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Advantage® and Advantage® 2.0 Actuator Sizing - Fail Close

Fail Close Actuators - Air-To-Open, Spring-To-Close (Reverse Acting)																		
Actuator and Spring Package	Maximum Line Pressure (psig)																Air pressure required to open for full stroke at 0 psi line pressure	
	Valve Size																	
	100% ΔP								0% ΔP									
	BT ²	0.5"	0.75"	1"	1.5"	2"	3"	4"	BT ²	0.5"	0.75"	1"	1.5"	2"	3"	4"		
Elastomer Diaphragm	A203/B203 60#	150							150								55	
	A204/B204 90#	150							150								75	
	A205/B205 60#		110							90							50	
	A206/B206 90#		150							150							90	
	A208/B208 60#			100							60						45	
	A208/B208 60#				150							80					60	
	A209/B209 90#			150	150							120	130				90	
	A216/B216 60#					100								65			50	
	A216/B216 60#						70								30		60	
	A217/B217 90#					150	150							130	75		90	
	A233 60#							95	70							60	35	62
	A234 90#							150	110							92	50	85
	A247 60#							150								92		57
	A247 60#								119								59	60
A248 80#							150							150		76		
A248 80#								150								93	82	
PTFE Diaphragm ¹	A203/B203 60#	70							55								55	
	A204/B204 90#	150							125								75	
	A206/B206 90#		150							150							90	
	A208/B208 60#		150	140						100	70						60	
	A208/B208 60#				100							35					70	
	A209/B209 90#			150	150						80	80					90	
	A216/B216 60#					125							70				50	
	A216/B216 60#						60								45		60	
	A217/B217 90#					150	150							125	70		90	
	A233 60#							50	30							20	15	62
	A234 90#							105	60							45	30	85
	A247 60#							133	70							68		61
	A247 60#																41	62
	A248 80#							150								114		82
A248 80#								150								70	90	

Fail Close Actuators - Air-To-Open, Spring-To-Close (Reverse Acting)																		
Actuator and Spring Package	Maximum Line Pressure (bar)																Air pressure required to open for full stroke at 0 bar line pressure	
	Valve Size																	
	100% ΔP								0% ΔP									
	BT ²	DN15	DN20	DN25	DN40	DN50	DN80	DN100	BT ²	DN15	DN20	DN25	DN40	DN50	DN80	DN100		
Elastomer Diaphragm	A203/B203 60#	10,34							10,34								3,79	
	A204/B204 90#	10,34							10,34								5,17	
	A205/B205 60#		7,58							6,21							3,45	
	A206/B206 90#		10,34							10,34							6,21	
	A208/B208 60#			6,89							4,14						3,10	
	A208/B208 60#				10,34							5,52					4,14	
	A209/B209 90#			10,34	10,34						8,27	8,96					6,21	
	A216/B216 60#					6,89								4,48			3,45	
	A216/B216 60#						4,83								2,07		4,14	
	A217/B217 90#					10,34	10,34							8,96	5,17		6,21	
	A233 60#							6,55	4,83							4,14	2,41	4,28
	A234 90#							10,34	7,59							6,34	3,45	5,86
	A247 60#							10,34								6,34		3,93
	A247 60#								8,20								4,07	4,14
A248 80#							10,34								10,34		5,24	
A248 80#								10,34								6,41	5,65	
PTFE Diaphragm ¹	A203/B203 60#	4,83							3,79								3,79	
	A204/B204 90#	10,34							8,62								5,17	
	A206/B206 90#		10,34							10,34							6,21	
	A208/B208 60#		10,34	9,65						6,89	4,83						4,14	
	A208/B208 60#				6,89							2,41					4,83	
	A209/B209 90#			10,34	10,34						5,52	5,52					6,21	
	A216/B216 60#					8,62								4,83			3,45	
	A216/B216 60#						4,14								3,10		4,14	
	A217/B217 90#					10,34	10,34							8,82	4,83		6,21	
	A233 60#							3,45	2,07							1,38	1,03	4,28
	A234 90#							7,24	4,14							3,10	2,07	5,86
	A247 60#							9,17	4,83							4,69		4,21
	A247 60#																2,83	4,27
	A248 80#							10,34								7,86		5,65
A248 80#								10,34								4,83	6,21	

¹ The exposure of the diaphragm to steam may increase the air requirements to close by as much as 30%.

² Bio-Tek includes size 0.25" (DN8), 0.375" (DN10), and 0.5" (DN15).

Note: See Page G-9 brochure for ΔP Pressure Drop definition.



Advantage® and Advantage® 2.0 Actuator Sizing - Fail Open

Fail Open Actuators - Air-To-Close, Spring-To-Open (Direct Acting)																					
		Air Pressure Required to Close (psig)																			
Size		Bio-Tek ²		0.5"		0.75"		1"		1.5"		2"		3"		4"		3"		4"	
Actuator		A103/B103		A105/B105		A108/B108		A108/B108		A116/B116		A116/B116		A133		A133		A147		A147	
Line Pressure		% ΔP																			
		100	0	100	0	100	0	100	0	100	0	100	0	100	0	100	0	100	0	100	0
Elastomer Diaphragm	20	38	40	38	45	38	55	28	40	36	40	40	45	44	46	48	55	32	37	30	40
	40	40	42	40	50	42	60	32	45	38	44	45	50	50	58	55	69	41	44	36	47
	60	42	44	44	55	46	65	36	55	42	48	50	60	55	66	64	85	42	49	42	56
	80	46	48	48	60	50	70	40	60	44	52	56	70	61	76	72	90	44	56	48	66
	100	48	52	50	65	52	75	45	70	48	56	60	75	66	90	80	-	52	65	53	79
	125	52	56	54	70	60	85	50	75	50	60	64	80	78	-	90	-	63	73	59	90
	150	56	60	58	75	68	-	55	85	52	65	68	-	81	-	-	-	71	83	65	-
PTFE Diaphragm ¹	20	42	50	46	66	55	55	50	55	45	52	48	50	64	60	78	80	36	53	46	48
	40	44	52	50	68	58	60	55	60	50	56	50	60	68	78	84	90	44	60	52	66
	60	48	56	52	72	60	65	60	65	55	60	56	70	74	88	90	-	51	75	56	74
	80	52	60	56	76	65	70	65	70	60	64	64	80	78	-	-	-	55	85	62	81
	100	54	65	60	82	68	75	70	80	64	68	70	90	84	-	-	-	57	-	70	90
	125	58	70	64	86	74	80	75	-	68	72	76	-	90	-	-	-	59	-	79	-
	150	62	75	68	-	80	85	80	-	72	76	82	-	-	-	-	-	63	-	83	-

Fail Open Actuators - Air-To-Close, Spring-To-Open (Direct Acting)																					
		Air Pressure Required to Close (bar)																			
Size		Bio-Tek ²		DN15		DN20		DN25		DN40		DN50		DN80		DN100		DN80		DN100	
Actuator		A103/B103		A105/B105		A108/B108		A108/B108		A116/B116		A116/B116		A133		A133		A147		A147	
Line Pressure		% ΔP																			
		100	0	100	0	100	0	100	0	100	0	100	0	100	0	100	0	100	0	100	0
Elastomer Diaphragm	1,38	2,62	2,76	2,62	3,10	2,62	3,79	1,93	2,76	2,48	2,76	2,76	3,10	3,03	3,17	3,31	3,79	2,21	2,55	2,07	2,76
	2,76	2,76	2,90	2,21	3,45	2,70	4,14	2,21	3,10	2,62	3,03	3,10	3,45	3,45	4,00	3,79	4,76	2,83	3,03	2,48	3,24
	4,14	2,90	3,03	3,03	3,79	3,17	4,48	2,48	3,79	2,90	3,31	3,45	4,14	3,79	4,55	4,41	5,86	2,90	3,38	2,90	3,86
	5,52	3,17	3,31	3,31	4,14	3,45	4,83	2,76	4,14	3,03	3,56	3,86	4,83	4,21	5,24	4,97	6,21	3,03	3,86	3,31	4,55
	6,89	3,31	3,59	3,45	4,48	3,59	5,17	3,10	4,83	3,31	3,86	4,14	5,17	4,55	6,21	5,52	-	3,59	4,48	3,65	5,45
	8,62	3,59	3,86	3,72	4,83	4,14	5,86	3,45	5,17	3,45	4,13	4,41	5,52	5,38	-	6,21	-	4,34	5,03	4,07	6,21
	10,34	3,86	4,14	4,00	5,17	4,70	-	3,79	5,86	3,59	4,48	4,69	-	5,59	-	-	-	4,90	5,72	4,48	-
PTFE Diaphragm ¹	1,38	2,90	3,45	3,17	4,55	3,79	3,79	3,45	3,79	3,10	3,59	3,31	3,45	4,41	4,14	5,38	5,52	2,48	3,65	3,17	3,31
	2,76	3,03	3,59	3,45	4,70	4,00	4,14	3,79	4,14	3,45	3,86	3,45	4,14	4,69	5,38	5,79	6,21	3,03	4,14	3,59	4,55
	4,14	3,31	3,86	3,59	4,97	4,14	4,48	4,14	4,48	3,79	4,14	3,86	4,83	5,10	6,07	6,21	-	3,52	5,17	3,86	5,10
	5,52	3,59	4,14	3,86	5,24	4,48	4,83	4,48	4,83	4,14	4,41	4,41	5,52	5,38	-	-	-	3,79	5,86	4,27	5,58
	6,89	3,72	4,48	4,14	5,65	4,69	5,17	4,83	5,52	4,41	4,69	4,83	6,21	5,79	-	-	-	3,93	-	4,83	6,21
	8,62	4,00	4,83	4,41	5,93	5,10	5,52	5,17	-	4,69	4,97	5,24	-	6,21	-	-	-	4,07	-	5,45	-
	10,34	4,27	5,17	4,70	-	5,52	5,86	5,52	-	4,96	5,24	5,65	-	-	-	-	-	4,34	-	5,72	-

¹ The exposure of the diaphragm to steam may increase the air requirements to close by as much as 30%.

² Bio-Tek includes size 0.25" (DN8), 0.375" (DN10), and 0.5" (DN15).

Note: See Page G-9 brochure for ΔP Pressure Drop definition.



Advantage® and Advantage® 2.0 Actuator Sizing - Double Acting

Double Acting Actuators - Air-To-Close, Air-To-Open																					
		Air Pressure Required to Close (psig)																			
Size		Bio-Tek ²		0.5"		0.75"		1"		1.5"		2"		3"		4"		3"		4"	
Actuator		A303/B303		A305/B305		A308/B308		A308/B308		A316/B316		A316/B316		A333		A333		A347		A147	
Line Pressure		% ΔP																			
Elastomer Diaphragm ¹	100	0	100	0	100	0	100	0	100	0	100	0	100	0	100	0	100	0	100	0	
	20	22	26	24	30	18	25	12	20	16	20	22	40	18	24	16	25	11	14	9	25
	40	24	28	26	35	20	30	16	25	20	25	26	45	26	29	24	38	17	21	15	30
	60	26	30	28	40	24	35	20	35	24	30	30	50	32	38	30	55	22	28	22	46
	80	28	32	32	45	26	40	24	40	28	35	35	55	38	48	38	68	23	35	27	60
	100	30	34	34	50	30	50	28	50	32	40	40	60	42	58	48	84	26	43	32	68
	125	32	38	38	55	34	55	36	55	36	45	45	70	52	68	58	-	34	53	40	76
PTFE Diaphragm ¹	150	34	44	42	60	38	60	44	65	40	50	50	80	57	80	68	-	37	61	49	88
	20	34	36	34	36	28	30	25	35	25	34	35	40	38	38	42	44	19	33	31	37
	40	36	40	36	40	34	35	35	40	30	38	40	50	41	49	50	60	21	40	35	53
	60	40	44	40	46	38	40	45	50	35	42	50	60	47	58	56	74	29	46	44	59
	80	42	46	42	50	40	45	50	55	40	46	55	70	53	67	65	90	32	51	49	65
	100	44	52	44	54	42	50	55	60	45	50	60	80	58	78	73	-	35	58	54	77
	125	46	56	46	58	44	55	60	70	50	55	64	90	64	90	82	-	42	68	62	-
150	48	62	48	62	46	60	65	80	55	62	68	-	69	-	90	-	45	78	68	-	

Double Acting Actuators - Air-To-Close, Air-To-Open																					
		Air Pressure Required to Close (bar)																			
Size		Bio-Tek ²		DN15		DN20		DN25		DN40		DN50		DN80		DN100		DN80		DN100	
Actuator		A303/B303		A305/B305		A308/B308		A308/B308		A316/B316		A316/B316		A333		A333		A347		A147	
Line Pressure		% ΔP																			
Elastomer Diaphragm ¹	100	0	100	0	100	0	100	0	100	0	100	0	100	0	100	0	100	0	100	0	
	1,38	1,51	1,79	1,65	2,07	1,24	1,72	0,83	1,38	1,10	1,38	1,52	2,76	1,24	1,66	1,10	1,72	0,76	0,79	0,62	1,72
	2,76	1,65	1,93	1,79	2,41	1,38	2,07	1,10	1,72	1,38	1,72	1,79	3,10	1,79	2,00	1,66	2,62	1,17	1,45	1,03	2,07
	4,14	1,79	2,07	1,93	2,75	1,65	2,41	1,38	2,41	1,65	2,07	2,07	3,45	2,21	2,62	2,07	3,79	1,52	1,93	1,52	3,17
	5,52	1,93	2,21	2,21	3,10	1,79	2,76	1,65	2,76	1,93	2,41	2,41	3,79	2,62	3,31	2,62	4,69	1,59	2,41	1,86	4,14
	6,89	2,07	2,34	2,34	3,45	2,07	3,45	1,93	3,45	2,21	2,76	2,76	4,14	2,90	4,00	3,31	5,79	1,79	2,96	2,21	4,69
	8,62	2,21	2,62	2,62	3,79	2,34	3,79	2,48	3,79	2,48	3,10	3,10	4,83	3,59	4,69	4,00	-	2,34	3,65	2,76	5,24
PTFE Diaphragm ¹	10,34	2,34	3,03	2,90	4,14	2,62	4,14	3,03	4,48	2,76	3,45	3,45	5,52	3,93	5,52	4,69	-	2,55	4,21	3,38	6,07
	1,38	2,34	2,48	2,34	2,48	1,93	2,07	1,72	2,41	1,72	2,34	2,41	2,76	2,62	2,62	2,90	3,03	1,31	2,28	2,14	2,55
	2,76	2,45	2,76	2,48	2,76	2,34	2,41	2,41	2,76	2,07	2,62	2,76	3,45	2,83	3,38	3,45	4,14	1,45	2,76	2,41	3,66
	4,14	2,76	3,03	2,76	3,17	2,62	2,76	3,10	3,45	2,41	2,90	3,45	4,14	3,24	4,00	3,86	5,10	2,00	3,17	3,03	4,07
	5,52	2,90	3,17	2,90	3,45	2,76	3,10	3,45	3,79	2,76	3,17	3,79	4,83	3,66	4,62	4,48	6,21	2,21	3,52	3,38	4,48
	6,89	3,03	3,57	3,03	3,72	2,90	3,45	3,79	4,14	3,10	3,45	4,14	5,52	4,00	5,38	5,03	-	2,41	4,00	3,72	5,31
	8,62	3,17	3,86	3,17	4,00	3,03	3,79	4,14	4,83	3,45	3,79	4,41	6,21	4,41	6,21	5,66	-	2,90	4,69	4,28	-
10,34	3,31	4,27	3,31	4,28	3,17	4,14	4,48	5,52	3,79	4,28	4,69	-	4,76	-	6,21	-	3,10	5,38	4,69	-	

¹ The exposure of the diaphragm to steam may increase the air requirements to close by as much as 30%.

² Bio-Tek includes size 0.25" (DN8), 0.375" (DN10), and 0.5" (DN15).

Note: See Page G-9 brochure for ΔP Pressure Drop definition.



Advantage® Excel Actuator Sizing - Fail Close

Fail Close Actuators - Air-To-Open, Spring-To-Close (Reverse Acting)														
	Spring Package	Maximum Line Pressure (psig)											Air pressure required to open for full stroke at 0 psi line pressure	
		Valve Size												
		100 % ΔP						0% ΔP						
		BP ²	0.5"	0.75"	1"	1.5"	2"	BP ²	0.5"	0.75"	1"	1.5"	2"	
Elastomer Diaphragm	60#	150						125						58
	90#	150						150						84
	60#		120						50					65
	90#		150						105					80
	60#			150						80				69
	90#			150						110				74
	60#				150						110			71
	90#				150						130			77
	60#					135						90		61
	90#					150						110		76
	60#						80						55	59
	90#						150						90	77
PTFE Diaphragm ¹	60#	-						-						-
	90#	150						140						87
	60#		60						30					70
	90#		120						50					89
	60#			150						90				69
	90#			150						130				82
	60#				80						50			69
	90#				130						70			80
	60#					50						15		67
	90#					105						60		80
	60#						55						30	62
	90#						100						45	80

Fail Close Actuators - Air-To-Open, Spring-To-Close (Reverse Acting)														
	Spring Package	Maximum Line Pressure (bar)											Air pressure required to open for full stroke at 0 bar line pressure	
		Valve Size												
		100 % ΔP						0% ΔP						
		BP ²	DN15	DN20	DN25	DN40	DN50	BP ²	DN15	DN20	DN25	DN40	DN50	
Elastomer Diaphragm	4 bar	10,34						8,62						4,00
	6 bar	10,34						10,34						5,79
	4 bar		7,58						4,83					3,79
	6 bar		10,34						7,24					4,96
	4 bar			10,34						6,89				4,14
	6 bar			10,34						7,58				5,17
	4 bar				10,34						7,58			4,41
	6 bar				10,34						8,96			5,31
	4 bar					7,58						6,21		4,21
	6 bar					10,34						7,58		5,24
	4 bar						5,52						3,79	4,07
	6 bar						10,34						6,55	5,31
PTFE Diaphragm ¹	4 bar	-						-						-
	6 bar	10,34						9,65						6,00
	4 bar		4,14						2,76					4,83
	6 bar		8,27						3,45					6,14
	4 bar			10,34						6,21				4,76
	6 bar			10,34						8,96				5,52
	4 bar				5,52						3,45			4,76
	6 bar				10,34						5,52			5,72
	4 bar					3,45						1,03		4,62
	6 bar					7,24						4,48		5,58
	4 bar						3,79						2,07	4,14
	6 bar						6,89						3,10	5,38

¹ The exposure of the diaphragm to steam may increase the air requirements to close by as much as 30%.

² Bio-Pure includes size 0.25" (DN8), 0.375" (DN10), and 0.5" (DN15).

Note: See page G-9 brochure for ΔP Pressure Drop definition.



Advantage® Excel Actuator Sizing - Fail Open

Fail Open Actuators - Air-To-Close, Spring-To-Open (Direct Acting)													
	Line Pressure	Air Pressure Required to Close (psig)											
		Bio-Pure ²		0.5"		0.75"		1"		1.5"		2"	
		% ΔP											
		100	0	100	0	100	0	100	0	100	0	100	0
Elastomer Diaphragm ¹	20	46	43	49	49	55	56	41	48	31	38	47	59
	40	49	48	52	56	58	63	46	56	36	47	52	67
	60	52	52	54	63	61	69	50	64	41	55	57	75
	80	54	57	56	69	64	75	54	71	46	63	62	83
	100	57	61	59	76	67	82	59	79	51	72	67	90
	125	60	67	62	84	70	90	64	88	57	82	73	100
	150	63	72	64	92	73	97	69	97	62	92	78	-
PTFE Diaphragm ¹	20	72	61	61	62	79	67	79	82	64	64	55	66
	40	75	66	65	67	83	73	84	90	68	74	60	83
	60	77	70	69	72	87	79	89	98	71	83	64	100
	80	79	74	72	76	91	84	94	-	74	92	65	-
	100	81	78	76	81	95	90	99	-	77	-	73	-
	125	84	83	80	87	100	97	-	-	81	-	78	-
	150	86	88	84	92	-	-	-	-	84	-	83	-

Fail Open Actuators - Air-To-Close, Spring-To-Open (Direct Acting)													
	Line Pressure	Air Pressure Required to Close (bar)											
		Bio-Pure ²		DN15		DN20		DN25		DN40		DN50	
		% ΔP											
		100	0	100	0	100	0	100	0	100	0	100	0
Elastomer Diaphragm ¹	1,38	3,17	2,96	3,17	3,10	3,72	3,79	2,76	3,10	2,00	2,48	3,03	3,38
	2,76	3,38	3,31	3,38	3,59	3,93	4,21	3,03	3,65	2,34	3,10	3,45	4,00
	4,14	3,59	3,59	3,59	4,00	4,07	4,62	3,31	4,21	2,69	3,65	3,79	4,62
	5,52	3,72	3,93	3,79	4,41	4,21	5,03	3,59	4,76	3,03	4,21	4,14	5,17
	6,89	3,93	4,21	4,00	4,90	4,41	5,38	3,86	5,31	3,38	4,83	4,48	5,79
	8,62	4,14	4,62	4,21	5,45	4,62	5,86	4,21	6,00	3,79	5,52	4,96	6,55
	10,34	4,34	4,96	4,41	5,93	4,76	6,34	4,48	6,48	4,21	6,21	5,38	-
PTFE Diaphragm ¹	1,38	4,96	4,21	4,76	5,17	4,83	4,55	5,24	5,10	3,93	3,72	3,72	5,17
	2,76	5,17	4,55	4,96	5,52	5,10	4,90	5,58	5,65	4,21	4,27	4,07	5,86
	4,14	5,31	4,83	5,17	5,79	5,31	5,24	5,86	6,14	4,41	4,83	4,34	6,55
	5,52	5,45	5,10	5,38	6,07	5,52	5,58	6,21	6,69	4,62	5,38	4,62	-
	6,89	5,58	5,38	5,58	6,34	5,72	5,93	6,48	-	4,83	5,93	4,96	-
	8,62	5,79	5,72	5,79	6,69	6,00	6,34	6,89	-	5,10	6,62	5,31	-
	10,34	5,93	6,07	6,00	-	6,27	6,69	-	-	5,31	-	5,65	-

¹ The exposure of the diaphragm to steam may increase the air requirements to close by as much as 30%.

² Bio-Pure includes size 0.25" (DN8), 0.375" (DN10), and 0.5" (DN15).

Note: See Page G-9 brochure for ΔP Pressure Drop definition.



Advantage® Excel Actuator Sizing - Double Acting

Double Acting Actuators - Air-To-Close, Air-To-Open													
	Line Pressure	Air Pressure Required to Close (psig)											
		Bio-Pure ²		0.5"		0.75"		1"		1.5"		2"	
		% ΔP											
		100	0	100	0	100	0	100	0	100	0	100	0
Elastomer Diaphragm	20	21	15	27	36	27	30	19	20	18	20	21	23
	40	24	20	30	43	30	36	23	27	23	29	27	33
	60	27	24	33	50	32	42	26	33	28	37	33	42
	80	29	29	36	58	34	48	29	39	32	45	39	54
	100	32	33	39	63	37	54	32	45	37	53	44	60
	125	35	39	43	71	40	61	36	53	43	63	51	72
PTFE Diaphragm ¹	150	38	44	46	79	42	68	40	60	48	73	58	83
	20	47	36	52	58	38	36	39	37	47	48	28	34
	40	50	41	55	65	42	41	45	46	51	57	34	47
	60	52	45	58	71	46	45	50	54	54	65	39	60
	80	54	49	60	77	49	49	55	62	57	74	44	73
	100	56	53	63	83	53	54	60	71	60	82	49	86
	125	59	58	66	91	57	59	67	81	64	93	56	-
	150	61	63	69	98	61	64	73	91	68	-	62	-

Double Acting Actuators - Air-To-Close, Air-To-Open													
	Line Pressure	Air Pressure Required to Close (bar)											
		Bio-Pure ²		DN15		DN20		DN25		DN40		DN50	
		%ΔP											
		100	0	100	0	100	0	100	0	100	0	100	0
Elastomer Diaphragm	1,38	1,45	1,03	1,79	2,62	1,86	1,93	1,10	1,38	1,10	1,03	1,03	1,31
	2,76	1,65	1,38	2,07	2,96	2,07	2,34	1,38	1,86	1,45	1,65	1,45	2,07
	4,14	1,86	1,65	2,28	3,31	2,21	2,76	1,65	2,28	1,79	2,21	1,79	2,76
	5,52	2,00	2,00	2,48	3,65	2,34	3,10	1,93	2,69	2,07	2,76	2,14	3,45
	6,89	2,21	2,28	2,69	4,00	2,48	3,52	2,21	3,17	2,41	3,38	2,48	4,14
	8,62	2,41	2,69	2,96	4,41	2,69	4,00	2,55	3,72	2,83	4,07	2,96	5,03
PTFE Diaphragm ¹	10,34	2,62	3,03	3,17	4,76	2,83	4,41	2,83	4,21	3,17	4,76	3,38	5,86
	1,38	3,24	2,48	3,59	4,00	2,28	2,14	3,38	4,00	2,69	2,83	1,93	2,14
	2,76	3,45	2,83	3,86	4,48	2,55	2,55	3,65	4,55	2,96	3,38	2,07	3,10
	4,14	3,59	3,10	4,07	4,90	2,76	2,90	3,93	5,03	3,17	3,93	2,34	4,00
	5,52	3,72	3,38	4,34	5,38	2,96	3,24	4,21	5,52	3,38	4,48	2,62	4,90
	6,89	3,86	3,65	4,55	5,79	3,17	3,59	4,48	6,00	3,59	5,03	2,90	5,93
	8,62	4,07	4,00	4,83	6,34	3,45	4,07	4,83	6,62	3,86	5,72	3,24	-
	10,34	4,21	4,34	5,10	6,89	3,65	4,48	5,17	-	4,14	6,34	3,52	-

¹ The exposure of the diaphragm to steam may increase the air requirements to close by as much as 30%.

² Bio-Pure includes size 0.25" (DN8), 0.375" (DN10), and 0.5" (DN15).

Note: See Page G-9 brochure for ΔP Pressure Drop definition.



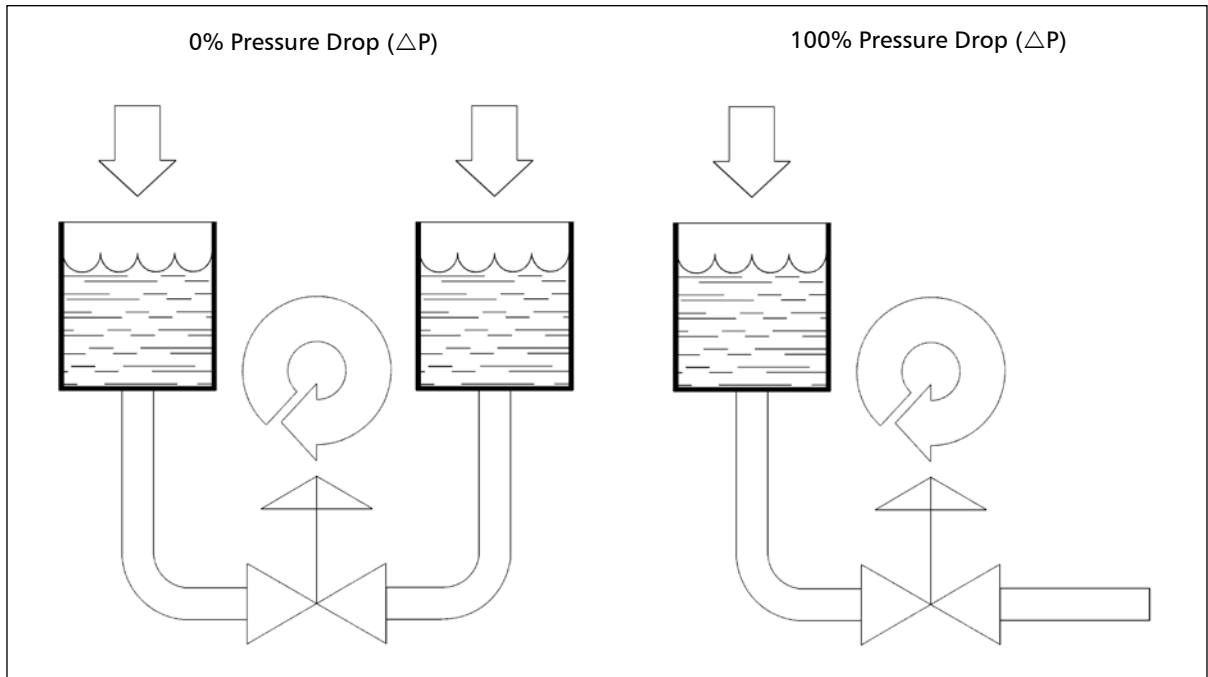
Advantage Piston Actuator (APA) Sizing

Fail Close Actuators - Air-To-Open, Spring-To-Close (Reverse Acting)												
Actuator and Spring Package	Maximum Line Pressure (psig)										Air pressure required to open for full stroke at 0 psi line pressure	
	Valve Size											
	100 % ΔP					0% ΔP						
	0.5"	0.75"	1"	1.5"	2"	0.5"	0.75"	1"	1.5"	2"		
Elastomer Diaphragm	AP0506 60#	80					60					60
	AP0509 90#	150					100					85
	AP0756 60#		100					50				60
	AP0759 90#		150					100				85
	AP1006 60#			130					70			60
	AP1009 90#			150					110			88
	AP1506 60#				100					50		54
	AP1509 90#				150					120		82
	AP2006 60#					70					30	58
	AP2009 90#					140					75	90
PTFE Diaphragm ¹	AP0506 60#	50					30					60
	AP0509 90#	150					70					85
	AP0756 60#		60					60				60
	AP0759 90#		105					80				85
	AP1006 60#			40					35			60
	AP1009 90#			110					75			88
	AP1506 60#				40					40		54
	AP1509 90#				150					90		82
	AP2006 60#					40					20	58
	AP2009 90#					90					35	90

Fail Close Actuators - Air-To-Open, Spring-To-Close (Reverse Acting)												
Actuator and Spring Package	Maximum Line Pressure (psig)										Air pressure required to open for full stroke at 0 bar line pressure	
	Valve Size											
	100 % ΔP					0% ΔP						
	DN15	DN20	DN25	DN40	DN50	DN15	DN20	DN25	DN40	DN50		
Elastomer Diaphragm	AP0506 60#	5,52					4,14					4,14
	AP0509 90#	10,34					6,89					5,86
	AP0756 60#		6,89					3,45				4,14
	AP0759 90#		10,34					6,89				5,86
	AP1006 60#			8,96					4,83			4,14
	AP1009 90#			10,34					7,58			6,07
	AP1506 60#				6,89					3,45		3,72
	AP1509 90#				10,34					8,27		5,65
	AP2006 60#					4,89					2,07	4,00
	AP2009 90#					9,65					5,17	6,21
PTFE Diaphragm ¹	AP0506 60#	3,45					2,07					4,14
	AP0509 90#	10,34					4,83					5,86
	AP0756 60#		4,14					4,14				4,14
	AP0759 90#		7,24					5,52				5,86
	AP1006 60#			2,76					2,41			4,14
	AP1009 90#			7,58					5,17			6,07
	AP1506 60#				2,76					2,76		3,72
	AP1509 90#				10,34					6,21		5,65
	AP2006 60#					2,76						4,00
	AP2009 90#					6,21						6,21

¹ The exposure of the diaphragm to steam may increase the air requirements to close by as much as 30%. Note: See Page G-9 brochure for ΔP Pressure Drop definition.

Pressure Drop Definition



Approximate Maximum Chamber Volume

Valve Size		Advantage Actuator Upper Chamber		Advantage Actuator Lower Chamber		APA Lower Chamber	
Inch	DN	in ³	cm ³	in ³	cm ³	in ³	cm ³
0.25, 0.375, 0.5 ¹	6, 10, 15 ¹	2.62	43	2.26	37	-	-
0.5	15	5.49	90	4.27	70	3.22	52,8
0.75	20	12.51	205	7.63	125	3.72	61,0
1	25	12.08	198	9.15	150	4.06	66,5
1.5	40	71.00	1163	34.78	570	14.6	239
2	50	71.00	1163	38.75	635	18.3	300
3 (47)	80	463.80	7600	250.20	4100	NA	NA
4 (47)	100	463.80	7600	250.20	4100	NA	NA

¹ Bio-Tek sizes

Valve Stroke (approximate)

Valve Size		Manual		Actuated	
Inch	DN	Inch	mm	Inch	mm
BP/BT	8,10,15	0.16	4,1	0.16	4,1
0.5	15	0.25	6,3	0.25	6,3
0.75	20	0.38	9,6	0.38	9,6
1	25	0.50	12,7	0.50	12,7
1.5	40	0.81	20,6	0.87	20,6
2	50	1.00	25,4	1.00	25,4
3	80	1.62	41,3	1.62	41,3
4	100	2.12	53,8	1.62	41,3

Flow Coefficients

C_v Ratings for Advantage, APA, 903, 913, 963, and 970 Topworks

Size (in)	0.50	0.75	1.00	1.50	2.00	2.50	3.00	4.00 ¹
10% Open	0.19	1.2	2.0	6.0	6	16.0	24	25.6
20% Open	0.38	2.4	3.8	11.5	11	29.6	44	56
30% Open	0.67	3.3	5.8	17.5	16	41.6	68	104
40% Open	1.14	4.1	7.6	22.5	21	52.0	92	160
50% Open	1.43	4.7	9.2	27.5	25	60.0	108	212
60% Open	1.90	5.2	10.9	31.5	31	66.4	124	232
70% Open	2.28	5.7	12.2	35.0	35	71.2	132	256
80% Open	2.66	6.0	13.3	35.0	41	75.2	136	288
90% Open	2.85	6.2	13.6	33.5	45	76.0	140	308
100% Open	3.33	6.2	13.6	28.0	51	76.0	144	320

¹ C_v for 4" valve full open with Advantage Actuator is 272.

C_v Ratings for Advantage 2.0 and AXS Topworks

Size (in)	0.50	0.75	1.00	1.50	2.00
10% Open	0.19	1.0	1.6	4.0	5
20% Open	0.38	1.9	3.2	9.0	10
30% Open	0.67	2.8	4.8	12.5	15
40% Open	1.14	3.5	6.2	16.5	19
50% Open	1.43	4.1	7.6	20.0	23
60% Open	1.90	4.6	8.9	23.5	28
70% Open	2.28	5.0	10.2	27.0	33
80% Open	2.66	5.5	11.3	30.5	38
90% Open	2.85	5.8	12.5	33.5	42
100% Open	3.33	6.0	13.3	35.5	46

C_v Ratings for Bio-Tek

Size (in)	0.25	0.375	0.50
100% Open	0.89	1.92	3.03

C_v Ratings for Bio-Pure

Size (in)	0.25	0.375	0.50
100% Open	0.47	1.10	1.60

Note: C_v values expressed in GPM per one psi pressure drop.

Flow Coefficients

K_v Ratings for Advantage, APA, 903, 913, 963, and 970 Topworks

Size (DN)	15	20	25	40	50	65	80	100 ¹
10% Open	0,16	1,0	1,7	5,2	5,2	13,6	20,4	21,8
20% Open	0,33	2,1	3,3	9,9	9,5	25,2	37,4	47,7
30% Open	0,58	2,9	5,0	15,1	13,8	35,4	57,8	88,5
40% Open	0,99	3,5	6,6	19,5	18,2	44,2	78,3	136,2
50% Open	1,23	4,1	8,0	23,8	21,6	51,0	91,9	180,4
60% Open	1,65	4,5	9,4	27,2	26,8	56,5	105,5	197,4
70% Open	1,97	4,9	10,6	30,3	30,3	60,6	112,3	217,8
80% Open	2,30	5,2	11,5	30,3	35,5	64,6	115,8	245,1
90% Open	2,47	5,4	11,8	29,0	38,9	64,6	119,1	262,1
100% Open	2,88	5,4	11,8	24,2	44,1	64,6	122,6	272,3

¹ K_v for DN100 valve full open with Advantage Actuator is 232.

K_v Ratings for Advantage 2.0 and AXS

Size (DN)	15	20	25	40	50
10% Open	0,16	0,9	1,4	3,5	4,3
20% Open	0,33	1,6	2,8	7,8	8,7
30% Open	0,58	2,4	4,2	10,8	13,0
40% Open	0,99	3,0	5,4	14,3	16,4
50% Open	1,23	3,5	6,6	17,3	19,9
60% Open	1,65	4,0	7,7	20,3	24,2
70% Open	1,97	4,3	8,8	23,4	28,5
80% Open	2,30	4,8	9,8	26,4	32,9
90% Open	2,47	5,0	10,8	29,0	36,3
100% Open	2,88	5,2	11,5	30,7	39,8

K_v Ratings for Bio-Tek

Size (DN)	8	10	15
100% Open	0,76	1,63	2,58

K_v Ratings for Bio-Pure

Size (DN)	8	10	15
100% Open	0,40	0,95	1,36

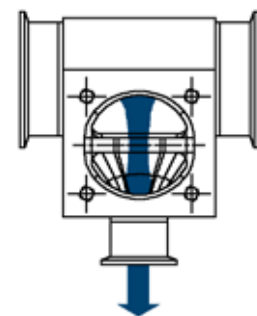
Note: K_v values expressed in m³/h per one bar pressure drop.

Zerostatic Block Body T Flow Reduction (% Reduction) Estimate of Reduction of C_v (Standard 2-Way Valve Baseline)

Valve Size Run Size	BT 0.5" (DN15)	0.5" (DN15)	0.75" (DN20)	1" (DN25)	1.5" (DN40)	2" (DN50)
0.5" (DN15)	15.2	18.0	NA	NA	NA	NA
0.75" (DN20)	14.5	17.2	16.2	NA	NA	NA
1" (DN25)	13.8	16.3	15.4	23.5	NA	NA
1.5" (DN40)	13.1	15.5	14.6	22.3	25.5	NA
2" (DN50)	12.4	14.6	13.8	21.0	24.1	19.0
2.5" (DN65)	12.0	14.1	13.4	20.3	23.3	18.4
3" (DN80)	12.0	14.1	13.4	20.3	23.3	18.4
4" (DN100)	11.6	13.7	12.9	19.7	22.6	17.8

Notes: Consider entrance loss (at valve inlet) is similar to flow through branch of standard tee.

Reduced Flow vs.
Standard 2 Way Valve



Example: 1.5" (DN40) Zero Static Tee with 3" (DN80) Run

$$\begin{aligned} \text{Approximate 100\% open } C_v &= \\ 28 - (23.3\%) (28) &= 21.5 C_v \\ &= 18,3 K_v \end{aligned}$$

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Validation and Qualification Documentation

Pure-Flo can provide the following documentation to aid the validation and qualification process upon request.

Process Validation Documentation

- Certified Mill Test Reports
- Interior Surface Characterization
- Certification of compliance to specifications
- Certification of compliance to CFR Title #21 section 177
- Certification to latest edition of the USP Class VI compliance
- Quality assurance manual
- ISO 9001 certification
- Certification of testing to MSS SP-88

Qualification Assistance

To assist you in compliance to IQs, OQs and PQs, a preventative maintenance program can be established for the changeout of diaphragms based on your passivation, cleaning, sterilization and process protocols.

Test Certificate		2005/3004047																																																	
Date		30/06/2005																																																	
Page		1																																																	
INDUSTRIAL INC.		ITT ENGINEERED VALVES																																																	
550 TEST RD.		33 CENTERVILLE ROAD																																																	
17603 LANCASTER, PA		17603 LANCASTER, PA																																																	
Customer Order	Delivery Note	Invoice	Delivered Qty																																																
869-STOCK	12005/000/0031635	IO 0031689	2,500,00																																																
Code Article		Piece Description																																																	
815002163106		BODY BLO TER 113208 P/N 42409																																																	
Material - Type Specification																																																			
F316L9/1.4435 ASTM A182+DIN 17440-A ND BASEL STD EN2																																																			
Heat Number	Steel Mill	Trade Mark	Forgin Code																																																
236913	TEST INDUSTRIAL		PM																																																
CHEMICAL ANALYSIS																																																			
<table border="1"> <thead> <tr> <th>Element</th> <th>As</th> <th>C</th> <th>Cr</th> <th>Cu</th> <th>Mo</th> <th>Ni</th> <th>Mn</th> <th>P</th> <th>S</th> <th>Si</th> <th>Ta</th> <th>Nb</th> <th>W</th> <th>Al</th> <th>Fe</th> </tr> </thead> <tbody> <tr> <td>Heat 1</td> <td>0.021</td> <td>0.030</td> <td>18.009</td> <td>0.500</td> <td>2.000</td> <td>3.000</td> <td>0.100</td> <td>14.000</td> <td>0.041</td> <td>0.037</td> <td>1.000</td> <td>0.000</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Heat 2</td> <td>0.021</td> <td>0.021</td> <td>17.880</td> <td>0.480</td> <td>1.880</td> <td>2.920</td> <td>0.099</td> <td>13.760</td> <td>0.036</td> <td>0.041</td> <td>0.412</td> <td>0.001</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>				Element	As	C	Cr	Cu	Mo	Ni	Mn	P	S	Si	Ta	Nb	W	Al	Fe	Heat 1	0.021	0.030	18.009	0.500	2.000	3.000	0.100	14.000	0.041	0.037	1.000	0.000				Heat 2	0.021	0.021	17.880	0.480	1.880	2.920	0.099	13.760	0.036	0.041	0.412	0.001			
Element	As	C	Cr	Cu	Mo	Ni	Mn	P	S	Si	Ta	Nb	W	Al	Fe																																				
Heat 1	0.021	0.030	18.009	0.500	2.000	3.000	0.100	14.000	0.041	0.037	1.000	0.000																																							
Heat 2	0.021	0.021	17.880	0.480	1.880	2.920	0.099	13.760	0.036	0.041	0.412	0.001																																							
MECHANICAL PROPERTIES																																																			
Laboratory Order	IR (Description)	IRMS	IRMax	IRMin	IRSD	IRW	IRW	IRW	IRW	IRW	IRW	IRW	IRW	IRW	IRW																																				
1805/N/05	101TS Rp1 Amb T	1W/amb	1	225,000																																															
1805/N/05	101Hd 2% offest. Amb T	1W/amb	1	190,000																																															
1805/N/05	101Tens. Str. on Amb T	1W/amb	1	480,000	650,000																																														
1805/N/05	101Lapline AS AS T Amb T	1W	1	30,000																																															
1805/N/05	101Lapline Str. AS AS T Amb T	1W	1	20,000																																															
1805/N/05	101Hd. area Amb T 2% T	1W	1	50,000																																															
1805/N/05	101Impact 100 V Amb T	1J	1	55,000																																															
1805/N/05	101	1J	1	55,000																																															
1805/N/05	103	1J	1	55,000																																															
Heat Treatment																																																			
SOLUTION ANNEAL:																																																			
ALL PIECES WERE HEATED TO 1940 F.																																																			
HELD AT THIS TEMPERATURE FOR 1 HOUR FOR EACH 1" OF THICKNESS AND QUENCHED IN WATER.																																																			
APPROVED BY:																																																			
NOV 30 2005																																																			
O. A. DEPARTMENT																																																			
Remarks: DELTA FERRITE CONTENT = 0.24 FERRITE AS TO EN2 = 5.96 MATERIAL PRODUCED ACCORDING TO ITT SPEC. ESA-0143 AND ESA-005 (ENGINEERED VALVE) 3.1B CERTIFICATE ACCORDING TO EN 10204																																																			
<p>1. The results of chemical analysis is a true and correct copy of the mill certificate issued by the manufacturer of the steel employed.</p> <p>2. The laboratory which has determined the above order number did not come in direct contact with material or any of its components, or with any measuring devices employing a single boundary of containment, during the manufacturing process inspection or storage.</p>																																																			



ITT Industries Engineered Process Solutions Group 33 Centerville Road P.O. Box 6164 Lancaster, PA 17603-0064 Phone: (800) 366-1111 Fax: (717) 509-2336																															
CERTIFICATE OF COMPLIANCE																															
Date Issued: October 24, 2005																															
Customer: ABC CORP	Quantity: 100																														
Customer Order Number: 100000																															
ITT Order Number: 76750																															
ITT Line Number: 032																															
ITT Item Number: 42175																															
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/S/ Richard E. Bird Richard E. Bird Manager, Quality Assurance (or representative) (This certificate was created electronically and is valid without signature.)																															
This certificate is correct at the time of issue and no changes shall be made to it without the authorization of the issuing ITT Manager. If any unauthorized changes are made, the certificate is void. CERTIFICATE ID 00380																															

Compliance

100% Interior Surface Finish Inspection:

- 100% visual inspection
- Statistical profilometer checks

100% Visual Weld Inspection:

- 100% visual inspection of fabrication welds
- Welds by ASME Section IX certified welders.
- 100% pressure test of fabricated welds

Seat and Shell Test:

- Valves are statistically seat and shell tested per MSS SP-88
- 100% inspection is available upon request

100% Final Assembly Inspection:

- All valve assemblies are 100% visually inspected prior to shipment

Certified Mill Tests Reports:

- All valve bodies contain a heat number traceable to a Certified Mill Test Report (CMTR)
- CMTRs for weld wire, tubing, and fittings used in valve fabrications.

Non-Destructive Testing:

(available upon request)

- Alloy Identity Testing identifies the exact chemical composition of material
- Liquid Penetration Inspection surface inspection capable of identifying subsurface porosity and weld defects
- Radiographic Inspection volumetric test capable of locating voids or inclusions within material

Leak and Shell Test



Alloy Identity Testing



Compliance

Visual Inspection



Welding



Profilometer Check for Valve Surface Finish



Stainless Steel Valve Bodies



Approvals

USDA Accepted

The Pure-Flo diaphragm valve is accepted by the USDA for use in federally inspected meat and poultry plants.

Selection from the following configurations is necessary to assure USDA acceptance.

Body:

- 316L casting
- 316L forging
- Sizes: 0.5–6" (DN15–150)

Interior Polishes:

- 35 μin (0,89 μm) - 11 μin (0,28 μm), see page B-7 for Surface Finish chart.
- Electropolish exterior (optional)

End Connections:

- Tri-Clover Tri-Clamp
- Cherry Burrell "S", "Q", and "I" line, male sanitary thread

Diaphragms:

- Black Butyl
- Buna N
- EPDM
- PTFE

Bonnets:

- White epoxy
- PVDF coatings
- Stainless steel

Grade TM17 PTFE and Grade 17 EPDM Diaphragms



ASME Bioprocessing Equipment Standard (ASME BPE)

Scope:

The BPE standard was created to develop requirements for the design, materials, construction, inspection, and testing of vessels, piping, and related accessories such as pumps, valves, and fittings for use in the biopharmaceutical industry.

Pure-Flo valves are manufactured in accordance with applicable portions of the ASME BPE.

The BPE standard applies to all parts of equipment and piping that contact:

- Finished product
- Raw materials
- Product intermediates

This includes systems such as:

- Water-for-injection (WFI)
- Clean steam
- Purified water
- Ultrafiltration
- Intermediate product storage

The BPE is divided into sections or “Parts”

Part SD - Design for Sterility & Cleanability

Outlines accepted practices for the fabrication of bioprocessing equipment that is both Cleanable and Sterilizable.

- Cleanability
- Sterility
- Dead Legs L/D = 2:1 target
- Drainability
- Preferred, recommended, and not recommended designs

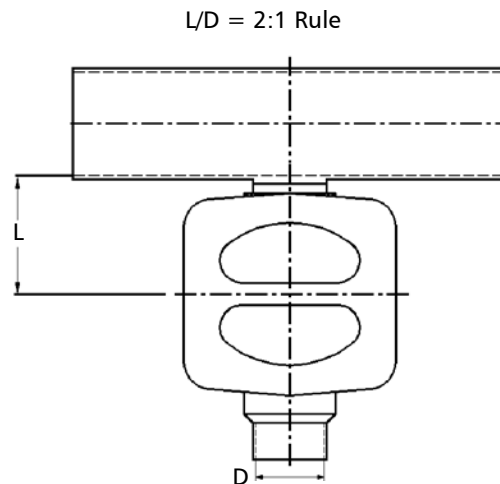
Part DT - Dimensions and Tolerances

Establishes acceptable dimensions, tolerances, and markings. This section is not intended to cover valves.

Part DT - V - Dimensions and Tolerances - Valves

Addresses valve related criteria including:

- Dimensions
- Tolerances
- Reduced sulfur content 316L specification
- Weld end tangent lengths
- Product marking information



ASME Bioprocessing Equipment Standard (ASME BPE)

Part MJ - Material Joining

Establishes requirements for the joining of bioprocessing equipment.

Weld beads acceptance criteria for:

- Misalignment
- OD / ID concavity
- Lack of penetration
- Convexity
- Width variation
- Meander

Part SF - Surface Finish

Specification of interior surface finishes for vessels, distribution systems, and other components having product contact.

- Ra measurements (profilometer)
- Mechanical polish and electropolish requirements
- Visual acceptance criteria

Part SG - Seals

Establishes requirements for various mechanical seals and gaskets including valve diaphragms.

- Biocompatibility - compliance to USP Class VI
- Leakage rates
- Process compatibility

ASME Table SF-6

R_a Readings for Valves

Mechanically Polished or any other finishing method that meets the R_a Max

Code	R _a MAX	
	μ-in.	μm
SF1	20	0.5
SF2	25	0.625
SF3	30	0.75

General Notes:

1. All Ra readings are taken across the lay, wherever possible.
2. No single R_a reading shall exceed the R_a max. value in this table.
3. Other R_a readings are available if agreed upon between owner/user and manufacturer, not to exceed values in this table.

ASME Table DT-3

Chemical Composition for Automatic Weld Ends, %

Element	% (316L)
Carbon (C)	0.035 max
Silicon (Si)	0.75 max
Manganese (Mn)	2.0 max
Nickel (Ni)	10 - 15
Chromium (Cr)	16 - 18
Molybdenum (Mo)	2 - 3
Phosphorous (P)	0.04 max
Sulfur (S)	0.005-0.017 max

ASME Table DT-4

Tangent Lengths

Nominal OD Tu be Size		Tangent, T	
In	DN	In	mm
0.25	8	1.5	38
0.375	10	1.5	38
0.50	15	1.5	38
0.75	20	1.5	38
1	25	1.5	38
1.5	40	1.5	38
2	50	1.5	38
2.5	65	1.5	38
3	80	1.75	44
4	100	2	50
6	150	2.5	63

Mechanically Polished and Electropolished

Code	R _a MAX	
	μ-in.	μm
SF4	15	0.375
SF5	20	0.5
SF6	25	0.625

European Union Directives

European Union Directives apply to categories of equipment. CE Marking is applied to products where applicable.

Relevant Directives for Valves

- Pressure Equipment Directive (PED) 97/23/EC
- Electromagnetic Compatibility Directive (EMC) 89/336/EEC
- Low-Voltage Directive (LVD) 73/23/EEC
- Safety of Machinery Directive 98/37/EC
- Equipment for Explosive Atmospheres (ATEX) 94/9/EC

PED - Pressure Equipment Directive 97/23/EC

- The nominal size (DN)
- Maximum allowable pressure
- State of the intended fluid contents (gas or liquid)
- The classification of the intended fluid contents (Group 1 or 2 as defined in Council Directive 67/548/EEC)
- Fluid categories (Liquid or Gas)
 - Group 1
 - Explosive
 - Extremely flammable
 - Highly flammable
 - Flammable (where max allowable temp is above flashpoint)
 - Very toxic
 - Toxic
 - Oxidizing
 - Group 2
 - All other fluids including steam

PED Compliance Categories

- Sound Engineering Practice "SEP"
- Valves < 1" (DN25) by definition
- "CE" can not be marked
- Category I
- Valves > 1"(DN25) and < 6"(DN150)
- "CE" is marked




Valve Size		PN Rating Stainless Steel Bonnet	PN Rat- ing PAS Bonnet	Suitable Fluid Categories			
DN	Inch			Liquid Group 2	Liquid Group 1	Gas Group 2	Gas Group 1
6 ¹	0.25 ¹	10.3	10.3	SEP	SEP	SEP	SEP
10 ¹	0.375 ¹	10.3	10.3	SEP	SEP	SEP	SEP
15 ¹	0.5 ¹	10.3	10.3	SEP	SEP	SEP	SEP
15	0.5	13.8	10.3	SEP	SEP	SEP	SEP
20	0.75	13.8	10.3	SEP	SEP	SEP	SEP
25	1	13.8	10.3	SEP	SEP	SEP	SEP
40	1.5	12.1	10.3	I	I	I	I
50	2	12.1	10.3	I	I	I	I
65	2.5	10 ²	10 ²	I	I	I	I
80	3	10 ²	10 ²	I	I	I	I
100	4	10 ²	10 ²	I	I	I	I
150	6	8.6	N/A	I	I	I	II

¹ Bio-Pure and Bio-Tek

² Derated to 145 psi / 10 bar from standard product

Requires Technical File & Notified Body (Optional upon request/agreement)



ITT Industries
Engineered Process Solutions Group
33 Centerville Road
Lancaster, PA 17603 USA


**Declaration of Incorporation
Machinery Directive 98/37/EC**

<p>Authorised Representative within the European Union</p> <p>ITT Pure-Flo® (UK) Ltd. Richard Street Kirkham, Lancashire England PR4 2HU Tel: +44 (0)1772-682696</p>	<p>Manufacturing Site</p> <p>ITT Pure-Flo® (UK) Ltd. Richard Street Kirkham, Lancashire England PR4 2HU Tel: +44 (0)1772-682696</p>
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Description of the machinery or parts:

<p>Manufacturer's Name Valve Type Model End connections Materials of Construction</p>	<p>ITT Industries – Engineered Valves Diaphragm valve Pure-Flo All Body – A182 F316L /SA479 316L/DIN 17440 1.4435 Topworks – Actuated</p>
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The machinery (valve or valve assembly) to which this Declaration of Incorporation relates must not be put in service until the relevant machinery into which it is to be incorporated has been declared in conformity with the provisions of the Machinery Directive 98/37/EC.

Authorised representative:

 M. Steele
 Managing Director

Date: 30th June 2003

European Union Directives (cont.)

EMC - Electromagnetic Compatibility Directive 89/336/EEC

The EMC Directive covers any apparatus liable to cause electromagnetic disturbance or can be affected by such disturbance.

Included Apparatus:

- Solenoid valves
- Proximity switches
- Electro Pnuematic positioners
- Electro Pnuematic transducers

Excluded Apparatus:

- Limit switches
- "CE" Marked

LVD - Low Voltage Directive 73/23/EEC


- Electrical equipment rated between 50 - 1000 VAC, 75-1500 VDC
- EC Declaration of Conformity required
- "CE" marked

Safety of Machinery Directive 98/37/EC

- An assembly of linked parts or components, at least one of which that moves
- Actuated valves are considered components and therefore require a Declaration of Incorporation
- Manual valves are excluded from this directive

ATEX Directive 94/9/EC

- Institutes uniform controls on equipment intended for use in potentially explosive atmospheres (PEAs) within the EU and European Economic Area (EEA)
- Compliance mandatory on July 1, 2003 - All equipment intended for use in potentially explosive atmospheres, defined as machines, apparatus, fixed or mobile devices, control components and instrumentation which, separately or jointly, are capable of causing an explosion through their own potential sources of ignition.
- Facility owners must classify potentially explosive atmospheres into Zones
- Products must be classified into Equipment Groups and Categories
- Pure-Flo valves are Equipment Group II products
 - Zone 0 environments require Category 1 hardware
 - Zone 1 environments require Category 1 or 2 hardware
 - Zone 2 environments require Category 1, 2, or 3 hardware
- A facility must specify whether the hazard present is due to gas or dust. The ATEX Directive treats these hazards differently and outlines different methods of protection
- An equipment manufacturer must provide
 - ambient temperature range
 - maximum surface temperature
- All products must be assessed as a system. The compliance of individual components is not sufficient justification for deeming the assembly as ATEX approved.
- All ATEX approved products must bear a CE mark
- A Declaration of Conformity and Instructions for Safe Use are supplied as required
- Manufacturers and Users are responsible for compliance



ITT Industries
Engineered Process Solutions Group
33 Centerville Road
Lancaster, PA 17603 USA

**Declaration of Conformity
94/9/EC (ATEX)**

<p><i>Authorized Representative within the European Union</i></p> <p>ITT Pure-Flo® (UK) Ltd. Richard Street Kirkham, Lancashire England PR4 2HJ Tel: +44 (0)1772-682096</p>	<p><i>Manufacturing Site</i></p> <p>ITT Pure-Flo® (UK) Ltd. Richard Street Kirkham, Lancashire England PR4 2HJ Tel: +44 (0)1772-682096</p>
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We hereby certify that the products listed below satisfy the requirements set forth in the Directives of the Committee for the Harmonization of Legal Regulations of Member States concerning *Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres* (ATEX 94/9/EC).

Advantage® Actuator


Models: A103, A105, A108, A116, A203, A204, A205, A208, A209, A216, A217, A303, A305, A308, A316, A113, A233, A234, A333

The following standard was consulted with respect to the compliance with ATEX 94/9/EC

EN13463-1, April 2002 Non-electrical equipment for potentially explosive atmospheres

The marking of the equipment listed above shall include the following:

Consult the *Instructions for Safe Use* for further information on using this equipment in potentially explosive environments.





Authorized representative:



M. Stone
Managing Director

Date: 14th August 2003