



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



PUMPS · VALVES · FITTINGS · TUBING · CUSTOM SPECIALTIES

Active members: ISPE
Active Committee Participants: ASME BPE

www.toplineonline.com



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TOP LINE

PROCESS EQUIPMENT COMPANY

Top Line Process Equipment Company continues to be a leading supplier of high purity stainless steel processing equipment for over 50 years. Top Line products consist of high purity stainless steel process flow equipment for the pharmaceutical, biotech, personal care, food, beverage and other sanitary industries. As a long-time contributing member of ASME BPE, we supply certified BPE fittings and tubing along with our complete line of high purity processing equipment designed for the pharmaceutical and biotechnology industries. Our industry leading technology and manufacturing techniques result in the highest quality equipment manufactured at the lowest production cost, thus providing competitive priced products. We market through a world-wide network of distributors with key organizations specializing in the pharmaceutical and biotechnology market. We provide full factory technical support to our customers with direct communication to engineering firms and project managers to provide exacting equipment with superior customer service.

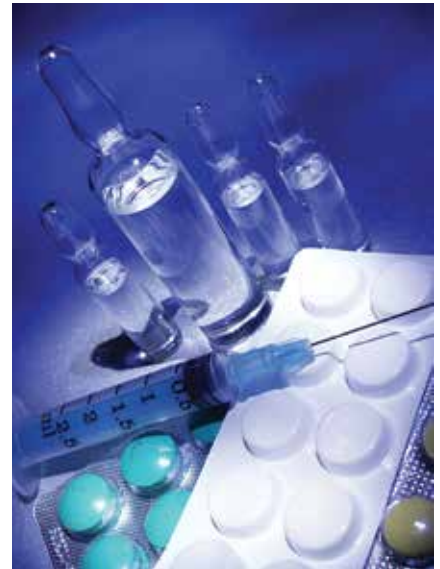
Our commitment to finely crafted, high quality certified BPE components, unequaled customer service and competitive pricing has led to our company's continued growth and highly respected reputation in the industries we serve.

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 Certified Fittings

Top Line provides certified BPE fittings 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.		Polishing
Designation	$\mu\text{in.}$	μm	Criteria
SF0	No Finish Requirement		
SF1	20	0.51	Mechanical
SF2	25	0.64	Mechanical
SF3	30	0.76	Mechanical
SF4	15	0.38	Electropolished
SF5	20	0.51	Electropolished
SF6	25	0.64	Electropolished



BPE Dimensions and Tolerances

Top Line BPE Certified fittings are manufactured to exacting 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

BioClean™

BPE Fittings

Top Line provides certified BPE fittings in sizes ranging from 1/2" through 4" in both automatic weld and hygienic clamp ends. 6" fittings are also available. Our precision crafted **BioClean™** fittings provide reliable technology advanced components which are designed for today's high speed automatic weld equipment. Our fittings are provided with sanitary finishes that meet or exceed pharmaceutical process specifications with a wide range of complimentary products. These fittings are manufactured to dimensional specifications per BPE and demonstrate cost reduction to third party users due to decreased rejection rate. All BPE fittings are protected with end caps, sealed in transparent bags or shrink wrapped and provided with material test reports.



BPE Fittings Specifications

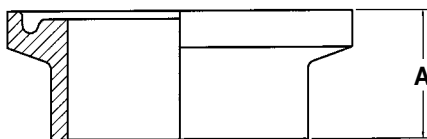
Size Range: 1/2" OD - 6" OD

Materials: 316L (Stock No. Prefix 40) for weld connections
316L (Stock No. Prefix 48) for clamp connections

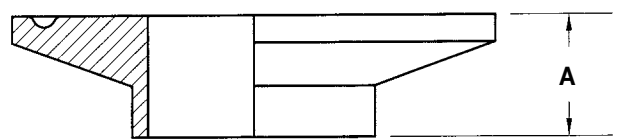
Finish: No. 3 - 20R_a ID (SF1)/mill OD (BPE SF1)
No. 3 EP - 15R_a ID electropolish/mill OD (BPE SF4)
No. 7 - 20R_a ID (SF1)/32R_a OD (BPE SF1)
No. 7EP - 15R_a ID electropolish/32R_a OD (BPE SF4)
10R_a ID available

Please Note: -7 & -7EP parts are available, use these designations for suffix codes

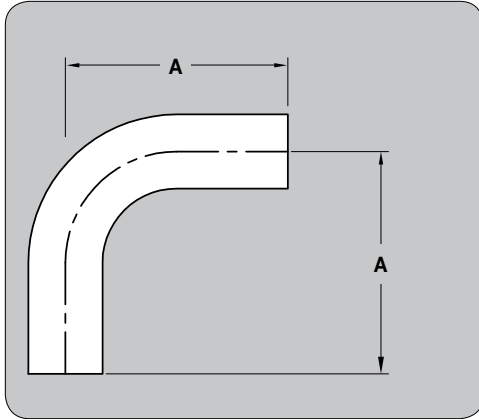
Ferrule Type:



TYPE "A" FERRULE



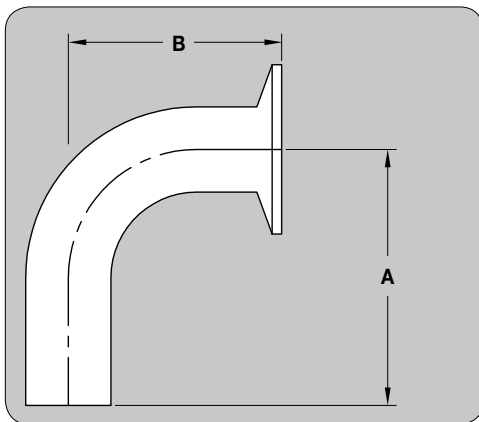
TYPE "B" FERRULE



TL2S – 90° ELL

BPE# DT-4.1.1-1

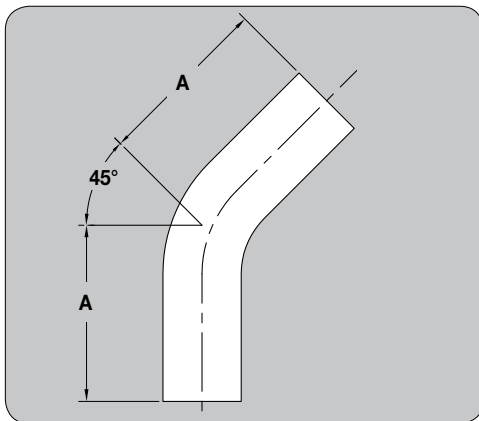
SIZE (TUBE O.D.)	A	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
1/2	3	40705-3	40705-3EP
3/4	3	40707-3	40707-3EP
1	3	40710-3	40710-3EP
1-1/2	3-3/4	40715-3	40715-3EP
2	4-3/4	40720-3	40720-3EP
2-1/2	5-1/2	40725-3	40725-3EP
3	6-1/4	40730-3	40730-3EP
4	8	40740-3	40740-3EP
6	11-1/2	40760-3	40760-3EP



TL2CMS – 90° ELL

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	407MS05-3	407MS05-3EP
3/4	A	3	1-5/8	407MS07-3	407MS07-3EP
1	A	3	2	407MS10A-3	407MS10A-3EP
1	B	3	2	407MS10-3	407MS10-3EP
1-1/2	B	3-3/4	2-3/4	407MS15-3	407MS15-3EP
2	B	4-3/4	3-1/2	407MS20-3	407MS20-3EP
2-1/2	B	5-1/2	4-1/4	407MS25-3	407MS25-3EP
3	B	6-1/4	5	407MS30-3	407MS30-3EP
4	B	8	6-5/8	407MS40-3	407MS40-3EP
6	B	11-1/2	10-1/2	407MS60-3	407MS60-3EP



TL2KS – 45° ELL

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	40805-3	40805-3EP
3/4	2-1/4	40807-3	40807-3EP
1	2-1/4	40810-3	40810-3EP
1-1/2	2-1/2	40815-3	40815-3EP
2	3	40820-3	40820-3EP
2-1/2	3-3/8	40825-3	40825-3EP
3	3-5/8	40830-3	40830-3EP
4	4-1/2	40840-3	40840-3EP
6	6-1/4	40860-3	40860-3EP

ELBOWS

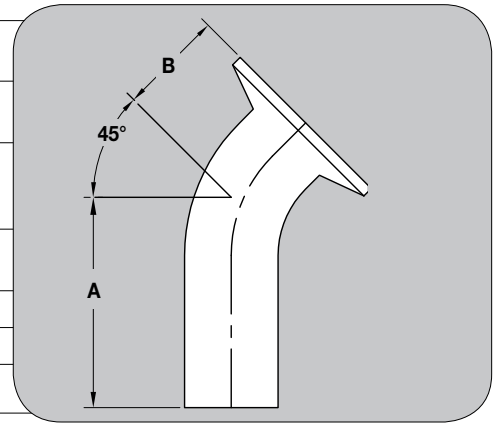
BioClean™ BPE FITTINGS



TL2KMS – 45° ELL

BPE# DT-4.1.1-5

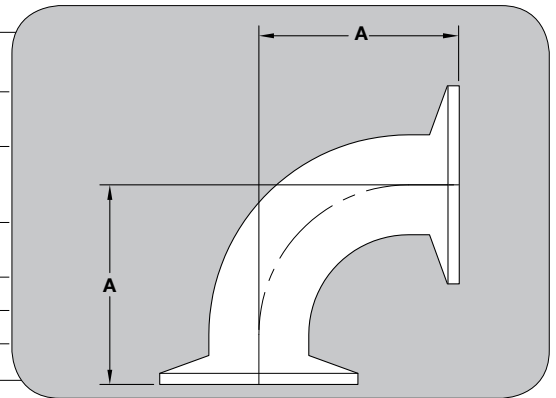
SIZE (TUBE O.D.)	TYPE	A	B	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
1/2	A	2-1/4	1	408MS05-3	408MS05-3EP
3/4	A	2-1/4	1	408MS07-3	408MS07-3EP
1	A	2-1/4	1-1/8	408MS10A-3	408MS10A-3EP
1	B	2-1/4	1-1/8	408MS10-3	408MS10-3EP
1-1/2	B	2-1/2	1-7/16	408MS15-3	408MS15-3EP
2	B	3	1-3/4	408MS20-3	408MS20-3EP
2-1/2	B	3-3/8	2-1/16	408MS25-3	408MS25-3EP
3	B	3-5/8	2-3/8	408MS30-3	408MS30-3EP
4	B	4-1/2	3-1/8	408MS40-3	408MS40-3EP
6	B	6-1/4	5-1/4	408MS60-3	408MS60-3EP



2CMP – 90° ELL

BPE# DT-4.1.1-3

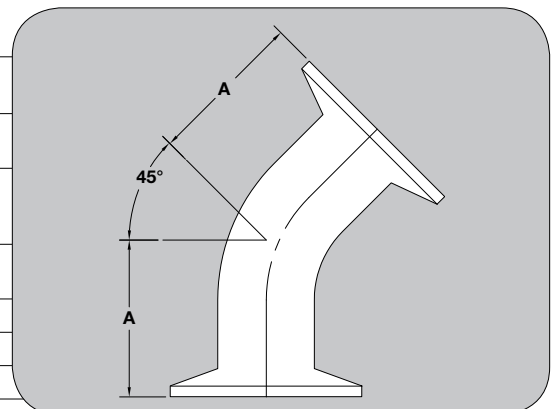
SIZE (TUBE O.D.)	TYPE	A	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
1/2	A	1-5/8	48705-3	48705-3EP
3/4	A	1-5/8	48707-3	48707-3EP
1	A	2	48710A-3	48710A-3EP
1	B	2	48710-3	48710-3EP
1-1/2	B	2-3/4	48715-3	48715-3EP
2	B	3-1/2	48720-3	48720-3EP
2-1/2	B	4-1/4	48725-3	48725-3EP
3	B	5	48730-3	48730-3EP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

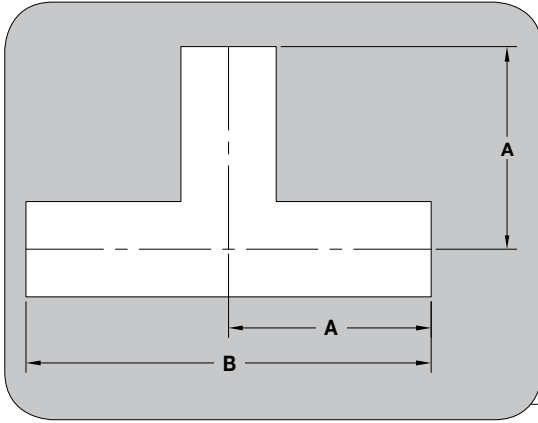


2KMP – 45° ELL

BPE# DT-4.1.1-6

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

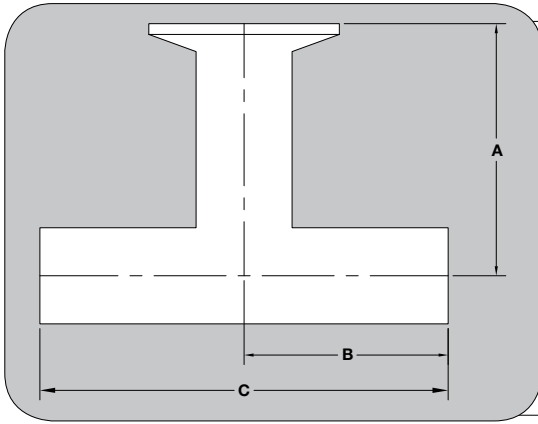




TL7WWW – TEE

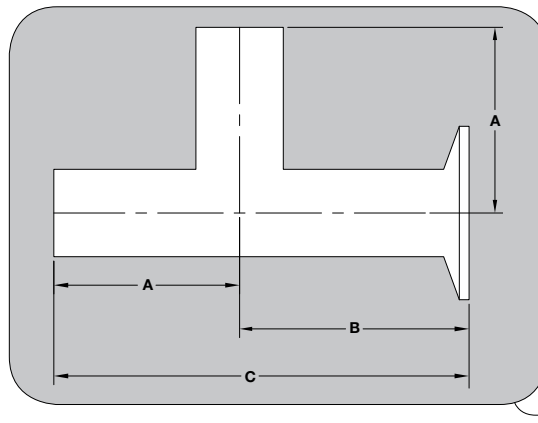
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SIZE (TUBE O.D.)	A	B	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
1/2	1-7/8	3-3/4	401105-3	401105-3EP
3/4	2	4	401107-3	401107-3EP
1	2-1/8	4-1/4	401110-3	401110-3EP
1-1/2	2-3/8	4-3/4	401115-3	401115-3EP
2	2-7/8	5-3/4	401120-3	401120-3EP
2-1/2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



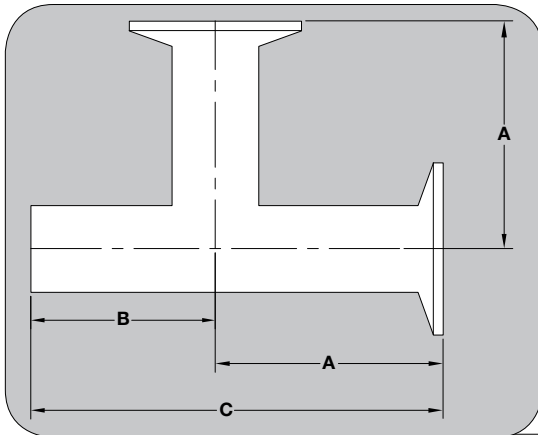
TL7WWM – TEE

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	3-3/4	4011MB05-3	4011MB05-3EP
3/4	A	2-1/2	2	4	4011MB07-3	4011MB07-3EP
1	A	2-5/8	2-1/8	4-1/4	4011MB10A-3	4011MB10A-3EP
1	B	2-5/8	2-1/8	4-1/4	4011MB10-3	4011MB10-3EP
1-1/2	B	2-7/8	2-3/8	4-3/4	4011MB15-3	4011MB15-3EP
2	B	3-3/8	2-7/8	5-3/4	4011MB20-3	4011MB20-3EP
2-1/2	B	3-5/8	3-1/8	6-1/4	4011MB25-3	4011MB25-3EP
3	B	3-7/8	3-3/8	6-3/4	4011MB30-3	4011MB30-3EP
4	B	4-3/4	4-1/8	8-1/4	4011MB40-3	4011MB40-3EP
6	B	6-3/8	5-5/8	11-1/4	4011MB60-3	4011MB60-3EP



TL7WMW – TEE

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	4011M05-3	4011M05-3EP
3/4	A	2	2-1/2	4-1/2	4011M07-3	4011M07-3EP
1	A	2-1/8	2-5/8	4-3/4	4011M10A-3	4011M10A-3EP
1	B	2-1/8	2-5/8	4-3/4	4011M10-3	4011M10-3EP
1-1/2	B	2-3/8	2-7/8	5-1/4	4011M15-3	4011M15-3EP
2	B	2-7/8	3-3/8	6-1/4	4011M20-3	4011M20-3EP
2-1/2	B	3-1/8	3-5/8	6-3/4	4011M25-3	4011M25-3EP
3	B	3-3/8	3-7/8	7-1/4	4011M30-3	4011M30-3EP
4	B	4-1/8	4-3/4	8-7/8	4011M40-3	4011M40-3EP
6	B	5-5/8	6-3/8	12	4011M60-3	4011M60-3EP



TL7WMM – TEE

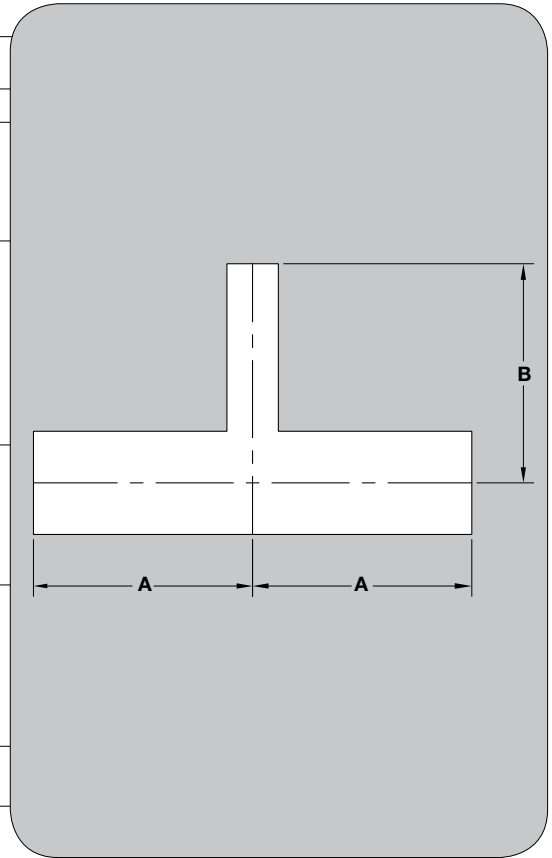
SIZE (TUBE O.D.)	TYPE	A	B	C	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
1/2	A	2-3/8	1-7/8	4-1/4	4011MMB05-3	4011MMB05-3EP
3/4	A	2-1/2	2	4-1/2	4011MMB07-3	4011MMB07-3EP
1	A	2-5/8	2-1/8	4-3/4	4011MMB10A-3	4011MMB10A-3EP
1	B	2-5/8	2-1/8	4-3/4	4011MMB10-3	4011MMB10-3EP
1-1/2	B	2-7/8	2-3/8	5-1/4	4011MMB15-3	4011MMB15-3EP
2	B	3-3/8	2-7/8	6-1/4	4011MMB20-3	4011MMB20-3EP
2-1/2	B	3-5/8	3-1/8	6-3/4	4011MMB25-3	4011MMB25-3EP
3	B	3-7/8	3-3/8	7-1/4	4011MMB30-3	4011MMB30-3EP
4	B	4-3/4	4-1/8	8-7/8	4011MMB40-3	4011MMB40-3EP
6	B	6-3/8	5-5/8	12	4011MMB60-3	4011MMB60-3EP

TEES

TL7RWWW – REDUCING TEE

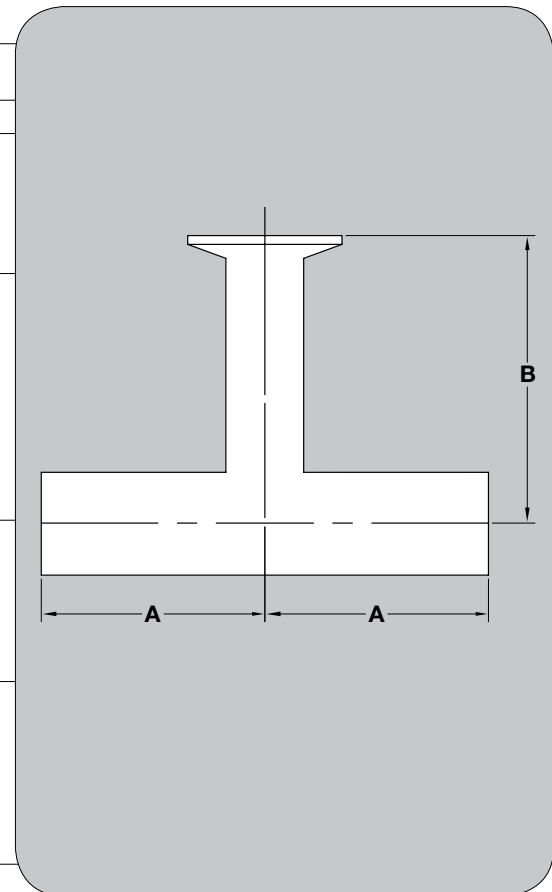
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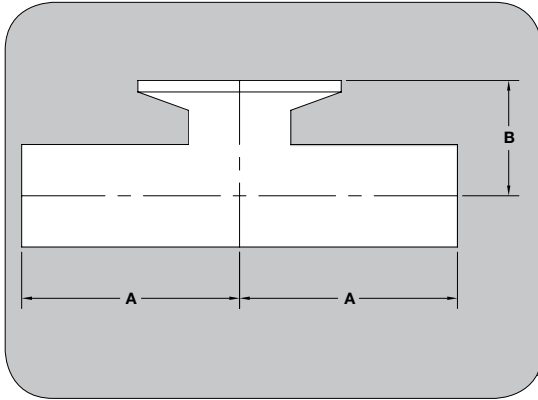
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3/4 X 1/2	2	2	401107R05-3	401107R05-3EP
1 X 1/2	2-1/8	2-1/8	401110R05-3	401110R05-3EP
1 X 3/4	2-1/8	2-1/8	401110R07-3	401110R07-3EP
1-1/2 X 1/2	2-3/8	2-3/8	401115R05-3	401115R05-3EP
1-1/2 X 3/4	2-3/8	2-3/8	401115R07-3	401115R07-3EP
1-1/2 X 1	2-3/8	2-3/8	401115R10-3	401115R10-3EP
2 X 1/2	2-7/8	2-5/8	401120R05-3	401120R05-3EP
2 X 3/4	2-7/8	2-5/8	401120R07-3	401120R07-3EP
2 X 1	2-7/8	2-5/8	401120R10-3	401120R10-3EP
2 X 1-1/2	2-7/8	2-5/8	401120R15-3	401120R15-3EP
2-1/2 X 1/2	3-1/8	2-7/8	401125R05-3	401125R05-3EP
2-1/2 X 3/4	3-1/8	2-7/8	401125R07-3	401125R07-3EP
2-1/2 X 1	3-1/8	2-7/8	401125R10-3	401125R10-3EP
2-1/2 X 1-1/2	3-1/8	2-7/8	401125R15-3	401125R15-3EP
2-1/2 X 2	3-1/8	2-7/8	401125R20-3	401125R20-3EP
3 X 1/2	3-3/8	3-1/8	401130R05-3	401130R05-3EP
3 X 3/4	3-3/8	3-1/8	401130R07-3	401130R07-3EP
3 X 1	3-3/8	3-1/8	401130R10-3	401130R10-3EP
3 X 1-1/2	3-3/8	3-1/8	401130R15-3	401130R15-3EP
3 X 2	3-3/8	3-1/8	401130R20-3	401130R20-3EP
3 X 2-1/2	3-3/8	3-1/8	401130R25-3	401130R25-3EP
4 X 1/2	4-1/8	3-5/8	401140R05-3	401140R05-3EP
4 X 3/4	4-1/8	3-5/8	401140R07-3	401140R07-3EP
4 X 1	4-1/8	3-5/8	401140R10-3	401140R10-3EP
4 X 1-1/2	4-1/8	3-5/8	401140R15-3	401140R15-3EP
4 X 2	4-1/8	3-7/8	401140R20-3	401140R20-3EP
4 X 2-1/2	4-1/8	3-7/8	401140R25-3	401140R25-3EP
4 X 3	4-1/8	3-7/8	401140R30-3	401140R30-3EP
6 X 3	5-5/8	4-7/8	401160R30-3	401160R30-3EP
6 X 4	5-5/8	5-1/8	401160R40-3	401160R40-3EP



TL7RWWW – REDUCING TEE

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	401107MB05-3	401107MB05-3EP
1 X 1/2	A	2-1/8	2-5/8	401110MB05-3	401110MB05-3EP
1 X 3/4	A	2-1/8	2-5/8	401110MB07-3	401110MB07-3EP
1-1/2 X 1/2	A	2-3/8	2-7/8	401115MB05-3	401115MB05-3EP
1-1/2 X 3/4	A	2-3/8	2-7/8	401115MB07-3	401115MB07-3EP
1-1/2 X 1	A	2-3/8	2-7/8	401115MB10A-3	401115MB10A-3EP
1-1/2 X 1	B	2-3/8	2-7/8	401115MB10-3	401115MB10-3EP
2 X 1/2	A	2-7/8	3-1/8	401120MB05-3	401120MB05-3EP
2 X 3/4	A	2-7/8	3-1/8	401120MB07-3	401120MB07-3EP
2 X 1	A	2-7/8	3-1/8	401120MB10A-3	401120MB10A-3EP
2 X 1	B	2-7/8	3-1/8	401120MB10-3	401120MB10-3EP
2 X 1-1/2	B	2-7/8	3-1/8	401120MB15-3	401120MB15-3EP
2-1/2 X 1/2	A	3-1/8	3-3/8	401125MB05-3	401125MB05-3EP
2-1/2 X 3/4	A	3-1/8	3-3/8	401125MB07-3	401125MB07-3EP
2-1/2 X 1	A	3-1/8	3-3/8	401125MB10A-3	401125MB10A-3EP
2-1/2 X 1	B	3-1/8	3-3/8	401125MB10-3	401125MB10-3EP
2-1/2 X 1-1/2	B	3-1/8	3-3/8	401125MB15-3	401125MB15-3EP
2-1/2 X 2	B	3-1/8	3-3/8	401125MB20-3	401125MB20-3EP
3 X 1/2	A	3-3/8	3-5/8	401130MB05-3	401130MB05-3EP
3 X 3/4	A	3-3/8	3-5/8	401130MB07-3	401130MB07-3EP
3 X 1	A	3-3/8	3-5/8	401130MB10A-3	401130MB10A-3EP
3 X 1	B	3-3/8	3-5/8	401130MB10-3	401130MB10-3EP
3 X 1-1/2	B	3-3/8	3-5/8	401130MB15-3	401130MB15-3EP
3 X 2	B	3-3/8	3-5/8	401130MB20-3	401130MB20-3EP
3 X 2-1/2	B	3-3/8	3-5/8	401130MB25-3	401130MB25-3EP
4 X 1/2	A	4-1/8	4-1/8	401140MB05-3	401140MB05-3EP
4 X 3/4	A	4-1/8	4-1/8	401140MB07-3	401140MB07-3EP
4 X 1	A	4-1/8	4-1/8	401140MB10A-3	401140MB10A-3EP
4 X 1	B	4-1/8	4-1/8	401140MB10-3	401140MB10-3EP
4 X 1-1/2	B	4-1/8	4-1/8	401140MB15-3	401140MB15-3EP
4 X 2	B	4-1/8	4-3/8	401140MB20-3	401140MB20-3EP
4 X 2-1/2	B	4-1/8	4-3/8	401140MB25-3	401140MB25-3EP
4 X 3	B	4-1/8	4-3/8	401140MB30-3	401140MB30-3EP
6 X 4	B	5-5/8	5-3/4	401160MB40-3	401160MB40-3EP



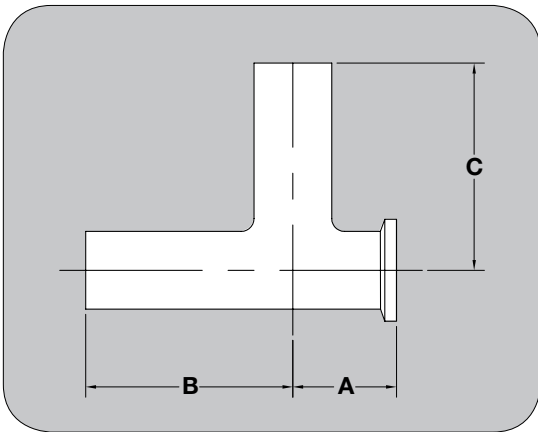


TL7WWMS – SHORT OUTLET TEE

BPE# DT-4.1.2-2

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-3*	401105S-3EP*
3/4	A	2	1-1/8	401107S-3	401107S-3EP
1	A	2-1/8	1-1/8	401110SA-3	401110SA-3EP
1	B	2-1/8	1-1/8	401110S-3*	401110S-3EP*
1-1/2	B	2-3/8	1-3/8	401115S-3*	401115S-3EP*
2	B	2-7/8	1-5/8	401120S-3	401120S-3EP
2-1/2	B	3-1/8	1-7/8	401125S-3	401125S-3EP
3	B	3-3/8	2-1/8	401130S-3*	401130S-3EP*
4	B	4-1/8	2-3/4	401140S-3*	401140S-3EP*
6	B	5-5/8	4-5/8	401160S-3*	401160S-3EP*

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

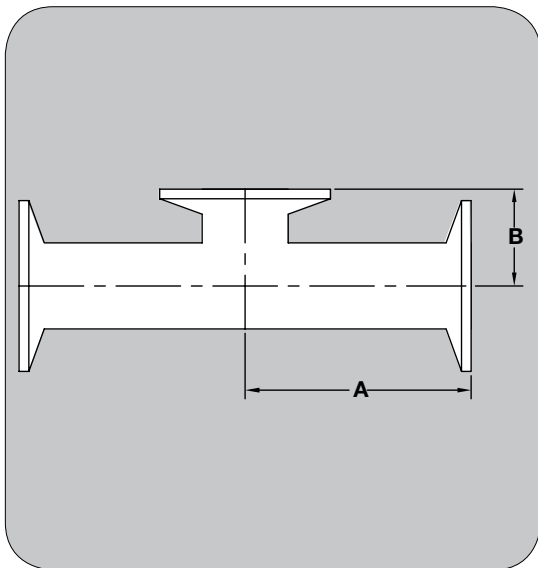


TL7WMSW – SHORT OUTLET RUN TEE

BPE# DT-4.1.2-3

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	4011MS05-3*	4011MS05-3EP*
3/4	A	1	2	2	4011MS07-3	4011MS07-3EP
1	A	1-1/8	2-1/8	2-1/8	4011MS10A-3	4011MS10A-3EP
1	B	1-1/8	2-1/8	2-1/8	4011MS10-3*	4011MS10-3EP*
1-1/2	B	1-3/8	2-3/8	2-3/8	4011MS15-3*	4011MS15-3EP*
2	B	1-5/8	2-7/8	2-7/8	4011MS20-3	4011MS20-3EP
2-1/2	B	1-7/8	3-1/8	3-1/8	4011MS25-3	4011MS25-3EP
3	B	2-1/8	3-3/8	3-3/8	4011MS30-3*	4011MS30-3EP*
4	B	2-3/4	4-1/8	4-1/8	4011MS40-3*	4011MS40-3EP*
6	B	4-5/8	5-5/8	5-5/8	4011MS60-3*	4011MS60-3EP*

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



7MPS – SHORT OUTLET TEE

BPE# DT-4.1.2-5

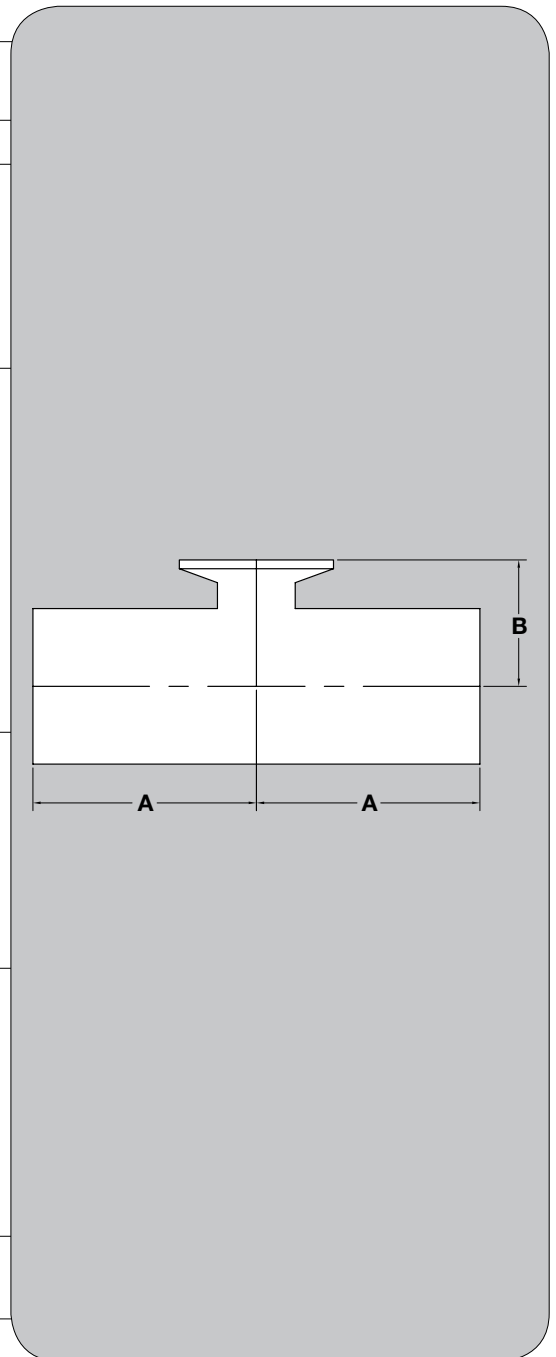
SIZE (TUBE O.D.)	TYPE	A	B	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
1/2	A	2-1/4	1	481105S-3	481105S-3EP
3/4	A	2-3/8	1-1/8	481107S-3	481107S-3EP
1	A	2-5/8	1-1/8	481110SA-3	481110SA-3EP
1	B	2-5/8	1-1/8	481110S-3	481110S-3EP
1-1/2	B	2-7/8	1-3/8	481115S-3	481115S-3EP
2	B	3-3/8	1-5/8	481120S-3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

BPE# DT-4.1.2-7

TL7RWWMS – REDUCING SHORT OUTLET TEE

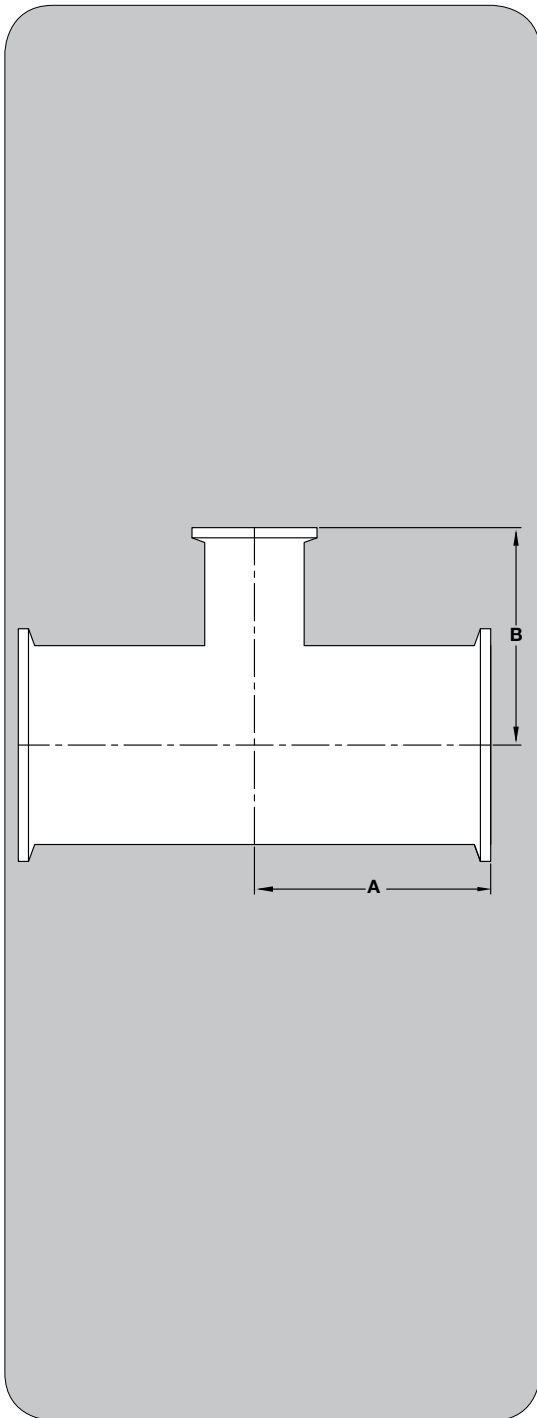
SIZE (TUBE O.D.)	TYPE	A	B	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
3/4 X 1/2	A	2	1	401107RS05-3	401107RS05-3EP
1 X 1/2	A	2-1/8	1-1/8	401110RS05-3	401110RS05-3EP
1 X 3/4	A	2-1/8	1-1/8	401110RS07-3	401110RS07-3EP
1-1/2 X 1/2	A	2-3/8	1-3/8	401115RS05-3	401115RS05-3EP
1-1/2 X 3/4	A	2-3/8	1-3/8	401115RS07-3	401115RS07-3EP
1-1/2 X 1	A	2-3/8	1-3/8	401115RS10A-3	401115RS10A-3EP
1-1/2 X 1	B	2-3/8	1-3/8	401115RS10-3*	401115RS10-3EP*
2 X 1/2	A	2-7/8	1-5/8	401120RS05-3	401120RS05-3EP
2 X 3/4	A	2-7/8	1-5/8	401120RS07-3	401120RS07-3EP
2 X 1	A	2-7/8	1-5/8	401120RS10A-3	401120RS10A-3EP
2 X 1	B	2-7/8	1-5/8	401120RS10-3	401120RS10-3EP
2 X 1-1/2	B	2-7/8	1-5/8	401120RS15-3	401120RS15-3EP
2-1/2 X 1/2	A	3-1/8	1-7/8	401125RS05-3	401125RS05-3EP
2-1/2 X 3/4	A	3-1/8	1-7/8	401125RS07-3	401125RS07-3EP
2-1/2 X 1	A	3-1/8	1-7/8	401125RS10A-3	401125RS10A-3EP
2-1/2 X 1	B	3-1/8	1-7/8	401125RS10-3	401125RS10-3EP
2-1/2 X 1-1/2	B	3-1/8	1-7/8	401125RS15-3	401125RS15-3EP
2-1/2 X 2	B	3-1/8	1-7/8	401125RS20-3	401125RS20-3EP
3 X 1/2	A	3-3/8	2-1/8	401130RS05-3	401130RS05-3EP
3 X 3/4	A	3-3/8	2-1/8	401130RS07-3	401130RS07-3EP
3 X 1	A	3-3/8	2-1/8	401130RS10A-3	401130RS10A-3EP
3 X 1	B	3-3/8	2-1/8	401130RS10-3	401130RS10-3EP
3 X 1-1/2	B	3-3/8	2-1/8	401130RS15-3	401130RS15-3EP
3 X 2	B	3-3/8	2-1/8	401130RS20-3	401130RS20-3EP
3 X 2-1/2	B	3-3/8	2-1/8	401130RS25-3	401130RS25-3EP
4 X 1/2	A	4-1/8	2-5/8	401140RS05-3	401140RS05-3EP
4 X 3/4	A	4-1/8	2-5/8	401140RS07-3	401140RS07-3EP
4 X 1	A	4-1/8	2-5/8	401140RS10A-3	401140RS10A-3EP
4 X 1	B	4-1/8	2-5/8	401140RS10-3	401140RS10-3EP
4 X 1-1/2	B	4-1/8	2-5/8	401140RS15-3	401140RS15-3EP
4 X 2	B	4-1/8	2-5/8	401140RS20-3	401140RS20-3EP
4 X 2-1/2	B	4-1/8	2-5/8	401140RS25-3	401140RS25-3EP
4 X 3	B	4-1/8	2-5/8	401140RS30-3	401140RS30-3EP
6 X 3	B	5-5/8	3-5/8	401160RS30-3	401160RS30-3EP
6 X 4	B	5-5/8	3-3/4	401160RS40-3	401160RS40-3EP

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



7RMP – REDUCING TEE

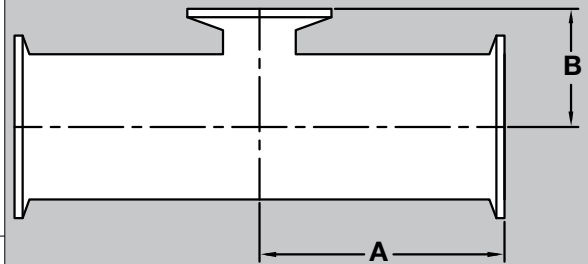
BPE# DT-4.1.2-8

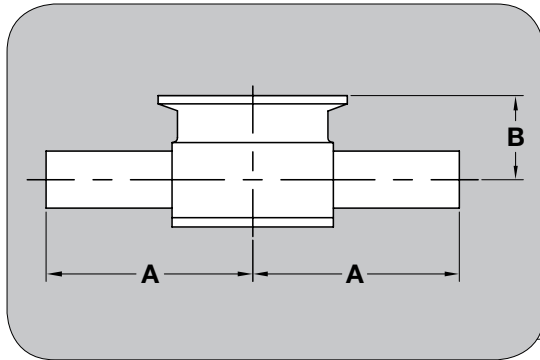


SIZE (TUBE O.D.)	TYPE	A	B	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
3/4 X 1/2	A/A	2-1/2	2-1/2	481107R05-3	481107R05-3EP
1 X 1/2	A/A	2-5/8	2-5/8	481110R05A-3	481110R05A-3EP
1 X 1/2	B/A	2-5/8	2-5/8	481110R05-3	481110R05-3EP
1 X 3/4	A/A	2-5/8	2-5/8	481110R07A-3	481110R07A-3EP
1 X 3/4	B/A	2-5/8	2-5/8	481110R07-3	481110R07-3EP
1-1/2 X 1/2	B/A	2-7/8	2-7/8	481115R05-3	481115R05-3EP
1-1/2 X 3/4	B/A	2-7/8	2-7/8	481115R07-3	481115R07-3EP
1-1/2 X 1	B/A	2-7/8	2-7/8	481115R10A-3	481115R10A-3EP
1-1/2 X 1	B/B	2-7/8	2-7/8	481115R10-3	481115R10-3EP
2 X 1/2	B/A	3-3/8	3-1/8	481120R05-3	481120R05-3EP
2 X 3/4	B/A	3-3/8	3-1/8	481120R07-3	481120R07-3EP
2 X 1	B/A	3-3/8	3-1/8	481120R10A-3	481120R10A-3EP
2 X 1	B/B	3-3/8	3-1/8	481120R10-3	481120R10-3EP
2 X 1-1/2	B/B	3-3/8	3-1/8	481120R15-3	481120R15-3EP
2-1/2 X 1/2	B/A	3-5/8	3-3/8	481125R05-3	481125R05-3EP
2-1/2 X 3/4	B/A	3-5/8	3-3/8	481125R07-3	481125R07-3EP
2-1/2 X 1	B/A	3-5/8	3-3/8	481125R10A-3	481125R10A-3EP
2-1/2 X 1	B/B	3-5/8	3-3/8	481125R10-3	481125R10-3EP
2-1/2 X 1-1/2	B/B	3-5/8	3-3/8	481125R15-3	481125R15-3EP
2-1/2 X 2	B/B	3-5/8	3-3/8	481125R20-3	481125R20-3EP
3 X 1/2	B/B	3-7/8	3-5/8	481130R05-3	481130R05-3EP
3 X 3/4	B/A	3-7/8	3-5/8	481130R07-3	481130R07-3EP
3 X 1	B/A	3-7/8	3-5/8	481130R10A-3	481130R10A-3EP
3 X 1	B/B	3-7/8	3-5/8	481130R10-3	481130R10-3EP
3 X 1-1/2	B/B	3-7/8	3-5/8	481130R15-3	481130R15-3EP
3 X 2	B/B	3-7/8	3-5/8	481130R20-3	481130R20-3EP
3 X 2-1/2	B/B	3-7/8	3-5/8	481130R25-3	481130R25-3EP
4 X 1/2	B/A	4-3/4	4-1/8	481140R05-3	481140R05-3EP
4 X 3/4	B/A	4-3/4	4-1/8	481140R07-3	481140R07-3EP
4 X 1	B/A	4-3/4	4-1/8	481140R10A-3	481140R10A-3EP
4 X 1	B/B	4-3/4	4-1/8	481140R10-3	481140R10-3EP
4 X 1-1/2	B/B	4-3/4	4-1/8	481140R15-3	481140R15-3EP
4 X 2	B/B	4-3/4	4-3/8	481140R20-3	481140R20-3EP
4 X 2-1/2	B/B	4-3/4	4-3/8	481140R25-3	481140R25-3EP
4 X 3	B/B	4-3/4	4-3/8	481140R30-3	481140R30-3EP
6 X 4	B/B	7-1/8	5-3/4	481160R40-3	481160R40-3EP

7RMPS – REDUCING TEE SHORT OUTLET BPE# DT-4.1.2-9

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	481107RS05-3	481107RS05-3EP
1 X 1/2	A/A	2-5/8	1-1/8	481110RS05A-3	481110RS05A-3EP
1 X 1/2	B/A	2-5/8	1-1/8	481110RS05-3	481110RS05-3EP
1 X 3/4	A/A	2-5/8	1-1/8	481110RS07A-3	481110RS07A-3EP
1 X 3/4	B/A	2-5/8	1-1/8	481110RS07-3	481110RS07-3EP
1-1/2 X 1/2	B/A	2-7/8	1-3/8	481115RS05-3	481115RS05-3EP
1-1/2 X 3/4	B/A	2-7/8	1-3/8	481115RS07-3	481115RS07-3EP
1-1/2 X 1	B/A	2-7/8	1-3/8	481115RS10A-3	481115RS10A-3EP
1-1/2 X 1	B/B	2-7/8	1-3/8	481115RS10-3	481115RS10-3EP
2 X 1/2	B/A	3-3/8	1-5/8	481120RS05-3	481120RS05-3EP
2 X 3/4	B/A	3-3/8	1-5/8	481120RS07-3	481120RS07-3EP
2 X 1	B/A	3-3/8	1-5/8	481120RS10A-3	481120RS10A-3EP
2 X 1	B/B	3-3/8	1-5/8	481120RS10-3	481120RS10-3EP
2 X 1-1/2	B/B	3-3/8	1-5/8	481120RS15-3	481120RS15-3EP
2-1/2 X 1/2	B/A	3-5/8	1-7/8	481125RS05-3	481125RS05-3EP
2-1/2 X 3/4	B/A	3-5/8	1-7/8	481125RS07-3	481125RS07-3EP
2-1/2 X 1	B/A	3-5/8	1-7/8	481125RS10A-3	481125RS10A-3EP
2-1/2 X 1	B/B	3-5/8	1-7/8	481125RS10-3	481125RS10-3EP
2-1/2 X 1-1/2	B/B	3-5/8	1-7/8	481125RS15-3	481125RS15-3EP
2-1/2 X 2	B/B	3-5/8	1-7/8	481125RS20-3	481125RS20-3EP
3 X 1/2	B/A	3-7/8	2-1/8	481130RS05-3	481130RS05-3EP
3 X 3/4	B/A	3-7/8	2-1/8	481130RS07-3	481130RS07-3EP
3 X 1	B/A	3-7/8	2-1/8	481130RS10A-3	481130RS10A-3EP
3 X 1	B/B	3-7/8	2-1/8	481130RS10-3	481130RS10-3EP
3 X 1-1/2	B/B	3-7/8	2-1/8	481130RS15-3	481130RS15-3EP
3 X 2	B/B	3-7/8	2-1/8	481130RS20-3	481130RS20-3EP
3 X 2-1/2	B/B	3-7/8	2-1/8	481130RS25-3	481130RS25-3EP
4 X 1/2	B/A	4-3/4	2-5/8	481140RS05-3	481140RS05-3EP
4 X 3/4	B/A	4-3/4	2-5/8	481140RS07-3	481140RS07-3EP
4 X 1	B/A	4-3/4	2-5/8	481140RS10A-3	481140RS10A-3EP
4 X 1	B/B	4-3/4	2-5/8	481140RS10-3	481140RS10-3EP
4 X 1-1/2	B/B	4-3/4	2-5/8	481140RS15-3	481140RS15-3EP
4 X 2	B/B	4-3/4	2-5/8	481140RS20-3	481140RS20-3EP
4 X 2-1/2	B/B	4-3/4	2-5/8	481140RS25-3	481140RS25-3EP
4 X 3	B/B	4-3/4	2-5/8	481140RS30-3	481140RS30-3EP
6 X 4	B/B	7-1/8	3-3/4	481160RS40-3	481160RS40-3EP

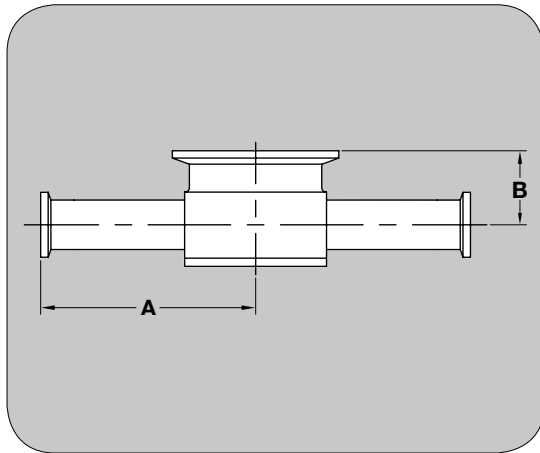




TL71WWMS – INSTRUMENT TEE

BPE# DT-4.1.2-10

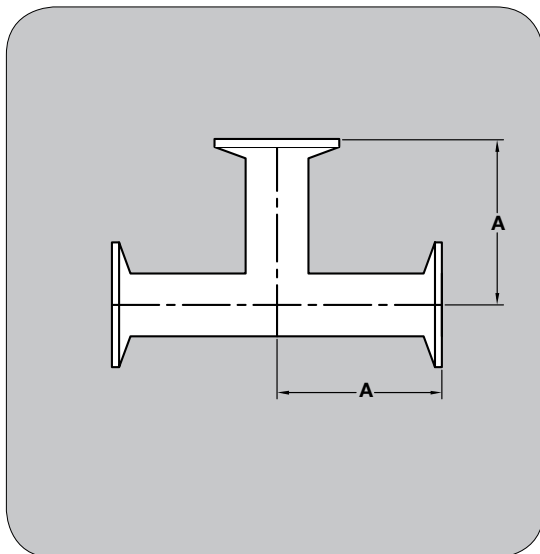
SIZE (TUBE O.D.)	TYPE	A	B	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
1/2 X 1-1/2	B	2-1/2	7/8	407105W15C-7	407105W15C-7EP
1/2 X 2	B	2-3/4	1	407105W20C-7	407105W20C-7EP
3/4 X 1-1/2	B	2-1/2	1	407107W15C-7	407107W15C-7EP
3/4 X 2	B	2-3/4	1-1/8	407107W20C-7	407107W20C-7EP
1 X 1-1/2	B	2-1/2	1-1/8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

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	487110C15CA-7	487110C15CA-7EP
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	487110C20CA-7	487110C20CA-7EP
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 – STRAIGHT TEE

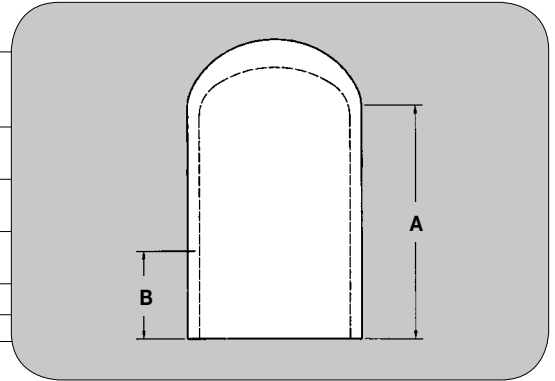
BPE# DT-4.1.2-4

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	481105-3	481105-3EP
3/4	A	2-3/8	481107-3	481107-3EP
1	A	2-5/8	481110A-3	481110A-3EP
1	B	2-5/8	481110-3	481110-3EP
1-1/2	B	2-7/8	481115-3	481115-3EP
2	B	3-3/8	481120-3	481120-3EP
2-1/2	B	3-5/8	481125-3	481125-3EP
3	B	3-7/8	481130-3	481130-3EP
4	B	4-3/4	481140-3	481140-3EP
6	B	7-1/8	481160-3	481160-3EP

TL16W – CAP

BPE# DT-4.1.5-1

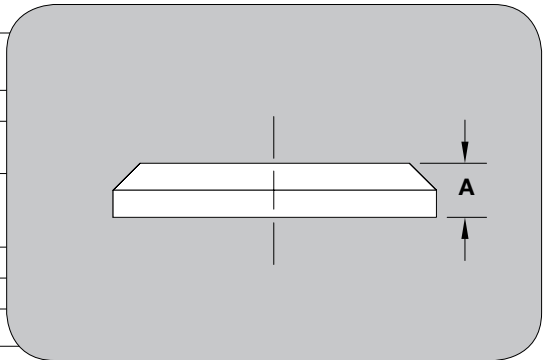
SIZE (TUBE O.D.)	A MINIMUM O.D. TANGENT LENGTH	B MINIMUM I.D. CONTROL PORTION	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
1/2	1-1/2	3/8	4031605-3	4031605-3EP
3/4	1-1/2	3/8	4031607-3	4031607-3EP
1	1-1/2	3/8	4031610-3	4031610-3EP
1-1/2	1-1/2	3/8	4031615-3	4031615-3EP
2	1-1/2	3/8	4031620-3	4031620-3EP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



16AMP – SOLID END CAP

BPE# DT-4.1.5-2

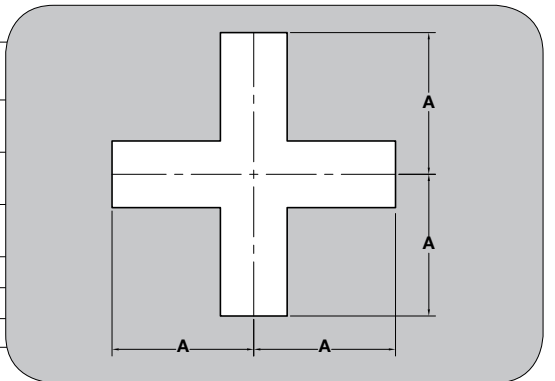
SIZE (TUBE O.D.)	A	TYPE	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
1/2 & 3/4	3/16	A	489807-7	489807-7EP
1	1/4	A	489810A-7	489810A-7EP
1	1/4	B	489810-7	489810-7EP
2	1/4	B	489815-7	489815-7EP
2	1/4	B	489820-7	489820-7EP
2-1/2	1/4	B	489825-7	489825-7EP
3	1/4	B	489830-7	489830-7EP
4	5/16	B	489840-7	489840-7EP
6	7/16	B	489860-7	489860-7EP



TL9WWWW – CROSS

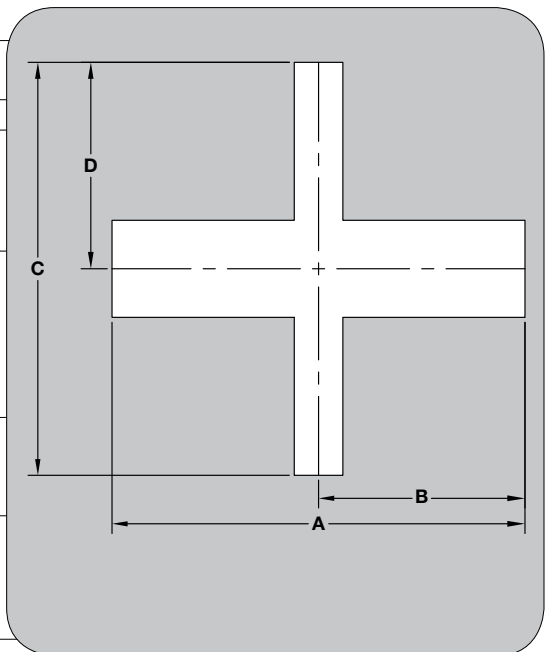
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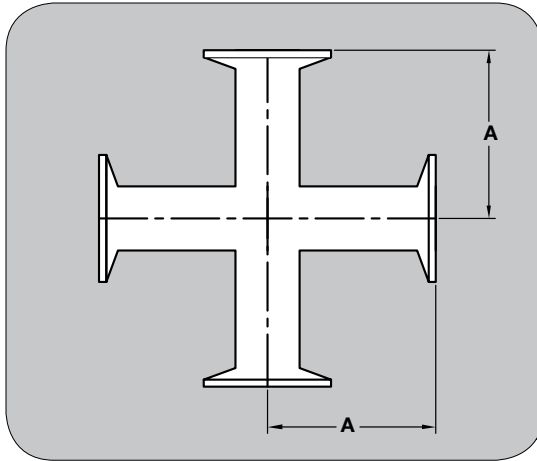
SIZE (TUBE O.D.)	A	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
1/2	1-7/8	4011405-3	4011405-3EP
3/4	2	4011407-3	4011407-3EP
1	2-1/8	4011410-3	4011410-3EP
1-1/2	2-3/8	4011415-3	4011415-3EP
2	2-7/8	4011420-3	4011420-3EP
2-1/2	3-1/8	4011425-3	4011425-3EP
3	3-3/8	4011430-3	4011430-3EP
4	4-1/8	4011440-3	4011440-3EP
6	5-5/8	4011460-3	4011460-3EP



TL9RWWWW – REDUCING CROSS

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	4011407R05-3	4011407R05-3EP
1 X 1/2	4-1/4	2-1/8	4-1/4	2-1/8	4011410R05-3	4011410R05-3EP
1 X 3/4	4-1/4	2-1/8	4-1/4	2-1/8	4011410R07-3	4011410R07-3EP
1-1/2 X 1/2	4-3/4	2-3/8	4-3/4	2-3/8	4011415R05-3	4011415R05-3EP
1-1/2 X 3/4	4-3/4	2-3/8	4-3/4	2-3/8	4011415R07-3	4011415R07-3EP
1-1/2 X 1	4-3/4	2-3/8	4-3/4	2-3/8	4011415R10-3	4011415R10-3EP
2 X 1/2	5-3/4	2-7/8	5-1/4	2-5/8	4011420R05-3	4011420R05-3EP
2 X 3/4	5-3/4	2-7/8	5-1/4	2-5/8	4011420R07-3	4011420R07-3EP
2 X 1	5-3/4	2-7/8	5-1/4	2-5/8	4011420R10-3	4011420R10-3EP
2 X 1-1/2	5-3/4	2-7/8	5-1/4	2-5/8	4011420R15-3	4011420R15-3EP
2-1/2 X 1	6-1/4	3-1/8	5-3/4	2-7/8	4011425R10-3	4011425R10-3EP
2-1/2 X 1-1/2	6-1/4	3-1/8	5-3/4	2-7/8	4011425R15-3	4011425R15-3EP
2-1/2 X 2	6-1/4	3-1/8	5-3/4	2-7/8	4011425R20-3	4011425R20-3EP
3 X 1	6-3/4	3-3/8	6-1/4	3-1/8	4011430R10-3	4011430R10-3EP
3 X 1-1/2	6-3/4	3-3/8	6-1/4	3-1/8	4011430R15-3	4011430R15-3EP
3 X 2	6-3/4	3-3/8	6-1/4	3-1/8	4011430R20-3	4011430R20-3EP
3 X 2-1/2	6-3/4	3-3/8	6-1/4	3-1/8	4011430R25-3	4011430R25-3EP
4 X 1	8-1/4	4-1/8	7-1/4	3-5/8	4011440R10-3	4011440R10-3EP
4 X 1-1/2	8-1/4	4-1/8	7-1/4	3-5/8	4011440R15-3	4011440R15-3EP
4 X 2	8-1/4	4-1/8	7-3/4	3-7/8	4011440R20-3	4011440R20-3EP
4 X 2-1/2	8-1/4	4-1/8	7-3/4	3-7/8	4011440R25-3	4011440R25-3EP
4 X 3	8-1/4	4-1/8	7-3/4	3-7/8	4011440R30-3	4011440R30-3EP

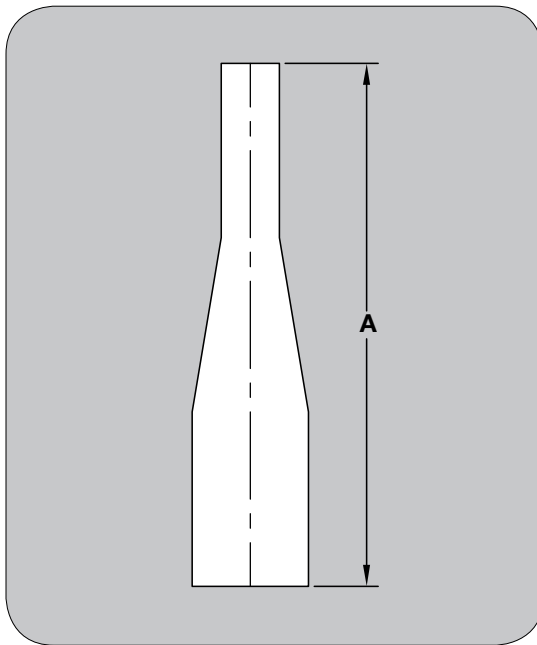




9MP – CROSS

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	4810105-3	4810105-3EP
3/4	A	2-3/8	4810107-3	4810107-3EP
1	A	2-5/8	4810110A-3	4810110A-3EP
1	B	2-5/8	4810110-3	4810110-3EP
1-1/2	B	2-7/8	4810115-3	4810115-3EP
2	B	3-3/8	4810120-3	4810120-3EP
2-1/2	B	3-5/8	4810125-3	4810125-3EP
3	B	3-7/8	4810130-3	4810130-3EP
4	B	4-3/4	4810140-3	4810140-3EP
6	B	7-1/8	4810160-3	4810160-3EP

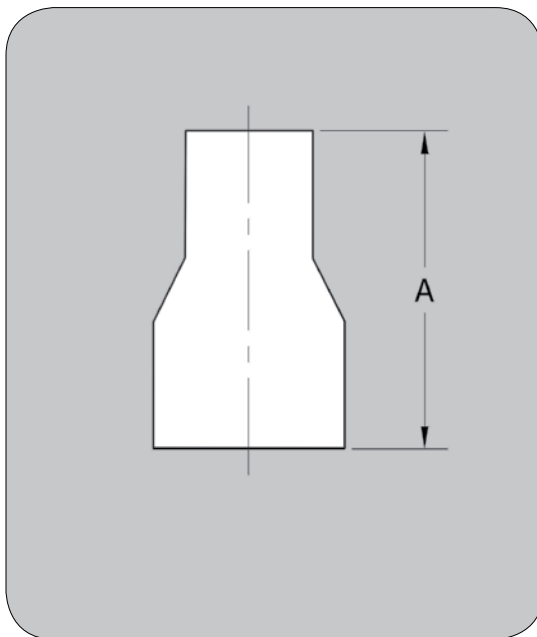


TL31 – CONCENTRIC REDUCER

BPE# DT-4.1.3-1(a)

SIZE (TUBE O.D.)	A	STOCK NO. 20RA ID (SF1)	STOCK NO. 15RA EP ID (SF4)
3/4 X 1/2	4	401160705-3	401160705-3EP
1 X 1/2	4-1/2	401161005-3	401161005-3EP
1 X 3/4	4	401161007-3	401161007-3EP
1-1/2 X 3/4	5	401161507-3	401161507-3EP
1-1/2 X 1	5	401161510-3	401161510-3EP
2 X 1	7-1/4	401162010-3	401162010-3EP
2 X 1-1/2	5-1/4	401162015-3	401162015-3EP
2-1/2 X 1-1/2	7-1/4	401162515-3	401162515-3EP
2-1/2 X 2	5-1/2	401162520-3	401162520-3EP
3 X 1-1/2	9-1/4	401163015-3	401153015-3EP
3 X 2	7-1/2	401163020-3	401163020-3EP
3 X 2-1/2	5-1/2	401163025-3	401163025-3EP
4 X 2	11-3/4	401164020-3	401164020-3EP
4 X 2-1/2	9-3/4	401164025-3	401164025-3EP
4 X 3	7-3/4	401164030-3	401164030-3EP
6 X 3	10	401166030-3	401166030-3EP
6 X 4	10	401166040-3	401166040-3EP

OTHER SIZES AVAILABLE UPON REQUEST



TL31 – CONCENTRIC REDUCER

BPE# DT-4.1.3-1(b)

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-3	401160705N-3EP
1 X 1/2	2-1/2	401161005N-3	401161005N-3EP
1 X 3/4	2-1/8	401161007N-3	401161007N-3EP
1- 1/2 X 3/4	3	401161507N-3	401161507N-3EP
1- 1/2 X 1	2-1/2	401161510N-3	401161510N-3EP
2 X 1	3-3/8	401162010N-3	401162010N-3EP
2 X 1-1/2	2-1/2	401162015N-3	401162015N-3EP
2- 1/2 X 1-1/2	3-3/8	401162515N-3	401162515N-3EP
2- 1/2 X 2	2-1/2	401162520N-3	401162520N-3EP
3 X 1-1/2	4-1/4	401163015N-3	401163015N-3EP
3 X 2	3-3/8	401163020N-3	401163020N-3EP
3 X 2-1/2	2-5/8	401163025N-3	401163025N-3EP
4 X 2	5-1/8	401164020N-3	401164020N-3EP
4 X 2-1/2	4-1/4	401164025N-3	401164025N-3EP
4 X 3	3-7/8	401164030N-3	401164030N-3EP
6 X 3	7-1/4	401166030N-3	401166030N-3EP
6 X 4	5-5/8	401166040N-3	401166040N-3EP

OTHER SIZES AVAILABLE UPON REQUEST

REDUCERS

BioClean™ BPE FITTINGS

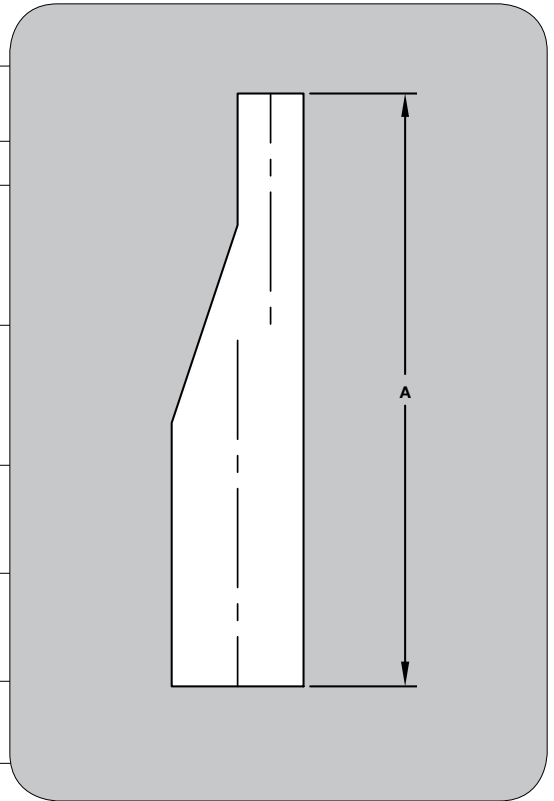


TL32 – ECCENTRIC REDUCER

BPE# DT-4.1.3-1 (a)

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

OTHER SIZES AVAILABLE UPON REQUEST

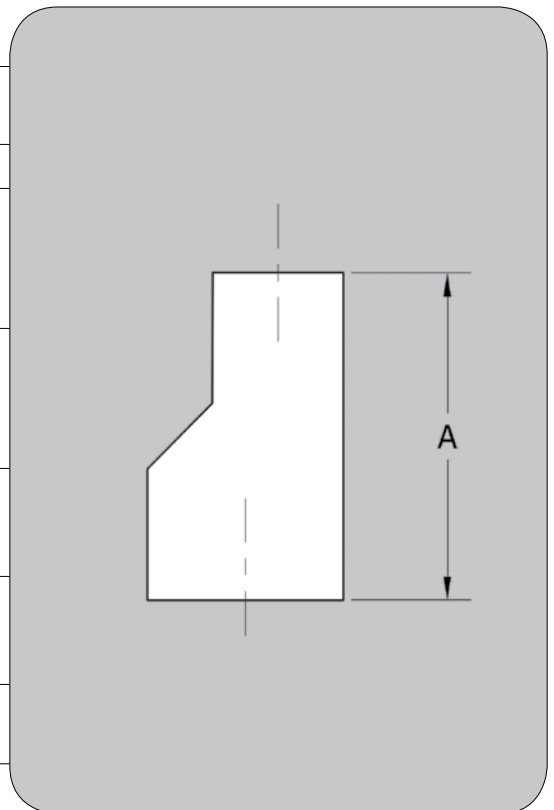


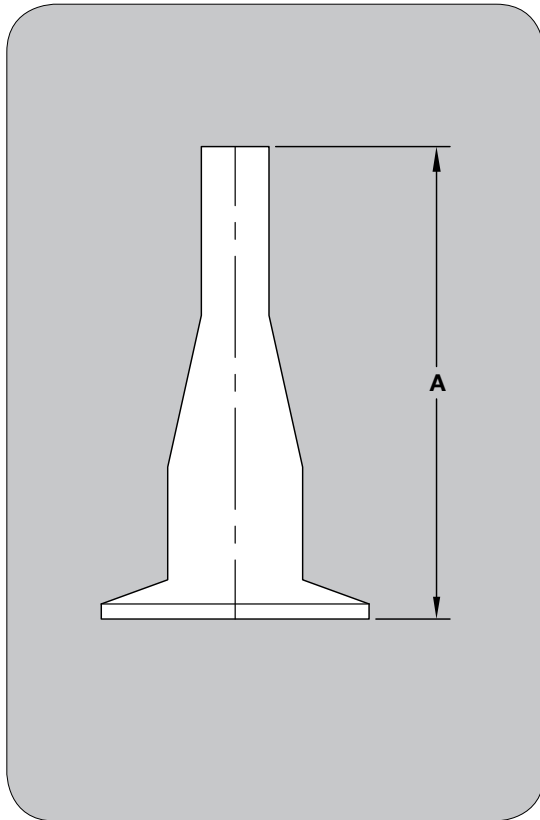
TL32 – ECCENTRIC REDUCER

BPE# DT-4.1.3-1 (b)

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-3	401220705N-3EP
1 X 1/2	2-1/2	401221005N-3	401221005N-3EP
1 X 3/4	2-1/8	401221007N-3	401221007N-3EP
1- 1/2 X 3/4	3	401221507N-3	401221507N-3EP
1- 1/2 X 1	2-1/2	401221510N-3	401221510N-3EP
2 X1	3-3/8	401222010N-3	401222010N-3EP
2 X 1-1/2	2-1/2	401222015N-3	401222015N-3EP
2- 1/2 X 1-1/2	3-3/8	401222515N-3	401222515N-3EP
2- 1/2 X 2	2-1/2	401222520N-3	401222520N-3EP
3 X 1-1/2	4-1/4	401223015N-3	401223015N-3EP
3 X 2	3-3/8	401223020N-3	401223020N-3EP
3 X 2-1/2	2-5/8	401223025N-3	401223025N-3EP
4 X 2	5-1/8	401224020N-3	401224020N-3EP
4 X 2-1/2	4-1/4	401224025N-3	401224025N-3EP
4 X 3	3-7/8	401224030N-3	401224030N-3EP
6 X 3	7-1/4	401226030N-3	401226030N-3EP
6 X 4	5-5/8	401226040N-3	401226040N-3EP

OTHER SIZES AVAILABLE UPON REQUEST



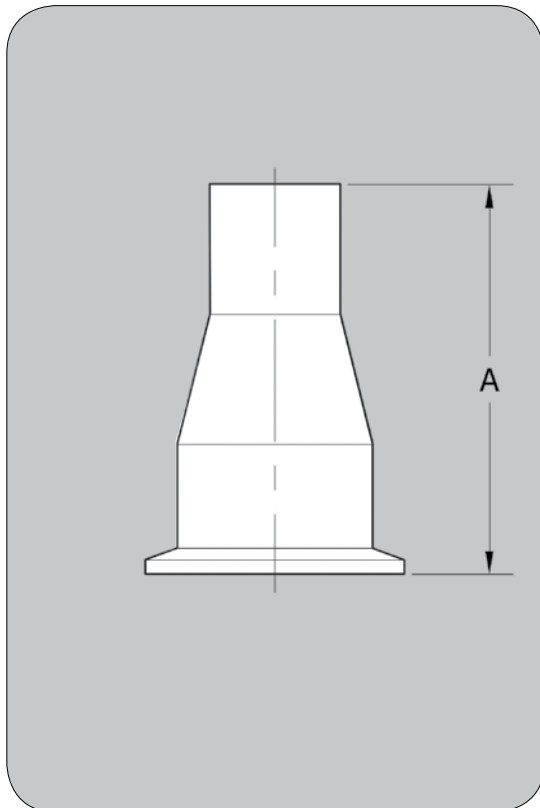


TL31M – CONCENTRIC REDUCER

BPE# DT-4.1.3-2 (a)

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	40116M0705-3	40116M0705-3EP
1 X 1/2	A	3-1/2	40116M1005A-3	40116M1005A-3EP
1 X 1/2	B	3-1/2	40116M1005-3	40116M1005-3EP
1 X 3/4	A	3	40116M1007A-3	40116M1007A-3EP
1 X 3/4	B	3	40116M1007-3	40116M1007-3EP
1-1/2 X 3/4	B	4	40116M1507-3	40116M1507-3EP
1-1/2 X 1	B	4	40116M1510-3	40116M1510-3EP
2 X 1	B	6	40116M2010-3	40116M2010-3EP
2 X 1-1/2	B	4	40116M2015-3	40116M2015-3EP
2-1/2 X 1-1/2	B	6	40116M2515-3	40116M2515-3EP
2-1/2 X 2	B	4-1/4	40116M2520-3	40116M2520-3EP
3 X 1-1/2	B	8	40116M3015-3	40116M3015-3EP
3 X 2	B	6-1/4	40116M3020-3	40116M3020-3EP
3 X 2-1/2	B	4-1/4	40116M3025-3	40116M3025-3EP
4 X 2	B	10-3/8	40116M4020-3	40116M4020-3EP
4 X 2-1/2	B	8-3/8	40116M4025-3	40116M4025-3EP
4 X 3	B	6-3/8	40116M4030-3	40116M4030-3EP
6 X 3	B	9	40116M6030-3	40116M6030-3EP
6 X 4	B	9	40116M6040-3	40116M6040-3EP

OTHER SIZES AVAILABLE UPON REQUEST



TL31M – CONCENTRIC REDUCER

BPE# DT-4.1.3-2 (b)

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-3	40116M0705N-3EP
1 X 1/2	A	3	40116M1005AN-3	40116M1005AN-3EP
1 X 1/2	B	3	40116M1005N-3	40116M1005N-3EP
1 X 3/4	A	2-5/8	40116M1007AN-3	40116M1007AN-3EP
1 X 3/4	B	2-5/8	40116M1007N-3	40116M1007N-3EP
1-1/2 X 3/4	B	3-1/2	40116M1507N-3	40116M1507N-3EP
1-1/2 X 1	B	3	40116M1510N-3	40116M1510N-3EP
2 X 1	B	3-7/8	40116M2010N-3	40116M2010N-3EP
2 X 1-1/2	B	3	40116M2015N-3	40116M2015N-3EP
2-1/2 X 1-1/2	B	3-7/8	40116M2515N-3	40116M2515N-3EP
2- 1/2 X 2	B	3	40116M2520N-3	40116M2520N-3EP
3 X 1-1/2	B	4-3/4	40116M3015N-3	40116M3015N-3EP
3 X 2	B	3-7/8	40116M3020N-3	40116M3020N-3EP
3 X 2-1/2	B	3-1/8	40116M3025N-3	40116M3025N-3EP
4 X 2	B	5-3/4	40116M4020N-3	40116M4020N-3EP
4 X 2-1/2	B	4-7/8	40116M4025N-3	40116M4025N-3EP
4 X 3	B	4-1/2	40116M4030N-3	40116M4030N-3EP
6 X 3	B	8	40116M6030N-3	40116M6030N-3EP
6 X 4	B	6-3/8	40116M6040N-3	40116M6040N-3EP

OTHER SIZES AVAILABLE UPON REQUEST

REDUCERS

BioClean™ BPE FITTINGS

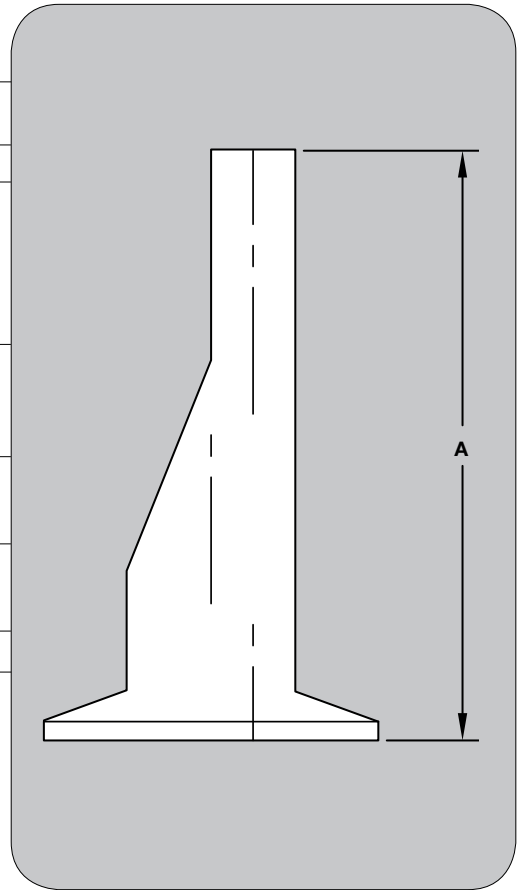
TOP LINE

TL32M – ECCENTRIC REDUCER

BPE# DT-4.1.3-2(a)

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	40122M0705-3	40122M0705-3EP
1 X 1/2	A	3-1/2	40122M1005A-3	40122M1005A-3EP
1 X 1/2	B	3-1/2	40122M1005-3	40122M1005-3EP
1 X 3/4	A	3	40122M1007A-3	40122M1007A-3EP
1 X 3/4	B	3	40122M1007-3	40122M1007-3EP
1-1/2 X 3/4	B	4	40122M1507-3	40122M1507-3EP
1-1/2 X 1	B	4	40122M1510-3	40122M1510-3EP
2 X 1	B	6	40122M2010-3	40122M2010-3EP
2 X 1-1/2	B	4	40122M2015-3	40122M2015-3EP
2-1/2 X 1-1/2	B	6	40122M2515-3	40122M2515-3EP
2-1/2 X 2	B	4-1/4	40122M2520-3	40122M2520-3EP
3 X 1-1/2	B	8	40122M3015-3	40122M3015-3EP
3 X 2	B	6-1/4	40122M3020-3	40122M3020-3EP
3 X 2-1/2	B	4-1/4	40122M3025-3	40122M3025-3EP
4 X 2	B	10-3/8	40122M4020-3	40122M4020-3EP
4 X 2-1/2	B	8-3/8	40122M4025-3	40122M4025-3EP
4 X 3	B	6-3/8	40122M4030-3	40122M4030-3EP
6 X 4	B	9	40122M6040-3	40122M6040-3EP

OTHER SIZES AVAILABLE UPON REQUEST

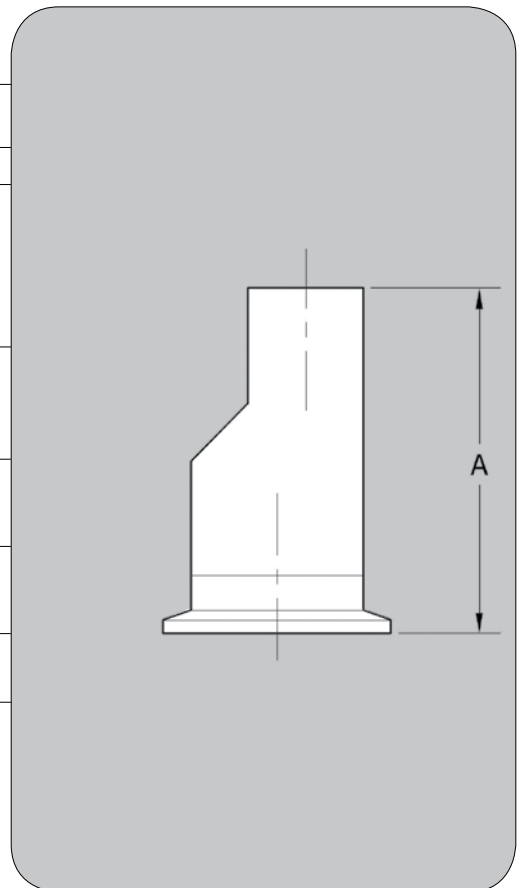


TL32M – ECCENTRIC REDUCER

BPE# DT-4.1.3-2(b)

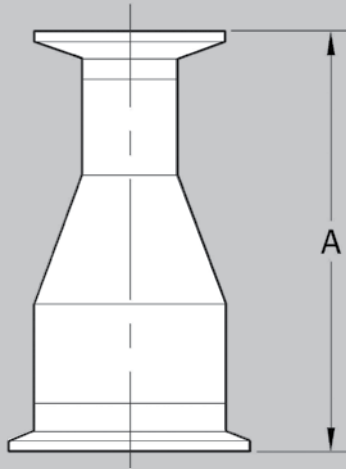
SIZE (TUBE O.D.)	TYPE	A	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
3/4 X 1/2	A	2-5/8	40122M0705N-3	40122M0705N-3EP
1 X 1/2	A	3	40122M1005AN-3	40122M1005AN-3EP
1 X 1/2	B	3	40122M1005N-3	40122M1005N-3EP
1 X 3/4	A	2-5/8	40122M1007AN-3	40122M1007AN-3EP
1 X 3/4	B	2-5/8	40122M1007N-3	40122M1007N-3EP
1-1/2 X 3/4	B	3-1/2	40122M1507N-3	40122M1507N-3EP
1-1/2 X 1	B	3	40122M1510N-3	40122M1510N-3EP
2 X 1	B	3-7/8	40122M2010N-3	40122M2010N-3EP
2 X 1-1/2	B	3	40122M2015N-3	40122M2015N-3EP
2-1/2 X 1-1/2	B	3-7/8	40122M2515N-3	40122M2515N-3EP
2-1/2 X 2	B	3	40122M2520N-3	40122M2520N-3EP
3 X 1-1/2	B	4-3/4	40122M3015N-3	40122M3015N-3EP
3 X 2	B	3-7/8	40122M3020N-3	40122M3020N-3EP
3 X 2-1/2	B	3-1/8	40122M3025N-3	40122M3025N-3EP
4 X 2	B	5-3/4	40122M4020N-3	40122M4020N-3EP
4 X 2-1/2	B	4-7/8	40122M4025N-3	40122M4025N-3EP
4 X 3	B	4-1/2	40122M4030N-3	40122M4030N-3EP
6 X 3	B	8	40122M6030N-3	40122M6030N-3EP
6 X 4	B	6-3/8	40122M6040N-3	40122M6040N-3EP

OTHER SIZES AVAILABLE UPON REQUEST



31-14MP – CONCENTRIC REDUCER

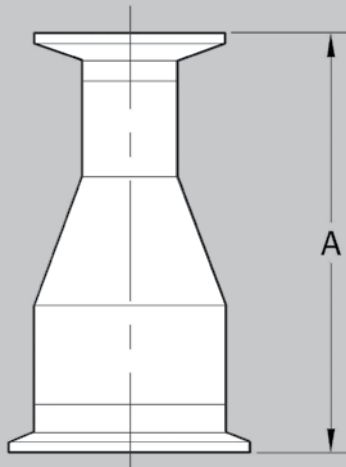
BPE# DT-4.1.3-3 (a)



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-3	4884-0705A-3EP
3/4 X 1/2	B/A	2	4884-0705-3	4884-0705-3EP
1 X 1/2	A/A	2-1/2	4884-1005A-3	4884-1005A-3EP
1 X 1/2	B/A	2-1/2	4884-1005-3	4884-1005-3EP
1 X 3/4	A/A	2	4884-1007A-3	4884-1007A-3EP
1 X 3/4	B/A	2	4884-1007-3	4884-1007-3EP
1-1/2 X 3/4	B/A	3	4884-1507-3	4884-1507-3EP
1-1/2 X 1	B/A	3	4884-1510A-3	4884-1510A-3EP
1-1/2 X 1	B/B	3	4884-1510-3	4884-1510-3EP
2 X 1	B/A	5	4884-2010A-3	4884-2010A-3EP
2 X 1	B/B	5	4884-2010-3	4884-2010-3EP
2 X 1 1/2	B/B	3	4884-2015-3	4884-2015-3EP
2-1/2 X 1-1/2	B/B	5	4884-2515-3	4884-2515-3EP
2-1/2 X 2	B/B	3	4884-2520-3	4884-2520-3EP
3 X 1-1/2	B/B	7	4884-3015-3	4884-3015-3EP
3 X 2	B/B	5	4884-3020-3	4884-3020-3EP
3 X 2-1/2	B/B	3	4884-3025-3	4884-3025-3EP
4 X 2	B/B	9-1/8	4884-4020-3	4884-4020-3EP
4 X 2-1/2	B/B	7-1/8	4884-4025-3	4884-4025-3EP
4 X 3	B/B	5-1/8	4884-4030-3	4884-4030-3EP
6 X 3	B/B	7-1/2	4884-6030-3	4884-6030-3EP
6 X 4	B/B	7-5/8	4884-6040-3	4884-6040-3EP

31-14MP – CONCENTRIC REDUCER

BPE# DT-4.1.3-3 (b)



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-3	4884-0705AN-3EP
3/4 X 1/2	B/A	3-1/8	4884-0705N-3	4884-0705N-3EP
1 X 1/2	A/A	3-1/2	4884-1005AN-3	4884-1005AN-3EP
1 X 1/2	B/A	3-1/2	4884-1005N-3	4884-1005N-3EP
1 X 3/4	A/A	3-1/8	4884-1007AN-3	4884-1007AN-3EP
1 X 3/4	B/A	3-1/8	4884-1007N-3	4884-1007N-3EP
1-1/2 X 3/4	B/A	4	4884-1507N-3	4884-1507N-3EP
1-1/2 X 1	B/A	3-1/2	4884-1510AN-3	4884-1510AN-3EP
1-1/2 X 1	B/B	3-1/2	4884-1510N-3	4884-1510N-3EP
2 X 1	B/A	4-3/8	4884-2010AN-3	4884-2010AN-3EP
2 X 1	B/B	4-3/8	4884-2010N-3	4884-2010-3EP
2 X 1-1/2	B/B	3-1/2	4884-2015N-3	4884-2015N-3EP
2-1/2 X 1-1/2	B/B	4-3/8	4884-2515N-3	4884-2515-3EP
2-1/2 X 2	B/B	3-1/2	4884-2520N-3	4884-2520N-3EP
3 X 1-1/2	B/B	5-1/4	4884-3015N-3	4884-3015N-3EP
3 X 2	B/B	4-3/8	4884-3020N-3	4884-3020N-3EP
3 X 2-1/2	B/B	3-5/8	4884-3025N-3	4884-3025N-3EP
4 X 2	B/B	6-1/4	4884-4020N-3	4884-4020N-3EP
4 X 2-1/2	B/B	5-3/8	4884-4025N-3	4884-4025N-3EP
4 X 3	B/B	5	4884-4030N-3	4884-4030N-3EP
6 X 3	B/B	8-1/2	4884-6030N-3	4884-6030N-3EP
6 X 4	B/B	7	4884-6040N-3	4884-6040N-3EP

REDUCERS

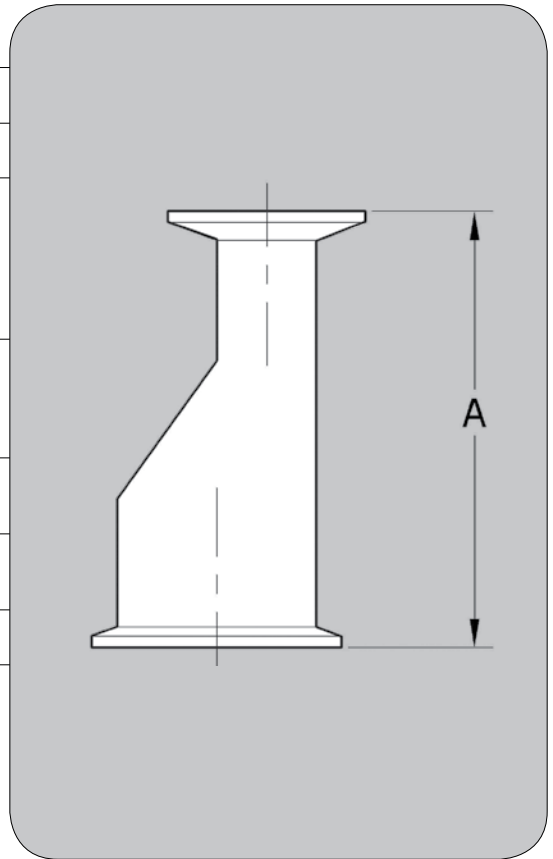
BioClean™ BPE FITTINGS



32-14MP – ECCENTRIC REDUCER

BPE# DT-4.1.3-3 (a)

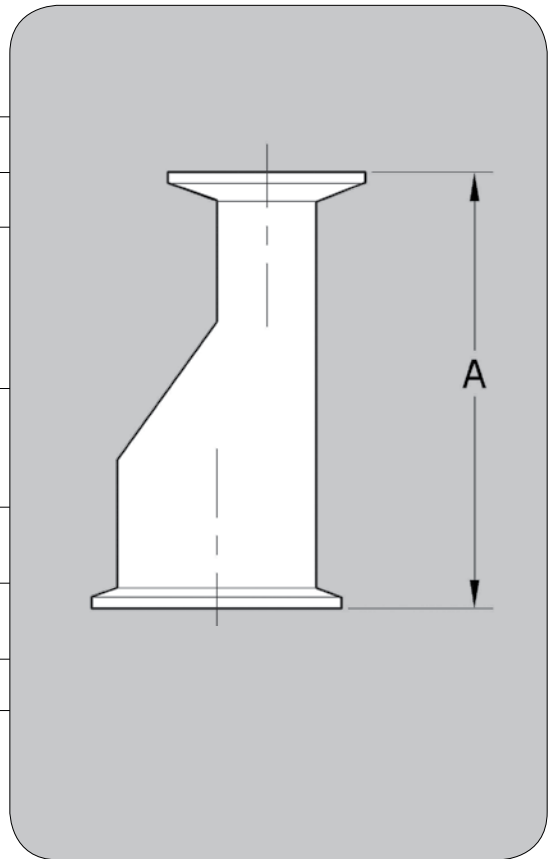
SIZE (TUBE O.D.)	TYPE	A	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
3/4 X 1/2	A/A	2	4885-0705A-3	4885-0705A-3EP
3/4 X 1/2	B/A	2	4885-0705-3	4885-0705-3EP
1 X 1/2	A/A	2-1/2	4885-1005A-3	4885-1005A-3EP
1 X 1/2	B/A	2-1/2	4885-1005-3	4885-1005-3EP
1 X 3/4	A/A	2	4885-1007A-3	4885-1007A-3EP
1 X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

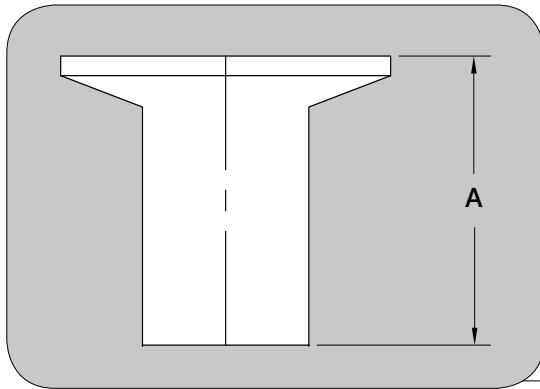


32-14MP – ECCENTRIC REDUCER

BPE# DT-4.1.3-3 (b)

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	4885-0705AN-3	4885-0705AN-3EP
3/4 X 1/2	B/A	3-1/8	4885-0705N-3	4885-0705N-3EP
1 X 1/2	A/A	3-1/2	4885-1005AN-3	4885-1005AN-3EP
1 X 1/2	B/A	3-1/2	4885-1005N-3	4885-1005N-3EP
1 X 3/4	A/A	3-1/8	4885-1007AN-3	4885-1007AN-3EP
1 X 3/4	B/A	3-1/8	4885-1007N-3	4885-1007N-3EP
1- 1/2 X 3/4	B/A	4	4885-1507N-3	4885-1507N-3EP
1- 1/2 X 1	B/A	3-1/2	4885-1510AN-3	4885-1510AN-3EP
1- 1/2 X 1	B/B	3-1/2	4885-1510N-3	4885-1510N-3EP
2 X 1	B/A	4-3/8	4885-2010AN-3	4885-2010AN-3EP
2 X 1	B/B	4-3/8	4885-2010N-3	4885-2010N-3EP
2 X 1-1/2	B/B	3-1/2	4885-2015N-3	4885-2015N-3EP
2-1/2 X 1-1/2	B/B	4-3/8	4885-2515N-3	4885-2515N-3EP
2-1/2 X 2	B/B	3-1/2	4885-2520N-3	4885-2520N-3EP
3 X 1-1/2	B/B	5-1/4	4885-3015N-3	4885-3015N-3EP
3 X 2	B/B	4-3/8	4885-3020N-3	4885-3020N-3EP
3 X 2-1/2	B/B	3-5/8	4885-3025N-3	4885-3025N-3EP
4 X 2	B/B	6-1/4	4885-4020N-3	4885-4020N-3EP
4 X 2-1/2	B/B	5-3/8	4885-4025N-3	4885-4025N-3EP
4 X 3	B/B	5	4885-4030N-3	4885-4030N-3EP
6 X 3	B/B	8-1/2	4885-6030N-3	4885-6030N-3EP
6 X 4	B/B	7	4885-6040N-3	4885-6040N-3EP

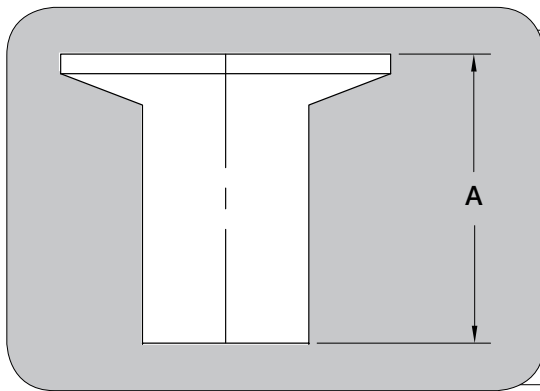




TL14AM7 – FERRULE

BPE# DT-4.1.4-1

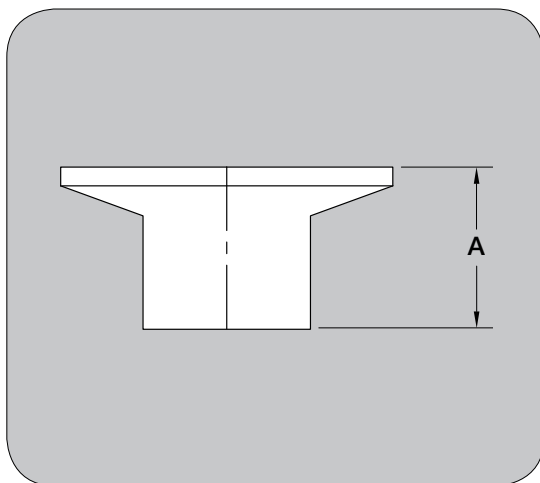
SIZE (TUBE O.D.)	TYPE	A	STOCK NO. 20R _a ID (SF1)	STOCK NO. 15R _a EP ID (SF4)
1/2	A	1-3/4	407505S	407505S-7EP
3/4	A	1-3/4	407507S	407507S-7EP
1	A	1-3/4	407510SA	407510SA-7EP
1	B	1-3/4	407510S	407510S-7EP
1-1/2	B	1-3/4	407515S	407515S-7EP
2	B	2-1/4	407520S	407520S-7EP
2-1/2	B	2-1/4	407525S	407525S-7EP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



L14AM7 – FERRULE

BPE# DT-4.1.4-1

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-7	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



14WMP – WELD FERRULE

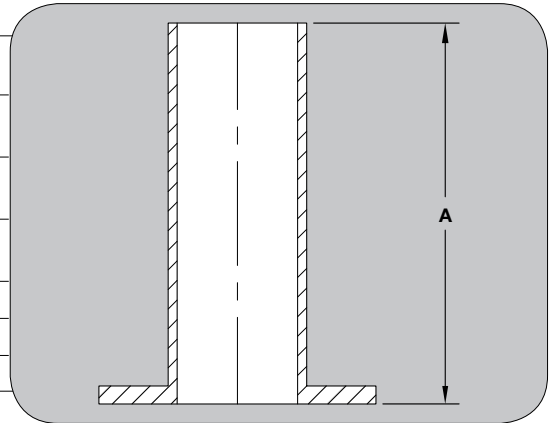
BPE# DT-4.1.4-1

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	48210A-7EP
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*

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	4030760-3LSEP

Flange face is phonographed * Not a BPE fitting

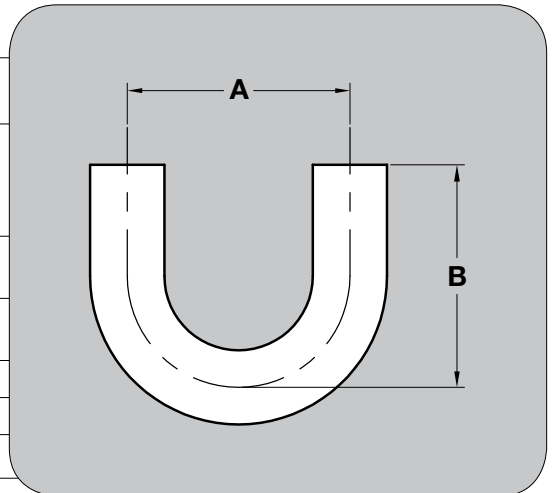


2WUL – 180° U-BEND

BPE# DT-4.1.1-7

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	40U02-3	40U02-3EP
3/8*	4-1/2	2-5/8	40U03-3	40U03-3EP
1/2*	4-1/2	3	40U05-3	40U05-3EP
3/4*	4-1/2	3	40U07-3	40U07-3EP
1	3	3	40U10-3	40U10-3EP
1-1/2	4-1/2	4-1/2	40U15-3	40U15-3EP
2	6	5	40U20-3	40U20-3EP
2-1/2	7-1/2	5-3/4	40U25-3	40U25-3EP
3	9	6-1/2	40U30-3	40U30-3EP
4	12	8-1/2	40U40-3	40U40-3EP
6	18	11-1/2	40U60-3	40U60-3EP

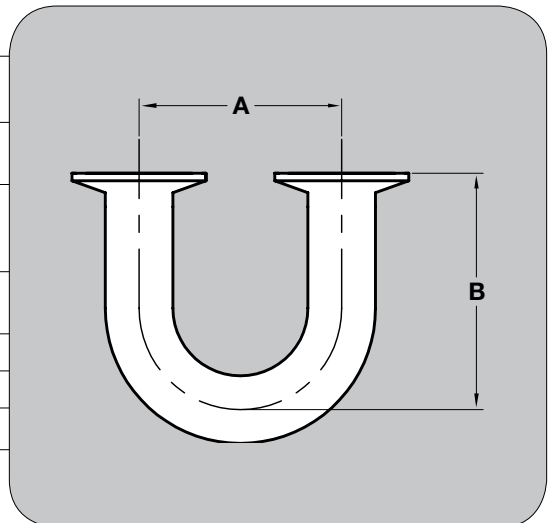
* DOES NOT MEET MINIMUM TANGENT LENGTHS IN BPE TABLE DT-4.1.1



2WUMP – 180° U-BEND

BPE# DT-4.1.1-8

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	48U05-3	48U05-3EP
3/4	A	4-1/2	3-1/2	48U07-3	48U07-3EP
1	A	3	3-1/2	48U10A-3	48U10A-3EP
1	B	3	3-1/2	48U10-3	48U10-3EP
1-1/2	B	4-1/2	5	48U15-3	48U15-3EP
2	B	6	5-1/2	48U20-3	48U20-3EP
2-1/2	B	7-1/2	6-1/4	48U25-3	48U25-3EP
3	B	9	7	48U30-3	48U30-3EP
4	B	12	9-1/8	48U40-3	48U40-3EP
6	B	18	13	48U60-3	48U60-3EP



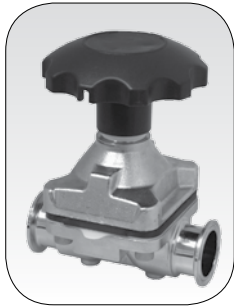
TOP-FLO® Hygienic Diaphragm Valves

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



ZERODL™ T-Pattern Type

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.



ZERODL™ Point of Use Valve

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

Sterile Access Valve

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.



L-Pattern Type

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

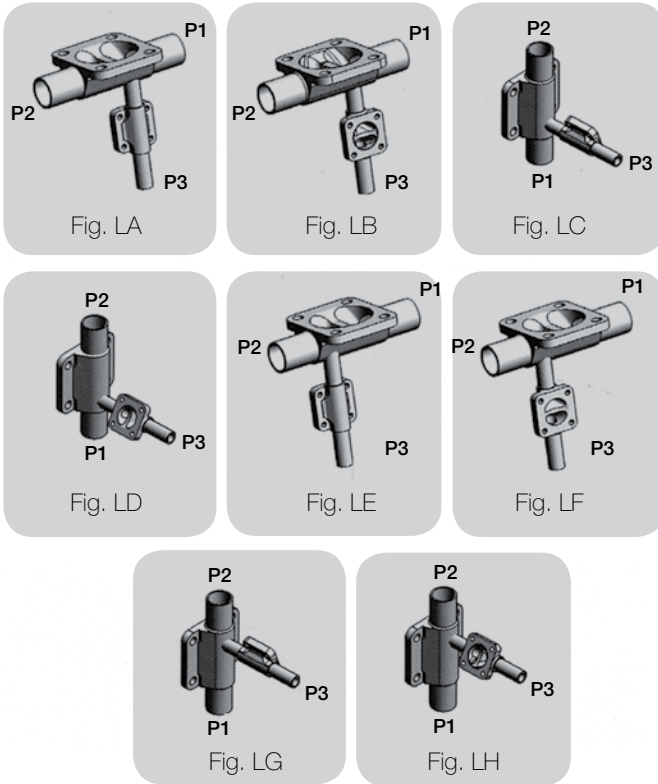


of uncontaminated samples. The outlet can also serve as a drain or a divert port.

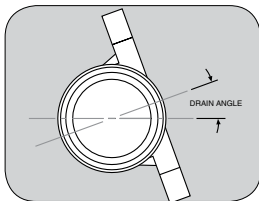
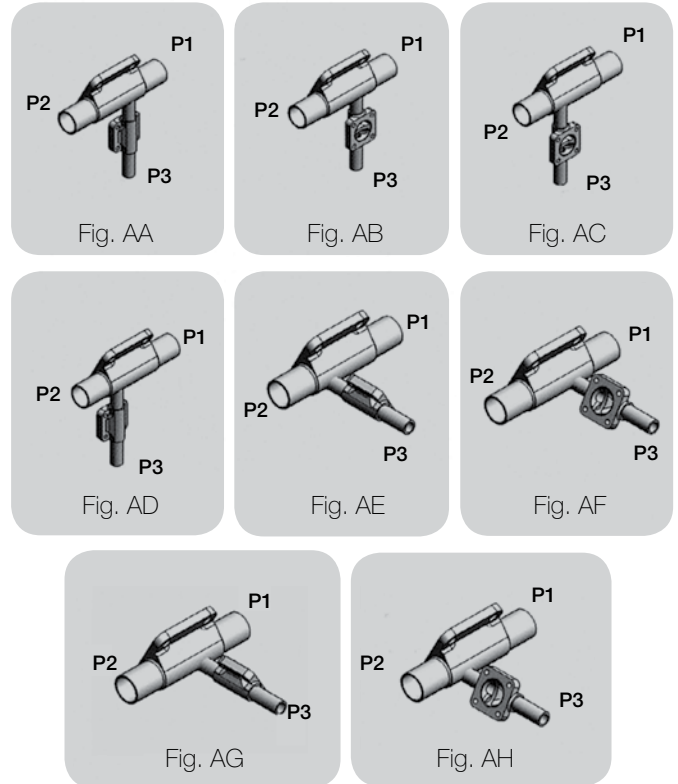
Manufactured from forged 316L SS in sizes ranging from 1/4" through 6". The L-pattern type can be supplied with butt weld or clamp end connections and a wide variety of finish options.

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	12.00
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 Valve

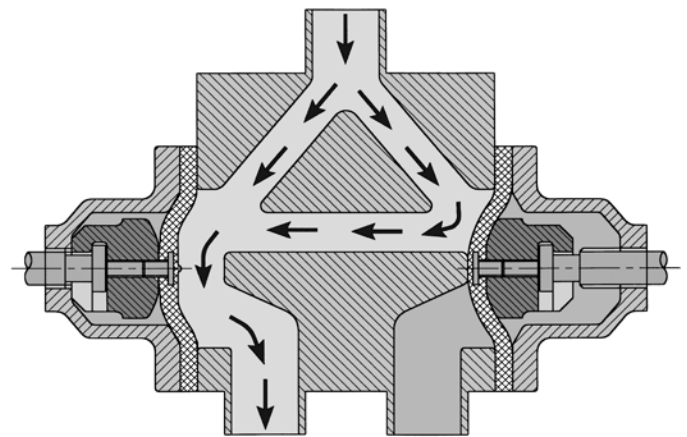


Features and Benefits

- 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.

Bonnet Assemblies

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"

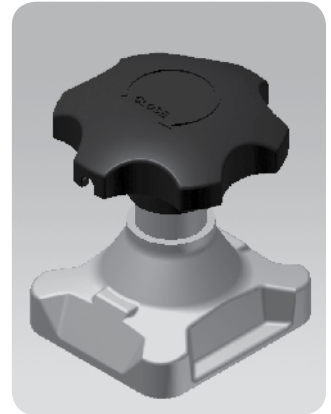
- 304 SS base with 304 SS hand wheel
- Dual FKM O-ring sealed
- Sanitary internals



#12 Bonnet

Sizes 1/2" - 2"

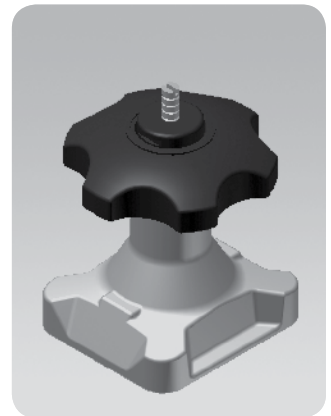
- Non-adjustable low profile
- 304 SS base with noryl hand wheel
- Dual FKM O-ring sealed
- Sanitary internals



#15 Bonnet

Sizes 1/2" - 2"

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



#10 Bonnet

Sizes 1/2" - 2"

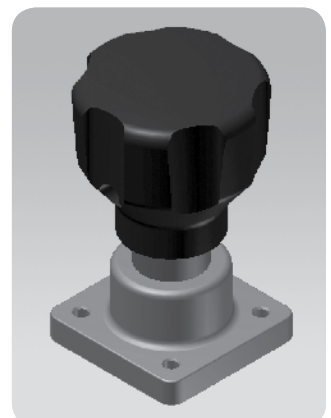
- Adjustable close stop
- 304 SS base with 304 SS hand wheel
- Dual FKM O-ring sealed
- Sanitary internals



#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" BSP thread (Compact valves)
 - 1/4" BSP thread (Standard size valves)
- **Visual Indicator**
Identifies valve position.
- **Material of construction**
Molded from a high performance polymer 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.

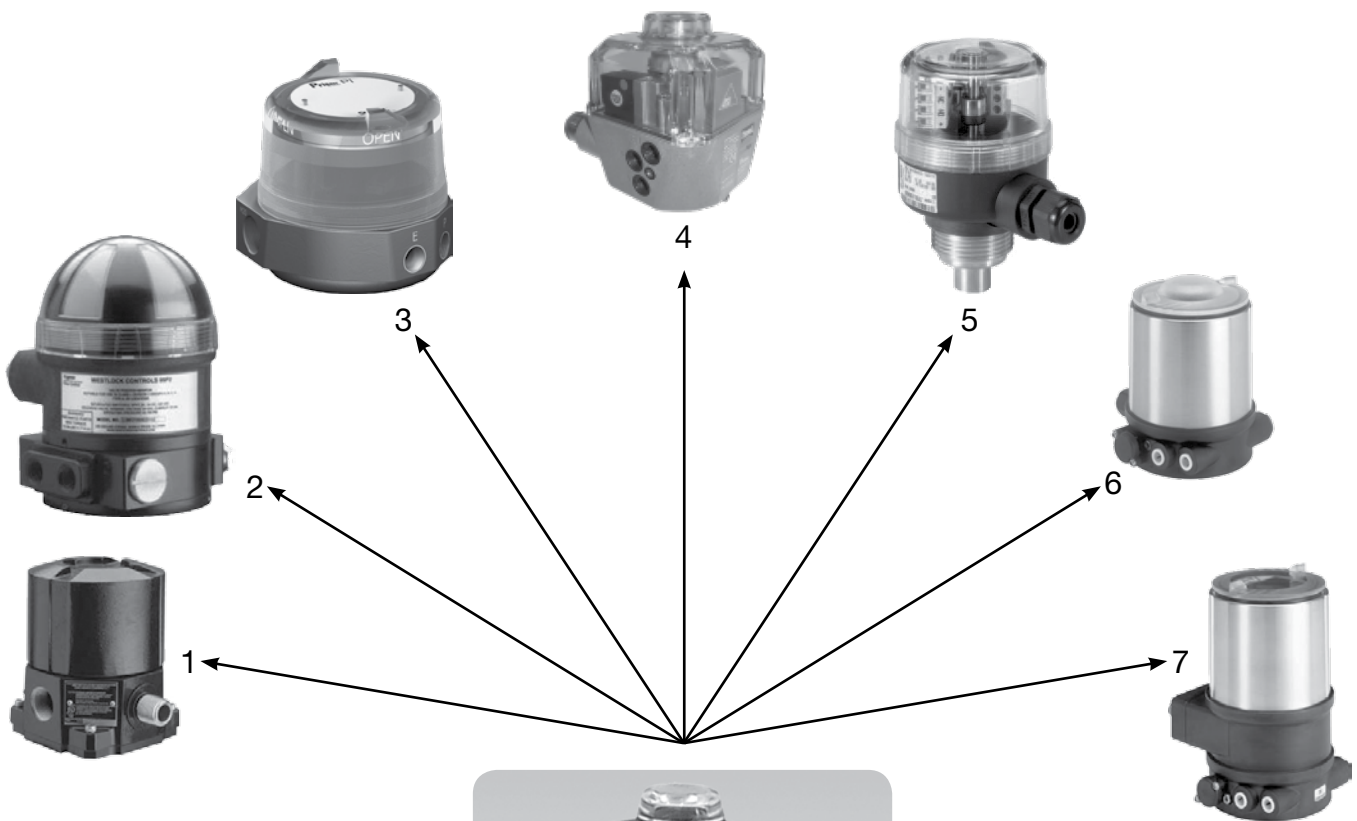
Features and Benefits

- **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 (optional)
- **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



AUTOMATION CONTROL OPTIONS

- 1 - WESTLOCK 988 1
- 2 - WESTLOCK 99P2
- 3 - STONEL PRISM PI
- 4 - STONEL PRISM PM
- 5 - BURKERT 1062
- 6 - BURKERT 8691
- 7 - BURKERT 8692 POSITIONER

Many options exist within the product ranges shown.

Consult factory for specific control requirement and solutions.

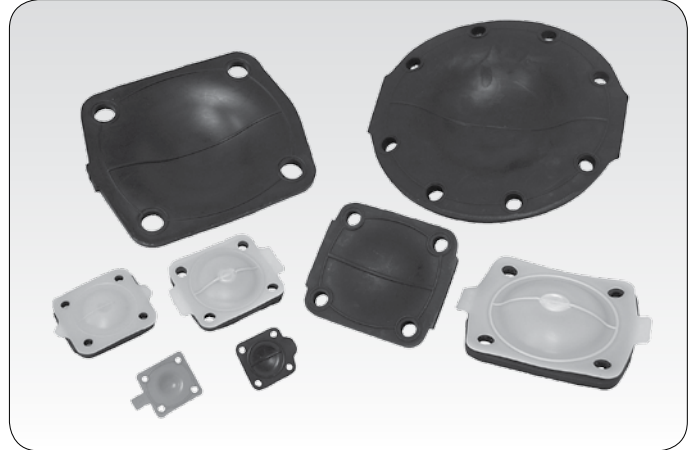
FDA & USP Weir Diaphragms

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 wide 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) S5 (214S/425C)	-	EA 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® SV2 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:

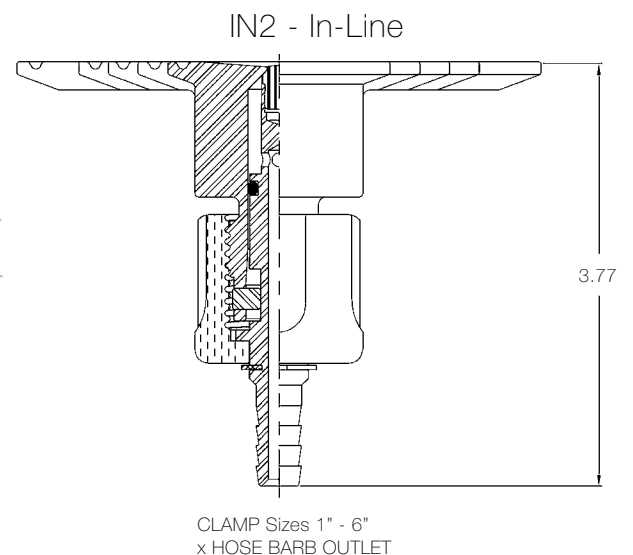
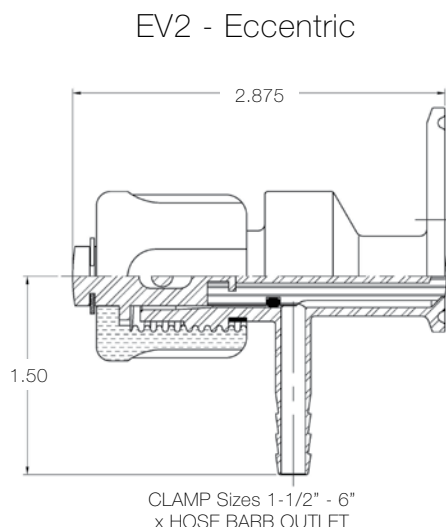
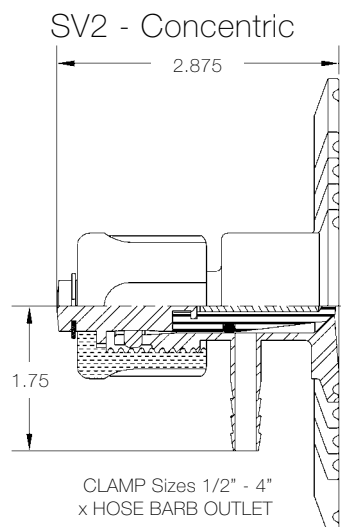
- Maximum operating temperature: 300°F
- Maximum operating pressure: 400 PSIG
- Maximum SWP: 35 PSIG SWP @ 280°F



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 High Purity 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 Efactor
- Triac

Positioners:

- Triac
- Siemens
- Westlock

Mechanical Specifications:

Sizes:

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

Connections:

- Hygienic clamp & extended butt weld per BPE

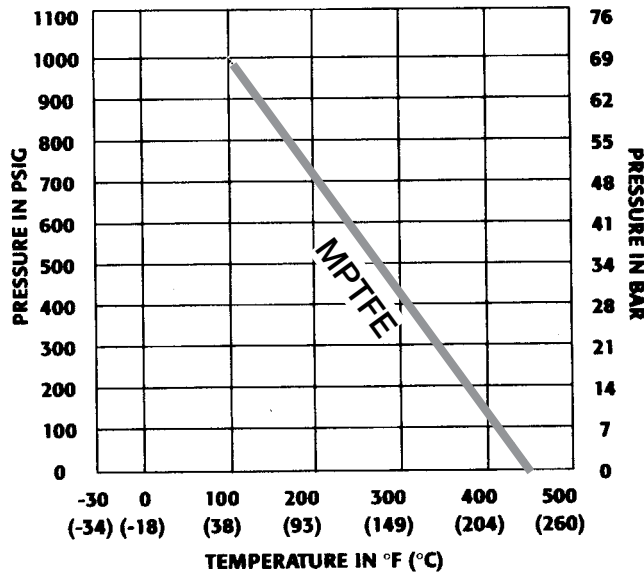
Materials:

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

Full port to ID of tubing for reduced pressure drop

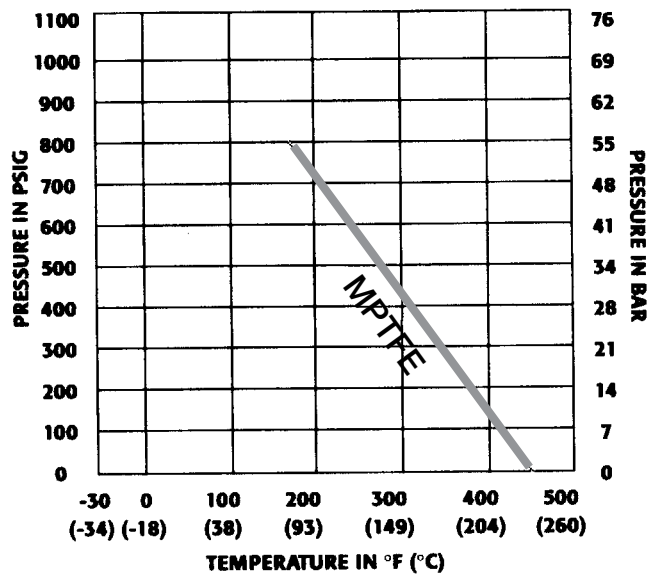
Manual lockable handle with vinyl sleeve

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"



Automated Flow Control Valves

Aseptic options available

DCX3 – Single Sealing Shut-Off
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)



Definox
DCX3 Automatic

Definox
DCX4 Automatic

Specifications:

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

Surface Finish:

R_a Interior = $32R_a$

R_a Exterior = $40-50R_a$

Materials:

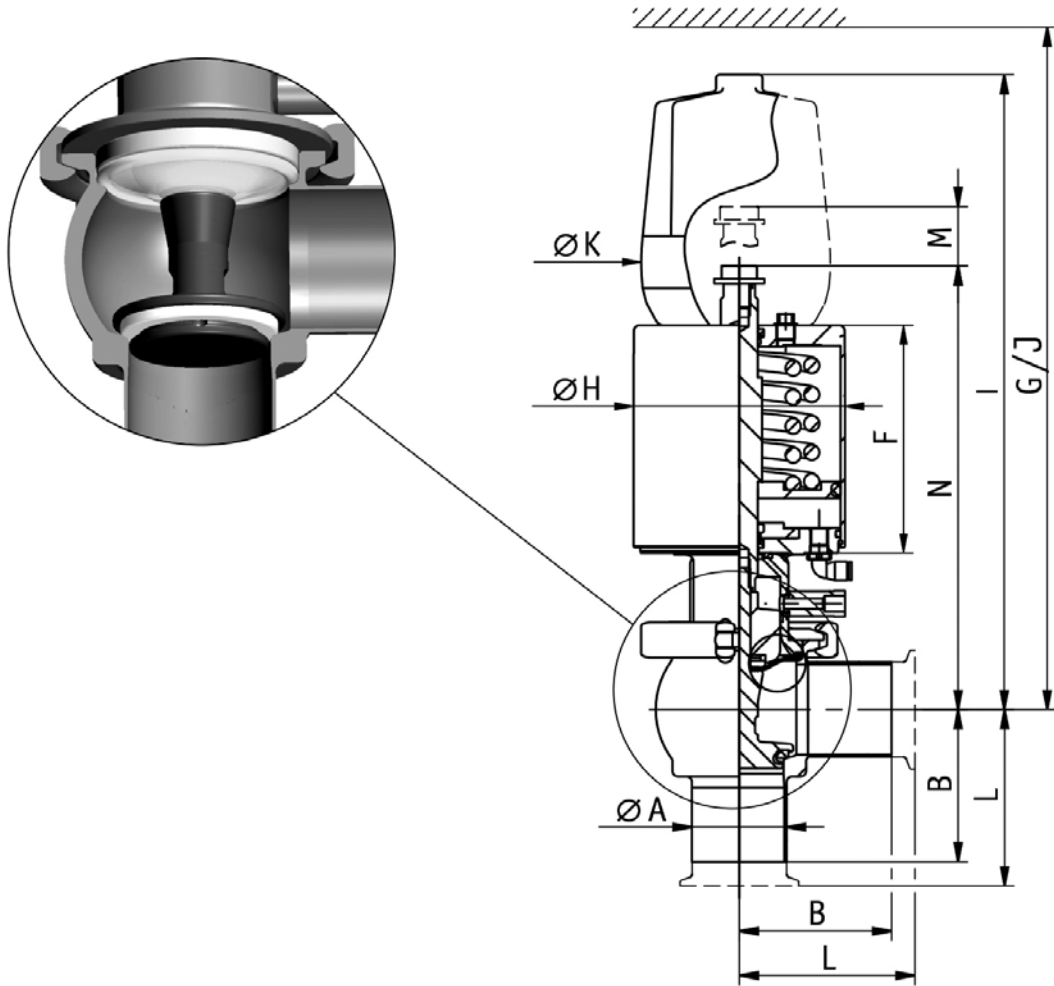
Body/Stem: 316L SS

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

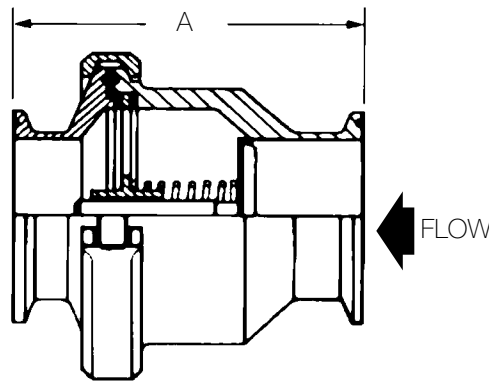
TOP-FLO® High Purity Check Valves

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.



Features:

- Suitable for 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 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

BPE Stainless Steel Pharmaceutical Grade Tubing

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 with bright annealed/mill OD (BPE surface finish code SF4). Mechanically polished OD to 32R_a or 20R_a available on application. 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.

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

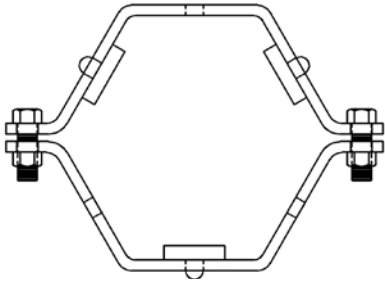
Dimensional Tolerances

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	3160196T-7BPE

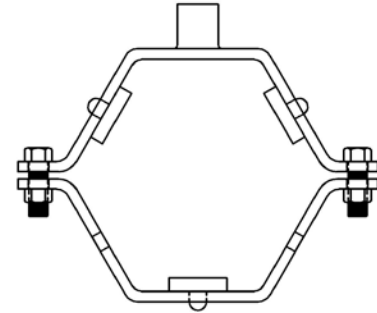
Hangers

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



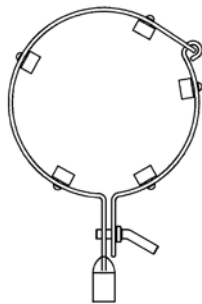
B24W Tubing Hanger

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	33D-25PP
3	32D-30	32D-30PP
4	32D-40	32D-40PP
6	32D-60	32D-60PP
8	32D-80	32D-80PP
10	32D-100	-
12	32D-120	-



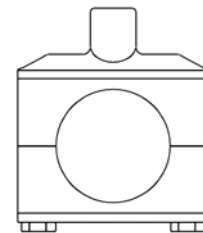
C24T Tubing Hanger

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	32C-80	32C-80PP
10	32C-100	-
12	32C-120	-



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/hangerspvc

topln.co/hangerscast

topln.co/hangersdual

topln.co/hangersquad

Rotary Lobe Pumps



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.



AccuLobe™

The AccuLobe™ is a sanitary lobe pump designed to provide superior metering accuracy and repeatability, especially for viscous or shear-sensitive fluids. Its multilobe design allows precise volumetric dosing for filling and packaging, lab and pilot plant, or manufacturing applications as well as general fluid transfer where low flow rates (0.5-9.2 gpm / 2-35 lpm) and medium pressures (0-175 psi / 0-12 bar) are required.



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.

Hygienic Centrifugal Pumps

The reliability of Wright's TRA[®] 400 centrifugal design has been proven over many decades. Its robust design and high quality materials of construction make it the right choice for both high purity and ultra hygienic fluid transfer. These pumps set a new standard with patented innovations such as internal seal flushing and true ZERO DEAD LEG casing drain. Typical applications include water for injection (WFI), RO, DI, USP, process water, non-shear sensitive products requiring the highest hygienic control and compendial water recirculation.

TRA[®] 400 Series

Technical Specifications:

- Capacity range: 2-290 gpm (0.4 to 68 m³/hr)
- Pressure range: to 135 PSI
- Viscosity: to 2,700 SSU (600 cPs)
- Temperature: to 380°F (195°C)

Construction:

- Wetted parts entirely machined from 316L
- Stainless steel flange adapters
- Integral inlet/outlet housing
- Machined or polished exterior surfaces
- UPS Class VI elastomers standard
- Silicon carbide seals
- 25 R_a(0.6 μm) interior flush (available as low as 10R_a)
- IQ supporting documentation



Advantages:

- Patented Zero Dead Leg Drain allows for total purging of the Wright CFP casing which eliminates product accumulation and reduces the possibility of contamination. Utilizing a diaphragm valve machined directly into the casing removes the need for auxiliary components and piping.
- When double seals are required, the Softsterile™ patented internal seal flush system eliminates all external flush piping loops with their multiple connections, gaskets, elbows, compression fittings, and tubes - all of which can be sources of contamination, misalignment, gasket extrusion, and damage.
- This series is CIP-able and SIP-able.
- No castings reduces or eliminates rouge formation in high purity water systems.
- Fully adjustable head orientation for installation flexibility.
- Several seal options including single, double, internal or front pull-out cartridge seals in a choice of seal faces and elastomers.
- Very small clearances affords low NPSH, ideal for vacuum, liquids with slight viscosity, high temperatures or low NPSHA conditions.
- Two mechanical seals fit the entire line and spare part interchangeability reduces maintenance inventory.

Manufactured by Wright Flow Technologies - A Unit of IDEX Corporation

TRA[®] ~ 400 & 500 Series are registered trademarks of Wright Pump - A Unit of IDEX Corporation

topln.co/tra400

Hygienic Centrifugal Pumps

TRA® 500 Series centrifugal pumps provide processors with a lower cost of ownership with its ease of installation, ease of maintenance, and reduced parts inventory. This series of pumps meet the most stringent hygienic standards for CIP and SIP. Typical applications include process waters for pharmaceuticals and biotech (RO, DI, Analytical), personal care items (mouthwash, cologne, sanitizers), and cosmetics.

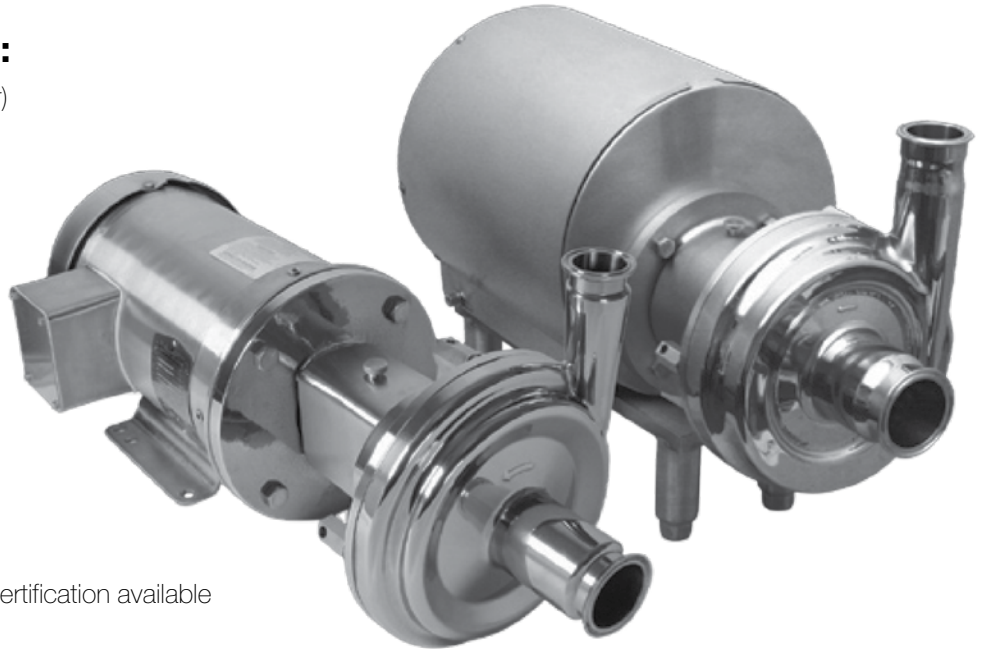
TRA® 500 Series

Technical Specifications:

- Capacity range: 900 gpm (210 m³/hr)
- Pressure range: to 190 PSI (13 Bar)
- Viscosity: to 2,700 SSU (600 cPs)
- Temperature: to 380°F (195°C)

Construction:

- Cast 316L SS
- Stainless steel flange adapters
- Integral inlet/outlet housing
- Polished exterior surfaces
- Large variety of seals to choose from
- Full material traceability and material certification available



Advantages:

- The front-pull out seal design simplifies inventory needs and maintenance with its in-line serviceability, which eliminates the need for pump removal from the system saving time and effort.
- Integral inlet and outlet ports are machined-in-place providing “no-weld” sanitary clamp style fittings on models through TRA® 506.
- Fully adjustable flange adapter/pump head orientation for best fit-up and fine adjustment in hard to reach piping arrangements.
- Durable stainless steel flange adapter eliminates chips and rust to reduce maintenance cost.
- Simple shaft lock collar permits quick, easy installation while providing self-alignment (no special tools).
- “Drop-In” replacement is dimensionally interchangeable with other manufacturers.
- The impeller is designed for gentle handling of shear sensitive products.
- Heavy wall, cast 316L SS construction extends service life and minimizes vibration.
- Very small clearances affords low NPSH, ideal for vacuum, liquids with slight viscosity, high temperatures or low NPSHA conditions.

Manufactured by Wright Flow Technologies - A Unit of IDEX Corporation

TRA® ~ 400 & 500 Series are registered trademarks of Wright Pump - A Unit of IDEX Corporation

TOP-FLO® TF-C Series Centrifugal Pumps



These versatile pumps serve as excellent choices for utility purposes like DI water, non-compensated 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 components 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

To order, complete the pump datasheet at topln.co/pumpdata

Sanitary Magnetic Drive Pump

The newly developed Series MKP-Bio offers you an excellent solution for aseptic applications in the pharmaceutical, biotech, 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 m³/h 220 GPM

Head H: up to 260 ft.

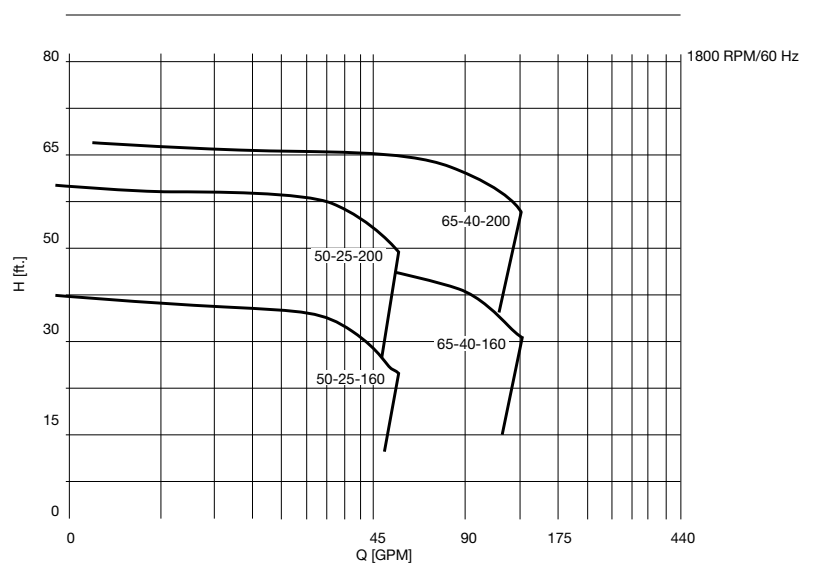
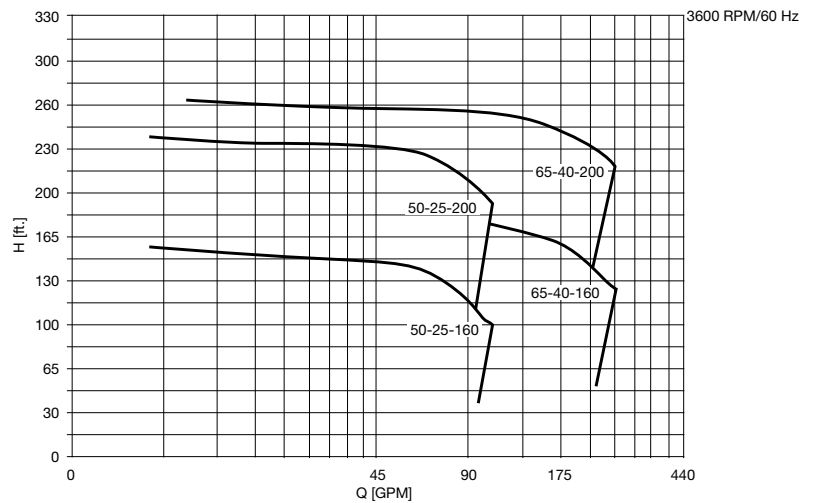
Temp °F: -72 up to 300°F

Nom. Pres. PN: 230 PSI

Materials 316 SS Hast. C22, Alloy 59

Other materials available on request.

Execution Vertical / close coupled



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, bevel seat, TI-Line, butt weld, and industry specific vacuum type end connections. All Top Line fittings are manufactured from both 304 and 316L stainless steel that meet all 3-A dairy standards. Most fitting types are available in sizes 1/2" through 12".



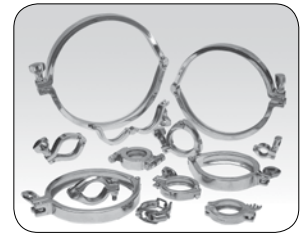
Clamp



Butt Weld



Tube O.D. Butt Weld



Clamps

Top Line carries the largest selection of clamps in the industry.

- 13MHHM
- 13MHP
- 13LAH
- 13MHHS

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

TOP-FLO® Butterfly Valves

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

topln.co/butterfly



TOP-FLO® Full Flow Ball Valve

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.

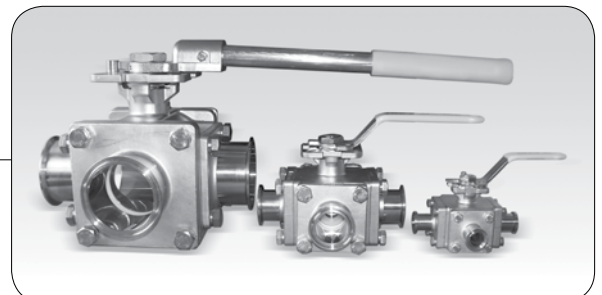
topln.co/ballvalves



TOP-FLO® 3-way Ball Valve

TOP-FLO® 3-way ball valves feature PTFE cavity filler, fully encapsulated and locking device handle. Meets 3-A, FDA, and USDA requirements.

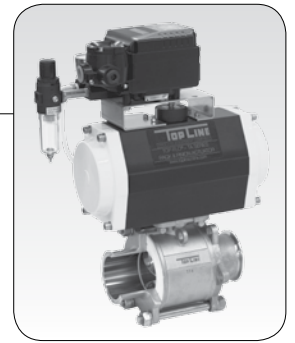
topln.co/3way



TOP-FLO® T4V Control Ball Valves

TOP-FLO® Series T4V sanitary V-Port control ball valves exhibit excellent throttling capabilities and have a wide range of controls 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.

topln.co/vport



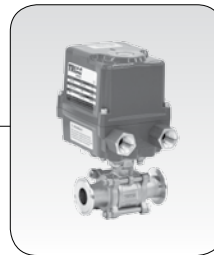
TOP-FLO® Actuators

- Rack & pinion
- Electric
- Stainless steel canister

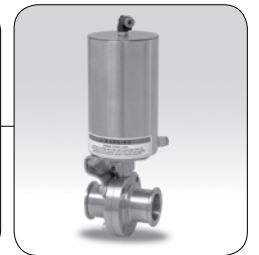
topln.co/rpa topln.co/ea topln.co/ca



Rack & Pinion



Electric

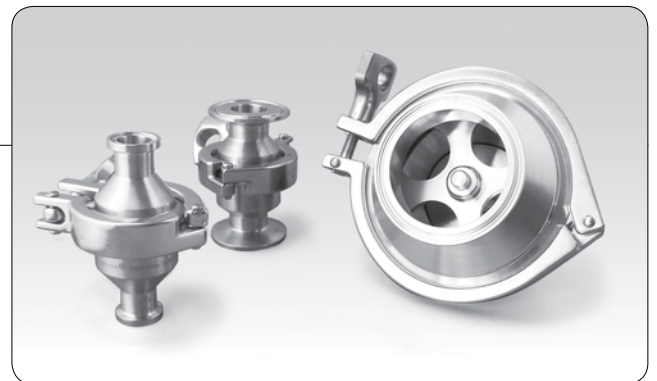


SS Canister

TOP-FLO® K45MP Check Valves

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.

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. Meets 3-A sanitary finish.

topln.co/plug



TOP-FLO® 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 Valve

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

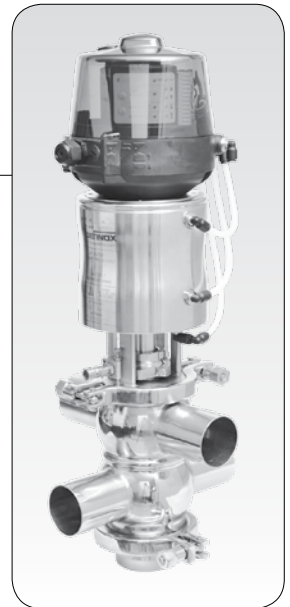
TOP-FLO® PMO-C mixproof valve technology allows two different liquids to cross over in complete safety even during seat lifting operations. Production no longer needs to completely stop during cleaning operations.

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

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® Air Relief Valves

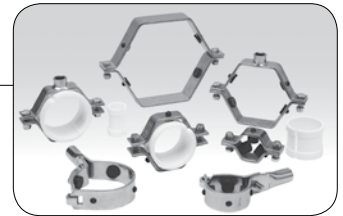
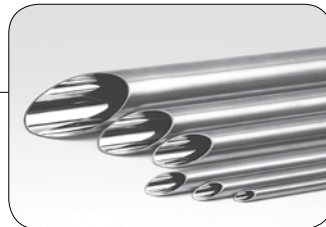
The TL60ARV air relief valve is used primarily for removal of trapped air from a line without loss of product. This design will not allow air to enter the line or container under negative pressure. These valves are typically found installed vertically on the suction inlet tube in front of CIP pumps.

topln.co/relief



Tubing & 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

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, and Allegheny Surface Technology.** 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 biotech industries.

www.abccorporate.com • 800-542-0650 / 814-362-2590



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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 has been supplying high quality stainless steel products to the dairy, food, beverage, pharmaceutical, and other process industries for over 50 years. Our commitment to fine craftsmanship, responsible service and realistic pricing has led to our company's strong ability to meet our customer's needs.

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.