is provided for every application. The pump can be configured to handle nearly every unique pumping problem.



ConceptSQ

The SQ uniquely offers specification flexibility combining sterile barriers with front-loading single or double mechanical seals, external rotor fixing, and superb self-draining characteristics. As a result, the range delivers benchmark CIP and SIP performance with the simplicity of maintenance to assure minimum downtime. Together, these features deliver tremendous operational benefits across a broad spectrum of applications.



Classic+

The Classic+ is a positive displacement rotary lobe pump designed using the latest innovative computer aided techniques and manufactured to meet today's stringent demands for high product quality, reliability, ease of maintenance, economy in purchase and low life time costs.

TOP-FLO® TF-C Series Centrifugal Pumps (3-A)



These versatile pumps serve as excellent choices for utility purposes like DI water, non-compensial water and CIP. The TF-C Series pumps parts are interchangeable with other manufacturers.

Pump dolly carts are available to aid mobility of the pump throughout your manufacturing facility. Dolly options include pump, motor, VFD, switches and wiring.

Go to topln.co/dolly for cart options.

Model No.	TF-C114	TF-C216	TF-C218	TF-C328
Inlet	1-1/2 or 2	2 or 2-1/2	2 or 3	3 or 4
Outlet	1-1/2	1-1/2	1-1/2	2
Max. Imp.	4	6	8	8

PUMP SPECIFICATIONS:

Pump Construction Materials:

- All wetted parts 316 SS
- 304 SS adapters
- Seals - carbon (other seals available)
- Seats - silicon carbide (other seats available)
- Casing gasket - FKM (other gaskets available)

Pump Casings:

- Casting drain optional
- Volute type (standard)
- Inlet-oversizing as noted in chart above

Pump Connections:

- Sanitary clamp (standard)
- Others available upon request

Pump Finishes:

- 32R_a ID (standard)
- Others available upon request

Pump Seals:

- DG seal recommended
- Others available upon request

Motor, Electrical:

- 3 phase - 230/460 volts - 1750 & 3500 rpm
- Single phase - 115/230 volts - 1750 & 3500 rpm
- Others available upon request

Motor Housings:

- TEFC (totally enclosed fan cooled)
- Washdown duty (painted or stainless steel)
- Other styles available upon request

For pump maintenance manual, go to topln.co/pumpmanual

For pump curves, go to topln.co/curves

For detailed technical information, go to topln.co/cent

For pump quote, go to topln.co/pumpdata

For pump seal, go to topln.co/pumpsealvideo

For pump wiring, go to topln.co/datasheet

For pump assembly, go to topln.co/pumpassemblyvideo

Magnetic Drive Pump

The newly developed Series MKP-Bio offers you an excellent solution for aseptic applications in the pharmaceutical, biotechnology, food industry and other sanitary processes.

The pump has been developed and designed according to the EHEDG recommendations and takes in to account VDMA 24432 and EN 12462 standards.



FEATURES

- Vertically mounted magnetic drive pump with patented drive system.
- The pump is totally self-draining through the suction connection eliminating requirement for additional flush drain and vent connections.
- Due to the inherent design of the internal bearing lubrication and the gasket construction according to DIN 11864, the pump is dead space free.
- Specially designed flushing in the internal bearing guarantees excellent lubrication and cooling.
- All wetted components meet a surface finish of minimum $32R_a$ standard, other finishes available on request.
- All wetted corners are radiused for complete drainability.
- All wetted surfaces are finished with a minimum 3° slope.
- Microorganism cannot enter from the atmosphere into the pump.
- CIP/SIP capable
- Reliable and easy assembly and reassembly.
- For assembly and reassembly of the pump, there is no special tool required.
- All wetted materials are made of FDA approved components.
- Slurry content up to 10% max. 0.03".

OPTIONS

- Internal bearing in tungsten carbide
- Diamond coated internal bearing
- Jacketed casing
- Temperature protection sensor PT-100 (recommended) to protect against dry running
- Double shroud system
- Special frame mounting
- Special O-ring material available on request (FKM, EPDM, Silicone).
- Different suction and discharge connections available (clamp, TI-Line, flange, and butt weld).

TECHNICAL DATA

Capacity	Q:	up to 20 m ³ /h 220 GPM
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Head	H:	up to 260 ft.
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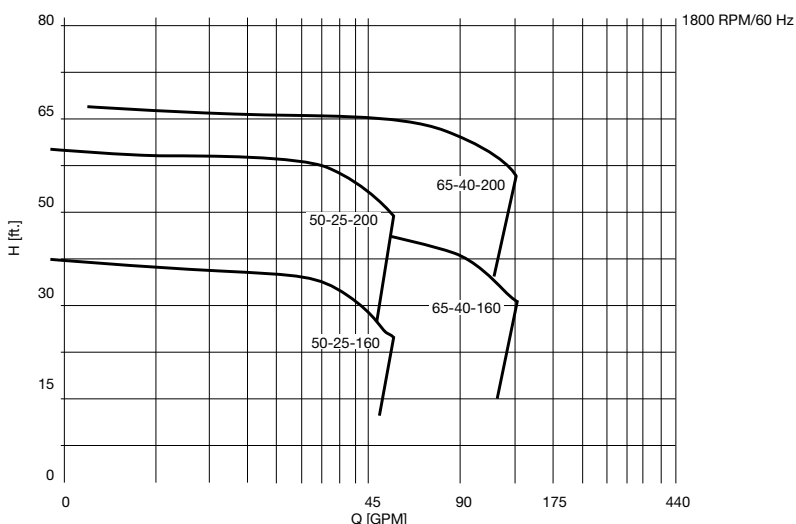
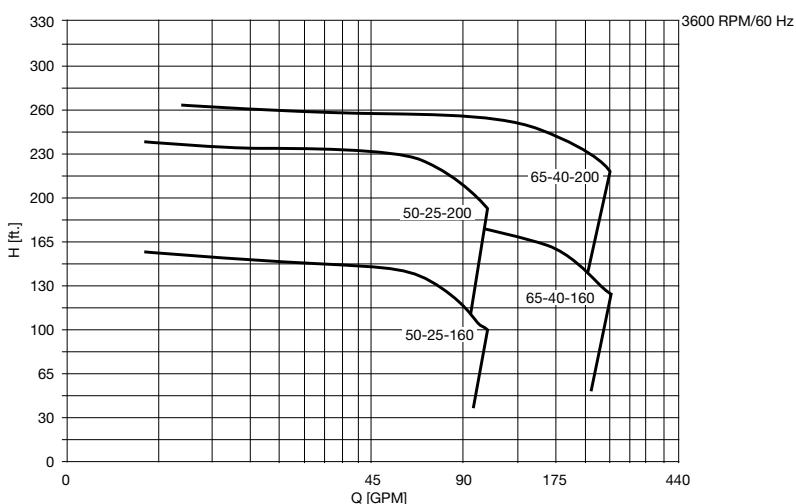
Temp	°F:	-72 up to 300°F
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Nom. Pres.	PN:	230 PSI
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Materials	316 SS Hast. C22, Alloy 59
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Other materials available on request.

Execution	Vertical / close coupled
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TOP-FLO® Custom Fittings & Fabrications



Top Line's skilled craftsmen and specialized equipment combine to produce a wide variety of custom fabricated stainless steel process flow components. All specials are made to customer requirements and are available in a wide variety of sanitary finishes. Fast service is assured.

topln.co/custom

Electropolishing



Electropolishing is an electrochemical process that removes surface metal by attacking the high points on the surface. The surface becomes smoother and any contaminants and free irons will be removed. This will improve the corrosion resistance, reduce the product adhesion and contamination buildup, deburr, and create a lustrous finish.

topln.co/electropolishing

Food, Beverage, & Dairy Products

Fittings, Clamps & Gaskets

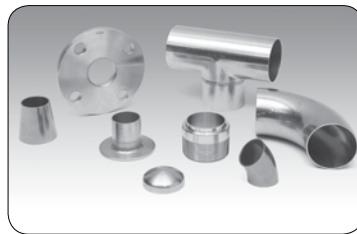
Top Line produces stainless steel fittings with sanitary type connections including clamp, tube O.D. and butt weld. All Top Line fittings are manufactured from both 304 and 316L stainless steel that meet all 3-A standards. Most fitting types are available in sizes 1/2" through 12". Internal quality control practices at Top Line ensure a low rejection rate that facilitates smooth jobsite installation.



Clamp



Butt Weld



Tube O.D. Butt Weld



Clamps

Top Line carries a large selection of clamps for the sanitary industry.

- 13MHMM
- 13MHP
- 13LAH
- 13MHHS
- 13IS
- 13IW

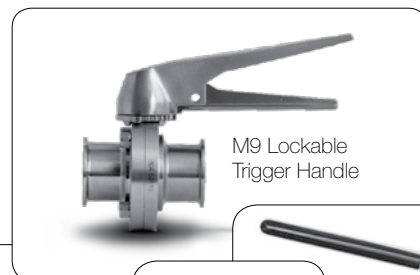
3-A, FDA and USP gaskets

- Buna
- PTFE
- EPDM
- Silicone
- FKM
- PTFE Envelope
- Orifice Plates
- Screen Gaskets

topln.co/clampfittings topln.co/sweld topln.co/odweld topln.co/clamppsi

TOP-FLO® Butterfly Valves

- Value
- Premium - Definox
- TOP-FLO® standard



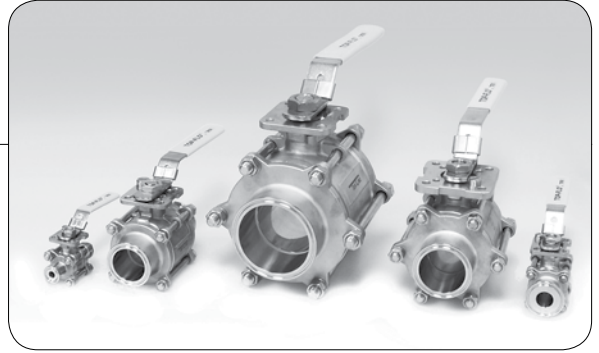
M9 Lockable
Trigger Handle



topln.co/butterfly

TOP-FLO® TF4 Ball Valves

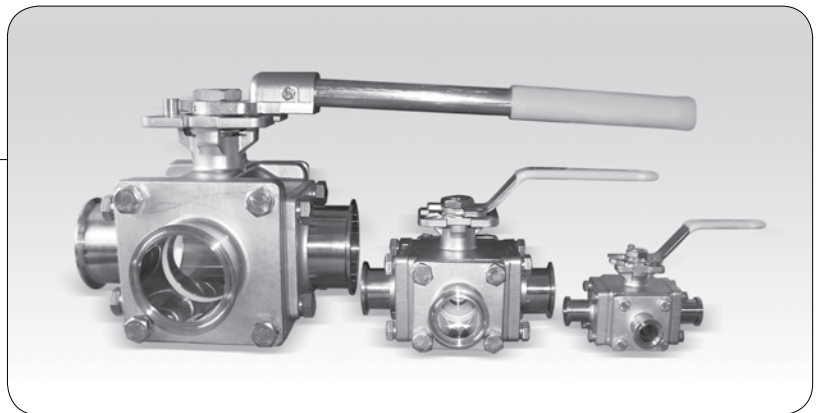
TOP-FLO® TF4 series full flow ball valves are engineered to perform flawlessly in most general service industry applications. Cavity filled virgin PTFE seats are standard. Available in sizes 1/2" - 6"



topln.co/ballvalves

TOP-FLO® 3-way Ball Valves (3-A)

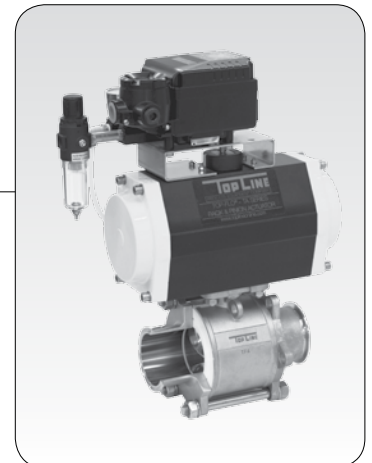
TOP-FLO® 3-way ball valves feature PTFE cavity filler, fully encapsulated and locking device handle. Meets 3-A, FDA, and USDA requirements. Available in sizes 1/2" - 4"



topln.co/3way

TOP-FLO® T4V V-Port Control Ball Valves

TOP-FLO® Series T4V sanitary V-Port control ball valves exhibit excellent throttling capabilities and have a wide range of control options. Pneumatic and electro-pneumatic positioners and modulating electric actuators are available to suit many applications. V-ported balls in both 30° and 60° openings are used depending on service requirements. PTFE cavity filled seats and 20R_a internal surface finish are standard. Available in sizes 1/2" - 4"



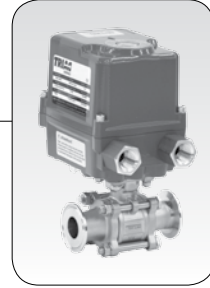
topln.co/vport

TOP-FLO® Actuators

- Rack & pinion
- Electric
- Stainless steel canister



Rack & Pinion



Electric

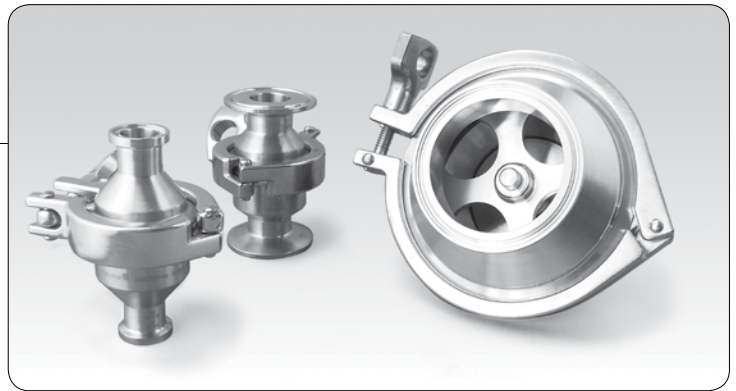


SS Canister

topln.co/rpa topln.co/ea topln.co/ca

TOP-FLO® K45MP Check Valves (3-A)

Top Line offers disc, ball, and air-blow check valves manufactured from 316L SS with corresponding FDA & 3-A conforming elastomers. Standard connections are sanitary clamp end with others available upon request. Available in sizes 1/2" - 6"



topln.co/check

TOP-FLO® Plug Valves

TOP-FLO® plug valves are basic sanitary flow control valves with minimal pressure drop. They feature a tapered core assembly that allows for easy manual cleaning while eliminating crevices that can lead to contamination. Available in sizes 1" - 3"



topln.co/plug

TOP-FLO® Air Operated Flow Control Valves

The automated flow control valves product line consists of mix proof, tank bottom, shutoff, divert, and pressure relief types. Valves are pneumatically automated as standard with optional electronic control tops for feedback. End connections available are sanitary clamp and butt weld with other connection styles upon request. Sizes range from 1/2" through 6".



topln.co/dcx

TOP-FLO® VDCI MC PMO-C Mixproof Air Operated Flow Control Valves (3-A)

New Generation. Continuous operation (7 days a week, 24 hours a day).

TOP-FLO® PMO-C mixproof valve technology allows two different liquids to cross over in complete safety even during seat lifting operations. Production no longer needs to completely stop during cleaning operations.

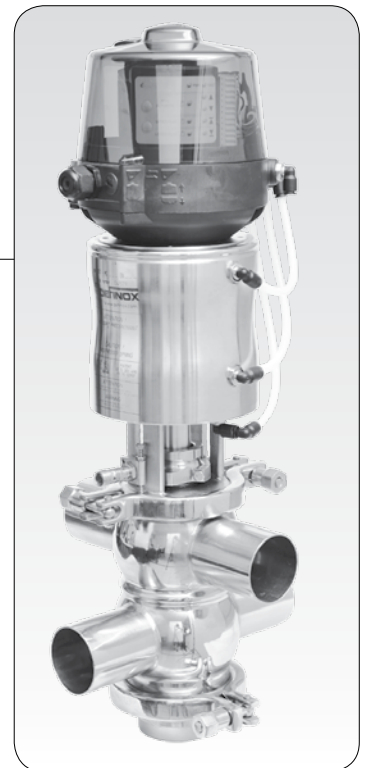
The new design of DEFINOX VDCI MC PMO-C mixproof valve meets the 3-A recommendations (85-02) in accordance with dairy sanitary requirements.

Available in sizes 1-1/2" - 4"

The valve offers:

- Simple and high-tech design
- 3-A design
- Aseptic version on request
- Patented solution
- Numerous command - ACS control top options

topln.co/pmoc



TOP-FLO® TL60 ARV Air Relief Valves

The TL60ARV air relief valve is used primarily for removal of trapped air from a line without loss of product. This design will not allow air to enter the line or container under negative pressure. These valves are typically found installed vertically on the suction inlet tube in front of CIP pumps.

topln.co/relief



Stainless Steel Tubing (3-A) & Hangers

Full length 20' tubing is stocked in type 304 and 316L with specialty alloys upon request. Tubing is manufactured to ASTM A249, A269 and A270 standards dependant on requirement. Mechanical polish options include 3-A sanitary finish, 20R_a mechanical or 15R_a electropolish. Various styles of hangers are available with polypropylene inserts or with EPDM grommets to compliment tubing installation.

topln.co/tubing



TOP-FLO® Filters & Strainers (3-A)

TOP-FLO® in-line filters and strainers are constructed from corrosion fighting 316L material. They feature a sanitary design that facilitates ease of installation and quick cleanup during maintenance. Top Line offers filters and strainers in two lengths that are interchangeable with other comparable competitor models in the industry. A wide selection of replacement filter media, backup tubes, and overscreens as well as standard spare parts are also available.



topln.co/strainers

For more information, download our full food, dairy and beverage catalog
topln.co/food

Allegheny Bradford Family of Companies



The ABC family of companies consists of three operating divisions: **Allegheny Bradford Corporation, Top Line Process Equipment Company, Allegheny Surface Technology, and ABC Actini.**

Each division delivers the highest level of quality, along with the technical support, professional expertise, and dedicated service you expect. Our focus is to meet or exceed the most stringent standards in the pharmaceutical, biotechnology, and personal care processing industries. We combine unsurpassed excellence with single-source convenience and value.

History:

The company started as Top Line Corporation supplying dairy equipment to the dairy farm and dairy process industries nationwide. It was originally founded and located in Janesville, Wisconsin in the 1950s. In 1962, Top Line moved its headquarters to Lewis Run, Pennsylvania and began to market stainless steel components to the food and beverage industry through a network of distributors. This formed the new operating division named Top Line Process Equipment Company. Allegheny Bradford Corporation was originally formed to supply stainless steel flow equipment to both Top Line divisions. Allegheny Bradford went on to become its own operating division manufacturing custom equipment to the pharmaceutical and biotechnology industries.

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Always giving you
top of the line
service and quality.

Contact your Top Line Representative for Assistance

Office: P.O. Box 264 · Bradford, PA 16701

Plant: 21 Valley Hunt Drive · Lewis Run, PA 16738

800-458-6095

814-362-4626

Fax: 814-362-4453

This is what our customers are saying about us:

- "Can't ask for anything more. You have the most complete line I have ever seen. Your response time to me is quick and accurate."
Tim Bond - American Process Solutions
- "Personalized commitment and service to the distributor and not having to wait to speak to a knowledgeable person."
Stephen McCarthy - New England Stainless Distributors

Top Line is the leading supplier of sanitary stainless steel process equipment serving the food, beverage, dairy, pharmaceutical, biotechnological and personal care industries. For over 50 years we've provided our customers with exceptional customer service and quality products. We are committed to meeting the fastest delivery, new product development and application engineering to meet all our customer's needs with our extensive inventory and expert sales team.

Top Line specializes in stainless steel materials – type 304 and 316L. Our modern, well equipped manufacturing facilities are staffed by skilled and dedicated craftsmen. Consistently meeting important tolerances and finish specifications is of primary concern to us. Before any products leave our plant they are subjected to rigid quality assurance checks.

Top Line should always be considered your first choice for both standard and custom fabricated stainless steel products.

Limited Warranty

Top Line Process Equipment Company products are warranted to be free of defects in material or workmanship for a period of one year from date of shipment. Warranty covers those Top Line products used in an approved installation and maintained in strict accordance with recognized standard industry practice. If, after properly authorized return, Top Line determines that products are defective, Top Line may at its option, repair or replace such defective products.

Top Line shall not be liable for consequential, indirect or incidental damages. The above warranty is in lieu of all other warranties, expressed or implied.



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