ASME/ISA/IEC VALVE SIZING

Part number of complete catalog with binder: D103183X012
Part number of complete catalog without binder: D103182X012

SECTION 1 FLOW COEFFICIENTS (ASME/ISA/IEC)

SECTION 2 VALVE SIZING PROCEDURE

SECTION 3 NOISE ABATEMENT

Typical F_d Valve Style Modifier Values

(From IEC534)

Table 1. Typical Values of Valve Style Modifier F_d (Full Size Trim)

VALVE TYPE	**FLOW DIRECTION**	**RELATIVE FLOW COEFFICIENT Φ**					
		0.10	**0.20**	**0.40**	**0.60**	**0.80**	**1.00**
Globe, parabolic plug	To open To close	0.10 0.20	0.15 0.30	0.25 0.50	0.31 0.60	0.39 0.80	0.46 1.00
Globe, 3 V-port plug	Either(1)	0.29	0.40	0.42	0.43	0.45	0.48
Globe, 4 V-port plug	Either(1)	0.25	0.35	0.36	0.37	0.39	0.41
Globe, 6 V-port plug	Either(1)	0.17	0.23	0.24	0.26	0.28	0.30
Globe, 60 equal diameter hole drilled cage	Either(1)	0.40	0.29	0.20	0.17	0.14	0.13
Globe, 120 equal diameter hole drilled cage	Either(1)	0.29	0.20	0.14	0.12	0.10	0.09
Butterfly, swing-through (centered shaft), to 70°	Either	0.26	0.34	0.42	0.50	0.53	0.57
Butterfly, fluted vane, to 70°	Either	0.08	0.10	0.15	0.20	0.24	0.30
60° flat disk	Either						0.50
Eccentric rotary plug	Either	0.12	0.18	0.22	0.30	0.36	0.42
Segmented ball	Either	0.60	0.65	0.70	0.75	0.78	0.80

Note: These values are typical only; actual values shall be stated by manufacturer.
1. Limited P1 - P2 in flow to close direction.

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461 - Flow Down

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
2 x 3	12.7	1/2(2)	19	3/4	C_v	0.597	0.982	1.38	1.87	2.54	3.45	4.91	7.22	9.95	11.7	0.49
					K_v	0.516	0.849	1.19	1.62	2.20	2.98	4.25	6.25	8.61	10.1	- - -
					X_T	0.301	0.205	0.186	0.198	0.206	0.212	0.196	0.159	0.160	0.187	- - -
	19.1	3/4(2)	19	3/4	C_v	0.991	1.55	2.21	3.10	4.17	5.99	9.09	13.3	19.6	25.4	0.41
					K_v	0.857	1.34	1.91	2.68	3.61	5.18	7.86	11.5	17.0	22.0	- - -
					X_T	0.188	0.147	0.144	0.170	0.178	0.188	0.175	0.174	0.154	0.154	- - -
	25.4	1(2)	19	3/4	C_v	1.69	2.30	2.94	3.52	4.97	7.58	12.2	18.6	29.8	41.1	0.42
					K_v	1.46	1.99	2.54	3.05	4.30	6.56	10.6	16.1	25.8	35.6	- - -
					X_T	0.176	0.182	0.234	0.348	0.370	0.341	0.280	0.249	0.160	0.156	- - -
	31.8	1-1/4(2)	29	1-1/8	C_v	2.58	3.93	5.69	8.16	11.9	17.8	26.6	39.6	56.2	74.9	0.42
					K_v	2.23	3.40	4.92	7.06	10.3	15.4	23.0	34.3	48.6	64.8	- - -
					X_T	0.154	0.138	0.138	0.137	0.137	0.136	0.137	0.137	0.137	0.137	- - -
	38.1	1-1/2(3)	29	1-1/8	C_v	5.20	9.00	15.2	24.3	35.2	48.8	64.5	81.2	94.1	100	0.50
					K_v	4.50	7.79	13.1	21.0	30.4	42.2	55.8	70.2	81.4	86.5	- - -
					X_T	0.124	0.156	0.168	0.155	0.153	0.151	0.150	0.158	0.176	0.189	- - -
	41.3	1-5/8(3)	29	1-1/8	C_v	4.66	10.6	17.4	26.6	41.2	58.3	75.0	89.6	99.4	106	0.57
					K_v	4.03	9.17	15.1	23.0	35.6	50.4	64.9	77.5	86.0	91.7	- - -
					X_T	0.234	0.225	0.220	0.217	0.178	0.158	0.163	0.178	0.209	0.233	- - -
3 x 4	25.4	1(2)	19	3/4	C_v	1.58	2.40	3.25	4.02	5.92	9.04	14.2	22.5	35.7	45.2	0.42
					K_v	1.37	2.08	2.81	3.48	5.12	7.82	12.3	19.5	30.9	39.1	- - -
					X_T	0.324	0.315	0.372	0.503	0.434	0.357	0.290	0.218	0.150	0.135	- - -
	31.8	1-1/4(2)	29	1-1/8	C_v	2.38	3.97	6.03	8.02	9.05	12.7	20.0	36.9	61.9	79.4	0.42
					K_v	2.06	3.43	5.22	6.94	7.83	11.0	17.3	31.9	53.5	68.7	- - -
					X_T	0.274	0.198	0.182	0.213	0.324	0.333	0.291	0.173	0.125	0.124	- - -
	38.1	1-1/2(3)	29	1-1/8	C_v	6.34	12.3	19.8	28.3	40.0	57.4	73.8	86.2	96.7	104	0.47
					K_v	5.48	10.6	17.1	24.5	34.6	49.7	63.8	74.6	83.6	90.0	- - -
					X_T	0.192	0.155	0.146	0.149	0.140	0.117	0.117	0.129	0.146	0.160	- - -
	44.5	1-3/4(3)	29	1-1/8	C_v	4.59	9.97	18.9	31.4	42.0	57.2	75.6	91.8	105	112	0.55
					K_v	3.97	8.62	16.3	27.2	36.3	49.5	65.4	79.4	90.8	96.9	- - -
					X_T	0.244	0.244	0.193	0.171	0.184	0.179	0.174	0.192	0.218	0.243	- - -
	50.8	2(3)	29	1-1/8	C_v	9.72	23.0	37.0	53.1	70.1	85.0	97.4	109	117	123	0.62
					K_v	8.41	19.9	32.0	45.9	60.6	73.5	84.3	94.3	101	106	- - -
					X_T	0.246	0.150	0.148	0.151	0.160	0.179	0.218	0.259	0.295	0.314	- - -
	57.2	2-1/4(3)	29	1-1/8	C_v	7.08	16.0	32.9	46.4	59.4	79.2	94.2	106	116	122	0.70
					K_v	6.12	13.8	28.5	40.1	51.4	68.5	81.5	91.7	100	106	- - -
					X_T	0.292	0.247	0.180	0.212	0.251	0.258	0.305	0.353	0.380	0.410	- - -

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
4 x 6	50.8	2(3)	29	1-1/8	C_V	7.26	10.5	20.8	28.5	42.2	64.2	97.4	129	159	191	0.44
					K_V	6.28	9.08	18.0	24.7	36.5	55.5	84.3	112	138	165	- - -
					X_T	0.168	0.343	0.254	0.299	0.284	0.226	0.171	0.159	0.155	0.137	- - -
	57.2	2-1/4(3)	29	1-1/8	C_V	6.51	10.9	19.3	30.8	45.6	75.5	112	149	189	217	0.49
					K_V	5.63	9.43	16.7	26.6	39.4	65.3	96.9	129	163	188	- - -
					X_T	0.175	0.372	0.438	0.394	0.398	0.253	0.199	0.183	0.172	0.162	- - -
	63.5	2-1/2(3)	38	1-1/2	C_V	17.1	31.4	45.7	57.2	93.6	131	184	246	286	311	0.44
					K_V	14.8	27.2	39.5	49.5	81.0	113	159	213	247	269	- - -
					X_T	0.168	0.173	0.207	0.280	0.218	0.194	0.164	0.141	0.141	0.139	- - -
	69.9	2-3/4(3)	38	1-1/2	C_V	21.5	41.2	63.1	74.4	110	163	223	270	304	332	0.49
					K_V	18.6	35.6	54.6	64.4	95.2	141	193	234	263	287	- - -
					X_T	0.153	0.142	0.147	0.224	0.198	0.163	0.131	0.151	0.166	0.168	- - -
	76.2	3(3)	38	1-1/2	C_V	14.8	36.4	55.3	87.4	125	204	248	273	305	331	0.56
					K_V	12.8	31.5	47.8	75.6	108	176	215	236	264	286	- - -
					X_T	0.264	0.210	0.256	0.228	0.227	0.149	0.164	0.201	0.214	0.226	- - -
6 x 8	76.2	3(3)	38	1-1/2	C_V	16.9	34.5	56.5	84.6	120	162	213	273	322	342	0.42
					K_V	14.6	29.8	48.9	73.2	104	140	184	236	279	296	- - -
					X_T	0.244	0.244	0.241	0.241	0.238	0.235	0.229	0.216	0.199	0.209	- - -
	88.9	3-1/2(3)	51	2	C_V	27.5	43.9	55.4	84.8	128	209	329	395	429	475	0.52
					K_V	23.8	38.0	47.9	73.4	111	181	285	342	371	411	- - -
					X_T	0.179	0.284	0.464	0.448	0.388	0.263	0.168	0.183	0.211	0.202	- - -
	101.6	4(3)	51	2	C_V	29.7	61.7	100	151	214	289	372	474	568	605	0.53
					K_V	25.7	53.4	86.5	131	185	250	322	410	491	523	- - -
					X_T	0.244	0.244	0.242	0.240	0.236	0.234	0.231	0.220	0.198	0.207	- - -
	114.3	4-1/2(3)	51	2	C_V	38.7	79.2	127	193	272	378	498	620	722	764	0.57
					K_V	33.5	68.5	110	167	235	327	431	536	625	661	- - -
					X_T	0.244	0.243	0.242	0.240	0.237	0.234	0.229	0.215	0.199	0.207	- - -

1. At 100% travel.
2. Equal percentage characteristic (Micro Form).
3. Modified parabolic characteristic.

CL150/150										
Coefficients	**Valve Size, NPS**	**Valve Rotation, Degrees**								
		10	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**
C_v	30	608	2030	4460	7700	12,200	18,200	25,500	32,800	40,500
K_v		526	1760	3860	6660	10,600	15,700	22,100	28,400	35,000
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.77	0.79	0.81	0.81	0.78	0.73	0.68	0.60	0.52
X_T		0.50	0.53	0.55	0.55	0.51	0.45	0.39	0.30	0.23
C_v	36	910	3030	6670	11,500	18,200	27,300	38,200	49,100	60,600
K_v		787	2620	5770	9950	15,700	23,600	33,000	42,500	52,400
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.77	0.79	0.81	0.81	0.78	0.73	0.68	0.60	0.52
X_T		0.50	0.53	0.55	0.55	0.51	0.45	0.39	0.30	0.23
C_v	42	1200	3990	8780	15,200	24,000	35,900	50,300	64,700	79,800
K_v		1040	3450	7600	13,100	20,800	31,100	43,500	56,000	69,000
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.77	0.79	0.81	0.81	0.78	0.73	0.68	0.60	0.52
X_T		0.50	0.53	0.55	0.55	0.51	0.45	0.39	0.30	0.23
C_v	48	1590	5300	11,700	20,100	31,800	47,700	66,800	85,800	106,000
K_v		1380	4580	10,100	17,400	27,500	41,300	57,800	74,200	91,700
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.77	0.79	0.81	0.81	0.78	0.73	0.68	0.60	0.52
X_T		0.50	0.53	0.55	0.55	0.51	0.45	0.39	0.30	0.23

CL150

Coefficients	Valve Size, NPS	Valve Rotation, Degrees								
		10	20	30	40	50	60	70	80	90
C_v	14	95	316	695	1200	1900	2840	3980	5120	6320
K_v		82.2	273	601	1038	1643	2457	3443	4429	5467
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.77	0.79	0.81	0.81	0.78	0.73	0.68	0.60	0.52
X_T		0.50	0.53	0.55	0.55	0.51	0.45	0.39	0.30	0.23
C_v	16	129	430	946	1640	2580	3870	5420	6970	8600
K_v		112	372	818	1419	2232	3348	4688	6029	7439
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.77	0.79	0.81	0.81	0.78	0.73	0.68	0.60	0.52
X_T		0.50	0.53	0.55	0.51	0.51	0.45	0.39	0.30	0.23
C_v	18	166	553	1220	2100	3320	4970	6960	8950	11,050
K_v		144	478	1055	1817	2872	4299	6020	7742	9558
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.77	0.79	0.81	0.81	0.78	0.73	0.68	0.60	0.52
X_T		0.50	0.53	0.55	0.55	0.51	0.45	0.39	0.30	0.23
C_v	20	208	692	1520	2630	4160	6230	8730	11,220	13,850
K_v		180	599	1315	2275	3598	5389	7551	9705	11,980
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.77	0.79	0.81	0.81	0.78	0.73	0.68	0.60	0.52
X_T		0.50	0.53	0.55	0.55	0.51	0.45	0.39	0.30	0.23
C_v	24	322	1080	2370	4080	6450	9670	13,540	17,410	21,500
K_v		277	934	2050	3529	5579	8365	11,712	15,060	18,598
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.77	0.79	0.81	0.81	0.78	0.73	0.68	0.60	0.52
X_T		0.50	0.53	0.55	0.55	0.51	0.45	0.39	0.30	0.23
C_v	30	508	1690	3730	6440	10,200	15,200	21,300	27,400	33,900
K_v		439	1460	3230	5570	8823	13,100	18,400	23,700	29,300
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.77	0.79	0.81	0.81	0.78	0.73	0.68	0.60	0.52
X_T		0.50	0.53	0.55	0.55	0.51	0.45	0.39	0.30	0.23
C_v	36	757	2520	5550	9590	15,100	22,700	31,800	40,900	50,500
K_v		654	2180	4800	8300	13,100	19,600	27,500	35,400	43,700
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.77	0.79	0.81	0.81	0.78	0.73	0.68	0.60	0.52
X_T		0.50	0.53	0.55	0.55	0.51	0.45	0.39	0.30	0.23
C_v	42	1090	3640	8000	13,800	21,800	32,700	45,800	58,900	72,700
K_v		943	3150	6920	11,900	18,900	28,300	39,600	50,900	62,900
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.77	0.79	0.81	0.81	0.78	0.73	0.68	0.60	0.52
X_T		0.50	0.53	0.55	0.55	0.51	0.45	0.39	0.30	0.23
C_v	48	1390	4630	10,200	17,600	27,800	41,700	58,400	75,000	92,600
K_v		1200	4000	8820	15,200	24,000	36,100	50,500	64,900	80,100
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.77	0.79	0.81	0.81	0.78	0.73	0.68	0.60	0.52
X_T		0.50	0.53	0.55	0.55	0.51	0.45	0.39	0.30	0.23

CL300

Coefficients	Valve Size, NPS	Valve Rotation, Degrees								
		10	20	30	40	50	60	70	80	90
C_v	14	136	341	704	1200	1860	2680	3450	4050	4550
K_v		118	295	609	1038	1609	2318	2984	3503	3936
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X_T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23
C_v	16	169	422	873	1490	2310	3320	4280	5010	5630
K_v		146	365	755	1289	1998	2872	3702	4334	4870
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X_T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23
C_v	18	247	617	1280	2180	3370	4860	6260	7330	8230
K_v		214	534	1107	1886	2915	4204	5415	6340	7119
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X_T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23
C_v	20	286	714	1480	2520	3910	5620	7240	8480	9530
K_v		247	618	1280	2180	3382	4861	6263	7335	8243
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X_T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23
C_v	24	375	938	1940	3320	5130	7380	9510	11,140	12,510
K_v		324	811	1678	2872	4437	6384	8226	9636	10,821
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X_T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23
C_v	30	715	1790	3700	6320	9780	14,000	18,100	21,200	23,800
K_v		618	1550	3200	5470	8460	12,100	15,700	18,300	20,600
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X_T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23
C_v	36	1100	2760	5700	9750	15,100	21,700	28,000	32,800	36,800
K_v		952	2390	4930	8430	13,100	18,800	24,200	28,400	31,800
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X_T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23
C_v	42	1710	4280	8840	15,100	23,400	33,700	43,400	50,800	57,100
K_v		1480	3700	7650	13,100	20,200	29,200	37,500	43,900	49,400
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X_T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23
C_v	48	1870	4670	9650	16,500	25,500	36,700	47,300	55,400	62,200
K_v		1620	4040	8350	14,300	22,100	31,700	40,900	47,900	53,800
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X_T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23

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Coefficients	Valve Size, NPS	Valve Rotation, Degrees								
		10	20	30	40	50	60	70	80	90
C_V	2(1)	2.25	11.4	19.9	32.6	48.1	58.9	64.0	69.8	80.2
K_V		1.95	9.86	17.2	28.2	41.6	50.9	55.4	60.4	69.4
F_L		- - -	0.78	0.77	0.76	0.74	0.76	0.77	0.76	0.71
X_T		0.295	0.289	0.315	0.314	0.357	0.497	0.540	0.518	0.442
Fd		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
C_V	3	3.21	20.8	40.5	66.7	90.1	115	150	189	237
K_V		2.78	18.0	35.0	57.7	77.9	99.5	130	163	205
F_L		0.78	0.89	0.80	0.75	0.68	0.71	0.65	0.61	0.58
X_T		0.855	0.602	0.461	0.404	0.372	0.358	0.306	0.259	0.232
Fd		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
C_V	4	18.2	52.6	96.7	154	199	270	351	447	499
K_V		15.7	45.5	83.6	133	172	234	304	387	432
F_L		0.80	0.85	0.79	0.73	0.74	0.69	0.64	0.61	0.53
X_T		0.474	0.474	0.500	0.416	0.407	0.326	0.271	0.220	0.196
Fd		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
C_V	6	34.7	109	198	321	452	664	882	1180	1250
K_V		30.0	94.3	171	278	391	574	763	1020	1080
F_L		0.85	0.83	0.75	0.71	0.71	0.67	0.65	0.61	0.55
X_T		0.389	0.552	0.528	0.438	0.424	0.331	0.278	0.206	0.203
Fd		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
C_V	8	60.5	190	345	560	788	1160	1540	2060	2180
K_V		52.3	164	298	484	682	1000	1330	1780	1890
F_L		0.81	0.81	0.79	0.82	0.71	0.66	0.60	0.55	0.48
X_T		0.368	0.520	0.498	0.412	0.399	0.310	0.261	0.193	0.191
Fd		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
C_V	10	83.3	259	463	727	1090	1670	2400	3340	3600
K_V		72.1	224	400	629	943	1440	2080	2890	3110
F_L		0.81	0.81	0.79	0.82	0.71	0.66	0.60	0.55	0.48
X_T		0.626	0.658	0.646	0.622	0.538	0.381	0.285	0.201	0.167
Fd		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
C_V	12	125	388	694	1090	1640	2500	3600	5010	5400
K_V		108	336	600	943	1420	2160	3110	4330	4670
F_L		0.83	0.78	0.78	0.78	0.75	0.66	0.61	0.52	0.47
X_T		0.528	0.556	0.547	0.528	0.451	0.324	0.241	0.170	0.141
Fd		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70

1. NPS 2 is multirated to CL150, 300 and 600.

Coefficients	Valve Size, NPS	Valve Rotation, Degrees								
		10	20	30	40	50	60	70	80	90
C_V	2(1)	2.11	9.96	20.7	34.0	50.5	68.4	81.0	81.0	81.0
K_V		1.83	8.62	17.9	29.4	43.7	59.2	70.0	70.0	70.0
F_L		- - -	0.88	0.84	0.77	0.71	0.69	0.67	0.71	0.69
X_T		0.399	0.507	0.354	0.334	0.340	0.342	0.359	0.401	0.401
Fd		0.090	0.17	0.26	.034	0.42	0.49	0.57	0.64	0.70
C_V	3	1.79	23.0	37.0	58.8	91.9	139	192	270	259
K_V		1.55	19.9	32.0	50.9	79.5	120	166	234	224
F_L		0.70	0.81	0.73	0.76	0.75	0.66	0.60	0.50	0.54
X_T		0.449	0.455	0.395	0.417	0.423	0.313	0.256	0.188	0.203
Fd		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
C_V	4	17.2	50.2	87.8	146	206	285	365	465	521
K_V		14.9	43.4	75.9	126	178	247	316	402	451
F_L		0.72	0.84	0.79	0.75	0.71	0.63	0.58	0.53	0.55
X_T		0.445	0.471	0.481	0.417	0.370	0.276	0.225	0.191	0.196
Fd		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
C_V	6	30.6	100	173	285	424	640	893	1180	1290
K_V		26.5	86.5	150	247	367	554	772	1020	1120
F_L		0.83	0.83	0.80	0.78	0.76	0.69	0.59	0.52	0.54
X_T		0.444	0.608	0.574	0.485	0.441	0.316	0.227	0.176	0.182
Fd		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
C_V	8	53.6	175	303	499	743	1120	1560	2070	2260
K_V		46.4	151	262	432	643	969	1350	1790	1950
F_L		0.79	0.83	0.82	0.79	0.73	0.66	0.58	0.51	0.48
X_T		0.413	0.567	0.534	0.449	0.409	0.295	0.213	0.164	0.170
Fd		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
C_V	10	84.4	232	423	737	1180	1730	2560	3250	3710
K_V		73.0	200	366	638	1020	1500	2210	2810	3210
F_L		0.79	0.83	0.82	0.79	0.73	0.66	0.58	0.51	0.48
X_T		0.542	0.745	0.673	0.590	0.489	0.380	0.245	0.189	0.156
Fd		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
C_V	12	126	347	631	1100	1760	2590	3820	4850	5540
K_V		109	300	546	95.2	1520	2240	3300	4200	4790
F_L		0.78	0.87	0.85	0.80	0.75	0.69	0.55	0.51	0.47
X_T		0.491	0.671	0.610	0.535	0.443	0.343	0.222	0.171	0.141
Fd		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70

1. NPS 2 is multirated to CL150, 300 and 600.

Coefficients	Valve Size, NPS	Valve Rotation, Degrees								
		10	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**
C_V	2(1)	2.25	11.4	19.9	32.6	48.1	58.9	64.0	69.8	80.2
K_V		1.95	9.86	17.2	28.2	41.6	50.9	55.4	60.4	69.4
F_L		- - -	0.78	0.77	0.75	0.74	0.75	0.77	0.75	0.71
X_T		0.299	0.292	0.319	0.318	0.362	0.502	0.546	0.525	0.446
Fd		0.090	0.17	0.26	.034	0.42	0.49	0.57	0.64	0.70
C_V	3	3.21	20.8	40.5	66.7	90.1	115	150	189	237
K_V		2.78	18.0	35.0	57.7	77.9	99.5	130	163	205
F_L		0.78	0.88	0.78	0.77	0.79	0.80	0.72	0.69	0.64
X_T		0.370	0.542	0.433	0.411	0.464	0.469	0.397	0.346	0.286
Fd		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
C_V	4	12.9	37.4	72.9	124	174	236	318	420	488
K_V		11.2	32.4	63.1	107	151	204	275	363	422
F_L		0.81	0.86	0.79	0.73	0.72	0.71	0.65	0.60	0.54
X_T		0.455	0.499	0.416	0.395	0.410	0.363	0.292	0.235	0.210
Fd		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
C_V	6	39.6	120	215	340	440	598	777	1050	1100
K_V		34.3	104	186	294	381	604	672	908	952
F_L		0.80	0.77	0.71	0.68	0.71	0.68	0.62	0.60	0.56
X_T		0.420	0.433	0.434	0.369	0.360	0.299	0.282	0.214	0.205
Fd		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
C_V	8	73.9	224	401	634	821	1120	1450	1960	2070
K_V		63.9	194	347	548	710	969	1250	1700	1790
F_L		0.80	0.79	0.77	0.75	0.71	0.66	0.61	0.55	0.49
X_T		0.367	0.380	0.381	0.322	0.314	0.260	0.248	0.187	0.177
Fd		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
C_V	10	64.6	248	453	706	1070	1630	2340	3280	3480
K_V		55.9	215	392	611	926	1410	2020	2840	3010
F_L		0.80	0.79	0.77	0.75	0.71	0.66	0.61	0.55	0.49
X_T		0.464	0.565	0.562	0.544	0.455	0.335	0.255	0.179	0.159
Fd		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
C_V	12	95.2	365	668	1040	1580	2410	3450	4840	5130
K_V		82.3	316	578	900	1370	2080	2980	4190	4440
F_L		0.86	0.80	0.78	0.79	0.74	0.67	0.59	0.53	0.48
X_T		0.422	0.514	0.506	0.492	0.412	0.301	0.231	0.162	0.144
Fd		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70

1. NPS 2 is multirated to CL150, 300 and 600.

Coefficients	Valve Size, NPS	Valve Rotation, Degrees								
		10	20	30	40	50	60	70	80	90
C_V	2[1]	2.11	9.96	20.7	34.0	50.5	68.4	81.0	81.0	81.0
K_V		1.83	8.62	17.9	29.4	43.7	59.2	70.0	70.0	70.0
F_L		- - -	0.88	0.84	0.77	0.71	0.69	0.67	0.71	0.69
X_T		0.399	0.507	0.354	0.334	0.340	0.342	0.359	0.401	0.401
Fd		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
C_V	3	1.79	23.0	37.0	58.8	91.9	139	192	270	259
K_V		1.55	19.9	32.0	50.9	79.5	120	166	234	224
F_L		0.71	0.75	0.77	0.81	0.79	0.71	0.62	0.49	0.59
X_T		0.370	0.542	0.433	0.411	0.464	0.469	0.397	0.346	0.286
Fd		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
C_V	4	12.7	35.2	61.3	105	163	242	361	463	482
K_V		11.0	30.4	53.0	90.8	141	209	312	400	417
F_L		0.74	0.80	0.82	0.80	0.77	0.69	0.57	0.51	0.55
X_T		0.455	0.499	0.416	0.395	0.410	0.363	0.292	0.235	0.210
Fd		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
C_V	6	38.8	106	183	294	436	605	779	976	1100
K_V		33.6	91.7	158	254	377	523	674	844	952
F_L		0.78	0.81	0.79	0.80	0.74	0.68	0.59	0.58	0.57
X_T		0.420	0.433	0.434	0.369	0.360	0.299	0.282	0.214	0.205
Fd		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
C_V	8	73.1	200	345	554	821	1140	1470	1840	2090
K_V		63.2	173	298	479	710	986	1270	1590	1810
F_L		0.80	0.83	0.83	0.80	0.74	0.66	0.58	0.50	0.48
X_T		0.405	0.454	0.542	0.451	0.346	0.269	0.239	0.206	0.173
Fd		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
C_V	10	66.2	217	399	708	1110	1690	2400	3100	3560
K_V		57.3	188	345	612	960	1460	2080	2680	3080
F_L		0.80	0.83	0.83	0.80	0.74	0.66	0.58	0.50	0.48
X_T		0.505	0.714	0.672	0.557	0.465	0.339	0.243	0.187	0.155
Fd		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
C_V	12	100	328	603	1070	1680	2550	3620	4690	5380
K_V		86.5	284	522	926	1450	2210	3130	4060	4650
F_L		0.80	0.86	0.87	0.80	0.75	0.66	0.55	0.50	0.48
X_T		0.451	0.636	0.595	0.494	0.414	0.303	0.217	0.167	0.138
Fd		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70

1. NPS 2 is multirated to CL150, 300 and 600.

PN 10 through PN 40, CL150 and CL300

Approximately Linear Characteristic

Valve Size		Coefficients	Valve Rotation, Degrees								
DN	**NPS**		**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**
50	2	C_v	2.28	7.7	21.5	35.5	51	58.9	62.4	78.3	83.7
		K_v	1.97	6.7	18.6	30.7	44.1	50.9	53.9	67.7	72.3
		F_d	0.16	0.21	0.21	0.25	0.29	0.32	0.36	0.37	0.39
		F_L	- - -	0.91	0.84	0.76	0.73	0.78	0.80	0.68	0.66
		X_T	- - -	0.76	0.53	0.39	0.39	0.52	0.54	0.39	0.35
80	3	C_v	3.50	22.1	46.3	73.1	120	147	181	239	275
		K_v	3.02	19.1	40.0	63.2	103.7	127	156	206	238
		F_d	0.10	0.17	0.23	0.27	0.32	0.33	0.41	0.47	0.51
		F_L	0.77	0.81	0.79	0.79	0.69	0.70	0.67	0.62	0.58
		X_T	0.46	0.60	0.54	0.55	0.40	0.37	0.35	0.29	0.23
100	4	C_v	9.40	48.8	90.6	137	171	224	297	397	484
		K_v	8.12	42.2	78.3	118	148	194	257	343	418
		F_d	0.10	0.18	0.23	0.28	0.33	0.38	0.43	0.50	0.53
		F_L	0.9	0.83	0.80	0.77	0.77	0.74	0.68	0.62	0.58
		X_T	0.48	0.47	0.48	0.48	0.46	0.39	0.32	0.26	0.22
150	6	C_v	26.2	99.1	181	283	401	543	717	951	1000
		K_v	22.6	85.6	156	245	346	469	619	822	864
		F_d	0.10	0.18	0.26	0.31	0.36	0.40	0.43	0.47	0.49
		F_L	0.82	0.79	0.77	0.74	0.72	0.68	0.66	0.61	0.58
		X_T	0.44	0.48	0.52	0.48	0.42	0.36	0.32	0.26	0.22
200	8	C_v	44.6	138	285	457	698	994	1390	2190	2550
		K_v	38.5	119	246	395	603	859	1201	1892	2203
		F_d	0.13	0.20	0.25	0.31	0.37	0.43	0.47	0.51	0.55
		F_L	0.86	0.94	0.82	0.71	0.68	0.67	0.61	0.54	0.47
		X_T	0.49	0.43	0.54	0.52	0.45	0.36	0.31	0.18	0.14
250	10	C_v	72.0	225	423	729	1150	1720	2440	3370	3720
		K_v	62.2	194	365	630	994	1486	2108	2912	3214
		F_d	0.12	0.18	0.23	0.26	0.36	0.41	0.45	0.57	0.54
		F_L	0.89	0.78	0.82	0.75	0.70	0.66	0.60	0.55	0.50
		X_T	0.53	0.42	0.57	0.49	0.41	0.32	0.23	0.18	0.16
300	12	C_v	128	401	733	1220	1800	2490	3380	4470	5080
		K_v	111	346	633	1054	1555	2151	2920	3862	4389
		F_d	0.13	0.19	0.25	0.31	0.38	0.44	0.47	0.50	0.53
		F_L	0.83	0.73	0.74	0.70	0.69	0.66	0.61	0.51	0.50
		X_T	0.41	0.34	0.46	0.42	0.36	0.30	0.24	0.18	0.16

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Modified Equal Percentage Characteristic

Valve Size	Coefficients	Valve Rotation, Degrees								
NPS		10	20	30	40	50	60	70	80	90
3	Cv	5	18	37	63	95	135	157	164	167
	Kv	4	16	32	54	82	117	136	142	144
	Fd	0.09	0.15	0.22	0.27	0.31	0.35	0.38	0.41	0.47
	FL	0.78	0.81	0.81	0.79	0.73	0.66	0.59	0.55	0.52
	XT	0.05	0.52	0.50	0.43	0.36	0.31	0.29	0.29	0.29
4	Cv	9	26	57	100	156	225	267	293	302
	Kv	8	22	49	86	135	194	231	253	261
	Fd	0.08	0.14	0.21	0.29	0.34	0.37	0.37	0.41	0.49
	FL	0.78	0.81	0.81	0.79	0.73	0.66	0.59	0.55	0.52
	XT	0.03	0.49	0.48	0.41	0.35	0.30	0.28	0.24	0.24
6	Cv	19	85	160	242	331	428	482	495	507
	Kv	16	73	138	209	286	370	416	428	438
	Fd	0.10	0.17	0.23	0.29	0.32	0.36	0.39	0.43	0.47
	FL	0.78	0.81	0.81	0.79	0.73	0.66	0.59	0.55	0.52
	XT	0.16	0.41	0.40	0.37	0.34	0.31	0.30	0.31	0.33
8	Cv	82	129	226	372	567	813	1049	1252	1435
	Kv	71	111	195	321	490	702	906	1082	1240
	Fd	0.09	0.17	0.24	0.29	0.34	0.36	0.39	0.47	0.50
	FL	0.78	0.81	0.81	0.79	0.73	0.66	0.59	0.55	0.52
	XT	0.10	0.43	0.48	0.43	0.36	0.31	0.27	0.24	0.22
10	Cv	95	232	415	646	922	1245	1545	1806	2041
	Kv	82	200	359	558	797	1076	1335	1560	1763
	Fd	0.10	0.16	0.23	0.29	0.31	0.34	0.38	0.44	0.48
	FL	0.78	0.81	0.81	0.79	0.73	0.66	0.59	0.55	0.52
	XT	0.05	0.49	0.51	0.43	0.34	0.28	0.24	0.24	0.24
12	Cv	177	368	641	995	1431	1950	2462	2922	3354
	Kv	153	318	554	860	1236	1685	2127	2525	2898
	Fd	0.09	0.17	0.25	0.30	0.34	0.38	0.42	0.48	0.53
	FL	0.78	0.81	0.81	0.79	0.73	0.66	0.59	0.55	0.52
	XT	0.05	0.47	0.52	0.45	0.37	0.30	0.25	0.23	0.22
14	Cv	197	396	693	1090	1585	2179	2786	3355	3912
	Kv	170	342	599	942	1369	1883	2407	2899	3380
	Fd	0.09	0.17	0.24	0.29	0.34	0.37	0.43	0.48	0.54
	FL	0.78	0.81	0.81	0.79	0.73	0.66	0.59	0.55	0.52
	XT	0.07	0.45	0.50	0.44	0.37	0.32	0.27	0.24	0.22
16	Cv	342	680	1118	1658	2300	3043	3774	4422	5022
	Kv	295	588	966	1433	1987	2629	3261	3821	4339
	Fd	0.11	0.19	0.25	0.30	0.35	0.39	0.43	0.49	0.54
	FL	0.78	0.81	0.81	0.79	0.73	0.66	0.59	0.55	0.52
	XT	0.10	0.41	0.45	0.41	0.35	0.29	0.26	0.24	0.24
18	Cv	365	720	1246	1943	2812	3853	4881	5819	6714
	Kv	315	622	1077	1679	2430	3329	4217	5028	5801
	Fd	0.09	0.17	0.24	0.29	0.33	0.37	0.41	0.45	0.51
	FL	0.78	0.81	0.81	0.79	0.73	0.66	0.59	0.55	0.52
	XT	0.07	0.40	0.45	0.40	0.34	0.29	0.25	0.22	0.21
20	Cv	629	1154	1826	2646	3614	4730	5811	6754	7612
	Kv	543	997	1578	2286	3122	4087	5021	5835	6577
	Fd	0.12	0.19	0.25	0.29	0.34	0.37	0.41	0.46	0.52
	FL	0.78	0.81	0.81	0.79	0.73	0.66	0.59	0.55	0.52
	XT	0.11	0.38	0.43	0.39	0.33	0.28	0.24	0.23	0.22
24	Cv	823	1491	2549	3998	5839	8070	10127	11930	13565
	Kv	711	1288	2202	3454	5045	6972	8750	10308	11720
	Fd	0.09	0.17	0.23	0.28	0.33	0.37	0.41	0.45	0.51
	FL	0.78	0.81	0.81	0.79	0.73	0.66	0.59	0.55	0.52
	XT	0.06	0.36	0.39	0.33	0.27	0.22	0.19	0.18	0.18

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Conventional Disk

Approximately Equal Percentage Characteristic

Valve Size, NPS	Coefficients	Disk Angle of Opening, Degrees									
		0	10	20	30	40	50	60	70	80	90
2	C_V	0	0.2	1.8	5.7	12.7	24.0	40.1	71.4	86.7	91.2
	K_V	0	0.17	1.56	4.93	11.0	20.8	34.7	61.8	75.0	78.9
	F_L	0	.78	.80	.82	.84	.80	.74	.67	.59	.55
	X_T	0	.490	.490	.563	.563	.494	.413	.255	.189	.185
3	C_V	0	0.5	5.1	16.1	35.8	67.6	112	200	243	256
	K_V	0	0.43	4.41	13.9	31.0	58.5	96.9	173	210	221
	F_L	0	.78	.80	.82	.84	.80	.74	.67	.59	.55
	X_T	0	.490	.490	.563	.563	.494	.413	.255	.189	.185
4	C_V	0	1.0	10.3	32.6	72.5	136	227	405	492	518
	K_V	0	0.87	8.91	28.2	62.7	118	196	350	426	448
	F_L	0	.78	.80	.82	.84	.80	.74	.67	.59	.55
	X_T	0	.490	.490	.563	.563	.494	.413	.255	.189	.185
6	C_V	0	22.7	55.9	131	244	454	769	1120	1610	1750
	K_V	0	19.6	48.4	113	211	393	665	969	1390	1510
	F_L	0	.78	.80	.82	.84	.80	.74	.67	.59	.55
	X_T	0	.391	.394	.426	.436	.449	.375	.270	.139	.128
8	C_V	0	36.6	90.2	211	394	733	1240	1800	2500	2820
	K_V	0	31.7	78.0	183	341	634	1070	1560	2160	2440
	F_L	0	.78	.80	.82	.84	.80	.74	.67	.59	.55
	X_T	0	.391	.394	.426	.436	.449	.375	.270	.139	.128
10	C_V	0	60.2	148	347	648	1200	2040	2960	4260	4630
	K_V	0	52.1	128	300	561	1040	1760	2560	3680	4000
	F_L	0	.78	.80	.82	.84	.80	.74	.67	.59	.55
	X_T	0	.391	.394	.426	.436	.449	.375	.270	.139	.128
12	C_V	0	91.2	224	526	982	1820	3090	4490	6460	7020
	K_V	0	78.9	194	455	849	1570	2670	3880	5590	6070
	F_L	0	.78	.80	.82	.84	.80	.74	.67	.59	.55
	X_T	0	.391	.394	.426	.436	.449	.375	.270	.139	.128

Fishtail™ Disk

Approximately Equal Percentage Characteristic

Valve Size, NPS	Coefficients	Disk Angle of Opening, Degrees									
		0	10	20	30	40	50	60	70	80	90
2	C_V	0	1.81	4.78	8.37	14.3	24.6	39.5	61.7	80	91
	K_V	0	1.57	4.13	7.24	12.4	21.3	34.2	53.4	69.2	78.7
	F_L	0	.84	.84	.84	.84	.82	.78	.71	.67	.66
	X_T	0	.466	.559	.563	.601	.555	.462	.331	.294	.205
3	C_V	0	4.0	10.6	18.7	31.8	54.8	92	138	179	203
	K_V	0	3.46	9.17	16.2	27.5	47.4	79.6	119	155	176
	F_L	0	.84	.84	.84	.84	.82	.78	.71	.67	.66
	X_T	0	.466	.559	.563	.601	.555	.462	.331	.294	.205
4	C_V	0	7.75	19.4	35	61.2	102	171	275	408	490
	K_V	0	6.70	16.8	30.3	52.9	88.2	148	238	353	424
	F_L	0	.84	.84	.84	.84	.82	.78	.71	.67	.66
	X_T	0	.466	.559	.563	.601	.555	.462	.331	.294	.205
6	C_V	0	16.8	44.3	78.9	141	232	399	638	994	1220
	K_V	0	14.5	38.3	68.2	122	201	345	552	860	1060
	F_L	0	.84	.84	.84	.84	.82	.78	.71	.67	.66
	X_T	0	.466	.559	.766	.744	.620	.515	.372	.228	.160
8	C_V	0	29.9	78.8	140	252	412	710	1130	1770	2170
	K_V	0	25.9	68.2	121	218	356	614	977	1530	1880
	F_L	0	.84	.84	.84	.84	.82	.78	.71	.67	.66
	X_T	0	.466	.559	.766	.744	.620	.515	.372	.228	.160
10	C_V	0	46	123	222	412	672	1170	1910	3160	4010
	K_V	0	39.8	106	192	356	581	1010	1650	2730	3470
	F_L	0	.84	.84	.84	.84	.82	.78	.71	.67	.66
	X_T	0	.466	.559	.766	.744	.620	.515	.372	.228	.160
12	C_V	0	79	178	322	592	967	1680	2720	4470	5640
	K_V	0	68.3	154	279	512	836	1450	2350	3870	4880
	F_L	0	.84	.84	.84	.84	.82	.78	.71	.67	.66
	X_T	0	.466	.559	.766	.744	.620	.515	.372	.228	.160

Valve Size,		Coefficients	Valve Rotation, Degrees								
mm	NPS		10	20	30	40	50	60	70	80	90
80	3	Cv	10	27	46	64	80	90	97	98	94
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
		Fd	0.15	0.25	0.33	0.40	0.44	0.46	0.47	0.45	0.45
100	4	Cv	23	61	103	143	179	202	216	218	210
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
		Fd	0.17	0.28	0.37	0.44	0.49	0.52	0.52	0.50	0.50
150	6	Cv	55	126	213	324	458	600	727	814	790
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
		Fd	0.17	0.26	0.35	0.43	0.51	0.57	0.62	0.62	0.63
200	8	Cv	92	214	383	581	826	1086	1362	1545	1530
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
		Fd	0.16	0.25	0.34	0.43	0.51	0.57	0.63	0.64	0.65
250	10	Cv	155	337	595	906	1295	1735	2201	2589	2589
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
		Fd	0.17	0.25	0.34	0.43	0.51	0.58	0.65	0.67	0.68
300	12	Cv	196	471	824	1255	1805	2471	3217	3845	3923
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
		Fd	0.15	0.25	0.34	0.42	0.50	0.58	0.65	0.68	0.70
350	14	Cv	260	571	987	1559	2234	3117	4104	5039	5195
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
		Fd	0.16	0.25	0.34	0.42	0.51	0.59	0.66	0.70	0.73
400	16	Cv	278	694	1180	1874	2707	3886	5274	6662	6940
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
		Fd	0.15	0.24	0.32	0.41	0.49	0.58	0.67	0.71	0.74
450	18	Cv	365	820	1459	2279	3373	4923	6837	8660	9116
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
		Fd	0.15	0.23	0.32	0.40	0.49	0.58	0.67	0.71	0.75
500	20	Cv	464	1043	1739	2782	4057	6027	8461	10895	11590
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
		Fd	0.15	0.24	0.31	0.40	0.48	0.58	0.67	0.72	0.76
600	24	Cv	528	1407	2463	3870	5805	8619	12489	16535	17590
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
		Fd	0.13	0.22	0.30	0.39	0.47	0.56	0.67	0.73	0.77

30,000
PN25
Reverse Flow (Shaft Side)

Valve Size, mm	Coefficients	Valve Rotation, Degrees								
		10	20	30	40	50	60	70	80	90
80	Cv	10	27	46	64	80	90	97	98	94
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
	Fd	0.15	0.25	0.33	0.40	0.44	0.46	0.47	0.45	0.45
100	Cv	23	61	103	143	179	202	216	218	210
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
	Fd	0.17	0.28	0.37	0.44	0.49	0.52	0.52	0.50	0.50
150	Cv	55	126	213	324	458	600	727	814	790
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
	Fd	0.17	0.26	0.35	0.43	0.51	0.57	0.62	0.62	0.63
200	Cv	92	214	383	581	826	1086	1362	1545	1530
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
	Fd	0.16	0.25	0.34	0.43	0.51	0.57	0.63	0.64	0.65
250	Cv	155	337	595	906	1295	1735	2201	2589	2589
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
	Fd	0.17	0.25	0.34	0.43	0.51	0.58	0.65	0.67	0.68
300	Cv	196	471	824	1255	1805	2471	3217	3845	3923
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
	Fd	0.15	0.25	0.34	0.42	0.50	0.58	0.65	0.68	0.70
350	Cv	260	571	987	1559	2234	3117	4104	5039	5195
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
	Fd	0.16	0.25	0.34	0.42	0.51	0.59	0.66	0.70	0.73
400	Cv	278	694	1180	1874	2707	3886	5274	6662	6940
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
	Fd	0.15	0.24	0.32	0.41	0.49	0.58	0.67	0.71	0.74
450	Cv	365	820	1459	2279	3373	4923	6837	8660	9116
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
	Fd	0.15	0.23	0.32	0.40	0.49	0.58	0.67	0.71	0.75
500	Cv	464	1043	1739	2782	4057	6027	8461	10895	11590
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
	Fd	0.15	0.24	0.31	0.40	0.48	0.58	0.67	0.72	0.76
600	Cv	528	1407	2463	3870	5805	8619	12489	16535	17590
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
	Fd	0.13	0.22	0.30	0.39	0.47	0.56	0.67	0.73	0.77

Valve Size,		**Coefficients**	**Valve Rotation, Degrees**								
mm	**NPS**		**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**
80	3	Cv	9	25	42	58	72	82	88	88	85
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.580	0.570	0.550	0.520	0.480	0.410	0.350	0.320	0.280
		Fd	0.14	0.24	0.32	0.38	0.42	0.44	0.45	0.43	0.43
100	4	Cv	20	52	88	122	153	173	185	187	180
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.580	0.570	0.550	0.520	0.480	0.410	0.350	0.320	0.280
		Fd	0.15	0.26	0.34	0.40	0.45	0.47	0.48	0.46	0.46
150	6	Cv	51	117	198	300	425	556	673	754	732
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.580	0.570	0.550	0.520	0.480	0.410	0.350	0.320	0.280
		Fd	0.16	0.25	0.33	0.41	0.49	0.55	0.59	0.59	0.60
200	8	Cv	88	206	368	559	795	1045	1310	1487	1472
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.580	0.570	0.550	0.520	0.480	0.410	0.350	0.320	0.280
		Fd	0.16	0.25	0.34	0.42	0.50	0.56	0.62	0.63	0.64
250	10	Cv	149	322	570	868	1240	1662	2108	2480	2480
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.580	0.570	0.550	0.520	0.480	0.410	0.350	0.320	0.280
		Fd	0.17	0.24	0.33	0.42	0.50	0.57	0.63	0.65	0.66
300	12	Cv	190	455	796	1213	1743	2388	3108	3714	3790
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.580	0.570	0.550	0.520	0.480	0.410	0.350	0.320	0.280
		Fd	0.15	0.25	0.33	0.41	0.50	0.57	0.64	0.67	0.69
350	14	Cv	254	558	963	1521	2181	3043	4006	4919	5071
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.580	0.570	0.550	0.520	0.480	0.410	0.350	0.320	0.280
		Fd	0.16	0.24	0.33	0.42	0.50	0.58	0.66	0.69	0.72
400	16	Cv	273	682	1159	1841	2660	3819	5183	6547	6820
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.580	0.570	0.550	0.520	0.480	0.410	0.350	0.320	0.280
		Fd	0.15	0.24	0.31	0.40	0.48	0.57	0.66	0.70	0.73
450	18	Cv	360	811	1441	2252	3332	4863	6755	8556	9006
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.580	0.570	0.550	0.520	0.480	0.410	0.350	0.320	0.280
		Fd	0.15	0.23	0.31	0.39	0.48	0.57	0.66	0.70	0.74
500	20	Cv	459	1033	1722	2756	4019	5971	8382	10793	11482
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.580	0.570	0.550	0.520	0.480	0.410	0.350	0.320	0.280
		Fd	0.15	0.23	0.31	0.39	0.47	0.57	0.66	0.71	0.75
600	24	Cv	525	1400	2450	3850	5775	8575	12425	16450	17500
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.580	0.570	0.550	0.520	0.480	0.410	0.350	0.320	0.280
		Fd	0.13	0.22	0.30	0.39	0.47	0.56	0.67	0.73	0.77

Valve Size, mm	Coefficients	Valve Rotation, Degrees								
		10	20	30	40	50	60	70	80	90
80	Cv	9	25	42	58	72	82	88	88	85
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.580	0.570	0.550	0.520	0.480	0.410	0.350	0.320	0.280
	Fd	0.14	0.24	0.32	0.38	0.42	0.44	0.45	0.43	0.43
100	Cv	20	52	88	122	153	173	185	187	180
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.580	0.570	0.550	0.520	0.480	0.410	0.350	0.320	0.280
	Fd	0.15	0.26	0.34	0.40	0.45	0.47	0.48	0.46	0.46
150	Cv	51	117	198	300	425	556	673	754	732
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.580	0.570	0.550	0.520	0.480	0.410	0.350	0.320	0.280
	Fd	0.16	0.25	0.33	0.41	0.49	0.55	0.59	0.59	0.60
200	Cv	88	206	368	559	795	1045	1310	1487	1472
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.580	0.570	0.550	0.520	0.480	0.410	0.350	0.320	0.280
	Fd	0.16	0.25	0.34	0.42	0.50	0.56	0.62	0.63	0.64
250	Cv	149	322	570	868	1240	1662	2108	2480	2480
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.580	0.570	0.550	0.520	0.480	0.410	0.350	0.320	0.280
	Fd	0.17	0.24	0.33	0.42	0.50	0.57	0.63	0.65	0.66
300	Cv	190	455	796	1213	1743	2388	3108	3714	3790
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.580	0.570	0.550	0.520	0.480	0.410	0.350	0.320	0.280
	Fd	0.15	0.25	0.33	0.41	0.50	0.57	0.64	0.67	0.69
350	Cv	254	558	963	1521	2181	3043	4006	4919	5071
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.580	0.570	0.550	0.520	0.480	0.410	0.350	0.320	0.280
	Fd	0.16	0.24	0.33	0.42	0.50	0.58	0.66	0.69	0.72
400	Cv	273	682	1159	1841	2660	3819	5183	6547	6820
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.580	0.570	0.550	0.520	0.480	0.410	0.350	0.320	0.280
	Fd	0.15	0.24	0.31	0.40	0.48	0.57	0.66	0.70	0.73
450	Cv	360	811	1441	2252	3332	4863	6755	8556	9006
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.580	0.570	0.550	0.520	0.480	0.410	0.350	0.320	0.280
	Fd	0.15	0.23	0.31	0.39	0.48	0.57	0.66	0.70	0.74
500	Cv	459	1033	1722	2756	4019	5971	8382	10793	11482
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.580	0.570	0.550	0.520	0.480	0.410	0.350	0.320	0.280
	Fd	0.15	0.23	0.31	0.39	0.47	0.57	0.66	0.71	0.75
600	Cv	525	1400	2450	3850	5775	8575	12425	16450	17500
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.580	0.570	0.550	0.520	0.480	0.410	0.350	0.320	0.280
	Fd	0.13	0.22	0.30	0.39	0.47	0.56	0.67	0.73	0.77

Valve Size,		Coefficients	Valve Rotation, Degrees								
mm	NPS		10	20	30	40	50	60	70	80	90
80	3	Cv	10	27	46	64	80	90	97	98	94
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
		Fd	0.15	0.25	0.33	0.40	0.44	0.46	0.47	0.45	0.45
100	4	Cv	23	61	103	143	179	202	216	218	210
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
		Fd	0.17	0.28	0.37	0.44	0.49	0.52	0.52	0.50	0.50
150	6	Cv	50	107	183	277	391	504	605	655	630
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
		Fd	0.16	0.24	0.32	0.40	0.47	0.53	0.57	0.55	0.56
200	8	Cv	88	200	338	513	725	950	1150	1288	1250
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
		Fd	0.16	0.24	0.32	0.40	0.48	0.54	0.58	0.58	0.59
250	10	Cv	143	334	596	906	1287	1692	2121	2407	2383
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
		Fd	0.16	0.25	0.34	0.43	0.51	0.57	0.63	0.64	0.65
300	12	Cv	215	465	823	1253	1790	2398	3042	3579	3579
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
		Fd	0.17	0.25	0.34	0.42	0.50	0.58	0.64	0.66	0.67
350	14	Cv	231	555	972	1481	2128	2915	3794	4534	4627
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
		Fd	0.16	0.26	0.34	0.43	0.51	0.59	0.66	0.69	0.71
400	16	Cv	313	688	1188	1875	2688	3751	4938	6063	6251
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
		Fd	0.15	0.24	0.32	0.41	0.49	0.57	0.64	0.67	0.70
450	18	Cv	329	824	1400	2224	3212	4613	6260	7908	8237
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
		Fd	0.14	0.23	0.31	0.39	0.47	0.55	0.64	0.68	0.71
500	20	Cv	418	940	1670	2610	3863	5638	7830	9918	10440
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
		Fd	0.14	0.22	0.30	0.38	0.47	0.55	0.64	0.68	0.72
600	24	Cv	647	1456	2427	3883	5663	8414	11811	15209	16180
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
		Fd	0.15	0.23	0.30	0.38	0.47	0.56	0.65	0.70	0.74

30,000
CL300, PN40
Forward Flow (Disk Side)

Valve Size		Coefficients	Valve Rotation, Degrees								
mm	NPS		10	20	30	40	50	60	70	80	90
80	3	Cv	9	25	42	58	72	82	88	88	85
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.580	0.570	0.550	0.520	0.480	0.410	0.350	0.320	0.280
		Fd	0.14	0.24	0.32	0.38	0.42	0.44	0.45	0.43	0.43
100	4	Cv	20	52	88	122	153	173	185	187	180
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.580	0.570	0.550	0.520	0.480	0.410	0.350	0.320	0.280
		Fd	0.15	0.26	0.34	0.40	0.45	0.47	0.48	0.46	0.46
150	6	Cv	47	100	170	258	364	470	564	610	587
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.580	0.570	0.550	0.520	0.480	0.410	0.350	0.320	0.280
		Fd	0.15	0.23	0.31	0.38	0.45	0.51	0.55	0.53	0.54
200	8	Cv	85	195	329	500	708	927	1122	1257	1220
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.580	0.570	0.550	0.520	0.480	0.410	0.350	0.320	0.280
		Fd	0.16	0.24	0.32	0.39	0.47	0.53	0.57	0.57	0.58
250	10	Cv	137	319	570	866	1231	1618	2028	2302	2279
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.580	0.570	0.550	0.520	0.480	0.410	0.350	0.320	0.280
		Fd	0.16	0.25	0.34	0.42	0.50	0.56	0.62	0.63	0.64
300	12	Cv	206	446	789	1201	1716	2299	2917	3432	3432
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.580	0.570	0.550	0.520	0.480	0.410	0.350	0.320	0.280
		Fd	0.16	0.24	0.33	0.41	0.49	0.56	0.62	0.64	0.65
350	14	Cv	224	538	942	1435	2063	2826	3678	4395	4485
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.580	0.570	0.550	0.520	0.480	0.410	0.350	0.320	0.280
		Fd	0.15	0.25	0.34	0.42	0.50	0.58	0.65	0.68	0.70
400	16	Cv	306	673	1162	1835	2631	3671	4833	5934	6118
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.580	0.570	0.550	0.520	0.480	0.410	0.350	0.320	0.280
		Fd	0.15	0.23	0.32	0.40	0.48	0.56	0.63	0.66	0.69
450	18	Cv	325	812	1380	2192	3166	4546	6170	7793	8118
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.580	0.570	0.550	0.520	0.480	0.410	0.350	0.320	0.280
		Fd	0.14	0.23	0.30	0.39	0.46	0.55	0.63	0.67	0.70
500	20	Cv	413	930	1653	2583	3822	5578	7748	9814	10330
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.580	0.570	0.550	0.520	0.480	0.410	0.350	0.320	0.280
		Fd	0.14	0.22	0.30	0.38	0.46	0.55	0.63	0.67	0.71
600	24	Cv	644	1448	2414	3862	5632	8367	11746	15125	16090
		Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
		Xt	0.580	0.570	0.550	0.520	0.480	0.410	0.350	0.320	0.280
		Fd	0.15	0.23	0.30	0.38	0.47	0.56	0.65	0.70	0.74

Valve Size, NPS	Coefficients	Valve Rotation, Degrees								
		10	20	30	40	50	60	70	80	90
3	Cv	10	27	46	64	80	90	97	98	94
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
	Fd	0.15	0.25	0.33	0.40	0.44	0.46	0.47	0.45	0.45
4	Cv	23	61	103	143	179	202	216	218	210
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
	Fd	0.17	0.28	0.37	0.44	0.49	0.52	0.52	0.50	0.50
6	Cv	55	126	213	324	458	600	727	814	790
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
	Fd	0.17	0.26	0.35	0.43	0.51	0.57	0.62	0.62	0.63
8	Cv	92	214	383	581	826	1086	1362	1545	1530
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
	Fd	0.16	0.25	0.34	0.43	0.51	0.57	0.63	0.64	0.65
10	Cv	155	337	595	906	1295	1735	2201	2589	2589
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
	Fd	0.17	0.25	0.34	0.43	0.51	0.58	0.65	0.67	0.68
12	Cv	196	471	824	1255	1805	2471	3217	3845	3923
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
	Fd	0.15	0.25	0.34	0.42	0.50	0.58	0.65	0.68	0.70
14	Cv	260	571	987	1559	2234	3117	4104	5039	5195
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
	Fd	0.16	0.25	0.34	0.42	0.51	0.59	0.66	0.70	0.73
16	Cv	278	694	1180	1874	2707	3886	5274	6662	6940
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
	Fd	0.15	0.24	0.32	0.41	0.49	0.58	0.67	0.71	0.74
18	Cv	365	820	1459	2279	3373	4923	6837	8660	9116
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
	Fd	0.15	0.23	0.32	0.40	0.49	0.58	0.67	0.71	0.75
20	Cv	464	1043	1739	2782	4057	6027	8461	10895	11590
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
	Fd	0.15	0.24	0.31	0.40	0.48	0.58	0.67	0.72	0.76
24	Cv	528	1407	2463	3870	5805	8619	12489	16535	17590
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
	Fd	0.13	0.22	0.30	0.39	0.47	0.56	0.67	0.73	0.77

Valve Size, NPS	Coefficients	Valve Rotation, Degrees								
		10	20	30	40	50	60	70	80	90
3	Cv	10	27	46	64	80	90	97	98	94
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
	Fd	0.15	0.25	0.33	0.40	0.44	0.46	0.47	0.45	0.45
4	Cv	23	61	103	143	179	202	216	218	210
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
	Fd	0.17	0.28	0.37	0.44	0.49	0.52	0.52	0.50	0.50
6	Cv	50	107	183	277	391	504	605	655	630
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
	Fd	0.16	0.24	0.32	0.40	0.47	0.53	0.57	0.55	0.56
8	Cv	88	200	338	513	725	950	1150	1288	1250
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
	Fd	0.16	0.24	0.32	0.40	0.48	0.54	0.58	0.58	0.59
10	Cv	143	334	596	906	1287	1692	2121	2407	2383
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
	Fd	0.16	0.25	0.34	0.43	0.51	0.57	0.63	0.64	0.65
12	Cv	215	465	823	1253	1790	2398	3042	3579	3579
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
	Fd	0.17	0.25	0.34	0.42	0.50	0.58	0.64	0.66	0.67
14	Cv	231	555	972	1481	2128	2915	3794	4534	4627
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
	Fd	0.16	0.26	0.34	0.43	0.51	0.59	0.66	0.69	0.71
16	Cv	313	688	1188	1875	2688	3751	4938	6063	6251
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
	Fd	0.15	0.24	0.32	0.41	0.49	0.57	0.64	0.67	0.70
18	Cv	329	824	1400	2224	3212	4613	6260	7908	8237
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
	Fd	0.14	0.23	0.31	0.39	0.47	0.55	0.64	0.68	0.71
20	Cv	418	940	1670	2610	3863	5638	7830	9918	10440
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
	Fd	0.14	0.22	0.30	0.38	0.47	0.55	0.64	0.68	0.72
24	Cv	647	1456	2427	3883	5663	8414	11811	15209	16180
	Fl	0.850	0.840	0.820	0.790	0.750	0.700	0.650	0.575	0.600
	Xt	0.530	0.520	0.500	0.475	0.440	0.400	0.360	0.320	0.280
	Fd	0.15	0.23	0.30	0.38	0.47	0.56	0.65	0.70	0.74

CL150 to CL250

Valve Size, NPS[1]	Trim/ Flow Char	Port Diameter		Experimentally Determined Cv at Valve Opening—Percent of Total Travel											F_L[2]	X_T[2]	F_d[2]
		mm	Inch	5	10	20	30	40	50	60	70	80	90	100			
1/2	102 Linear	6.3	0.25	.00036	.0018	.0038	.0061	.008	.01	.012	.015	.016	.018	.02	0.95	0.76	0.18
		6.3	0.25	.002	.004	.008	.012	.02	.024	.031	.038	.041	.046	.05	0.95	0.76	0.18
		6.3	0.25	.0063	.011	.02	.025	.035	.045	.055	.065	.081	.09	.1	0.95	0.76	0.18
		6.3	0.25	.012	.021	.028	.045	.063	.085	.115	.147	.172	.19	.2	0.95	0.76	0.18
	577 =%	9.5	0.375	.006	.01	.02	.04	.06	.12	.2	.35	.5	.82	1	0.9	0.68	0.4
		9.5	0.375	.008	.015	.03	.05	.07	.14	.25	.41	.65	1	1.5	0.9	0.68	0.33
		9.5	0.375	.03	.09	.14	.25	.38	.55	.7	1	1.3	1.7	2.5	0.9	0.33	0.42
		20.6	0.8125	--	.17	.40	.65	.89	1.1	1.5	2.1	2.7	3.2	3.9	0.82	0.42	0.46
		20.6	0.8125	.16	.24	.38	.6	.7	1	1.4	2.2	3	4.2	6	0.9	0.68	0.46
	548/ 588 =%	6.3	0.25	0	.013	.02	.026	.034	.044	.056	.07	.102	.154	.2	0.98	0.5	0.28
		6.3	0.25	0	.01	.017	.027	.041	.062	.091	.136	.232	.406	.5	0.98	0.49	0.28
		6.3	0.25	.006	.01	.02	.04	.06	.12	.2	.35	.5	.82	1	0.9	0.68	0.4
		9.5	0.375	.008	.015	.03	.05	.07	.14	.25	.41	.65	1	1.5	0.9	0.68	0.33
		9.5	0.375	.015	.03	.06	.1	.2	.3	.6	.9	1.3	1.8	2.5	0.9	0.68	0.33
		20.6	0.8125	.195	.28	.52	.77	1.01	1.31	1.74	2.39	3.07	3.89	4	0.82	0.42	0.46
		20.6	0.8125	.16	.24	.38	.5	.7	1	1.4	2.1	2.9	4.1	6	0.9	0.68	0.46
	677 Linear	9.5	0.375	.004	.01	.02	.03	.04	.05	.06	.07	.08	.09	.1	0.9	0.08	0.33
		9.5	0.375	.009	.02	.04	.06	.08	.1	.12	.14	.16	.18	.2	0.9	0.08	0.33
		9.5	0.375	.03	.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	0.9	0.08	0.33
		9.5	0.375	.01	.12	.23	.34	.45	.55	.64	.73	.82	.9	1	0.9	0.08	0.42
		9.5	0.375	.2	.5	.75	1	1.3	1.5	1.7	1.9	2.1	2.3	2.5	0.9	0.08	0.42
		20.6	0.8125	--	.31	.74	1.1	1.5	1.9	2.3	2.7	3.1	3.7	5	0.9	0.68	0.46
	648/ 688 Linear	6.3	0.25	.03	.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	0.9	0.68	0.19
		6.3	0.25	.01	.12	.23	.34	.45	.55	.64	.73	.82	.9	1	0.9	0.68	0.4
		9.5	0.375	.1	.2	.3	.5	.6	.73	.87	1.0	1.1	1.3	1.5	0.9	0.68	0.33
		9.5	0.375	.2	.5	.75	1	1.3	1.5	1.7	1.9	2.1	2.3	2.5	0.9	0.68	0.46
		20.6	0.8125	.2	.4	.55	.7	1.0	1.3	1.6	2.1	2.6	3.3	4	0.9	0.68	0.46
		20.6	0.8125	.52	1	1.9	2.5	3	3.5	4	4.5	5	5.5	6	0.9	0.68	0.46

1. Max travel is 0.5 inches.
2. At 100% travel.

Flow Up

CL150 to CL250

Valve Size, NPS(1)	Trim/ Flow Char	Port Diameter		Experimentally Determined Cv at Valve Opening—Percent of Total Travel											F_L(2)	X_T(2)	F_d(2)
		mm	Inch	5	10	20	30	40	50	60	70	80	90	100			
3/4	102 Linear	6.3	0.25	.00036	.0018	.0038	.0061	.008	.01	.012	.015	.016	.018	.02	0.95	0.76	0.18
		6.3	0.25	.002	.004	.008	.012	.02	.024	.031	.038	.041	.046	.05	0.95	0.76	0.18
		6.3	0.25	.0063	.011	.02	.025	.035	.045	.055	.065	.081	.09	.1	0.95	0.76	0.18
		6.3	0.25	.012	.021	.028	.045	.063	.085	.115	.147	.172	.19	.2	0.95	0.76	0.18
	577 =%	9.5	0.375	.006	.01	.02	.04	.06	.12	.2	.35	.5	.82	1	0.9	0.68	0.4
		9.5	0.375	.008	.015	.03	.05	.07	.14	.25	.41	.65	1	1.5	0.9	0.68	0.33
		9.5	0.375	.03	.09	.14	.25	.38	.55	.7	1	1.3	1.7	2.5	0.9	0.33	0.42
		20.6	0.8125	--	.17	.40	.65	.89	1.1	1.5	2.1	2.7	3.2	4	0.82	0.42	0.46
		20.6	0.8125	.16	.24	.38	.6	.95	1.5	2.3	3.5	5.3	6.8	7.5	0.9	0.68	0.46
	548/ 588 =%	6.3	0.25	0	.013	.02	.026	.034	.044	.056	.07	.102	.154	.2	0.98	0.5	0.28
		6.3	0.25	0	.01	.017	.027	.041	.062	.091	.136	.232	.406	.5	0.98	0.49	0.28
		6.3	0.25	.006	.01	.02	.04	.06	.12	.2	.35	.5	.82	1	0.9	0.68	0.4
		9.5	0.375	.008	.015	.03	.05	.07	.14	.25	.41	.65	1	1.5	0.9	0.68	0.33
		9.5	0.375	.015	.03	.06	.1	.2	.3	.6	.9	1.3	1.8	2.5	0.9	0.68	0.33
		20.6	0.8125	.195	.28	.52	.77	1.01	1.31	1.74	2.39	3.07	3.89	4	0.82	0.42	0.46
		20.6	0.8125	.16	.24	.38	.7	1	1.7	2.4	3.7	5.4	7	8	0.9	0.68	0.46
	677 Linear	9.5	0.375	.004	.01	.02	.03	.04	.05	.06	.07	.08	.09	.1	0.9	0.08	0.33
		9.5	0.375	.009	.02	.04	.06	.08	.1	.12	.14	.16	.18	.2	0.9	0.08	0.33
		9.5	0.375	.03	.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	0.9	0.08	0.33
		9.5	0.375	.01	.12	.23	.34	.45	.55	.64	.73	.82	.9	1	0.9	0.08	0.42
		9.5	0.375	.2	.5	.75	1	1.3	1.5	1.7	1.9	2.1	2.3	2.5	0.9	0.08	0.42
		20.6	0.8125	--	.31	.74	1.1	1.5	1.9	2.3	2.7	3.1	3.7	5	0.9	0.68	0.46
	648/ 688 Linear	6.3	0.25	.03	.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	0.9	0.68	0.19
		6.3	0.25	.05	.1	.2	.3	.4	.5	.6	.7	.8	.9	1	0.9	0.68	0.4
		9.5	0.375	.1	.2	.3	.5	.6	.73	.87	1.0	1.1	1.3	1.5	0.9	0.68	0.46
		9.5	0.375	.2	.5	.75	1	1.3	1.5	1.7	1.9	2.1	2.3	2.5	0.9	0.68	0.46
		20.6	0.8125	.2	.4	.55	.7	1.0	1.3	1.6	2.1	2.6	3.3	4	0.9	0.68	0.46
		20.6	0.8125	.52	1	1.9	2.8	3.9	4.8	5.4	6.1	6.9	7.5	8	0.9	0.68	0.46

1. Max travel is 0.5 inches.
2. At 100% travel.

Flow Up

CL150 to CL250

Valve Size, NPS[1]	Trim/ Flow Char	Port Diameter		Experimentally Determined Cv at Valve Opening—Percent of Total Travel											F_L[2]	X_T[2]	F_d[2]
		mm	Inch	5	10	20	30	40	50	60	70	80	90	100			
1	102 Linear	6.3	0.25	.00036	.0018	.0038	.0061	.008	.01	.012	.015	.016	.018	.02	0.95	0.76	0.18
		6.3	0.25	.002	.004	.008	.012	.02	.024	.031	.038	.041	.046	.05	0.95	0.76	0.18
		6.3	0.25	.0063	.011	.02	.025	.035	.045	.055	.065	.081	.09	.1	0.95	0.76	0.18
		6.3	0.25	.012	.021	.028	.045	.063	.085	.115	.147	.172	.19	.2	0.95	0.76	0.18
	577 =%	9.5	0.375	.006	.01	.02	.04	.06	.12	.2	.35	.5	.82	1	0.9	0.68	0.4
		9.5	0.375	.008	.015	.03	.05	.07	.14	.25	.41	.65	1	1.5	0.9	0.68	0.33
		9.5	0.375	.03	.09	.14	.25	.38	.55	.7	1	1.3	1.7	2.5	0.9	0.33	0.42
		20.6	0.8125	.195	.28	.52	.77	1.01	1.31	1.74	2.39	3.07	3.89	4	0.82	0.42	0.46
		20.6	0.8125	.16	.24	.38	.6	.95	1.5	2.5	3.7	5.3	7.5	8.5	0.9	0.68	0.46
		26.9	1.0625	.2	.3	.6	.92	1.4	2.2	3.4	5.3	88	12	13	0.9	0.68	0.46
	548/ 588 =%	6.3	0.25	0	.013	.02	.026	.034	.044	.056	.07	.102	.154	.2	0.98	0.5	0.28
		6.3	0.25	0	.01	.017	.027	.041	.062	.091	.136	.232	.406	.5	0.98	0.49	0.28
		6.3	0.25	.006	.01	.02	.04	.06	.12	.2	.35	.5	.82	1	0.9	0.68	0.4
		9.5	0.375	.008	.015	.03	.05	.07	.14	.25	.41	.65	1	1.5	0.9	0.68	0.33
		9.5	0.375	.015	.03	.06	.1	.2	.3	.6	.9	1.3	1.8	2.5	0.9	0.68	0.33
		20.6	0.8125	--	.10	.41	.71	.93	1.2	1.6	2.1	2.9	3.6	4	0.82	0.42	0.46
		20.6	0.8125	--	.16	.32	.57	.99	1.6	3.0	5.2	6.8	8.7	9	0.9	0.68	0.46
		26.9	1.0625	.15	.25	.44	.75	1.2	2	3.4	5.3	8	12	13	0.9	0.68	0.46
	677 Linear	9.5	0.375	.004	.01	.02	.03	.04	.05	.06	.07	.08	.09	.1	0.9	0.08	0.33
		9.5	0.375	.009	.02	.04	.06	.08	.1	.12	.14	.16	.18	.2	0.9	0.08	0.33
		9.5	0.375	.03	.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	0.9	0.08	0.33
		9.5	0.375	.01	.12	.23	.34	.45	.55	.64	.73	.82	.9	1	0.9	0.08	0.42
		9.5	0.375	.2	.5	.75	1	1.3	1.5	1.7	1.9	2.1	2.3	2.5	0.9	0.08	0.42
		20.6	0.8125	--	.31	.74	1.1	1.5	1.9	2.3	2.7	3.1	3.7	5	0.9	0.68	0.46
	648/ 688 Linear	6.3	0.25	.03	.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	0.9	0.68	0.19
		6.3	0.25	.05	.1	.2	.3	.4	.5	.6	.7	.8	.9	1	0.9	0.68	0.4
		9.5	0.375	.1	.2	.3	.5	.6	.73	.87	1.0	1.1	1.3	1.5	0.9	0.68	0.46
		9.5	0.375	.2	.5	.75	1	1.3	1.5	1.7	1.9	2.1	2.3	2.5	0.9	0.68	0.46
		20.6	0.8125	.2	.4	.55	.7	1.0	1.3	1.6	2.1	2.6	3.3	4	0.9	0.68	0.46
		20.6	0.8125	.52	1	1.9	2.8	3.9	4.8	5.5	6.3	7.2	8.1	9	0.9	0.68	0.46
		26.9	1.0625	.6	1.3	2.6	4.2	5.5	6.8	8.1	9.4	10.7	12	13	0.9	0.68	0.46

1. Max travel is 0.5 inches.
2. At 100% travel.

Flow Up

CL150 to CL250

Valve Size, NPS[1]	Trim/ Flow Char	Port Diameter		Experimentally Determined Cv at Valve Opening—Percent of Total Travel											F_L[2]	X_T[2]	F_d[2]
		mm	Inch	5	10	20	30	40	50	60	70	80	90	100			
1-1/2	577 =%	31.8	1.25	.31	1	1.7	2.6	3.7	5	6.5	9.5	13.5	17.5	20	0.9	0.68	0.46
		38.1	1.50	.3	.5	1.1	1.6	2.2	2.8	3.6	4.7	6.4	8.1	10	0.9	0.68	0.46
		38.1	1.50	.5	1	1.6	2.8	4.2	6	8.8	11.2	14.2	15.8	17	0.9	0.68	0.46
		38.1	1.50	.5	1	1.9	3	5	7.7	11	16	21	26	28	0.9	0.68	0.46
	548/ 588 =%	31.8	1.25	.25	.5	.7	1	1.4	2	2.8	3.6	5.7	7.9	10	0.9	0.68	0.46
		31.8	1.25	.25	.9	1.7	2.6	3.7	5	6.5	9.5	13.5	17.5	20	0.9	0.68	0.46
		38.1	1.50	.3	.5	1.1	1.6	2.2	2.8	3.6	4.7	6.4	8.1	10	0.9	0.68	0.46
		38.1	1.50	.4	1.1	1.7	2.7	4.1	6.1	8.9	11	14	16	17	0.9	0.68	0.46
		38.1	1.50	.4	1	1.9	3	5	7.7	11	16	21	26	28	0.9	0.68	0.46
	677 Linear	38.1	1.50	.4	.9	1.6	2.5	3.6	4.5	5.6	6.5	7.5	8.7	10	0.9	0.68	0.46
		38.1	1.50	.52	2.2	3.9	5.5	7	8.5	10	11.5	13.5	15.5	17	0.9	0.68	0.46
	648/ 688 Linear	31.8	1.25	.52	2.2	3.9	5.5	8.5	10.5	12	14	16	18	20	0.9	0.68	0.46
		38.1	1.50	.4	.9	1.6	2.5	3.6	4.5	5.6	6.5	7.5	8.7	10	0.9	0.68	0.46
		38.1	1.50	.52	2.2	3.9	5.5	7	8.5	10	11.5	13.5	15.5	17	0.9	0.68	0.46
		38.1	1.50	1.5	3	6	9	12	15	18	20	23	26	28	0.9	0.68	0.46
2	577 =%	38.1	1.50	.3	.5	1.1	1.6	2.2	2.8	3.6	4.7	6.4	8.1	10	0.9	0.68	0.46
		38.1	1.50	.5	1	1.6	2.8	4.2	6	8.8	11.2	14.2	15.8	17	0.9	0.68	0.46
		38.1	1.50	.5	1	1.9	3	5	7.7	11	16	21	26	28	0.9	0.68	0.46
		50.8	2.0	.62	1.2	3.1	6.4	11	16	20	23	26	29	30	0.9	0.68	0.46
	548/ 588 =%	38.1	1.50	.3	.5	1.1	1.6	2.2	2.8	3.6	4.7	6.4	8.1	10	0.9	0.68	0.46
		38.1	1.50	.4	1.1	1.7	2.7	4.1	6.1	8.9	11	14	16	17	0.9	0.68	0.46
		38.1	1.50	.4	1	1.9	3	5	7.7	11	16	21	26	28	0.9	0.68	0.46
		50.8	2.0	.62	1.2	33.1	6.4	11	16	20	23	26	29	30	0.9	0.68	0.46
		50.8	2.0	2	2.38	4.34	7.45	11.8	17.3	26.3	37	44.3	48.9	50	0.89	0.68	0.56
	677 Linear	38.1	1.50	.4	.9	1.6	2.5	3.6	4.5	5.6	6.5	7.5	8.7	10	0.9	0.68	0.46
		38.1	1.50	.52	2.2	3.9	5.5	7	8.5	10	11.5	13.5	15.5	17	0.9	0.68	0.46
		50.8	2.0	1.5	3	6	9	12	14.9	17.8	19.8	23.9	26.9	30	0.9	0.68	0.46
		50.8	2.0	2	6	10	15	20	25	30	35	40	45	50	0.9	0.68	0.46
	648/ 688 Linear	38.1	1.50	.4	.9	1.6	2.5	3.6	4.5	5.6	6.5	7.5	8.7	10	0.9	0.68	0.46
		38.1	1.50	.52	2.2	3.9	5.5	7	8.5	10	11.5	13.5	15.5	17	0.9	0.68	0.46
		38.1	1.50	1.5	3.0	6.0	9.0	12	15	18	20	23	26	28	0.9	0.68	0.46
		50.8	2.0	1.5	3.0	6.0	9.0	12	14.9	17.8	19.8	23.9	26.9	30	0.9	0.68	0.46
		50.8	2.0	3.0	6.0	10	15	20	25	30	32	40	45	50	0.9	0.68	0.56

1. Max travel is 0.75 inches.
2. At 100% travel.

CL150

Valve Size, NPS(1)	Trim/ Flow Char	Port Diameter		Experimentally Determined Cv at Valve Opening—Percent of Total Travel											F_L(2)	X_T(2)	F_d(2)
		mm	Inch	5	10	20	30	40	50	60	70	80	90	100			
1/2	102 Linear	6.3	0.25	.00036	.0018	.0038	.0061	.008	.01	.012	.015	.016	.018	.02	0.95	0.76	0.18
		6.3	0.25	.002	.004	.008	.012	.02	.024	.031	.038	.041	.046	.05	0.95	0.76	0.18
		6.3	0.25	.0063	.011	.02	.025	.035	.045	.055	.065	.081	.09	.1	0.95	0.76	0.18
		6.3	0.25	.012	.021	.028	.045	.063	.085	.115	.147	.172	.19	.2	0.95	0.76	0.18
	577 =%	9.5	0.375	.006	.01	.02	.04	.06	.12	.2	.35	.5	.82	1	0.9	0.40	0.46
		9.5	0.375	.008	.015	.03	.05	.07	.14	.25	.41	.65	1	1.5	0.9	0.33	0.46
		9.5	0.375	.03	.09	.14	.25	.38	.55	.7	1	1.3	1.7	2.5	0.9	0.42	0.46
		20.6	0.8125	.19	.28	.52	.77	1.0	1.3	1.7	2.3	3.0	3.8	4	0.82	0.68	0.46
		20.6	0.8125	.16	.24	.38	.6	.7	1	1.4	2.2	3	4.2	6	0.9	0.68	0.46
	548/ 588 =%	6.3	0.25	--	.013	.02	.026	.034	.044	.056	.07	.10	.15	.2	0.98	0.50	0.28
		6.3	0.25	--	.01	.017	.027	.041	.062	.091	.136	.23	.40	.5	0.98	0.49	0.28
		6.3	0.25	.006	.01	.02	.04	.06	.12	.2	.35	.5	.82	1	0.9	0.68	0.40
		9.5	0.375	.008	.015	.03	.05	.07	.14	.25	.41	.65	1	1.5	0.9	0.68	0.33
		9.5	0.375	.015	.03	.06	.1	.2	.3	.6	.9	1.3	1.8	2.5	0.9	0.68	0.42
		20.6	0.8125	.19	.28	.52	.77	1.0	1.3	1.7	2.3	3.0	3.8	4	0.82	0.42	0.46
		20.6	0.8125	--	.09	.25	.52	.94	1.5	3.2	5.0	5.9	7.3	7.7	0.91	0.65	0.46
	677 Linear	9.5	0.375	.004	.01	.02	.03	.04	.05	.06	.07	.08	.09	.1	0.9	0.68	0.08
		9.5	0.375	.009	.02	.04	.06	.08	.1	.12	.14	.16	.18	.2	0.9	0.68	0.12
		9.5	0.375	.03	.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	0.9	0.68	0.19
		9.5	0.375	.05	.1	.2	.3	.4	.5	.6	.7	.8	.9	1	0.9	0.68	0.27
		9.5	0.375	.2	.5	.75	1	1.3	1.5	1.7	1.9	2.1	2.3	2.5	0.9	0.68	0.42
		20.6	0.8125	.22	.45	.82	1.3	1.8	2.2	2.6	3.1	3.8	4.5	5	0.9	0.68	0.46
	648/ 688 Linear	6.3	0.25	.03	.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	0.9	0.68	0.19
		6.3	0.25	.06	.12	.23	.34	.45	.55	.64	.73	.82	.9	1	0.9	0.68	0.4
		9.5	0.375	.1	.2	.3	.5	.6	.73	.87	1.0	1.1	1.3	1.5	0.9	0.68	0.33
		9.5	0.375	.2	.5	.75	1	1.3	1.5	1.7	1.9	2.1	2.3	2.5	0.9	0.68	0.68
		20.6	0.8125	.2	.4	.55	.7	1.0	1.3	1.6	2.1	2.6	3.3	4	0.9	0.68	0.46
		20.6	0.8125	.52	1	1.9	2.5	3	3.5	4	4.5	5	5.5	6	0.9	0.68	0.46

1. Max travel is 0.5 inches.
2. At 100% travel.

Flow Up

CL150

Valve Size, NPS[1]	Trim/ Flow Char	Port Diameter		Experimentally Determined Cv at Valve Opening—Percent of Total Travel											F_L[2]	X_T[2]	F_d[2]
		mm	Inch	5	10	20	30	40	50	60	70	80	90	100			
3/4	102 Linear	6.3	0.25	.00036	.0018	.0038	.0061	.008	.01	.012	.015	.016	.018	.02	0.95	0.76	0.18
		6.3	0.25	.002	.004	.008	.012	.02	.024	.031	.038	.041	.046	.05	0.95	0.76	0.18
		6.3	0.25	.0063	.011	.02	.025	.035	.045	.055	.065	.081	.09	.1	0.95	0.76	0.18
		6.3	0.25	.012	.021	.028	.045	.063	.085	.115	.147	.172	.19	.2	0.95	0.76	0.18
	577 =%	9.5	0.375	.006	.01	.02	.04	.06	.12	.2	.35	.5	.82	1	0.9	0.40	0.46
		9.5	0.375	.008	.015	.03	.05	.07	.14	.25	.41	.65	1	1.5	0.9	0.33	0.46
		9.5	0.375	.03	.09	.14	.25	.38	.55	.7	1	1.3	1.7	2.5	0.9	0.42	0.46
		20.6	0.8125	.19	.28	.52	.77	1.0	1.3	1.7	2.3	3.0	3.8	4	0.82	0.68	0.46
		20.6	0.8125	.16	.24	.38	.6	.95	1.5	2.3	3.5	5.3	6.8	7.5	0.9	0.68	0.46
	548/ 588 =%	6.3	0.25	--	.013	.02	.026	.034	.044	.056	.07	.10	.15	.2	0.98	0.50	0.28
		6.3	0.25	--	.01	.017	.027	.041	.062	.091	.13	.23	.40	.5	0.98	0.49	0.28
		.25	0.25	.006	.01	.02	.04	.06	.12	.2	.35	.5	.82	1	0.9	0.68	0.40
		9.5	0.375	.008	.015	.03	.05	.07	.14	.25	.41	.65	1	1.5	0.9	0.68	0.33
		9.5	0.375	.015	.03	.06	.1	.2	.3	.6	.9	1.3	1.8	2.5	0.9	0.68	0.42
		20.6	0.8125	.19	.28	.52	.77	1.0	1.3	1.7	2.3	3.0	3.8	4	0.82	0.42	0.46
		20.6	0.8125	--	.07	.22	.48	.85	1.6	3.6	5.1	6.8	8.8	10.1	0.96	0.68	0.46
	677 Linear	9.5	0.375	.004	.01	.02	.03	.04	.05	.06	.07	.08	.09	.1	0.9	0.68	0.08
		9.5	0.375	.009	.02	.04	.06	.08	.1	.12	.14	.16	.18	.2	0.9	0.68	0.12
		9.5	0.375	.03	.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	0.9	0.68	0.19
		9.5	0.375	.05	.1	.2	.3	.4	.5	.6	.7	.8	.9	1	0.9	0.68	0.27
		9.5	0.375	.2	.5	.75	1	1.3	1.5	1.7	1.9	2.1	2.3	2.5	0.9	0.68	0.42
		20.6	0.8125	.22	.45	.82	1.3	1.8	2.2	2.6	3.1	3.8	4.5	5	0.9	0.68	0.46
	648/ 688 Linear	6.3	0.25	.03	.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	0.9	0.68	0.19
		6.3	0.25	.06	.12	.23	.34	.45	.55	.64	.73	.82	.9	1	0.9	0.68	0.40
		9.5	0.375	.1	.2	.3	.5	.6	.73	.87	1.0	1.1	1.3	1.5	0.9	0.68	0.33
		9.5	0.375	.2	.5	.75	1	1.3	1.5	1.7	1.9	2.1	2.3	2.5	0.9	0.68	0.68
		20.6	0.8125	.2	.4	.55	.7	1.0	1.3	1.6	2.1	2.6	3.3	4	0.9	0.68	0.46
		20.6	0.8125	.52	1	1.9	2.8	3.9	4.8	5.4	6.1	6.9	7.5	8	0.9	0.68	0.46

1. Max travel is 0.5 inches.
2. At 100% travel.

CL150

Valve Size, NPS[1]	Trim/ Flow Char	Port Diameter		Experimentally Determined Cv at Valve Opening—Percent of Total Travel											F_L[2]	X_T[2]	F_d[2]
		mm	Inch	5	10	20	30	40	50	60	70	80	90	100			
1	102 Linear	6.3	0.25	.00036	.0018	.0038	.0061	.008	.01	.012	.015	.016	.018	.02	0.95	0.76	0.18
		6.3	0.25	.002	.004	.008	.012	.02	.024	.031	.038	.041	.046	.05	0.95	0.76	0.18
		6.3	0.25	.0063	.011	.02	.025	.035	.045	.055	.065	.081	.09	.1	0.95	0.76	0.18
		6.3	0.25	.012	.021	.028	.045	.063	.085	.115	.147	.172	.19	.2	0.95	0.76	0.18
	577 =%	9.5	0.375	.006	.01	.02	.04	.06	.12	.2	.35	.5	.82	1	0.9	0.40	0.46
		9.5	0.375	.008	.015	.03	.05	.07	.14	.25	.41	.65	1	1.5	0.9	0.33	0.46
		9.5	0.375	.03	.09	.14	.25	.38	.55	.7	1	1.3	1.7	2.5	0.9	0.42	0.46
		20.6	0.8125	.19	.28	.52	.77	1.0	1.3	1.7	2.3	3.0	3.8	4	0.82	0.68	0.46
		20.6	0.8125	.16	.24	.38	.6	.95	1.5	2.5	3.7	5.3	7.5	8.5	0.9	0.68	0.46
		1.0625	1.0625	.2	.3	.6	.92	1.4	2.2	3.4	5.3	8.8	12	13	0.9	0.68	0.46
	548/ 588 =%	6.3	0.25	--	.013	.02	.026	.034	.044	.056	.07	.10	.15	.2	0.98	0.50	0.28
		6.3	0.25	--	.01	.017	.027	.041	.062	.091	.13	.23	.40	.5	0.98	0.49	0.28
		6.3	0.25	.006	.01	.02	.04	.06	.12	.2	.35	.5	.82	1	0.9	0.68	0.40
		9.5	0.375	.008	.015	.03	.05	.07	.14	.25	.41	.65	1	1.5	0.9	0.68	0.33
		9.5	0.375	.015	.03	.06	.1	.2	.3	.6	.9	1.3	1.8	2.5	0.9	0.68	0.42
		20.6	0.8125	.19	.28	.52	.77	1.0	1.3	1.7	2.3	3.0	3.8	4	0.82	0.42	0.46
		20.6	0.8125	--	.07	.22	.48	.85	1.6	3.6	5.1	6.8	8.8	10.1	0.9	0.68	0.46
		26.9	1.0625	--	.25	.52	.91	1.4	2.3	3.5	5.6	7.5	10.8	13.6	0.95	0.71	0.46
	677 Linear	9.5	0.375	.004	.01	.02	.03	.04	.05	.06	.07	.08	.09	.1	0.9	0.68	0.08
		9.5	0.375	.009	.02	.04	.06	.08	.1	.12	.14	.16	.18	.2	0.9	0.68	0.12
		9.5	0.375	.03	.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	0.9	0.68	0.19
		9.5	0.375	.05	.1	.2	.3	.4	.5	.6	.7	.8	.9	1	0.9	0.68	0.27
		9.5	0.375	.2	.5	.75	1	1.3	1.5	1.7	1.9	2.1	2.3	2.5	0.9	0.68	0.42
		20.6	0.8125	.22	.45	.82	1.3	1.8	2.2	2.6	3.1	3.8	4.5	5	0.9	0.68	0.46
	648/ 688 Linear	6.3	0.25	.03	.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	0.9	0.68	0.19
		6.3	0.25	.06	.12	.23	.34	.45	.55	.64	.73	.82	.9	1	0.9	0.68	0.40
		9.5	0.375	.1	.2	.3	.5	.6	.73	.87	1.0	1.1	1.3	1.5	0.9	0.68	0.33
		9.5	0.375	.2	.5	.75	1	1.3	1.5	1.7	1.9	2.1	2.3	2.5	0.9	0.68	0.68
		20.6	0.8125	.2	.4	.55	.7	1.0	1.3	1.6	2.1	2.6	3.3	4	0.9	0.68	0.46
		20.6	0.8125	.52	1	1.9	2.8	3.9	4.8	5.5	6.3	7.2	8.1	9	0.9	0.68	0.46
		26.9	1.0625	.6	1.3	2.6	4.2	5.5	6.8	8.1	9.4	10.7	12	13	0.9	0.68	0.46

1. Max travel is 0.5 inches.
2. At 100% travel.

Flow Up

CL150

Valve Size, NPS[1]	Trim/ Flow Char	Port Diameter		Experimentally Determined Cv at Valve Opening—Percent of Total Travel											F_L[2]	X_T[2]	F_d[2]
		mm	Inch	5	10	20	30	40	50	60	70	80	90	100			
1-1/2	577 =%	31.8	1.25	.31	1	1.7	2.6	3.7	5	6.5	9.5	13.5	17.5	20	0.9	0.68	0.46
		38.1	1.50	.3	.5	1.1	1.6	2.2	2.8	3.6	4.7	6.4	8.1	10	0.9	0.68	0.46
		38.1	1.50	.5	1	1.6	2.8	4.2	6	8.8	11.2	14.2	15.8	17	0.9	0.68	0.46
		38.1	1.50	.5	1	1.9	3	5	7.7	11	16	21	26	28	0.9	0.68	0.46
	548/588 =%	31.8	1.25	.25	.5	.7	1	1.4	2	2.8	3.6	5.7	7.9	10	0.9	0.68	0.46
		31.8	1.25	.25	.9	1.7	2.9	3.7	5	8.5	9.8	13.5	17.5	20	0.9	0.68	0.46
		38.1	1.50	.3	.5	1.1	1.6	2.2	2.8	3.6	4.7	6.4	8.1	10	0.9	0.68	0.46
		38.1	1.50	.4	1.1	1.7	2.7	4.1	6.1	8.9	11	14	16	17	0.9	0.68	0.46
		38.1	1.50	--	.76	1.6	2.6	4.4	7.0	12.2	17.3	22.7	29.2	32.9	0.95	0.86	0.46
	677 Linear	38.1	1.50	.4	.9	1.6	2.5	3.6	4.5	5.6	6.5	7.5	8.7	10	0.9	0.68	0.46
		38.1	1.50	.52	2.2	3.9	5.5	7	8.5	10	11.5	13.5	15.5	17	0.9	0.68	0.46
	648/688 Linear	31.8	1.25	.4	.9	1.6	2.5	3.6	4.5	5.6	6.5	7.5	8.7	10	0.9	0.68	0.46
		31.8	1.25	.52	2.2	3.9	5.5	8.5	10.5	12	14	16	18	20	0.9	0.68	0.46
		38.1	1.50	.4	.9	1.6	2.5	3.6	4.5	5.6	6.5	7.5	8.7	10	0.9	0.68	0.46
		38.1	1.50	.52	2.2	3.9	5.5	7	8.5	10	11.5	13.5	15.5	17	0.9	0.68	0.46
		38.1	1.50	1.5	3	6	9	12	15	18	20	23	26	28	0.9	0.68	0.46
2	577 =%	38.1	1.50	.3	.5	1.1	1.6	2.2	2.8	3.6	4.7	6.4	8.1	10	0.9	0.68	0.46
		38.1	1.50	.5	1	1.6	2.8	4.2	6	8.8	11.2	14.2	15.8	17	0.9	0.68	0.46
		38.1	1.50	.5	1	1.9	3	5	7.7	11	16	21	26	28	0.9	0.68	0.46
		50.8	2.0	.62	1.2	3.1	6.4	11	16	20	23	26	29	30	0.9	0.68	0.46
	548/588 =%	38.1	1.50	.3	.5	1.1	1.6	2.2	2.8	3.6	4.7	6.4	8.1	10	0.9	0.68	0.46
		38.1	1.50	.4	1.1	1.7	2.7	4.1	6.1	8.9	11	14	16	17	0.9	0.68	0.46
		38.1	1.50	--	.76	1.6	2.6	4.4	7.0	12.2	17.3	22.7	29.2	32.9	0.9	0.86	0.46
		50.8	2.0	.62	1.2	3.1	6.4	11	16	20	23	26	29	30	0.9	0.68	0.46
		50.8	2.0	--	1.5	3.5	6.1	11.1	17.1	27.3	37.3	44.6	50.1	52.9	0.91	0.77	0.46
	677 Linear	38.1	1.50	.4	.9	1.6	2.5	3.6	4.5	5.6	6.5	7.5	8.7	10	0.9	0.68	0.46
		38.1	1.50	.52	2.2	3.9	5.5	7	8.5	10	11.5	13.5	15.5	17	0.9	0.68	0.46
		50.8	2.0	1.5	3	6	9	12	14.9	17.8	19.8	23.9	26.9	30	0.9	0.68	0.46
		50.8	2.0	2	6	10	15	20	25	30	35	40	45	50	0.9	0.68	0.46
	648/688 Linear	38.1	1.50	.4	.9	1.6	2.5	3.6	4.5	5.6	6.5	7.5	8.7	10	0.9	0.68	0.46
		38.1	1.50	.52	2.2	3.9	5.5	7	8.5	10	11.5	13.5	15.5	17	0.9	0.68	0.46
		38.1	1.50	1.5	3.0	6.0	9.0	12	15	18	20	23	26	28	0.9	0.68	0.46
		50.8	2.0	1.5	3.0	6.0	9.0	12	14.9	17.8	19.8	23.9	26.9	30	0.9	0.68	0.46
		50.8	2.0	3.0	6.0	10	15	20	25	30	32	40	45	50	0.9	0.68	0.46

1. Max travel is 0.75 inches.
2. At 100% travel.

CL150 to CL300

Valve Size, NPS (1)	Trim / Flow Char	Port Diameter		Experimentally Determinded Cv at Valve Opening - Percent of Total Travel											FL(2)	XT(2)	Fd(2)
		mm	Inch	5	10	20	30	40	50	60	70	80	90	100			
1/2	102 Linear	6.3	.25	.00036	.0018	.0038	.0061	.008	.010	.012	.015	.016	.018	.02	0.95	0.76	0.05
		6.3	.25	.002	.004	.008	.012	.020	.024	.031	.038	.041	.046	.05	0.95	0.76	0.08
		6.3	.25	.0063	.011	.020	.025	.035	.045	.055	.065	.081	.09	.10	0.95	0.76	0.12
		6.3	.25	.012	.021	.028	.045	.063	.085	.115	.147	.172	.19	.20	0.95	0.76	0.17
	151 (Flow Down Only) Mod =%	4.0	.156	---	---	.00001	.00002	.00003	.00005	.00006	.00008	.0001	.00012	.00013	0.98	0.81	0.01
		4.0	.156	---	.00001	.00002	.00004	.00006	.00009	.00011	.00015	.0002	.00023	.00025	0.98	0.81	0.01
		4.0	.156	---	.00001	.00004	.00006	.00009	.00013	.00021	.00031	.0004	.00045	.0005	0.98	0.81	0.01
		4.0	.156	.00001	.00003	.00008	.00012	.00017	.00025	.00037	.0006	.0008	.0009	.001	0.98	0.81	0.02
		4.0	.156	.00002	.00007	.00017	.00025	.00036	.0005	.0007	.0010	.0015	.0018	.002	0.98	0.81	0.03
		4.0	.156	.00004	.0001	.00025	.0004	.00058	.0009	.0014	.0020	.0029	.0036	.004	0.98	0.81	0.04
		4.0	.156	.00008	.00015	.0003	.00057	.0010	.0017	.0029	.0046	.0062	.0072	.008	0.98	0.81	0.05
		4.0	.156	.00009	.00018	.0004	.0008	.0016	.0031	.0057	.0087	.011	.014	.015	0.98	0.81	0.07
		4.0	.156	.0001	.0002	.0005	.0012	.0028	.006	010	.016	.022	.026	.03	0.98	0.81	0.10
		4.0	.156	.00012	.00025	.0007	.0019	.005	.011	.022	.035	.046	.054	.06	0.98	0.81	0.15
		4.0	.156	.00015	.0003	.001	.003	.008	.021	.040	.062	.08	.09	.10	0.98	0.81	0.19
		4.0	.156	.0002	.0005	.002	.006	.016	.04	.079	.12	.16	.18	.20	0.98	0.81	0.29
		4.0	.156	.0017	.005	.011	.020	.034	.06	.11	.19	.29	.38	.45	0.98	0.81	0.51
	177 Mod =%	7.9	.3125	---	---	.00001	.00004	.00008	.00014	.0002	.00028	.00037	.00044	.0005	0.95	0.76	0.01
		7.9	.3125	---	.00001	.00007	.00015	.00024	.00036	.00048	.0006	.0008	.0009	.001	0.95	0.76	0.01
		7.9	.3125	.00001	.00002	.0002	.00029	.00047	.00071	.0010	.0013	.0016	.0018	.002	0.95	0.76	0.01
		7.9	.3125	.00003	.00006	.0003	.00051	.00099	.0016	.0021	.0028	.0035	.0041	.005	0.95	0.76	0.02
		7.9	.3125	.00004	.00007	.0004	.0010	.0018	.0029	.0045	.0060	.0074	.0085	.010	0.95	0.76	0.03
		7.9	.3125	.00007	.0003	.0005	.0016	.0031	.005	.0075	.011	.013	.017	.020	0.95	0.76	0.04
		7.9	.3125	.0001	.0005	.0011	.003	.007	.012	.017	.025	.031	.041	.050	0.95	0.76	0.06
	577 =%	9.5	.375	---	---	.029	.056	.098	.15	.20	.30	.44	.71	1.0	0.90	0.60	0.25
		9.5	.375	---	---	.056	.10	.16	.22	.44	.76	1.0	1.3	1.6	0.90	0.66	0.34
		9.5	.375	---	.054	.23	.39	.55	.72	.89	1.1	1.5	2.3	2.7	0.90	0.71	0.49
		20.6	.8125	---	.17	.40	.65	.89	1.1	1.5	2.1	2.7	3.2	3.9	0.90	0.62	0.23
		20.6	.8125	---	---	.83	1.5	2.1	2.7	3.2	4.5	5.2	5.7	6.1	0.90	0.53	0.30
	548/ 588 =%	6.3	.25	---	0.0013	0.0054	0.011	0.019	0.033	.045	.062	.094	.14	0.22	0.98	0.81	0.18
		6.3	.25	---	.012	.021	.029	.048	.065	.10	.14	.24	.41	.61	0.98	0.81	0.32
		6.3	.25	.006	.01	.02	.04	.06	.12	.2	.35	.5	.82	1.0	0.98	0.68	0.46
		9.5	.375	---	.036	.087	.13	.19	.26	.53	.85	1.1	1.4	1.6	0.90	0.66	0.34
		9.5	.375	---	.032	.073	.11	.18	.33	.54	1.1	2.0	2.6	2.9	0.90	0.76	0.52
		20.6	.8125	---	---	.37	.58	.80	1.0	1.4	1.9	2.6	3.1	3.9	0.82	0.65	0.22
		20.6	.8125	---	.13	.29	.56	.97	1.5	2.9	4.4	5.2	5.9	6.1	0.90	0.53	0.30
	677 Linear	9.5	.375	.004	.01	.02	.03	.04	.05	.06	.07	.08	.09	.10	0.90	0.68	0.07
		9.5	.375	.009	.02	.04	.06	.08	.1	.12	.14	.16	.18	.20	0.90	0.68	0.11
		9.5	.375	.030	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	0.90	0.68	0.17
		9.5	.375	---	.06	.17	.28	.40	.50	.61	.72	.82	.92	1.0	0.90	0.64	0.25
		9.5	.375	---	.04	.33	.63	.91	1.1	1.4	1.6	1.9	2.4	2.8	0.90	0.73	0.51
		20.6	.8125	---	.25	.65	1.0	1.4	1.8	2.1	2.5	2.8	3.1	3.4	0.90	0.81	0.21
	648/ 688 Linear	6.3	.25	.03	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	0.90	0.68	0.27
		6.3	.25	.01	.12	.23	.34	.45	.55	.64	.73	.82	.90	1.0	0.90	0.68	0.43
		9.5	.375	---	.03	.23	.44	.64	.83	1.0	1.1	1.3	1.5	1.6	0.90	0.66	0.34
		9.5	.375	---	.04	.32	.62	.90	1.1	1.4	1.6	1.9	2.5	2.9	0.90	0.76	0.52
		20.6	.8125	---	.30	.73	1.1	1.6	2.0	2.4	2.7	3.1	3.4	3.7	0.90	0.72	0.22
		20.6	.8125	---	.58	1.7	2.8	3.6	4.2	4.8	5.3	5.7	6.0	6.1	0.90	0.53	0.30

1. Max travel is 0.5 inches.
2. At 100% travel.

Flow Up

CL150 to CL300

Valve Size, NPS (1)	Trim/ Flow Char	Port Diameter		Experimentally Determinded Cv at Valve Opening - Percent of Total Travel											FL(2)	XT(2)	Fd(2)
		mm	Inch	5	10	20	30	40	50	60	70	80	90	100			
3/4	102 Linear	6.3	.25	.00036	.0018	.0038	.0061	.008	.010	.012	.015	.016	.018	.02	0.95	0.76	0.05
		6.3	.25	.002	.004	.008	.012	.020	.024	.031	.038	.041	.046	.05	0.95	0.76	0.08
		6.3	.25	.0063	.011	.020	.025	.035	.045	.055	.065	.081	.09	.10	0.95	0.76	0.12
		6.3	.25	.012	.021	.028	.045	.063	.085	.115	.147	.172	.19	.20	0.95	0.76	0.17
	151 (Flow Down Only) Mod =%	4.0	.156	---	---	.00001	.00002	.00003	.00005	.00006	.00008	.0001	.00012	.00013	0.98	0.81	0.01
		4.0	.156	---	.00001	.00002	.00004	.00006	.00009	.00011	.00015	.0002	.00023	.00025	0.98	0.81	0.01
		4.0	.156	---	.00001	.00004	.00006	.00009	.00013	.00021	.00031	.0004	.00045	.0005	0.98	0.81	0.01
		4.0	.156	.00001	.00003	.00008	.00012	.00017	.00025	.00037	.0006	.0008	.0009	.001	0.98	0.81	0.02
		4.0	.156	.00002	.00007	.00017	.00025	.00036	.0005	.0007	.0010	.0015	.0018	.002	0.98	0.81	0.03
		4.0	.156	.00004	.0001	.00025	.0004	.00058	.0009	.0014	.0020	.0029	.0036	.004	0.98	0.81	0.04
		4.0	.156	.00008	.00015	.0003	.00057	.0010	.0017	.0029	.0046	.0062	.0072	.008	0.98	0.81	0.05
		4.0	.156	.00009	.00018	.0004	.0008	.0016	.0031	.0057	.0087	.011	.014	.015	0.98	0.81	0.07
		4.0	.156	.0001	.0002	.0005	.0012	.0028	.006	010	.016	.022	.026	.03	0.98	0.81	0.10
		4.0	.156	.00012	.00025	.0007	.0019	.005	.011	.022	.035	.046	.054	.06	0.98	0.81	0.15
		4.0	.156	.00015	.0003	.001	.003	.008	.021	.040	.062	.08	.09	.10	0.98	0.81	0.19
		4.0	.156	.0002	.0005	.002	.006	.016	.04	.079	.12	.16	.18	.20	0.98	0.81	0.29
		4.0	.156	.0017	.005	.011	.020	.034	.06	.11	.19	.29	.38	.45	0.98	0.81	0.51
	177 Mod =%	7.9	.3125	---	---	.00001	.00004	.00008	.00014	.0002	.00028	.00037	.00044	.0005	0.95	0.76	0.01
		7.9	.3125	---	.00001	.00007	.00015	.00024	.00036	.00048	.0006	.0008	.0009	.001	0.95	0.76	0.01
		7.9	.3125	.00001	.00002	.0002	.00029	.00047	.00071	.0010	.0013	.0016	.0018	.002	0.95	0.76	0.01
		7.9	.3125	.00003	.00006	.0003	.00051	.00099	.0016	.0021	.0028	.0035	.0041	.005	0.95	0.76	0.02
		7.9	.3125	.00004	.00007	.0004	.0010	.0018	.0029	.0045	.0060	.0074	.0085	.010	0.95	0.76	0.03
		7.9	.3125	.00007	.0003	.0005	.0016	.0031	.005	.0075	.011	.013	.017	.020	0.95	0.76	0.04
		7.9	.3125	.0001	.0005	.0011	.003	.007	.012	.017	.025	.031	.041	.050	0.95	0.76	0.06
	577 =%	9.5	.375	---	---	.029	.056	.098	.15	.20	.30	.44	.71	1.0	0.90	0.60	0.25
		9.5	.375	---	---	.056	.10	.16	.22	.44	.76	1.0	1.3	1.6	0.90	0.66	0.34
		9.5	.375	---	.054	.23	.39	.55	.72	.89	1.1	1.5	2.3	2.7	0.90	0.71	0.49
		20.6	.8125	---	.17	.40	.65	.89	1.1	1.5	2.1	2.7	3.2	3.9	0.90	0.62	0.23
		20.6	.8125	.16	0.18	0.92	1.6	2.3	3	3.7	5.7	7.5	8.7	9.5	0.90	0.59	0.40
	548/ 588 =%	6.3	.25	---	.0013	.0054	.011	.019	.033	.045	.062	.094	.14	.22	0.98	0.81	0.18
		6.3	.25	---	.0110	.0210	.029	.048	.065	.10	.14	.24	.41	.61	0.98	0.81	0.32
		6.3	.25	.006	.010	.020	.04	.06	.12	.20	.35	.50	.82	1.0	0.90	0.68	0.43
		9.5	.375	---	.036	.087	.13	.19	.26	.53	.85	1.1	1.4	1.6	0.90	0.66	0.34
		9.5	.375	---	.032	.073	.11	.18	.33	.54	1.1	2.0	2.6	2.9	0.90	0.76	0.52
		20.6	.8125	---	---	.37	.58	.80	1.0	1.4	1.9	2.6	3.1	3.9	0.82	0.65	0.22
		20.6	.8125	---	.15	.31	.56	.98	1.6	2.8	5.0	6.7	8.6	9.8	0.82	0.60	0.38
	677 Linear	9.5	.375	.004	.01	.02	.03	.04	.05	.06	.07	.08	.09	.10	0.90	0.68	0.07
		9.5	.375	.009	.02	.04	.06	.08	.1	.12	.14	.16	.18	.20	0.90	0.68	0.11
		9.5	.375	.03	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	0.90	0.68	0.17
		9.5	.375	---	.06	.17	.28	.40	.50	.61	.72	.82	.92	1.0	0.90	0.64	0.25
		9.5	.375	---	.04	.33	.63	.91	1.1	1.4	1.6	1.9	2.4	2.8	0.90	0.73	0.51
		20.6	.8125	---	.25	.65	1.0	1.4	1.8	2.2	2.5	2.8	3.1	3.4	0.90	0.81	0.21
	648/ 688 Linear	6.3	.25	.03	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	0.90	0.68	0.27
		6.3	.25	.01	.12	.23	.34	.45	.55	.64	.73	.82	.90	1.0	0.90	0.68	0.43
		9.5	.375	---	.03	.23	.44	.64	.83	1.0	1.1	1.3	1.5	1.6	0.90	0.66	0.34
		9.5	.375	---	.04	.32	.62	.90	1.1	1.4	1.6	1.9	2.5	2.9	0.90	0.76	0.52
		20.6	.8125	---	.30	.73	1.1	1.6	2.0	2.4	2.7	3.1	3.4	3.7	0.90	0.72	0.22
		20.6	.8125	---	.51	1.7	2.9	3.9	4.9	5.9	7.0	7.9	8.8	9.8	0.90	0.60	0.41

1. Max travel is 0.5 inches.
2. At 100% travel.

CL150 to CL300

Valve Size, NPS (1)	Trim/ Flow Char	Port Diameter		Experimentally Determinded Cv at Valve Opening - Percent of Total Travel											FL(2)	XT(2)	Fd(2)
		mm	Inch	5	10	20	30	40	50	60	70	80	90	100			
1	102 Linear	6.3	.25	.00036	.0018	.0038	.0061	.008	.010	.012	.015	.016	.018	.02	0.95	0.76	0.05
		6.3	.25	.002	.004	.008	.012	.020	.024	.031	.038	.041	.046	.05	0.95	0.76	0.08
		6.3	.25	.0063	.011	.020	.025	.035	.045	.055	.065	.081	.09	.10	0.95	0.76	0.12
		6.3	.25	.012	.021	.028	.045	.063	.085	.115	.147	.172	.19	.20	0.95	0.76	0.17
	151 (Flow Down Only) Mod =%	4.0	.156	---	---	.00001	.00002	.00003	.00005	.00006	.00008	.0001	.00012	.00013	0.98	0.81	0.01
		4.0	.156	---	.00001	.00002	.00004	.00006	.00009	.00011	.00015	.0002	.00023	.00025	0.98	0.81	0.01
		4.0	.156	---	.00001	.00004	.00006	.00009	.00013	.00021	.00031	.0004	.00045	.0005	0.98	0.81	0.01
		4.0	.156	.00001	.00003	.00008	.00012	.00017	.00025	.00037	.0006	.0008	.0009	.001	0.98	0.81	0.02
		4.0	.156	.00002	.00007	.00017	.00025	.00036	.0005	.0007	.0010	.0015	.0018	.002	0.98	0.81	0.03
		4.0	.156	.00004	.0001	.00025	.0004	.00058	.0009	.0014	.0020	.0029	.0036	.004	0.98	0.81	0.04
		4.0	.156	.00008	.00015	.0003	.00057	.0010	.0017	.0029	.0046	.0062	.0072	.008	0.98	0.81	0.05
		4.0	.156	.00009	.00018	.0004	.0008	.0016	.0031	.0057	.0087	.011	.014	.015	0.98	0.81	0.07
		4.0	.156	.0001	.0002	.0005	.0012	.0028	.006	010	.016	.022	.026	.03	0.98	0.81	0.10
		4.0	.156	.00012	.00025	.0007	.0019	.005	.011	.022	.035	.046	.054	.06	0.98	0.81	0.15
		4.0	.156	.00015	.0003	.001	.003	.008	.021	.040	.062	.08	.09	.10	0.98	0.81	0.19
		4.0	.156	.0002	.0005	.002	.006	.016	.04	.079	.12	.16	.18	.20	0.98	0.81	0.29
		4.0	.156	.0017	.005	.011	.020	.034	.06	.11	.19	.29	.38	.45	0.98	0.81	0.51
	177 Mod =%	7.9	.3125	---	---	.00001	.00004	.00008	.00014	.0002	.00028	.00037	.00044	.0005	0.95	0.76	0.01
		7.9	.3125	---	.00001	.00007	.00015	.00024	.00036	.00048	.0006	.0008	.0009	.001	0.95	0.76	0.01
		7.9	.3125	.00001	.00002	.0002	.00029	.00047	.00071	.0010	.0013	.0016	.0018	.002	0.95	0.76	0.01
		7.9	.3125	.00003	.00006	.0003	.00051	.00099	.0016	.0021	.0028	.0035	.0041	.005	0.95	0.76	0.02
		7.9	.3125	.00004	.00007	.0004	.0010	.0018	.0029	.0045	.0060	.0074	.0085	.010	0.95	0.76	0.03
		7.9	.3125	.00007	.0003	.0005	.0016	.0031	.005	.0075	.011	.013	.017	.020	0.95	0.76	0.04
		7.9	.3125	.0001	.0005	.0011	.003	.007	.012	.017	.025	.031	.041	.050	0.95	0.76	0.06
	577 =%	9.5	.375	---	.019	.028	.062	.10	.15	.22	.32	.51	.79	1.1	0.90	0.63	0.27
		9.5	.375	---	.017	.056	.10	.16	.22	.47	.79	1.1	1.4	1.6	0.90	0.60	0.34
		9.5	.375	---	.052	.23	.39	.57	.73	.90	1.1	1.6	2.6	3.2	0.90	0.55	0.57
		20.6	.8125	---	.21	.45	.70	.96	1.2	1.6	2.4	3.0	3.7	5.0	0.90	0.47	0.26
		20.6	.8125	---	.27	.95	1.6	2.3	3.0	3.7	5.9	7.8	9.6	11	0.90	0.62	0.44
		27.0	1.0625	.20	.30	.60	.92	1.4	2.2	3.4	5.3	8.8	12	13	0.90	0.62	0.34
	548/ 588 =%	6.3	.25	---	.0013	.0054	.011	.019	.033	.045	.062	.094	.14	.22	0.98	0.81	0.18
		6.3	.25	---	.011	.0210	.029	.048	.065	.10	.14	.24	.41	.61	0.98	0.81	0.32
		6.3	.25	.006	.010	.020	.04	.06	.12	.20	.35	.50	.82	1.0	0.90	0.68	0.43
		9.5	.375	---	.029	.074	.12	.19	.26	.55	.88	1.2	1.5	1.7	0.90	0.64	0.35
		9.5	.375	---	.027	.067	.11	.18	.33	.54	1.0	2.2	3.0	3.3	0.90	0.62	0.58
		20.6	.8125	---	.17	.38	.65	.89	1.1	1.5	2.0	2.8	3.5	4.4	0.82	0.55	0.23
		20.6	.8125	---	.14	.31	.58	1.0	1.6	2.9	5.3	7.2	9.8	11	0.82	0.55	0.41
		27.0	1.0625	---	.27	.59	1.1	1.8	3.0	5.1	7.3	9.6	13.7	15.5	0.90	0.68	0.38
	677 Linear	9.5	.375	.004	.01	.02	.03	.04	.05	.06	.07	.08	.09	.10	0.90	0.68	0.07
		9.5	.375	.009	.02	.04	.06	.08	.1	.12	.14	.16	.18	.20	0.90	0.68	0.11
		9.5	.375	.03	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	0.90	0.68	0.17
		9.5	.375	---	.07	.19	.30	.41	.52	.63	.74	.85	.95	1.0	0.90	0.61	0.25
		9.5	.375	---	.04	.36	.66	.96	1.2	1.5	1.7	2.0	2.8	3.3	0.90	0.58	0.58
		20.6	.8125	---	.31	.74	1.1	1.5	1.9	2.3	2.7	3.1	3.7	5.1	0.90	0.46	0.27
	648/ 688 Linear	6.3	.25	.03	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	0.90	0.68	0.27
		6.3	.25	.01	.03	.09	.17	.23	.3	.37	.44	.52	.83	1.4	0.90	0.49	0.56
		9.5	.375	---	.03	.24	.45	.66	.86	1.0	1.2	1.4	1.6	1.7	0.90	0.60	0.35
		9.5	.375	---	.05	.37	.68	.97	1.2	1.5	1.7	2.1	2.9	3.3	0.90	0.61	0.58
		20.6	.8125	---	.25	.76	1.1	1.6	2.1	2.5	3.0	3.4	3.9	4.6	0.90	0.53	0.25
		20.6	.8125	---	.54	1.7	2.8	3.9	4.9	6.0	7.6	9.1	10	11	0.90	0.57	0.44
		27.0	1.0625	.6	1.3	2.6	4.2	5.5	6.8	8.1	9.4	10	12	13	0.90	0.68	0.34

1. 1. Max travel is 0.5 inches.
2. At 100% travel.

Flow Up

CL150 to CL300

Valve Size, NPS (1)	Trim/ Flow Char	Port Diameter		Experimentally Determinded Cv at Valve Opening - Percent of Total Travel											FL[2]	XT[2]	Fd[2]
		mm	Inch	5	10	20	30	40	50	60	70	80	90	100			
1-1/2	577 =%	31.8	1.25	.81	1.2	2.3	3.2	4.3	6.1	12	17	22	25	26	0.73	0.68	0.38
		38.1	1.50	---	.16	.29	.58	1.1	1.7	2.5	3.6	5.3	7.7	13	0.90	0.68	0.22
		38.1	1.50	.48	.80	1.5	2.1	2.8	3.5	4.8	6.9	10	14	20	0.77	0.68	0.26
		38.1	1.50	1.3	2.1	3.6	5.6	7.8	13	19	24	29	31	33	0.71	0.68	0.34
	548/ 588 =%	31.8	1.25	.16	.20	.35	.60	1.0	1.5	2.3	3.3	4.8	6.9	10	0.80	0.68	0.22
		31.8	1.25	.24	.53	1.1	1.8	2.8	4.2	9.5	14	20	25	27	0.72	0.68	0.39
		38.1	1.50	.13	.16	.29	.52	.92	1.5	2.4	3.5	5.2	7.6	11	0.89	0.68	0.20
		38.1	1.50	.50	.74	1.4	2.0	2.7	3.4	4.4	6.2	9.3	13	19	0.81	0.68	0.26
		38.1	1.50	.66	1.1	2.0	3.1	5.0	7.7	14	19	24	29	31	0.67	0.68	0.32
	677 Linear	31.8	1.25	.99	2.1	4.6	6.9	9.1	11	16	20	24	25	26	0.73	0.68	0.30
		38.1	1.50	.28	.96	2.4	3.7	5.1	6.4	7.7	8.9	10	11	14	0.90	0.68	0.23
		38.1	1.50	.59	.94	3.4	6.1	8.6	11	13	16	18	20	23	0.75	0.68	0.28
	648/ 688 Linear	31.8	1.25	---	.51	1.6	2.8	3.9	5.0	6.1	7.2	8.2	9.0	11	0.86	0.68	0.24
		31.8	1.25	.48	1.3	3.1	4.8	6.4	7.9	10	14	18	23	26	0.74	0.68	0.38
		38.1	1.50	.19	.45	1.8	3.2	4.5	5.8	7.1	8.4	9.8	11	12	0.82	0.68	0.20
		38.1	1.50	.25	.55	1.9	4.6	7.3	9.8	12	14	17	19	22	0.73	0.68	0.27
		38.1	1.50	.63	1.5	3.1	4.8	6.3	8.1	12	18	24	28	31	0.67	0.68	0.32
2	577 =%	38.1	1.50	.08	.12	.29	.59	1.1	1.9	2.9	4.2	6.2	9.1	13	0.90	0.68	0.22
		38.1	1.50	.48	.80	1.5	2.1	2.8	3.5	4.8	6.9	10	14	20	0.77	0.68	0.26
		38.1	1.50	1.3	2.1	3.6	5.6	7.5	13	19	25	31	35	38	0.64	0.68	0.35
		50.8	2.0	1.0	1.2	1.9	2.8	4.2	6.0	8.8	13	18	25	33	0.74	0.68	0.25
	548/ 588 =%	38.1	1.50	.13	.16	.29	.52	.92	1.5	2.4	3.5	5.2	7.6	11	0.89	0.68	0.20
		38.1	1.50	.20	.51	1.2	1.8	2.5	3.1	4.2	5.9	8.7	13	18	0.81	0.68	0.25
		38.1	1.50	.41	.82	1.7	2.7	4.5	7.2	11	19	25	30	35	0.67	0.68	0.34
		50.8	2.0	1.0	1.6	3.7	6.7	12	19	30	39	47	52	55	0.67	0.68	0.32
	677 Linear	38.1	1.50	.28	.96	2.4	3.7	5.1	6.4	7.7	8.9	10	11	14	0.90	0.68	0.23
		38.1	1.50	.59	.94	3.4	6.1	8.6	11	13	16	18	20	23	0.75	0.68	0.28
		50.8	2.0	4.3	5.9	9.8	13	17	20	24	27	30	34	37	0.60	0.68	0.23
		50.8	2.0	3.2	4.6	7.5	13	22	32	42	47	52	55	56	0.69	0.68	0.33
	648/ 688 Linear	38.1	1.50	.19	.45	1.9	3.2	4.6	5.9	7.2	8.4	9.8	11	12	0.82	0.68	0.20
		38.1	1.50	.25	.55	1.9	4.6	7.3	9.8	12	14	17	19	22	0.73	0.68	0.27
		38.1	1.50	.47	1.2	2.8	4.5	6.1	7.6	11	18	24	30	35	0.90	0.68	0.42
		50.8	2.0	.75	2.8	7.0	10	14	18	21	24	27	30	33	0.90	0.68	0.28
		50.8	2.0	1.0	1.3	3.9	7.4	12	19	29	39	46	51	55	0.90	0.68	0.38

1. Max travel is 0.75 inches.
2. At 100% travel.

CL150 to CL300

Valve Size, NPS[1]	Trim/ Flow Char	Port Diameter		Experimentally Determined Cv at Valve Opening—Percent of Total Travel											F_L[2]	X_T[2]	F_d[2]
		mm	Inch	5	10	20	30	40	50	60	70	80	90	100			
1/2	102 Linear	6.3	.25	.00036	.0018	.0038	.0061	.008	.010	.012	.015	.016	.018	.02	0.95	0.76	0.05
		6.3	.25	.002	.004	.008	.012	.020	.024	.031	.038	.041	.046	.05	0.95	0.76	0.08
		6.3	.25	.0063	.011	.020	.025	.035	.045	.055	.065	.081	.09	.10	0.95	0.76	0.12
		6.3	.25	.012	.021	.028	.045	.063	.085	.115	.147	.172	.19	.20	0.95	0.76	0.17
	151 (Flow Down Only) Mod =%	4.0	.156	---	---	.00001	.00002	.00003	.00005	.00006	.00008	.0001	.00012	.00013	0.98	0.81	0.01
		4.0	.156	---	.00001	.00002	.00004	.00006	.00009	.00011	.00015	.0002	.00023	.00025	0.98	0.81	0.01
		4.0	.156	---	.00001	.00004	.00006	.00009	.00013	.00021	.00031	.0004	.00045	.0005	0.98	0.81	0.01
		4.0	.156	.00001	.00003	.00008	.00012	.00017	.00025	.00037	.0006	.0008	.0009	.001	0.98	0.81	0.02
		4.0	.156	.00002	.00007	.00017	.00025	.00036	.0005	.0007	.0010	.0015	.0018	.002	0.98	0.81	0.03
		4.0	.156	.00004	.0001	.00025	.0004	.00058	.0009	.0014	.0020	.0029	.0036	.004	0.98	0.81	0.04
		4.0	.156	.00008	.00015	.0003	.00057	.0010	.0017	.0029	.0046	.0062	.0072	.008	0.98	0.81	0.05
		4.0	.156	.00009	.00018	.0004	.0008	.0016	.0031	.0057	.0087	.011	.014	.015	0.98	0.81	0.07
		4.0	.156	.0001	.0002	.0005	.0012	.0028	.006	010	.016	.022	.026	.03	0.98	0.81	0.10
		4.0	.156	.00012	.00025	.0007	.0019	.005	.011	.022	.035	.046	.054	.06	0.98	0.81	0.15
		4.0	.156	.00015	.0003	.001	.003	.008	.021	.040	.062	.08	.09	.10	0.98	0.81	0.19
		4.0	.156	.0002	.0005	.002	.006	.016	.04	.079	.12	.16	.18	.20	0.98	0.81	0.29
		4.0	.156	.0017	.005	.011	.020	.034	.06	.11	.19	.29	.38	.45	0.98	0.81	0.51
	177 Mod =%	7.9	.3125	---	---	.00001	.00004	.00008	.00014	.0002	.00028	.00037	.00044	.0005	0.95	0.76	0.01
		7.9	.3125	---	.00001	.00007	.00015	.00024	.00036	.00048	.0006	.0008	.0009	.001	0.95	0.76	0.01
		7.9	.3125	.00001	.00002	.0002	.00029	.00047	.00071	.0010	.0013	.0016	.0018	.002	0.95	0.76	0.01
		7.9	.3125	.00003	.00006	.0003	.00051	.00099	.0016	.0021	.0028	.0035	.0041	.005	0.95	0.76	0.02
		7.9	.3125	.00004	.00007	.0004	.0010	.0018	.0029	.0045	.0060	.0074	.0085	.010	0.95	0.76	0.03
		7.9	.3125	.00007	.0003	.0005	.0016	.0031	.005	.0075	.011	.013	.017	.020	0.95	0.76	0.04
		7.9	.3125	.0001	.0005	.0011	.003	.007	.012	.017	.025	.031	.041	.050	0.95	0.76	0.06
	577 =%	9.5	.375	.006	.01	.02	.04	.06	.12	.2	.35	.5	.82	1.0	0.9	0.68	0.40
		9.5	.375	.008	.015	.03	.05	.07	.14	.25	.41	.65	1.0	1.5	0.9	0.68	0.40
		9.5	.375	.03	.09	.14	.25	.38	.55	.7	1	1.3	1.7	2.5	0.9	0.68	0.33
	548/ 588 =%	6.3	.25	--	.013	.02	.026	.034	.044	.056	.07	.10	.15	.22	0.98	0.81	0.28
		6.3	.25	--	.01	.017	.027	.041	.062	.091	.136	.232	.406	.61	0.98	0.81	0.28
		6.3	.25	.006	.01	.02	.04	.06	.12	.2	.35	.5	.82	1.0	0.9	0.68	0.40
		9.5	.375	.008	.015	.03	.05	.07	.14	.25	.41	.65	1.0	1.5	0.9	0.68	0.40
		9.5	.375	.015	.03	.06	.1	.2	.35	.6	.9	1.3	1.8	2.5	0.9	0.68	0.33
	677 Linear	9.5	.375	.004	.01	.02	.03	.04	.05	.06	.07	.08	.09	.1	0.9	0.68	0.08
		9.5	.375	.009	.02	.04	.06	.08	.1	.12	.14	.16	.18	.2	0.9	0.68	0.08
		9.5	.375	.03	.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	0.9	0.68	0.12
		9.5	.375	.05	.1	.2	.3	.4	.5	.6	.7	.8	.9	1.0	0.9	0.68	0.19
		9.5	.375	.03	.09	.14	.25	.38	.55	.7	1	1.3	1.7	2.5	0.9	0.68	0.27
	648/ 688 Linear	6.3	.25	.03	.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	0.9	0.68	0.40
		6.3	.25	.01	.12	.23	.34	.45	.55	.64	.73	.82	.9	1.0	0.9	0.68	0.40
		9.5	.375	.1	.2	.3	.5	.6	.73	.87	1.0	1.1	1.3	1.5	0.9	0.68	0.33
		9.5	.375	.2	.5	.75	1	1.3	1.5	1.7	1.9	2.1	2.3	2.5	0.9	0.68	0.42

1. Max travel is 0.5 inches.
2. At 100% travel.

CL150 to CL300

Valve Size, NPS(1)	Trim/ Flow Char	Port Diameter		Experimentally Determined Cv at Valve Opening—Percent of Total Travel											F_L(2)	X_T(2)	F_d(2)
		mm	Inch	5	10	20	30	40	50	60	70	80	90	100			
1	102 Linear	6.3	.25	.00036	.0018	.0038	.0061	.008	.010	.012	.015	.016	.018	.02	0.95	0.76	0.05
		6.3	.25	.002	.004	.008	.012	.020	.024	.031	.038	.041	.046	.05	0.95	0.76	0.08
		6.3	.25	.0063	.011	.020	.025	.035	.045	.055	.065	.081	.09	.10	0.95	0.76	0.12
		6.3	.25	.012	.021	.028	.045	.063	.085	.115	.147	.172	.19	.20	0.95	0.76	0.17
	151 (Flow Down Only) Mod =%	4.0	.156	---	---	.00001	.00002	.00003	.00005	.00006	.00008	.0001	.00012	.00013	0.98	0.81	0.01
		4.0	.156	---	.00001	.00002	.00004	.00006	.00009	.00011	.00015	.0002	.00023	.00025	0.98	0.81	0.01
		4.0	.156	---	.00001	.00004	.00006	.00009	.00013	.00021	.00031	.0004	.00045	.0005	0.98	0.81	0.01
		4.0	.156	.00001	.00003	.00008	.00012	.00017	.00025	.00037	.0006	.0008	.0009	.001	0.98	0.81	0.02
		4.0	.156	.00002	.00007	.00017	.00025	.00036	.0005	.0007	.0010	.0015	.0018	.002	0.98	0.81	0.03
		4.0	.156	.00004	.0001	.00025	.0004	.00058	.0009	.0014	.0020	.0029	.0036	.004	0.98	0.81	0.04
		4.0	.156	.00008	.00015	.0003	.00057	.0010	.0017	.0029	.0046	.0062	.0072	.008	0.98	0.81	0.05
		4.0	.156	.00009	.00018	.0004	.0008	.0016	.0031	.0057	.0087	.011	.014	.015	0.98	0.81	0.07
		4.0	.156	.0001	.0002	.0005	.0012	.0028	.006	010	.016	.022	.026	.03	0.98	0.81	0.10
		4.0	.156	.00012	.00025	.0007	.0019	.005	.011	.022	.035	.046	.054	.06	0.98	0.81	0.15
		4.0	.156	.00015	.0003	.001	.003	.008	.021	.040	.062	.08	.09	.10	0.98	0.81	0.19
		4.0	.156	.0002	.0005	.002	.006	.016	.04	.079	.12	.16	.18	.20	0.98	0.81	0.29
		4.0	.156	.0017	.005	.011	.020	.034	.06	.11	.19	.29	.38	.45	0.98	0.81	0.51
	177 Mod =%	7.9	.3125	---	---	.00001	.00004	.00008	.00014	.0002	.00028	.00037	.00044	.0005	0.95	0.76	0.01
		7.9	.3125	---	.00001	.00007	.00015	.00024	.00036	.00048	.0006	.0008	.0009	.001	0.95	0.76	0.01
		7.9	.3125	.00001	.00002	.0002	.00029	.00047	.00071	.0010	.0013	.0016	.0018	.002	0.95	0.76	0.01
		7.9	.3125	.00003	.00006	.0003	.00051	.00099	.0016	.0021	.0028	.0035	.0041	.005	0.95	0.76	0.02
		7.9	.3125	.00004	.00007	.0004	.0010	.0018	.0029	.0045	.0060	.0074	.0085	.010	0.95	0.76	0.03
		7.9	.3125	.00007	.0003	.0005	.0016	.0031	.005	.0075	.011	.013	.017	.020	0.95	0.76	0.04
		7.9	.3125	.0001	.0005	.0011	.003	.007	.012	.017	.025	.031	.041	.050	0.95	0.76	0.06
	577 =%	9.5	.375	.006	.01	.02	.04	.06	.12	.2	.35	.5	.82	1.0	0.9	0.68	0.40
		9.5	.375	.008	.015	.03	.05	.07	.14	.25	.41	.65	1	1.5	0.9	0.68	0.40
		9.5	.375	.03	.09	.14	.25	.38	.55	.7	1	1.3	1.7	2.5	0.9	0.68	0.33
		20.6	.8125	.19	.28	.52	.77	1.0	1.3	1.7	2.3	3.0	3.8	4.0	0.82	0.68	0.42
		20.6	.8125	.16	.24	.38	.6	.95	1.5	2.4	3.7	5.3	7.5	8.5	0.9	0.68	0.42
	548/ 588 =%	6.3	.25	--	.013	.02	.026	.034	.044	.056	.07	.10	.15	.22	0.98	0.81	0.28
		6.3	.25	--	.01	.017	.027	.041	.062	.091	.13	.23	.40	.61	0.98	0.81	0.28
		6.3	.25	.006	.01	.02	.04	.06	.12	.2	.35	.5	.82	1.0	0.9	0.68	0.40
		9.5	.375	.008	.015	.03	.05	.07	.14	.25	.41	.65	1	1.5	0.9	0.68	0.40
		9.5	.375	.015	.03	.06	.1	.2	.35	.6	.9	1.3	1.8	2.5	0.9	0.68	0.33
		20.6	.8125	.19	.28	.52	.77	1.0	1.3	1.7	2.3	3.0	3.8	4.7	0.82	0.68	0.42
		20.6	.8125	.16	.24	.38	.7	1.1	1.7	2.6	3.8	5.7	8.5	9.5	0.9	0.68	0.42
	677 Linear	9.5	.375	.004	.01	.02	.03	.04	.05	.06	.07	.08	.09	.1	0.9	0.68	0.08
		9.5	.375	.009	.02	.04	.06	.08	.1	.12	.14	.16	.18	.2	0.9	0.68	0.08
		9.5	.375	.03	.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	0.9	0.68	0.12
		9.5	.375	.05	.1	.2	.3	.4	.5	.6	.7	.8	.9	1.0	0.9	0.68	0.19
		20.6	.8125	.22	.45	.82	1.2	1.6	2	2.4	2.8	3.2	3.6	4.0	0.9	0.68	0.27
	648/ 688 Linear	6.3	.25	.03	.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	0.9	0.68	0.40
		6.3	.25	.01	.12	.23	.34	.45	.55	.64	.73	.82	.9	1	0.9	0.68	0.40
		9.5	.375	.1	.2	.3	.5	.6	.73	.87	1.0	1.1	1.3	1.5	0.9	0.68	0.33
		9.5	.375	.2	.5	.75	1	1.3	1.5	1.7	1.9	2.1	2.3	2.5	0.9	0.68	0.42
		20.6	.8125	.2	.4	.55	.7	1.0	1.3	1.6	2.1	2.6	3.3	4.0	0.9	0.68	0.42
		20.6	.8125	.52	1	1.9	2.8	3.9	4.8	5.7	6.7	7.6	8.6	9.5	0.9	0.68	0.46

1. Max travel is 0.5 inches.
2. At 100% travel.

CL150 to CL300

Valve Size, NPS(1)	Trim/ Flow Char	Port Diameter		Experimentally Determined Cv at Valve Opening—Percent of Total Travel											F_L(2)	X_T(2)	F_d(2)
		mm	Inch	5	10	20	30	40	50	60	70	80	90	100			
1-1/2	577 =%	31.8	1.25	.31	1	1.7	2.6	3.7	5.3	7.6	11	13.5	16	17.5	0.9	0.68	0.46
	548/ 588 =%	31.8	1.25	.25	.5	.7	1	1.4	2	2.8	3.6	5	7	9	0.9	0.68	0.46
		31.8	1.25	.25	.9	1.7	2.6	3.7	5.3	7.6	11	13.5	16	17.5	0.9	0.68	0.46
	677 Linear	31.8	1.25	.31	1	1.7	2.6	3.7	5.3	7.6	11	13.5	16	17.5	0.9	0.68	0.46
	648/ 688 Linear	31.8	1.25	.52	2.2	3.9	5.5	7	8.5	10	11.5	13.5	15.5	17.5	0.9	0.68	0.46
2	577 =%	38.1	1.50	.3	.5	1.1	1.6	2.2	2.8	3.6	4.7	6.4	8.1	10	0.9	0.68	0.46
		38.1	1.50	0.5	1	1.6	2.8	4.2	6	8.8	11.2	14.2	15.8	18	0.9	0.68	0.46
		38.1	1.50	0.5	1	1.9	3	5	7.7	11	15	20	24	30.5	0.9	0.68	0.46
	548/ 588 =%	38.1	1.50	.3	.5	1.1	1.6	2.2	2.8	3.6	4.7	6.4	8.1	10	0.9	0.68	0.46
		38.1	1.50	.4	1.1	1.7	2.7	4.1	6.1	8.9	11	14	16	17.5	0.9	0.68	0.46
		38.1	1.50	.4	1	1.9	3	5	7.7	11	15	20	24	30.5	0.9	0.68	0.46
	677 Linear	38.1	1.50	.3	.5	1.1	1.6	2.2	2.8	3.6	4.7	6.4	8.1	10	0.9	0.68	0.46
		38.1	1.50	0.31	1	1.7	2.6	3.7	5.3	7.6	11	13.5	16	17.5	0.9	0.68	0.46
	648/ 688 Linear	38.1	1.50	.4	.9	1.6	2.5	3.6	4.5	5.6	6.5	7.5	8.7	10	0.9	0.68	0.46
		38.1	1.50	.53	2.2	3.9	5.5	7	8.5	10	11.5	13.5	15.5	17.5	0.9	0.68	0.46
		38.1	1.50	1.5	3	6	9	12	15	18	21	24	27	30.5	0.9	0.68	0.46
3	577 =%	50.8	2.0	0.72	1.4	3.6	7.5	12.8	18.7	23	27	30	33.8	35	0.9	0.68	0.46
	548/ 588 =%	50.8	2.0	.72	1.4	3.6	7.5	12.8	18.7	23	27	30	33.8	35	0.9	0.68	0.46
		50.8	2.0	--	1.5	3.8	6.4	11.2	18.2	28.5	37.8	45.3	50.3	61	0.9	0.68	0.46
	677 Linear	50.8	2.0	0.72	1.4	3.6	7.5	12.8	18.7	23	27	30	33.8	35	0.9	0.68	0.46
		50.8	2.0	3.1	6	13	20	26	32	38	44	50	55	61	0.9	0.68	0.46
	648/ 688 Linear	50.8	2.0	.72	1.4	3.6	7.5	12.8	18.7	23	27	30	33.8	35	0.9	0.68	0.46
		50.8	2.0	3	1.57	10	15	20	25	30	36	41	56	61	0.9	0.68	0.46

1. Max travel is 0.75 inches.
2. At 100% travel.

Baumann 24000F
CL150 to CL600

Flow Up

CL150 to CL600

Valve Size, NPS(1)	Trim/ Flow Char	Port Diameter		Experimentally Determined Cv at Valve Opening—Percent of Total Travel											F_L(2)	X_T(2)	F_d(2)
		mm	Inch	5	10	20	30	40	50	60	70	80	90	100			
1/2	102 Linear	6.3	.25	.00036	.0018	.0038	.0061	.008	.010	.012	.015	.016	.018	.02	0.95	0.76	0.05
		6.3	.25	.002	.004	.008	.012	.020	.024	.031	.038	.041	.046	.05	0.95	0.76	0.08
		6.3	.25	.0063	.011	.020	.025	.035	.045	.055	.065	.081	.09	.10	0.95	0.76	0.12
		6.3	.25	.012	.021	.028	.045	.063	.085	.115	.147	.172	.19	.20	0.95	0.76	0.17
	151 (Flow Down Only) Mod =%	4.0	.156	---	---	.00001	.00002	.00003	.00005	.00006	.00008	.0001	.00012	.00013	0.98	0.81	0.01
		4.0	.156	---	.00001	.00002	.00004	.00006	.00009	.00011	.00015	.0002	.00023	.00025	0.98	0.81	0.01
		4.0	.156	---	.00001	.00004	.00006	.00009	.00013	.00021	.00031	.0004	.00045	.0005	0.98	0.81	0.01
		4.0	.156	.00001	.00003	.00008	.00012	.00017	.00025	.00037	.0006	.0008	.0009	.001	0.98	0.81	0.02
		4.0	.156	.00002	.00007	.00017	.00025	.00036	.0005	.0007	.0010	.0015	.0018	.002	0.98	0.81	0.03
		4.0	.156	.00004	.0001	.00025	.0004	.00058	.0009	.0014	.0020	.0029	.0036	.004	0.98	0.81	0.04
		4.0	.156	.00008	.00015	.0003	.00057	.0010	.0017	.0029	.0046	.0062	.0072	.008	0.98	0.81	0.05
		4.0	.156	.00009	.00018	.0004	.0008	.0016	.0031	.0057	.0087	.011	.014	.015	0.98	0.81	0.07
		4.0	.156	.0001	.0002	.0005	.0012	.0028	.006	010	.016	.022	.026	.03	0.98	0.81	0.10
		4.0	.156	.00012	.00025	.0007	.0019	.005	.011	.022	.035	.046	.054	.06	0.98	0.81	0.15
		4.0	.156	.00015	.0003	.001	.003	.008	.021	.040	.062	.08	.09	.10	0.98	0.81	0.19
		4.0	.156	.0002	.0005	.002	.006	.016	.04	.079	.12	.16	.18	.20	0.98	0.81	0.29
		4.0	.156	.0017	.005	.011	.020	.034	.06	.11	.19	.29	.38	.45	0.98	0.81	0.51
	177 Mod =%	7.9	.3125	---	---	.00001	.00004	.00008	.00014	.0002	.00028	.00037	.00044	.0005	0.95	0.76	0.01
		7.9	.3125	---	.00001	.00007	.00015	.00024	.00036	.00048	.0006	.0008	.0009	.001	0.95	0.76	0.01
		7.9	.3125	.00001	.00002	.0002	.00029	.00047	.00071	.0010	.0013	.0016	.0018	.002	0.95	0.76	0.01
		7.9	.3125	.00003	.00006	.0003	.00051	.00099	.0016	.0021	.0028	.0035	.0041	.005	0.95	0.76	0.02
		7.9	.3125	.00004	.00007	.0004	.0010	.0018	.0029	.0045	.0060	.0074	.0085	.010	0.95	0.76	0.03
		7.9	.3125	.00007	.0003	.0005	.0016	.0031	.005	.0075	.011	.013	.017	.020	0.95	0.76	0.04
		7.9	.3125	.0001	.0005	.0011	.003	.007	.012	.017	.025	.031	.041	.050	0.95	0.76	0.06
	577 =%	9.5	.375	.006	.01	.02	.04	.06	.12	.2	.35	.5	.82	1	0.9	0.68	0.42
		9.5	.375	.008	.015	.03	.05	.07	.14	.25	.41	.65	1	1.5	0.9	0.68	0.42
		9.5	.375	.03	.09	.14	.25	.38	.55	.7	1	1.3	1.7	2	0.9	0.68	0.42
	548/ 588 =%	6.3	.25	--	.013	.016	.022	.032	.042	.056	.082	0.12	0.16	0.2	0.98	0.50	0.28
		6.3	.25	--	.014	.023	.033	.045	.069	.098	0.14	0.25	0.4	0.5	0.98	0.49	0.28
		6.3	.25	.009	.014	.028	.048	0.08	0.12	.20	0.34	0.54	0.8	1.0	0.9	0.68	0.46
		9.5	.375	.035	.043	0.094	0.14	0.2	0.26	0.54	0.84	1.1	1.3	1.5	0.9	0.68	0.46
		9.5	.375	.025	.031	.098	0.11	0.18	0.31	0.5	1.0	1.7	1.9	2.0	0.9	0.68	0.46
	677 Linear	9.5	.375	.004	.01	.02	.03	.04	.05	.06	.07	.08	.09	.1	0.9	0.68	0.08
		9.5	.375	.009	.02	.04	.06	.08	.1	.12	.14	.16	.18	.2	0.9	0.68	0.12
		9.5	.375	.03	.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	0.9	0.68	0.19
		9.5	.375	.05	.1	.2	.3	.4	.5	.6	.7	.8	.9	1.0	0.9	0.68	0.27
		9.5	.375	.2	.5	.75	1	1.3	1.5	1.6	1.7	1.8	1.9	2.0	0.9	0.68	0.46
	648/ 688 Linear	6.3	.25	.03	.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	0.9	0.68	0.46
		6.3	.25	.01	.12	.23	.34	.45	.55	.64	.73	.82	.9	1.0	0.9	0.68	0.46
		9.5	.375	.1	.2	.3	.5	.6	.73	.87	1.02	1.15	1.3	1.5	0.9	0.68	0.46
		9.5	.375	--	.083	0.32	.54	.72	.91	1.1	1.2	1.7	1.9	2.0	0.9	0.68	0.46

1. Max travel is 0.5 inches.
2. At 100% travel.

CL150 to CL600

Valve Size, NPS(1)	Trim/ Flow Char	Port Diameter		Experimentally Determined Cv at Valve Opening—Percent of Total Travel											F_L(2)	X_T(2)	F_d(2)
		mm	Inch	5	10	20	30	40	50	60	70	80	90	100			
3/4	102 Linear	6.3	.25	.00036	.0018	.0038	.0061	.008	.010	.012	.015	.016	.018	.02	0.95	0.76	0.05
		6.3	.25	.002	.004	.008	.012	.020	.024	.031	.038	.041	.046	.05	0.95	0.76	0.08
		6.3	.25	.0063	.011	.020	.025	.035	.045	.055	.065	.081	.09	.10	0.95	0.76	0.12
		6.3	.25	.012	.021	.028	.045	.063	.085	.115	.147	.172	.19	.20	0.95	0.76	0.17
	151 (Flow Down Only) Mod =%	4.0	.156	---	---	.00001	.00002	.00003	.00005	.00006	.00008	.0001	.00012	.00013	0.98	0.81	0.01
		4.0	.156	---	.00001	.00002	.00004	.00006	.00009	.00011	.00015	.0002	.00023	.00025	0.98	0.81	0.01
		4.0	.156	---	.00001	.00004	.00006	.00009	.00013	.00021	.00031	.0004	.00045	.0005	0.98	0.81	0.01
		4.0	.156	.00001	.00003	.00008	.00012	.00017	.00025	.00037	.0006	.0008	.0009	.001	0.98	0.81	0.02
		4.0	.156	.00002	.00007	.00017	.00025	.00036	.0005	.0007	.0010	.0015	.0018	.002	0.98	0.81	0.03
		4.0	.156	.00004	.0001	.00025	.0004	.00058	.0009	.0014	.0020	.0029	.0036	.004	0.98	0.81	0.04
		4.0	.156	.00008	.00015	.0003	.00057	.0010	.0017	.0029	.0046	.0062	.0072	.008	0.98	0.81	0.05
		4.0	.156	.00009	.00018	.0004	.0008	.0016	.0031	.0057	.0087	.011	.014	.015	0.98	0.81	0.07
		4.0	.156	.0001	.0002	.0005	.0012	.0028	.006	010	.016	.022	.026	.03	0.98	0.81	0.10
		4.0	.156	.00012	.00025	.0007	.0019	.005	.011	.022	.035	.046	.054	.06	0.98	0.81	0.15
		4.0	.156	.00015	.0003	.001	.003	.008	.021	.040	.062	.08	.09	.10	0.98	0.81	0.19
		4.0	.156	.0002	.0005	.002	.006	.016	.04	.079	.12	.16	.18	.20	0.98	0.81	0.29
		4.0	.156	.0017	.005	.011	.020	.034	.06	.11	.19	.29	.38	.45	0.98	0.81	0.51
	177 Mod =%	7.9	.3125	---	---	.00001	.00004	.00008	.00014	.0002	.00028	.00037	.00044	.0005	0.95	0.76	0.01
		7.9	.3125	---	.00001	.00007	.00015	.00024	.00036	.00048	.0006	.0008	.0009	.001	0.95	0.76	0.01
		7.9	.3125	.00001	.00002	.0002	.00029	.00047	.00071	.0010	.0013	.0016	.0018	.002	0.95	0.76	0.01
		7.9	.3125	.00003	.00006	.0003	.00051	.00099	.0016	.0021	.0028	.0035	.0041	.005	0.95	0.76	0.02
		7.9	.3125	.00004	.00007	.0004	.0010	.0018	.0029	.0045	.0060	.0074	.0085	.010	0.95	0.76	0.03
		7.9	.3125	.00007	.0003	.0005	.0016	.0031	.005	.0075	.011	.013	.017	.020	0.95	0.76	0.04
		7.9	.3125	.0001	.0005	.0011	.003	.007	.012	.017	.025	.031	.041	.050	0.95	0.76	0.06
	577 =%	9.5	.375	.006	.01	.02	.04	.06	.12	.2	.35	.5	.82	1.0	0.9	0.68	0.42
		9.5	.375	.008	.015	.03	.05	.07	.14	.25	.41	.65	1	1.5	0.9	0.68	0.42
		9.5	.375	.03	.09	.14	.25	.38	.55	.7	1	1.3	1.7	2.0	0.9	0.68	0.42
	548/ 588 =%	6.3	.25	--	.017	.023	.029	.037	.045	.056	.083	0.12	0.16	0.2	0.98	0.50	0.28
		6.3	.25	--	.014	.022	.032	.045	.067	.096	0.13	0.22	0.39	0.5	0.98	0.49	0.28
		6.3	.25	.016	.020	.034	.056	.07	0.13	.20	0.33	0.5	0.89	1	0.9	0.68	0.46
		9.5	.375	.026	.034	.084	0.13	0.19	0.26	0.55	0.86	1.1	1.3	1.5	0.9	0.68	0.46
		9.5	.375	.031	.039	.078	0.12	0.19	0.33	0.51	1.1	1.7	1.9	2.0	0.9	0.68	0.46
	677 Linear	9.5	.375	.004	.01	.02	.03	.04	.05	.06	.07	.08	.09	.1	0.9	0.68	0.08
		9.5	.375	.009	.02	.04	.06	.08	.1	.12	.14	.16	.18	.2	0.9	0.68	0.12
		9.5	.375	.03	.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	0.9	0.68	0.19
		9.5	.375	.05	.1	.2	.3	.4	.5	.6	.7	.8	.9	1.0	0.9	0.68	0.27
		9.5	.375	.2	.5	.75	1	1.3	1.5	1.7	1.9	2.1	2.3	2.0	0.9	0.68	0.46
	648/ 688 Linear	6.3	.25	.03	.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	0.9	0.68	0.46
		6.3	.25	.01	.14	.23	.34	.45	.55	.64	.73	.82	.9	1.0	0.9	0.68	0.46
		9.5	.375	.1	.2	.3	.5	.6	.73	.87	1.02	1.15	1.3	1.5	0.9	0.68	0.46
		9.5	.375	.2	.5	.75	1	1.3	1.5	1.7	1.9	2.1	2.3	2.0	.9.	0.68	0.46

1. Max travel is 0.5 inches.
2. At 100% travel.

CL150 to CL600

Valve Size, NPS(1)	Trim/ Flow Char	Port Diameter		Experimentally Determined Cv at Valve Opening—Percent of Total Travel											F_L(2)	X_T(2)	F_d(2)
		mm	Inch	5	10	20	30	40	50	60	70	80	90	100			
1	102 Linear	6.3	.25	.00036	.0018	.0038	.0061	.008	.010	.012	.015	.016	.018	.02	0.95	0.76	0.05
		6.3	.25	.002	.004	.008	.012	.020	.024	.031	.038	.041	.046	.05	0.95	0.76	0.08
		6.3	.25	.0063	.011	.020	.025	.035	.045	.055	.065	.081	.09	.10	0.95	0.76	0.12
		6.3	.25	.012	.021	.028	.045	.063	.085	.115	.147	.172	.19	.20	0.95	0.76	0.17
	151 (Flow Down Only) Mod =%	4.0	.156	---	---	.00001	.00002	.00003	.00005	.00006	.00008	.0001	.00012	.00013	0.98	0.81	0.01
		4.0	.156	---	.00001	.00002	.00004	.00006	.00009	.00011	.00015	.0002	.00023	.00025	0.98	0.81	0.01
		4.0	.156	---	.00001	.00004	.00006	.00009	.00013	.00021	.00031	.0004	.00045	.0005	0.98	0.81	0.01
		4.0	.156	.00001	.00003	.00008	.00012	.00017	.00025	.00037	.0006	.0008	.0009	.001	0.98	0.81	0.02
		4.0	.156	.00002	.00007	.00017	.00025	.00036	.0005	.0007	.0010	.0015	.0018	.002	0.98	0.81	0.03
		4.0	.156	.00004	.0001	.00025	.0004	.00058	.0009	.0014	.0020	.0029	.0036	.004	0.98	0.81	0.04
		4.0	.156	.00008	.00015	.0003	.00057	.0010	.0017	.0029	.0046	.0062	.0072	.008	0.98	0.81	0.05
		4.0	.156	.00009	.00018	.0004	.0008	.0016	.0031	.0057	.0087	.011	.014	.015	0.98	0.81	0.07
		4.0	.156	.0001	.0002	.0005	.0012	.0028	.006	010	.016	.022	.026	.03	0.98	0.81	0.10
		4.0	.156	.00012	.00025	.0007	.0019	.005	.011	.022	.035	.046	.054	.06	0.98	0.81	0.15
		4.0	.156	.00015	.0003	.001	.003	.008	.021	.040	.062	.08	.09	.10	0.98	0.81	0.19
		4.0	.156	.0002	.0005	.002	.006	.016	.04	.079	.12	.16	.18	.20	0.98	0.81	0.29
		4.0	.156	.0017	.005	.011	.020	.034	.06	.11	.19	.29	.38	.45	0.98	0.81	0.51
	177 Mod =%	7.9	.3125	---	---	.00001	.00004	.00008	.00014	.0002	.00028	.00037	.00044	.0005	0.95	0.76	0.01
		7.9	.3125	---	.00001	.00007	.00015	.00024	.00036	.00048	.0006	.0008	.0009	.001	0.95	0.76	0.01
		7.9	.3125	.00001	.00002	.0002	.00029	.00047	.00071	.0010	.0013	.0016	.0018	.002	0.95	0.76	0.01
		7.9	.3125	.00003	.00006	.0003	.00051	.00099	.0016	.0021	.0028	.0035	.0041	.005	0.95	0.76	0.02
		7.9	.3125	.00004	.00007	.0004	.0010	.0018	.0029	.0045	.0060	.0074	.0085	.010	0.95	0.76	0.03
		7.9	.3125	.00007	.0003	.0005	.0016	.0031	.005	.0075	.011	.013	.017	.020	0.95	0.76	0.04
		7.9	.3125	.0001	.0005	.0011	.003	.007	.012	.017	.025	.031	.041	.050	0.95	0.76	0.06
	577 =%	9.5	.375	.006	.01	.02	.04	.06	.12	.2	.35	.5	.82	1.0	0.9	0.68	0.42
		9.5	.375	.008	.015	.03	.05	.07	.14	.25	.41	.65	1	1.5	0.9	0.68	0.42
		9.5	.375	.03	.09	.14	.25	.38	.55	.7	1	1.3	1.7	2.5	0.9	0.68	0.42
		20.6	.8125	.19	.28	.52	.77	1.0	1.3	1.7	2.3	3.0	3.8	4.0	0.82	0.68	0.42
		20.6	.8125	.16	.24	.38	.6	.7	1	1.4	2.2	3.3	4.4	6.5	0.9	0.68	0.42
	548/588 =%	6.3	.25	--	.017	.023	.029	.037	.045	.056	.082	.12	.16	0.2	0.98	0.50	0.28
		6.3	.25	--	.014	.021	.031	.046	.067	.095	.14	.23	.39	0.5	0.98	0.49	0.28
		6.3	.25	.013	.017	.030	.052	.083	.12	.20	.34	.51	.93	1.0	0.9	0.68	0.46
		9.5	.375	.025	.033	.08	.13	.18	.25	.54	.85	1.1	1.4	1.5	0.9	0.68	0.46
		9.5	.375	.024	.030	.068	.11	.18	.32	.51	1.0	1.9	2.4	2.5	0.9	0.68	0.46
		20.6	.8125	.12	.21	.44	.67	.91	1.1	1.5	2.0	2.6	3.3	4.0	0.9	0.68	0.46
		20.6	.8125	.10	.15	.31	.57	.96	1.5	2.8	4.6	5.6	6.2	6.5	0.9	0.68	0.46
	677 Linear	9.5	.375	.004	.01	.02	.03	.04	.05	.06	.07	.08	.09	.1	0.9	0.68	0.08
		9.5	.375	.009	.02	.04	.06	.08	.1	.12	.14	.16	.18	.2	0.9	0.68	0.12
		9.5	.375	.03	.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	0.9	0.68	0.19
		9.5	.375	.05	.1	.2	.3	.4	.5	.6	.7	.8	.9	1.0	0.9	0.68	0.27
		9.5	.375	.2	.5	.75	1	1.3	1.5	1.7	1.9	2.1	2.3	2.5	0.9	0.68	0.46
		20.6	.8125	.22	.45	.82	1.2	1.6	2	2.4	2.8	3.2	3.6	4.0	0.9	0.68	0.46
	648/688 Linear	6.3	.25	.03	.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	0.9	0.68	0.46
		6.3	.25	.01	.12	.23	.34	.45	.55	.64	.73	.82	.9	1.0	0.9	0.68	0.46
		9.5	.375	.1	.2	.3	.5	.6	.73	.87	1.02	1.15	1.3	1.5	0.9	0.68	0.46
		9.5	.375	.2	.5	.75	1	1.3	1.5	1.7	1.9	2.1	2.3	2.5	0.9	0.68	0.46
		20.6	.8125	.2	.4	.55	.7	1.02	1.31	1.6	2.1	2.65	3.3	4.0	0.9	0.68	0.46
		20.6	.8125	.52	1	1.9	2.8	3.9	4.8	5.5	5.7	6	6.3	6.5	0.9	0.68	0.46

1. Max travel is 0.5 inches.
2. At 100% travel.

CWP 3000 to 6000 PSI

Valve Size, NPS(1)	Trim/ Flow Char	Port Diameter		Experimentally Determined Cv at Valve Opening—Percent of Total Travel											F_L(2)	X_T(2)	F_d(2)
		mm	Inch	5	10	20	30	40	50	60	70	80	90	100			
1/2	102 Linear	6.3	.25	.00036	.0018	.0038	.0061	.008	.010	.012	.015	.016	.018	.02	0.95	0.76	0.05
		6.3	.25	.002	.004	.008	.012	.020	.024	.031	.038	.041	.046	.05	0.95	0.76	0.08
		6.3	.25	.0063	.011	.020	.025	.035	.045	.055	.065	.081	.09	.10	0.95	0.76	0.12
		6.3	.25	.012	.021	.028	.045	.063	.085	.115	.147	.172	.19	.20	0.95	0.76	0.17
	151 (Flow Down Only) Mod =%	4.0	.156	---	---	.00001	.00002	.00003	.00005	.00006	.00008	.0001	.00012	.00013	0.98	0.81	0.01
		4.0	.156	---	.00001	.00002	.00004	.00006	.00009	.00011	.00015	.0002	.00023	.00025	0.98	0.81	0.01
		4.0	.156	---	.00001	.00004	.00006	.00009	.00013	.00021	.00031	.0004	.00045	.0005	0.98	0.81	0.01
		4.0	.156	.00001	.00003	.00008	.00012	.00017	.00025	.00037	.0006	.0008	.0009	.001	0.98	0.81	0.02
		4.0	.156	.00002	.00007	.00017	.00025	.00036	.0005	.0007	.0010	.0015	.0018	.002	0.98	0.81	0.03
		4.0	.156	.00004	.0001	.00025	.0004	.00058	.0009	.0014	.0020	.0029	.0036	.004	0.98	0.81	0.04
		4.0	.156	.00008	.00015	.0003	.00057	.0010	.0017	.0029	.0046	.0062	.0072	.008	0.98	0.81	0.05
		4.0	.156	.00009	.00018	.0004	.0008	.0016	.0031	.0057	.0087	.011	.014	.015	0.98	0.81	0.07
		4.0	.156	.0001	.0002	.0005	.0012	.0028	.006	010	.016	.022	.026	.03	0.98	0.81	0.10
		4.0	.156	.00012	.00025	.0007	.0019	.005	.011	.022	.035	.046	.054	.06	0.98	0.81	0.15
		4.0	.156	.00015	.0003	.001	.003	.008	.021	.040	.062	.08	.09	.10	0.98	0.81	0.19
		4.0	.156	.0002	.0005	.002	.006	.016	.04	.079	.12	.16	.18	.20	0.98	0.81	0.29
		4.0	.156	.0017	.005	.011	.020	.034	.06	.11	.19	.29	.38	.45	0.98	0.81	0.51
	177 Mod =%	7.9	.3125	---	---	.00001	.00004	.00008	.00014	.0002	.00028	.00037	.00044	.0005	0.95	0.76	0.01
		7.9	.3125	---	.00001	.00007	.00015	.00024	.00036	.00048	.0006	.0008	.0009	.001	0.95	0.76	0.01
		7.9	.3125	.00001	.00002	.0002	.00029	.00047	.00071	.0010	.0013	.0016	.0018	.002	0.95	0.76	0.01
		7.9	.3125	.00003	.00006	.0003	.00051	.00099	.0016	.0021	.0028	.0035	.0041	.005	0.95	0.76	0.02
		7.9	.3125	.00004	.00007	.0004	.0010	.0018	.0029	.0045	.0060	.0074	.0085	.010	0.95	0.76	0.03
		7.9	.3125	.00007	.0003	.0005	.0016	.0031	.005	.0075	.011	.013	.017	.020	0.95	0.76	0.04
		7.9	.3125	.0001	.0005	.0011	.003	.007	.012	.017	.025	.031	.041	.050	0.95	0.76	0.06
	577 =%	9.5	.375	.006	.01	.02	.04	.06	.12	.2	.35	.5	.82	1	0.9	0.68	0.42
		9.5	.375	.008	.015	.03	.05	.07	.14	.25	.41	.65	1	1.5	0.9	0.68	0.42
		9.5	.375	.03	.09	.14	.25	.38	.55	.7	1	1.3	1.7	2	0.9	0.68	0.42
	548/ 588 =%	6.3	.25	--	.013	.016	.022	.032	.042	.056	.082	0.12	0.16	0.2	0.98	0.50	0.28
		6.3	.25	--	.014	.023	.033	.045	.069	.098	0.14	0.25	0.4	0.5	0.98	0.49	0.28
		6.3	.25	.009	.014	.028	.048	0.08	0.12	.20	0.34	0.54	0.8	1.0	0.9	0.68	0.46
		9.5	.375	.035	.043	0.094	0.14	0.2	0.26	0.54	0.84	1.1	1.3	1.5	0.9	0.68	0.46
		9.5	.375	.025	.031	.098	0.11	0.18	0.31	0.5	1.0	1.7	1.9	2.0	0.9	0.68	0.46
	677 Linear	9.5	.375	.004	.01	.02	.03	.04	.05	.06	.07	.08	.09	.1	0.9	0.68	0.08
		9.5	.375	.009	.02	.04	.06	.08	.1	.12	.14	.16	.18	.2	0.9	0.68	0.12
		9.5	.375	.03	.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	0.9	0.68	0.19
		9.5	.375	.05	.1	.2	.3	.4	.5	.6	.7	.8	.9	1.0	0.9	0.68	0.27
		9.5	.375	.2	.5	.75	1	1.3	1.5	1.6	1.7	1.8	1.9	2.0	0.9	0.68	0.46
	648/ 688 Linear	6.3	.25	.03	.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	0.9	0.68	0.46
		6.3	.25	.01	.12	.23	.34	.45	.55	.64	.73	.82	.9	1.0	0.9	0.68	0.46
		9.5	.375	.1	.2	.3	.5	.6	.73	.87	1.02	1.15	1.3	1.5	0.9	0.68	0.46
		9.5	.375	--	.083	0.32	.54	.72	.91	1.1	1.2	1.7	1.9	2.0	0.9	0.68	0.46

1. Max travel is 0.5 inches.
2. At 100% travel.

Flow Up

CWP 3000 to 6000 PSI

Valve Size, NPS(1)	Trim/ Flow Char	Port Diameter		Experimentally Determined Cv at Valve Opening—Percent of Total Travel											F_L(2)	X_T(2)	F_d(2)
		mm	Inch	5	10	20	30	40	50	60	70	80	90	100			
3/4	102 Linear	6.3	.25	.00036	.0018	.0038	.0061	.008	.010	.012	.015	.016	.018	.02	0.95	0.76	0.05
		6.3	.25	.002	.004	.008	.012	.020	.024	.031	.038	.041	.046	.05	0.95	0.76	0.08
		6.3	.25	.0063	.011	.020	.025	.035	.045	.055	.065	.081	.09	.10	0.95	0.76	0.12
		6.3	.25	.012	.021	.028	.045	.063	.085	.115	.147	.172	.19	.20	0.95	0.76	0.17
	151 (Flow Down Only) Mod =%	4.0	.156	---	---	.00001	.00002	.00003	.00005	.00006	.00008	.0001	.00012	.00013	0.98	0.81	0.01
		4.0	.156	---	.00001	.00002	.00004	.00006	.00009	.00011	.00015	.0002	.00023	.00025	0.98	0.81	0.01
		4.0	.156	---	.00001	.00004	.00006	.00009	.00013	.00021	.00031	.0004	.00045	.0005	0.98	0.81	0.01
		4.0	.156	.00001	.00003	.00008	.00012	.00017	.00025	.00037	.0006	.0008	.0009	.001	0.98	0.81	0.02
		4.0	.156	.00002	.00007	.00017	.00025	.00036	.0005	.0007	.0010	.0015	.0018	.002	0.98	0.81	0.03
		4.0	.156	.00004	.0001	.00025	.0004	.00058	.0009	.0014	.0020	.0029	.0036	.004	0.98	0.81	0.04
		4.0	.156	.00008	.00015	.0003	.00057	.0010	.0017	.0029	.0046	.0062	.0072	.008	0.98	0.81	0.05
		4.0	.156	.00009	.00018	.0004	.0008	.0016	.0031	.0057	.0087	.011	.014	.015	0.98	0.81	0.07
		4.0	.156	.0001	.0002	.0005	.0012	.0028	.006	010	.016	.022	.026	.03	0.98	0.81	0.10
		4.0	.156	.00012	.00025	.0007	.0019	.005	.011	.022	.035	.046	.054	.06	0.98	0.81	0.15
		4.0	.156	.00015	.0003	.001	.003	.008	.021	.040	.062	.08	.09	.10	0.98	0.81	0.19
		4.0	.156	.0002	.0005	.002	.006	.016	.04	.079	.12	.16	.18	.20	0.98	0.81	0.29
		4.0	.156	.0017	.005	.011	.020	.034	.06	.11	.19	.29	.38	.45	0.98	0.81	0.51
	177 Mod =%	7.9	.3125	---	---	.00001	.00004	.00008	.00014	.0002	.00028	.00037	.00044	.0005	0.95	0.76	0.01
		7.9	.3125	---	.00001	.00007	.00015	.00024	.00036	.00048	.0006	.0008	.0009	.001	0.95	0.76	0.01
		7.9	.3125	.00001	.00002	.0002	.00029	.00047	.00071	.0010	.0013	.0016	.0018	.002	0.95	0.76	0.01
		7.9	.3125	.00003	.00006	.0003	.00051	.00099	.0016	.0021	.0028	.0035	.0041	.005	0.95	0.76	0.02
		7.9	.3125	.00004	.00007	.0004	.0010	.0018	.0029	.0045	.0060	.0074	.0085	.010	0.95	0.76	0.03
		7.9	.3125	.00007	.0003	.0005	.0016	.0031	.005	.0075	.011	.013	.017	.020	0.95	0.76	0.04
		7.9	.3125	.0001	.0005	.0011	.003	.007	.012	.017	.025	.031	.041	.050	0.95	0.76	0.06
	577 =%	9.5	.375	.006	.01	.02	.04	.06	.12	.2	.35	.5	.82	1	0.9	0.68	0.42
		9.5	.375	.008	.015	.03	.05	.07	.14	.25	.41	.65	1	1.5	0.9	0.68	0.42
		9.5	.375	.03	.09	.14	.25	.38	.55	.7	1	1.3	1.7	2.5	0.9	0.68	0.42
		20.6	.8125	.1	.15	.39	.6	.88	1.2	1.6	2.1	2.7	3.2	3.8	0.9	0.68	0.42
	548/ 588 =%	6.3	.25	--	.017	.023	.029	.037	.045	.056	.083	0.12	0.16	0.2	0.98	0.50	0.28
		6.3	.25	--	.014	.022	.032	.045	.067	.096	0.13	0.22	0.39	0.5	0.98	0.49	0.28
		6.3	.25	.016	.020	.034	.056	.07	0.13	.20	0.33	0.5	0.89	1	0.9	0.68	0.46
		9.5	.375	.026	.034	.084	0.13	0.19	0.26	0.55	0.86	1.1	1.3	1.5	0.9	0.68	0.46
		9.5	.375	.031	.039	.078	0.12	0.19	0.33	0.51	1.1	1.7	2.0	2.5	0.9	0.68	0.46
		20.6	.8125	0.1	.18	.40	0.62	.85	1.0	1.4	1.9	2.5	3.1	3.8	0.9	0.68	0.46
	677 Linear	9.5	.375	.004	.01	.02	.03	.04	.05	.06	.07	.08	.09	.1	0.9	0.68	0.08
		9.5	.375	.009	.02	.04	.06	.08	.1	.12	.14	.16	.18	.2	0.9	0.68	0.12
		9.5	.375	.03	.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	0.9	0.68	0.19
		9.5	.375	.05	.1	.2	.3	.4	.5	.6	.7	.8	.9	1.0	0.9	0.68	0.27
		9.5	.375	.2	.5	.75	1	1.3	1.5	1.7	1.9	2.1	2.3	2.5	0.9	0.68	0.46
		20.6	.8125	.2	.4	.55	.7	1.02	1.31	1.6	2.1	2.65	3.3	3.8	0.9	0.68	0.46
	648/ 688 Linear	6.3	.25	.03	.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	0.9	0.68	0.46
		6.3	.25	.01	.14	.23	.34	.45	.55	.64	.73	.82	.9	1	0.9	0.68	0.46
		9.5	.375	.1	.2	.3	.5	.6	.73	.87	1.02	1.15	1.3	1.5	0.9	0.68	0.46
		9.5	.375	.2	.5	.75	1	1.3	1.5	1.7	1.9	2.1	2.3	2.5	.9.	0.68	0.46
		20.6	.8125	.2	.4	.55	.7	1.02	1.31	1.6	2.1	2.65	3.3	3.8	0.9	0.68	0.46

1. Max travel is 0.5 inches.
2. At 100% travel.

CWP 3000 to 6000 PSI

Valve Size, NPS(1)	Trim/ Flow Char	Port Diameter		Experimentally Determined Cv at Valve Opening—Percent of Total Travel											F_L(2)	X_T(2)	F_d(2)
		mm	Inch	5	10	20	30	40	50	60	70	80	90	100			
1	102 Linear	6.3	.25	.00036	.0018	.0038	.0061	.008	.010	.012	.015	.016	.018	.02	0.95	0.76	0.05
		6.3	.25	.002	.004	.008	.012	.020	.024	.031	.038	.041	.046	.05	0.95	0.76	0.08
		6.3	.25	.0063	.011	.020	.025	.035	.045	.055	.065	.081	.09	.10	0.95	0.76	0.12
		6.3	.25	.012	.021	.028	.045	.063	.085	.115	.147	.172	.19	.20	0.95	0.76	0.17
	151 (Flow Down Only) Mod =%	4.0	.156	---	---	.00001	.00002	.00003	.00005	.00006	.00008	.0001	.00012	.00013	0.98	0.81	0.01
		4.0	.156	---	.00001	.00002	.00004	.00006	.00009	.00011	.00015	.0002	.00023	.00025	0.98	0.81	0.01
		4.0	.156	---	.00001	.00004	.00006	.00009	.00013	.00021	.00031	.0004	.00045	.0005	0.98	0.81	0.01
		4.0	.156	.00001	.00003	.00008	.00012	.00017	.00025	.00037	.0006	.0008	.0009	.001	0.98	0.81	0.02
		4.0	.156	.00002	.00007	.00017	.00025	.00036	.0005	.0007	.0010	.0015	.0018	.002	0.98	0.81	0.03
		4.0	.156	.00004	.0001	.00025	.0004	.00058	.0009	.0014	.0020	.0029	.0036	.004	0.98	0.81	0.04
		4.0	.156	.00008	.00015	.0003	.00057	.0010	.0017	.0029	.0046	.0062	.0072	.008	0.98	0.81	0.05
		4.0	.156	.00009	.00018	.0004	.0008	.0016	.0031	.0057	.0087	.011	.014	.015	0.98	0.81	0.07
		4.0	.156	.0001	.0002	.0005	.0012	.0028	.006	010	.016	.022	.026	.03	0.98	0.81	0.10
		4.0	.156	.00012	.00025	.0007	.0019	.005	.011	.022	.035	.046	.054	.06	0.98	0.81	0.15
		4.0	.156	.00015	.0003	.001	.003	.008	.021	.040	.062	.08	.09	.10	0.98	0.81	0.19
		4.0	.156	.0002	.0005	.002	.006	.016	.04	.079	.12	.16	.18	.20	0.98	0.81	0.29
		4.0	.156	.0017	.005	.011	.020	.034	.06	.11	.19	.29	.38	.45	0.98	0.81	0.51
	177 Mod =%	7.9	.3125	---	---	.00001	.00004	.00008	.00014	.0002	.00028	.00037	.00044	.0005	0.95	0.76	0.01
		7.9	.3125	---	.00001	.00007	.00015	.00024	.00036	.00048	.0006	.0008	.0009	.001	0.95	0.76	0.01
		7.9	.3125	.00001	.00002	.0002	.00029	.00047	.00071	.0010	.0013	.0016	.0018	.002	0.95	0.76	0.01
		7.9	.3125	.00003	.00006	.0003	.00051	.00099	.0016	.0021	.0028	.0035	.0041	.005	0.95	0.76	0.02
		7.9	.3125	.00004	.00007	.0004	.0010	.0018	.0029	.0045	.0060	.0074	.0085	.010	0.95	0.76	0.03
		7.9	.3125	.00007	.0003	.0005	.0016	.0031	.005	.0075	.011	.013	.017	.020	0.95	0.76	0.04
		7.9	.3125	.0001	.0005	.0011	.003	.007	.012	.017	.025	.031	.041	.050	0.95	0.76	0.06
	577 =%	9.5	.375	.006	.01	.02	.04	.06	.12	.2	.35	.5	.82	1.0	0.9	0.68	0.42
		9.5	.375	.008	.015	.03	.05	.07	.14	.25	.41	.65	1	1.5	0.9	0.68	0.42
		9.5	.375	.03	.09	.14	.25	.38	.55	.7	1	1.3	1.7	2.5	0.9	0.68	0.42
		20.6	.8125	.19	.28	.52	.77	1.0	1.3	1.7	2.3	3.0	3.8	4.0	0.82	0.68	0.42
		20.6	.8125	.16	.24	.38	.6	.7	1	1.4	2.2	3.3	4.4	6.8	0.9	0.68	0.42
	548/ 588 =%	6.3	.25	--	.017	.023	.029	.037	.045	.056	.082	.12	.16	0.2	0.98	0.50	0.28
		6.3	.25	--	.014	.021	.031	.046	.067	.095	.14	.23	.39	0.5	0.98	0.49	0.28
		6.3	.25	.013	.017	.030	.052	.083	.12	.20	.34	.51	.93	1.0	0.9	0.68	0.46
		9.5	.375	.025	.033	.08	.13	.18	.25	.54	.85	1.1	1.4	1.5	0.9	0.68	0.46
		9.5	.375	.024	.030	.068	.11	.18	.32	.51	1.0	1.9	2.4	2.5	0.9	0.68	0.46
		20.6	.8125	.12	.21	.44	.67	.91	1.1	1.5	2.0	2.6	3.3	4.0	0.9	0.68	0.46
		20.6	.8125	.10	.15	.31	.57	.96	1.5	2.8	4.6	5.6	6.2	6.8	0.9	0.68	0.46
	677 Linear	9.5	.375	.004	.01	.02	.03	.04	.05	.06	.07	.08	.09	.1	0.9	0.68	0.08
		9.5	.375	.009	.02	.04	.06	.08	.1	.12	.14	.16	.18	.2	0.9	0.68	0.12
		9.5	.375	.03	.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	0.9	0.68	0.19
		9.5	.375	.05	.1	.2	.3	.4	.5	.6	.7	.8	.9	1.0	0.9	0.68	0.27
		9.5	.375	.2	.5	.75	1	1.3	1.5	1.7	1.9	2.1	2.3	2.5	0.9	0.68	0.46
		20.6	.8125	.22	.45	.82	1.2	1.6	2	2.4	2.8	3.2	3.6	4.0	0.9	0.68	0.46
	648/ 688 Linear	6.3	.25	.03	.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	0.9	0.68	0.46
		6.3	.25	.01	.12	.23	.34	.45	.55	.64	.73	.82	.9	1.0	0.9	0.68	0.46
		9.5	.375	.1	.2	.3	.5	.6	.73	.87	1.02	1.15	1.3	1.5	0.9	0.68	0.46
		9.5	.375	.2	.5	.75	1	1.3	1.5	1.7	1.9	2.1	2.3	2.5	0.9	0.68	0.46
		20.6	.8125	.2	.4	.55	.7	1.02	1.31	1.6	2.1	2.65	3.3	4.0	0.9	0.68	0.46
		20.6	.8125	.52	1	1.9	2.8	3.9	4.8	5.5	5.7	6	6.3	6.8	0.9	0.68	0.46

1. Max travel is 0.5 inches.
2. At 100% travel.

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CWP 150 PSI

Valve Size, NPS	Trim	Flow Char	Port Diameter		Experimentally Determined Cv at Valve Opening—Percent of Total Travel											F_L[(1)]
			mm	Inch	5	10	20	30	40	50	60	70	80	90	100	
1	177	=%	8	0.312	- - -	0.00	0.01	0.02	0.04	0.06	0.1	0.1	0.1	0.2	0.2	0.95
			13	0.5	0.01	0.03	0.10	0.19	0.45	0.86	1.4	2.1	3.0	4.2	5.4	- - -

1. At 100% travel.

Coefficients

Valve Size	Port Dia.	Plug Tvl	CV AT VALVE OPENING - Percent of Plug Travel											F_d	F_L	X_T	K_C
NPS	in.	in.	5	10	20	30	40	50	60	70	80	90	100				
1	0.312	0.5	0.00002	0.00005	0.00013	0.00024	0.00036	0.00048	0.0006	0.0007	0.0008	0.0009	0.001	0.7	0.98	0.81	0.94
			0.00004	0.00015	0.0004	0.0007	0.009	0.0012	0.0018	0.0025	0.0033	0.0041	0.005				
			0.00007	0.00015	0.0004	0.0008	0.0013	0.002	0.003	0.005	0.007	0.009	0.01				
			0.0001	0.0002	0.0006	0.0008	0.0017	0.0031	0.0048	0.007	0.01	0.013	0.02				
			0.0003	0.0005	0.001	0.002	0.004	0.008	0.012	0.017	0.023	0.033	0.05				
			0.008	0.016	0.034	0.045	0.053	0.061	0.069	0.075	0.081	0.09	0.1				
			0.02	0.03	0.04	0.06	0.08	0.1	0.12	0.14	0.16	0.18	0.2				
			0.03	0.04	0.08	0.12	0.16	0.2	0.24	0.28	0.32	0.36	0.4				
			0.06	0.08	0.16	0.25	0.32	0.41	0.48	0.56	0.64	0.72	0.8	0.42			
			0.07	0.11	0.2	0.31	0.41	0.52	0.63	0.71	0.82	0.91	1	0.46			
	0.375	0.5	0.02	0.042	0.113	0.271	0.541	0.85	1.18	1.72	2.08	2.32	2.5		0.86	0.68	0.73
	0.5	0.5	0.04	0.07	0.19	0.46	0.905	1.45	2	2.91	3.52	4	4.2		0.8	0.53	0.51

CWP 3000 PSI

Valve Size, NPS	Trim	Flow Char	Port Diameter		Experimentally Determined Cv at Valve Opening—Percent of Total Travel											F_L(1)
			mm	Inch	5	10	20	30	40	50	60	70	80	90	100	
1/4	4	=%	4	0.156	- - -	0.00056	0.010	0.016	0.021	0.030	0.055	0.102	0.157	0.265	0.417	0.98
	5	=%	4	0.156	- - -	0.00009	0.00065	0.0043	0.011	0.015	0.021	0.043	0.089	0.132	0.152	0.98
	6	mod =%	4	0.156	0.00072	0.00180	0.0046	0.0091	0.016	0.033	0.059	0.086	0.095	0.100	0.103	0.98
	7	mod =%	4	0.156	- - -	0.00067	0.0033	0.0072	0.013	0.018	0.023	0.031	0.041	0.051	0.065	0.98
	8	mod =%	4	0.156	0.00045	0.00114	0.0027	0.0049	0.0077	0.012	0.016	0.021	0.026	0.033	0.041	0.98
	9	mod =%	4	0.156	- - -	0.00002	0.00039	0.00101	0.0021	0.0033	0.0047	0.0064	0.0082	0.010	0.014	0.98
	10	mod =%	4	0.156	- - -	0.00002	0.00023	0.00060	0.0011	0.0017	0.0026	0.0034	0.0044	0.0054	0.0066	0.98
	11	mod =%	4	0.156	0.00003	0.00010	0.00037	0.00065	0.0012	0.0018	0.0026	0.0033	0.0042	0.0050	0.0059	0.98
	12	mod =%	4	0.156	- - -	- - -	0.00004	0.00020	0.00042	0.00071	0.0011	0.0015	0.0020	0.0025	0.0030	0.98
	13	mod =%	4	0.156	- - -	- - -	0.00003	0.00011	0.00025	0.00039	0.00057	0.00080	0.0010	0.0013	0.0016	0.98
	14	mod =%	4	0.156	- - -	- - -	0.00002	0.00006	0.00012	0.00021	0.00030	0.00042	0.00052	0.00065	0.00079	0.98
	15	mod =%	4	0.156	0.000002	0.000006	0.00002	0.00004	0.00006	0.00009	0.00011	0.00015	0.0002	0.00023	0.00025	0.98
	16	mod =%	4	0.156	0.000001	0.000003	0.00001	0.00002	0.00003	0.00005	0.00006	0.00008	0.0001	0.0012	0.00013	0.98

1. At 100% travel.

Flow Coefficients (ASME/ISA/IEC)

Valve Size	Orifice Diameter	Plug Travel	Trim Number	C_V AT VALVE OPENING - Percent of Plug Travel										
mm (NPS)	mm (inch)	mm (inch)		5	10	20	30	40	50	60	70	80	90	100
6.35 (1/4) 12.7 (1/2)	3.97 (0.156)	12.7 (0.5)	16	0.000001	0.000003	0.00001	0.00002	0.00003	0.00005	0.00006	0.00008	0.0001	0.0012	0.00013
			15	0.000002	0.000006	0.00002	0.00004	0.00006	0.00009	0.00011	0.00015	0.0002	0.00023	0.00025
			14	0.000004	0.000014	0.00004	0.00006	0.00009	0.00013	0.00021	0.00031	0.0004	0.00045	0.0005
			13	0.00001	0.00003	0.00008	0.00012	0.00017	0.00025	0.00037	0.0006	0.0008	0.0009	0.001
			12	0.00002	0.00007	0.00017	0.00025	0.00036	0.0005	0.0007	0.0010	0.0015	0.0018	0.002
			11	0.00004	0.0001	0.00025	0.00040	0.00058	0.0009	0.0014	0.0020	0.0029	0.0036	0.004
			10	0.00008	0.00015	0.00030	0.00057	0.0010	0.0017	0.0029	0.0046	0.0062	0.0072	0.008
			09	0.00009	0.00018	0.00040	0.0008	0.0016	0.0031	0.0057	0.0087	0.011	0.014	0.015
			08	0.00010	0.00020	0.0005	0.0012	0.0028	0.006	0.010	0.016	0.022	0.026	0.03
			07	0.00012	0.00025	0.0007	0.0019	0.005	0.011	0.022	0.035	0.046	0.054	0.06
			06	0.00015	0.0003	0.001	0.003	0.008	0.021	0.040	0.062	0.08	0.09	0.10
			05	0.0002	0.0005	0.002	0.006	0.016	0.04	0.079	0.12	0.16	0.18	0.20
			04	0.0017	0.005	0.011	0.02	0.034	0.06	0.11	0.19	0.29	0.38	0.45
12.7 (1/2)	9.53 (0.375)	12.7 (0.5)	03	0.009	0.014	0.030	0.06	0.11	0.17	0.25	0.35	0.45	0.60	1.0
			02	0.015	0.020	0.050	0.10	0.15	0.25	0.37	0.50	0.72	1.2	1.5
			01	0.023	0.035	0.075	0.15	0.25	0.42	0.61	0.88	1.2	1.7	2.5

Flow Coefficients (ASME/ISA/IEC)

Valve Size	Orifice Diameter	Plug Travel	Trim No.	F_d	F_L	X_T	K_C
mm (NPS)	mm (inch)	mm (inch)					
6.35 (1/4) 12.7 (1/2)	3.97 (0.156)	12.7 (0.5)	16	0.035	0.98	0.80	0.94
			15	0.04			
			14	0.05			
			13	0.06			
			12	0.075			
			11	0.10			
			10	0.11			
			09	0.15			
			08	0.18			
			07	0.22			
			06	0.25			
			05	0.3			
			04	0.4			
12.7 (1/2)	9.53 (0.375)	12.7 (0.5)	03	0.23	0.95	0.75	0.86
			02	0.31	0.90	0.68	0.73
			01	0.60	0.88	0.65	0.68

Baumann 81000
CWP 275 PSI

Flow Up

Flow Coefficients (ASME/ISA/IEC) and ISA Sizing Factors

ORIFICE DIAMETER	DIAPHRAGM TRAVEL	Cv AT VALVE OPENING - PERCENT OF VALVE STEM TRAVEL											F_L	F_d	X_T	K_C
mm (Inch)	mm (Inch)	5	10	20	30	40	50	60	70	80	90	100				
0.635 (0.025)	0.177 (0.007)	0.00001	0.0001	0.0010	0.0024	0.0038	0.0052	0.0066	0.0076	0.0084	0.0092	0.01	0.85	0.50	0.61	0.61
1.60 (0.063)		0.00003	0.0003	0.002	0.005	0.009	0.013	0.017	0.021	0.024	0.027	0.03		0.50		
7.92 (0.312)		0.0002	0.001	0.010	0.030	0.050	0.060	0.068	0.076	0.084	0.092	0.10		0.20		
7.92 (0.312)	0.381 (0.015)	0.0004	0.002	0.020	0.070	0.120	0.150	0.180	0.210	0.240	0.270	0.30		0.20		
13.2 (0.520)	0.304 (0.012)	0.0007	0.003	0.040	0.100	0.150	0.200	0.250	0.310	0.370	0.430	0.50		0.20		
13.2 (0.520)	0.381 (0.015)	0.001	0.005	0.070	0.160	0.220	0.300	0.380	0.460	0.540	0.620	0.70		0.20		

CWP 275 PSI

Valve Size, NPS	Trim	Flow Char	Port Diameter		Experimentally Determined Cv at Valve Opening—Percent of Total Travel											F_L[1]
			mm	Inch	5	10	20	30	40	50	60	70	80	90	100	
1/2	Air	mod =%	0.635	0.025	0.000	0.000	0.002	0.005	0.007	0.009	0.011	0.012	0.012	0.013	0.014	0.85
	Water	mod =%	0.635	0.025	- - -	0.000	0.001	0.003	0.005	0.008	0.009	0.009	0.010	0.010	0.011	0.82
	Air	mod =%	1.60	0.063	0.000	0.000	0.004	0.013	0.020	0.027	0.034	0.039	0.045	0.049	0.053	0.85
	Water	mod =%	1.60	0.063	- - -	- - -	0.000	0.007	0.015	0.021	0.028	0.033	0.038	0.044	0.047	0.67
	Air	mod =%	7.92	0.312	0.000	0.000	0.001	0.006	0.020	0.044	0.071	0.099	0.129	0.157	0.182	0.85
	Water	mod =%	7.92	0.312	- - -	0.000	0.005	0.017	0.035	0.056	0.076	0.098	0.120	0.141	0.160	0.67
	Air	mod =%	7.92	0.312	0.000	0.000	0.043	0.099	0.165	0.223	0.281	0.336	0.379	0.407	0.427	0.85
	Water	mod =%	7.92	0.312	- - -	- - -	0.034	0.092	0.149	0.205	0.263	0.314	0.352	0.385	0.414	0.76
	Air	mod =%	13.2	0.52	0.000	0.031	0.072	0.144	0.215	0.296	0.377	0.448	0.519	0.576	0.631	0.85
	Water	mod =%	13.2	0.52	- - -	- - -	0.073	0.146	0.226	0.298	0.382	0.451	0.539	0.606	0.675	0.85
	Water	mod =%	13.2	0.52	- - -	0.019	0.131	0.250	0.368	0.492	0.622	0.726	0.832	0.929	1.019	0.85
	Water	mod =%	13.2	0.52	- - -	0.01	0.14	0.32	0.54	0.71	0.86	1.02	1.13	1.23	1.30	0.91

1. At 100% travel.

Flow Coefficients (Cv Values)

ORIFICE DIA-METER	DIA-PHRAGM TRAVEL	Cv AT VALVE OPENING - PERCENT OF VALVE STEM TRAVEL										
mm (Inch)	mm (Inch)	5	10	20	30	40	50	60	70	80	90	100
0.686 (0.027)	0.177 (0.007)	0.00001	0.0001	0.0015	0.0050	0.0075	0.0094	0.0108	0.0118	0.0123	0.0129	0.014
1.60 (0.063)		0.00003	0.0003	0.0040	0.0127	0.0200	0.0273	0.0340	0.0393	0.0450	0.0490	0.053
3.81 (0.150)		0.0002	0.0002	0.0010	0.0057	0.0197	0.0440	0.0707	0.0993	0.1293	0.1573	0.182
3.81 (0.150)	0.381 (0.015)	0.0004	0.002	0.043	0.099	0.165	0.223	0.281	0.336	0.379	0.407	0.427
9.40 (0.370)	0.304 (0.012)	0.0007	0.031	0.072	0.144	0.215	0.296	0.377	0.448	0.519	0.576	0.631
9.40 (0.370)	0.381 (0.015)	0.001	0.019	0.131	0.250	0.368	0.492	0.622	0.726	0.832	0.929	1.02

Flow Coefficients (Kv Values [Kv = 0.86 x Cv])

ORIFICE DIA-METER	DIA-PHRAGM TRAVEL	Kv AT VALVE OPENING - PERCENT OF VALVE STEM TRAVEL										
mm (Inch)	**mm (Inch)**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
0.686 (0.027)	0.177 (0.007)	0.0000086	0.000086	0.00129	0.0043	0.0065	0.0081	0.0093	0.0101	0.0106	0.0111	0.0117
1.60 (0.063)		0.000026	0.000258	0.00344	0.0109	0.0172	0.0235	0.0292	0.0338	0.0387	0.0421	0.0453
3.81 (0.150)		0.00017	0.000172	0.00086	0.0049	0.0169	0.0378	0.0608	0.0854	0.1112	0.1353	0.1568
3.81 (0.150)	0.381 (0.015)	0.00034	0.00172	0.03698	0.0851	0.1419	0.1918	0.2417	0.289	0.326	0.350	0.367
9.40 (0.370)	0.304 (0.012)	0.0006	0.0267	0.0619	0.124	0.185	0.2546	0.324	0.385	0.446	0.4954	0.5427
9.40 (0.370)	0.381 (0.015)	0.00086	0.0160	0.1131	0.215	0.316	0.423	0.535	0.624	0.715	0.799	0.877

Flow Coefficients

ORIFICE DIAMETER	DIAPHRAGM TRAVEL	F_L	F_d	X_T	K_C
mm (Inch)	**mm (Inch)**				
0.686 (0.027)	0.177 (0.007)	0.82	0.5	0.55	0.56
1.60 (0.063)		0.7		0.34	0.41
3.81 (0.150)			0.2		
3.81 (0.150)	0.381 (0.015)	0.76		0.44	0.49
9.40 (0.370)	0.304 (0.012)	0.95		0.86	0.76
9.40 (0.370)	0.381 (0.015)				

CWP 150 PSI

Valve Size, NPS	Trim	Flow Char	Port Diameter		Experimentally Determined Cv at Valve Opening—Percent of Total Travel											F_L(1)
			mm	Inch	5	10	20	30	40	50	60	70	80	90	100	
1	A-B(.5)	mod =%	25.4	1	0.018	0.021	0.11	0.29	0.54	0.84	1.20	1.58	1.99	2.38	2.79	- - -
	B-A(.5)	mod =%	25.4	1	0.00	0.00	0.10	0.33	0.61	0.93	1.34	1.69	2.10	2.49	2.91	- - -
	A-B(.5)	mod =%	25.4	1	0.00	0.002	0.036	0.49	1.13	1.86	2.55	3.32	4.03	4.71	5.33	- - -
	B-A(.5)	mod =%	25.4	1	0.00	0.001	0.079	0.66	1.37	2.06	2.77	3.49	4.30	5.07	5.84	- - -
	A-B(.75)	mod =%	25.4	1	0.014	0.204	0.925	2.01	4.00	5.59	6.23	6.61	6.61	6.64	6.60	- - -
	B-A(.75)	mod =%	25.4	1	0.00	0.091	0.831	2.23	4.42	6.13	7.12	7.55	7.54	7.55	7.55	- - -
1-1/2	A-B(.75)	mod =%	38.1	1.5	- - -	2.18	4.86	8.00	12.00	15.49	19.13	22.92	25.86	28.18	29.55	- - -
	B-A(.75)	mod =%	38.1	1.5	1.68	2.73	5.39	8.43	12.10	14.06	15.73	17.85	20.20	22.51	24.17	- - -
2	B-A(.5)	mod =%	50.8	2	- - -	0.002	0.092	2.22	5.13	9.34	13.02	15.59	17.35	19.05	21.34	- - -
	A-B(.75)	mod =%	50.8	2	- - -	3.90	3.90	8.46	14.20	20.50	26.08	31.01	35.29	39.64	42.59	- - -
	B-A(.75)	mod =%	50.8	2	- - -	0.00	1.35	3.06	11.31	16.17	21.49	24.54	25.99	29.16	32.53	- - -

1. At 100% travel.

Cv Values at Percent Plug Opening

VALVE SIZE	FLOW DIRECTION (1)	ACTUATOR TRAVEL	Cv VERSUS PERCENT OF ACTUATOR TRAVEL OPEN									
NPS		Inches	10	20	30	40	50	60	70	80	90	100
1 Angle & Inline	A to B or B to A	0.50	0.02	0.09	0.20	0.40	0.64	0.90	1.16	1.44	1.72	2.00
		0.50	0.03	0.16	0.36	0.90	1.20	1.75	2.30	2.90	3.50	4.00
		0.75	0.04	0.24	0.62	1.20	2.00	3.10	4.20	5.50	6.80	8.00
1-1/2 Angle	A to B	0.50	1.45	3.07	4.86	6.95	9.34	12.0	14.3	16.7	19.1	21.7
		0.75	2.18	4.86	8.00	12.0	15.5	19.1	22.9	25.9	28.2	29.6
	B to A	0.50	1.82	3.61	5.39	7.42	9.66	12.1	13.4	14.6	15.7	17.1
		0.75	2.73	5.39	8.43	12.1	14.1	15.7	17.8	20.2	22.5	24.2
2 Angle	A to B	0.50	2.60	3.0	3.90	6.94	10.4	14.2	18.4	22.4	26.1	29.4
		0.75	2.70	3.90	8.46	14.2	20.5	26.1	31.0	35.3	39.6	42.6
	B to A	0.50	0.50	0.80	1.35	2.49	5.81	11.3	14.6	17.9	21.5	23.5
		0.75	0.50	1.35	3.06	11.3	16.2	21.5	24.5	26.0	29.2	32.5

1. Flow A to B is recommended for low discharge pressure. Low discharge pressure being defined as near or below atmospheric pressure.

Kv Values at Percent Plug Opening

VALVE SIZE	FLOW DIRECTION (1)	ACTUATOR TRAVEL	Kv VERSUS PERCENT OF ACTUATOR TRAVEL OPEN									
DN		mm	10	20	30	40	50	60	70	80	90	100
25 Angle & Inline	A to B or B to A	12.7	0.017	0.077	0.17	0.34	0.55	0.77	0.998	1.24	1.48	1.72
		12.7	0.026	0.138	0.31	0.77	1.03	1.51	1.98	2.49	3.01	3.44
		19.05	0.034	0.206	0.53	1.03	1.72	2.67	3.61	4.73	5.85	6.88
40 Angle	A to B	12.7	1.25	2.64	4.18	5.98	8.03	10.32	12.29	14.36	16.43	18.66
		19.05	1.88	4.18	6.88	10.32	13.33	16.43	19.69	22.27	24.25	25.46
	B to A	12.7	1.57	3.10	4.64	6.38	8.31	10.41	11.52	12.56	13.50	14.71
		19.05	2.35	4.64	7.25	10.41	12.13	13.50	15.31	17.37	19.35	20.81
50 Angle	A to B	12.7	2.24	3.0	3.35	5.97	8.94	12.21	15.82	19.26	22.45	25.28
		19.05	2.33	3.35	7.28	12.21	17.63	22.45	26.66	30.36	34.06	36.64
	B to A	12.7	0.43	0.69	1.16	2.14	4.98	9.72	12.56	15.39	18.49	20.21
		19.05	0.43	1.16	2.63	9.72	13.93	18.49	21.07	22.36	25.11	27.95

1. Flow A to B is recommended for low discharge pressure. Low discharge pressure being defined as near or below atmospheric pressure.

CWP 275 PSI

Valve Size, NPS	Trim	Flow Char	Port Diameter		Experimentally Determined Cv at Valve Opening—Percent of Total Travel											F_L[1]
			mm	Inch	5	10	20	30	40	50	60	70	80	90	100	
1/2	N/A	mod linear	12.7	1/2	- - -	0.01	0.1	0.3	0.5	0.7	0.9	1.0	1.1	1.2	1.3	- - -

1. At 100% travel.

Flow Coefficients (ASME/ISA/IEC) and ISA Sizing Factors

PLUG TRAVEL mm (INCH)	ORIFICE DIAMETER mm (INCH)	C_V AT VALVE OPENING - PERCENT OF PLUG TRAVEL											F_L	F_d	X_T	K_C
		5	10	20	30	40	50	60	70	80	90	100				
7.9 (0.3125)	3.18 (0.125)	0.0025	0.005	0.0125	0.033	0.065	0.125	0.18	0.19	0.215	0.22	0.25	0.87	0.56	0.63	0.66
	9.40 (0.370)	0.0030	0.020	0.12	0.24	0.40	0.532	0.69	0.85	1.0	1.15	1.25	0.87	0.40	0.63	0.66

250 PSI CWP(1)

VALVE SIZE		EQUAL PERCENTAGE C_V VALUES AT PERCENT OPEN											F_L	F_d	X_T	K_C
DN	NPS		10	20	30	40	50	60	70	80	90	100				
15	1/2	Cv	0.016	0.022	0.031	0.042	0.058	0.080	0.110	0.153	0.211	0.29	0.90	0.28	0.68	0.70
		Kv	0.014	0.019	0.026	0.036	0.050	0.069	0.095	0.131	0.181	0.25				
		Cv	0.06	0.09	0.12	0.17	0.23	0.32	0.44	0.61	0.84	1.2	0.90	0.46	0.68	0.70
		Kv	0.06	0.08	0.11	0.15	0.20	0.28	0.38	0.53	0.73	1.0				
20	3/4	Cv	0.10	0.14	0.20	0.27	0.37	0.51	0.71	0.98	1.35	1.9				
		Kv	0.09	0.12	0.17	0.23	0.32	0.44	0.61	0.84	1.16	1.6				
		Cv	0.26	0.35	0.49	0.67	0.93	1.28	1.77	2.44	3.37	4.7				
		Kv	0.22	0.30	0.42	0.58	0.80	1.10	1.52	2.10	2.90	4.0				
25	1	Cv	0.58	0.80	1.10	1.52	2.09	2.88	3.98	5.49	7.59	10				
		Kv	0.49	0.68	0.95	1.31	1.80	2.47	3.42	4.73	6.53	9				
40	1-1/2	Cv	1.16	1.59	2.20	3.03	4.19	5.76	7.95	11.0	15.2	21				
		Kv	1.00	1.37	1.89	2.61	3.60	4.95	6.84	9.45	13.1	18				
50	2	Cv	1.79	2.47	3.42	4.72	6.51	8.95	12.4	17.1	23.60	33				
		Kv	1.5	2.1	2.9	4.1	5.6	7.7	10.6	14.7	20.3	28				
--	3	Cv	4.36	6.01	8.30	11.5	15.8	21.7	30.0	41.5	57.3	79				
		Kv	3.75	5.17	7.14	9.86	13.6	18.7	25.8	35.7	49.3	68				
80	--	Cv	5.44	7.51	10.4	14.3	19.8	27.2	37.6	51.9	71.7	99				
		Kv	4.67	6.46	8.93	12.3	17.0	23.4	32.3	44.6	61.6	85				
100	4	Cv	11.5	15.9	21.9	30.3	41.8	57.5	79.4	110	152	209				
		Kv	9.90	13.7	18.9	26.1	36.0	49.5	68.5	94.6	130.6	180				
150	6	Cv	24.3	33.6	46.4	64.1	88.4	122	168	232	320	442				
		Kv	20.9	28.9	39.9	55.1	76.0	104	144	200	276	380				

1.Cold Working Pressure

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CL150/150

Coefficients	Valve Size, NPS	Valve Rotation, Degrees								
		10	20	30	40	50	60	70	80	90
C_v	30	608	2030	4460	7700	12,200	18,200	25,500	32,800	40,500
K_v		526	1760	3860	6660	10,600	15,700	22,100	28,400	35,000
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.77	0.79	0.81	0.81	0.78	0.73	0.68	0.60	0.52
X_T		0.50	0.53	0.55	0.55	0.51	0.45	0.39	0.30	0.23
C_v	36	910	3030	6670	11,500	18,200	27,300	38,200	49,100	60,600
K_v		787	2620	5770	9950	15,700	23,600	33,000	42,500	52,400
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.77	0.79	0.81	0.81	0.78	0.73	0.68	0.60	0.52
X_T		0.50	0.53	0.55	0.55	0.51	0.45	0.39	0.30	0.23
C_v	42	1200	3990	8780	15,200	24,000	35,900	50,300	64,700	79,800
K_v		1040	3450	7600	13,100	20,800	31,100	43,500	56,000	69,000
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.77	0.79	0.81	0.81	0.78	0.73	0.68	0.60	0.52
X_T		0.50	0.53	0.55	0.55	0.51	0.45	0.39	0.30	0.23
C_v	48	1590	5300	11,700	20,100	31,800	47,700	66,800	85,800	106,000
K_v		1380	4580	10,100	17,400	27,500	41,300	57,800	74,200	91,700
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.77	0.79	0.81	0.81	0.78	0.73	0.68	0.60	0.52
X_T		0.50	0.53	0.55	0.55	0.51	0.45	0.39	0.30	0.23

CL150

Coefficients	Valve Size, NPS	Valve Rotation, Degrees								
		10	20	30	40	50	60	70	80	90
C_v	30	508	1690	3730	6440	10,200	15,200	21,300	27,400	33,900
K_v		439	1460	3230	5570	8823	13,100	18,400	23,700	29,300
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.77	0.79	0.81	0.81	0.78	0.73	0.68	0.60	0.52
X_T		0.50	0.53	0.55	0.55	0.51	0.45	0.39	0.30	0.23
C_v	36	757	2520	5550	9590	15,100	22,700	31,800	40,900	50,500
K_v		654	2180	4800	8300	13,100	19,600	27,500	35,400	43,700
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.77	0.79	0.81	0.81	0.78	0.73	0.68	0.60	0.52
X_T		0.50	0.53	0.55	0.55	0.51	0.45	0.39	0.30	0.23
C_v	42	1090	3640	8000	13,800	21,800	32,700	45,800	58,900	72,700
K_v		943	3150	6920	11,900	18,900	28,300	39,600	50,900	62,900
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.77	0.79	0.81	0.81	0.78	0.73	0.68	0.60	0.52
X_T		0.50	0.53	0.55	0.55	0.51	0.45	0.39	0.30	0.23
C_v	48	1390	4630	10,200	17,600	27,800	41,700	58,400	75,000	92,600
K_v		1200	4000	8820	15,200	24,000	36,100	50,500	64,900	80,100
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.77	0.79	0.81	0.81	0.78	0.73	0.68	0.60	0.52
X_T		0.50	0.53	0.55	0.55	0.51	0.45	0.39	0.30	0.23

CL300

Coefficients	Valve Size, NPS	Valve Rotation, Degrees								
		10	20	30	40	50	60	70	80	90
C_v	30	715	1790	3700	6320	9780	14,000	18,100	21,200	23,800
K_v		618	1550	3200	5470	8460	12,100	15,700	18,300	20,600
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X_T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23
C_v	36	1100	2760	5700	9750	15,100	21,700	28,000	32,800	36,800
K_v		952	2390	4930	8430	13,100	18,800	24,200	28,400	31,800
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X_T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23
C_v	42	1710	4280	8840	15,100	23,400	33,700	43,400	50,800	57,100
K_v		1480	3700	7650	13,100	20,200	29,200	37,500	43,900	49,400
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X_T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23
C_v	48	1870	4670	9650	16,500	25,500	36,700	47,300	55,400	62,200
K_v		1620	4040	8350	14,300	22,100	31,700	40,900	47,900	53,800
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X_T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23

CL600

Coefficients	Valve Size, NPS	Valve Rotation, Degrees								
		10	20	30	40	50	60	70	80	90
C_v	3	5	16	31	51	84	122	151	169	182
K_v		4	14	27	44	73	106	131	146	157
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.73	0.66	0.59	0.55	0.52
X_T		0.51	0.55	0.55	0.52	0.45	0.37	0.29	0.25	0.23
C_v	4	8	23	43	71	116	169	209	234	252
K_v		7	20	37	61	100	146	181	202	218
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.73	0.66	0.59	0.55	0.52
X_T		0.51	0.55	0.55	0.52	0.45	0.37	0.29	0.25	0.23
C_v	6	15	46	87	144	236	344	426	477	513
K_v		13	40	75	125	204	298	368	413	444
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.73	0.66	0.59	0.55	0.52
X_T		0.51	0.55	0.55	0.52	0.45	0.37	0.29	0.25	0.23

CL600

Coefficients	Valve Size, NPS	Valve Rotation, Degrees								
		10	20	30	40	50	60	70	80	90
C_v	8	35	104	197	324	532	775	960	1080	1160
K_v		30	90	170	280	460	670	830	934	1000
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.73	0.66	0.59	0.55	0.52
X_T		0.51	0.55	0.55	0.52	0.45	0.37	0.29	0.25	0.23
C_v	10	62	185	350	577	947	1380	1710	1920	2060
K_v		53	160	303	499	819	1190	1480	1660	1780
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.73	0.66	0.59	0.55	0.52
X_T		0.51	0.55	0.55	0.52	0.45	0.37	0.29	0.25	0.23
C_v	12	85	255	481	793	1300	1900	2350	2630	2830
K_v		74	221	416	686	1120	1640	2030	2270	2450
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.73	0.66	0.59	0.55	0.52
X_T		0.51	0.55	0.55	0.52	0.45	0.37	0.29	0.25	0.23
C_v	14	104	312	590	971	1600	2320	2880	3230	3470
K_v		90	270	510	840	1380	2010	2490	2790	3000
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.73	0.66	0.59	0.55	0.52
X_T		0.51	0.55	0.55	0.52	0.45	0.37	0.29	0.25	0.23
C_v	16	138	413	781	1290	2110	3080	3810	4270	4590
K_v		119	357	676	1120	1830	2660	3300	3690	3970
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.73	0.66	0.59	0.55	0.52
X_T		0.51	0.55	0.55	0.52	0.45	0.37	0.29	0.25	0.23
C_v	18	175	524	989	1630	2680	3900	4830	5410	5820
K_v		151	453	855	1410	2320	3370	4180	4680	5030
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.73	0.66	0.59	0.55	0.52
X_T		0.51	0.55	0.55	0.52	0.45	0.37	0.29	0.25	0.23
C_v	20	196	588	1110	1830	3010	4380	5430	6080	6540
K_v		170	509	960	1580	2600	3790	4700	5260	5660
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.73	0.66	0.59	0.55	0.52
X_T		0.51	0.55	0.55	0.52	0.45	0.37	0.29	0.25	0.23
C_v	24	349	1050	1980	3260	5350	7790	9650	10,800	11,600
K_v		302	908	1710	2820	4630	6740	8350	9340	10,000
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.73	0.66	0.59	0.55	0.52
X_T		0.51	0.55	0.55	0.52	0.45	0.37	0.29	0.25	0.23

CL900

Coefficients	Valve Size, NPS	Valve Rotation, Degrees								
		10	20	30	40	50	60	70	80	90
C_v	6	17	52	100	174	265	343	385	417	434
K_v		15	45	87	151	229	297	333	361	375
F_d		0.09	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.7
F_L		0.79	0.81	0.8	0.75	0.69	0.61	0.56	0.53	0.52
X_T		0.52	0.55	0.54	0.47	0.39	0.31	0.26	0.24	0.23
C_v	8	30	89	170	296	452	585	659	711	741
K_v		26	77	147	256	391	506	570	615	641
F_d		0.09	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.7
F_L		0.79	0.81	0.8	0.75	0.69	0.61	0.56	0.53	0.52
X_T		0.52	0.55	0.54	0.47	0.39	0.31	0.26	0.24	0.23
C_v	10	56	169	324	563	859	1112	1253	1352	1408
K_v		48	146	280	487	743	962	1084	1169	1218
F_d		0.09	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.7
F_L		0.79	0.81	0.8	0.75	0.69	0.61	0.56	0.53	0.52
X_T		0.52	0.55	0.54	0.47	0.39	0.31	0.26	0.24	0.23
C_v	12	50	151	290	504	769	995	1121	1210	1260
K_v		43	131	251	436	665	861	970	1047	1090
F_d		0.09	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.7
F_L		0.79	0.81	0.8	0.75	0.69	0.61	0.56	0.53	0.52
X_T		0.52	0.55	0.54	0.47	0.39	0.31	0.26	0.24	0.23
C_v	14	111	332	636	1106	1687	2184	2461	2654	2765
K_v		96	287	550	957	1459	1889	2129	2296	2392
F_d		0.09	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.7
F_L		0.79	0.81	0.8	0.75	0.69	0.61	0.56	0.53	0.52
X_T		0.52	0.55	0.54	0.47	0.39	0.31	0.26	0.24	0.23
C_v	16	140	421	806	1402	2138	2769	3119	3365	3505
K_v		121	364	697	1213	1849	2395	2698	2911	3032
F_d		0.09	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.7
F_L		0.79	0.81	0.8	0.75	0.69	0.61	0.56	0.53	0.52
X_T		0.52	0.55	0.54	0.47	0.39	0.31	0.26	0.24	0.23
C_v	18	182	546	1046	1820	2775	3594	4049	4367	4549
K_v		157	472	905	1574	2400	3109	3502	3777	3935
F_d		0.09	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.7
F_L		0.79	0.81	0.8	0.75	0.69	0.61	0.56	0.53	0.52
X_T		0.52	0.55	0.54	0.47	0.39	0.31	0.26	0.24	0.23
C_v	20	214	614	1228	2135	3256	4217	4751	5124	5338
K_v		185	531	1062	1847	2816	3648	4110	4432	4617
F_d		0.09	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.7
F_L		0.79	0.81	0.8	0.75	0.69	0.61	0.56	0.53	0.52
X_T		0.52	0.55	0.54	0.47	0.39	0.31	0.26	0.24	0.23
C_v	24	330	989	1895	3296	5029	6509	7333	7909	8239
K_v		285	855	1639	2851	4347	5630	6343	6841	7127
F_d		0.09	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.7
F_L		0.79	0.81	0.8	0.75	0.69	0.61	0.56	0.53	0.52
X_T		0.52	0.55	0.54	0.47	0.39	0.31	0.26	0.24	0.23

CL1500

Coefficients	Valve Size, NPS	Valve Rotation, Degrees								
		10	20	30	40	50	60	70	80	90
C_v	10	44	147	265	420	553	649	700	730	737
K_v		38	127	229	363	478	561	606	631	638
F_d		0.09	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.7
F_L		0.8	0.81	0.76	0.7	0.63	0.57	0.54	0.52	0.52
X_T		0.54	0.55	0.49	0.41	0.34	0.27	0.24	0.23	0.23
C_v	12	76	153	456	722	950	1115	1204	1254	1267
K_v		66	132	394	625	822	964	1041	1085	1096
F_d		0.09	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.7
F_L		0.8	0.81	0.76	0.7	0.63	0.57	0.54	0.52	0.52
X_T		0.54	0.55	0.49	0.41	0.34	0.27	0.24	0.23	0.23
C_v	14	83	275	495	784	1032	1211	1307	1362	1376
K_v		72	238	428	678	893	1048	1131	1178	1190
F_d		0.09	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.7
F_L		0.8	0.81	0.76	0.7	0.63	0.57	0.54	0.52	0.52
X_T		0.54	0.55	0.49	0.41	0.34	0.27	0.24	0.23	0.23
C_v	16	109	363	653	1033	1360	1595	1722	1795	1813
K_v		94	314	565	894	1176	1380	1490	1553	1568
F_d		0.09	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.7
F_L		0.8	0.81	0.76	0.7	0.63	0.57	0.54	0.52	0.52
X_T		0.54	0.55	0.49	0.41	0.34	0.27	0.24	0.23	0.23
C_v	18	166	554	997	1579	2077	2438	2631	2742	2770
K_v		144	479	862	1366	1797	2109	2276	2372	2396
F_d		0.09	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.7
F_L		0.8	0.81	0.76	0.7	0.63	0.57	0.54	0.52	0.52
X_T		0.54	0.55	0.49	0.41	0.34	0.27	0.24	0.23	0.23
C_v	20	203	677	1219	1931	2540	2981	3218	3353	3387
K_v		176	586	1054	1670	2197	2579	2784	2900	2930
F_d		0.09	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.7
F_L		0.8	0.81	0.76	0.7	0.63	0.57	0.54	0.52	0.52
X_T		0.54	0.55	0.49	0.41	0.34	0.27	0.24	0.23	0.23

CL600/300, CL900/300, and CL1500/300

Coefficients	Valve Size, NPS	Valve Rotation, Degrees								
		10	20	30	40	50	60	70	80	90
C_v	3	6	14	29	50	77	111	143	167	188
K_v		5	12	25	43	67	96	124	144	163
F_d		0.09	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X_T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23
C_v	4	12	30	63	107	166	238	307	360	404
K_v		10	26	54	93	144	206	266	311	349
F_d		0.09	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X_T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23
C_v	6	32	81	167	285	441	635	818	958	1076
K_v		28	70	144	247	381	549	708	829	931
F_d		0.09	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X_T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23
C_v	8	40	100	206	352	545	784	1010	1183	1329
K_v		35	87	178	304	471	678	874	1023	1150
F_d		0.09	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X_T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23
C_v	10	71	078	367	628	971	1398	1800	2108	2369
K_v		61	154	317	543	840	1209	1557	1823	2049
F_d		0.09	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X_T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23
C_v	12	110	276	571	975	1509	2172	2798	3276	3681
K_v		95	239	494	843	1305	1879	2420	2834	3184
F_d		0.09	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X_T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23
C_v	14	136	341	704	1204	1863	2682	3454	4045	4545
K_v		118	295	609	1041	1611	2320	2988	3499	3931
F_d		0.09	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X_T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23
C_v	16	169	422	873	1492	2309	3323	4280	5012	5632
K_v		146	365	755	1291	1997	2874	3702	4335	4872
F_d		0.09	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X_T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23
C_v	18	247	617	1276	2181	3374	4856	6255	7325	8230
K_v		214	534	1104	1887	2919	4200	5411	6336	7119
F_d		0.09	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X_T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23

CL600/300, CL900/300, and CL1500/300

Coefficients	Valve Size, NPS	Valve Rotation, Degrees								
		10	20	30	40	50	60	70	80	90
C_v	20	286	714	1477	2524	3906	5620	7240	8478	9526
K_v		247	618	1278	2183	3379	4861	6263	7333	8240
F_d		0.09	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X_T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23
C_v	24	375	938	1939	3315	5130	7381	9508	11135	12511
K_v		324	811	1677	2867	4437	6385	8224	9632	10822
F_d		0.09	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X_T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23

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CL150, Reverse Flow, NPS 3 through 18

Coefficients	Valve Size, NPS	Valve Rotation, Degrees								
		10	20	30	40	50	60	70	80	90
C_v	3	6	14	29	50	77	111	143	167	188
K_v		5.19	12.1	25.1	43.3	66.6	96.0	124	144	163
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X_T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23
Cv	4	12	30	63	107	165	238	307	359	404
Kv		10.4	26.0	54.5	92.6	143	206	266	311	349
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X_T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23
C_v	6	32	81	167	285	441	635	818	957	1080
K_v		27.7	70.1	144	247	381	549	708	828	934
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X_T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23
Cv	8	34	113	248	429	677	1020	1420	1830	2260
K_v		29.4	97.7	215	371	586	882	1228	1583	1955
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.77	0.79	0.81	0.81	0.78	0.73	0.68	0.60	0.52
X_T		0.50	0.53	0.55	0.55	0.51	0.45	0.39	0.30	0.23
C_v	10	47	159	349	604	953	1430	2000	2580	3180
K_v		40.7	138	302	522	824	1237	1730	2232	2751
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.77	0.79	0.81	0.81	0.78	0.73	0.68	0.60	0.52
X_T		0.50	0.53	0.55	0.55	0.51	0.45	0.39	0.30	0.23
C_v	12	74	247	543	939	1480	2220	3110	4000	4940
K_v		64.0	214	470	812	1280	1920	2690	3460	4273
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.77	0.79	0.81	0.81	0.78	0.73	0.68	0.60	0.52
X_T		0.50	0.53	0.55	0.55	0.51	0.45	0.39	0.30	0.23
C_v	14	95	316	695	1200	1900	2840	3980	5120	6320
K_v		82.2	273	601	1038	1643	2457	3443	4429	5467
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.77	0.79	0.81	0.81	0.78	0.73	0.68	0.60	0.52
X_T		0.50	0.53	0.55	0.55	0.51	0.45	0.39	0.30	0.23
C_v	16	129	430	946	1640	2580	3870	5420	6970	8600
K_v		112	372	818	1419	2232	3348	4688	6029	7439
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.77	0.79	0.81	0.81	0.78	0.73	0.68	0.60	0.52
X_T		0.50	0.53	0.55	0.55	0.51	0.45	0.39	0.30	0.23
C_v	18	166	553	1220	2100	3320	4970	6960	8950	11,050
K_v		144	478	1055	1817	2872	4299	6020	7742	9558
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.77	0.79	0.81	0.81	0.78	0.73	0.68	0.60	0.52
X_T		0.50	0.53	0.55	0.55	0.51	0.45	0.39	0.30	0.23

CL150, Reverse Flow, NPS 20 and 24

Coefficients	Valve Size, NPS	Valve Rotation, Degrees								
		10	20	30	40	50	60	70	80	90
C_v	20	208	692	1520	2630	4160	6230	8730	11,220	13,850
K_v		180	599	1315	2275	3598	5389	7551	9705	11,980
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.77	0.79	0.81	0.81	0.78	0.73	0.68	0.60	0.52
X_T		0.50	0.53	0.55	0.55	0.51	0.45	0.39	0.30	0.23
C_v	24	322	1080	2370	4080	6450	9670	13,540	17,410	21,500
K_v		277	934	2050	3529	5579	8365	11,712	15,060	18,598
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.77	0.79	0.81	0.81	0.78	0.73	0.68	0.60	0.52
X_T		0.50	0.53	0.55	0.55	0.51	0.45	0.39	0.30	0.23

CL300, Reverse Flow, NPS 3 through 18

Coefficients	Valve Size, NPS	Valve Rotation, Degrees								
		10	20	30	40	50	60	70	80	90
C_v	3	6	14	29	50	77	111	143	167	188
K_v		5.19	12.1	25.1	43.3	66.6	96.0	124	144	163
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X_T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23
C_v	4	12	30	63	107	165	238	307	359	404
K_v		10.4	26.0	54.5	92.6	143	206	266	311	349
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X_T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23
C_v	6	32	81	167	285	441	635	818	957	1080
K_v		27.7	70.1	144	247	381	549	708	828	934
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X_T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23
C_v	8	40	100	206	352	545	784	1010	1180	1330
K_v		34.6	86.5	178	304	471	677	874	1020	1150
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X_T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23
C_v	10	71	178	367	628	971	1400	1800	2110	2370
K_v		61.4	154	317	543	840	1211	1557	1825	2050
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X_T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23
C_v	12	110	276	570	975	1510	2170	2800	3280	3680
K_v		95.2	239	493	843	1306	1877	2422	2837	3183
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X_T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23
C_v	14	136	341	704	1200	1860	2680	3450	4050	4550
K_v		118	295	609	1038	1609	2318	2984	3503	3936
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X_T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23
C_v	16	169	422	873	1490	2310	3320	4280	5010	5630
K_v		146	365	755	1289	1998	2872	3702	4334	4870
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X_T		0.51	0.55	0.55	0.47	0.40	0.33	0.26	0.26	0.23
C_v	18	247	617	1280	2180	3370	4860	6260	7330	8230
K_v		214	534	1107	1886	2915	4204	5415	6340	7119
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X_T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23

CL300, Reverse Flow, NPS 20 and 24

Coefficients	Valve Size, NPS	Valve Rotation, Degrees								
		10	20	30	40	50	60	70	80	90
C_v	20	286	714	1480	2520	3910	5620	7240	8480	9530
K_v		247	618	1280	2180	3382	4861	6263	7335	8243
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X_T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23
C_v	24	375	938	1940	3320	5130	7380	9510	11,140	12,500
K_v		324	811	1678	2872	4437	6384	8226	9636	10,821
F_d		0.090	0.17	0.26	0.34	0.42	0.49	0.57	0.64	0.70
F_L		0.78	0.81	0.81	0.79	0.75	0.69	0.62	0.56	0.52
X_T		0.51	0.55	0.55	0.53	0.47	0.40	0.33	0.26	0.23

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The Fisher® A31D flow coefficients are identical to the 8532. For NPS 14 through 24 A31D flow coefficients, refer to the 8532 information.

Coefficients	Valve Size, NPS	Valve Rotation, Degrees								
		10	20	30	40	50	60	70	80	90
C_V	3	6	14	29	50	77	111	143	167	188
K_V		5.19	12.1	25.1	43.3	66.6	96.0	124	144	163
F_L		- - -	.81	.81	.79	.75	.69	.62	.56	.52
X_T		.51	.55	.55	.47	.40	.33	.26	.26	.23
C_V	4	12	30	63	107	165	238	307	359	404
K_V		10.4	26.0	54.5	92.6	143	206	266	311	349
F_L		- - -	.81	.81	.79	.75	.69	.62	.56	.52
X_T		.51	.55	.55	.47	.40	.33	.26	.26	.23
C_V	6	32	81	167	285	441	635	818	957	1080
K_V		27.7	70.1	144	247	381	549	708	828	934
F_L		- - -	.81	.81	.79	.75	.69	.62	.56	.52
X_T		.51	.55	.55	.47	.40	.33	.26	.26	.23
C_V	8	34	113	248	429	677	1020	1420	1830	2260
K_V		29.4	97.7	215	371	586	882	1228	1583	1955
F_L		- - -	.81	.81	.79	.75	.69	.62	.56	.52
X_T		.51	.55	.55	.47	.40	.33	.26	.26	.23
C_V	10	47	159	349	604	953	1430	2000	2580	3180
K_V		40.7	138	302	522	824	1237	1730	2232	2751
F_L		- - -	.81	.81	.79	.75	.69	.62	.56	.52
X_T		.51	.55	.55	.47	.40	.33	.26	.26	.23
C_V	12	74	247	543	939	1480	2220	3110	4000	4940
K_V		64.0	214	470	812	1280	1920	2690	3460	4273
F_L		- - -	.81	.81	.79	.75	.69	.62	.56	.52
X_T		.51	.55	.55	.47	.40	.33	.26	.26	.23

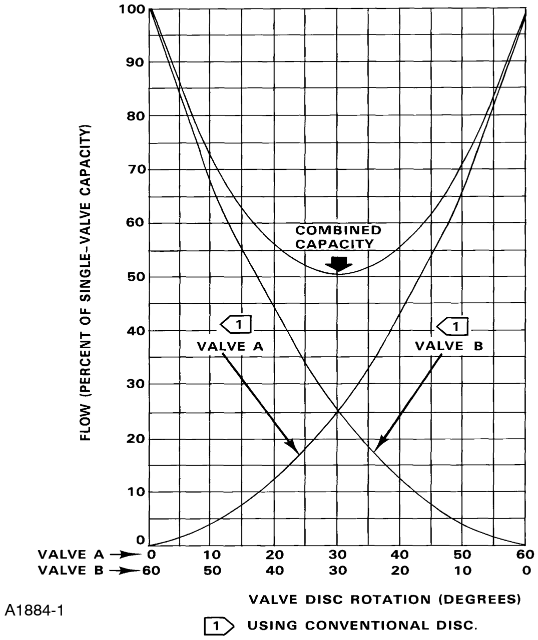
The Fisher A31D flow coefficients are identical to the 8532. For NPS 14 through 24 A31D flow coefficients, refer to the 8532 information.

Coefficients	Valve Size, NPS	Valve Rotation, Degrees								
		10	20	30	40	50	60	70	80	90
C_V	3	6	14	29	50	77	111	143	167	188
K_V		5.19	12.1	25.1	43.3	66.6	96.0	124	144	163
F_L		- - -	.81	.81	.79	.75	.69	.62	.56	.52
X_T		.51	.55	.55	.47	.40	.33	.26	.26	.23
C_V	4	12	30	63	107	165	238	307	359	404
K_V		10.4	26.0	54.5	92.6	143	206	266	311	349
F_L		- - -	.81	.81	.79	.75	.69	.62	.56	.52
X_T		.51	.55	.55	.47	.40	.33	.26	.26	.23
C_V	6	32	81	167	285	441	635	818	957	1080
K_V		27.7	70.1	144	247	381	549	708	828	934
F_L		- - -	.81	.81	.79	.75	.69	.62	.56	.52
X_T		.51	.55	.55	.47	.40	.33	.26	.26	.23
C_V	8	40	100	206	352	545	783	1010	1180	1330
K_V		34.6	86.5	178	304	471	677	874	1020	1150
F_L		- - -	.81	.81	.79	.75	.69	.62	.56	.52
X_T		.51	.55	.55	.47	.40	.33	.26	.26	.23
C_V	10	71	178	367	628	971	1400	1800	2110	2370
K_V		61.4	154	317	543	840	1211	1557	1825	2050
F_L		- - -	.81	.81	.79	.75	.69	.62	.56	.52
X_T		.51	.55	.55	.47	.40	.33	.26	.26	.23
C_V	12	110	276	570	975	1510	2170	2800	3280	3680
K_V		95.2	239	493	843	1306	1877	2422	2837	3183
F_L		- - -	.81	.81	.79	.75	.69	.62	.56	.52
X_T		.51	.55	.55	.47	.40	.33	.26	.26	.23

A three-way butterfly valve consists of two standard butterfly valves mounted on a pipe tee. The valves are operated by a single actuator through a tandem linkage. The linkage is normally arranged so that one of the valves is opening while the other is closing. For additional three-way butterfly valve information, refer to Bulletin 51.4:020.

When sizing a three-way butterfly valve, the relationship between valve disk rotation and flow must be kept in mind. With butterfly valves, this relationship is equal percentage and not linear. Due to this relationship, at mid-travel of the valve disk, flow capacity is less than one-half total valve capacity. With a three-way butterfly valve, one valve is opening while the other valve is closing, and both valves are midway through total disk rotation of 60 or 90 degrees when the actuator is at mid-travel. The combined capacity of the two valves at mid-travel is less than wide-open capacity of one valve.

Figure 1. Three-Way Valve Capacity with Single Actuator--60 Degree Maximum Valve Disk Rotation

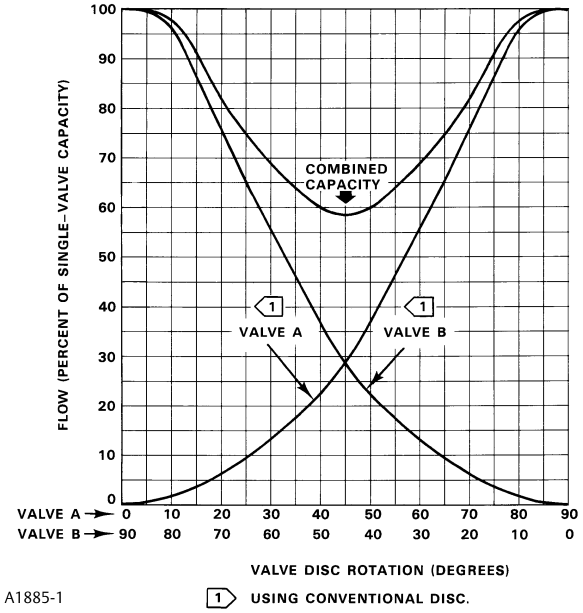


If each valve is sized to handle maximum pipe tee flow at full disk rotation, combined capacity of the two valves at mid-travel will be lower than the flow capacity of the tee. Although this reduction is present at all points of travel, it is most significant at mid-travel. This is illustrated in figures 1 and 2 for conventional disks. For Fishtail™ disks, one-half of total valve capacity is reached at an even larger angle of disk rotation, and the reduction in combined capacity at mid-travel is greater than it is with conventional disks.

For flow-switching (on/off) applications, this is not serious since the valves will be at mid-travel only momentarily while the valves are being stroked open and closed.

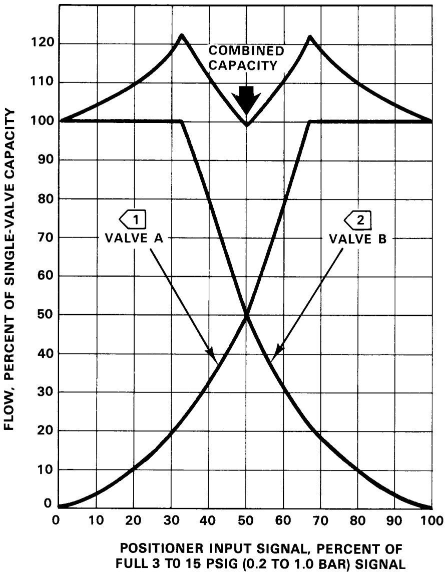
For throttling applications, it is possible that the valves will remain at mid-travel for significant periods of time. In these applications, the capacity reduction could cause system problems such as compressor surging. To avoid these problems, size each valve to carry one-half of the maximum pipe tee flow at mid-travel. Then, the combined flow capacity of the two valves at mid-travel will equal maximum flow.

Figure 2. Three-Way Valve Capacity with Single Actuator--90 Degree Maximum Valve Disk Rotation



If it is not desirable to do this, operate each valve with a separate actuator and valve positioner. Use one direct-acting and one reverse-acting positioner and adjust the positioners for split-range operation. With this arrangement, a single input signal will open one valve while closing the other. Since split-range operation is being used, the positioners can be adjusted such that the mid-travel position of the disk is reached before the input signal reaches mid-range. Then at mid-range of the input signal, each valve can be at one-half of total capacity, rather than at one-half of total disk rotation. A typical example is shown in figure 3. Although figure 3 illustrates the use of piston actuators with Fisher 3570 positioners, a similar arrangement can be made with any actuator and positioner type. Contact your Emerson Automation Solutions sales office for sizing assistance if dual actuation with split-range positioners is desired.

Figure 3. Three-Way Valve Capacity with Dual Actuators--60 Degree Maximum Valve Disk Rotation



1 USING CONVENTIONAL DISC, PISTON ACTUATOR, AND DIRECT-ACTING 3-TO-15 PSIG (0.2 to 1.0 BAR) TYPE 3570 POSITIONER ADJUSTED TO STROKE VALVE FULLY WITH 3-TO-11 PSIG (0.2 TO 0.8 BAR) SPLIT-RANGE INPUT SIGNAL.

2 USING CONVENTIONAL DISC, PISTON ACTUATOR, AND REVERSE-ACTING 3-TO-15 PSIG (0.2 TO 1.0 BAR) TYPE 3570 POSITIONER ADJUSTED TO STROKE VALVE FULLY WITH 15-TO-7 PSIG (1.0 TO 0.5 BAR) SPLIT-RANGE INPUT SIGNAL.

A26761-1

CL1500 (Flow Down)

Pure Linear Characteristic

Valve Size, NPS	Body Style	Port Diameter		Maximum Travel		Flow Coefficient	Minimum(1)	Valve Opening—Percent of Total Travel										F_L(2)
		mm	Inch	mm	Inch			10	20	30	40	50	60	70	80	90	100	
2	Globe	25.4	1	19	0.75	C_v	0.10	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	1.0	1.1	0.99
								0.1	0.2	0.4	0.6	0.8	0.9	1.1	1.3	1.5	1.6	
								0.1	0.4	0.7	1.1	1.4	1.8	2.1	2.4	2.6	2.9	

CL2500 (Flow Down)

Pure Linear Characteristic

Valve Size, NPS	Body Style	Port Diameter		Maximum Travel		Flow Coefficient	Minimum(1)	Valve Opening—Percent of Total Travel										F_L(2)
2	Globe	25.4	1	19	0.75	C_v	0.10	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	1.0	1.1	0.99
								0.1	0.2	0.4	0.6	0.8	0.9	1.1	1.3	1.5	1.6	0.99
								0.1	0.4	0.7	1.1	1.4	1.8	2.1	2.4	2.6	2.9	0.99
	Angle	38.1	1.5	38	1.5	C_v	0.46	0.52	1.49	2.55	3.50	4.53	5.40	6.25	7.00	7.67	8.25	0.99
						K_v	0.40	0.45	1.29	2.21	3.03	3.92	4.67	5.41	6.06	6.64	7.14	- - -
3	Angle	55.6	1.875	51	2	C_v	0.65	0.5	2.2	3.9	5.5	7.2	8.7	10.3	11.8	13.3	14.6	0.99
						K_v	0.56	0.4	1.9	3.4	4.8	6.2	7.5	8.9	10.2	11.5	12.6	- - -
4	Angle	69.9	2.75	64	2.5	C_v	0.81	2.15	4.42	6.75	9.04	11.3	13.6	15.8	18.0	20.0	21.9	0.99
						K_v	0.70	1.86	3.82	5.84	7.82	9.78	11.8	13.7	15.6	17.3	18.9	- - -
6	Angle	111.1	4.375	102	4	C_v	1.30	4.45	10.9	17.4	23.4	29.2	35.0	40.7	46.1	50.9	55.6	0.99
						K_v	1.13	3.95	9.43	15.1	20.2	25.3	30.3	35.2	39.9	44.0	48.1	- - -

CL2500 (Flow Down)

Approximately Linear Characteristic

Valve Size, NPS	Body Style	Port Diameter		Maximum Travel		Flow Coefficient	Minimum(1)	Valve Opening—Percent of Total Travel										F_L(2)
		mm	Inch	mm	Inch			10	20	30	40	50	60	70	80	90	100	
2	Angle	38.1	1.5	38	1.5	C_v	0.46	0.31	1.11	2.12	3.44	5.02	6.55	7.99	9.35	10.60	11.30	0.99
						K_v	0.40	0.27	0.96	1.83	2.98	4.34	5.67	6.91	8.09	9.17	9.78	- - -
3	Angle	55.6	1.875	51	2	C_v	0.65	0.5	2.2	3.9	5.6	7.2	9.7	12.9	16.7	20.7	24.0	0.99
						K_v	0.56	0.4	1.9	3.4	4.8	6.2	8.4	11.2	14.4	17.9	20.8	- - -
4	Angle	69.9	2.75	64	2.5	C_v	0.81	2.33	4.89	7.49	10.60	14.6	19.6	25.5	31.3	35.8	38.2	0.99
						K_v	0.70	2.02	4.23	6.48	9.17	12.6	17.0	22.1	27.1	31.0	33.0	- - -
6	Angle	111.1	4.375	102	4	C_v	1.30	3.90	10.1	16.9	24.1	33.4	45.2	58.4	71.0	82.1	89.1	0.99
						K_v	1.13	3.37	8.74	14.6	20.8	28.9	39.1	50.5	61.4	71.0	77.1	- - -

1. The ability of Cavitrol IV trim to prevent cavitation noise and damage is diminished when throttling for long times at C_vs less than these minimums.
2. At 100% travel.

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Linear - Flow Down

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
8	136.5	5.375	152	6	C_V	57.9	134	205	262	308	363	417	458	500	519	0.86
					X_T	0.54	0.51	0.53	0.59	0.67	0.68	0.73	0.70	0.65	0.66	- - -

Modified Equal Percentage - Flow Down

Modified Equal Percentage Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
8	136.5	5.375	152	6	C_V	19.4	44.1	68.0	110	196	307	409	449	487	514	0.86
					X_T	0.55	0.55	0.56	0.55	0.53	0.60	0.69	0.70	0.68	0.65	- - -

Equal Percentage - Flow Down

Equal Percentage Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
8	136.5	5.375	102	4	C_V	11.5	27.9	44.1	60.6	75.4	110	164	236	307	381	0.84
					X_T	0.53	0.55	0.55	0.55	0.58	0.55	0.52	0.54	0.60	0.67	- - -

Cavitrol III Two-Stage, Flow Down

Cavitrol III Two Stage Characteristic

Valve Size, NPS	Shutoff Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
8	136.5	5.375	152	6	C_V	9.56	28.4	47.0	65.6	83.8	102	119	136	153	169	0.98

Linear - Flow Up

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
8	136.5	5.375	152	6	C_V	58.7	133	206	267	313	343	382	421	456	482	0.84
					X_T	0.58	0.57	0.56	0.59	0.65	0.74	0.77	0.68	0.65	0.68	- - -

Modified Equal Percentage - Flow Up

Modified Equal Percentage Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
8	136.5	5.375	152	6	C_V	20.3	45.9	72.5	115	200	301	408	459	487	489	0.87
					X_T	0.57	0.55	0.53	0.53	0.54	0.61	0.69	0.72	0.69	0.69	- - -

Equal Percentage - Flow Up

Equal Percentage Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
8	136.5	5.375	102	4	C_V	11.3	28.5	45.9	63.5	82.7	115	169	237	301	375	0.8
					X_T	0.68	0.59	0.55	0.56	0.52	0.53	0.52	0.54	0.61	0.67	- - -

EMERSON.

PN 10 through PN 40, CL150 and CL300

Equal Percentage Characteristic

Valve Size		Coefficients	Valve Rotation, Degrees								
DN	NPS		10	20	30	40	50	60	70	80	90
50	2	C_v	1.52	5.20	9.68	13.2	19.8	25.2	33.1	44.5	60.7
		K_v	1.31	4.49	8.36	11.4	17.1	21.8	28.6	38.4	52.4
		F_d	0.14	0.10	0.13	0.14	0.19	0.21	0.25	0.27	0.33
		F_L	- - -	0.78	0.77	0.75	0.74	0.75	0.77	0.75	0.71
		X_T	0.30	0.29	0.32	0.32	0.36	0.50	0.54	0.52	0.44
80	3	C_v	4.60	11.0	17.0	28.3	48.4	71.6	107	162	227
		K_v	3.97	9.50	14.7	24.5	41.8	61.9	92.4	140	196
		F_d	0.09	0.11	0.12	0.16	0.21	0.27	0.34	0.46	0.52
		F_L	0.67	0.73	0.65	0.73	0.76	0.76	0.74	0.70	0.66
		X_T	0.41	0.44	0.39	0.47	0.51	0.50	0.53	0.45	0.31
100	4	C_v	9.99	25.3	33.5	51.4	79.4	124	190	282	391
		K_v	8.63	21.9	28.9	44.4	68.6	107	164	244	338
		F_d	0.09	0.11	0.12	0.16	0.21	0.28	0.35	0.43	0.49
		F_L	0.85	0.86	0.82	0.80	0.78	0.75	0.73	0.68	0.60
		X_T	0.50	0.46	0.45	0.45	0.43	0.41	0.36	0.30	0.27
150	6	C_v	25.8	61.0	86.6	134	207	320	509	749	883
		K_v	22.3	52.7	74.8	116	179	276	440	647	763
		F_d	0.10	0.12	0.13	0.18	0.25	0.32	0.39	0.45	0.50
		F_L	0.76	0.76	0.70	0.70	0.74	0.74	0.68	0.64	0.59
		X_T	0.71	0.42	0.38	0.40	0.45	0.46	0.38	0.31	0.24
200	8	C_v	56.8	104	147	214	361	589	906	1390	1930
		K_v	49.1	89.9	127	185	312	509	783	1201	1668
		F_d	0.11	0.11	0.13	0.19	0.26	0.33	0.39	0.46	0.54
		F_L	0.8	0.76	0.71	0.77	0.76	0.74	0.71	0.63	0.56
		X_T	0.30	0.35	0.32	0.41	0.39	0.46	0.38	0.32	0.21
250	10	C_v	76.0	183	275	409	669	1070	1650	2540	3270
		K_v	65.7	158	238	353	578	924	1426	2195	2825
		F_d	0.11	0.13	0.16	0.22	0.29	0.35	0.41	0.48	0.55
		F_L	0.81	0.75	0.71	0.80	0.79	0.73	0.67	0.61	0.54
		X_T	0.44	0.41	0.37	0.45	0.45	0.39	0.34	0.25	0.19
300	12	C_v	108	188	272	515	925	1450	2230	3080	4530
		K_v	93.3	162	235	445	799	1253	1927	2661	3914
		F_d	0.09	0.11	0.14	0.21	0.28	0.34	0.40	0.47	0.54
		F_L	0.77	0.71	0.78	0.80	0.78	0.74	0.68	0.68	0.54
		X_T	0.26	0.37	0.48	0.47	0.45	0.47	0.37	0.34	0.19

NPS 14 through 36, CL150

Equal Percentage Characteristic

Valve Size	Coefficients	Valve Rotation, Degrees								
NPS		10	20	30	40	50	60	70	80	90
14	C_v	175	260	370	600	1030	1750	2860	4420	6540
	K_v	151	225	320	518	890	1512	2471	3819	5651
	F_L	0.75	0.71	0.77	0.74	0.78	0.75	0.72	0.65	0.60
	X_T	0.17	0.17	0.40	0.56	0.54	0.43	0.33	0.25	0.19
	F_d	0.08	0.10	0.12	0.18	0.24	0.31	0.39	0.47	0.55
16	C_v	275	425	580	875	1430	2380	3860	5990	8900
	K_v	238	367	501	756	1236	2056	3335	5175	7690
	F_L	0.75	0.71	0.77	0.74	0.78	0.75	0.72	0.65	0.60
	X_T	0.17	0.15	0.33	0.50	0.51	0.41	0.32	0.24	0.18
	F_d	0.09	0.11	0.14	0.19	0.25	0.32	0.39	0.47	0.55
18	C_v	410	630	840	1210	1900	3090	4950	7640	11340
	K_v	354	544	726	1045	1642	2670	4277	6601	9798
	F_L	0.75	0.71	0.77	0.74	0.78	0.75	0.72	0.65	0.60
	X_T	0.08	0.07	0.16	0.26	0.29	0.25	0.19	0.15	0.11
	F_d	0.09	0.13	0.15	0.20	0.26	0.32	0.39	0.47	0.55
20	C_v	515	785	1060	1530	2380	3800	6000	9110	13400
	K_v	445	678	916	1322	2056	3283	5184	7871	11578
	F_L	0.75	0.71	0.77	0.74	0.78	0.75	0.72	0.65	0.60
	X_T	0.18	0.21	0.40	0.56	0.56	0.46	0.35	0.26	0.20
	F_d	0.09	0.12	0.15	0.20	0.26	0.33	0.40	0.48	0.55
24	C_v	520	975	1280	1810	2970	5150	8730	14100	21600
	K_v	449	842	1106	1564	2566	4450	7543	12182	18662
	F_L	0.75	0.71	0.77	0.74	0.78	0.75	0.72	0.65	0.60
	X_T	0.19	0.07	0.22	0.48	0.56	0.46	0.34	0.25	0.18
	F_d	0.07	0.09	0.11	0.16	0.23	0.30	0.38	0.46	0.54
30	C_v	1840	2530	3010	4000	6050	10000	16400	26000	39300
	K_v	1590	2186	2601	3456	5227	8640	14170	22464	33955
	F_L	0.75	0.71	0.77	0.74	0.78	0.75	0.72	0.65	0.60
	X_T	0.14	0.14	0.30	0.50	0.52	0.41	0.29	0.21	0.15
	F_d	0.10	0.13	0.17	0.22	0.28	0.34	0.41	0.49	0.56
36	C_v	2410	3550	4310	5750	8890	14800	24500	39100	59500
	K_v	2082	3067	3724	4968	7681	12787	21168	33782	51408
	F_L	0.75	0.71	0.77	0.74	0.78	0.75	0.72	0.65	0.60
	X_T	0.13	0.15	0.34	0.55	0.56	0.42	0.29	0.20	0.14
	F_d	0.10	0.13	0.17	0.22	0.28	0.34	0.42	0.50	0.56

NPS 14 through 36, CL300

Equal Percentage Characteristic

Valve Size	Coefficients	Valve Rotation, Degrees								
NPS		10	20	30	40	50	60	70	80	90
14	C_v	140	200	305	500	840	1360	2120	3160	4540
	K_v	121	173	264	432	726	1175	1832	2730	3923
	F_L	0.75	0.71	0.77	0.74	0.78	0.75	0.72	0.65	0.60
	X_T	0.12	0.15	0.33	0.46	0.47	0.42	0.35	0.29	0.24
	F_d	0.08	0.11	0.14	0.17	0.25	0.32	0.40	0.48	0.54
16	C_v	230	365	505	720	1100	1700	2610	3910	5670
	K_v	199	315	436	622	950	1469	2255	3378	4899
	F_L	0.75	0.71	0.77	0.74	0.78	0.75	0.72	0.65	0.60
	X_T	0.15	0.13	0.26	0.42	0.48	0.44	0.37	0.29	0.23
	F_d	0.09	0.13	0.15	0.18	0.26	0.33	0.40	0.48	0.51
18	C_v	300	435	590	880	1420	2340	3750	5770	8510
	K_v	259	376	510	760	1227	2022	3240	4985	7353
	F_L	0.75	0.71	0.77	0.74	0.78	0.75	0.72	0.65	0.60
	X_T	0.10	0.12	0.29	0.47	0.49	0.41	0.32	0.24	0.19
	F_d	0.09	0.11	0.14	0.17	0.25	0.32	0.39	0.47	0.52
20	C_v	535	620	830	1270	2050	3290	5110	7600	10900
	K_v	462	536	717	1097	1771	2843	4415	6566	9418
	F_L	0.75	0.71	0.77	0.74	0.78	0.75	0.72	0.65	0.60
	X_T	0.14	0.25	0.44	0.53	0.48	0.39	0.30	0.23	0.19
	F_d	0.11	0.13	0.16	0.20	0.26	0.33	0.40	0.46	0.53
24	C_v	830	1000	1410	2130	3230	4800	6900	9610	13000
	K_v	717	864	1218	1840	2791	4147	5962	8303	11232
	F_L	0.75	0.71	0.77	0.74	0.78	0.75	0.72	0.65	0.60
	X_T	0.14	0.29	0.42	0.45	0.42	0.36	0.31	0.27	0.23
	F_d	0.12	0.14	0.16	0.20	0.28	0.34	0.41	0.48	0.53
30	C_v	1170	1940	2470	3210	4610	7120	11200	17200	25750
	K_v	1011	1676	2134	2773	3983	6152	9677	14861	22248
	F_L	0.75	0.71	0.77	0.74	0.78	0.75	0.72	0.65	0.60
	X_T	0.14	0.12	0.25	0.43	0.52	0.47	0.36	0.27	0.20
	F_d	0.10	0.13	0.16	0.19	0.25	0.32	0.39	0.46	0.53
36	C_v	1340	1920	2650	4060	6690	11100	17800	27400	40300
	K_v	1158	1659	2290	3508	5780	9590	15379	23674	34819
	F_L	0.75	0.71	0.77	0.74	0.78	0.75	0.72	0.65	0.60
	X_T	0.15	0.17	0.37	0.53	0.52	0.43	0.33	0.25	0.19
	F_d	0.08	0.11	0.14	0.19	0.25	0.32	0.38	0.47	0.54

CL600 Control-Disk

Equal Percentage Characteristic

Valve Size	Coefficients	Valve Rotation, Degrees								
NPS		10	20	30	40	50	60	70	80	90
3	C_v	2	12	14	22	35	53	75	102	132
	K_v	2	10	12	19	30	46	65	88	114
	F_d	0.08	0.13	0.13	0.15	0.18	0.24	0.32	0.39	0.48
	F_L	0.76	0.74	0.75	0.75	0.77	0.75	0.71	0.65	0.59
	X_T	0.33	0.31	0.36	0.35	0.34	0.33	0.32	0.33	0.33
4	C_v	5	20	23	33	51	79	118	168	231
	K_v	4	17	20	29	44	68	102	145	200
	F_d	0.08	0.12	0.13	0.15	0.19	0.24	0.31	0.39	0.48
	F_L	0.76	0.74	0.75	0.75	0.77	0.75	0.71	0.65	0.59
	X_T	0.27	0.26	0.29	0.33	0.34	0.33	0.32	0.29	0.27
6	C_v	16	55	67	92	132	186	253	332	425
	K_v	14	48	58	79	114	161	219	287	367
	F_d	0.10	0.14	0.14	0.16	0.19	0.24	0.32	0.40	0.46
	F_L	0.76	0.74	0.75	0.75	0.77	0.75	0.71	0.65	0.59
	X_T	0.37	0.36	0.34	0.34	0.34	0.35	0.36	0.37	0.38
8	C_v	36	71	108	142	201	310	493	776	1185
	K_v	31	61	93	123	174	268	426	670	1024
	F_d	0.09	0.11	0.13	0.16	0.21	0.28	0.36	0.45	0.51
	F_L	0.76	0.74	0.75	0.75	0.77	0.75	0.71	0.65	0.59
	X_T	0.26	0.30	0.18	0.29	0.43	0.47	0.41	0.33	0.26
10	C_v	53	125	162	241	378	584	876	1266	1769
	K_v	46	108	140	208	327	505	757	1094	1528
	F_d	0.10	0.12	0.14	0.17	0.21	0.27	0.34	0.43	0.50
	F_L	0.76	0.74	0.75	0.75	0.77	0.75	0.71	0.65	0.59
	X_T	0.30	0.30	0.33	0.40	0.43	0.41	0.38	0.34	0.30
12	C_v	104	177	196	315	553	927	1457	2160	3055
	K_v	90	153	169	272	478	801	1259	1866	2640
	F_d	0.09	0.11	0.13	0.16	0.22	0.30	0.38	0.47	0.52
	F_L	0.76	0.74	0.75	0.75	0.77	0.75	0.71	0.65	0.59
	X_T	0.24	0.18	0.43	0.54	0.49	0.40	0.33	0.28	0.24
14	C_v	121	170	229	407	717	1170	1781	2561	3522
	K_v	105	147	198	352	619	1011	1539	2213	3043
	F_d	0.09	0.10	0.12	0.17	0.22	0.30	0.38	0.46	0.53
	F_L	0.76	0.74	0.75	0.75	0.77	0.75	0.71	0.65	0.59
	X_T	0.29	0.23	0.48	0.53	0.48	0.42	0.37	0.33	0.29
16	C_v	234	380	436	679	1105	1707	2481	3419	4518
	K_v	202	328	377	587	955	1475	2144	2954	3904
	F_d	0.11	0.13	0.16	0.19	0.24	0.32	0.39	0.48	0.53
	F_L	0.76	0.74	0.75	0.75	0.77	0.75	0.71	0.65	0.59
	X_T	0.31	0.27	0.50	0.53	0.47	0.41	0.37	0.34	0.32
18	C_v	226	406	496	758	1225	1930	2903	4179	5789
	K_v	195	351	429	655	1058	1668	2508	3611	5002
	F_d	0.09	0.12	0.14	0.18	0.22	0.30	0.37	0.45	0.53
	F_L	0.76	0.74	0.75	0.75	0.77	0.75	0.71	0.65	0.59
	X_T	0.27	0.24	0.38	0.46	0.45	0.40	0.35	0.31	0.27
20	C_v	459	736	831	1201	1838	2735	3884	5276	6905
	K_v	397	636	718	1038	1588	2363	3356	4558	5966
	F_d	0.11	0.14	0.17	0.20	0.25	0.31	0.38	0.45	0.52
	F_L	0.76	0.74	0.75	0.75	0.77	0.75	0.71	0.65	0.59
	X_T	0.27	0.25	0.42	0.45	0.41	0.36	0.32	0.29	0.27
24	C_v	551	789	980	1530	2511	3998	6066	8788	12239
	K_v	476	682	847	1322	2170	3454	5241	7593	10574
	F_d	0.09	0.11	0.14	0.18	0.23	0.31	0.38	0.45	0.50
	F_L	0.76	0.74	0.75	0.75	0.77	0.75	0.71	0.65	0.59
	X_T	0.22	0.17	0.34	0.42	0.40	0.35	0.30	0.26	0.22

Forward Flow

Modified Equal Percentage Characteristic

Coefficients	Valve Size, NPS	Valve Rotation, Degrees								
		10	20	30	40	50	60	70	80	90
C_v	3	4.74	14.1	34.6	60.1	84.0	107	133	163	166
K_V		4.10	12.2	29.9	52.0	72.7	92.6	115	141	144
F_d		0.18	0.24	0.33	0.43	0.53	0.63	0.75	0.99	0.99
F_L		0.85	0.86	0.84	0.83	0.87	0.86	0.80	0.71	0.69
X_T		0.294	0.632	0.511	0.494	0.537	0.559	0.501	0.384	0.372
C_v	4	11.1	27.1	61.7	106	149	193	252	324	346
K_V		9.60	23.4	53.4	91.7	129	167	218	280	299
F_d		0.18	0.28	0.34	0.43	0.51	0.59	0.70	0.99	0.99
F_L		0.76	0.89	0.86	0.82	0.85	0.83	0.77	0.66	0.62
X_T		0.263	0.616	0.526	0.476	0.497	0.501	0.422	0.311	0.276
C_v	6	15.7	33.0	86.1	154	229	330	497	718	809
K_V		13.6	28.5	74.5	133	198	285	430	621	700
F_d		0.12	0.24	0.32	0.40	0.48	0.56	0.64	0.74	0.99
F_L		0.93	0.82	0.81	0.78	0.77	0.74	0.70	0.61	0.57
X_T		0.281	0.174	0.311	0.449	0.522	0.459	0.322	0.228	0.221
C_v	8	21.5	82.4	156	259	402	592	832	1120	1440
K_V		18.6	71.3	135	224	348	512	720	969	1250
F_d		0.11	0.19	0.27	0.35	0.45	0.49	0.55	0.62	0.99
F_L		0.83	0.80	0.83	0.83	0.80	0.75	0.72	0.62	0.58
X_T		0.126	0.432	0.624	0.620	0.529	0.429	0.342	0.273	0.221
C_v	10	41.4	162	301	455	699	995	1300	1820	2360
K_V		35.8	140	260	394	605	861	1125	1514	2041
F_d		0.14	0.23	0.30	0.38	0.45	0.53	0.60	0.68	1.00
F_L		0.72	0.77	0.84	0.87	0.82	0.75	0.74	0.63	0.54
X_T		0.273	0.384	0.473	0.487	0.369	0.302	0.284	0.219	0.152
C_v	12	60.4	215	443	699	1020	1390	1850	2560	3050
K_V		52.2	186	383	605	882	1200	1600	2210	2640
F_d		0.14	0.24	0.32	0.40	0.48	0.55	0.63	0.73	1.00
F_L		0.81	0.78	0.77	0.72	0.78	0.73	0.68	0.63	0.51
X_T		0.714	0.336	0.366	0.449	0.452	0.416	0.360	0.263	0.223

Reverse Flow

Modified Equal Percentage Characteristic

Coefficients	Valve Size, NPS	Valve Rotation, Degrees								
		10	20	30	40	50	60	70	80	90
C_v	3	3.25	14.2	34.2	61.8	94.5	129	160	181	181
K_V		2.81	12.3	29.6	53.5	81.7	112	138	157	157
F_d		0.18	0.24	0.33	0.43	0.53	0.63	0.75	0.99	0.99
F_L		0.96	0.91	0.80	0.73	0.70	0.64	0.57	0.54	0.53
X_T		0.581	0.555	0.515	0.466	0.406	0.345	0.289	0.253	0.258
C_v	4	7.20	27.2	64.8	116	172	223	263	290	300
K_V		6.23	23.5	56.1	100	149	193	227	251	260
F_d		0.18	0.28	0.34	0.43	0.51	0.59	0.70	0.99	0.99
F_L		0.98	0.93	0.84	0.72	0.67	0.65	0.63	0.62	0.61
X_T		0.436	0.685	0.526	0.410	0.354	0.334	0.322	0.305	0.308
C_v	6	5.20	33.3	88.5	170	268	372	476	600	808
K_V		4.50	28.8	76.6	147	232	322	412	519	699
F_d		0.12	0.24	0.32	0.40	0.48	0.56	0.64	0.74	0.99
F_L		0.69	0.80	0.84	0.80	0.72	0.67	0.63	0.60	0.49
X_T		0.668	0.620	0.544	0.459	0.403	0.366	0.339	0.294	0.198
C_v	8	8.68	61.1	156	293	463	656	856	1050	1240
K_V		7.51	52.9	135	253	400	567	740	908	1070
F_d		0.11	0.19	0.27	0.35	0.45	0.49	0.55	0.62	0.99
F_L		0.77	0.83	0.87	0.80	0.73	0.66	0.61	0.59	0.58
X_T		0.898	0.731	0.585	0.483	0.413	0.354	0.314	0.284	0.260
C_v	10	37.0	137	288	505	752	1080	1460	1710	2140
K_V		32.0	119	249	437	650	934	1260	1480	1850
F_d		0.14	0.23	0.30	0.38	0.45	0.53	0.60	0.68	1.00
F_L		0.84	0.86	0.90	0.79	0.74	0.64	0.58	0.57	0.49
X_T		0.248	0.462	0.483	0.366	0.308	0.250	0.207	0.203	0.166
C_v	12	39.0	192	411	703	1090	1560	2040	2490	3080
K_V		33.7	166	356	608	943	1350	1760	2150	2660
F_d		0.14	0.24	0.32	0.40	0.48	0.55	0.63	0.73	1.00
F_L		0.71	0.81	0.80	0.74	0.69	0.63	0.59	0.54	0.50
X_T		0.975	0.616	0.533	0.473	0.391	0.325	0.286	0.258	0.196

Micro-Form - Flow Up

Equal Percentage Characteristic

Valve Size, NPS	Port Diameter		Total Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1	6.4	1/4	19	3/4	C_v	0.070	0.115	0.164	0.224	0.315	0.450	0.641	0.921	1.28	1.66	.87
					K_v	0.061	0.099	0.142	0.194	0.272	0.389	0.554	0.797	1.11	1.44	- - -
					X_T	0.783	0.783	0.744	0.691	0.625	0.614	0.608	0.611	0.610	0.611	- - -
					F_d	0.12	0.14	0.17	0.20	0.24	0.29	0.35	0.43	0.55	0.68	- - -
	9.5	3/8	19	3/4	C_v	0.155	0.260	0.407	0.596	0.858	1.21	1.65	2.22	3.00	4.03	.84
					K_v	0.134	0.225	0.352	0.516	0.742	1.05	1.43	1.92	2.60	3.49	- - -
					X_T	0.625	0.535	0.534	0.539	0.535	0.535	0.538	0.534	0.537	0.536	- - -
	12.7	1/2	19	3/4	C_v	0.273	0.436	0.631	0.911	1.30	1.84	2.57	3.65	5.08	6.51	.84
					K_v	0.236	0.377	0.546	0.788	1.13	1.59	2.22	3.16	4.39	5.63	- - -
					X_T	0.673	0.644	0.641	0.590	0.592	0.587	0.586	0.557	0.523	0.549	- - -
					F_d	0.11	0.13	0.16	0.19	0.23	0.27	0.33	0.40	0.48	0.56	- - -
	19.1	3/4	19	3/4	C_v	0.483	0.775	1.25	1.97	2.89	4.13	5.87	8.16	10.9	12.3	.92
					K_v	0.418	0.670	1.08	1.70	2.50	3.57	5.08	7.06	9.43	10.6	- - -
					X_T	0.571	0.599	0.527	0.473	0.492	0.519	0.537	0.505	0.486	0.628	- - -
					F_d	0.10	0.39	0.47	0.18	0.22	0.26	0.31	0.37	0.43	0.49	- - -
2	6.4	1/4	19	3/4	C_v	0.070	0.115	0.164	0.224	0.315	0.450	0.641	0.921	1.28	1.66	.87
					K_v	0.061	0.099	0.142	0.194	0.272	0.389	0.554	0.797	1.11	1.44	- - -
					X_T	0.783	0.783	0.744	0.691	0.625	0.614	0.608	0.611	0.610	0.611	- - -
					F_d	0.12	0.14	0.17	0.20	0.24	0.29	0.35	0.43	0.55	0.68	- - -
	9.5	3/8	19	3/4	C_v	0.155	0.260	0.407	0.596	0.858	1.21	1.65	2.22	3.00	4.03	.84
					K_v	0.134	0.225	0.352	0.516	0.742	1.05	1.43	1.92	2.60	3.49	- - -
					X_T	0.625	0.535	0.534	0.539	0.535	0.535	0.538	0.534	0.537	0.536	- - -
					F_d	0.11	0.13	0.16	0.19	0.22	0.27	0.33	0.41	0.50	0.61	- - -
	12.7	1/2	19	3/4	C_v	0.348	0.505	0.709	0.998	1.38	1.92	2.69	3.82	5.25	6.82	.81
					K_v	0.301	0.437	0.613	0.863	1.19	1.66	2.33	3.30	4.54	5.90	- - -
					X_T	0.613	0.627	0.585	0.576	0.565	0.553	0.535	0.509	0.490	0.501	- - -
					F_d	0.11	0.13	0.16	0.19	0.23	0.27	0.33	0.40	0.48	0.56	- - -
	19.1	3/4	19	3/4	C_v	0.613	0.952	1.44	2.06	2.92	4.13	5.87	8.16	11.1	14.1	.81
					K_v	0.530	0.823	1.25	1.78	2.53	3.57	5.08	7.06	9.60	12.2	- - -
					X_T	0.581	0.616	0.581	0.586	0.581	0.573	0.549	0.541	0.529	0.528	- - -
					F_d	0.10	0.39	0.47	0.18	0.22	0.26	0.31	0.37	0.43	0.49	- - -
	25.4	1	19	3/4	C_v	1.20	1.68	2.44	3.53	5.05	7.28	10.5	14.0	18.4	23.7	.82
					K_v	1.04	1.45	2.11	3.05	4.37	6.30	9.08	12.1	15.9	20.5	- - -
					X_T	0.517	0.569	0.559	0.542	0.544	0.540	0.507	0.508	0.507	0.508	- - -
					F_d	0.11	0.12	0.15	0.18	0.21	0.25	0.30	0.35	0.41	0.46	- - -
	31.8	1-1/4	19	3/4	C_v	1.32	1.76	2.50	3.66	5.42	8.25	12.7	20.6	29.0	34.5	.85
					K_v	1.14	1.52	2.16	3.17	4.69	7.14	11.0	17.8	25.1	29.8	- - -
					X_T	0.521	0.563	0.548	0.534	0.498	0.503	0.553	0.528	0.524	0.579	- - -
					F_d	0.087	0.10	0.12	0.15	0.18	0.22	0.28	0.33	0.39	0.44	- - -

1. At 100% travel.

Micro-Flute - Flow Up

Equal Percentage Characteristic

Valve Size, NPS	Port Diameter		Total Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
All Sizes 1 and 2	6.4 1 Flute	1/4 1 Flute	19	3/4	C_v	0.0385	0.0455	0.0560	0.0719	0.0942	0.124	0.162	0.212	0.278	0.354	.87
					K_v	0.033	0.039	0.048	0.062	0.081	0.107	0.140	0.183	0.240	0.306	- - -
					X_T	0.778	0.734	0.690	0.653	0.642	0.635	0.637	0.634	0.632	0.656	- - -
	6.4 3 Flutes	1/4 3 Flutes	19	3/4	C_v	0.0562	0.0725	0.101	0.146	0.216	0.312	0.433	0.588	0.802	1.07	.90
					K_v	0.049	0.063	0.087	0.126	0.187	0.270	0.375	0.509	0.694	0.926	- - -
					X_T	0.692	0.648	0.639	0.625	0.600	0.586	0.597	0.613	0.620	0.624	- - -

1. At 100% travel.

Flow Down

Equal Percentage Characteristic

Valve Size, NPS	Port Diameter		Total Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1	6.4	1/4	19	3/4	C_v	0.096	0.173	0.294	0.481	0.727	0.995	1.35	1.99	2.73	3.21	0.45
					K_v	0.0830	0.150	0.254	0.416	0.629	0.861	1.17	1.72	2.36	2.78	- - -
					X_T	0.578	0.379	0.271	0.201	0.154	0.144	0.148	0.129	0.127	0.153	- - -
	9.5	3/8	19	3/4	C_v	0.189	0.343	0.624	1.05	1.45	1.84	2.47	3.81	5.58	7.06	0.45
					K_v	0.164	0.297	0.540	0.908	1.25	1.59	2.14	3.30	4.83	6.11	- - -
					X_T	0.516	0.355	0.220	0.151	0.152	0.180	0.194	0.163	0.163	0.163	- - -
	12.7	1/2	19	3/4	C_v	0.487	0.952	1.40	2.07	2.90	3.55	4.54	6.16	8.79	11.2	0.50
					K_v	0.421	0.823	1.21	1.79	2.51	3.07	3.93	5.33	7.60	9.69	- - -
					X_T	0.226	0.137	0.124	0.111	0.111	0.144	0.174	0.185	0.180	0.186	- - -
	19.1	3/4	19	3/4	C_v	0.840	1.58	2.25	2.86	3.82	5.51	8.69	11.8	14.4	16.8	0.67
					K_v	0.727	1.37	1.95	2.47	3.30	4.77	7.52	10.2	12.5	14.5	- - -
					X_T	0.194	0.142	0.168	0.238	0.288	0.292	0.242	0.259	0.318	0.372	- - -
2	6.4	1/4	19	3/4	C_v	0.096	0.177	0.353	0.546	0.742	0.995	1.35	1.99	2.73	3.21	0.50
					K_v	0.083	0.153	0.305	0.472	0.642	0.861	1.17	1.72	2.36	2.78	- - -
					X_T	0.578	0.362	0.188	0.156	0.148	0.144	0.148	0.138	0.139	0.164	- - -
	9.5	3/8	19	3/4	C_v	0.256	0.445	0.734	1.09	1.45	1.84	2.47	3.81	5.58	7.06	0.45
					K_v	0.221	0.385	0.635	0.943	1.25	1.59	2.14	3.30	4.83	6.11	- - -
					X_T	0.394	0.237	0.164	0.140	0.152	0.180	0.194	0.163	0.163	0.163	- - -
	12.7	1/2	19	3/4	C_v	0.641	1.03	1.55	2.20	2.90	3.55	4.63	7.13	9.86	12.1	0.45
					K_v	0.555	0.891	1.34	1.90	2.51	3.07	4.01	6.17	8.53	10.5	- - -
					X_T	0.265	0.195	0.162	0.143	0.146	0.168	0.179	0.165	0.165	0.164	- - -
	19.1	3/4	19	3/4	C_v	1.06	1.70	2.25	2.86	3.82	5.51	8.69	13.1	17.4	21.2	0.55
					K_v	0.917	1.47	1.95	2.47	3.30	4.77	7.52	11.3	15.1	18.3	- - -
					X_T	0.209	0.195	0.235	0.295	0.325	0.306	0.245	0.210	0.222	0.235	- - -
	25.4	1	19	3/4	C_v	2.04	2.93	3.59	4.32	5.98	8.71	13.0	19.9	26.7	31.8	0.55
					K_v	1.76	2.53	3.11	3.74	5.17	7.53	11.2	17.2	23.1	27.5	- - -
					X_T	0.171	0.176	0.242	0.342	0.343	0.313	0.274	0.227	0.225	0.255	- - -
	31.8	1-1/4	19	3/4	C_v	1.72	2.31	3.31	4.71	6.78	10.5	17.6	26.0	35.2	44.9	0.59
					K_v	1.49	2.00	2.86	4.07	5.86	9.08	15.2	22.5	30.4	38.8	- - -
					X_T	0.312	0.311	0.311	0.311	0.310	0.310	0.312	0.311	0.311	0.310	- - -

1. At 100% travel.

Flow Up

Equal Percentage Characteristic

Valve Size, NPS	Port Diameter		Total Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1	6.4	1/4	19	3/4	C_V	0.070	0.115	0.164	0.224	0.315	0.450	0.641	0.921	1.28	1.66	0.87
					K_V	0.060	0.100	0.142	0.194	0.273	0.389	0.555	0.797	1.11	1.44	- - -
					X_T	0.783	0.783	0.744	0.695	0.625	0.614	0.609	0.611	0.610	0.611	- - -
	9.5	3/8	19	3/4	C_V	0.155	0.260	0.407	0.596	0.858	1.21	1.65	2.22	3.00	4.03	0.84
					K_V	0.134	0.225	0.352	0.516	0.742	1.05	1.43	1.92	2.60	3.49	- - -
					X_T	0.625	0.535	0.534	0.539	0.535	0.535	0.538	0.534	0.537	0.536	- - -
	12.7	1/2	19	3/4	C_V	0.273	0.436	0.631	0.911	1.30	1.84	2.57	3.65	5.08	6.51	0.84
					K_V	0.236	0.377	0.546	0.788	1.12	1.59	2.22	3.16	4.39	5.63	- - -
					X_T	0.673	0.644	0.641	0.590	0.592	0.587	0.586	0.557	0.524	0.549	- - -
	19.1	3/4	19	3/4	C_V	0.483	0.775	1.25	1.97	2.89	4.13	5.87	8.16	10.9	12.3	0.92
					K_V	0.418	0.670	1.08	1.70	2.50	3.57	5.08	7.06	9.43	10.6	- - -
					X_T	0.571	0.599	0.527	0.473	0.492	0.519	0.537	0.505	0.486	0.628	- - -
2	6.4	1/4	19	3/4	C_V	0.070	0.115	0.164	0.224	0.315	0.450	0.641	0.921	1.28	1.66	0.87
					K_V	0.061	0.100	0.142	0.194	0.273	0.389	0.555	0.797	1.11	1.44	- - -
					X_T	0.783	0.783	0.744	0.695	0.625	0.614	0.609	0.611	0.610	0.611	- - -
	9.5	3/8	19	3/4	C_V	0.155	0.260	0.407	0.596	0.858	1.21	1.65	2.22	3.00	4.03	0.84
					K_V	0.134	0.225	0.352	0.516	0.742	1.05	1.43	1.92	2.60	3.49	- - -
					X_T	0.625	0.535	0.534	0.539	0.535	0.535	0.538	0.534	0.537	0.536	- - -
	12.7	1/2	19	3/4	C_V	0.348	0.505	0.709	0.989	1.38	1.92	2.69	3.82	5.25	6.82	0.81
					K_V	0.301	0.437	0.613	0.856	1.19	1.66	2.33	3.30	4.54	5.90	- - -
					X_T	0.613	0.627	0.585	0.587	0.565	0.553	0.535	0.509	0.490	0.501	- - -
	19.1	3/4	19	3/4	C_V	0.613	0.952	1.44	2.06	2.92	4.13	5.87	8.16	11.1	14.1	0.81
					K_V	0.530	0.824	1.25	1.78	2.53	3.57	5.08	7.06	9.60	12.2	- - -
					X_T	0.582	0.616	0.581	0.586	0.581	0.573	0.549	0.541	0.529	0.528	- - -
	25.4	1	19	3/4	C_V	1.20	1.68	2.44	3.53	5.05	7.28	10.5	14.0	18.4	23.7	0.81
					K_V	1.04	1.45	2.11	3.05	4.37	6.30	9.08	12.1	15.9	20.5	- - -
					X_T	0.516	0.569	0.556	0.542	0.544	0.540	0.507	0.508	0.507	0.508	- - -
	31.8	1-1/4	19	3/4	C_V	1.32	1.76	2.50	3.66	5.42	8.25	12.7	20.6	29.0	34.5	0.87
					K_V	1.14	1.52	2.16	3.17	4.69	7.14	11.0	17.8	25.1	29.8	- - -
					X_T	0.520	0.563	0.548	0.534	0.498	0.503	0.554	0.528	0.524	0.578	- - -

1. At 100% travel.

Micro-Flute - Flow Down

Equal Percentage Characteristic

Valve Size, NPS	Port Diameter		Total Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1 and 2	6.4 1 Flute	1/4 1 Flute	19	3/4	C_v	0.0313	0.0377	0.0470	0.0624	0.0874	0.124	0.175	0.243	0.330	0.407	0.79
					K_v	0.0271	0.0326	0.0407	0.0540	0.0756	0.107	0.151	0.210	0.286	0.352	- - -
					X_T	0.990	0.975	0.867	0.765	0.659	0.569	0.494	0.450	0.450	0.550	- - -
	6.4 3 Flutes	1/4 3 Flutes	19	3/4	C_v	0.0612	0.0900	0.136	0.210	0.310	0.430	0.573	0.784	1.12	1.42	0.68
					K_v	0.0529	0.0779	0.118	0.182	0.268	0.372	0.496	0.678	0.969	1.23	- - -
					X_T	0.669	0.520	0.388	0.313	0.295	0.306	0.326	0.326	0.313	0.378	- - -

Micro-Flute - Flow Up

Equal Percentage Characteristic

Valve Size, NPS	Port Diameter		Total Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1 and 2	6.4 1 Flute	1/4 1 Flute	19	3/4	C_v	0.0385	0.0455	0.0560	0.0719	0.0942	0.124	0.162	0.212	0.278	0.354	0.87
					K_v	0.0333	0.0394	0.0484	0.0622	0.0815	0.107	0.140	0.183	0.241	0.306	- - -
					X_T	0.778	0.734	0.690	0.653	0.642	0.635	0.637	0.634	0.632	0.656	- - -
	6.4 3 Flutes	1/4 3 Flutes	19	3/4	C_v	0.0562	0.0725	0.101	0.146	0.216	0.312	0.433	0.588	0.802	1.07	0.90
					K_v	0.049	0.0627	0.0874	0.126	0.187	0.270	0.375	0.509	0.694	0.926	- - -
					X_T	0.692	0.648	0.639	0.625	0.600	0.586	0.597	0.613	0.620	0.624	- - -

1. At 100% travel.

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Equal Percentage / Micro-Form Plug

Equal Percentage Characteristic

Valve Size, NPS	Flow Direction	Port Diameter	Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(3)
		Inches		10	20	30	40	50	60	70	80	90	100	
1	Up	0.375	C_V	0.266	0.480	0.698	0.984	1.31	1.69	2.10	2.63	3.23	3.70	0.94
			K_V	0.230	0.415	0.522	0.851	1.13	1.46	1.82	2.27	2.79	3.20	---
			X_T	0.449	0.455	0.468	0.481	0.477	0.495	0.482	0.488	0.516	0.572	---
		0.75	C_V	0.708	1.34	1.97	2.60	3.58	4.95	6.44	7.95	9.30	10.4	0.91
			K_V	0.612	1.16	1.70	2.25	3.10	4.28	5.57	6.88	8.04	9.00	---
			X_T	0.499	0.463	0.505	0.491	0.505	0.541	0.562	0.559	0.599	0.653	---
		1	C_V	1.38	2.70	3.98	5.30	6.80	8.00	9.60	11.2	12.5	13.6	0.86
			K_V	1.19	2.34	3.44	4.58	5.88	6.92	8.30	9.69	10.8	11.8	---
			X_T	0.457	0.449	0.520	0.544	0.542	0.564	0.542	0.572	0.662	0.761	---
	Down	0.375	C_V	0.600	1.02	1.40	1.90	2.37	2.74	2.90	3.78	4.58	5.00	0.59
			K_V	0.519	0.882	1.21	1.64	2.05	2.37	2.51	3.27	3.96	4.33	---
			X_T	0.163	0.172	0.161	0.188	0.250	0.342	0.450	0.454	0.435	0.376	---
		0.75	C_V	1.31	2.30	3.20	2.90	3.50	5.10	6.58	7.60	8.50	9.07	0.91
			K_V	1.13	1.99	2.77	2.51	3.03	4.41	5.69	6.57	7.35	7.85	---
			X_T	0.160	0.177	0.242	0.402	0.527	0.566	0.616	0.686	0.793	0.882	---
		1	C_V	1.50	2.90	4.85	6.58	7.25	8.00	8.70	9.84	10.8	11.5	0.90
			K_V	1.30	2.51	4.20	5.69	6.27	6.92	7.53	8.51	9.34	9.95	---
			X_T	0.250	0.344	0.415	0.518	0.585	0.639	0.654	0.749	0.819	0.983	---
2	Up	0.375	C_V	0.270	0.480	0.690	0.990	1.32	1.70	2.13	2.66	3.29	3.74	0.95
			K_V	0.233	0.415	0.597	0.856	1.14	1.47	1.84	2.30	2.85	3.24	---
			X_T	0.437	0.426	0.439	0.472	0.476	0.475	0.480	0.387	0.459	0.563	---
		0.75	C_V	0.653	1.28	1.90	2.55	3.50	4.86	6.58	8.40	10.1	11.5	0.92
			K_V	0.565	1.11	1.64	2.21	3.03	4.20	5.69	7.27	8.74	9.95	---
			X_T	0.510	0.489	0.476	0.476	0.482	0.504	0.513	0.509	0.496	0.478	---
		1	C_V	1.71	3.03	4.54	6.00	7.35	9.10	11.1	13.2	15.3	16.8	0.91
			K_V	1.48	2.62	3.93	5.19	6.36	7.87	9.60	11.4	13.2	14.5	---
			X_T	0.434	0.455	0.497	0.513	0.504	0.489	0.459	0.453	0.530	0.578	---
	Down	0.375	C_V	0.480	0.900	1.30	1.75	2.20	2.50	2.85	3.50	4.40	4.70	0.62
			K_V	0.415	0.779	1.12	1.51	1.90	2.16	2.47	3.03	3.81	4.07	---
			X_T	0.163	0.171	0.171	0.184	0.245	0.346	0.462	0.378	0.391	0.375	---
		0.75	C_V	1.08	2.00	3.00	3.20	3.50	5.00	6.75	8.26	9.40	10.4	0.91
			K_V	0.934	1.73	2.60	2.77	3.03	4.33	5.84	7.14	8.13	9.00	---
			X_T	0.164	0.179	0.199	0.357	0.501	0.530	0.560	0.583	0.650	0.683	---
		1	C_V	1.55	3.40	5.35	6.85	7.90	8.70	10.3	11.9	12.9	13.8	0.86
			K_V	1.34	2.94	4.63	5.93	6.83	7.53	8.91	10.3	11.2	11.9	---
			X_T	0.260	0.356	0.459	0.524	0.528	0.564	0.552	0.597	0.705	0.763	---

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Micro-Form - Flow Up

Equal Percentage Characteristic

Valve Size, NPS	Port Diameter		Total Travel		Flow Coefficient	Valve Opening—Percent of Total Travel											F_L(1)
	mm	Inches	mm	Inches		5	10	20	30	40	50	60	70	80	90	100	
1	6.4	0.25	19	0.75	C_V	0.0679	0.0858	0.122	0.167	0.231	0.325	0.458	0.646	0.905	1.25	1.76	0.96
					K_V	0.0587	0.0742	0.106	0.144	0.200	0.281	0.396	0.559	0.783	1.08	1.52	- - -
					X_T	0.705	0.623	0.620	0.631	0.585	0.565	0.578	0.569	0.555	0.588	0.569	- - -
	9.5	0.375	19	0.75	C_V	0.114	0.132	0.205	0.298	0.426	0.590	0.834	1.21	1.75	2.45	3.53	0.95
					K_V	0.099	0.114	0.177	0.258	0.368	0.510	0.721	1.05	1.51	2.12	3.05	- - -
					X_T	0.776	0.848	0.656	0.673	0.626	0.608	0.589	0.582	0.575	0.588	0.691	- - -
	12.7	0.5	19	0.75	C_V	0.185	0.235	0.357	0.523	0.752	1.07	1.50	2.13	3.05	4.30	5.87	0.96
					K_V	0.160	0.203	0.309	0.452	0.650	0.926	1.30	1.84	2.64	3.72	5.08	- - -
					X_T	0.718	0.674	0.640	0.596	0.575	0.592	0.593	0.568	0.569	0.599	0.755	- - -
	19.1	0.75	19	0.75	C_V	0.324	0.358	0.571	0.900	1.30	1.91	3.04	5.08	7.75	9.56	11.2	0.94
					K_V	0.280	0.310	0.494	0.779	1.13	1.65	2.63	4.39	6.70	8.27	9.69	- - -
					X_T	0.561	0.684	0.645	0.594	0.605	0.614	0.592	0.594	0.613	0.696	0.783	- - -
2	6.4	0.25	19	0.75	C_V	0.0679	0.0858	0.122	0.167	0.231	0.325	0.458	0.646	0.905	1.25	1.76	0.96
					K_V	0.0587	0.0742	0.106	0.144	0.200	0.281	0.396	0.559	0.783	1.08	1.52	- - -
					X_T	0.705	0.623	0.620	0.631	0.585	0.565	0.578	0.569	0.555	0.588	0.569	- - -
	9.5	0.375	19	0.75	C_V	0.114	0.132	0.205	0.298	0.426	0.590	0.834	1.21	1.75	2.45	3.53	0.95
					K_V	0.099	0.114	0.177	0.258	0.368	0.510	0.721	1.05	1.51	2.12	3.05	- - -
					X_T	0.776	0.848	0.656	0.673	0.626	0.608	0.589	0.582	0.575	0.588	0.691	- - -
	12.7	0.5	19	0.75	C_V	0.186	0.244	0.359	0.540	0.784	1.09	1.52	2.25	3.20	4.49	6.27	0.95
					K_V	0.161	0.211	0.311	0.467	0.678	0.943	1.32	1.95	2.77	3.88	5.42	- - -
					X_T	0.814	0.699	0.799	0.685	0.593	0.560	0.573	0.531	0.536	0.547	0.612	- - -
	19.1	0.75	19	0.75	C_V	0.305	0.367	0.583	0.892	1.31	2.02	3.14	5.18	8.01	10.6	13.4	0.92
					K_V	0.264	0.317	0.504	0.772	1.13	1.75	2.72	4.48	6.93	9.17	11.6	- - -
					X_T	0.697	0.513	0.477	0.481	0.478	0.447	0.400	0.432	0.465	0.512	0.640	- - -
	25.4	1	19	0.75	C_V	0.734	0.922	1.35	1.79	2.38	3.65	5.50	9.04	13.6	17.3	21.6	0.95
					K_V	0.635	0.798	1.17	1.55	2.06	3.16	4.76	7.82	11.8	15.0	18.7	- - -
					X_T	0.501	0.684	0.658	0.548	0.648	0.548	0.577	0.525	0.513	0.632	0.745	- - -
	31.8	1.25	19	0.75	C_V	1.08	1.22	1.65	2.26	3.24	5.14	8.90	15.2	22.6	26.9	33.2	0.94
					K_V	0.934	1.06	1.43	1.96	2.80	4.45	7.70	13.1	19.5	23.3	28.7	- - -
					X_T	0.587	0.686	0.636	0.638	0.649	0.520	0.706	0.687	0.680	0.767	0.761	- - -

1. At 100% travel.

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With Liner

Quick Opening Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel(1)		Flow Coefficient	Coeffs. for 6 mm (1/4 in.) Travel(2)	Valve Opening—Percent of Total Travel										F_L(3)
	mm	Inches	mm	Inches			10	20	30	40	50	60	70	80	90	100	
1	33.3	0.3125	19	0.75	C_v	14.2	5.14	9.24	13.1	16.2	18.8	20.9	22.4	23.4	24.0	24.0	0.90
					K_v	*12.3*	4.45	7.99	11.3	14.0	16.3	18.1	19.4	20.2	20.8	20.8	- - -
					X_T	0.800	0.629	0.703	0.761	0.809	0.775	0.713	0.677	0.652	0.630	0.630	- - -
2	47.6	1.875	19	0.75	C_v	29.4	8.77	17.1	26.2	36.1	45.4	53.4	59.3	63.6	67.3	70.7	0.76
					K_v	*25.4*	7.59	14.8	22.7	31.2	39.3	46.2	51.3	55.0	58.2	61.2	- - -
					X_T	0.573	0.480	0.513	0.568	0.570	0.577	0.589	0.628	0.618	0.656	0.656	- - -
	33.3	1.3125	19	0.75	C_v	17.3	5.91	10.1	15.1	21.7	29.4	37.3	43.7	48.5	52.4	55.2	0.60
					K_v	15.0	5.11	8.74	13.1	18.8	25.4	32.3	37.8	42.0	45.3	47.7	- - -
					X_T	0.543	0.404	0.584	0.570	0.522	0.478	0.431	0.396	0.370	0.344	0.326	- - -
3	73.0	2.875	38	1.5	C_v	30.6	24.2	47.2	77.8	108	133	148	159	171	181	183	0.76
					K_v	*26.5*	20.9	40.8	67.3	93.4	115	128	138	148	157	158	- - -
					X_T	0.540	0.517	0.534	0.504	0.545	0.582	0.636	0.651	0.616	0.575	0.569	- - -
	47.6	1.875	19	0.75	C_v	29.8	7.96	15.5	25.7	37.4	49.0	61.2	72.5	83.1	92.8	102	0.60
					K_v	*25.8*	6.89	13.4	22.2	32.4	42.4	52.9	62.7	71.9	80.3	88.2	- - -
					X_T	0.576	0.549	0.624	0.603	0.541	0.525	0.482	0.452	0.422	0.391	0.349	- - -
4	87.3	3.4375	38	1.5	C_v	37.1	22.3	46.3	77.1	117	155	180	197	212	230	235	0.72
					K_v	*32.1*	19.3	40.0	66.7	101	134	156	170	183	199	203	- - -
					X_T	0.580	0.616	0.547	0.537	0.531	0.529	0.575	0.629	0.635	0.609	0.620	- - -
	58.7	2.3125	29	1.125	C_v	31.4	14.4	28.3	46.1	66.7	87.5	107	124	138	149	160	0.61
					K_v	27.2	12.5	24.5	39.9	57.7	75.7	92.6	107	119	129	138	- - -
					X_T	0.548	0.509	0.533	0.505	0.486	0.482	0.465	0.443	0.416	0.387	0.354	- - -
6	111.1	4.375	51	2	C_v	50.0	39.8	84.0	150	219	279	332	379	420	435	435	0.71
					K_v	*43.3*	34.4	72.7	130	189	241	287	328	363	376	376	- - -
					X_T	0.578	0.597	0.599	0.577	0.581	0.581	0.578	0.565	0.527	0.533	0.533	- - -
	73.0	2.875	38	1.5	C_v	38.7	23.9	47.1	74.9	109	142	174	201	219	244	248	0.59
					K_v	33.5	20.7	40.7	64.8	94.3	123	151	174	189	211	215	- - -
					X_T	0.353	0.353	0.353	0.353	0.353	0.356	0.352	0.353	0.352	0.353	0.354	- - -

1. When using Fisher 655-EAD as a control valve for on-off service, the maximum travel for sizing purposes is 19 mm (3/4 inch).
2. When sizing self-operated regulators, use coefficients listed for 6 mm (1/4 inch) travel.
3. At 100% travel.

▨ Restricted trim.

Without Liner[4]

Quick Opening Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel[1]		Flow Coefficient	Coeffs. for 6 mm (1/4 in.) Travel[2]	Valve Opening—Percent of Total Travel										F_L[3]
	mm	Inches	mm	Inches			10	20	30	40	50	60	70	80	90	100	
1	33.3	0.3125	19	0.75	C_v	14.8	5.07	9.36	13.6	16.8	19.2	20.9	22.2	23.1	23.6	23.7	0.87
					K_v	*12.8*	4.39	8.10	11.8	14.5	16.6	18.1	19.2	20.0	20.4	20.5	- - -
					X_T	0.757	0.638	0.753	0.753	0.766	0.736	0.703	0.670	0.650	0.640	0.636	- - -
2	47.6	1.875	19	0.75	C_v	28.0	8.06	15.7	24.9	34.3	43.1	51.0	57.1	61.4	64.6	67.2	0.87
					K_v	*24.2*	6.97	13.6	21.5	29.7	37.3	44.1	49.4	53.1	55.9	58.1	- - -
					X_T	0.629	0.531	0.621	0.623	0.631	0.641	0.638	0.656	0.676	0.686	0.682	- - -
	33.3	1.3125	19	0.75	C_v	17.2	6.02	10.4	15.4	20.9	27.1	33.7	38.5	41.7	44.2	45.6	0.71
					K_v	14.9	*5.21*	*9.00*	*13.3*	*18.1*	*23.4*	*29.2*	*33.3*	*36.1*	*38.2*	*39.4*	- - -
					X_T	0.573	0.470	0.541	0.570	0.575	0.563	0.526	0.510	0.492	0.476	0.470	- - -
3	73.0	2.875	38	1.5	C_v	39.2	23.4	47.9	78.7	108	128	142	153	163	171	171	0.81
					K_v	*33.9*	20.2	41.4	68.1	93.4	111	123	132	141	148	148	- - -
					X_T	0.576	0.588	0.573	0.534	0.573	0.635	0.662	0.654	0.626	0.600	0.605	- - -
	47.6	1.875	19	0.75	C_v	29.1	8.27	15.9	25.6	36.0	46.8	56.4	64.6	72.1	79.3	86.1	0.72
					K_v	25.2	7.15	13.8	22.1	31.1	40.5	48.8	55.9	62.4	68.6	74.5	- - -
					X_T	0.609	0.488	0.603	0.610	0.594	0.575	0.574	0.569	0.561	0.530	0.490	- - -
4	87.3	3.4375	38	1.5	C_v	39.0	23.9	48.2	80.3	118	151	178	195	209	223	223	0.76
					K_v	*33.7*	20.7	41.7	69.5	102	131	154	169	181	193	193	- - -
					X_T	0.562	0.588	0.566	0.554	0.556	0.580	0.610	0.659	0.669	0.644	0.650	- - -
	58.7	2.3125	29	1.125	C_v	30.9	13.6	27.0	43.9	62.5	80.6	96.0	109	120	127	133	0.73
					K_v	26.7	11.8	23.4	38.0	54.1	69.7	83.0	94.3	104	110	115	- - -
					X_T	0.608	0.593	0.614	0.582	0.578	0.587	0.590	0.576	0.547	0.533	0.513	- - -
6	111.1	4.375	51	2	C_v	45.8	37.6	79.6	142	207	265	311	351	383	398	398	0.76
					K_v	*39.6*	32.5	68.9	123	179	229	269	304	331	344	344	- - -
					X_T	0.652	0.680	0.652	0.639	0.639	0.655	0.686	0.683	0.666	0.657	0.667	- - -
	73.0	2.875	38	1.5	C_v	35.4	21.8	43.1	71.5	103	130	154	173	188	198	206	0.74
					K_v	30.6	18.9	37.3	61.8	89.1	112	133	150	163	171	178	- - -
					X_T	0.671	0.624	0.650	0.652	0.618	0.659	0.659	0.646	0.620	0.595	0.568	- - -

1. When using Fisher 655-EAD as a control valve for on-off service, the maximum travel for sizing purposes is 19 mm (3/4 inch).
2. When sizing self-operated regulators, use coefficients listed for 6 mm (1/4 inch) travel.
3. At 100% travel.
4. For NPS 8 values, please see the ED Catalog 12 pages.

▨ Restricted trim.

Note: The coefficients shown on this page are also appropriate for Fisher EAS and EAT.

With Liner - Flow Down

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1	33.3	1.3125	19	0.75	C_V	2.71	5.17	8.14	10.7	13.0	15.2	17.2	19.1	20.7	22.0	0.90
					K_V	2.34	4.47	7.04	9.26	11.2	13.1	14.9	16.5	17.9	19.0	- - -
					X_T	0.632	0.692	0.719	0.772	0.786	0.777	0.755	0.722	0.682	0.634	- - -
2	47.6	1.875	19	0.75	C_V	3.77	6.94	11.3	16.1	21.0	26.7	33.1	40.1	46.8	53.8	0.82
					K_V	3.26	6.00	9.77	13.9	18.2	23.1	28.6	34.7	40.5	46.5	- - -
					X_T	0.665	0.675	0.663	0.642	0.627	0.616	0.617	0.607	0.633	0.661	- - -
	33.3	1.3125	19	0.75	C_V	2.95	5.49	8.65	12.1	15.7	19.3	23.4	29.7	35.7	41.0	0.66
					K_V	2.55	4.75	7.48	10.5	13.6	16.7	20.2	25.7	30.9	35.5	- - -
					X_T	0.474	0.592	0.587	0.581	0.579	0.584	0.564	0.487	0.451	0.426	- - -
3	73.0	2.875	38	1.5	C_V	10.3	24.0	38.8	54.3	69.8	86.5	102	124	141	155	0.80
					K_V	8.91	20.8	33.6	47.0	60.4	74.8	88.2	107	122	134	- - -
					X_T	0.630	0.623	0.618	0.598	0.599	0.591	0.619	0.603	0.614	0.614	- - -
	47.6	1.875	19	0.75	C_V	3.37	6.45	10.6	15.3	19.8	25.3	32.2	40.1	48.4	58.1	0.74
					K_V	2.92	5.58	9.17	13.2	17.1	21.9	27.9	34.7	41.9	50.3	- - -
					X_T	0.630	0.682	0.693	0.665	0.663	0.637	0.600	0.588	0.569	0.548	- - -
4	87.3	3.4375	38	1.5	C_V	12.7	31.6	54.1	77.8	103	128	149	171	191	208	0.78
					K_V	11.0	27.3	46.8	67.3	89.1	111	129	148	165	180	- - -
					X_T	0.677	0.638	0.596	0.590	0.552	0.548	0.573	0.594	0.613	0.627	- - -
	58.7	2.3125	29	1.125	C_V	6.70	15.3	25.2	37.0	50.2	64.5	79.4	94.6	110	124	0.66
					K_V	5.80	13.2	21.8	32.0	43.4	55.8	68.7	81.8	95.2	107	- - -
					X_T	0.705	0.590	0.596	0.573	0.536	0.509	0.493	0.490	0.471	0.445	- - -
6	111.1	4.375	51	2	C_V	25.4	53.6	83.0	113	146	179	218	263	309	350	0.78
					K_V	22.0	46.4	71.8	97.7	126	155	189	227	267	303	- - -
					X_T	0.670	0.666	0.666	0.659	0.631	0.627	0.623	0.624	0.630	0.617	- - -
	73.0	2.875	38	1.5	C_V	10.6	25.2	41.1	57.7	76.1	94.8	116	139	168	195	0.67
					K_V	9.17	21.8	35.6	49.9	65.8	82.0	100	120	145	169	- - -
					X_T	0.445	0.443	0.448	0.445	0.445	0.445	0.443	0.448	0.442	0.444	- - -

1. At 100% travel.

▨ Restricted trim.

Note: The coefficients shown on this page are also appropriate for Fisher EAS and EAT.

Without Liner - Flow Down(2)

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1	33.3	1.3125	19	0.75	C_V	2.90	5.78	8.85	11.6	13.9	16.0	18.0	19.7	21.2	22.3	0.89
					K_V	2.51	5.00	7.66	10.0	12.0	13.8	15.6	17.0	18.3	19.3	- - -
					X_T	0.778	0.704	0.699	0.736	0.745	0.747	0.730	0.699	0.664	0.624	- - -
2	47.6	1.875	19	0.75	C_V	3.68	6.98	11.3	15.9	20.8	26.4	32.7	39.2	45.7	52.5	0.84
					K_V	3.18	6.04	9.77	13.8	18.0	22.8	28.3	33.9	39.5	45.4	- - -
					X_T	0.676	0.667	0.684	0.666	0.624	0.627	0.632	0.625	0.655	0.679	- - -
	33.3	1.3125	19	0.75	C_V	3.01	5.45	8.95	12.5	15.9	19.1	23.3	28.4	33.2	37.6	0.73
					K_V	2.60	4.71	7.74	10.8	13.8	16.5	20.2	24.6	28.7	32.5	- - -
					X_T	0.790	0.768	0.661	0.618	0.608	0.611	0.582	0.545	0.535	0.516	- - -
3	73.0	2.875	38	1.5	C_V	10.9	25.1	41.3	58.4	75.7	93.9	112	128	143	153	0.83
					K_V	9.43	21.7	35.7	50.5	65.5	81.2	96.9	111	124	132	- - -
					X_T	0.736	0.638	0.591	0.548	0.538	0.532	0.543	0.583	0.619	0.631	- - -
	47.6	1.875	19	0.75	C_V	3.61	6.92	11.1	15.5	20.6	26.4	33.2	41.4	50.1	60.2	0.78
					K_V	3.12	5.99	9.60	13.4	17.8	22.8	28.7	35.8	43.3	52.1	- - -
					X_T	0.623	0.721	0.694	0.684	0.663	0.630	0.602	0.570	0.568	0.546	- - -
4	87.3	3.4375	38	1.5	C_V	14.0	33.8	56.3	80.2	104	127	148	169	185	201	0.81
					K_V	12.1	29.2	48.7	69.4	90.0	110	128	146	160	174	- - -
					X_T	0.640	0.638	0.611	0.588	0.570	0.568	0.593	0.622	0.660	0.664	- - -
	58.7	2.3125	29	1.125	C_V	7.02	15.7	25.7	36.9	48.6	60.9	72.9	84.6	97.2	108	0.76
					K_V	6.07	13.6	22.2	31.9	42.0	52.7	63.1	73.2	84.1	93.4	- - -
					X_T	0.712	0.626	0.625	0.597	0.587	0.577	0.590	0.604	0.580	0.566	- - -
6	111.1	4.375	51	2	C_V	24.2	51.2	81.8	109	140	171	208	256	300	341	0.78
					K_V	20.9	44.3	70.8	94.3	121	148	180	221	260	295	- - -
					X_T	0.643	0.697	0.666	0.693	0.672	0.668	0.684	0.663	0.668	0.662	- - -
	73.0	2.875	38	1.5	C_V	10.2	22.8	36.6	52.1	68.0	84.5	102	124	147	168	0.74
					K_V	8.82	19.7	31.7	45.1	58.8	73.1	88.2	107	127	145	- - -
					X_T	0.592	0.651	0.661	0.635	0.619	0.619	0.615	0.584	0.568	0.556	- - -

1. At 100% travel.
2. For NPS 8 values, please see the ED Catalog 12 pages.
▨ Restricted trim.

Note: The coefficients shown on this page are also appropriate for Fisher EAS and EAT.

With Liner - Flow Down

Equal Percentage Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1	33.3	1.3125	19	0.75	C_V	1.02	1.49	2.07	2.70	3.92	5.68	8.18	11.7	15.5	18.5	0.93
					K_V	0.882	1.29	1.79	2.34	3.39	4.91	7.08	10.1	13.4	16.0	- - -
					X_T	0.902	0.902	0.820	0.740	0.741	0.737	0.738	0.734	0.742	0.739	- - -
2	47.6	1.875	19	0.75	C_V	1.44	2.38	3.54	5.10	7.60	11.6	18.1	26.9	37.8	48.1	0.83
					K_V	1.25	2.06	3.06	4.41	6.57	10.0	15.7	23.3	32.7	41.6	- - -
					X_T	0.619	0.649	0.671	0.678	0.666	0.639	0.574	0.578	0.578	0.576	- - -
	33.3	1.3125	19	0.75	C_V	0.792	1.28	1.84	2.56	3.78	5.66	8.64	13.3	19.9	27.6	0.75
					K_V	0.685	1.11	1.59	2.21	3.27	4.90	7.47	11.5	17.2	23.9	- - -
					X_T	0.648	0.654	0.682	0.659	0.683	0.661	0.592	0.534	0.479	0.468	- - -
3	73.0	2.875	38	1.5	C_V	4.38	7.99	12.1	16.5	24.2	36.5	56.6	85.9	116	151	0.78
					K_V	3.79	6.91	10.5	14.3	20.9	31.6	49.0	74.3	100	131	- - -
					X_T	0.783	0.746	0.680	0.652	0.620	0.588	0.551	0.525	0.553	0.550	- - -
	47.6	1.875	19	0.75	C_V	1.31	2.28	3.48	5.05	7.58	11.9	18.2	26.7	38.4	50.5	0.78
					K_V	1.13	1.97	3.01	4.37	6.56	10.3	15.7	23.1	33.2	43.7	- - -
					X_T	0.804	0.758	0.719	0.725	0.696	0.634	0.637	0.611	0.561	0.530	- - -
4	87.3	3.4375	38	1.5	C_V	2.31	0.470	7.45	11.3	17.8	28.7	47.9	77.5	112	152	0.81
					K_V	2.00	0.41	6.44	9.77	15.4	24.8	41.4	67.0	96.9	131	- - -
					X_T	0.780	0.780	0.791	0.726	0.652	0.630	0.565	0.546	0.549	0.545	- - -
	58.7	2.3125	29	1.125	C_V	2.24	3.67	5.44	7.81	11.7	17.9	27.6	41.9	62.6	86.3	0.73
					K_V	1.94	3.17	4.71	6.76	10.1	15.5	23.9	36.2	54.1	74.6	- - -
					X_T	0.630	0.668	0.662	0.672	0.659	0.610	0.593	0.574	0.500	0.456	- - -
6	111.1	4.375	51	2	C_V	5.54	11.0	18.1	30.9	51.7	84.3	136	205	276	336	0.74
					K_V	4.79	9.52	15.7	26.7	44.7	72.9	118	177	239	291	- - -
					X_T	0.727	0.684	0.657	0.624	0.599	0.585	0.590	0.587	0.573	0.576	- - -
	73.0	2.875	38	1.5	C_V	1.32	3.73	7.20	11.1	17.5	27.6	43.4	67.8	102	147	0.74
					K_V	1.14	3.23	6.23	9.60	15.1	23.9	37.5	58.6	88.2	127	- - -
					X_T	0.455	0.458	0.454	0.457	0.453	0.454	0.454	0.455	0.454	0.454	- - -

1. At 100% travel.

▨ Restricted trim.

Without Liner - Flow Down(2)

Equal Percentage Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1	33.3	1.3125	19	0.75	C_V	1.08	1.62	2.20	2.96	4.18	6.04	8.74	12.5	16.5	19.0	0.91
					K_V	0.934	1.40	1.90	2.56	3.62	5.22	7.56	10.8	14.3	16.4	- - -
					X_T	0.912	0.860	0.808	0.771	0.742	0.706	0.693	0.699	0.697	0.694	- - -
2	47.6	1.875	19	0.75	C_V	1.67	2.60	3.82	5.43	7.79	12.2	18.9	27.4	37.8	47.2	0.85
					K_V	1.44	2.25	3.30	4.70	6.74	10.6	16.3	23.7	32.7	40.8	- - -
					X_T	0.680	0.690	0.702	0.725	0.707	0.619	0.622	0.621	0.619	0.623	- - -
	33.3	1.3125	19	0.75	C_V	1.11	1.55	2.05	2.87	4.07	5.95	8.84	13.4	19.6	26.8	0.79
					K_V	0.960	1.34	1.77	2.48	3.52	5.15	7.65	11.6	17.0	23.2	- - -
					X_T	0.938	0.899	0.848	0.789	0.761	0.692	0.636	0.568	0.519	0.507	- - -
3	73.0	2.875	38	1.5	C_V	4.59	8.29	12.0	16.9	25.0	37.7	57.3	85.1	121	148	0.80
					K_V	3.97	7.17	10.4	14.6	21.6	32.6	49.6	73.6	105	128	- - -
					X_T	0.779	0.744	0.715	0.684	0.630	0.582	0.583	0.579	0.578	0.580	- - -
	47.6	1.875	19	0.75	C_V	1.56	2.51	3.68	5.40	7.65	11.7	18.2	27.0	37.3	47.8	0.84
					K_V	1.35	2.17	3.18	4.67	6.62	10.1	15.7	23.4	32.3	41.3	- - -
					X_T	0.834	0.807	0.768	0.718	0.756	0.723	0.679	0.627	0.615	0.615	- - -
4	87.3	3.4375	38	1.5	C_V	2.51	5.10	8.03	12.0	18.7	30.7	47.4	80.3	116	156	0.81
					K_V	2.17	4.41	6.95	10.4	16.2	26.6	41.0	69.5	100	135	- - -
					X_T	0.890	0.770	0.744	0.701	0..696	0.637	0.668	0.572	0.566	0.565	- - -
	58.7	2.3125	29	1.125	C_V	2.33	3.56	5.64	8.18	11.9	18.0	28.2	42.6	62.2	81.8	0.79
					K_V	2.02	3.08	4.88	7.08	10.3	15.6	24.4	36.8	53.8	70.8	- - -
					X_T	0.753	0.846	0.702	0.666	0.682	0.656	0.619	0.609	0.559	0.530	- - -
6	111.1	4.375	51	2	C_V	5.51	10.9	17.9	30.2	50.5	82.0	133	200	269	328	0.78
					K_V	4.77	9.43	15.5	26.1	43.7	70.9	115	173	233	284	- - -
					X_T	0.705	0.701	0.663	0.646	0.612	0.604	0.606	0.605	0.596	0.604	- - -
	73.0	2.875	38	1.5	C_V	4.00	7.63	11.1	15.0	23.3	35.0	53.3	79.6	112	144	0.78
					K_V	3.46	6.60	9.60	13.0	20.2	30.3	46.1	68.9	96.9	125	- - -
					X_T	0.670	0.698	0.725	0.731	0.637	0.629	0.599	0.597	0.573	0.571	- - -

1. At 100% travel.
2. For NPS 8 values, please see the ED Catalog 12 pages.
▨ Restricted trim.

Note: The coefficients shown on this page are also appropriate for Fisher EAS and EAT.

Whisper Trim I - Flow Up(1)

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel									
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100
1	33.3	1.3125	19	0.75	C_v	2.17	5.30	8.44	11.8	14.7	16.6	19.5	21.5	23.1	24.1
					K_v	*1.88*	*4.58*	*7.30*	*10.2*	*12.7*	*14.4*	*16.9*	*18.6*	*20.0*	*20.8*
					X_T	0.390	0.406	0.424	0.454	0.456	0.490	0.490	0.506	0.526	0.536
2	47.6	1.875	19	0.75	C_v	4.98	11.0	19.7	27.9	34.5	40.6	45.7	50.1	53.7	55.9
					K_v	*4.31*	*9.52*	*17.0*	*24.1*	*29.8*	*35.1*	*39.5*	*43.3*	*46.5*	*48.4*
					X_T	0.670	0.633	0.403	0.330	0.322	0.327	0.343	0.359	0.372	0.386
3	73.0	2.875	38	1.5	C_v	12.4	30.4	48.3	67.6	84.2	95.2	112	123	132	138
					K_v	*10.7*	*26.3*	*41.8*	*58.5*	*72.8*	*82.3*	*96.9*	*106*	*114*	*119*
					X_T	0.307	0.303	0.330	0.329	0.332	0.331	0.361	0.360	0.360	0.375
4	87.3	3.4375	38	1.5	C_v	16.7	42.9	67.5	91.2	113	133	152	168	182	194
					K_v	*14.4*	*37.1*	*58.4*	*78.9*	*97.7*	*115*	*131*	*145*	*157*	*168*
					X_T	0.738	0.411	0.378	0.331	0.323	0.342	0.354	0.370	0.391	0.400
6	111.1	4.375	51	2	C_v	28.8	70.4	112	157	195	220	260	285	310	320
					K_v	*24.9*	*60.9*	*96.9*	*136*	*169*	*190*	*225*	*247*	*268*	*277*
					X_T	0.303	0.331	0.361	0.330	0.330	0.360	0.360	0.390	0.391	0.403

1. For NPS 8 values, please see the ED Catalog 12 pages.

Note: The coefficients shown on this page are also appropriate for Fisher EAT.

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Whisper Trim III

Linear Characteristic

Valve Size, NPS[2]	Port Diameter		Maximum Travel		Cage Level	Flow Coeffi-cient	Valve Opening—Percent of Total Travel											X_T[1]
	mm	Inches	mm	Inches			Min.	10	20	30	40	50	60	70	80	90	100	
1	33.3	1.313	19.1	0.75	A1	Cv	2.5	2.5	4.8	6.7	8.5	10.3	11.9	13.3	14.7	15.4	15.9	0.569
						Kv	2.2	2.2	4.2	5.8	7.4	8.9	10.3	11.5	12.7	13.3	13.8	
2	47.6	1.875	19.1	0.75	A1	Cv	8.3	0.7	5.0	14.0	19.1	22.7	24.0	25.0	25.7	25.7	25.8	0.569
						Kv	7.2	0.6	4.3	12.1	16.5	19.6	20.8	21.6	22.2	22.2	22.3	
	33.3	1.313	19.1	0.75	A3	Cv	1.8	0.5	0.6	3.7	6.4	9.2	12.1	14.9	17.8	20.7	21.6	0.569
						Kv	1.6	0.4	0.5	3.2	5.5	8.0	10.5	12.9	15.4	17.9	18.7	
	33.3	1.313	19.1	0.75	B1	Cv	2.4	0.5	0.5	3.9	5.7	7.4	9.2	10.9	12.7	14.5	16.1	0.569
						Kv	2.1	0.4	0.4	3.4	4.9	6.4	8.0	9.4	11.0	12.5	13.9	
	33.3	1.313	19.1	0.75	B3	Cv	1.3	0.5	0.6	2.4	3.8	5.2	6.6	8.0	9.5	10.9	11.7	0.569
						Kv	1.1	0.4	0.5	2.1	3.3	4.5	5.7	6.9	8.2	9.4	10.1	
	19.1	0.750	28.6	1.13	C1	Cv	0.9	0.1	1.4	2.3	3.0	3.8	4.6	5.4	6.1	6.9	7.4	0.569
						Kv	0.8	0.1	1.2	2.0	2.6	3.3	4.0	4.7	5.3	6.0	6.4	
	19.1	0.750	28.6	1.13	C3	Cv	0.8	0.1	1.5	2.4	3.4	4.4	5.3	6.3	7.3	8.2	8.3	0.569
						Kv	0.7	0.1	1.3	2.1	2.9	3.8	4.6	5.4	6.3	7.1	7.2	
	19.1	0.750	28.6	1.13	D1	Cv	0.9	0.1	1.4	2.3	3.0	3.8	4.6	5.4	6.1	6.9	7.4	0.569
						Kv	0.8	0.1	1.2	2.0	2.6	3.3	4.0	4.7	5.3	6.0	6.4	
	19.1	0.750	28.6	1.13	D3	Cv	0.8	0.1	1.5	2.4	3.4	4.4	5.3	6.3	7.3	8.2	8.3	0.569
						Kv	0.7	0.1	1.3	2.1	2.9	3.8	4.6	5.4	6.3	7.1	7.2	
3	73.0	2.875	38.1	1.50	A1	Cv	8.9	1.2	12.1	28.7	41.7	52.0	60.1	66.3	70.0	73.3	74.0	0.569
						Kv	7.7	1.0	10.5	24.8	36.1	45.0	52.0	57.4	60.6	63.4	64.0	
	47.6	1.875	38.1	1.50	A3	Cv	2.7	0.7	3.5	11.6	18.7	25.4	31.9	38.2	44.2	49.8	52.0	0.569
						Kv	2.3	0.6	3.0	10.0	16.2	22.0	27.6	33.0	38.2	43.1	45.0	
	47.6	1.875	38.1	1.50	B1	Cv	3.1	0.8	3.5	8.0	11.8	15.4	18.9	22.2	25.5	28.7	29.0	0.569
						Kv	2.7	0.7	3.0	6.9	10.2	13.3	16.3	19.2	22.1	24.8	25.1	
	47.6	1.875	38.1	1.50	B3	Cv	2.1	0.7	2.6	7.6	12.1	16.3	20.3	24.1	28.0	31.6	35.2	0.569
						Kv	1.8	0.6	2.2	6.6	10.5	14.1	17.6	20.8	24.2	27.3	30.4	
	47.6	1.875	38.1	1.50	C1	Cv	3.1	0.7	3.5	7.5	10.6	13.5	16.3	19.0	21.7	24.3	25.2	0.569
						Kv	2.7	0.6	3.0	6.5	9.2	11.7	14.1	16.4	18.8	21.0	21.8	
	47.6	1.875	38.1	1.50	C3	Cv	1.7	0.7	2.1	5.1	7.7	10.3	12.7	15.1	17.4	19.6	21.4	0.569
						Kv	1.5	0.6	1.8	4.4	6.7	8.9	11.0	13.1	15.1	17.0	18.5	
	47.6	1.875	38.1	1.50	D1	Cv	3.1	0.7	3.5	7.5	10.6	13.5	16.3	19.0	21.7	24.3	25.2	0.569
						Kv	2.7	0.6	3.0	6.5	9.2	11.7	14.1	16.4	18.8	21.0	21.8	
	47.6	1.875	38.1	1.50	D3	Cv	1.7	0.7	2.1	5.1	7.7	10.3	12.7	15.1	17.4	19.6	21.4	0.569
						Kv	1.5	0.6	1.8	4.4	6.7	8.9	11.0	13.1	15.1	17.0	18.5	
4	87.3	3.438	38.1	1.50	A1	Cv	7.1	10.3	25.0	42.5	59.8	71.0	79.9	87.3	92.7	96.8	99.5	0.810
						Kv	6.1	8.9	21.6	36.8	51.7	61.4	69.1	75.5	80.2	83.7	86.1	
	58.7	2.313	38.1	1.50	A3	Cv	3.7	6.6	18.4	30.2	41.6	52.5	63.0	72.2	80.1	87.7	89.3	0.470
						Kv	3.2	5.7	15.9	26.1	36.0	45.4	54.5	62.5	69.3	75.9	77.2	
	58.7	2.313	38.1	1.50	B1	Cv	5.4	7.4	15.6	23.2	30.9	38.4	45.9	53.3	60.4	67.1	67.6	0.385
						Kv	4.7	6.4	13.5	20.1	26.7	33.2	39.7	46.1	52.2	58.0	58.5	
	58.7	2.313	38.1	1.50	B3	Cv	3.3	5.4	13.8	22.0	30.2	38.4	46.4	54.3	61.9	69.0	74.8	0.385
						Kv	2.9	4.7	11.9	19.0	26.1	33.2	40.1	47.0	53.5	59.7	64.7	
	58.7	2.313	38.1	1.50	C1	Cv	4.3	5.8	11.0	15.6	20.2	24.7	29.2	33.8	38.3	42.7	45.5	0.356
						Kv	3.7	5.0	9.5	13.5	17.5	21.4	25.3	29.2	33.1	36.9	39.4	
	58.7	2.313	38.1	1.50	C3	Cv	2.6	4.1	8.7	13.3	17.9	22.5	27.0	31.5	36.0	40.5	45.0	0.356
						Kv	2.2	3.5	7.5	11.5	15.5	19.5	23.4	27.2	31.1	35.0	38.9	
	58.7	2.313	38.1	1.50	D1	Cv	4.3	5.8	11.0	15.6	20.2	24.7	29.2	33.8	38.3	42.7	45.5	0.356
						Kv	3.7	5.0	9.5	13.5	17.5	21.4	25.3	29.2	33.1	36.9	39.4	
	54.2	2.133	38.1	1.50	D3	Cv	2.6	4.1	8.7	13.3	17.9	22.5	27.0	31.5	36.0	40.5	45.0	0.356
						Kv	2.2	3.5	7.5	11.5	15.5	19.5	23.4	27.2	31.1	35.0	38.9	

Valve Size, NPS$^{(2)}$	Port Diameter		Maximum Travel		Cage Level	Flow Coeffi-cient	Valve Opening—Percent of Total Travel											$X_T$$^{(1)}$
	mm	Inches	mm	Inches			Min.	**10**	20	30	40	50	60	70	80	90	100	
6	111.1	4.375	50.8	2.00	A1	Cv	10.9	28.0	49.0	78.0	96.4	116.0	126.0	137.0	142.0	148.0	158.0	0.770
						Kv	9.4	24.2	42.4	67.5	83.4	100.3	109.0	118.5	122.8	128.0	136.7	
	87.3	3.438	50.8	2.00	A3	Cv	5.9	11.2	27.4	49.4	70.0	90.6	110.0	125.0	135.0	139.0	139.0	0.810
						Kv	5.1	9.7	23.7	42.7	60.6	78.4	95.2	108.1	116.8	120.2	120.2	
	87.3	3.438	50.8	2.00	B1	Cv	7.4	4.3	19.6	32.0	43.8	55.3	66.6	77.9	88.9	99.8	109.0	0.492
						Kv	6.4	3.7	17.0	27.7	37.9	47.8	57.6	67.4	76.9	86.3	94.3	
	87.3	3.438	50.8	2.00	B3	Cv	4.4	8.4	21.2	32.9	43.7	54.2	64.5	74.8	85.1	95.5	102.0	0.492
						Kv	3.8	7.3	18.3	28.5	37.8	46.9	55.8	64.7	73.6	82.6	88.2	
	87.3	3.438	50.8	2.00	C1	Cv	4.6	6.5	15.3	23.7	31.9	39.8	47.6	55.2	62.8	70.3	76.6	0.523
						Kv	4.0	5.6	13.2	20.5	27.6	34.4	41.2	47.8	54.3	60.8	66.3	
	87.3	3.438	50.8	2.00	C3	Cv	4.0	10.1	18.4	26.2	33.5	40.5	47.3	54.0	60.6	67.2	73.8	0.467
						Kv	3.5	8.7	15.9	22.7	29.0	35.0	40.9	46.7	52.4	58.1	63.8	
	87.3	3.438	50.8	2.00	D1	Cv	4.6	6.5	15.3	23.7	31.9	39.8	47.6	55.2	62.8	70.3	76.6	0.523
						Kv	4.0	5.6	13.2	20.5	27.6	34.4	41.2	47.8	54.3	60.8	66.3	
	87.3	3.438	50.8	2.00	D3	Cv	4.0	10.1	18.4	26.2	33.5	40.5	47.3	54.0	60.6	67.2	73.8	0.467
						Kv	3.5	8.7	15.9	22.7	29.0	35.0	40.9	46.7	52.4	58.1	63.8	

1. This column lists XT factors for Whisper Trim III calges at 100% travel.

Notes: The coefficients shown on this page are also appropriate for Fisher EAS, EAT valves.

Quick Opening

Quick Opening Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel(1)		Flow Coeffi-cient	Coeffs. for 6 mm (1/4 in.) Travel(2)	Valve Opening—Percent of Total Travel										F_L(3)
	mm	Inches	mm	Inches			10	20	30	40	50	60	70	80	90	100	
1	33.3	1-5/16	19	3/4	C_v	15.6	4.90	9.94	14.3	17.9	20.5	22.3	23.3	23.6	23.8	23.9	0.90
					K_v	*13.5*	*4.24*	*8.60*	*12.4*	*15.5*	*17.7*	*19.3*	*20.2*	*20.4*	*20.6*	*20.7*	- - -
					X_T	0.719	0.726	0.736	0.722	0.709	0.670	0.646	0.625	0.614	0.607	0.604	- - -
2	47.6	1-7/8	19	3/4	C_v	29.2	7.90	16.4	25.8	35.9	44.8	53.3	59.9	64.2	67.2	69.9	0.81
					K_v	*25.3*	*6.83*	*14.2*	*22.3*	*31.1*	*38.8*	*46.1*	*51.8*	*55.5*	*58.1*	*60.5*	- - -
					X_T	0.648	0.601	0.631	0.645	0.641	0.646	0.628	0.622	0.631	0.622	0.602	- - -
	33.3	1-5/16	19	3/4	C_v	16.7	5.43	10.2	15.1	20.3	26.1	31.4	35.2	37.5	39.2	40.5	0.87
					K_v	*14.4*	*4.70*	*8.82*	*13.1*	*17.6*	*22.6*	*27.2*	*30.4*	*32.4*	*33.9*	*35.0*	- - -
					X_T	0.632	0.591	0.631	0.632	0.621	0.638	0.673	0.739	0.786	0.763	0.726	- - -
3	73.0	2-7/8	38	1-1/2	C_v	38.8	24.5	47.3	79.1	106	125	139	154	168	177	184	0.90
					K_v	*33.6*	*21.2*	*40.9*	*68.4*	*91.7*	*108*	*120*	*133*	*145*	*153*	*159*	- - -
					X_T	0.638	0.630	0.637	0.619	0.693	0.729	0.705	0.641	0.596	0.569	0.563	- - -
	47.6	1-7/8	19	3/4	C_v	29.7	7.34	15.9	26.8	36.4	45.3	53.7	60.7	66.6	71.8	76.5	0.97
					K_v	*25.7*	*6.35*	*13.8*	*23.2*	*31.5*	*39.2*	*46.5*	*52.5*	*57.6*	*62.1*	*66.2*	- - -
					X_T	0.568	0.598	0.594	0.561	0.571	0.623	0.664	0.713	0.778	0.820	0.819	- - -
4	87.3	3-7/16	38	1-1/2	C_v	37.5	23.8	46.3	79.6	116	150	176	197	217	233	245	0.79
					K_v	*32.4*	*20.6*	*40.0*	*68.9*	*100*	*130*	*152*	*170*	*188*	*202*	*212*	- - -
					X_T	0.608	0.594	0.604	0.621	0.646	0.632	0.619	0.613	0.605	0.593	0.590	- - -
	58.7	2-5/16	29	1-1/8	C_v	31.5	14.2	28.4	45.2	63.2	80.6	96.1	109	119	129	135	0.81
					K_v	*27.2*	*12.3*	*24.6*	*39.1*	*54.7*	*69.7*	*83.1*	*94.3*	*103*	*112*	*117*	- - -
					X_T	0.624	0.622	0.623	0.617	0.626	0.665	0.706	0.740	0.771	0.666	0.625	- - -
6	111.1	4-3/8	51	2	C_v	51.1	40.0	84.3	138	194	246	293	340	378	403	409	0.78
					K_v	*44.2*	*34.6*	*72.9*	*119*	*168*	*213*	*253*	*294*	*327*	*349*	*354*	- - -
					X_T	0.582	0.581	0.585	0.587	0.584	0.582	0.583	0.585	0.578	0.582	0.584	- - -
	73.0	2-7/8	38	1-1/2	C_v	36.5	21.3	45.3	71.4	98.9	123	142	159	175	186	192	0.81
					K_v	*31.6*	*18.4*	*39.2*	*61.8*	*85.5*	*106*	*123*	*138*	*151*	*161*	*166*	- - -
					X_T	0.721	0.720	0.722	0.718	0.717	0.718	0.723	0.718	0.715	0.731	0.719	- - -

1. When using 655-EAS as a control valve for on-off service, the maximum travel for sizing purposes is 19 mm (3/4 inch).
2. When sizing self-operated regulators, use coefficients listed for 6 mm (1/4 inch) travel.
3. At 100% travel.

▨ Restricted trim.

Linear

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1	33.3	1-5/16	19	3/4	C_v	3.97	6.17	8.40	10.7	12.9	15.3	17.9	20.3	22.3	24.2	0.92
					K_v	*3.43*	*5.34*	*7.27*	*9.26*	*11.2*	*13.2*	*15.5*	*17.6*	*19.3*	*20.9*	- - -
					X_T	0.712	0.697	0.699	0.704	0.734	0.730	0.693	0.644	0.609	0.577	- - -
2	47.6	1-7/8	19	3/4	C_v	5.20	6.97	11.0	15.2	19.6	24.5	30.3	36.7	42.8	49.1	0.85
					K_v	*4.50*	*6.03*	*9.52*	*13.1*	*17.0*	*21.2*	*26.2*	*31.7*	*37.0*	*42.5*	- - -
					X_T	0.584	0.600	0.618	0.660	0.658	0.664	0.669	0.679	0.698	0.697	- - -
	33.3	1-5/16	19	3/4	C_v	2.45	4.35	6.44	8.80	11.8	15.4	19.4	23.6	28.1	32.7	0.89
					K_v	*2.11*	*3.76*	*5.57*	*7.61*	*10.2*	*13.3*	*16.8*	*20.4*	*24.3*	*28.3*	- - -
					X_T	0.723	0.723	0.749	0.736	0.690	0.651	0.642	0.655	0.688	0.720	- - -
3	73.0	2-7/8	38	1-1/2	C_v	10.5	22.9	35.5	48.7	61.8	76.3	91.3	109	129	149	0.85
					K_v	*9.08*	*19.8*	*30.7*	*42.1*	*53.5*	*66.0*	*79.0*	*94.3*	*112*	*129*	- - -
					X_T	0.651	0.649	0.691	0.692	0.701	0.698	0.702	0.686	0.666	0.646	- - -
	47.6	1-7/8	19	3/4	C_v	3.62	6.94	10.7	14.9	19.0	23.9	28.9	34.9	42.4	51.0	0.92
					K_v	*3.13*	*6.00*	*9.26*	*12.9*	*16.4*	*20.7*	*25.0*	*30.2*	*36.7*	*44.1*	- - -
					X_T	0.506	0.634	0.723	0.673	0.723	0.704	0.722	0.739	0.721	0.703	- - -
4	87.3	3-7/16	38	1-1/2	C_v	12.9	28.6	45.5	67.8	88.4	108	129	151	174	196	0.81
					K_v	*11.2*	*24.7*	*39.4*	*58.6*	*76.5*	*93.4*	*112*	*131*	*151*	*170*	- - -
					X_T	0.616	0.648	0.661	0.676	0.687	0.698	0.688	0.672	0.661	0.656	- - -
	58.7	2-5/16	29	1-1/8	C_v	6.84	13.9	22.1	31.2	40.9	51.3	62.0	73.2	84.8	95.0	0.87
					K_v	*5.92*	*12.0*	*19.1*	*27.0*	*35.4*	*44.4*	*53.6*	*63.3*	*73.4*	*82.2*	- - -
					X_T	0.647	0.661	0.688	0.655	0.631	0.623	0.625	0.644	0.696	0.723	- - -
6	111.1	4-3/8	51	2	C_v	26.1	52.3	78.3	105	132	164	200	247	303	361	0.81
					K_v	*22.6*	*45.2*	*67.7*	*90.8*	*114*	*142*	*173*	*214*	*262*	*312*	- - -
					X_T	0.631	0.684	0.727	0.718	0.720	0.690	0.683	0.670	0.647	0.623	- - -
	73.0	2-7/8	38	1-1/2	C_v	10.5	22.7	35.1	48.0	60.8	74.7	89.6	107	128	150	0.90
					K_v	*9.08*	*19.6*	*30.4*	*41.5*	*52.6*	*64.6*	*77.5*	*92.6*	*111*	*130*	- - -
					X_T	0.675	0.708	0.731	0.757	0.767	0.769	0.772	0.772	0.772	0.771	- - -

1. At 100% travel.
▨ Restricted trim.

Equal Percentage

Equal Percentage Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1	33.3	1-5/16	19	3/4	C_v	1.29	1.87	2.59	3.85	5.59	8.46	12.5	16.9	20.9	23.5	0.82
					K_v	*1.12*	*1.62*	*2.24*	*3.33*	*4.84*	*7.32*	*10.8*	*14.6*	*18.1*	*20.3*	- - -
					X_T	0.812	0.771	0.674	0.702	0.730	0.714	0.723	0.669	0.633	0.579	- - -
2	47.6	1-7/8	19	3/4	C_v	1.41	2.41	3.43	4.86	7.26	11.3	17.3	24.5	32.6	40.8	0.91
					K_v	*1.22*	*2.09*	*2.97*	*4.20*	*6.28*	*9.78*	*15.0*	*21.2*	*28.2*	*35.3*	- - -
					X_T	0.724	0.736	0.727	0.738	0.723	0.714	0.646	0.680	0.673	0.725	- - -
	33.3	1-5/16	19	3/4	C_v	0.850	1.35	1.87	2.42	3.64	5.54	8.22	11.9	16.6	21.8	0.95
					K_v	*0.735*	*1.17*	*1.62*	*2.09*	*3.15*	*4.79*	*7.11*	*10.3*	*14.4*	*18.9*	- - -
					X_T	0.858	0.827	0.846	0.800	0.810	0.675	0.644	0.696	0.727	0.760	- - -
3	73.0	2-7/8	38	1-1/2	C_v	4.16	6.90	10.4	14.7	21.2	32.6	49.3	73.3	101	128	0.85
					K_v	*3.60*	*5.97*	*9.00*	*12.7*	*18.3*	*28.2*	*42.6*	*63.4*	*87.4*	*111*	- - -
					X_T	0.718	0.867	0.770	0.743	0.766	0.712	0.683	0.687	0.671	0.670	- - -
	47.6	1-7/8	19	3/4	C_v	1.48	2.44	3.47	4.87	7.31	10.9	16.7	24.5	33.0	41.3	0.91
					K_v	*1.28*	*2.11*	*3.00*	*4.21*	*6.32*	*9.43*	*14.4*	*21.2*	*28.5*	*35.7*	- - -
					X_T	0.713	0.737	0.747	0.780	0.749	0.744	0.733	0.704	0.720	0.749	- - -
4	87.3	3-7/16	38	1-1/2	C_v	3.63	6.33	9.32	13.9	21.0	32.9	52.5	81.7	115	148	0.84
					K_v	*3.14*	*5.48*	*8.06*	*12.0*	*18.2*	*28.5*	*45.4*	*70.7*	*99.5*	*128*	- - -
					X_T	0.839	0.776	0.784	0.799	0.793	0.699	0.776	0.724	0.697	0.691	- - -
	58.7	2-5/16	29	1-1/8	C_v	1.94	3.36	4.81	6.76	10.7	16.4	25.0	36.8	51.4	67.6	0.91
					K_v	*1.68*	*2.91*	*4.16*	*5.85*	*9.26*	*14.2*	*21.6*	*31.8*	*44.5*	*58.5*	- - -
					X_T	0.693	0.694	0.692	0.794	0.792	0.724	0.694	0.676	0.692	0.692	- - -
6	111.1	4-3/8	51	2	C_v	5.21	10.3	16.9	28.0	45.6	73.5	121	184	251	310	0.84
					K_v	*4.51*	*8.91*	*14.6*	*24.2*	*39.4*	*63.6*	*105*	*159*	*217*	*268*	- - -
					X_T	0.968	0.846	0.801	0.794	0.769	0.770	0.728	0.712	0.687	0.690	- - -
	73.0	2-7/8	38	1-1/2	C_v	4.12	7.27	10.5	14.6	21.4	32.1	47.9	71.3	97.0	126	0.90
					K_v	*3.56*	*6.29*	*9.08*	*12.6*	*18.5*	*27.8*	*41.4*	*61.7*	*83.9*	*109*	- - -
					X_T	0.728	0.763	0.772	0.790	0.778	0.774	0.778	0.750	0.777	0.776	- - -

1. At 100% travel.

▨ Restricted trim.

Whisper Trim I

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel									
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100
1	33.3	1-5/16	19	3/4	C_V	2.30	5.62	8.95	12.5	15.6	17.6	20.7	22.8	24.5	25.5
					K_V	*1.99*	*4.86*	*7.74*	*10.8*	*13.5*	*15.2*	*17.9*	*19.7*	*21.2*	*22.1*
					X_T	0.351	0.377	0.395	0.423	0.419	0.448	0.448	0.467	0.484	0.498
2	47.6	1-7/8	19	3/4	C_V	4.77	10.6	18.8	26.9	33.2	39.2	44.0	48.8	52.9	56.1
					K_V	*4.13*	*9.17*	*16.3*	*23.3*	*28.7*	*33.9*	*38.1*	*42.2*	*45.8*	*48.5*
					X_T	0.794	0.635	0.409	0.341	0.335	0.339	0.363	0.372	0.383	0.384
3	73.0	2-7/8	38	1-1/2	C_V	12.8	33.9	56.6	76.4	96.3	114	130	143	156	164
					K_V	*11.1*	*29.3*	*49.0*	*66.1*	*83.3*	*98.6*	*112*	*124*	*135*	*142*
					X_T	0.638	0.471	0.350	0.332	0.317	0.326	0.331	0.349	0.361	0.377
4	87.3	3-7/16	38	1-1/2	C_V	19.2	49.3	77.6	105	130	153	175	193	209	223
					K_V	*16.6*	*42.6*	*67.1*	*90.8*	*112*	*132*	*151*	*167*	*181*	*193*
					X_T	0.478	0.402	0.371	0.324	0.317	0.336	0.348	0.364	0.385	0.394
6	111.1	4-3/8	51	2	C_V	31.7	77.5	123	173	214	242	286	313	341	352
					K_V	*27.4*	*67.0*	*106*	*150*	*185*	*209*	*247*	*271*	*295*	*304*
					X_T	0.292	0.318	0.350	0.318	0.320	0.347	0.347	0.377	0.377	0.389

CL150, 300, 600, Micro-Flat Anti-Cavitation Plug & Seat, Flow Down with or without Liner

Linear Characteristic

Valve Size	Port Diameter [1]		Travel		Flow Coefficient	Percent of Total Travel										FL[3]
NPS	mm	inch	mm	inch		10[2]	20	30	40	50	60	70	80	90	100	
1, 2	6.4	1/4	19	3/4	Cv	0.001	0.001	0.003	0.007	0.012	0.017	0.023	0.03	0.037	0.044	0.775
					Kv	0.0009	0.001	0.003	0.006	0.010	0.015	0.020	0.026	0.032	0.038	
					Cv	0.001	0.003	0.02	0.046	0.078	0.114	0.154	0.197	0.243	0.292	0.775
					Kv	0.0009	0.003	0.017	0.040	0.067	0.098	0.133	0.170	0.209	0.252	
	9.5	3/8	19	3/4	Cv	0.001	0.005	0.03	0.068	0.115	0.169	0.229	0.294	0.364	0.437	0.775
					Kv	0.0009	0.004	0.026	0.059	0.099	0.146	0.197	0.253	0.314	0.377	
					Cv	0.001	0.008	0.06	0.136	0.23	0.337	0.457	0.587	0.726	0.873	0.775
					Kv	0.0009	0.007	0.052	0.117	0.198	0.290	0.394	0.506	0.626	0.753	
	12.7	1/2	19	3/4	Cv	0.001	0.016	0.12	0.275	0.465	0.684	0.926	1.188	1.468	1.764	0.775
					Kv	0.0009	0.014	0.103	0.237	0.401	0.590	0.798	1.024	1.265	1.521	
	19.1	3/4	19	3/4	Cv	0.002	0.03	0.229	0.524	0.887	1.306	1.77	2.274	2.813	3.383	0.775
					Kv	0.0017	0.026	0.197	0.452	0.765	1.126	1.526	1.960	2.425	2.916	
			29	1-1/8	Cv	0.002	0.152	0.463	0.868	1.344	1.879	2.365	3.093	3.759	4.458	0.775
					Kv	0.0017	0.131	0.399	0.748	1.159	1.620	2.039	2.666	3.240	3.843	
2	25.4	1	29	1 1/8	Cv	0.002	0.265	0.81	1.519	2.353	3.291	4.316	5.416	6.583	7.809	0.775
					Kv	0.0017	0.228	0.698	1.309	2.028	2.837	3.720	4.669	5.675	6.731	
	28.6	1-1/8	29	1 1/8	Cv	0.003	0.357	1.091	2.044	3.167	4.426	5.803	7.281	8.846	10.488	0.775
					Kv	0.0026	0.308	0.940	1.762	2.730	3.815	5.002	6.276	7.625	9.041	

1. Micro-flat Cavitation trims use a shutoff port diameter which is 0.125 inch larger than the flowing port diameter. Use the shutoff port diameter for actuator sizing.
2. Clearance flow only
3. At 100% travel

The EAS valve (Flow Down) has flow coefficients identical to the EAD valve. Refer to the EAD coefficients. For additional EAS valve body information, refer to Bulletin 51.1:ES.

The Fisher™ EAT valve (“Flow Down”) has flow coefficients identical to the EAD valve. Refer to the EAD coefficients for trim types not listed below. For additional EAT valve body information, refer to Bulletin 51.1:ET.

CL300-CL600 - DST(4), Flow Down

Linear Characteristic

Valve Size, NPS	Port Diameter		Total Travel		Unbalanced Area, in^2	Minimum Throttling C_v(1)	Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(2)	K_n
	mm	Inches	mm	Inches				10	20	30	40	50	60	70	80	90	100		
Two Stage																			
4	63.50	2.5	19.05	0.75	0.041	1.00	C_V	(3)	1.4	7.8	15.9	24	31	36	41	45	48	.95	3.0
6	87.31	3.437	31.75	1.25	0.118	1.70	C_V	(3)	3.6	11.9	25	39	51	61	70	77	82	.95	3.0
Three Stage																			
4	63.5	2.5	19.05	0.75	0.041	0.80	C_V	(3)	1.0	5.1	10.5	15.9	21	26	30	33	36	.97	3.0
6	87.31	3.437	31.75	1.25	0.118	1.50	C_V	(3)	2.5	8.3	17.4	28	37	45	52	57	62	.97	3.0

1. Valves should not be required to throttle at a Cv less than the specified minimum Cv for an extended period of time. Erosion damage to the valve seats may result.
2. At 100% travel.
3. Clearance flow only.
4. For use with R31233 trim only, for additional capacities, contact your Emerson sales office.

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Quick Opening

Quick Opening Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel[1]		Flow Coefficient	Coeffs for 6 mm (0.25 In) Travel[2]	Valve Opening—Percent of Total Travel										F_L[3]
	mm	Inches	mm	Inches			10	20	30	40	50	60	70	80	90	100	
1 & 1-1/4	33.3	1.3125	19	0.75	C_v	14.7	4.86	9.39	13.4	16.9	18.9	20.3	21.1	21.8	21.9	22.1	0.81
					K_v	*12.7*	*4.20*	*8.12*	*11.6*	*14.6*	*16.3*	*17.6*	*18.3*	*18.9*	*18.9*	*19.1*	- - -
					X_T	0.703	0.556	0.744	0.724	0.666	0.626	0.584	0.566	0.549	0.554	0.556	- - -
1-1/2	47.6	1.875	19	0.75	C_v	22.6	7.79	14.4	20.5	26.8	32.0	36.6	39.4	41.3	42.7	44.0	0.79
					K_v	*19.5*	*6.74*	*12.5*	*17.7*	*23.2*	*27.7*	*31.7*	*34.1*	*35.7*	*36.9*	*38.1*	- - -
					X_T	0.679	0.494	0.641	0.682	0.680	0.686	0.661	0.649	0.638	0.616	0.597	- - -
					F_d	- - -	0.22	0.28	0.32	0.34	0.35	0.36	0.36	0.36	0.36	0.36	- - -
	33.3	1.3125	19	0.75	C_v	16.2	5.05	9.99	14.7	20.0	24.0	25.7	26.2	27.4	28.6	29.9	0.88
					K_v	*14.0*	*4.37*	*8.64*	*12.7*	*17.3*	*20.8*	*22.2*	*22.7*	*23.7*	*24.7*	*25.9*	- - -
					X_T	0.942	0.803	0.904	0.946	0.872	0.838	0.849	0.874	0.832	0.795	0.756	- - -
2	58.7	2.3125	29	1.125	C_v	29.7	13.4	26.8	39.9	51.3	62.9	70.6	73.7	75.6	76.8	77.6	0.77
					K_v	*25.7*	*11.6*	*23.2*	*34.5*	*44.4*	*54.4*	*61.1*	*63.8*	*65.4*	*66.4*	*67.1*	- - -
					X_T	0.773	0.605	0.695	0.737	0.761	0.703	0.658	0.641	0.635	0.626	0.623	- - -
					F_d	- - -	0.24	0.30	0.33	0.35	0.36	0.36	0.36	0.36	0.36	0.36	- - -
	33.3	1.3125	19	0.75	C_v	16.7	4.80	9.58	14.9	20.2	25.7	29.3	31.2	31.2	31.2	31.2	0.87
					K_v	*14.4*	*4.15*	*8.29*	*12.9*	*17.5*	*22.2*	*25.3*	*27.0*	*27.0*	*27.0*	*27.0*	- - -
					X_T	0.705	0.578	0.733	0.695	0.698	0.666	0.689	0.735	0.791	0.805	0.805	- - -
2-1/2	73.0	2.875	38	1.5	C_v	33.4	20.9	39.6	58.8	74.2	84.9	97.0	103	106	108	109	0.81
					K_v	*28.9*	*18.1*	*34.3*	*50.9*	*64.2*	*73.4*	*83.9*	*89.1*	*91.7*	*93.4*	*94.3*	- - -
					X_T	0.635	0.601	0.684	0.738	0.767	0.744	0.689	0.669	0.658	0.660	0.652	- - -
					F_d	- - -	0.25	0.31	0.34	0.35	0.36	0.36	0.36	0.36	0.36	0.35	- - -
	47.6	1.875	19	0.75	C_v	25.3	7.83	15.2	22.8	31.0	40.0	48.3	54.9	60.3	66.4	71.2	0.86
					K_v	*21.9*	*6.77*	*13.1*	*19.7*	*26.8*	*34.6*	*41.8*	*47.5*	*52.2*	*57.4*	*61.6*	- - -
					X_T	0.642	0.498	0.618	0.627	0.636	0.640	0.669	0.725	0.758	0.737	0.710	- - -
3	87.3	3.4375	38	1.5	C_v	43.6	27.2	52.2	77.9	99.5	124	140	149	154	158	161	0.77
					K_v	*37.7*	*23.5*	*45.2*	*67.4*	*86.1*	*107*	*121*	*129*	*133*	*137*	*139*	- - -
					X_T	0.635	0.626	0.671	0.745	0.796	0.703	0.657	0.619	0.602	0.591	0.577	- - -
					F_d	- - -	0.22	0.29	0.32	0.34	0.35	0.36	0.36	0.36	0.36	0.36	- - -
	58.7	2.3125	29	1.125	C_v	35.2	15.9	31.7	47.2	60.7	74.4	83.6	87.3	89.5	91.0	91.9	0.86
					K_v	*30.4*	*13.8*	*27.4*	*40.8*	*52.5*	*64.4*	*72.3*	*75.5*	*77.4*	*78.7*	*79.5*	- - -
					X_T	0.852	0.718	0.837	0.889	0.905	0.842	0.784	0.763	0.760	0.744	0.744	- - -

1. When using Fisher 655-ED or 655-ET as a control valve for on-off service, the maximum travel for sizing purposes is 19 mm (0.75 inch).
2. When using self-operated regulators, use coefficients listed for 6 mm (0.25 inch) travel.
3. At 100% travel.

▨ Restricted trim.

Notes: The coefficients shown on this page are also appropriate for Fisher EDR, ET, and ETR.

Valve Size, NPS	Port Diameter		Maximum Travel[1]		Flow Coefficient	Coeffs for 6 mm (0.25 In) Travel[2]	Valve Opening—Percent of Total Travel										F_L[3]
	mm	Inches	mm	Inches			10	20	30	40	50	60	70	80	90	100	
4	111.1	4.375	51	2	C_v	45.9	37.7	75.0	125	163	193	220	238	247	251	251	0.79
					K_v	*39.7*	*32.6*	*64.9*	*108*	*141*	*167*	*190*	*206*	*214*	*217*	*217*	- - -
					X_T	0.607	0.623	0.689	0.733	0.764	0.762	0.723	0.689	0.669	0.683	0.694	- - -
					F_d	- - -	0.22	0.27	0.29	0.31	0.31	0.31	0.31	0.31	0.31	0.30	- - -
	73.0	2.875	38	1.5	C_v	39.8	25.0	47.2	70.1	88.5	101	116	123	127	129	130	0.89
					K_v	*34.4*	*21.6*	*40.8*	*60.6*	*76.6*	*87.4*	*100*	*106*	*110*	*112*	*112*	- - -
					X_T	0.841	0.707	0.879	0.948	0.989	0.956	0.875	0.851	0.834	0.840	0.834	- - -
6[4]	177.8	7	51	2	C_v	92.0	73.6	150	232	306	353	389	416	441	451	460	0.82
					K_v	*79.6*	*63.7*	*130*	*201*	*265*	*305*	*336*	*360*	*381*	*390*	*398*	- - -
					X_T	0.660	0.664	0.651	0.667	0.694	0.722	0.742	0.728	0.723	0.719	0.710	- - -
					F_d	- - -	0.17	0.22	0.25	0.26	0.27	0.28	0.28	0.28	0.28	0.28	- - -
	111.1	4.375	51	2	C_v	64.9	*52.3*	*101*	*150*	*199*	*247*	*284*	*310*	*329*	*345*	*358*	*0.87*
					K_v	*56.1*	*45.2*	*87.4*	*130*	*172*	*214*	*246*	*268*	*285*	*298*	*310*	- - -
					X_T	0.758	0.774	0.763	0.771	0.778	0.763	0.761	0.717	0.699	0.707	0.691	- - -
8	203.2	8	51	2	C_v	108	80.3	188	290	389	480	554	615	658	705	744	0.87
					K_v	*93.4*	*69.5*	*163*	*251*	*336*	*415*	*479*	*532*	*569*	*610*	*644*	- - -
					X_T	0.653	0.670	0.628	0.679	0.731	0.766	0.806	0.829	0.859	0.863	0.866	- - -
8	203.2	8	76	3	C_v	108	135	291	434	551	639	706	759	807	841	863	0.85
					K_v	*93.4*	*117*	*252*	*375*	*477*	*553*	*611*	*657*	*698*	*727*	*746*	- - -
					X_T	0.653	0.643	0.699	0.757	0.807	0.838	0.861	0.857	0.841	0.838	0.827	- - -
					F_d	- - -	0.19	0.24	0.26	0.27	0.28	0.28	0.28	0.28	0.28	0.27	- - -

1. When using Fisher 655-ED or 655-ET as a control valve for on-off service, the maximum travel for sizing purposes is 19 mm (0.75 inch).
2. When using self-operated regulators, use coefficients listed for 6 mm (0.25 inch) travel.
3. At 100% travel.
4. NPS 8 EAD/EAT valves use the same C_v values for sizing as NPS 6 ED valves with 177.8 mm (7 inch) port.

▨ Restricted trim.

Notes: The coefficients shown on this page are also appropriate for Fisher EDR, ET, and ETR.

Linear

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel[2]		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L[1]
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1 & 1-1/4	33.3	1.3125	19	0.75	C_v	3.21	5.50	8.18	10.9	13.2	15.0	16.9	18.6	19.9	20.6	0.84
					K_v	*2.78*	*4.76*	*7.08*	*9.43*	*11.4*	*13.0*	*14.6*	*16.1*	*17.2*	*17.8*	- - -
					X_T	0.340	0.644	0.494	0.509	0.532	0.580	0.610	0.629	0.628	0.636	- - -
1-1/2	47.6	1.875	19	0.75	C_v	4.23	7.84	11.8	15.8	20.4	25.3	30.3	34.7	37.2	39.2	0.82
					K_v	*3.66*	*6.78*	*10.2*	*13.7*	*17.6*	*21.9*	*26.2*	*30.0*	*32.2*	*33.9*	- - -
					X_T	0.656	0.709	0.758	0.799	0.738	0.729	0.708	0.686	0.683	0.656	- - -
					F_d	0.30	0.37	0.41	0.44	0.44	0.41	0.38	0.35	0.34	0.34	- - -
	33.3	1.3125	19	0.75	C_v	2.92	5.70	9.05	12.5	15.6	18.5	21.1	23.9	26.8	29.2	0.91
					K_v	*2.53*	*4.93*	*7.83*	*10.8*	*13.5*	*16.0*	*18.3*	*20.7*	*23.2*	*25.3*	- - -
					X_T	0.690	0.651	0.633	0.634	0.650	0.666	0.708	0.718	0.737	0.733	- - -
2	58.7	2.3125	29	1.125	C_v	7.87	16.0	24.9	33.4	42.1	51.8	62.0	68.1	70.6	72.9	0.77
					K_v	*6.81*	*13.8*	*21.5*	*28.9*	*36.4*	*44.8*	*53.6*	*58.9*	*61.1*	*63.1*	- - -
					X_T	0.641	0.720	0.728	0.767	0.793	0.754	0.683	0.658	0.652	0.638	- - -
					F_d	0.30	0.35	0.36	0.37	0.37	0.36	0.35	0.35	0.34	0.33	- - -
	33.3	1.3125	19	0.75	C_v	3.53	6.36	9.92	13.3	16.5	19.7	22.7	25.6	29.3	33.3	0.87
					K_v	*3.05*	*5.50*	*8.58*	*11.5*	*14.3*	*17.0*	*19.6*	*22.1*	*25.3*	*28.8*	- - -
					X_T	0.456	0.529	0.549	0.582	0.611	0.633	0.671	0.723	0.727	0.694	- - -
2-1/2	73.0	2.875	38	1.5	C_v	9.34	21.6	35.5	49.5	62.7	74.1	83.6	93.5	102	108	0.81
					K_v	*8.08*	*18.7*	*30.7*	*42.8*	*54.2*	*64.1*	*72.3*	*80.9*	*88.2*	*93.4*	- - -
					X_T	0.680	0.660	0.644	0.669	0.674	0.706	0.716	0.687	0.658	0.641	- - -
					F_d	0.27	0.33	0.35	0.36	0.35	0.34	0.32	0.29	0.27	0.27	- - -
	47.6	1.875	19	0.75	C_v	4.10	8.09	12.3	16.7	21.1	26.8	33.7	41.3	49.2	57.0	0.84
					K_v	*3.55*	*7.00*	*10.6*	*14.4*	*18.3*	*23.2*	*29.2*	*35.7*	*42.6*	*49.3*	- - -
					X_T	0.668	0.646	0.684	0.688	0.698	0.694	0.678	0.668	0.669	0.666	- - -
3	87.3	3.4375	38	1.5	C_v	14.5	32.9	52.1	70.4	88.5	105	118	133	142	148	0.82
					K_v	*12.5*	*28.5*	*45.1*	*60.9*	*76.6*	*90.8*	*102*	*115*	*123*	*128*	- - -
					X_T	0.671	0.699	0.697	0.720	0.733	0.718	0.707	0.650	0.630	0.620	- - -
					F_d	0.26	0.32	0.35	0.36	0.36	0.36	0.36	0.28	0.29	0.30	- - -
	58.7	2.3125	29	1.125	C_v	8.06	16.9	26.7	37.5	49.0	61.4	73.8	85.3	94.7	102	0.85
					K_v	*6.97*	*14.6*	*23.1*	*32.4*	*42.4*	*53.1*	*63.8*	*73.8*	*81.9*	*88.2*	- - -
					X_T	0.592	0.614	0.662	0.672	0.674	0.676	0.694	0.722	0.736	0.732	- - -
4	111.1	4.375	51	2	C_v	23.3	50.3	78.1	105	127	152	181	203	223	236	0.82
					K_v	*20.2*	*43.5*	*67.6*	*90.8*	*110*	*131*	*157*	*176*	*193*	*204*	- - -
					X_T	0.691	0.714	0.720	0.731	0.764	0.757	0.748	0.762	0.732	0.688	- - -
					F_d	0.31	0.36	0.38	0.38	0.37	0.35	0.32	0.30	0.27	0.28	- - -
	73.0	2.875	38	1.5	C_v	9.77	22.6	37.2	51.8	65.7	77.5	87.5	97.9	107	113	0.84
					K_v	*8.45*	*19.5*	*32.2*	*44.8*	*56.8*	*67.0*	*75.7*	*84.7*	*92.6*	*97.7*	- - -
					X_T	0.926	0.899	0.873	0.904	0.919	0.962	0.972	0.937	0.891	0.872	- - -

1. At 100% travel.
2. If coefficients listed above for the NPS 8 linear cage with 51 mm (2-inch) travel are not sufficient for your application, consider using the quick opening cage. The NPS 8 quick opening cage with 51 mm (2-inch) travel has approximately a linear characteristic.

▨ Restricted trim.

Notes: The coefficients shown on this page are also appropriate for Fisher EDR, ET, and ETR. The full-size port coefficients for NPS 3 through 8 also apply to Fisher ET-C valves.

Valve Size, NPS	Port Diameter		Maximum Travel(2)		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
6(3)	177.8	7	51	2	C_v	46.3	107	171	228	279	327	367	402	420	433	0.84
					K_v	*40.0*	*92.6*	*148*	*197*	*241*	*283*	*317*	*348*	*363*	*375*	- - -
					X_T	0.656	0.727	0.744	0.781	0.803	0.800	0.784	0.758	0.755	0.740	- - -
					F_d	0.21	0.26	0.29	0.30	0.31	0.31	0.31	0.28	0.28	0.28	- - -
	111.1	4.375	51	2	C_v	16.7	38.6	65.4	93.7	123	156	194	244	290	322	0.88
					K_v	*14.4*	*33.4*	*56.6*	*81.1*	*106*	*135*	*168*	*211*	*251*	*279*	- - -
					X_T	0.762	0.698	0.675	0.684	0.681	0.660	0.676	0.657	0.685	0.703	- - -
8(2)	203.2	8	51	2	C_v	60.2	129	206	285	363	444	526	581	640	688	0.87
					K_v	*52.1*	*112*	*178*	*247*	*314*	*384*	*455*	*503*	*554*	*595*	- - -
					X_T	0.704	0.721	0.657	0.651	0.683	0.713	0.740	0.801	0.821	0.839	- - -
8	203.2	8	76	3	C_v	91.4	207	325	440	550	639	711	760	795	846	0.87
					K_v	*79.1*	*179*	*281*	*381*	*476*	*553*	*615*	*657*	*688*	*732*	- - -
					X_T	0.651	0.624	0.677	0.746	0.786	0.803	0.823	0.836	0.843	0.807	- - -
					F_d	0.23	0.28	0.30	0.31	0.31	0.31	0.31	0.31	0.31	0.31	- - -

1. At 100% travel.
2. If coefficients listed above for the NPS 8 linear cage with 51 mm (2-inch) travel are not sufficient for your application, consider using the quick opening cage. The NPS 8 quick opening cage with 51 mm (2-inch) travel has approximately a linear characteristic.
3. NPS 8 EAD/EAT valves use the same C_v values for sizing as NPS 6 ED valves with 177.8 mm (7 inch) port.

▨ Restricted trim.

Notes: The coefficients shown on this page are also appropriate for Fisher EDR, ET, and ETR. The full-size port coefficients for NPS 3 through 8 also apply to Fisher ET-C valves.

Equal Percentage

Equal Percentage Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1 & 1-1/4	33.3	1.3125	19	0.75	C_v	0.783	1.54	2.20	2.89	4.21	5.76	7.83	10.9	14.1	17.2	0.88
					K_v	*0.677*	*1.33*	*1.90*	*2.50*	*3.64*	*4.98*	*6.77*	*9.43*	*12.2*	*14.9*	- - -
					X_T	0.766	0.614	0.587	0.667	0.672	0.687	0.743	0.760	0.733	0.667	- - -
1-1/2	47.6	1.875	19	0.75	C_v	1.52	2.63	3.87	5.41	7.45	11.2	17.4	24.5	30.8	35.8	0.84
					K_v	*1.31*	*2.27*	*3.35*	*4.68*	*6.44*	*9.69*	*15.1*	*21.2*	*26.6*	*31.0*	- - -
					X_T	0.780	0.735	0.716	0.715	0.738	0.727	0.690	0.685	0.685	0.679	- - -
					F_d	0.64	0.63	0.63	0.64	0.46	0.45	0.30	0.31	0.35	0.38	- - -
	33.3	1.3125	19	0.75	C_v	1.12	1.56	2.22	3.10	4.27	6.17	9.01	13.1	18.2	23.1	0.91
					K_v	*0.969*	*1.35*	*1.92*	*2.68*	*3.69*	*5.34*	*7.79*	*11.3*	*15.7*	*20.0*	- - -
					X_T	0.821	0.864	0.820	0.703	0.721	0.679	0.665	0.639	0.650	0.700	- - -
2	58.7	2.3125	29	1.125	C_v	1.66	2.93	4.66	6.98	10.8	16.5	25.4	37.3	50.7	59.7	0.85
					K_v	*1.44*	*2.53*	*4.03*	*6.04*	*9.34*	*14.3*	*22.0*	*32.3*	*43.9*	*51.6*	- - -
					X_T	0.827	0.834	0.774	0.727	0.687	0.684	0.702	0.736	0.686	0.687	- - -
					F_d	0.41	0.50	0.53	0.58	0.37	0.32	0.27	0.26	0.29	0.31	- - -
	33.3	1.3125	19	0.75	C_v	0.923	1.42	2.09	2.84	4.11	5.83	8.58	12.8	18.5	24.3	0.88
					K_v	*0.798*	*1.23*	*1.81*	*2.46*	*3.56*	*5.04*	*7.42*	*11.1*	*16.0*	*21.0*	- - -
					X_T	0.775	0.744	0.742	0.707	0.715	0.714	0.714	0.641	0.621	0.649	- - -
2-1/2	73.0	2.875	38	1.5	C_v	3.43	7.13	10.8	15.1	22.4	33.7	49.2	71.1	89.5	99.4	0.84
					K_v	*2.97*	*6.17*	*9.34*	*13.1*	*19.4*	*29.2*	*42.6*	*61.5*	*77.4*	*86.0*	- - -
					X_T	0.778	0.702	0.678	0.677	0.658	0.654	0.661	0.665	0.661	0.660	- - -
					F_d	0.45	0.49	0.49	0.47	0.35	0.32	0.30	0.24	0.25	0.27	- - -
	47.6	1.875	19	0.75	C_v	1.57	2.57	3.82	5.44	7.64	11.5	18.2	26.7	35.1	43.9	0.89
					K_v	*1.36*	*2.22*	*3.30*	*4.71*	*6.61*	*9.95*	*15.7*	*23.1*	*30.4*	*38.0*	- - -
					X_T	0.801	0.756	0.713	0.677	0.648	0.672	0.628	0.635	0.706	0.710	- - -
3	87.3	3.4375	38	1.5	C_v	4.32	7.53	10.9	17.1	27.2	43.5	66.0	97.0	120	136	0.82
					K_v	*3.74*	*6.51*	*9.43*	*14.8*	*23.5*	*37.6*	*57.1*	*83.9*	*104*	*118*	- - -
					X_T	0.774	0.706	0.682	0.635	0.616	0.602	0.663	0.693	0.670	0.675	- - -
					F_d	0.52	0.63	0.68	0.39	0.36	0.29	0.26	0.28	0.30	0.32	- - -
	58.7	2.3125	29	1.125	C_v	1.75	3.11	4.77	7.07	10.7	17.0	27.9	41.5	58.0	70.7	0.87
					K_v	*1.51*	*2.69*	*4.13*	*6.12*	*9.26*	*14.7*	*24.1*	*35.9*	*50.2*	*61.2*	- - -
					X_T	0.944	0.840	0.803	0.757	0.735	0.642	0.531	0.613	0.629	0.702	- - -
4	111.1	4.375	51	2	C_v	5.85	11.6	18.3	30.2	49.7	79.7	125	171	205	224	0.82
					K_v	*5.06*	*10.0*	*15.8*	*26.1*	*43.0*	*68.9*	*108*	*148*	*177*	*194*	- - -
					X_T	0.731	0.650	0.643	0.645	0.632	0.625	0.672	0.742	0.737	0.716	- - -
					F_d	0.45	0.42	0.40	0.33	0.30	0.28	0.23	0.24	0.26	0.28	- - -
	73.0	2.875	38	1.5	C_v	3.82	7.65	11.4	16.9	25.5	38.2	60.5	85.7	105	112	0.89
					K_v	*3.30*	*6.62*	*9.86*	*14.6*	*22.1*	*33.0*	*52.3*	*74.1*	*90.8*	*96.9*	- - -
					X_T	0.746	0.700	0.694	0.669	0.640	0.627	0.591	0.644	0.735	0.813	- - -

1. At 100% travel.
▨ Restricted trim.

Notes: The coefficients shown on this page are also appropriate for Fisher EDR, ET, and ETR. The full-size port coefficients for NPS 3 through 8 also apply to Fisher ET-C valves.

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
6(2)	177.8	7	51	2	C_v	12.9	25.8	43.3	67.4	104	162	239	316	368	394	0.85
					K_v	*11.2*	*22.3*	*37.5*	*58.3*	*90.0*	*140*	*207*	*273*	*318*	*341*	- - -
					X_T	0.688	0.680	0.682	0.709	0.700	0.720	0.736	0.744	0.780	0.778	- - -
					F_d	0.39	0.44	0.47	0.33	0.29	0.22	0.22	0.24	0.25	0.26	- - -
	111.1	4.375	51	2	C_v	5.40	10.1	15.8	26.7	45.2	71.2	111	169	232	274	0.88
					K_v	*4.67*	*8.74*	*13.7*	*23.1*	*39.1*	*61.6*	*96.0*	*146*	*201*	*237*	- - -
					X_T	0.834	0.834	0.735	0.654	0.626	0.613	0.614	0.610	0.629	0.695	- - -
8	203.2	8	51	2	C_v	18.5	38.0	58.4	86.7	130	189	268	371	476	567	0.85
					K_v	*16.0*	*32.9*	*50.5*	*75.0*	*112*	*163*	*232*	*321*	*412*	*490*	- - -
					X_T	0.727	0.623	0.600	0.588	0.580	0.587	0.599	0.611	0.671	0.724	- - -
8	203.2	8	76	3	C_v	27.0	58.1	105	188	307	478	605	695	761	818	0.86
					K_v	*23.4*	*50.3*	*90.8*	*163*	*266*	*413*	*523*	*601*	*658*	*708*	- - -
					X_T	0.644	0.654	0.636	0.611	0.643	0.615	0.725	0.809	0.804	0.807	- - -
					F_d	0.28	0.26	0.23	0.20	0.17	0.22	0.24	0.25	0.25	0.26	- - -

1. At 100% travel.
2. NPS 8 EAD/EAT valves use the same C_v values for sizing as NPS 6 ED valves with 177.8 mm (7 inch) port.

▨ Restricted trim.

Notes: The coefficients shown on this page are also appropriate for Fisher EDR, ET, and ETR. The full-size port coefficients for NPS 3 through 8 also apply to Fisher ET-C valves.

Linear

Linear,
Flow Down

Body Size, NPS	Port Diameter inches	Travel Inches	Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L
				10	20	30	40	50	60	70	80	90	100	
10	9.50	4.00	Cv	136	284	430	569	703	833	956	1060	1140	1190	0.88
			Xt	0.663	0.682	0.663	0.661	0.687	0.726	0.772	0.795	0.785	0.771	
12	11.00	5.00	Cv	189	374	568	771	979	1180	1360	1500	1570	1570	0.88
			Xt	0.651	0.687	0.649	0.652	0.706	0.769	0.805	0.792	0.775	0.818	
16	14.75	5.00	Cv	334	648	999	1380	1770	2120	2410	2630	2780	2880	0.88
			Xt	0.653	0.682	0.653	0.650	0.666	0.709	0.745	0.755	0.739	0.752	

Equal Percentage

Equal Percentage,
Flow Down

Body Size, NPS	Port Diameter inches	Travel Inches	Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L
				10	20	30	40	50	60	70	80	90	100	
10	9.50	4	Cv	24	52	80	131	210	325	465	655	860	980	0.88
			Xt	0.602	0.599	0.598	0.591	0.595	0.604	0.583	0.630	0.706	0.811	
12	11.00	5	Cv	46.2	83.6	123	183	280	424	618	873	1190	1380	0.88
			Xt	0.750	0.737	0.715	0.656	0.595	0.570	0.578	0.625	0.692	0.804	
16	14.75	5	Cv	58.1	106	166	274	464	758	1150	1630	2210	2540	0.88
			Xt	0.613	0.647	0.689	0.643	0.585	0.565	0.589	0.688	0.623	0.685	

Whisper III Level A1

Whisper III Level A1,
Flow Up

Body Size, NPS	Port Diameter inches	Travel Inches	Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L
				10	20	30	40	50	60	70	80	90	100	
10	9.50	8	Cv	112	224	379	512	645	773	894	994	1061	1100	
			Xt	0.681	0.681	0.681	0.681	0.681	0.681	0.681	0.681	0.681	0.681	
12	11.00	8	Cv	165	358	555	752	939	1130	1306	1439	1527	1579	
			Xt	0.681	0.681	0.681	0.681	0.681	0.681	0.681	0.681	0.681	0.681	
16	14.75	8	Cv	226	494	758	1015	1267	1515	1764	2613	2212	2371	
			Xt	0.664	0.664	0.664	0.664	0.664	0.664	0.664	0.664	0.664	0.664	
		9	Cv	257	558	851	1134	1415	1692	1960	2198	2375	2488	
			Xt	0.672	0.672	0.672	0.672	0.672	0.672	0.672	0.672	0.672	0.672	

Cavitrol III One Stage

Cavitrol III One Stage, Flow Down

Body Size, NPS	Port Diameter inches	Travel Inches	Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L
				10	20	30	40	50	60	70	80	90	100	
10	9.50	8	Cv	107	244	373	491	595	687	786	833	890	938	0.91
12	11.00	8	Cv	125	285	405	545	715	830	930	1020	1100	1185	0.91
	11.00	9	Cv	145	325	495	650	788	908	1010	1100	1180	1240	0.91
16	14.75	8	Cv	170	390	545	800	990	1165	1330	1475	1610	1735	0.91
		9	Cv	195	440	675	897	1100	1290	1460	1610	1750	1870	0.91

Cavitrol III Two Stage

Cavitrol III Two Stage Flow Down

Body Size, NPS	Port Diameter inches	Travel Inches	Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L
				10	20	30	40	50	60	70	80	90	100	
10	9.50	8	Cv	39	91	143	193	243	292	340	388	431	473	0.98
12	11.00	8	Cv	45	110	165	225	285	345	400	455	508	560	0.98
	11.00	9	Cv	53	121	188	255	321	385	447	508	566	622	0.98
16	14.75	8	Cv	60	145	225	305	385	465	545	620	695	770	0.98
		9	Cv	71	163	254	345	434	523	610	695	778	860	0.98

Whisper Trim I

Linear Characteristic

Valve Size, NPS[1]	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel									
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100
1 & 1-1/4	33.3	1.3125	19	0.75	C_V	3.28	7.39	12.0	14.2	14.9	15.3	15.7	16.0	16.4	16.8
					K_V	*2.84*	*6.39*	*10.4*	*12.3*	*12.9*	*13.2*	*13.6*	*13.8*	*14.2*	*14.5*
					X_T	0.581	0.605	0.617	0.644	0.764	0.790	0.809	0.813	0.795	0.768
1-1/2	47.6	1.875	19	0.75	C_V	2.62	7.42	13.9	20.8	23.2	24.2	24.9	25.4	26.1	26.7
					K_V	*2.27*	*6.42*	*12.0*	*18.0*	*20.1*	*20.9*	*21.5*	*22.0*	*22.6*	*23.1*
					X_T	0.892	0.766	0.632	0.498	0.614	0.771	0.876	0.919	0.901	0.894
	33.3	1.3125	19	0.75	C_V	3.12	7.36	13.0	18.5	20.7	21.4	21.8	23.1	23.9	25.2
					K_V	*2.70*	*6.37*	*11.2*	*16.0*	*17.9*	*18.5*	*18.9*	*20.0*	*20.7*	*21.8*
					X_T	0.559	0.605	0.460	0.383	0.472	0.622	0.768	0.823	0.874	0.857
2	58.7	2.3125	29	1.125	C_V	7.30	19.2	34.6	42.2	45.5	47.0	47.1	47.2	47.2	48.0
					K_V	*6.31*	*16.6*	*29.9*	*36.5*	*39.4*	*40.7*	*40.7*	*40.8*	*40.8*	*41.5*
					X_T	0.604	0.467	0.318	0.387	0.526	0.689	0.843	0.899	0.940	0.938
	33.3	1.3125	19	0.75	C_V	2.86	6.79	11.7	18.4	23.6	27.9	30.9	33.5	35.3	36.7
					K_V	*2.47*	*5.87*	*10.1*	*15.9*	*20.4*	*24.1*	*26.7*	*29.0*	*30.5*	*31.7*
					X_T	0.672	0.755	0.547	0.386	0.358	0.377	0.398	0.431	0.470	0.483
2-1/2	73.0	2.875	38	1.5	C_V	12.2	32.6	49.7	54.4	55.9	59.8	64.0	67.7	71.4	74.0
					K_V	*10.6*	*28.2*	*43.0*	*47.1*	*48.4*	*51.7*	*55.4*	*58.6*	*61.8*	*64.0*
					X_T	0.748	0.428	0.414	0.589	0.792	0.877	0.857	0.792	0.712	0.719
	47.6	1.875	19	0.75	C_V	3.11	8.31	14.9	22.4	29.9	36.0	41.6	46.4	50.5	53.6
					K_V	*2.69*	*7.19*	*12.9*	*19.4*	*25.9*	*31.1*	*36.0*	*40.1*	*43.7*	*46.4*
					X_T	0.603	0.761	0.596	0.467	0.397	0.395	0.398	0.411	0.427	0.439
3	87.3	3.4375	38	1.5	C_V	16.5	40.3	70.8	88.0	92.1	90.7	90.3	92.6	95.6	99.1
					K_V	*14.3*	*34.9*	*61.2*	*76.1*	*79.7*	*78.5*	*78.1*	*80.1*	*82.7*	*85.7*
					X_T	0.685	0.471	0.331	0.378	0.532	0.753	0.929	0.983	0.968	0.923
	58.7	2.3125	29	1.125	C_V	8.15	19.1	33.2	47.6	60.8	72.1	81.8	90.1	97.4	103
					K_V	*7.05*	*16.5*	*28.7*	*41.2*	*52.6*	*62.4*	*70.8*	*77.9*	*84.3*	*89.1*
					X_T	0.720	0.660	0.500	0.439	0.406	0.412	0.437	0.472	0.504	0.510
4	111.1	4.375	51	2	C_V	33.9	76.6	117	135	137	137	141	149	157	169
					K_V	*29.3*	*66.3*	*101*	*117*	*119*	*119*	*122*	*129*	*136*	*146*
					X_T	0.607	0.385	0.352	0.467	0.682	0.887	0.977	0.958	0.921	0.811
	73.0	2.875	38	1.5	C_V	13.6	32.5	54.3	75.5	94.6	112	127	141	153	160
					K_V	*11.8*	*28.1*	*47.0*	*65.3*	*81.8*	*96.9*	*110*	*122*	*132*	*138*
					X_T	0.674	0.481	0.374	0.344	0.345	0.354	0.370	0.385	0.407	0.428
6[2]	177.8	7	51	2	C_V	55.8	125	196	245	270	286	297	308	323	338
					K_V	*48.3*	*108*	*170*	*212*	*234*	*247*	*257*	*266*	*279*	*292*
					X_T	0.294	0.323	0.286	0.322	0.406	0.494	0.579	0.644	0.673	0.662
8	203.2	8	76	3	C_V	100	226	337	436	502	581	641	655	659	681
					K_V	*86.5*	*195*	*292*	*377*	*434*	*503*	*554*	*567*	*570*	*589*
					X_T	0.456	0.490	0.470	0.427	0.452	0.468	0.521	0.624	0.703	0.701
			102	4	C_V	142	303	428	542	611	652	669	689	700	726
					K_V	*123*	*262*	*370*	*469*	*529*	*564*	*579*	*596*	*606*	*628*
					X_T	0.549	0.450	0.436	0.441	0.513	0.624	0.707	0.709	0.729	0.718

1. NPS 6 easy-e with restricted Whisper Trim not available. Use EW valve body where this trim is desired.
2. These values are also used to size NPS 8 EAD/EAT valves.
▨ Restricted trim.

Notes: The coefficients shown on this page are also appropriate for Fisher EDR, ET, and ETR. The full-size port coefficients for NPS 3 through 6 also apply to Fisher ET-C valves.

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Whisper Trim III

Linear Characteristic(2)

Valve Size, NPS	Port Diameter		Maximum Travel		Cage Level	Flow Coefficient	Valve Opening—Percent of Total Travel											X_T(1)
	mm	Inches	mm	Inches			Minimum	10	20	30	40	50	60	70	80	90	100	
1	33.3	1.313	19.1	0.75	A1	Cv	2.5	2.5	4.8	6.7	8.5	10.3	11.9	13.3	14.7	15.4	15.9	0.569
						Kv	2.2	2.2	4.2	5.8	7.4	8.9	10.3	11.5	12.7	13.3	13.8	
1.5	47.6	1.875	19.1	0.75	A1	Cv	8.3	0.7	5.0	14.0	19.1	22.7	24.0	25.0	25.7	25.7	25.8	0.569
						Kv	7.2	0.6	4.3	12.1	16.5	19.6	20.8	21.6	22.2	22.2	22.3	
	33.3	1.313	19.1	0.75	A3	Cv	1.8	0.5	0.6	3.7	6.4	9.2	12.1	14.9	17.8	20.7	21.6	0.569
						Kv	1.6	0.4	0.5	3.2	5.5	8.0	10.5	12.9	15.4	17.9	18.7	
	33.3	1.313	19.1	0.75	B1	Cv	2.4	0.5	0.5	3.9	5.7	7.4	9.2	10.9	12.7	14.5	16.1	0.569
						Kv	2.1	0.4	0.4	3.4	4.9	6.4	8.0	9.4	11.0	12.5	13.9	
	33.3	1.313	19.1	0.75	B3	Cv	1.3	0.5	0.6	2.4	3.8	5.2	6.6	8.0	9.5	10.9	11.7	0.569
						Kv	1.1	0.4	0.5	2.1	3.3	4.5	5.7	6.9	8.2	9.4	10.1	
	19.1	0.750	28.6	1.13	C1 (2)	Cv	0.9	0.1	1.4	2.3	3.0	3.8	4.6	5.4	6.1	6.9	7.4	0.569
						Kv	0.8	0.1	1.2	2.0	2.6	3.3	4.0	4.7	5.3	6.0	6.4	
	19.1	0.750	28.6	1.13	C3 (2)	Cv	0.8	0.1	1.5	2.4	3.4	4.4	5.3	6.3	7.3	8.2	8.3	0.569
						Kv	0.7	0.1	1.3	2.1	2.9	3.8	4.6	5.4	6.3	7.1	7.2	
	19.1	0.750	28.6	1.13	D1 (2)	Cv	0.9	0.1	1.4	2.3	3.0	3.8	4.6	5.4	6.1	6.9	7.4	0.569
						Kv	0.8	0.1	1.2	2.0	2.6	3.3	4.0	4.7	5.3	6.0	6.4	
	19.1	0.750	28.6	1.13	D3 (2)	Cv	0.8	0.1	1.5	2.4	3.4	4.4	5.3	6.3	7.3	8.2	8.3	0.569
						Kv	0.7	0.1	1.3	2.1	2.9	3.8	4.6	5.4	6.3	7.1	7.2	
2	58.7	2.313	34.9	1.38	A1 (3)	Cv	7.4	8.7	18.7	28.7	36.7	41.6	45.3	47.4	48.4	48.9	49.4	0.890
						Kv	6.4	7.5	16.2	24.8	31.7	36.0	39.2	41.0	41.9	42.3	42.7	
	33.3	1.313	31.8	1.25	A3	Cv	2.2	0.4	3.1	7.7	12.8	17.1	21.6	24.5	27.3	28.5	29.7	0.880
						Kv	1.9	0.3	2.7	6.7	11.1	14.8	18.7	21.2	23.6	24.7	25.7	
	33.3	1.313	31.8	1.25	B1	Cv	3.0	0.5	4.1	7.0	9.7	12.7	15.8	18.8	21.8	24.5	24.7	0.750
						Kv	2.6	0.4	3.5	6.1	8.4	11.0	13.7	16.3	18.9	21.2	21.4	
	33.3	1.313	31.8	1.25	B3	Cv	1.5	0.5	1.3	4.4	7.0	9.5	11.8	14.1	16.3	18.5	19.8	0.750
						Kv	1.3	0.4	1.1	3.8	6.1	8.2	10.2	12.2	14.1	16.0	17.1	
	33.3	1.313	31.8	1.25	C1	Cv	2.2	0.5	3.0	4.6	5.9	7.5	9.1	10.7	12.3	13.9	14.0	0.780
						Kv	1.9	0.4	2.6	4.0	5.1	6.5	7.9	9.3	10.6	12.0	12.1	
	33.3	1.313	31.8	1.25	C3	Cv	1.4	0.5	1.7	3.6	5.3	6.9	8.5	10.0	11.4	12.8	13.8	0.780
						Kv	1.2	0.4	1.5	3.1	4.6	6.0	7.4	8.7	9.9	11.1	11.9	
	33.3	1.313	31.8	1.25	D1	Cv	2.2	0.5	3.0	4.6	5.9	7.5	9.1	10.7	12.3	13.9	14.0	0.780
						Kv	1.9	0.4	2.6	4.0	5.1	6.5	7.9	9.3	10.6	12.0	12.1	
	33.3	1.313	31.8	1.25	D3	Cv	1.4	0.5	1.7	3.6	5.3	6.9	8.5	10.0	11.4	12.8	13.8	0.780
						Kv	1.2	0.4	1.5	3.1	4.6	6.0	7.4	8.7	9.9	11.1	11.9	
2.5	73.0	2.875	38.1	1.50	A1	Cv	8.9	1.2	12.1	28.7	41.7	52.0	60.1	66.3	70.0	73.3	74.0	0.569
						Kv	7.7	1.0	10.5	24.8	36.1	45.0	52.0	57.4	60.6	63.4	64.0	
	47.6	1.875	38.1	1.50	A3	Cv	2.7	0.7	3.5	11.6	18.7	25.4	31.9	38.2	44.2	49.8	52.0	0.569
						Kv	2.3	0.6	3.0	10.0	16.2	22.0	27.6	33.0	38.2	43.1	45.0	
	47.6	1.875	38.1	1.50	B1	Cv	3.1	0.8	3.5	8.0	11.8	15.4	18.9	22.2	25.5	28.7	29.0	0.569
						Kv	2.7	0.7	3.0	6.9	10.2	13.3	16.3	19.2	22.1	24.8	25.1	
	47.6	1.875	38.1	1.50	B3	Cv	2.1	0.7	2.6	7.6	12.1	16.3	20.3	24.1	28.0	31.6	35.2	0.569
						Kv	1.8	0.6	2.2	6.6	10.5	14.1	17.6	20.8	24.2	27.3	30.4	
	47.6	1.875	38.1	1.50	C1	Cv	3.1	0.7	3.5	7.5	10.6	13.5	16.3	19.0	21.7	24.3	25.2	0.569
						Kv	2.7	0.6	3.0	6.5	9.2	11.7	14.1	16.4	18.8	21.0	21.8	
	47.6	1.875	38.1	1.50	C3	Cv	1.7	0.7	2.1	5.1	7.7	10.3	12.7	15.1	17.4	19.6	21.4	0.569
						Kv	1.5	0.6	1.8	4.4	6.7	8.9	11.0	13.1	15.1	17.0	18.5	
	47.6	1.875	38.1	1.50	D1	Cv	3.1	0.7	3.5	7.5	10.6	13.5	16.3	19.0	21.7	24.3	25.2	0.569
						Kv	2.7	0.6	3.0	6.5	9.2	11.7	14.1	16.4	18.8	21.0	21.8	
	47.6	1.875	38.1	1.50	D3	Cv	1.7	0.7	2.1	5.1	7.7	10.3	12.7	15.1	17.4	19.6	21.4	0.569
						Kv	1.5	0.6	1.8	4.4	6.7	8.9	11.0	13.1	15.1	17.0	18.5	
3	87.3	3.438	38.1	1.50	A1	Cv	7.1	10.3	25.0	42.5	59.8	71.0	79.9	87.3	92.7	96.8	99.5	0.810
						Kv	6.1	8.9	21.6	36.8	51.7	61.4	69.1	75.5	80.2	83.7	86.1	
	58.7	2.313	38.1	1.50	A3	Cv	3.7	6.6	18.4	30.2	41.6	52.5	63.0	72.2	80.1	87.7	89.3	0.470
						Kv	3.2	5.7	15.9	26.1	36.0	45.4	54.5	62.5	69.3	75.9	77.2	
	58.7	2.313	38.1	1.50	B1	Cv	5.4	7.4	15.6	23.2	30.9	38.4	45.9	53.3	60.4	67.1	67.6	0.385
						Kv	4.7	6.4	13.5	20.1	26.7	33.2	39.7	46.1	52.2	58.0	58.5	

Valve Size, NPS	Port Diameter		Maximum Travel		Cage Level	Flow Coeffi-cient	Valve Opening—Percent of Total Travel											X_T[1]
	mm	Inches	mm	Inches			Minimum	10	20	30	40	50	60	70	80	90	100	
3	58.7	2.313	38.1	1.50	B3	Cv	3.3	5.4	13.8	22.0	30.2	38.4	46.4	54.3	61.9	69.0	74.8	0.385
						Kv	2.9	4.7	11.9	19.0	26.1	33.2	40.1	47.0	53.5	59.7	64.7	
	58.7	2.313	38.1	1.50	C1	Cv	4.3	5.8	11.0	15.6	20.2	24.7	29.2	33.8	38.3	42.7	45.5	0.356
						Kv	3.7	5.0	9.5	13.5	17.5	21.4	25.3	29.2	33.1	36.9	39.4	
	58.7	2.313	38.1	1.50	C3	Cv	2.6	4.1	8.7	13.3	17.9	22.5	27.0	31.5	36.0	40.5	45.0	0.356
						Kv	2.2	3.5	7.5	11.5	15.5	19.5	23.4	27.2	31.1	35.0	38.9	
	58.7	2.313	38.1	1.50	D1	Cv	4.3	5.8	11.0	15.6	20.2	24.7	29.2	33.8	38.3	42.7	45.5	0.356
						Kv	3.7	5.0	9.5	13.5	17.5	21.4	25.3	29.2	33.1	36.9	39.4	
	54.2	2.133	38.1	1.50	D3	Cv	2.6	4.1	8.7	13.3	17.9	22.5	27.0	31.5	36.0	40.5	45.0	0.356
						Kv	2.2	3.5	7.5	11.5	15.5	19.5	23.4	27.2	31.1	35.0	38.9	
4	111.1	4.375	50.8	2.00	A1	Cv	10.9	28.0	49.0	78.0	96.4	116.0	126.0	137.0	142.0	148.0	158.0	0.770
						Kv	9.4	24.2	42.4	67.5	83.4	100.3	109.0	118.5	122.8	128.0	136.7	
	87.3	3.438	50.8	2.00	A3	Cv	5.9	11.2	27.4	49.4	70.0	90.6	110.0	125.0	135.0	139.0	139.0	0.810
						Kv	5.1	9.7	23.7	42.7	60.6	78.4	95.2	108.1	116.8	120.2	120.2	
	87.3	3.438	50.8	2.00	B1	Cv	7.4	4.3	19.6	32.0	43.8	55.3	66.6	77.9	88.9	99.8	109.0	0.492
						Kv	6.4	3.7	17.0	27.7	37.9	47.8	57.6	67.4	76.9	86.3	94.3	
	87.3	3.438	50.8	2.00	B3	Cv	4.4	8.4	21.2	32.9	43.7	54.2	64.5	74.8	85.1	95.5	102.0	0.492
						Kv	3.8	7.3	18.3	28.5	37.8	46.9	55.8	64.7	73.6	82.6	88.2	
	87.3	3.438	50.8	2.00	C1	Cv	4.6	6.5	15.3	23.7	31.9	39.8	47.6	55.2	62.8	70.3	76.6	0.523
						Kv	4.0	5.6	13.2	20.5	27.6	34.4	41.2	47.8	54.3	60.8	66.3	
	87.3	3.438	50.8	2.00	C3	Cv	4.0	10.1	18.4	26.2	33.5	40.5	47.3	54.0	60.6	67.2	73.8	0.467
						Kv	3.5	8.7	15.9	22.7	29.0	35.0	40.9	46.7	52.4	58.1	63.8	
	87.3	3.438	50.8	2.00	D1	Cv	4.6	6.5	15.3	23.7	31.9	39.8	47.6	55.2	62.8	70.3	76.6	0.523
						Kv	4.0	5.6	13.2	20.5	27.6	34.4	41.2	47.8	54.3	60.8	66.3	
	87.3	3.438	50.8	2.00	D3	Cv	4.0	10.1	18.4	26.2	33.5	40.5	47.3	54.0	60.6	67.2	73.8	0.467
						Kv	3.5	8.7	15.9	22.7	29.0	35.0	40.9	46.7	52.4	58.1	63.8	
6	136.5	5.375	76.2	3.00	A1	Cv	14.2	17.8	67.6	126.0	176.0	216.0	246.0	267.0	281.0	290.0	294.9	0.563
						Kv	12.3	15.4	58.5	109.0	152.2	186.9	212.8	231.0	243.1	250.9	255.1	
	177.8	7.000	50.8	2.00	A1	Cv	18.4	25.5	32.5	73.7	120.0	165.0	204.0	234.0	256.0	273.0	285.6	0.563
						Kv	15.9	22.1	28.1	63.8	103.8	142.7	176.5	202.4	221.5	236.2	247.1	
	136.5	5.375	76.2	3.00	A3	Cv	4.7	17.8	67.6	126.0	176.0	216.0	246.0	267.0	281.0	290.0	295.0	0.563
						Kv	4.0	15.4	58.5	109.0	152.2	186.9	212.8	231.0	243.1	250.9	255.2	
	136.5	5.375	76.2	3.00	B1	Cv	11.6	21.5	45.2	68.8	92.5	116.2	140.0	163.6	187.3	211.0	231.2	0.563
						Kv	10.0	18.6	39.1	59.5	80.0	100.5	121.1	141.5	162.0	182.5	200.0	
	136.5	5.375	76.2	3.00	B3	Cv	4.7	12.6	38.2	66.9	94.5	120.0	144.0	167.0	190.0	211.0	228.0	0.563
						Kv	4.0	10.9	33.0	57.9	81.7	103.8	124.6	144.5	164.4	182.5	197.2	
	136.5	5.375	76.2	3.00	C1	Cv	8.0	6.5	20.6	34.0	48.5	63.7	77.4	91.3	107.2	121.0	129.3	0.563
						Kv	6.9	5.6	17.8	29.4	42.0	55.1	67.0	79.0	92.7	104.7	111.9	
	136.5	5.375	76.2	3.00	C3	Cv	4.7	11.0	28.0	41.3	55.3	69.3	83.0	97.0	110.0	124.0	138.0	0.563
						Kv	4.0	9.5	24.2	35.7	47.8	59.9	71.8	83.9	95.2	107.3	119.4	
	136.5	5.375	76.2	3.00	D1	Cv	8.0	6.5	20.6	34.0	48.5	63.7	77.4	91.3	107.2	121.0	129.3	0.563
						Kv	6.9	5.6	17.8	29.4	42.0	55.1	67.0	79.0	92.7	104.7	111.9	
	136.5	5.375	76.2	3.00	D3	Cv	4.7	5.1	6.7	9.5	19.9	31.4	46.0	61.0	75.7	89.7	104.0	0.563
						Kv	4.0	4.4	5.8	8.2	17.2	27.2	39.8	52.8	65.5	77.6	90.0	
8	203.2	8.000	76.2	3.00	A1	Cv	21.5	20.0	77.9	136.1	194.4	249.3	300.3	347.1	384.0	416.0	425.7	0.626
						Kv	18.6	17.3	67.4	117.7	168.2	215.7	259.8	300.3	332.2	359.9	368.3	
	203.2	8.000	101.6	4.00	A1	Cv	22.0	51.9	144.0	213.0	282.0	374.0	443.0	495.0	558.0	601.0	638.0	0.626
						Kv	19.0	44.9	124.6	184.3	243.9	323.5	383.2	428.2	482.7	519.9	551.9	
	203.2	8.000	101.6	4.00	A3	Cv	22.0	51.9	144.0	213.0	282.0	374.0	443.0	495.0	558.0	601.0	638.0	0.626
						Kv	19.0	44.9	124.6	184.3	243.9	323.5	383.2	428.2	482.7	519.9	551.9	
	203.2	8.000	101.6	4.00	B1	Cv	15.0	43.0	85.0	126.0	168.0	209.0	250.0	292.0	333.0	374.0	406.0	0.566
						Kv	13.0	37.2	73.5	109.0	145.3	180.8	216.3	252.6	288.1	323.5	351.2	
	203.2	8.000	101.6	4.00	B3	Cv	12.7	32.3	75.8	119.0	163.0	206.0	241.0	285.0	328.0	363.0	407.0	0.566
						Kv	11.0	27.9	65.6	102.9	141.0	178.2	208.5	246.5	283.7	314.0	352.1	
	203.2	8.000	101.6	4.00	C1	Cv	13.0	34.0	61.0	88.0	116.0	143.0	171.0	198.0	226.0	253.0	280.0	0.566
						Kv	11.2	29.4	52.8	76.1	100.3	123.7	147.9	171.3	195.5	218.9	242.2	
	203.2	8.000	101.6	4.00	C3	Cv	10.2	26.7	47.1	74.4	102.0	129.0	156.0	184.0	204.0	232.0	259.0	0.566
						Kv	8.8	23.1	40.7	64.4	88.2	111.6	134.9	159.2	176.5	200.7	224.0	

(Continued)

Notes: The coefficients shown on this page are also appropriate for Fisher ES, ET valves. The coefficients for NPS 3 through 8 also apply to Fisher ET-C valves.

Valve Size, NPS	Port Diameter		Maximum Travel		Cage Level	Flow Coeffi-cient	Valve Opening—Percent of Total Travel											X_T(1)
	mm	Inches	mm	Inches			Minimum	10	20	30	40	50	60	70	80	90	100	
8(4)	203.2	8	95.25	3.75	A1	Cv	22	48.7	132.5	200.1	264.8	345.3	417.1	472.3	526.5	576.8	614.9	0.626
						Kv	19	41.7	113.5	171.5	226.9	295.9	357.4	404.7	451.2	494.3	526.9	
	203.2	8	95.25	3.75	A3	Cv	22	48.7	132.5	200.1	264.8	345.3	417.1	472.3	526.5	576.8	614.9	0.626
						Kv	19	41.7	113.5	171.5	226.9	295.9	357.4	404.7	451.2	494.3	526.9	
	203.2	8	95.25	3.75	B1	Cv	15	40.3	79.8	118.3	157.5	196.2	234.6	273.6	312.5	350.9	386	0.566
						Kv	13	34.5	68.4	101.4	135	168.1	201	234.4	267.8	300.7	330.8	
	203.2	8	95.25	3.75	B3	Cv	12.7	30.3	70.4	110.9	152	192.6	227.9	265.8	306.5	343.3	379.5	0.566
						Kv	11	26	60.3	95	130.2	165	195.3	227.8	262.6	294.2	325.2	
	203.2	8	95.25	3.75	C1	Cv	13	31.9	57.6	82.9	109	134.6	160.5	186.2	212	237.8	263.1	0.566
						Kv	11.2	27.3	49.4	71	93.4	115.3	137.5	159.6	181.7	203.8	225.4	
	203.2	8	95.25	3.75	C3	Cv	10.2	25	44.6	69.3	95.1	120.6	145.9	171.8	194	216.3	242.1	0.566
						Kv	8.8	21.4	38.2	59.4	81.5	103.3	125	147.2	166.2	185.3	207.5	

1. This column lists XT factors for Whisper Trim III cages at 100% travel
2. NPS 1-1/2 valves with 3/4"port diameter is for ES constructions only
3. Not applicable for ET with Spring loaded seal ring or ED with Class IV multiple piston rings
4. Only applied for ET-C

Notes: The coefficients shown on this page are also appropriate for Fisher ES, ET valves. The coefficients for NPS 3 through 8 also apply to Fisher ET-C valves.

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Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										
	mm	Inches	mm	Inches		Min	10	20	30	40	50	60	70	80	90	100
WhisperFlo™ Level X																**Linear Characteristic**
4	87.3	3.4375	76	3	C_v	6.4	12.7	27.8	41.9	55.4	68.5	81.4	91.9	101	108	114
					X_T	*0.654*	0.654	*0.753*	*0.737*	*0.727*	*0.714*	*0.708*	*0.732*	*0.76*	*0.831*	*0.842*
6[1]	136.5	5.375	76	3	C_v	10.4	20.7	47.3	70.4	94.6	116	137	159	175	189	199
					X_T	*0.638*	0.638	*0.673*	*0.716*	*0.688*	*0.692*	*0.723*	*0.708*	*0.735*	*0.747*	*0.77*
8	177.8	7	152	6	C_v	30.4	60.9	120	179	237	287	331	368	397	421	441
					X_T	*0.702*	0.702	*0.704*	*0.669*	*0.647*	*0.668*	*0.699*	*0.74*	*0.783*	*0.809*	*0.829*
WhisperFlo Level Y																**Linear Characteristic**
4	87.3	3.4375	76	3	C_v	6	12	23	35	47	59	70	82	94	105	117
					X_T	*0.536*	0.536	*0.532*	*0.525*	*0.51*	*0.503*	*0.507*	*0.514*	*0.528*	*0.532*	*0.575*
6[1]	136.5	5.375	76	3	C_v	9	18	36	55	73	91	109	127	146	164	182
					X_T	*0.536*	0.536	*0.532*	*0.525*	*0.51*	*0.503*	*0.507*	*0.514*	*0.528*	*0.532*	*0.575*
8	177.8	7	152	6	C_v	11	42	84	125	167	209	251	293	334	376	418
					X_T	*0.51*	0.51	*0.543*	*0.547*	*0.536*	*0.46*	*0.496*	*0.496*	*0.514*	*0.547*	*0.609*
WhisperFlo Level Z																**Linear Characteristic**
4	87.3	3.4375	76	3	C_v	3	6	13	19	25	32	38	44	50	57	63
					X_T	*0.600*	0.600	*0.539*	*0.521*	*0.528*	*0.528*	*0.547*	*0.539*	*0.526*	*0.507*	*0.525*
6[1]	136.5	5.375	76	3	C_v	5	10	20	30	40	51	61	71	81	91	101
					X_T	*0.600*	0.600	*0.539*	*0.521*	*0.528*	*0.528*	*0.547*	*0.539*	*0.525*	*0.507*	*0.525*
8	177.8	7	152	6	C_v	7	26	52	78	104	130	156	182	208	234	260
					X_T	*0.600*	0.600	*0.539*	*0.521*	*0.528*	*0.528*	*0.547*	*0.539*	*0.525*	*0.507*	*0.525*

1. These values are also used to size NPS 8 EAD/EAT valves.

Notes: The coefficients shown on this page are also appropriate for Fisher EDR, ET, and ETR. The full-size port coefficients for NPS 4 through 8 also apply to Fisher ET-C valves.

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Linear

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Constr-uction	Flow Coeffi-cient	Valve Opening—Percent of Total Travel											$F_L^{(1)}$
	mm	Inches	mm	Inches			Min$^{(2)}$	10	20	30	40	50	60	70	80	90	100	
12	279.4	11	102	4	SNC	Cv	40	155	300	450	610	770	940	1100	1250	1390	1500	0.88
						Kv	34.6	134	260	389	528	666	813	952	1081	1202	1298	- - -
						X_T	0.391	0.609	0.678	0.676	0.645	0.654	0.693	0.746	0.789	0.799	0.792	- - -
			140	5.5		Cv	40	206	415	630	852	1079	1295	1465	1557	1570	1570	0.88
						Kv	34.6	178	359	545	737	933	1120	1267	1347	1358	1358	- - -
						X_T	0.391	0.644	0.683	0.644	0.654	0.704	0.769	0.792	0.775	0.818	0.82	- - -
14	279.4	11	102	4	SNC	Cv	40	106	222	368	541	727	922	1109	1283	1437	1560	0.88
						Kv	34.6	92	192	319	468	629	797	959	1110	1243	1350	- - -
						X_T	0.391	0.837	0.811	0.749	0.703	0.703	0.722	0.748	0.769	0.774	0.777	- - -
			140	5.5		Cv	40	206	415	629	838	1110	1420	1630	1760	1850	1860	0.88
						Kv	34.6	178	359	544	725	960	1228	1410	1522	1600	1609	- - -
						X_T	0.391	0.99	0.77	0.70	0.72	0.78	0.80	0.80	0.81	0.79	0.82	- - -
16x12	279.4	11	102	4	SNC	Cv	40	73	169	314	495	698	909	1115	1305	1468	1601	0.88
						Kv	34.6	63	146	272	428	604	786	965	1128	1270	1385	- - -
						X_T	0.391	0.989	0.899	0.797	0.742	0.735	0.741	0.749	0.756	0.758	0.767	- - -
			140	5.5		Cv	40	90	300	500	800	1100	1350	1550	1700	1800	1875	0.88
						Kv	34.6	78	260	433	692	952	1168	1341	1471	1557	1622	- - -
						X_T	0.391	0.989	0.899	0.797	0.742	0.735	0.741	0.749	0.756	0.758	0.767	- - -
16	374.7	14.75	102	4	SNC	Cv	76	202	456	709	963	1232	1534	1900	2234	2526	2772	0.85
						Kv	66	175	394	613	833	1066	1327	1644	1933	2185	2398	- - -
						X_T		0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	- - -
						Fd		0.19	0.26	0.29	0.31	0.31	0.27	0.27	0.28	0.35	0.30	- - -
			140	5.5		Cv	124	298	649	1000	1376	1846	2324	2701	2988	3188	3312	0.85
						Kv	107	258	562	865	1190	1597	2010	2337	2585	2757	2865	- - -
						X_T		0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	- - -
						Fd		0.22	0.28	0.31	0.29	0.27	0.29	0.30	0.30	0.31	0.31	- - -
18	374.7	14.75	102	4	SNC	Cv	82	218	492	765	1038	1310	1622	1989	2311	2583	2810	0.85
						Kv	71	189	426	662	899	1134	1404	1721	2000	2236	2431	- - -
						X_T		0.81	0.81	0.76	0.76	0.78	0.78	0.86	0.82	0.79	0.81	- - -
						Fd		0.18	0.22	0.23	0.20	0.19	0.20	0.20	0.20	0.20	0.21	- - -
			140	5.5		Cv	133	322	701	1078	1460	1935	2396	2745	3010	3208	3351	0.85
						Kv	115	279	606	933	1263	1674	2073	2375	2605	2776	2900	- - -
						X_T		0.81	0.81	0.76	0.76	0.78	0.78	0.86	0.82	0.79	0.81	- - -
						Fd		0.22	0.28	0.31	0.29	0.27	0.29	0.30	0.30	0.31	0.31	- - -
20 x 16	374.7	14.75	102	4	SNC	Cv	80	213	480	747	1038	1316	1644	2044	2413	2742	3026	0.85
						Kv	70	184	415	646	898	1139	1422	1768	2087	2371	2618	- - -
						X_T		0.81	0.81	0.76	0.76	0.78	0.78	0.86	0.82	0.79	0.81	- - -
						Fd		0.18	0.22	0.23	0.20	0.19	0.20	0.20	0.20	0.20	0.21	- - -
			140	5.5		Cv	130	314	683	1079	1472	1984	2514	2944	3286	3543	3721	0.85
						Kv	113	272	591	933	1274	1716	2174	2546	2842	3065	3219	- - -
						X_T		0.81	0.81	0.76	0.76	0.78	0.78	0.86	0.82	0.79	0.81	- - -
						Fd		0.22	0.28	0.31	0.29	0.27	0.29	0.30	0.30	0.31	0.31	- - -
24 x 16	374.7	14.75	102	4	SNC	Cv	80	213	480	747	1000	1283	1627	2065	2490	2888	3253	0.85
						Kv	70	184	415	646	865	1110	1407	1786	2153	2498	2814	- - -
						X_T	0.81	0.81	0.81	0.76	0.76	0.78	0.78	0.86	0.82	0.79	0.81	- - -
						Fd		0.18	0.22	0.23	0.20	0.19	0.20	0.20	0.20	0.20	0.21	- - -
			140	5.5		Cv	130	314	683	1041	1445	1998	2609	3145	3606	3982	4265	0.85
						Kv	113	272	591	900	1250	1728	2257	2720	3119	3444	3689	- - -
						X_T	0.81	0.81	0.81	0.76	0.76	0.78	0.78	0.86	0.82	0.79	0.81	- - -
						Fd		0.22	0.28	0.31	0.29	0.27	0.29	0.30	0.30	0.31	0.31	- - -

1. At 100% travel.
2. Clearance flow only

Valve Size, NPS	Port Diameter		Maximum Travel		Constr-uction	Flow Coeffi-cient	Valve Opening—Percent of Total Travel											F_L[1]
	mm	Inches	mm	Inches			Min[2]	10	20	30	40	50	60	70	80	90	100	
20	464	18.25	203	8	SNC	Cv	270	647	1377	2089	2720	3274	3747	4309	4787	5196	5196	0.85
						Kv	234	560	1192	1808	2354	2833	3243	3729	4143	4497	4497	- - -
						X_T	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	- - -
						Fd		0.22	0.28	0.31	0.32	0.32	0.31	0.30	0.30	0.30	0.30	- - -
24x20	464	18.25	203	8	SNC	Cv	271	649	1394	2123	2827	3455	4010	4589	5157	5626	5841	0.85
						Kv	234	562	1206	1837	2446	2990	3470	3971	4463	4869	5055	- - -
						X_T	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	- - -
						Fd		0.22	0.28	0.31	0.32	0.32	0.31	0.30	0.30	0.30	0.30	- - -
30	610	24	302	11.88	SN	C_v	100	906	2000	3080	4230	5290	6690	7710	8450	9260	9530	0.99
						K_v	87	784	1730	2664	3659	4576	5787	6669	7309	8010	8243	- - -
						X_T		0.7	0.73	0.72	0.75	0.72	0.74	0.71	0.74	0.72	0.71	- - -

1. At 100% travel.
2. Clearance flow only

Equal Percentage

Equal Percentage Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Construction	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L[1]
	mm	Inches	mm	Inches			Min[2]	10	20	30	40	50	60	70	80	90	100	
12	279.4	11	140	5.5	SNC	Cv	22	50	91	141	222	352	540	797	1127	1361	1488	0.88
						Kv	19.0	43	79	122	192	304	467	689	975	1177	1287	- - -
						X_T	0.391	0.747	0.731	0.706	0.650	0.584	0.575	0.610	0.679	0.797	0.804	- - -
14	279.4	11	140	5.5	SNC	Cv	22	51	95	139	193	277	406	582	803	1079	1397	0.88
						Kv	19.0	44	82	120	167	240	351	503	695	933	1208	- - -
						Xt	0.391	0.894	0.891	0.883	0.855	0.788	0.711	0.674	0.696	0.728	0.780	- - -
16x12	279.4	11	140	5.5	SNC	Cv	21	58	109	158	220	317	463	664	917	1232	1595	0.88
						Kv	20.3	56.0	105	153	212	306	447	641	885	1189	1539	- - -
						X_T	0.391	0.99	0.994	0.995	0.987	0.916	0.805	0.738	0.743	0.752	0.764	- - -
16	374.7	14.75	102	4	SNC	Cv	7	22	54	86	136	213	321	477	695	1010	1414	0.85
						Kv	6	19	47	74	117	184	277	412	601	873	1223	- - -
						X_T		0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	- - -
						Fd		0.41	0.46	0.45	0.27	0.28	0.27	0.26	0.24	0.22	0.24	- - -
			140	5.5	SNC	Cv	13	35	79	145	263	454	765	1272	1808	2278	2664	0.85
						Kv	11	30	68	125	228	393	662	1100	1564	1971	2304	---
						X_T		0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	---
						Fd		0.45	0.46	0.39	0.28	0.26	0.24	0.23	0.26	0.27	0.28	---
			203	8	LNC	Cv	34	77	163	249	433	670	1003	1490	2154	2686	3054	0.85
						Kv	29	66	141	216	375	579	868	1289	1863	2323	2642	- - -
						X_T		0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	- - -
						Fd		0.46	0.45	0.42	0.25	0.32	0.25	0.21	0.23	0.25	0.26	- - -
18	374.7	14.75	102	4	SNC	Cv	8	24	58	93	146	230	346	514	750	1088	1499	0.85
						Kv	7	21	50	80	127	199	299	445	649	942	1297	---
						X_T		0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	---
						Fd		0.46	0.45	0.42	0.25	0.32	0.25	0.21	0.23	0.25	0.26	---
			140	5.5	SNC	Cv	14	38	85	156	284	490	825	1351	1897	2352	2711	0.85
						Kv	12	33	74	135	246	424	714	1169	1642	2036	2346	- - -
						Xt		0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	- - -
						Fd		0.46	0.45	0.42	0.25	0.32	0.25	0.21	0.23	0.25	0.26	- - -
			203	8	SNC	Cv	36	83	176	269	467	723	1082	1577	2234	2730	3073	0.85
						Kv	31	72	152	233	404	625	936	1364	1933	2363	2660	- - -
						X_T		0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	- - -
						Fd		0.46	0.45	0.42	0.25	0.32	0.25	0.21	0.23	0.25	0.26	- - -
20 x 16	374.7	14.75	102	4	SNC	Cv	8	23	57	90	143	224	338	502	732	1089	1513	0.85
						Kv	7	20	49	78	123	194	292	434	633	942	1309	---
						X_T	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	---
						Fd		0.46	0.45	0.42	0.25	0.32	0.25	0.21	0.23	0.25	0.26	---
			140	5.5	SNC	Cv	14	37	83	153	277	478	805	1359	1943	2462	2900	0.85
						Kv	12	32	72	132	240	413	696	1175	1681	2130	2509	- - -
						X_T	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	- - -
						Fd		0.46	0.45	0.42	0.25	0.32	0.25	0.21	0.23	0.25	0.26	- - -
			203	8	SNC	Cv	35	81	172	262	456	705	1082	1596	2324	2925	3369	0.85
						Kv	31	70	148	227	394	610	936	1380	2010	2530	2914	- - -
						X_T	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	- - -
						Fd		0.46	0.45	0.42	0.25	0.32	0.25	0.21	0.23	0.25	0.26	- - -
24 x 16	374.7	14.75	102	4	SNC	C_v	8	23	57	90	143	224	338	502	732	1089	1513	0.85
						K_v	7	20	49	78	123	194	292	434	633	942	1309	---
						X_T	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	---
						Fd		0.46	0.45	0.42	0.25	0.32	0.25	0.21	0.23	0.25	0.26	---
			140	5.5	SNC	Cv	14	37	83	153	277	478	805	1327	1952	2548	3089	0.85
						Kv	12	32	72	132	240	413	696	1148	1688	2204	2672	- - -
						X_T	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	- - -
						Fd		0.46	0.45	0.42	0.25	0.32	0.25	0.21	0.23	0.25	0.26	- - -
			203	8	SNC	Cv	34	77	165	252	437	676	1044	1575	2385	3121	3724	0.85
						Kv	29	67	142	218	378	585	903	1363	2063	2700	3221	- - -
						X_T	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	- - -
						Fd		0.46	0.45	0.42	0.25	0.32	0.25	0.21	0.23	0.25	0.26	- - -
20	464	18.25	203	8	SNC	Cv	38	90	214	408	733	1276	2122	2954	3661	4270	4820	0.85
						Kv	33	78	185	353	634	1104	1836	2557	3168	3695	4171	- - -
						X_T	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	- - -
						Fd		0.31	0.28	0.25	0.24	0.22	0.23	0.25	0.27	0.28	0.29	- - -

1. At 100% travel.
2. Clearance flow only

Valve Size, NPS	Port Diameter		Maximum Travel		Constr-uction	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L(1)
	mm	Inches	mm	Inches			Min(2)	10	20	30	40	50	60	70	80	90	100	
24x20	464	18.25	203	8	SNC	Cv	38	91	215	410	736	1282	2159	3087	3891	4579	5182	0.85
						Kv	33	78	186	355	637	1109	1868	2671	3368	3963	4484	- - -
						X_T	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	- - -
						Fd		0.31	0.28	0.25	0.24	0.22	0.23	0.25	0.27	0.28	0.29	- - -
30	610	24	302	11.88	SN	C_v	70	126	305	520	876	1343	2200	3599	5150	6563	7690	0.99
						K_v	61	109	264	450	758	1162	1903	3113	4455	5677	6652	- - -
						X_T		0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.65	0.68	0.7	- - -

1. At 100% travel.
2. Clearance flow only

Whisper Trim III - Level A1 - Flow Up

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Constr-uction	Flow Coeffi-cient	Valve Opening—Percent of Total Travel											F_L(1)
	mm	Inches	mm	Inches			Min(2)	10	20	30	40	50	60	70	80	90	100	
12	279.4	11	140	5.5	SNC	Cv	25	144	295	441	576	696	803	904	991	1070	1137	0.89
						Kv		125	255	381	498	602	695	782	857	926	984	- - -
						X_T		0.62	0.62	0.62	0.65	0.7	0.75	0.81	0.86	0.86	0.86	- - -
			203	8	LNC	Cv	25	212	428	622	785	930	1052	1150	1229	1285	1315	0.89
						Kv		183	370	538	679	804	910	995	1063	1112	1137	- - -
						X_T		0.619	0.620	0.665	0.739	0.827	0.856	0.854	0.852	0.849	0.847	- - -
14	279.4	11	140	5.5	SNC	Cv	25	144	295	441	584	721	851	981	1104	1225	1318	0.89
						Kv		125	255	381	505	623	736	849	955	1059	1140	- - -
						X_T		0.62	0.62	0.62	0.63	0.65	0.67	0.70	0.72	0.72	0.73	- - -
			203	8	LNC	Cv	25	212	428	635	828	1016	1194	1332	1420	1482	1515	0.89
						Kv		183	370	549	716	879	1033	1153	1229	1282	1310	- - -
						X_T		0.619	0.620	0.639	0.668	0.703	0.715	0.739	0.800	0.823	0.824	- - -
16x12	279.4	11	140	5.5	SNC	Cv	25	144	295	441	589	737	883	1033	1179	1328	1439	0.89
						Kv		125	255	381	509	638	764	894	1020	1149	1245	- - -
						Xt		0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.65	- - -
			203	8	LNC	Cv	25	212	428	644	857	1073	1289	1454	1548	1613	1648	0.89
						Kv		183	370	557	741	928	1115	1258	1339	1395	1425	- - -
						X_T		0.619	0.620	0.621	0.621	0.621	0.621	0.663	0.765	0.805	0.809	- - -
16	374.7	14.75	203	8.00	LNC	Cv	38	335	677	1019	1298	1529	1721	1871	1985	2059	2095	089
						Kv		290	585	882	1123	1322	1488	1618	1717	1781	1812	- - -
						X_T		0.436	0.433	0.432	0.471	0.533	0.589	0.616	0.647	0.686	0.732	- - -
18	374.7	14.75	203	8.00	SNC	Cv	48	233	549	530	1175	1433	1648	1824	1955	2053	2127	0.84
						Kv	41	202	475	459	1017	1240	1427	1578	1692	1777	1840	- - -
						X_T		0.50	0.52	0.52	0.52	0.52	0.53	0.54	0.56	0.58	0.60	- - -
			276	10.88	LNC	Cv	48	343	776	1194	1533	1791	1973	2094	2176	2240	2312	0.84
						Kv	41	297	671	1033	1327	1550	1707	1812	1883	1938	2001	- - -
						X_T		0.51	0.52	0.52	0.52	0.54	0.57	0.59	0.62	0.63	0.66	- - -
20x16	374.7	14.75	203	8.00	SNC	C_v	38	320	663	1001	1341	1685	1977	2211	2417	2590	2736	0.89
						K_v		277	574	865	1160	1457	1710	1912	2090	2241	2367	- - -
						X_T		0.436	0.433	0.432	0.432	0.432	0.451	0.493	0.541	0.570	0.589	- - -
			276	10.88	LNC	C_v	38	443	907	1372	1836	2171	2449	2675	2846	2964	3029	0.89
						K_v		383	785	1186	1588	1878	2119	2314	2462	2564	2620	- - -
						X_T		0.434	0.433	0.432	0.432	0.484	0.549	0.580	0.607	0.639	0.677	- - -
24x16	374.7	14.75	203	8.00	SNC	C_v	38	335	676	1019	1356	1698	1982	2219	2433	2620	2749	0.89
						K_v		290	585	881	1173	1469	1714	1919	2105	2266	2378	- - -
						X_T		0.435	0.433	0.432	0.432	0.432	0.457	0.495	0.539	0.563	0.575	- - -
			276	10.88	LNC	C_v	38	461	924	1387	1838	2176	2466	2707	2901	3045	3122	0.89
						K_v		399	799	1200	1590	1882	2133	2342	2509	2634	2701	- - -
						X_T		0.434	0.433	0.432	0.438	0.487	0.546	0.571	0.592	0.616	0.638	- - -
20	464	18.25	276	10.88	SNC	Cv	47	547	1123	1699	2128	2489	2776	2992	3135	3205	3214	0.89
						Kv		473	972	1470	1841	2153	2402	2588	2711	2773	2780	- - -
						X_T		0.434	0.433	0.432	0.494	0.567	0.604	0.637	0.677	0.726	0.784	- - -
			378	14.88	LNC	Cv	77	762	1544	2168	2634	2962	3158	3217	3217	3217	3217	0.89
						Kv		659	1335	1876	2278	2562	2731	2783	2783	2783	2783	- - -
						X_T		0.43	0.43	0.5	0.59	0.63	0.69	0.76	0.83	0.85	0.85	- - -

1. At 100% travel.
2. Clearance flow only

Valve Size, NPS	Port Diameter		Maximum Travel		Construction	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L(1)
	mm	Inches	mm	Inches			Min(2)	10	20	30	40	50	60	70	80	90	100	
24x20	464	18.25	276	10.88	SNC	Cv	70	481	987	1492	1923	2316	2673	2991	3271	3514	3720	0.89
						Kv	61	416	853	1291	1663	2004	2312	2587	2830	3040	3218	- - -
						X_T	- - -	0.53	0.53	0.52	0.57	0.57	0.58	0.6	0.62	0.65	0.67	- - -
			378	14.88	LNC	Cv	43	671	1358	2028	2614	3059	3369	3552	3708	3915	4187	0.89
						Kv	37	580	1174	1754	2261	2646	2914	3073	3207	3386	3622	- - -
						X_T	- - -	0.529	0.528	0.528	0.528	0.552	0.615	0.689	0.736	0.766	0.801	- - -
30	610	24	302	11.88	SN	C_V	55	684	1400	2118	2837	3555	4271	4687	5132	5519	5850	0.99
						K_V	48	592	1211	1832	2454	3075	3694	4054	4439	4774	5060	- - -
						X_T	- - -	0.6	0.6	0.6	0.6	0.57	0.54	0.58	0.59	0.61	0.63	- - -
			505	19.88	LN	C_V	55	1173	2370	3569	4544	5286	5873	6294	6559	6661	6661	0.99
						K_V	48	1015	2050	3087	3931	4572	5080	5444	5674	5762	5762	- - -
						X_T	- - -	0.6	0.6	0.57	0.57	0.6	0.63	0.67	0.72	0.78	0.78	- - -

1. At 100% travel.
2. Clearance flow only

Whisper Trim - Level A3 - Flow Up

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Constr-uction	Flow Coeffi-cient	Valve Opening—Percent of Total Travel											F_L(1)
	mm	Inches	mm	Inches			Min(2)	10	20	30	40	50	60	70	80	90	100	
12	279.4	11	140	5.5	SNC	Cv	17	123	253	381	508	617	719	813	901	978	1049	0.89
						Kv		106	219	330	439	534	622	703	779	846	907	---
						X_T		0.62	0.62	0.62	0.62	0.66	0.71	0.76	0.81	0.86	0.86	---
			203	8	LNC	Cv	17	181	371	550	705	839	960	1063	1149	1219	1272	0.89
						Kv		157	321	475	610	726	831	919	994	1055	1100	---
						X_T		0.619	0.620	0.638	0.700	0.769	0.851	0.856	0.854	0.852	0.850	---
14	279.4	11	140	5.5	SNC	Cv	17	123	253	381	509	630	748	863	978	1086	1192	0.89
						Kv		106	219	330	440	545	647	747	846	939	1031	---
						X_T		0.62	0.62	0.62	0.62	0.64	0.66	0.68	0.70	0.72	0.72	---
			203	8	LNC	Cv	17	181	371	554	731	896	1059	1212	1331	1410	1467	0.89
						Kv		157	321	479	632	775	916	1048	1152	1219	1269	---
						X_T		0.62	0.62	0.63	0.65	0.68	0.71	0.72	0.74	0.79	0.82	---
16x12	279.4	11	140	5.5	SNC	Cv	17	123	253	381	510	638	767	897	1029	1158	1287	0.89
						Kv		106	219	330	441	552	663	776	890	1002	1113	---
						X_T		0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	---
			203	8	LNC	Cv	17	181	371	557	748	934	1125	1311	1453	1537	1597	0.89
						Kv		157	321	482	647	808	973	1134	1256	1329	1381	---
						X_T		0.619	0.620	0.620	0.621	0.621	0.621	0.621	0.663	0.751	0.805	---
16	374.7	14.75	203	8.00	LNC	Cv	25	290	593	892	1178	1396	1590	1749	1880	1980	2049	0.89
						Kv		251	513	772	1019	1208	1375	1513	1626	1713	1772	- - -
						X_T		0.436	0.433	0.433	0.447	0.495	0.554	0.594	0.618	0.646	0.679	- - -
18	374.7	14.75	203	8.00	SNC	Cv	25	197	477	762	1041	1293	1506	1690	1838	1953	2043	0.84
						Kv	21	171	413	660	901	1119	1304	1462	1590	1690	1768	- - -
						X_T		0.49	0.52	0.52	0.52	0.51	0.52	0.53	0.55	0.56	0.58	- - -
			276	10.88	LNC	Cv	25	296	682	1062	1392	1654	1858	2002	2103	2174	2232	0.84
						Kv	21	256	590	919	1204	1432	1608	1732	1820	1881	1931	- - -
						X_T		0.50	0.52	0.52	0.52	0.53	0.55	0.57	0.60	0.61	0.63	- - -
20x16	374.7	14.75	203	8.00	SNC	C_v	25	290	593	892	1198	1495	1800	2032	2236	2416	2571	0.89
						K_v		251	513	772	1036	1293	1557	1758	1934	2089	2224	- - -
						X_T		0.436	0.433	0.432	0.432	0.432	0.432	0.460	0.498	0.541	0.569	- - -
			276	10.88	LNC	C_v	25	400	807	1223	1629	1994	2267	2503	2694	2844	2952	0.89
						K_v		346	698	1058	1409	1725	1961	2165	2330	2460	2554	- - -
						X_T		0.435	0.433	0.432	0.432	0.454	0.504	0.562	0.582	0.607	0.635	- - -
24x16	374.7	14.75	203	8.00	SNC	C_v	18	163	451	735	1025	1307	1597	1861	2075	2270	2425	0.89
						K_v		141	390	636	887	1131	1381	1610	1795	1964	2098	- - -
						X_T		0.440	0.434	0.433	0.432	0.432	0.432	0.441	0.471	0.505	0.537	- - -
			276	10.88	LNC	C_v	19	281	688	1103	1509	1895	2188	2449	2666	2849	2918	0.89
						K_v		243	595	954	1305	1639	1893	2118	2306	2464	2524	- - -
						X_T		0.437	0.433	0.432	0.432	0.445	0.489	0.542	0.567	0.585	0.594	- - -
20	464	18.25	276	10.88	SNC	Cv	31	470	976	1471	1912	2259	2555	2795	2980	3112	3189	0.89
						Kv		407	844	1272	1654	1954	2210	2418	2578	2692	2758	- - -
						X_T		0.435	0.433	0.432	0.461	0.517	0.583	0.607	0.635	0.669	0.710	- - -
			378	14.88	LNC	Cv	46	657	1337	1948	2407	2762	3014	3166	3216	3216	3216	0.89
						Kv		569	1157	1685	2082	2389	2607	2739	2781	2781	2781	- - -
						X_T		0.43	0.43	0.47	0.55	0.6	0.64	0.69	0.76	0.82	0.85	- - -

1. At 100% travel.
2. Clearance flow only

Valve Size, NPS	Port Diameter		Maximum Travel		Construction	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L[1]
	mm	Inches	mm	Inches			Min[2]	10	20	30	40	50	60	70	80	90	100	
24x20	464	18.25	276	10.88	SNC	C_V	42	414	857	1291	1702	2060	2394	2698	2973	3222	3440	0.89
						K_V	36	358	741	1117	1472	1782	2071	2334	2571	2787	2975	- - -
						X_T	- - -	0.53	0.53	0.52	0.54	0.56	0.57	0.59	0.6	0.62	0.64	- - -
			378	14.88	LNC	C_V	29	579	1177	1772	2323	2785	3135	3376	3537	3670	3830	0.89
						K_V	25	501	1018	1532	2010	2409	2711	2920	3060	3175	3313	- - -
						X_T	- - -	0.529	0.528	0.528	0.528	0.528	0.564	0.621	0.686	0.732	0.756	- - -
30	610	24	302	11.88	SN	C_V	50	594	1214	1833	2453	3073	3692	4312	4650	5043	5392	0.99
						K_V	43	514	1050	1586	2122	2658	3194	3730	4022	4362	4664	- - -
						X_T	- - -	0.6	0.6	0.6	0.6	0.6	0.56	0.54	0.58	0.59	0.61	- - -
			505	19.88	LN	C_V	50	1007	2050	3092	4215	4808	5413	5902	6270	6515	6642	0.99
						K_V	43	871	1773	2675	3568	4159	4682	5105	5424	5635	5745	- - -
						X_T	- - -	0.6	0.6	0.6	0.55	0.58	0.61	0.64	0.57	0.71	0.76	- - -

1. At 100% travel.
2. Clearance flow only

Whisper Trim - Level B1 - Flow Up

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Construction	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L(1)
	mm	Inches	mm	Inches			Min(2)	10	20	30	40	50	60	70	80	90	100	
12	279.4	11	140	5.5	SNC	Cv	21	79	157	238	311	384	464	537	597	659	721	0.89
						Kv		68	136	206	269	332	401	465	516	570	624	---
						X_T		0.62	0.62	0.62	0.62	0.62	0.62	0.64	0.66	0.68	0.71	---
			203	8	LNC	Cv	21	120	228	337	453	557	646	730	813	889	949	0.89
						Kv		104	197	291	392	482	559	631	703	769	821	---
						X_T		0.618	0.619	0.620	0.620	0.641	0.675	0.713	0.756	0.803	0.846	---
14	279.4	11	140	5.5	SNC	Cv	21	79	157	238	311	384	464	541	607	678	751	0.89
						Kv		68	136	206	269	332	401	468	525	586	650	---
						X_T		0.62	0.62	0.62	0.62	0.62	0.62	0.63	0.64	0.64	0.66	---
			203	8	LNC	Cv	21	120	228	337	453	562	663	761	863	962	1044	0.89
						Kv		104	197	292	392	486	573	658	747	832	903	---
						X_T		0.62	0.62	0.62	0.62	0.63	0.64	0.66	0.68	0.69	0.71	---
16x12	279.4	11	140	5.5	SNC	Cv	21	79	157	238	311	384	464	543	614	690	771	0.89
						Kv		68	136	206	269	332	401	470	531	597	667	---
						X_T		0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	---
			203	8	LNC	Cv	21	120	228	337	453	566	674	782	897	1011	1107	0.89
						Kv		104	197	291	392	489	583	676	776	875	958	---
						X_T		0.618	0.619	0.620	0.620	0.621	0.621	0.621	0.621	0.621	0.621	---
16	374.7	14.75	203	8.00	LNC	Cv	32	197	374	554	746	933	1111	1248	1385	1509	1603	0.89
						Kv		170	324	479	645	807	961	1080	1198	1305	1387	- - -
						X_T		0.438	0.435	0.433	0.433	0.432	0.432	0.461	0.493	0.528	0.56	- - -
18	374.7	14.75	203	8.00	SNC	Cv	36	133	299	470	651	823	990	1150	1304	1441	1559	0.84
						Kv	31	115	259	407	564	713	857	995	1128	1247	1349	- - -
						X_T		0.48	0.50	0.51	0.52	0.52	0.52	0.52	0.51	0.52	0.52	- - -
			276	10.88	LNC	Cv	36	188	432	656	900	1118	1327	1498	1658	1785	1895	0.84
						Kv	31	163	374	568	779	968	1149	1297	1435	1545	1640	- - -
						X_T		0.49	0.51	0.52	0.52	0.52	0.51	0.52	0.53	0.54	0.55	- - -
20x16	374.7	14.75	203	8.00	SNC	C_v	31	196	374	554	746	933	1111	1290	1480	1669	1827	0.89
						K_v		170	324	479	645	807	961	1116	1280	1444	1581	- - -
						X_T		0.438	0.435	0.433	0.433	0.432	0.432	0.432	0.431	0.431	0.431	- - -
			276	10.88	LNC	C_v	31	256	515	756	1016	1256	1517	1757	1974	2141	2307	0.89
						K_v		221	445	654	879	1087	1313	1520	1707	1852	1995	- - -
						X_T		0.437	0.434	0.433	0.432	0.432	0.432	0.432	0.451	0.480	0.514	- - -
24x16	374.7	14.75	203	8.00	SNC	C_v	31	196	374	554	746	933	1111	1290	1480	1669	1818	0.89
						K_v		170	324	479	645	807	961	1116	1280	1444	1573	- - -
						X_T		0.438	0.435	0.433	0.433	0.432	0.432	0.432	0.431	0.431	0.436	- - -
			276	10.88	LNC	C_v	31	255	515	755	1016	1255	1516	1756	1964	2137	2290	0.89
						K_v		221	445	653	879	1086	1311	1519	1699	1849	1981	- - -
						X_T		0.437	0.434	0.433	0.432	0.432	0.432	0.432	0.455	0.481	0.509	- - -
20	464	18.25	276	10.88	SNC	Cv	39	314	632	928	1247	1542	1824	2043	2260	2440	2614	0.89
						Kv		292	587	862	1159	1432	1724	1937	2151	2331	2508	- - -
						X_T		0.437	0.434	0.433	0.432	0.432	0.450	0.481	0.518	0.556	0.588	- - -
			378	14.88	LNC	Cv	61	437	855	1271	1688	2009	2298	2548	2756	2922	3051	0.89
						Kv		378	739	1100	1460	1738	1988	2204	2384	2528	2639	- - -
						X_T		0.43	0.43	0.43	0.43	0.48	0.52	0.58	0.6	0.63	0.65	- - -
24x20	464	18.25	276	10.88	SNC	C_v	56	276	555	815	1095	1354	1635	1835	2063	2262	2467	0.89
						K_v		239	480	705	948	1171	1414	1587	1784	1956	2134	- - -
						X_T		0.53	0.53	0.53	0.52	0.52	0.52	0.56	0.56	0.57	0.57	- - -
			378	14.88	LNC	C_v	36	385	754	1121	1486	1844	2191	2508	2783	3011	3196	0.89
						K_v		333	652	969	1285	1595	1895	2169	2407	2605	2765	- - -
						X_T		0.529	0.529	0.528	0.528	0.528	0.528	0.528	0.528	0.545	0.576	- - -

1. At 100% travel.
2. Clearance flow only

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Whisper Trim - Level B3 - Flow Up

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Construction	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L(1)
	mm	Inches	mm	Inches			Min(2)	10	20	30	40	50	60	70	80	90	100	
12	279.4	11	140	5.5	SNC	Cv	15	78	152	230	305	381	458	528	595	654	716	0.89
						Kv		67	131	199	264	330	396	457	515	566	619	---
						X_T		0.62	0.62	0.62	0.62	0.62	0.62	0.63	0.66	0.68	0.71	---
			203	8	LNC	Cv	15	114	222	336	445	550	641	728	808	883	942	0.89
						Kv		99	192	291	385	476	554	630	699	764	815	---
						X_T		0.617	0.619	0.62	0.62	0.639	0.674	0.712	0.754	0.799	0.841	---
14	279.4	11	140	5.5	SNC	Cv	15	78	152	230	305	381	458	531	605	673	745	0.89
						Kv		67	131	199	264	330	396	459	523	582	645	---
						X_T		0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.64	0.64	0.66	---
			203	8	LNC	Cv	15	114	222	336	445	555	657	759	858	954	1045	0.89
						Kv		99	192	291	385	480	568	657	742	826	904	---
						X_T		0.62	0.62	0.62	0.62	0.63	0.64	0.66	0.67	0.69	0.71	---
16x12	279.4	11	140	5.5	SNC	Cv	15	78	152	230	305	381	458	533	612	685	765	0.89
						Kv		67	131	199	264	330	396	461	529	593	662	---
						X_T		0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	---
			203	8	LNC	Cv	15	114	222	336	445	558	668	780	891	1002	1114	0.89
						Kv		98	192	291	385	483	578	675	771	867	963	---
						X_T		0.617	0.619	0.620	0.620	0.621	0.621	0.621	0.621	0.621	0.621	---
16	374.7	14.75	203	8.00	LNC	Cv	21	178	349	528	700	878	1052	1201	1331	1451	1555	0.89
						Kv		154	302	457	606	759	910	1039	1151	1255	1345	- - -
						X_T		0.439	0.435	0.433	0.433	0.432	0.432	0.452	0.48	0.511	0.543	- - -
18	374.7	14.75	203	8.00	SNC	Cv	17	118	278	447	607	776	936	1101	1243	1380	1500	0.84
						Kv	15	102	240	387	525	672	810	953	1075	1194	1298	- - -
						X_T		0.48	0.50	0.51	0.52	0.52	0.52	0.52	0.51	0.52	0.52	- - -
			276	10.88	LNC	Cv	17	173	397	622	846	1070	1282	1445	1600	1734	1846	0.84
						Kv	15	150	344	538	732	926	1110	1250	1385	1500	1597	- - -
						X_T		0.49	0.51	0.52	0.52	0.52	0.51	0.52	0.52	0.53	0.55	- - -
20x16	374.7	14.75	203	8.00	SNC	C_v	21	178	349	528	701	878	1052	1228	1404	1578	1756	0.89
						K_v		154	302	457	606	760	910	1062	1215	1365	1519	- - -
						X_T		0.439	0.435	0.433	0.433	0.432	0.432	0.432	0.431	0.431	0.431	- - -
			276	10.88	LNC	C_v	21	236	475	714	954	1194	1434	1674	1896	2070	2229	0.89
						K_v		204	411	618	825	1032	1240	1448	1640	1791	1928	- - -
						X_T		0.437	0.434	0.433	0.432	0.432	0.432	0.432	0.439	0.467	0.497	- - -
24x16	374.7	14.75	203	8.00	SNC	C_v	21	178	349	528	701	878	1052	1228	1404	1578	1744	0.89
						K_v		154	302	457	606	759	910	1062	1214	1365	1509	- - -
						X_T		0.439	0.435	0.433	0.433	0.432	0.432	0.432	0.431	0.431	0.431	- - -
			276	10.88	LNC	C_v	21	236	475	714	953	1193	1433	1673	1886	2064	2217	0.89
						K_v		204	411	618	824	1032	1240	1447	1631	1785	1918	- - -
						X_T		0.437	0.434	0.433	0.432	0.432	0.432	0.432	0.444	0.470	0.495	- - -
20	464	18.25	276	10.88	SNC	Cv	26	292	588	884	1181	1478	1756	1982	2190	2378	2547	0.89
						Kv		252	508	765	1021	1278	1519	1715	1894	2057	2203	- - -
						X_T		0.437	0.434	0.433	0.432	0.432	0.441	0.471	0.505	0.542	0.582	- - -
			378	14.88	LNC	Cv	37	403	812	1213	1616	1951	2232	2477	2690	2866	3003	0.89
						Kv		348	702	1049	1398	1687	1931	2142	2327	2479	2598	- - -
						X_T		0.44	0.43	0.43	0.43	0.47	0.51	0.56	0.6	0.62	0.64	- - -

1. At 100% travel.
2. Clearance flow only

Valve Size, NPS	Port Diameter		Maximum Travel		Constr-uction	Flow Coeffi-cient	Valve Opening—Percent of Total Travel											F_L(1)
	mm	Inches	mm	Inches			Min(2)	10	20	30	40	50	60	70	80	90	100	
24x20	464	18.25	276	10.88	SNC	C_v	34	257	516	776	1037	1297	1558	1773	1988	2192	2386	0.89
						K_v		222	447	671	897	1122	1348	1534	1719	1896	2064	- - -
						X_T		0.53	0.53	0.53	0.52	0.52	0.52	0.55	0.56	0.56	0.57	- - -
			378	14.88	LNC	C_v	25	354	716	1070	1423	1778	2110	2416	2695	2933	3127	0.89
						K_v		*307*	*620*	*925*	*1231*	*1538*	*1825*	*2090*	*2331*	*2537*	*2705*	- - -
						X_T		0.529	0.529	0.528	0.528	0.528	0.528	0.528	0.528	0.534	0.562	- - -

1. At 100% travel.
2. Clearance flow only

Whisper Trim - Level C1 - Flow Up

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Construction	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L(1)
	mm	Inches	mm	Inches			Min(2)	10	20	30	40	50	60	70	80	90	100	
12	279.4	11	140	5.5	SNC	Cv	18	61	103	159	206	253	308	351	404	454	497	0.89
						Kv		53	89	138	178	219	266	304	349	393	430	---
						X_T		0.61	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	---
			203	8	LNC	Cv	18	84	153	222	293	368	444	512	571	628	688	0.89
						Kv		73	132	192	253	318	384	443	494	543	595	---
						X_T		0.616	0.619	0.620	0.620	0.620	0.621	0.627	0.647	0.670	0.695	---
14	279.4	11	140	5.5	SNC	Cv	18	61	103	159	206	253	308	351	404	454	498	0.89
						Kv		53	89	138	178	219	266	304	349	393	430	---
						X_T		0.61	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	---
			203	8	LNC	Cv	18	84	153	222	293	368	444	514	578	642	711	0.89
						Kv		73	132	192	253	318	384	444	500	556	615	---
						X_T		0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.63	0.64	0.65	---
16x12	279.4	11	140	5.5	SNC	Cv	18	61	103	159	206	253	308	351	404	454	498	0.89
						Kv		53	89	138	178	219	266	304	349	393	431	---
						X_T		0.61	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	---
			203	8	LNC	Cv	18	84	153	222	293	368	444	515	583	652	727	0.89
						Kv		73	133	192	253	318	384	445	504	564	629	---
						X_T		0.616	0.619	0.620	0.620	0.620	0.621	0.621	0.621	0.621	0.621	---
16	374.7	14.75	203	8.00	LNC	Cv	27	131	244	351	460	577	696	811	919	1026	1132	0.89
						Kv		113	211	304	398	499	602	702	795	887	979	- - -
						X_T		0.442	0.436	0.434	0.433	0.433	0.432	0.432	0.432	0.431	0.439	- - -
18	374.7	14.75	203	8.00	SNC	Cv	28	84	196	300	400	504	615	727	833	934	1038	0.84
						Kv	24	72	169	259	346	436	532	629	721	809	898	- - -
						X_T		0.47	0.49	0.50	0.51	0.52	0.52	0.52	0.52	0.52	0.52	- - -
			276	10.88	LNC	Cv	28	118	268	417	559	699	840	988	1131	1260	1374	0.84
						Kv	24	102	232	361	484	605	726	855	979	1090	1189	- - -
						Xt		0.48	0.50	0.51	0.52	0.52	0.52	0.52	0.52	0.51	0.51	- - -
20x16	374.7	14.75	203	8.00	SNC	C_v	27	131	244	351	459	577	696	811	919	1026	1142	0.89
						K_v		113	211	303	397	499	602	701	795	888	987	- - -
						X_T		0.442	0.436	0.434	0.433	0.433	0.432	0.432	0.432	0.431	0.431	- - -
			276	10.88	LNC	C_v	27	161	318	478	637	787	936	1088	1247	1407	1562	0.89
						K_v		139	275	414	551	681	810	941	1079	1217	1351	- - -
						X_T		0.440	0.435	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.431	- - -
24x16	374.7	14.75	203	8.00	SNC	C_v	27	131	244	351	459	577	696	811	919	1026	1142	0.89
						K_v		113	211	304	397	499	602	702	795	887	988	- - -
						X_T		0.442	0.436	0.434	0.433	0.433	0.432	0.432	0.432	0.431	0.431	- - -
			276	10.88	LNC	C_v	27	161	318	478	636	787	936	1087	1246	1406	1562	0.89
						K_v		139	275	413	550	681	810	940	1078	1216	1351	- - -
						X_T		0.440	0.435	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.431	- - -
20	464	18.25	276	10.88	SNC	Cv	33	199	393	591	787	972	1156	1344	1541	1726	1875	0.89
						Kv		172	340	511	680	841	1000	1162	1333	1493	1622	- - -
						Xt		0.440	0.435	0.434	0.433	0.432	0.432	0.432	0.432	0.438	0.457	- - -
			378	14.88	LNC	Cv	51	272	531	791	1055	1320	1585	1814	2012	2194	2358	0.89
						Kv		235	459	685	912	1141	1371	1569	1740	1898	2040	- - -
						X_T		0.44	0.43	0.43	0.43	0.43	0.43	0.45	0.48	0.51	0.54	- - -

1. At 100% travel.
2. Clearance flow only

Valve Size, NPS	Port Diameter		Maximum Travel		Constr-uction	Flow Coeffi-cient	Valve Opening—Percent of Total Travel											F_L[1]
	mm	Inches	mm	Inches			Min[2]	10	20	30	40	50	60	70	80	90	100	
24x20	464	18.25	276	10.88	SNC	C_v	46	175	345	519	691	854	1015	1180	1353	1526	1666	0.89
						K_v		152	299	449	598	738	878	1021	1170	1320	1441	- - -
						X_T		0.53	0.53	0.53	0.53	0.52	0.52	0.52	0.52	0.52	0.54	- - -
			378	14.88	LNC	C_v	31	238	469	700	932	1165	1398	1628	1853	2069	2272	0.89
						K_v		*206*	*405*	*605*	*806*	*1008*	*1209*	*1409*	*1603*	*1790*	*1965*	- - -
						X_T		0.530	0.529	0.529	0.528	0.528	0.528	0.528	0.528	0.528	0.528	- - -

1. At 100% travel.
2. Clearance flow only

Whisper Trim - Level C3 - Flow Up

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Constr-uction	Flow Coeffi-cient	Valve Opening—Percent of Total Travel											F_L(1)
	mm	Inches	mm	Inches			Min(2)	10	20	30	40	50	60	70	80	90	100	
12	279.4	11	140	5.5	SNC	Cv	14	52	99	144	191	241	289	334	380	430	479	0.89
						Kv		45	86	125	165	208	250	289	329	372	414	---
						X_T		0.61	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	---
			203	8	LNC	Cv	14	73	143	209	281	349	418	490	548	607	651	0.89
						Kv		63	124	181	243	302	362	424	474	525	563	---
						X_T		0.615	0.618	0.619	0.620	0.620	0.621	0.620	0.639	0.662	0.680	---
14	279.4	11	140	5.5	SNC	Cv	14	52	99	144	191	241	289	334	380	430	479	0.89
						Kv		45	86	125	165	208	250	289	329	372	414	---
						X_T		0.61	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	---
			203	8	LNC	Cv	14	73	143	209	282	349	418	490	553	619	679	0.89
						Kv		63	124	181	244	302	362	424	478	535	587	---
						X_T		0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.63	0.64	0.64	---
16x12	279.4	11	140	5.5	SNC	Cv	14	52	99	144	191	241	289	334	380	430	479	0.89
						Kv		45	86	125	165	208	250	289	329	372	414	---
						X_T		0.61	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	---
			203	8	LNC	Cv	14	73	143	209	282	349	418	490	556	627	697	0.89
						Kv		63	124	181	243	302	361	424	481	542	603	---
						X_T		0.615	0.618	0.619	0.620	0.620	0.621	0.621	0.621	0.621	0.621	---
16	374.7	14.75	203	8.00	LNC	Cv	20	116	226	339	456	564	681	794	904	1023	1120	0.89
						Kv		100	195	293	394	488	589	687	782	885	969	- - -
						X_T		0.444	0.437	0.435	0.433	0.433	0.432	0.432	0.432	0.431	0.437	- - -
18	374.7	14.75	203	8.00	SNC	Cv	15	76	182	292	394	503	610	713	825	927	1036	0.84
						Kv	13	66	157	253	341	435	528	617	714	802	897	- - -
						X_T		0.47	0.49	0.50	0.51	0.52	0.52	0.52	0.52	0.52	0.52	- - -
			276	10.88	LNC	Cv	14	112	261	405	546	696	839	981	1125	1248	1366	0.84
						Kv	12	97	226	351	473	602	726	849	973	1080	1182	- - -
						X_T		0.48	0.50	0.51	0.52	0.52	0.52	0.52	0.52	0.51	0.51	- - -
20x16	374.7	14.75	203	8.00	SNC	C_v	19	116	235	344	458	574	682	800	912	1023	1141	0.89
						K_v		100	203	298	396	497	590	692	789	885	987	- - -
						X_T		0.443	0.437	0.434	0.433	0.433	0.432	0.432	0.432	0.431	0.431	- - -
			276	10.88	LNC	C_v	19	161	311	471	623	776	935	1085	1240	1398	1547	0.89
						K_v		139	269	408	539	671	809	939	1073	1209	1338	- - -
						X_T		0.440	0.435	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.431	- - -
24x16	374.7	14.75	203	8.00	SNC	C_v	19	116	235	344	458	574	682	800	912	1023	1127	0.89
						K_v		100	203	298	396	497	590	692	789	885	975	- - -
						X_T		0.443	0.437	0.434	0.433	0.433	0.432	0.432	0.432	0.431	0.431	- - -
			276	10.88	LNC	C_v	19	161	311	471	623	775	935	1085	1239	1398	1532	0.89
						K_v		139	269	407	539	670	809	939	1072	1209	1325	- - -
						X_T		0.440	0.435	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.431	- - -
20	464	18.25	276	10.88	SNC	Cv	24	194	375	568	752	935	1127	1309	1495	1686	1826	0.89
						Kv		168	325	491	650	809	975	1132	1293	1458	1579	- - -
						X_T		0.440	0.435	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.450	- - -
			378	14.88	LNC	Cv	32	264	518	770	1023	1279	1538	1772	1965	2144	2309	0.89
						Kv		229	448	666	885	1107	1330	1533	1700	1854	1997	- - -
						X_T		0.44	0.43	0.43	0.43	0.43	0.43	0.44	0.47	0.5	0.53	- - -

1. At 100% travel.
2. Clearance flow only

Valve Size, NPS	**Port Diameter**		**Maximum Travel**		**Constr-uction**	**Flow Coeffi-cient**	**Valve Opening—Percent of Total Travel**											**F_L(1)**
	mm	**Inches**	**mm**	**Inches**			**Min(2)**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**	
24x20	464	18.25	276	10.88	SNC	C_v	30	171	330	499	660	821	990	1149	1313	1480	1638	0.89
						K_v		148	285	431	571	710	856	994	1135	1280	1417	- - -
						X_T		0.53	0.53	0.53	0.53	0.52	0.52	0.52	0.52	0.52	0.52	- - -
			378	14.88	LNC	C_v	23	231	458	681	904	1130	1358	1582	1800	2009	2210	0.89
						K_v		*199*	*396*	*589*	*782*	*978*	*1174*	*1369*	*1557*	*1738*	*1912*	- - -
						X_T		0.530	0.529	0.529	0.528	0.528	0.528	0.528	0.528	0.528	0.528	- - -

1. At 100% travel.
2. Clearance flow only

Whisper Trim - Level D3 - Flow Up

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Constr-uction	Flow Coeffi-cient	Valve Opening—Percent of Total Travel											F_L(1)
	mm	Inches	mm	Inches			Min(2)	10	20	30	40	50	60	70	80	90	100	
12	254	10	203	8	LNC	Cv	12	67	132	192	259	321	384	445	496	549	594	0.89
						Kv		58	114	166	224	278	332	385	429	475	514	---
						X_T		0.615	0.618	0.619	0.620	0.620	0.621	0.636	0.658	0.685	0.710	---
14	254	10	203	8	LNC	Cv	12	67	132	192	259	321	384	449	505	566	622	
						Kv		58	114	166	224	278	332	388	437	489	538	---
						X_T		0.62	0.62	0.62	0.62	0.62	0.62	0.63	0.64	0.65	0.66	---
16x12	254	10	203	8	LNC	Cv	12	67	132	192	259	321	384	451	511	577	641	0.89
						Kv		58	114	166	224	278	332	390	442	499	554	---
						X_T		0.615	0.618	0.619	0.620	0.620	0.621	0.621	0.621	0.621	0.621	---
16	374.7	14.75	203	8.00	LNC	Cv	20	116	226	339	456	564	681	794	904	1023	1120	0.89
						Kv		100	195	293	394	488	589	687	782	885	969	- - -
						X_T		0.444	0.437	0.435	0.433	0.433	0.432	0.432	0.432	0.431	0.437	- - -
18	374.7	14.75	203	8.00	SNC	Cv	15	76	182	292	394	503	610	713	825	927	1036	0.84
						Kv	13	66	157	253	341	435	528	617	714	802	897	- - -
						X_T		0.47	0.49	0.50	0.51	0.52	0.52	0.52	0.52	0.52	0.52	- - -
			276	10.88	LNC	Cv	14	112	261	405	546	696	839	981	1125	1248	1366	0.84
						Kv	12	97	226	351	473	602	726	849	973	1080	1182	- - -
						X_T		0.48	0.50	0.51	0.52	0.52	0.52	0.52	0.52	0.51	0.51	- - -
			378	14.88	LNC	Cv	14	168	363	562	762	963	1151	1318	1469	1605	1725	0.84
						Kv	12	145	315	486	660	833	996	1140	1271	1389	1493	- - -
						Xt		0.49	0.51	0.52	0.52	0.52	0.52	0.51	0.52	0.52	0.53	- - -
20x16	374.7	14.75	203	8.00	SNC	Cv	19	116	235	344	458	574	682	800	912	1023	1141	0.89
						Kv		100	203	298	396	497	590	692	789	885	987	- - -
						X_T		0.443	0.437	0.434	0.433	0.433	0.432	0.432	0.432	0.431	0.431	- - -
			276	10.88	LNC	Cv	19	161	311	471	623	776	935	1085	1240	1398	1547	0.89
						Kv		139	269	408	539	671	809	939	1073	1209	1338	- - -
						X_T		0.440	0.435	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.431	- - -
			378	14.88	LNC	Cv	19	220	430	639	849	1063	1277	1490	1700	1893	2046	0.89
						Kv		191	372	553	734	919	1105	1289	1470	1637	1769	- - -
						X_T		0.438	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.439	0.463	- - -
24x16	374.7	14.75	203	8.00	SNC	Cv	19	116	235	344	458	574	682	800	912	1023	1127	0.89
						Kv		100	203	298	396	497	590	692	789	885	975	- - -
						X_T		0.443	0.437	0.434	0.433	0.433	0.432	0.432	0.432	0.431	0.431	- - -
			276	10.88	LNC	Cv	19	161	311	471	623	775	935	1085	1239	1398	1532	0.89
						Kv		139	269	407	539	670	809	939	1072	1209	1325	- - -
						X_T		0.440	0.435	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.431	- - -
			378	14.88	LNC	Cv	19	220	430	639	849	1062	1276	1490	1700	1882	2027	0.89
						Kv		190	372	553	734	919	1104	1289	1471	1628	1753	- - -
						X_T		0.438	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.444	0.464	- - -
20	464	18.25	276	10.88	SNC	Cv	24	194	375	568	752	935	1127	1309	1495	1686	1826	0.89
						Kv		168	325	491	650	809	975	1132	1293	1458	1579	- - -
						X_T		0.440	0.435	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.450	- - -
			378	14.88	LNC	Cv	32	264	518	770	1023	1279	1538	1772	1965	2144	2309	0.89
						Kv		229	448	666	885	1107	1330	1533	1700	1854	1997	- - -
						X_T		0.44	0.43	0.43	0.43	0.43	0.43	0.44	0.47	0.5	0.53	- - -

1. At 100% travel.
2. Clearance flow only

Valve Size, NPS	Port Diameter		Maximum Travel		Constr-uction	Flow Coeffi-cient	Valve Opening—Percent of Total Travel											F_L(1)
	mm	Inches	mm	Inches			Min(2)	10	20	30	40	50	60	70	80	90	100	
24x20	464	18.25	276	10.88	SNC	Cv	30	171	330	499	660	821	990	1149	1313	1480	1638	0.89
						Kv		148	285	431	571	710	856	994	1135	1280	1417	- - -
						X_T		0.53	0.53	0.53	0.53	0.52	0.52	0.52	0.52	0.52	0.52	- - -
			378	14.88	LNC	Cv	23	231	458	681	904	1130	1358	1582	1800	2009	2210	0.89
						Kv		199	396	589	782	978	1174	1369	1557	1738	1912	- - -
						X_T		0.530	0.529	0.529	0.528	0.528	0.528	0.528	0.528	0.528	0.528	- - -
30	610	24	505	19.88	LN	Cv	35	400	792	1183	1575	1968	2362	2756	3150	3545	3939	0.99
						Kv		346	685	1023	1362	1702	2043	2384	2725	3066	3407	- - -
						X_T		0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.57	0.55	- - -

1. At 100% travel.
2. Clearance flow only

WhisperFlo Trim - Level X - Flow Up

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Construction	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L(1)
	mm	Inches	mm	Inches			Min(2)	10	20	30	40	50	60	70	80	90	100	
12	279.4	11	140	5.5	SNC	Cv	62.2	92	180	274	366	454	538	616	689	757	820	
						X_T	0.53	0.71	0.7	0.69	0.68	0.68	0.69	0.69	0.7	0.71	0.73	---
			203	8	LNC	Cv	62.2	128	257	382	508	633	728	820	901	978	1019	0.89
						X_T	0.886	0.886	0.777	0.799	0.737	0.688	0.727	0.776	0.734	0.721	0.758	---
14	279.4	11	140	5.5	SNC	Cv	62.2	92	180	276	370	461	549	633	714	791	863	
						X_T	0.53	0.71	0.70	0.69	0.68	0.67	0.68	0.67	0.68	0.68	0.69	---
			203	8	LNC	Cv	62.2	126	258	386	517	642	762	866	961	1049	1113	
						X_T	0.69	0.69	0.66	0.69	0.66	0.65	0.66	0.71	0.70	0.70	0.73	---
16x12	279.4	11	140	5.5	SNC	Cv	62.2	92	180	277	372	465	556	645	730	813	892	
						X_T	0.53	0.71	0.7	0.69	0.68	0.67	0.67	0.66	0.66	0.66	0.66	---
			203	8	LNC	Cv	62.2	124	258	388	523	648	784	896	1001	1096	1175	
						X_T	0.556	0.556	0.58	0.614	0.612	0.629	0.615	0.665	0.678	0.691	0.719	---
16	374.7	14.75	203	8.00	LNC	Cv	60.2	170	358	541	720	890	1052	1205	1348	1481	1604	---
						X_T	0.534	0.711	0.697	0.688	0.684	0.684	0.687	0.694	0.703	0.715	0.729	---
18	374.7	14.75	203	8.00	SNC	Cv	60.2	178	373	550	745	923	1110	1267	1419	1544	1661	---
						X_T	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	---
			276	10.88	LNC	Cv	60.2	248	513	781	1049	1284	1491	1666	1811	1927	2017	---
						X_T	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	---
			378	14.88	LNC	Cv	60.2	348	717	1080	1385	1638	1838	1983	2086	2159	2214	---
						X_T	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	---
20x16	374.7	14.75	203	8.00	SNC	Cv	60.2	170	359	546	731	912	1089	1260	1427	1587	1741	---
						X_T	0.534	0.713	0.699	0.687	0.677	0.669	0.663	0.659	0.656	0.655	0.654	---
			276	10.88	LNC	Cv	60.2	238	494	745	990	1226	1452	1667	1870	2061	2240	---
						X_T	0.534	0.708	0.690	0.676	0.666	0.659	0.656	0.654	0.655	0.658	0.662	---
			378	14.88	LNC	Cv	60.2	332	679	1015	1339	1633	1911	2165	2397	2606	2793	---
						X_T	0.534	0.701	0.679	0.665	0.657	0.654	0.656	0.660	0.667	0.676	0.686	---
24x16	374.7	14.75	203	8.00	SNC	Cv	60.2	170	360	548	735	921	1104	1285	1462	1636	1807	---
						X_T	0.534	0.716	0.703	0.692	0.682	0.673	0.665	0.658	0.652	0.647	0.642	---
			276	10.88	LNC	Cv	60.2	238	495	750	1001	1248	1490	1725	1953	2173	2385	---
						X_T	0.534	0.711	0.695	0.681	0.669	0.659	0.651	0.644	0.639	0.635	0.632	---
			378	14.88	LNC	Cv	60.2	333	683	1027	1363	1687	1999	2296	2578	2843	3092	---
						X_T	0.534	0.705	0.685	0.668	0.655	0.645	0.638	0.633	0.630	0.628	0.628	---
20	464	18.25	276	10.88	SNC	Cv	86.5	286	592	891	1179	1453	1712	1954	2179	2386	2576	- - -
						X_T	0.534	0.708	0.694	0.685	0.682	0.683	0.688	0.696	0.708	0.722	0.738	- - -
			378	14.88	LNC	Cv	86.5	399	813	1208	1577	1917	2223	2497	2740	2954	3141	- - -
						X_T	0.534	0.702	0.687	0.682	0.685	0.695	0.711	0.731	0.755	0.781	0.809	- - -
24x20	464	18.25	276	10.88	SNC	Cv	86.5	286	595	900	1200	1493	1779	2056	2322	2578	2823	- - -
						X_T	0.534	0.710	0.695	0.683	0.673	0.665	0.659	0.656	0.654	0.653	0.654	- - -
			378	14.88	LNC	Cv	86.5	400	820	1231	1630	2012	2376	2720	3043	3343	3622	- - -
						X_T	0.534	0.704	0.686	0.672	0.662	0.656	0.653	0.653	0.655	0.659	0.665	- - -

1. At 100% travel.
2. Clearance flow only

WhisperFlo Trim - Level Y - Flow Up

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Constr-uction	Flow Coeffi-cient	Valve Opening—Percent of Total Travel											F_L(1)
	mm	Inches	mm	Inches			Min(2)	10	20	30	40	50	60	70	80	90	100	
12	279.4	11	140	5.5	SNC	Cv	35	55	109	168	225	282	338	392	445	496	546	0.89
						X_T	0.53	0.56	0.55	0.55	0.54	0.54	0.54	0.54	0.54	0.54	0.55	---
			203	8	LNC	Cv	35	90	180	270	360	450	540	630	720	810	900	0.89
						X_T	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	---
14	279.4	11	140	5.5	SNC	Cv	35	55	109	168	226	284	340	396	452	505	558	
						X_T	0.53	0.56	0.56	0.55	0.54	0.54	0.54	0.53	0.53	0.53	0.54	---
			203	8	LNC	Cv	35	90	180	270	360	450	540	630	720	810	900	
						X_T	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	---
16x12	279.4	11	140	5.5	SNC	Cv	35	55	109	168	227	285	342	399	456	511	566	
						X_T	0.53	0.56	0.56	0.55	0.54	0.54	0.54	0.53	0.53	0.53	0.53	---
			203	8	LNC	Cv	35	90	180	270	360	450	540	630	720	810	900	
						X_T	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	---
16	374.7	14.75	203	8.00	LNC	Cv	53.4	124	258	392	525	654	779	901	1018	1130	1238	---
						X_T	0.534	0.616	0.607	0.600	0.596	0.594	0.593	0.594	0.598	0.602	0.608	---
18	374.7	14.75	203	8.00	SNC	Cv	53.4	113	239	365	491	617	744	870	998	1113	1223	---
						X_T	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	---
			276	10.88	LNC	Cv	53.4	164	342	519	697	875	1053	1213	1360	1494	1614	---
						X_T	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	---
			378	14.88	LNC	Cv	53.4	229	473	716	957	1188	1389	1565	1715	1840	1941	---
						X_T	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	---
20x16	374.7	14.75	203	8.00	SNC	Cv	53.4	124	259	394	529	662	794	923	1051	1176	1298	---
						X_T	0.534	0.617	0.608	0.601	0.594	0.588	0.584	0.580	0.577	0.575	0.573	---
			276	10.88	LNC	Cv	53.4	171	356	539	720	897	1070	1239	1402	1560	1712	---
						X_T	0.534	0.614	0.603	0.594	0.586	0.581	0.577	0.574	0.573	0.573	0.574	---
			378	14.88	LNC	Cv	53.4	239	491	738	979	1212	1435	1648	1849	2038	2216	---
						X_T	0.534	0.609	0.596	0.586	0.579	0.574	0.573	0.573	0.575	0.579	0.585	---
24x16	374.7	14.75	203	8.00	SNC	Cv	53.4	125	259	395	531	666	800	933	1065	1195	1324	---
						X_T	0.534	0.619	0.611	0.604	0.598	0.592	0.587	0.582	0.578	0.574	0.570	---
			276	10.88	LNC	Cv	53.4	171	357	541	724	906	1085	1262	1436	1607	1774	---
						X_T	0.534	0.616	0.606	0.597	0.590	0.583	0.577	0.572	0.568	0.564	0.561	---
			378	14.88	LNC	Cv	53.4	240	492	743	991	1234	1472	1703	1928	2146	2356	---
						X_T	0.534	0.612	0.600	0.589	0.580	0.573	0.567	0.562	0.559	0.556	0.555	---
20	464	18.25	276	10.88	SNC	Cv	77.3	198	405	612	816	1016	1210	1397	1577	1750	1915	- - -
						X_T	0.534	0.576	0.568	0.562	0.559	0.557	0.557	0.559	0.562	0.567	0.574	- - -
			378	14.88	LNC	Cv	77.3	272	558	837	1108	1367	1614	1849	2063	2265	2452	- - -
						X_T	0.534	0.573	0.564	0.558	0.557	0.559	0.563	0.571	0.581	0.593	0.607	- - -
24x20	464	18.25	276	10.88	SNC	Cv	77.3	198	406	615	823	1029	1232	1433	1629	1822	2010	- - -
						X_T	0.534	0.577	0.569	0.562	0.556	0.552	0.548	0.544	0.542	0.540	0.539	- - -
			378	14.88	LNC	Cv	77.3	272	560	845	1125	1401	1669	1931	2183	2427	2662	- - -
						X_T	0.534	0.574	0.564	0.556	0.550	0.545	0.542	0.540	0.539	0.540	0.541	- - -

1. At 100% travel.
2. Clearance flow only

WhisperFlo Trim - Level Z - Flow Up

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Constr-uction	Flow Coeffi-cient	Valve Opening—Percent of Total Travel											F_L[1]
	mm	Inches	mm	Inches			Min[2]	10	20	30	40	50	60	70	80	90	100	
12	279.4	11	140	5.5	SNC	Cv	21	42	80	119	160	202	242	282	322	361	399	
						X_T	0.53	0.44	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	---
			203	8	LNC	Cv	21	55	110	165	220	275	330	385	440	495	550	0.89
						X_T	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	---
14	279.4	11	140	5.5	SNC	Cv	21	42	80	119	161	202	243	284	324	364	404	
						X_T	0.53	0.44	0.44	0.43	0.43	0.43	0.43	0.42	0.42	0.42	0.42	---
			203	8	LNC	Cv	21	55	110	165	220	275	330	385	440	495	550	
						X_T	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	---
16x12	279.4	11	140	5.5	SNC	Cv	21	42	80	119	161	202	244	285	326	366	407	
						X_T	0.53	0.44	0.44	0.43	0.43	0.43	0.43	0.42	0.42	0.42	0.42	---
			203	8	LNC	Cv	21	55	110	165	220	275	330	385	440	495	550	
						X_T	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	---
16	374.7	14.75	203	8.00	LNC	Cv	48.1	91	179	273	366	458	548	638	725	811	895	---
						X_T	0.534	0.466	0.462	0.459	0.456	0.454	0.453	0.453	0.453	0.454	0.456	---
18	374.7	14.75	203	8	SNC	Cv	48.1	68	143	219	295	370	446	522	598	673	749	---
						X_T	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	---
			276	10.88	LNC	Cv	48.1	103	206	312	419	526	633	740	846	951	1059	---
						X_T	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	---
			378	14.88	LNC	Cv	48.1	137	281	429	576	721	868	1012	1150	1276	1394	---
						X_T	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	---
20x16	374.7	14.75	203	8.00	SNC	Cv	48.1	91	179	273	367	460	553	645	737	827	917	---
						X_T	0.534	0.467	0.463	0.459	0.456	0.453	0.450	0.448	0.446	0.445	0.444	---
			276	10.88	LNC	Cv	48.1	121	247	374	501	627	751	874	994	1113	1229	---
						X_T	0.534	0.465	0.460	0.456	0.452	0.449	0.446	0.444	0.443	0.442	0.442	---
			378	14.88	LNC	Cv	48.1	166	341	514	685	854	1019	1180	1336	1488	1634	---
						X_T	0.534	0.463	0.457	0.451	0.447	0.444	0.443	0.442	0.442	0.443	0.445	---
24x16	374.7	14.75	203	8.00	SNC	Cv	48.1	91	179	273	368	462	555	649	742	834	926	---
						X_T	0.534	0.468	0.464	0.461	0.458	0.455	0.453	0.450	0.448	0.446	0.444	---
			276	10.88	LNC	Cv	48.1	121	267	375	503	630	756	881	1006	1129	1251	---
						X_T	0.534	0.466	0.462	0.458	0.454	0.451	0.447	0.445	0.442	0.440	0.438	---
			378	14.88	LNC	Cv	48.1	166	341	516	689	861	1032	1200	1365	1528	1688	---
						X_T	0.534	0.465	0.459	0.454	0.449	0.445	0.442	0.439	0.437	0.435	0.434	---
20	464	18.25	276	10.88	SNC	Cv	71.8	148	288	437	585	731	875	1016	1155	1290	1422	- - -
						X_T	0.534	0.453	0.448	0.445	0.443	0.441	0.440	0.440	0.441	0.442	0.445	- - -
			378	14.88	LNC	Cv	71.8	200	403	607	808	1005	1196	1381	1560	1730	1894	- - -
						X_T	0.534	0.451	0.446	0.446	0.441	0.440	0.441	0.444	0.448	0.453	0.459	- - -
24x20	464	18.25	276	10.88	SNC	Cv	71.8	149	292	444	595	745	894	1042	1188	1333	1476	- - -
						X_T	0.534	0.453	0.449	0.446	0.442	0.440	0.437	0.435	0.433	0.432	0.431	- - -
			378	14.88	LNC	Cv	71.8	200	404	610	815	1018	1218	1416	1609	1800	1986	- - -
						X_T	0.534	0.452	0.442	0.442	0.438	0.435	0.433	0.431	0.430	0.430	0.430	- - -

1. At 100% travel.
2. Clearance flow only

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The Fisher® EDR valve has flow coefficients identical to the NPS 1 through 4 CL125 - 600 ED valve. Please refer to those coefficients. For additional EDR valve body information, refer to Bulletin 51.1:ED.

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Linear - Flow Down

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
8 & 10x8	177.8	7	76	3	C_V	105	212	332	458	578	689	788	878	954	1020	0.82
					K_V	90.8	183	287	396	500	596	682	759	825	882	- - -
					X_T	0.591	0.676	0.661	0.653	0.633	0.620	0.624	0.622	0.614	0.592	- - -
12 & 14x12	254.0	10	102	4	C_V	211	390	593	804	1010	1240	1460	1660	1830	1970	0.80
					K_V	183	337	513	695	874	1073	1263	1436	1583	1704	- - -
					X_T	0.443	0.652	0.669	0.664	0.671	0.653	0.662	0.669	0.658	0.629	- - -
Equal Percentage - Flow Down																**Equal Percentage Characteristic**
8 & 10x8	177.8	7	76	3	C_V	32.5	59.6	85.3	114	159	229	334	468	619	755	0.85
					K_V	28.1	51.6	73.8	98.6	138	198	289	405	535	653	- - -
					X_T	0.969	0.939	0.842	0.944	0.840	0.731	0.641	0.633	0.639	0.639	- - -
12 & 14x12	254.0	10	102	4	C_V	81.3	143	207	286	382	557	752	1000	1290	1570	0.82
					K_V	70.3	124	179	247	330	482	650	865	1116	1358	- - -
					X_T	0.689	0.581	0.579	0.557	0.606	0.582	0.647	0.644	0.616	0.596	- - -

1. At 100% travel.

Notes: The coefficients in this table are also appropriate for the EHT Valve.

Modified Equal Percentage - Flow Down

Modified Equal Percentage Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
8 & 10x8	177.8	7	89	3.5	C_V	38.3	70.2	103	145	216	324	495	684	844	912	0.85
					K_V	33.1	60.7	89.1	125	187	280	428	592	730	789	- - -
					X_T	0.946	0.891	0.910	0.835	0.744	0.669	0.669	0.664	0.668	0.667	- - -
12 & 14x12	254.0	10	114	4.5	C_V	95.9	156	229	313	487	710	988	1280	1610	1830	0.83
					K_V	83.0	135	198	271	421	614	855	1107	1393	1583	- - -
					X_T	0.579	0.607	0.561	0.618	0.577	0.617	0.576	0.620	0.610	0.611	- - -

1. At 100% travel.

Notes: The coefficients in this table are also appropriate for the EHT Valve.

Whisper Trim III - Flow Up

Linear Characteristic

Valve Size, NPS	Body Size, Inches	Port Diameter		Maximum Travel		Flow Coeff-icient	Valve Opening—Percent of Total Travel										Xt(1)
		mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	Xt(1)
A1	8 & 10	177.8	7	177.8	7	Cv	31	113	195	275	351	439	500	551	592	617	0.50
						Kv	26.82	97.75	168.68	237.88	303.62	379.74	432.5	476.62	512.08	533.71	
	12	254	10	184.15	7-1/4	Cv	32.8	147.2	258.8	365.6	465.6	559.4	650	743.8	837.5	915.6	0.65
						Kv	28.37	127.33	223.86	316.24	402.74	483.88	562.25	643.39	724.44	791.99	
A3	8 & 10	177.8	7	177.8	7	Cv	32.3	95.7	154	216	280.3	340	400	460	520	586.7	0.57
						Kv	27.94	82.78	133.21	186.84	242.46	294.1	346	397.9	449.8	507.5	
	12	254	10	184.15	7-1/4	Cv	73.3	191.5	301.5	418.2	530.3	648.5	760.6	878.8	990.9	1112.1	0.69
						Kv	63.4	165.65	260.8	361.74	458.71	560.95	657.92	760.16	857.13	961.97	
B1	8 & 10	177.8	7	177.8	7	Cv	36.1	71.8	117.9	168.9	219.6	270.4	321.1	371.4	421.4	471.4	0.50
						Kv	31.23	62.11	101.98	146.1	189.95	233.9	277.75	321.26	364.51	407.76	
	12	254	10	184.15	7-1/4	Cv	48.4	122.3	190.6	263.5	332.3	393.5	461.3	522.6	577.4	632.3	0.61
						Kv	41.87	105.79	164.87	227.93	287.44	340.38	399.02	452.05	499.45	546.94	
B3	8 & 10	177.8	7	177.8	7	Cv	22.2	59	92.7	129.7	163.7	196	234	267.3	300	340	0.57
						Kv	19.2	51.04	80.19	112.19	141.6	169.54	202.41	231.21	259.5	294.1	
	12	254	10	184.15	7-1/4	Cv	45.3	117.2	191.3	258.1	331.3	396.9	462.5	534.4	600	675	0.65
						Kv	39.18	101.38	165.47	223.26	286.57	343.32	400.06	462.26	519	583.88	
C1	8 & 10	177.8	7	177.8	7	Cv	25.8	61.6	96.8	132.3	165.9	202.5	236.9	272	301.8	325.1	0.49
						Kv	22.32	53.28	83.73	114.44	143.5	175.16	204.92	235.28	261.06	281.21	
	12	254	10	184.15	7-1/4	Cv	42.2	87.1	131.6	176.5	222.4	266.3	312.2	357.1	398	4312	0.55
						Kv	36.5	75.34	113.83	152.67	192.38	230.35	270.05	308.89	344.27	373.68	
C3	8 & 10	177.8	7	177.8	7	Cv	18.6	39.5	63.9	88.7	113.7	139.9	164.3	188.7	213.7	232	0.53
						Kv	16.09	34.17	55.27	76.73	98.35	121.01	142.12	163.23	184.85	200.68	
	12	254	10	184.15	7-1/4	Cv	33.9	76.8	124.2	173.2	219.4	263.9	311.3	354.8	400	416.1	0.61
						Kv	29.32	66.43	107.43	149.82	189.78	228.27	269.27	306.9	346	359.93	
D1	8(2) & 10(2)	177.8	7	177.8	7	Cv	24.9	34	45.2	54.4	80	111.5	145.2	183.7	213.7	243	0.46
						Kv	21.54	29.41	39.1	47.06	69.2	96.45	125.6	158.9	184.85	210.2	
	12(2)	254	10	184.15	7-1/4	Cv	26.6	39.3	49.7	61	83.1	130.3	173.4	223.1	264.1	299.7	0.53
						Kv	23.01	33.99	42.99	52.77	71.88	112.71	149.99	192.98	228.45	259.24	
D3	8(3) & 10(3)	177.8	7	177.8	7	Cv	9.7	11.5	13.6	15.9	22.2	42.6	64.9	87.9	111.7	124.1	0.50
						Kv	8.39	9.95	11.76	13.75	19.2	36.85	56.14	76.03	96.62	107.35	
	12	254	10	184.15	7-1/4	Cv	28.3	60.7	93.3	125.7	158	185	216.7	248.7	281.3	313.7	0.57
						Kv	24.48	52.51	80.7	108.73	136.67	160.03	187.45	215.13	243.32	271.35	

1. At maximum travel.
2. These cages are characterized for low flow in the first 40 percent of travel then exhibit in a linear characteristic.
3. These cages are characterized for low flow in the first 50 percent of travel then exhibit in a linear characteristic.

Notes: The coefficients on this page are also appropriate for the EHT Valve.

Linear - Flow Down

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
2 & 3 x 2	38.1	1.5	29	1.125	C_V	1.44	3.39	9.44	15.2	20.5	25.0	29.0	32.3	34.9	36.1	0.93
					K_V	1.25	2.93	8.17	13.1	17.7	21.6	25.1	27.9	30.2	31.2	- - -
					X_T	0.718	0.612	0.566	0.605	0.648	0.697	0.727	0.740	0.740	0.735	- - -
3 & 4 x 3	58.7	2.3125	38	1.5	C_V	2.77	13.2	31.0	47.4	59.7	68.7	75.5	80.6	83.9	85.9	0.95
					K_V	2.40	11.4	26.8	41.0	51.6	59.4	65.3	69.7	72.6	74.3	- - -
					X_T	0.685	0.574	0.612	0.668	0.714	0.731	0.735	0.718	0.701	0.706	- - -
4 & 6 x 4	73.0	2.875	51	2	C_V	2.99	17.4	38.1	57.8	78.8	100	119	130	136	139	0.88
					K_V	2.59	15.1	33.0	50.0	68.2	86.5	103	112	118	120	- - -
					X_T	0.757	0.624	0.570	0.533	0.559	0.632	0.681	0.706	0.697	0.689	- - -
6 & 8 x 6	111.1	4.375	76	3	C_V	17.5	38.9	86.1	141	195	241	274	293	301	309	0.89
					K_V	15.1	33.6	74.5	122	169	208	237	253	260	267	- - -
					X_T	0.187	0.624	0.548	0.559	0.597	0.640	0.681	0.697	0.689	0.681	- - -
8 & 10x8	136.5	5.375	64	2.5	C_V	75.1	140	212	289	366	435	495	547	590	621	0.82
					K_V	65.0	121	183	250	317	376	428	473	510	537	- - -
					X_T	0.772	0.833	0.840	0.779	0.741	0.733	0.729	0.715	0.704	0.688	- - -
12 & 14x12	177.8	7	76	3	C_V	104	229	369	477	587	691	804	906	981	1030	0.81
					K_V	90.0	198	319	413	508	598	695	784	849	891	- - -
					X_T	0.406	0.476	0.478	0.523	0.543	0.561	0.552	0.547	0.558	0.584	- - -

Equal Percentage - Flow Down

Equal Percentage Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
2 & 3 x 2	38.1	1.5	22	0.875	C_V	1.25	1.36	2.47	4.14	6.33	9.48	13.8	18.7	23.1	27.0	0.93
					K_V	1.08	1.18	2.14	3.58	5.48	8.20	11.9	16.2	20.0	23.4	- - -
					X_T	0.766	0.761	0.608	0.589	0.601	0.601	0.593	0.605	0.660	0.735	- - -
3 & 4 x 3	58.7	2.3125	29	1.125	C_V	1.73	2.77	5.34	9.70	15.6	23.3	33.7	46.2	56.8	65.3	0.92
					K_V	1.50	2.40	4.62	8.39	13.5	20.2	29.2	40.0	49.1	56.5	- - -
					X_T	0.870	0.710	0.605	0.581	0.616	0.648	0.640	0.632	0.668	0.748	- - -
4 & 6 x 4	73.0	2.875	38	1.5	C_V	2.57	6.53	10.0	12.5	17.3	25.1	33.8	42.8	59.6	81.1	0.84
					K_V	2.22	5.65	8.65	10.8	15.0	21.7	29.2	37.0	51.6	70.2	- - -
					X_T	0.783	0.585	0.589	0.597	0.566	0.533	0.518	0.526	0.526	0.537	- - -
6 & 8 x 6	111.1	4.375	51	2	C_V	3.07	9.29	17.8	24.5	35.6	59.7	98.7	141	188	217	0.85
					K_V	2.66	8.04	15.4	21.2	30.8	51.6	85.4	122	163	188	- - -
					X_T	0.922	0.723	0.620	0.660	0.640	0.555	0.529	0.578	0.559	0.640	- - -
8 & 10x8	136.5	5.375	64	2.5	C_V	19.8	34.4	50.3	69.2	96.8	139	210	307	399	484	0.82
					K_V	17.1	29.8	43.5	59.9	83.7	120	182	266	345	419	- - -
					X_T	0.584	0.686	0.697	0.609	0.629	0.745	0.702	0.653	0.663	0.683	- - -
12 & 14x12	177.8	7	76	3	C_V	38.4	64.8	88.0	119	168	248	360	496	654	800	0.81
					K_V	33.2	56.1	76.1	103	145	215	311	429	566	692	- - -
					X_T	0.727	0.701	0.736	0.664	0.709	0.582	0.552	0.556	0.556	0.553	- - -

1. At 100% travel.

Notes: The coefficients on this page are also appropriate for the EHT Valve.

Modified Equal Percentage - Flow Down

Modified Equal Percentage Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L[1]
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
2 & 3 x 2	38.1	1.5	29	1.125	C_v	1.24	1.82	3.91	6.86	11.1	16.9	23.3	28.1	30.4	33.2	0.94
					K_v	1.07	1.57	3.38	5.93	9.60	14.6	20.2	24.3	26.3	28.7	- - -
					X_T	0.792	0.681	0.578	0.581	0.605	0.628	0.652	0.693	0.731	0.710	- - -
3 & 4 x 3	58.7	2.3125	38	1.5	C_v	1.94	4.28	9.66	18.1	29.9	45.4	60.5	68.9	74.7	80.9	0.96
					K_v	1.68	3.70	8.36	15.7	25.9	39.3	52.3	59.6	64.6	70.0	- - -
					X_T	0.805	0.640	0.593	0.624	0.668	0.672	0.677	0.753	0.779	0.710	- - -
4 & 6 x 4	73.0	2.875	51	2	C_v	2.99	9.01	12.7	19.6	30.3	44.5	65.8	96.3	114	126	0.90
					K_v	2.59	7.79	11.0	17.0	26.2	38.5	56.9	83.3	98.6	109	- - -
					X_T	0.681	0.578	0.593	0.559	0.526	0.518	0.544	0.597	0.693	0.693	- - -
6 & 8 x 6	111.1	4.375	76	3	C_v	5.82	16.2	30.6	59.8	115	185	234	254	278	293	0.88
					K_v	5.03	14.0	26.5	51.7	99.5	160	202	220	240	253	- - -
					X_T	0.806	0.677	0.624	0.574	0.559	0.597	0.664	0.723	0.706	0.689	- - -
8 & 10x8	136.5	5.375	76	3	C_v	22.9	41.9	61.9	86.4	140	225	334	451	537	584	0.85
					K_v	19.8	36.2	53.5	74.7	121	195	289	390	465	505	- - -
					X_T	0.563	0.698	0.726	0.739	0.734	0.691	0.666	0.682	0.734	0.740	- - -
12 & 14x12	177.8	7	89	3.5	C_v	42.4	73.7	104	147	223	351	523	717	899	1010	0.80
					K_v	36.7	63.8	90.0	127	193	304	452	620	778	874	- - -
					X_T	0.691	0.679	0.652	0.650	0.598	0.549	0.549	0.552	0.551	0.551	- - -

1. At 100% travel.

Notes: The coefficients on this page are also appropriate for the EHT Valve.

Whisper Trim III - Flow Up

Linear Characteristic

Valve Size, NPS	Body Size, Inches	Port Diameter		Maximum Travel		Flow Coeff-icient	Valve Opening—Percent of Total Travel										Xt(1)
		mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
A1	2	38.1	1-1/2	38.1	1-1/2	Cv	2.82	5.63	8.7	12.3	15.6	18.6	21.5	23.3	24.3	25.6	0.656
						Kv	2.44	4.87	7.53	10.64	13.49	16.09	18.6	20.15	21.02	22.16	
	3 & 4 x 3	58.7	2-5/16	38.1	1-1/2	Cv	5.43	10.7	16.9	23.7	30.6	36.1	41.7	45.4	47.4	49.4	0.632
						Kv	4.7	9.26	14.62	20.5	26.47	31.23	36.07	39.27	41	42.73	
	4 & 6 x 4	73	2-7/8	50.8	2	Cv	8.92	17.5	27.4	38.0	48.7	58.3	67.1	74.0	78.3	82.6	0.62
						Kv	7.72	15.14	23.70	32.87	42.13	50.43	58.04	64.01	67.73	71.45	
	6 & 8 x 6	111.1	4-3/8	76.2	3	Cv	19.90	39.2	60.8	82.8	105.0	123.0	142.0	155.0	162.0	169.0	0.64
						Kv	17.21	33.91	52.59	71.62	90.83	106.40	122.83	134.08	140.13	146.19	
	8 & 10	136.5	5-3/8	146	5-3/4	Cv	11.00	57.7	109.4	157.4	208.4	261.6	311.0	361.3	412.9	448.4	0.61
						Kv	9.52	49.91	94.63	136.15	180.27	226.28	269.02	312.52	357.16	387.87	
	12	177.8	7	177.8	7	Cv	31.00	112.5	193.9	275.7	356.8	439.3	521.4	600.0	675.0	721.4	0.50
						Kv	26.82	97.31	167.72	238.48	308.63	379.99	451.01	519.00	583.88	624.01	
A3	8 & 10	136.5	5-3/8	146	5-3/4	Cv	21.00	58.3	97.2	137.9	183.4	225.5	266.2	306.9	348.3	393.1	0.53
						Kv	18.17	50.43	84.08	119.28	158.64	195.06	230.26	265.47	301.28	340.03	
	12	177.8	7	177.8	7	Cv	41.00	116.0	187.0	264.0	343.3	413.3	490.0	563.3	640.0	720.0	0.57
						Kv	35.47	100.34	161.76	228.36	296.95	357.50	423.85	487.25	553.60	622.80	
B1	3 & 4 x 3	58.7	2-5/16	38.1	1-1/2	Cv	3.28	6.55	10.6	15.4	20.2	24.8	29.3	32.6	34.5	36.4	0.593
						Kv	2.84	5.67	9.17	13.32	17.47	21.45	25.34	28.2	29.84	31.49	
	4 & 6 x 4	73	2-7/8	50.8	2	Cv	7.15	14.1	20.9	27.3	34	41.6	48.9	54.2	56.7	59.6	0.551
						Kv	6.18	12.2	18.08	23.61	29.41	35.98	42.3	46.88	49.05	51.55	
	8 & 10	136.5	5-3/8	146	5-3/4	Cv	17.2	48.3	79	110	140.7	171.3	202.3	233	264	294.7	0.57
						Kv	14.88	41.78	68.34	95.15	121.71	148.17	174.99	201.55	228.36	254.92	
	12	177.8	7	177.8	7	Cv	36.1	71.8	117.9	168.9	219.6	270.4	321.1	371.4	421.4	471.4	0.5
						Kv	31.23	62.11	101.98	146.1	189.95	233.9	277.75	321.26	364.51	407.76	
B3	4 & 6 x 4	73	2-7/8	50.4	2	Cv	6.01	11.8	18.6	27	34.7	41.1	47.5	52.8	57	61.3	0.494
						Kv	5.2	10.21	16.09	23.36	30.02	35.55	41.09	45.67	49.31	53.02	
	6 & 8 x 6	111.1	4-3/8	76.2	3	Cv	15.3	30.4	47.2	64.2	81.7	96.3	111	121	126	131	0.578
						Kv	13.23	26.3	40.83	55.53	70.67	83.3	96.02	104.67	108.99	113.32	
	8 & 10	136.5	5-3/8	146	5-3/4	Cv	15.3	42.7	71.9	102.2	133	161.4	189.5	218	244.9	259.6	0.45
						Kv	13.23	36.94	62.19	88.4	115.05	139.61	163.92	188.57	211.84	224.55	
	12	177.8	7	177.8	7	Cv	35.7	85.3	134	182	230	278	326.3	373.3	420	470	0.57
						Kv	30.88	73.78	115.91	157.43	198.95	240.47	282.25	322.9	363.3	406.55	
C1	8 & 10	136.5	5-3/8	146	5-3/4	Cv	15.7	39.5	62.6	85.4	108.5	131	153.1	175.9	197.6	217	0.55
						Kv	13.58	34.17	54.15	73.87	93.85	113.32	132.43	152.15	170.92	187.71	
	12	177.8	7	177.8	7	Cv	21.5	55.7	89.3	123.6	157.1	191.1	225	258.6	292.9	326.4	0.5
						Kv	18.6	48.18	77.24	106.91	135.89	165.3	194.63	223.69	253.36	282.34	
C3	6 & 8 x 6	111.1	4-3/8	76.2	3	Cv	8.07	16.3	25.2	34.2	43.6	52.4	60.9	68	73.4	79.1	0.511
						Kv	6.98	14.1	21.8	29.58	37.71	45.33	52.68	58.82	63.49	68.42	
	8 & 10	136.5	5-3/8	146	5-3/4	Cv	11.8	28.4	45.3	63	81.3	98.6	116.6	134.9	152.2	160.9	0.53
						Kv	10.21	24.57	39.18	54.5	70.32	85.29	100.86	116.69	131.65	139.18	
	12	177.8	7	177.8	7	Cv	19.9	54.1	85.2	119.3	150.3	180	214.5	244.8	274.5	309.7	0.53
						Kv	17.21	46.8	73.7	103.19	130.01	155.7	185.54	211.75	237.44	267.89	

Whisper Trim III - Flow Up (cont.)

Linear Characteristic

Valve Size, NPS	Body Size, Inches	Port Diameter		Maximum Travel		Flow Coeff-icient	Valve Opening—Percent of Total Travel										Xt[1]
		mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
D1	8[2] & 10[2]	136.5	5-3/8	146	5-3/4	Cv	13.4	19.7	26	32.3	47.2	68.3	90.3	112.4	134.8	157.2	0.53
						Kv	11.59	17.04	22.49	27.94	40.83	59.08	78.11	97.23	116.6	135.98	
	12	177.8	7	177.8	7	Cv	24	31.3	39.6	46.7	55.6	81.9	115.9	154.1	183.7	213	0.46
						Kv	20.76	27.07	34.25	40.4	48.09	70.84	100.25	133.3	158.9	184.25	
D3	6 & 8 x 6	111.1	4-3/8	76.2	3	Cv	8.05	12.1	16.6	21.6	26.7	31.7	36.5	41.2	45.8	50.3	0.49
						Kv	6.96	10.47	14.36	18.68	23.1	27.42	31.57	35.64	39.62	43.51	
	8 & 10	136.5	5-3/8	146	5-3/4	Cv	6.8	17.5	27.7	39.2	48.1	59.6	68.1	79.6	88.1	99.6	0.43
						Kv	5.88	15.14	23.96	33.91	41.61	51.55	58.91	68.85	76.21	86.15	
	12	177.8	7	177.8	7	Cv	16.3	37.1	58.2	79.3	100.7	117.9	138.2	159.6	180.7	202.1	0.5
						Kv	14.1	32.09	50.34	68.59	87.11	101.98	119.54	138.05	156.31	174.82	

1. At 100% travel.
2. These cages are characterized for low flow in the first 40% of travel then exhibit a linear characteristic.

Notes: The coefficients in this table are also appropriate for the EHT Valve.

Linear - Flow Up

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
2 & 3 x 2	38.1	1.5	29	1.125	C_V	1.40	2.77	8.42	14.3	19.3	23.9	28.0	31.4	33.4	35.2	0.90
					K_V	1.21	2.40	7.28	12.4	16.7	20.7	24.2	27.2	28.9	30.4	- - -
					X_T	0.718	0.815	0.624	0.628	0.685	0.706	0.701	0.685	0.677	0.656	- - -
3 & 4 x 3	58.7	2.3125	38	1.5	C_V	2.98	11.7	28.3	45.7	58.8	67.9	75.3	82.0	86.4	88.6	0.94
					K_V	2.58	10.1	24.5	39.5	50.9	58.7	65.1	70.9	74.7	76.6	- - -
					X_T	0.706	0.664	0.697	0.710	0.731	0.731	0.727	0.710	0.689	0.681	- - -
4 & 6 x 4	73.0	2.875	51	2	C_V	2.92	15.1	30.6	48.6	68.0	86.8	103	116	123	125	0.92
					K_V	2.53	13.1	26.5	42.0	58.8	75.1	89.1	100	106	108	- - -
					X_T	0.748	0.819	0.792	0.636	0.624	0.697	0.779	0.797	0.788	0.797	- - -
6 & 8 x 6	111.1	4.375	76	3	C_V	9.11	37.3	78.2	128	180	224	254	269	278	282	0.89
					K_V	7.88	32.3	67.6	111	156	194	220	233	240	244	- - -
					X_T	0.620	0.656	0.589	0.574	0.601	0.648	0.689	0.718	0.714	0.714	- - -

Equal Percentage - Flow Up

Equal Percentage Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
2 & 3 x 2	38.1	1.5	22	0.875	C_V	1.06	1.31	2.10	3.73	6.26	9.46	13.1	17.3	22.1	26.3	0.91
					K_V	0.917	1.13	1.82	3.23	5.41	8.18	11.3	15.0	19.1	22.7	- - -
					X_T	0.970	0.757	0.731	0.689	0.652	0.624	0.624	0.648	0.693	0.723	- - -
3 & 4 x 3	58.7	2.3125	29	1.125	C_V	1.94	2.86	5.09	9.02	14.9	22.6	32.1	43.0	53.9	64.7	0.94
					K_V	1.68	2.47	4.40	7.80	12.9	19.5	27.8	37.2	46.6	56.0	- - -
					X_T	0.810	0.757	0.681	0.677	0.706	0.706	0.668	0.652	0.723	0.761	- - -
4 & 6 x 4	73.0	2.875	38	1.5	C_V	2.35	6.15	9.08	11.3	15.4	22.0	30.3	40.0	53.9	69.6	0.80
					K_V	2.03	5.32	7.85	9.77	13.3	19.0	26.2	34.6	46.6	60.2	- - -
					X_T	0.856	0.681	0.620	0.656	0.644	0.597	0.555	0.555	0.578	0.632	- - -
6 & 8 x 6	111.1	4.375	51	2	C_V	4.10	9.98	17.9	24.7	35.3	57.3	93.0	133	174	210	0.79
					K_V	3.55	8.63	15.5	21.4	30.5	49.6	80.4	115	151	182	- - -
					X_T	0.697	0.677	0.605	0.578	0.597	0.608	0.574	0.555	0.616	0.605	- - -

Modified Equal Percentage - Flow Up

Modified Equal Percentage Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
2 & 3 x 2	38.1	1.5	29	1.125	C_V	1.10	1.71	3.37	6.56	11.2	16.5	21.6	26.4	30.8	33.1	0.91
					K_V	0.952	1.48	2.92	5.67	9.69	14.3	18.7	22.8	26.6	28.6	- - -
					X_T	0.898	0.748	0.689	0.640	0.636	0.656	0.693	0.723	0.727	0.677	- - -
3 & 4 x 3	58.7	2.3125	38	1.5	C_V	2.11	4.16	8.97	16.9	28.4	42.5	55.8	68.2	78.5	84.0	0.
					K_V	1.83	3.60	7.76	14.6	24.6	36.8	48.3	59.0	67.9	72.7	- - -
					X_T	0.828	0.710	0.672	0.731	0.723	0.689	0.731	0.766	0.723	0.706	- - -
4 & 6 x 4	73.0	2.875	51	2	C_V	2.75	8.60	11.8	16.6	26.8	42.3	59.8	78.9	106	116	0.88
					K_V	2.38	7.44	10.2	14.4	23.2	36.6	51.7	68.2	91.7	100.3	- - -
					X_T	- - -	0.608	0.636	0.640	0.570	0.537	0.578	0.664	0.693	0.779	- - -
6 & 8 x 6	111.1	4.375	76	3	C_V	6.81	16.5	30.5	58.0	109	175	228	256	275	281	0.88
					K_V	5.89	14.3	26.4	50.2	94.3	151	197	221	238	243	- - -
					X_T	0.677	0.632	0.593	0.570	0.574	0.601	0.624	0.644	0.693	0.697	- - -

1. At 100% travel.

Micro-Form - Flow Up

Equal Percentage Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1, 1-1/2 x 1, & 2 x 1	6.4	0.25	19	0.75	C_v	0.072	0.106	0.163	0.232	0.324	0.449	0.626	0.871	1.22	1.58	0.91
					K_v	0.062	0.092	0.141	0.201	0.280	0.388	0.541	0.753	1.06	1.37	- - -
					X_T	0.778	0.717	0.421	0.474	0.513	0.540	0.558	0.566	0.569	0.644	- - -
	12.7	0.5	19	0.75	C_v	0.220	0.360	0.532	0.746	1.04	1.50	2.15	3.06	4.15	5.37	0.92
					K_v	0.190	0.311	0.460	0.645	0.900	1.30	1.86	2.65	3.59	4.65	- - -
					X_T	0.893	0.803	0.748	0.636	0.633	0.637	0.644	0.642	0.661	0.718	- - -
			22(2)	0.875(2)	C_v	0.254	0.445	0.636	0.890	1.40	2.23	3.50	4.77	5.72	6.36	0.93
					K_v	0.220	0.385	0.550	0.770	1.21	1.93	3.03	4.13	4.95	5.50	- - -
					X_T	0.632	0.627	0.630	0.632	0.629	0.628	0.629	0.626	0.633	0.630	- - -
	19.1	0.75	19	0.75	C_v	0.441	0.681	1.04	1.59	2.36	3.43	4.81	6.43	7.84	8.91	0.88
					K_v	0.381	0.589	0.900	1.38	2.04	2.97	4.16	5.56	6.78	7.71	- - -
					X_T	0.782	0.725	0.652	0.548	0.519	0.506	0.514	0.641	0.651	0.648	- - -
			22(2)	0.875(2)	C_v	0.550	0.721	1.24	1.85	2.78	4.43	6.70	8.45	9.27	10.3	0.84
					K_v	0.476	0.624	1.07	1.60	2.40	3.83	5.80	7.31	8.02	8.91	- - -
					X_T	0.516	0.693	0.581	0.587	0.586	0.589	0.585	0.583	0.587	0.585	- - -
2 & 3 x 2	25.4	1	22	0.875	C_v	0.653	1.19	1.89	2.89	4.50	7.08	10.9	15.9	20.0	21.5	0.95
					K_v	0.565	1.03	1.63	2.50	3.89	6.12	9.43	13.8	17.3	18.6	- - -
					X_T	0.809	0.812	0.814	0.809	0.810	0.811	0.817	0.806	0.810	0.810	- - -
			29(2)	1.125(2)	C_v	0.884	1.67	2.86	4.96	9.08	15.6	20.9	23.0	23.9	24.2	0.92
					K_v	0.765	1.44	2.47	4.29	7.85	13.5	18.1	19.9	20.7	20.9	- - -
					X_T	0.696	0.700	0.698	0.700	0.696	0.700	0.697	0.745	0.714	0.700	- -

1. At 100% travel.
2. Travels identified with this superscript are modified equal percentage characteristic. All other travels are equal percentage.

EHS and EHT, Cavitrol - Flow Down

Linear Characteristic

Trim Stage	Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coefficient	Min. Throttling C_V[2]	Valve Opening—Percent of Total Travel										F_L[3]
		mm	Inches	mm	Inches			10	20	30	40	50	60	70	80	90	100	
Two Stage	1, 1-1/2 x 1, & 2 x 1[1]	15.9	0.625	32	1.25	C_V	0.210	0.170	0.480	1.00	1.60	2.20	2.70	3.20	3.70	4.10	4.30	0.98
						K_V	*0.182*	0.147	0.415	0.865	1.38	1.90	2.34	2.77	3.20	3.55	3.72	- - -
	2 & 3 x 2	31.8	1.25	51	2	C_V	0.410	0.460	1.60	2.90	4.10	5.30	6.50	7.70	8.80	9.70	10.1	0.98
						K_V	*0.355*	0.398	1.38	2.51	3.55	4.58	5.62	6.66	7.61	8.39	8.74	- - -
	3 & 4 x 3	47.6	1.875	64	2.5	C_V	0.610	0.990	3.80	6.60	9.40	12.1	14.9	17.6	20.1	22.7	24.1	0.98
						K_V	*0.528*	0.856	3.29	5.71	8.13	10.5	12.9	15.2	17.4	19.6	20.8	- - -
	4 & 6 x 4	73.0	2.875	70	2.75	C_V	0.910	2.10	7.10	12.2	17.2	22.3	27.2	32.2	37.3	42.1	43.9	0.98
						K_V	*0.787*	1.82	6.14	10.6	14.9	19.3	23.5	27.9	32.3	36.4	38.0	- - -
	6 & 8 x 6	111.1	4.375	95	3.75	C_V	1.50	4.60	12.8	20.8	29.0	37.0	44.9	52.9	60.9	69.3	75.8	0.98
						K_V	*1.30*	3.98	11.1	18.0	25.1	32.0	38.8	45.8	52.7	59.9	65.6	- - -
Three Stage	1, 1-1/2 x 1, & 2 x 1	- - -	- - -	- - -	- - -	C_V	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
						K_V	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
	2 & 3 x 2[1]	15.9	0.625	51	2	C_V	0.420	0.280	0.740	1.20	1.60	2.00	2.50	2.90	3.30	3.60	3.70	0.99
						K_V	*0.363*	0.242	0.640	1.04	1.38	1.73	2.16	2.51	2.85	3.11	3.20	- - -
	3 & 4 x 3	33.3	1.3125	64	2.5	C_V	0.730	1.44	2.67	4.06	5.37	6.67	7.93	9.26	10.5	11.8	13.1	0.99
						K_V	*0.631*	1.25	2.31	3.51	4.65	5.77	6.86	8.01	9.08	10.2	11.3	- - -
	4 & 6 x 4	58.7	2.3125	70	2.75	C_V	1.00	1.00	3.90	6.50	8.90	11.7	14.4	16.9	19.0	20.3	20.8	0.99
						K_V	*0.865*	0.865	3.37	5.62	7.70	10.1	12.5	14.6	16.4	17.6	18.0	- - -
	6 & 8 x 6	111.1	4.375	95	3.75	C_V	2.80	4.4	11.2	16.3	21.5	28.3	35	38.5	45.2	51.9	55.2	0.99
						K_V	*2.42*	3.8	9.7	14.1	18.6	24.5	30.3	33.3	39.1	44.9	47.7	- - -

1. Cavitrol III trim in the CL2500, NPS 1, two-stage and in the CL2500, NPS 2, three-stage valve body sizes uses unbalanced valve plugs. These sizes and constructions are Fisher® EHS valves; all other valves in this table are EHT valves.
2. Valves should not be required to throttle at a C_V less than the specified minimum of C_V for an extended period. Erosion damage to the valve seats might result.
3. At 100 percent travel.

EHT, CL2500, Cavitrol III, Protected Inside Seat Design, Flow Down

Linear Characteristic

Trim Stage	Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coefficient	Minimum Throttling C_V	Valve Opening - Percent of Total Travel									
		mm	Inch	mm	Inch			10	20	30	40	50	60	70	80	90	100
Two Stage	3, 4 X 3	32.6	1.284	64	2.5	C_V	0.61	0.3	3.1	5.7	8.3	10.7	12.9	14.9	16.6	18.2	19.5
						K_V	0.528	0.26	2.7	4.9	7.2	9.3	11.2	12.1	14.4	15.7	16.8
	4, 6 X 4	58	2.284	70	2.75	C_V	0.91	1.1	6.2	11.2	16.1	20.9	25.5	30	34.2	38.3	41.1
						K_V	0.787	0.95	5.4	9.7	13.9	18.1	22.1	25.9	29.6	33.1	35.6
	6, 8 X 6	96.1	3.784	95	3.75	C_V	1.5	4.3	13.8	23	31.7	39.6	46.9	53.3	59	64	68.1
						K_V	1.3	3.7	11.9	19.9	27.4	34.3	40.6	46.1	51	55.4	58.9
Three Stage	3, 4 X 3	18.3	0.722	64	2.5	C_V	0.73	1	2.1	3	3.9	5.3	5.9	6.3	6.8	7.4	7.4
						K_V	0.631	0.865	1.8	2.6	3.4	4.6	5.1	5.4	5.9	6.4	6.4
	4, 6 X 4	43.7	1.722	70	2.75	C_V	1.0	2.0	4.0	5.8	7.7	11	12.8	14.5	16.3	18.2	19.2
						K_V	0.865	0.78	1.72	5	6.6	9.5	11.1	12.5	14.1	15.7	16.6
	6, 8 X 6	96.1	3.784	95	3.75	C_V	2.8	4.3	11.1	16.2	21.4	28.2	34.8	38.3	44.9	51.7	54.7
						K_V	2.42	3.7	9.6	14	18.5	24.4	30.1	33.1	38.8	44.7	47.3

Notes:
1. All other EHT flow coefficients are identical to EHD coefficients. Refer to EHD information using all flange ratings and cage styles.
In applications where pressure drop decreases with travel, consider using characterized Cavitrol III cages. Contact your Emerson Process Management sales office for assistance.

EHS, CL3273 Cavitrol III 3-Stage Micro-Flat - Flow Down

Linear Characteristic

Valve Size, NPS	Shutoff Port Diameter(2)		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel											F_L(1)
	mm	Inches	mm	Inches		Min	10	20	30	40	50	60	70	80	90	100	
2(3)	25.4	1	38.1	1.5	C_v	0.05	0.01	0.06	0.09	0.16	0.34	0.46	0.62	0.89	1.06	1.18	0.97
					K_v	0.04	0.01	0.05	0.08	0.14	0.29	0.40	0.54	0.77	0.92	1.02	
2(4)	25.4	1	63.5	2.5	C_v	0.06	0.01	0.14	0.37	0.72	1.20	1.86	2.75	3.74	4.53	5.54	0.97
					K_v	0.05	0.01	0.12	0.32	0.62	1.04	1.61	2.38	3.24	3.92	4.79	

1. At 100% travel
2. Cavitrol III Micro-Flat trims use a shutoff port diameter which is larger than the flowing port diameter. Use the shutoff port diameter for actuator sizing.
3. Flowing port: 12.7 mm / 0.5 Inch, Unbalanced Area: 5.065 cm2 / 0.785 In2, ¾” stem
4. Flowing port: 19.1 mm / 0.75 Inch, Unbalanced Area: 5.065 cm2 / 0.785 In2, ¾” stem

Quick Opening - Flow Up

Quick Opening Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel											F_L(3)
	mm	Inches	mm(1)	Inches(1)		Coeffs. for 6 mm (0.25 in.) Travel(2)	10	20	30	40	50	60	70	80	90	100	
1/2	33.3	1.3125	19	0.75	C_v	6.27	4.00	5.63	6.22	6.35	6.44	6.48	6.52	6.53	6.53	6.53	0.88
					K_v	*5.42*	*3.46*	*4.87*	*5.38*	*5.49*	*5.57*	*5.61*	*5.64*	*5.65*	*5.65*	*5.65*	- - -
					X_T	0.665	0.681	0.711	0.653	0.651	0.640	0.632	0.624	0.622	0.622	0.622	- - -
3/4	33.3	1.3125	19	0.75	C_v	12.3	4.94	8.80	11.8	13.1	13.8	14.1	14.2	14.2	14.2	14.2	0.83
					K_v	*10.6*	*4.27*	*7.61*	*10.2*	*11.3*	*11.9*	*12.2*	*12.3*	*12.3*	*12.3*	*12.3*	- - -
					X_T	0.593	0.576	0.688	0.605	0.571	0.552	0.539	0.534	0.534	0.534	0.534	- - -
1 & 1-1/4	33.3	1.3125	19	0.75	C_v	16.3	5.24	10.0	15.0	18.4	20.3	21.0	21.1	21.3	21.4	21.4	0.89
					K_v	*14.1*	*4.53*	*8.65*	*13.0*	*15.9*	*17.6*	*18.2*	*18.3*	*18.4*	*18.5*	*18.5*	- - -
					X_T	0.661	0.540	0.664	0.656	0.660	0.641	0.650	0.663	0.654	0.648	0.650	- - -
1-1/2	47.6	1.875	19	0.75	C_v	24.4	7.60	15.1	22.3	28.2	33.4	37.0	38.0	38.0	38.0	38.0	0.94
					K_v	*21.1*	*6.57*	*13.1*	*19.3*	*24.4*	*28.9*	*32.0*	*32.9*	*32.9*	*32.9*	*32.9*	- - -
					X_T	0.645	0.577	0.613	0.639	0.684	0.703	0.713	0.743	0.777	0.789	0.789	- - -
	33.3	1.3125	19	0.75	C_v	18.0	4.83	10.4	16.2	21.4	25.6	28.2	29.8	30.2	30.3	30.4	0.94
					K_v	*15.6*	*4.18*	*9.00*	*14.0*	*18.5*	*22.1*	*24.4*	*25.8*	*26.1*	*26.2*	*26.3*	- - -
					X_T	0.605	0.611	0.607	0.588	0.598	0.610	0.651	0.666	0.699	0.708	0.717	- - -
2	58.7	2.3125	29	1.125	C_v	35.3	14.3	31.1	48.6	59.3	65.2	67.2	67.2	67.2	67.2	67.2	0.93
					K_v	*30.5*	*12.4*	*26.9*	*42.0*	*51.3*	*56.4*	*58.1*	*58.1*	*58.1*	*58.1*	*58.1*	- - -
					X_T	0.607	0.633	0.627	0.619	0.732	0.758	0.771	0.797	0.810	0.810	0.810	- - -
	33.3	1.3125	19	0.75	C_v	18.6	5.12	10.5	16.7	22.2	26.9	30.9	33.9	36.3	38.1	39.4	0.91
					K_v	*16.1*	*4.43*	*9.08*	*14.4*	*19.2*	*23.3*	*26.7*	*29.3*	*31.4*	*33.0*	*34.1*	- - -
					X_T	0.560	0.588	0.617	0.565	0.571	0.640	0.722	0.796	0.826	0.785	0.734	- - -
2-1/2	73.0	2.875	38	1.5	C_v	35.3	21.8	42.0	66.6	83.8	91.1	93.1	93.1	93.1	93.1	93.1	0.91
					K_v	*30.5*	*18.9*	*36.3*	*57.6*	*72.5*	*78.8*	*80.5*	*80.5*	*80.5*	*80.5*	*80.5*	- - -
					X_T	0.675	0.659	0.684	0.720	0.790	0.795	0.827	0.848	0.868	0.868	0.868	- - -
	47.6	1.875	19	0.75	C_v	26.1	7.40	15.5	23.3	31.4	39.8	48.4	56.1	61.7	62.3	69.2	0.95
					K_v	*22.6*	*6.40*	*13.4*	*20.2*	*27.2*	*34.4*	*41.9*	*48.5*	*53.4*	*53.9*	*59.9*	- - -
					X_T	0.609	0.636	0.599	0.612	0.619	0.692	0.747	0.824	0.859	0.842	- - -	- - -
3	87.3	3.4375	38	1.5	C_v	37.4	23.3	45.5	78.3	106	120	130	136	143	146	150	0.87
					K_v	*32.4*	*20.2*	*39.4*	*67.7*	*91.7*	*104*	*112*	*118*	*124*	*126*	*130*	- - -
					X_T	0.590	0.585	0.592	0.602	0.685	0.740	0.726	0.737	0.731	0.733	0.720	- - -
	58.7	2.3125	29	1.125	C_v	36.3	14.7	32.4	51.2	68.8	83.1	94.3	103	108	112	115	0.91
					K_v	*31.4*	*12.7*	*28.0*	*44.3*	*59.5*	*71.9*	*81.6*	*89.1*	*93.4*	*96.9*	*99.5*	- - -
					X_T	0.564	0.609	0.565	0.565	0.593	0.679	0.729	0.751	0.774	0.785	0.752	- - -

1. When using Fisher 655-EC as a control valve for on-off service, the maximum travel for sizing purposes is 19 mm (0.75 inch),
2. When sizing self-operated regulators, use coefficients listed for 6 mm (0.25 inch) travel.
3. At 100% travel.

▨ Restricted trim.

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel											F_L(3)
	mm	Inches	mm(1)	Inches(1)		Coeffs. for 6 mm (0.25 in.) Travel(2)	10	20	30	40	50	60	70	80	90	100	
4	111.1	4.375	51	2	C_v	46.3	39.0	77.3	132	174	198	215	225	230	234	235	0.89
					K_v	*40.0*	*33.7*	*66.9*	*114*	*151*	*171*	*186*	*195*	*199*	*202*	*203*	- - -
					X_T	0.647	0.642	0.691	0.714	0.763	0.768	0.763	0.769	0.775	0.783	0.780	- - -
	73.0	2.875	38	1.5	C_v	41.2	26.9	47.2	76.4	108	135	156	169	178	181	183	0.88
					K_v	*35.6*	*23.3*	*40.8*	*66.1*	*93.4*	*117*	*135*	*146*	*154*	*157*	*158*	- - -
					X_T	0.613	0.524	0.683	0.669	0.664	0.688	0.741	0.783	0.763	0.752	0.736	- - -
6	177.8	7	51	2	C_v	102	89.9	162	255	322	365	395	418	436	455	469	0.82
					K_v	*88.2*	*77.8*	*140*	*221*	*279*	*316*	*342*	*362*	*377*	*394*	*406*	- - -
					X_T	0.642	0.572	0.612	0.601	0.652	0.664	0.677	0.681	0.701	0.698	0.700	- - -
	111.1	4.375	51	2	C_v	66.1	49.8	108	164	217	255	274	282	290	291	302	0.90
					K_v	*57.2*	*43.1*	*93.4*	*142*	*188*	*221*	*237*	*244*	*251*	*252*	*261*	- - -
					X_T	0.667	0.711	0.630	0.619	0.650	0.724	0.814	0.883	0.883	0.909	0.860	- - -
8	203.2	8	51	2	C_v	122	94.4	205	323	441	539	622	677	720	759	787	0.85
					K_v	*106*	*81.7*	*177*	*279*	*381*	*466*	*538*	*586*	*623*	*657*	*681*	- - -
					X_T	0.616	0.683	0.607	0.575	0.603	0.682	0.726	0.772	0.809	0.814	0.814	- - -
8	203.2	8	76	3	C_v	122	156	337	490	612	700	759	796	827	844	875	0.85
					K_v	*106*	*135*	*292*	*424*	*529*	*606*	*657*	*689*	*715*	*730*	*757*	- - -
					X_T	0.616	0.520	0.561	0.654	0.757	0.804	0.814	0.818	0.801	0.810	0.774	- - -

1. When using Fisher 655-EC as a control valve for on-off service, the maximum travel for sizing purposes is 19 mm (0.75 inch),
2. When sizing self-operated regulators, use coefficients listed for 6 mm (0.25 inch) travel.
3. At 100% travel.

▨ Restricted trim.

Linear - Flow Up

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1 & 1-1/4	33.3	1.3125	19	0.75	C_V	2.27	4.12	6.23	8.54	11.0	13.4	15.8	17.8	19.3	20.1	0.89
					K_V	*1.96*	*3.56*	*5.39*	*7.39*	*9.52*	*11.6*	*13.7*	*15.4*	*16.7*	*17.4*	- - -
					X_T	0.691	0.691	0.690	0.696	0.696	0.708	0.709	0.705	0.702	0.690	- - -
1-1/2	47.6	1.875	19	0.75	C_V	3.56	7.01	11.1	15.1	19.0	22.9	26.7	30.0	33.1	34.9	0.92
					K_V	*3.08*	*6.06*	*9.60*	*13.1*	*16.4*	*19.8*	*23.1*	*25.9*	*28.6*	*30.2*	- - -
					X_T	0.628	0.582	0.604	0.647	0.683	0.699	0.715	0.737	0.741	0.764	- - -
	33.3	1.3125	19	0.75	C_V	2.42	4.30	6.40	8.77	11.5	14.6	17.8	21.1	24.3	26.9	0.95
					K_V	*2.09*	*3.72*	*5.54*	*7.59*	*9.95*	*12.6*	*15.4*	*18.3*	*21.0*	*23.3*	- - -
					X_T	0.648	0.682	0.712	0.693	0.664	0.678	0.701	0.732	0.756	0.799	- - -
2	58.7	2.3125	29	1.125	C_V	8.49	17.1	25.9	35.3	44.4	52.9	59.2	62.0	63.9	65.3	0.91
					K_V	*7.34*	*14.8*	*22.4*	*30.5*	*38.4*	*45.8*	*51.2*	*53.6*	*55.3*	*56.5*	- - -
					X_T	0.618	0.635	0.689	0.710	0.723	0.732	0.742	0.759	0.761	0.762	- - -
	33.3	1.3125	19	0.75	C_V	2.22	4.11	6.06	8.25	11.0	14.3	18.0	21.8	26.0	30.9	0.91
					K_V	*1.92*	*3.56*	*5.24*	*7.14*	*9.52*	*12.4*	*15.6*	*18.9*	*22.5*	*26.7*	- - -
					X_T	0.725	0.694	0.729	0.746	0.688	0.675	0.667	0.686	0.711	0.722	- - -
2-1/2	73.0	2.875	38	1.5	C_V	10.4	22.2	34.9	47.1	58.2	66.6	73.7	79.3	84.4	86.5	0.93
					K_V	*9.00*	*19.2*	*30.2*	*40.7*	*50.3*	*57.6*	*63.8*	*68.6*	*73.0*	*74.8*	- - -
					X_T	0.672	0.727	0.739	0.776	0.783	0.832	0.858	0.877	0.854	0.866	- - -
	47.6	1.875	19	0.75	C_V	3.50	6.85	10.8	14.8	18.9	23.3	28.2	34.1	41.1	48.6	0.93
					K_V	*3.03*	*5.93*	*9.34*	*12.8*	*16.3*	*20.2*	*24.4*	*29.5*	*35.6*	*42.0*	- - -
					X_T	0.617	0.627	0.679	0.716	0.740	0.752	0.783	0.774	0.778	0.783	- - -
3	87.3	3.4375	38	1.5	C_V	15.3	34.3	52.8	71.4	87.8	101	112	121	129	135	0.89
					K_V	*13.2*	*29.7*	*45.7*	*61.8*	*75.9*	*87.4*	*96.9*	*105*	*112*	*117*	- - -
					X_T	0.607	0.631	0.663	0.694	0.720	0.742	0.762	0.786	0.771	0.751	- - -
	58.7	2.3125	29	1.125	C_V	6.39	13.0	20.7	29.1	38.2	47.9	58.0	68.4	79.3	88.8	0.91
					K_V	*5.53*	*11.2*	*17.9*	*25.2*	*33.0*	*41.4*	*50.2*	*59.2*	*68.6*	*76.8*	- - -
					X_T	0.662	0.677	0.704	0.677	0.648	0.646	0.643	0.658	0.714	0.742	- - -

1. At 100% travel.
2. If coefficients listed above for the NPS 8 linear cage with 51 mm (2 inch) travel are not sufficient for your application, consider using the quick opening cage. The NPS 8 quick opening cage with 51 mm (2 inch) travel has approximately a linear characteristic.

▨ Restricted trim.

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
4	111.1	4.375	51	2	C_v	23.7	46.4	72.9	98.2	122	145	165	183	199	212	0.89
					K_v	*20.5*	*40.1*	*63.1*	*84.9*	*106*	*125*	*143*	*158*	*172*	*183*	- - -
					X_T	0.553	0.619	0.644	0.680	0.713	0.737	0.743	0.823	0.816	0.791	- - -
	73.0	2.875	38	1.5	C_v	10.6	22.5	35.0	47.5	60.2	73.1	88.0	103	120	139	0.93
					K_v	*9.17*	*19.5*	*30.3*	*41.1*	*52.1*	*63.2*	*76.1*	*89.1*	*104*	*120*	- - -
					X_T	0.613	0.671	0.698	0.718	0.718	0.731	0.722	0.751	0.769	0.780	- - -
6	177.8	7	51	2	C_v	55.0	118	180	235	280	312	341	368	390	417	0.81
					K_v	*47.6*	*102*	*156*	*203*	*242*	*270*	*295*	*318*	*337*	*361*	- - -
					X_T	0.597	0.683	0.701	0.687	0.767	0.791	0.787	0.792	0.794	0.745	- - -
6	111.1	4.375	51	2	C_v	15.7	35.8	60.2	86.2	115	146	179	215	247	271	0.89
					K_v	*13.6*	*31.0*	*52.1*	*74.6*	*99.5*	*126*	*180*	*186*	*214*	*234*	- - -
					X_T	0.678	0.668	0.676	0.683	0.668	0.645	0.668	0.695	0.759	0.817	- - -
8(2)	203.2	8	51	2	C_v	66.6	147	221	292	375	450	522	592	652	701	0.84
					K_v	*57.6*	*127*	*191*	*253*	*324*	*389*	*452*	*512*	*564*	*606*	- - -
					X_T	0.758	0.588	0.597	0.637	0.640	0.676	0.702	0.720	0.738	0.757	- - -
8	203.2	8	76	3	C_v	100	213	330	451	553	648	719	773	809	836	0.85
					K_v	*86.5*	*184*	*285*	*390*	*478*	*561*	*622*	*669*	*700*	*723*	- - -
					X_T	0.616	0.624	0.669	0.691	0.738	0.747	0.762	0.780	0.787	0.799	- - -

1. At 100% travel.
2. If coefficients listed above for the NPS 8 linear cage with 51 mm (2 inch) travel are not sufficient for your application, consider using the quick opening cage. The NPS 8 quick opening cage with 51 mm (2 inch) travel has approximately a linear characteristic.
▨ Restricted trim.

Equal Percentage - Flow Up

Equal Percentage Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1 & 1-1/4	33.3	1.3125	19	0.75	C_V	0.783	1.29	1.86	2.71	4.18	6.44	9.54	13.1	15.7	17.4	0.95
					K_V	*0.677*	*1.12*	*1.61*	*2.34*	*3.62*	*5.57*	*8.25*	*11.3*	*13.6*	*15.1*	- - -
					X_T	0.754	0.794	0.763	0.670	0.652	0.621	0.630	0.677	0.718	0.721	- - -
1-1/2	47.6	1.875	19	0.75	C_V	1.54	2.52	3.57	4.94	7.41	11.6	17.2	23.5	28.7	33.4	0.94
					K_V	*1.33*	*2.18*	*3.09*	*4.27*	*6.41*	*10.0*	*14.9*	*20.3*	*24.8*	*28.9*	- - -
					X_T	0.674	0.670	0.694	0.731	0.706	0.681	0.698	0.692	0.789	0.793	- - -
	33.3	1.3125	19	0.75	C_V	0.882	1.35	1.89	2.52	3.68	5.52	8.13	12.0	16.6	21.0	0.96
					K_V	*0.763*	*1.17*	*1.63*	*2.18*	*3.18*	*4.77*	*7.03*	*10.4*	*14.4*	*18.2*	- - -
					X_T	0.858	0.845	0.867	0.810	0.833	0.755	0.776	0.766	0.766	0.766	- - -
2	58.7	2.3125	29	1.125	C_V	1.74	3.15	4.72	6.91	10.6	16.3	25.0	36.7	47.8	56.2	0.92
					K_V	*1.51*	*2.72*	*4.08*	*5.98*	*9.17*	*14.1*	*21.6*	*31.7*	*41.3*	*48.6*	- - -
					X_T	0.863	0.848	0.849	0.805	0.782	0.778	0.792	0.772	0.847	0.848	- - -
	33.3	1.3125	19	0.75	C_V	0.849	1.34	1.83	2.39	3.43	5.12	7.49	11.2	15.8	20.8	0.91
					K_V	*0.734*	*1.16*	*1.58*	*2.07*	*2.97*	*4.43*	*6.48*	*9.69*	*13.7*	*18.0*	- - -
					X_T	0.844	0.778	0.803	0.767	0.791	0.764	0.764	0.764	0.755	0.728	- - -
2-1/2	73.0	2.875	38	1.5	C_V	4.05	7.19	10.6	14.5	21.2	31.6	45.5	64.2	77.7	82.7	0.93
					K_V	*3.50*	*6.22*	*9.17*	*12.5*	*18.3*	*27.3*	*39.4*	*55.5*	*67.2*	*71.5*	- - -
					X_T	0.747	0.768	0.745	0.779	0.764	0.744	0.783	0.802	0.841	0.878	- - -
	47.6	1.875	19	0.75	C_V	1.43	2.37	3.34	4.76	7.25	11.3	17.3	24.2	31.8	40.3	0.95
					K_V	*1.24*	*2.05*	*2.89*	*4.12*	*6.27*	*9.77*	*15.0*	*20.9*	*27.5*	*34.9*	- - -
					X_T	0.664	0.721	0.741	0.765	0.679	0.681	0.678	0.681	0.748	0.744	- - -
3	87.3	3.4375	38	1.5	C_V	4.05	6.84	10.0	15.0	23.8	37.8	59.0	87.1	110	121	0.89
					K_V	*3.50*	*5.92*	*8.65*	*13.0*	*20.6*	*32.7*	*51.0*	*75.3*	*95.2*	*105*	- - -
					X_T	0.768	0.757	0.761	0.757	0.758	0.571	0.754	0.756	0.758	0.757	- - -
	58.7	2.3125	29	1.125	C_V	2.74	3.44	4.86	6.95	10.6	16.5	25.0	37.7	52.7	67.5	0..94
					K_V	*2.37*	*2.98*	*4.20*	*6.01*	*9.17*	*14.3*	*21.6*	*32.6*	*45.6*	*58.4*	- - -
					X_T	0.753	0.748	0.756	0.783	0.786	0.741	0.736	0.732	0.737	0.738	- - -
4	111.1	4.375	51	2	C_V	6.56	11.4	17.3	27.0	42.2	66.4	103	146	184	203	0.91
					K_V	*5.67*	*9.86*	*15.0*	*23.4*	*36.5*	*57.4*	*89.1*	*126*	*159*	*176*	- - -
					X_T	0.722	0.717	0.739	0.772	0.738	0.718	0.718	0.736	0.792	0.822	- - -
	73.0	2.875	38	1.5	C_V	3.96	7.14	10.6	14.5	21.1	31.7	48.0	69.7	95.6	121	0.94
					K_V	*3.43*	*6.18*	*9.17*	*12.5*	*18.3*	*27.4*	*41.5*	*60.3*	*82.7*	*105*	- - -
					X_T	0.792	0.803	0.770	0.767	0.760	0.725	0.703	0.717	0.763	0.764	- - -

1. At 100% travel.
▨ Restricted trim.

Valve Size, NPS	**Port Diameter**		**Maximum Travel**		**Flow Coeffi- cient**	**Valve Opening—Percent of Total Travel**										**F_L(1)**
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
6	177.8	7	51	2	C_v	13.2	24.6	41.1	62.5	97.1	155	223	286	326	357	0.86
					K_v	*11.4*	*21.3*	*35.6*	*54.1*	*84.0*	*134*	*193*	*247*	*282*	*309*	- - -
					X_T	0.723	0.737	0.767	0.846	0.803	0.781	0.808	0.826	0.847	0.816	- - -
	111.1	4.375	51	2	C_v	4.96	9.02	14.0	24.2	39.4	60.8	94.6	144	199	233	0.91
					K_v	*4.29*	*7.80*	*12.1*	*20.9*	*34.1*	*52.6*	*81.8*	*125*	*172*	*202*	- - -
					X_T	0.842	0.792	0.778	0.709	0.723	0.739	0.729	0.706	0.719	0.806	- - -
8	203.2	8	51	2	C_v	18.8	33.6	53.6	79.8	114	168	242	345	467	570	0.85
					K_v	*16.3*	*29.1*	*46.4*	*69.0*	*98.6*	*145*	*209*	*298*	*404*	*493*	- - -
					X_T	0.874	0.865	0.769	0.748	0.731	0.697	0.712	0.707	0.697	0.694	- - -
8	203.2	8	76	3	C_v	25.9	53.3	97.8	178	299	461	618	727	768	808	0.85
					K_v	*22.4*	*46.1*	*84.6*	*154*	*259*	*399*	*535*	*629*	*664*	*699*	- - -
					X_T	0.825	0.728	0.681	0.616	0.678	0.716	0.735	0.793	0.825	0.827	- - -

1. At 100% travel.
▨ Restricted trim.

Whisper Trim I

Linear Characteristic

Valve Size,(1) NPS	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel									
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100
1 & 1-1/4	33.3	1.3125	19	0.75	C_V	3.16	6.97	11.8	15.1	16.5	17.2	17.3	17.4	17.4	18.4
					K_V	*2.73*	*6.03*	*10.2*	*13.1*	*14.3*	*14.9*	*15.0*	*15.1*	*15.1*	*15.9*
					X_T	0.828	0.747	0.553	0.570	0.645	0.667	0.686	0.694	0.709	0.678
1-1/2	47.6	1.875	19	0.75	C_V	3.42	8.78	14.6	22.2	27.7	31.6	34.0	35.1	36.0	37.2
					K_V	*2.96*	*7.59*	*12.6*	*19.2*	*24.0*	*27.3*	*29.4*	*30.4*	*31.1*	*32.2*
					X_T	0.635	0.649	0.594	0.455	0.457	0.504	0.563	0.625	0.648	0.640
	33.3	1.3125	19	0.75	C_V	2.84	6.74	11.3	17.4	22.1	25.6	27.7	28.7	29.1	29.3
					K_V	*2.46*	*5.83*	*9.77*	*15.1*	*19.1*	*22.1*	*24.0*	*24.8*	*25.2*	*25.3*
					X_T	0.669	0.709	0.563	0.424	0.401	0.428	0.487	0.569	0.661	0.711
2	58.7	2.3125	29	1.125	C_V	8.27	21.8	35.3	47.3	55.1	60.2	63.2	65.3	66.8	67.8
					K_V	*7.15*	*18.9*	*30.5*	*40.9*	*47.7*	*52.1*	*54.7*	*56.5*	*57.8*	*58.6*
					X_T	0.647	0.411	0.347	0.352	0.409	0.499	0.577	0.622	0.647	0.656
	33.3	1.3125	19	0.75	C_V	3.62	7.07	12.2	18.4	23.3	27.6	31.1	34.0	35.8	37.0
					K_V	*3.13*	*6.12*	*10.6*	*15.9*	*20.2*	*23.9*	*26.9*	*29.4*	*31.0*	*32.0*
					X_T	0.620	0.769	0.559	0.420	0.390	0.396	0.408	0.440	0.475	0.494
2-1/2	73.0	2.875	38	1.5	C_V	12.8	33.9	55.0	70.6	80.0	85.4	88.5	90.3	91.1	91.7
					K_V	*11.1*	*29.3*	*47.6*	*61.1*	*69.2*	*73.9*	*76.6*	*78.1*	*78.8*	*79.3*
					X_T	0.766	0.476	0.377	0.388	0.460	0.540	0.590	0.631	0.660	0.669
	47.6	1.875	19	0.75	C_V	3.07	8.65	15.3	23.4	31.2	36.8	43.4	48.3	52.1	55.8
					K_V	*2.66*	*7.48*	*13.2*	*20.2*	*27.0*	*31.8*	*37.5*	*41.8*	*45.1*	*48.3*
					X_T	0.766	0.766	0.613	0.450	0.384	0.389	0.380	0.399	0.420	0.428
3	87.3	3.4375	38	1.5	C_V	11.1	36.0	60.3	81.9	99.6	111	119	124	128	131
					K_V	*9.60*	*31.1*	*52.2*	*70.8*	*86.2*	*96.0*	*103*	*107*	*111*	*113*
					X_T	0.766	0.649	0.451	0.415	0.416	0.469	0.522	0.566	0.595	0.603
	58.7	2.3125	29	1.125	C_V	6.63	18.1	30.8	43.4	56.1	67.1	77.8	87.2	95.9	102
					K_V	*5.73*	*15.7*	*26.6*	*37.5*	*48.5*	*58.0*	*67.3*	*75.4*	*83.0*	*88.2*
					X_T	0.766	0.662	0.483	0.424	0.395	0.387	0.385	0.387	0.395	0.397
4	111.1	4.375	51	2	C_V	25.1	56.5	85.6	111	128	139	147	151	208	211
					K_V	*21.7*	*48.9*	*74.0*	*96.0*	*111*	*120*	*127*	*131*	*180*	*183*
					X_T	1.222	0.807	0.683	0.680	0.786	0.909	1.017	1.109	0.635	0.645
	73.0	2.875	38	1.5	C_V	12.8	33.9	56.6	76.4	96.3	114	130	143	156	164
					K_V	*11.1*	*29.3*	*49.0*	*66.1*	*83.3*	*98.6*	*112*	*124*	*135*	*142*
					X_T	0.766	0.471	0.350	0.332	0.317	0.325	0.331	0.349	0.361	0.377
6	177.8	7	51	2	C_V	54.1	114	174	231	281	319	349	369	387	401
					K_V	*46.8*	*98.6*	*151*	*200*	*243*	*276*	*302*	*319*	*335*	*347*
					X_T	0.407	0.453	0.409	0.367	0.383	0.419	0.450	0.487	0.514	0.532
8	203.2	8	76	3	C_V	84.6	229	360	462	531	607	660	695	712	735
					K_V	*73.2*	*198*	*311*	*400*	*459*	*525*	*571*	*601*	*616*	*636*
					X_T	0.729	0.409	0.346	0.354	0.410	0.451	0.507	0.560	0.602	0.633
			29	4	C_V	132	318	464	566	641	693	724	742	760	773
					K_V	*114*	*275*	*401*	*490*	*554*	*599*	*626*	*642*	*657*	*669*
					X_T	0.499	0.358	0.371	0.422	0.482	0.542	0.604	0.659	0.682	0.675

1. NPS 6 easy-e™ with restricted Whisper Trim not available. Use EW valve body where this trim is desired.

▨ Restricted trim.

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Cavitrol - Flow Down

Linear Characteristic

Valve Size, NPS	Shutoff Port Diameter(2)		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel											F_L(1)
	mm	Inches	mm	Inches		Min	10	20	30	40	50	60	70	80	90	100	
1(3)	22.2	0.875	19	0.75	C_v	0.04	0.02	0.04	0.05	0.07	0.09	0.12	0.16	0.21	0.26	0.30	0.97
					K_v	0.03	0.02	0.03	0.04	0.06	0.08	0.10	0.14	0.18	0.22	0.26	
1(4)	25.4	1	38.1	1.5	C_v	0.04	0.00	0.07	0.12	0.21	0.30	0.41	0.53	0.68	0.84	1.02	0.97
					K_v	*0.03*	*0.00*	*0.06*	*0.10*	*0.18*	*0.26*	*0.35*	*0.46*	*0.59*	*0.73*	*0.88*	
1(5)	25.4	1	28.5	1.125	C_v	0.05	0.00	0.02	0.17	0.32	0.48	0.65	0.80	1.04	1.36	1.66	0.97
					K_v	*0.04*	*0.00*	*0.02*	*0.15*	*0.28*	*0.42*	*0.56*	*0.69*	*0.90*	*1.18*	*1.44*	
1(5)	25.4	1	25.4	1	C_v	0.05	0.00	0.06	0.16	0.39	0.60	0.94	1.28	1.63	1.98	2.30	0.97
					K_v	*0.04*	*0.00*	*0.05*	*0.14*	*0.34*	*0.52*	*0.81*	*1.11*	*1.41*	*1.71*	*1.99*	
1-1/2(3)	22.2	0.875	19	0.75	C_v	0.04	0.02	0.04	0.05	0.07	0.09	0.12	0.16	0.21	0.26	0.30	0.97
					K_v	*0.03*	*0.02*	*0.03*	*0.04*	*0.06*	*0.08*	*0.10*	*0.14*	*0.18*	*0.22*	*0.26*	
1-1/2(5)	25.4	1	28.5	1.125	C_v	0.05	0.00	0.02	0.17	0.32	0.48	0.65	0.80	1.04	1.36	1.66	0.97
					K_v	*0.04*	*0.00*	*0.02*	*0.15*	*0.28*	*0.42*	*0.56*	*0.69*	*0.90*	*1.18*	*1.44*	
1-1/2(5)	25.4	1	25.4	1	C_v	0.05	0.00	0.06	0.16	0.39	0.60	0.94	1.28	1.63	1.98	2.30	0.97
					K_v	*0.04*	*0.00*	*0.05*	*0.14*	*0.34*	*0.52*	*0.81*	*1.11*	*1.41*	*1.71*	*1.99*	
1-1/2(5)	25.4	1	38.1	1.5	C_v	0.05	0.02	0.08	0.27	0.62	1.02	1.40	1.90	2.30	2.70	3.10	0.97
					K_v	*0.04*	*0.02*	*0.07*	*0.23*	*0.54*	*0.88*	*1.21*	*1.64*	*1.99*	*2.34*	*2.68*	
2(6)	22.2	0.875	19	0.75	C_v	0.04	0.02	0.04	0.05	0.07	0.09	0.12	0.16	0.21	0.26	0.30	0.97
					K_v	*0.03*	*0.02*	*0.03*	*0.04*	*0.06*	*0.08*	*0.10*	*0.14*	*0.18*	*0.22*	*0.26*	
2(5)	25.4	1	38.1	1.5	C_v	0.05	0.02	0.16	0.45	0.95	1.47	2.00	2.50	3.10	3.70	4.10	0.97
					K_v	*0.04*	*0.02*	*0.14*	*0.39*	*0.82*	*1.27*	*1.73*	*2.16*	*2.68*	*3.20*	*3.55*	

1. At 100% travel
2. Cavitrol III Micro-Flat trims use a shutoff port diameter which is larger than the flowing port diameter. Use the shutoff port diameter for actuator sizing.
3. Flowing port: 12.7 mm / 0.5 Inch, Unbalanced Area: 3.869 cm2 / 0.601 In2, 3/8" stem (optional 1/2" stem)
4. Flowing port: 12.7 mm / 0.5 Inch, Unbalanced Area: 5.065 cm2 / 0.785 In2, 1/2" stem
5. Flowing port: 19 mm / 0.75 Inch, Unbalanced Area: 5.065 cm2 / 0.785 In2, 1/2" stem
6. Flowing port: 12.7 mm / 0.5 Inch, Unbalanced Area: 3.869 cm2 / 0.601 In2, 3/4" stem

CL150, 300, 600, Micro-Flat Anti-Cavitation Plug & Seat, with Flash Basket[1], Flow Down

Linear Characteristic

Valve Size	Port Diameter (2)		Travel		Flow Coefficient	Percent of Total Travel										FL(4)
NPS	mm	inch	mm	inch		10(3)	20	30	40	50	60	70	80	90	100	
1, 1-1/2, 2	6.4	1/4	19	3/4	Cv	0.001	0.001	0.003	0.007	0.012	0.017	0.023	0.03	0.037	0.044	0.775
					Kv	0.0009	0.0009	0.0026	0.0060	0.0103	0.0146	0.0198	0.0258	0.0318	0.0378	
					Cv	0.001	0.002	0.013	0.029	0.049	0.072	0.097	0.124	0.154	0.18	0.775
					Kv	0.0009	0.0017	0.0112	0.0249	0.0421	0.0619	0.0834	0.1066	0.1324	0.1548	
					Cv	0.001	0.004	0.028	0.063	0.105	0.154	0.207	0.265	0.326	0.38	0.775
					Kv	0.0009	0.0034	0.0241	0.0542	0.0903	0.1324	0.1780	0.2279	0.2804	0.3268	
	9.5	3/8	19	3/4	Cv	0.001	0.005	0.03	0.068	0.115	0.169	0.229	0.294	0.364	0.437	0.775
					Kv	0.0009	0.0043	0.0258	0.0585	0.0989	0.1453	0.1969	0.2528	0.3130	0.3758	
					Cv	0.001	0.006	0.042	0.095	0.16	0.235	0.318	0.407	0.503	0.603	0.775
					Kv	0.0009	0.0052	0.0361	0.0817	0.1376	0.2021	0.2735	0.3500	0.4326	0.5186	
					Cv	0.001	0.008	0.06	0.136	0.23	0.337	0.457	0.587	0.726	0.873	0.775
					Kv	0.0009	0.0069	0.0516	0.1170	0.1978	0.2898	0.3930	0.5048	0.6244	0.7508	
	19.1	3/4	19	3/4	Cv	0.002	0.016	0.115	0.263	0.445	0.654	0.886	1.138	1.407	1.69	0.775
					Kv	0.0017	0.0138	0.0989	0.2262	0.3827	0.5624	0.7620	0.9787	1.2100	1.4534	
					Cv	0.002	0.03	0.229	0.524	0.887	1.306	1.77	2.274	2.813	3.383	0.775
					Kv	0.0017	0.0258	0.1969	0.4506	0.7628	1.1232	1.5222	1.9556	2.4192	2.9094	

1. For additional capacities, contact GIS.
2. Micro-flat Cavitation trims use a shutoff port diameter which is 0.125 inch larger than the flowing port diameter. Use the shutoff port diameter for actuator sizing.
3. Clearance flow only
4. At 100% travel

CL600 - Flow Down

Linear Characteristic

Valve Size, NPS	Port Diameter		Total Travel		Minimum Throttling C_v(1)	Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L(3)
	mm	Inches	mm	Inches			10	20	30	40	50	60	70	80	90	100	
One Stage																	
1	33.3	1-5/16	25.4	1	1.9	C_v	0.25	0.48	2.36	5.04	7.36	9.47	11.2	13.1	14.6	15.5	0.90
						K_v	*0.216*	*0.415*	*2.04*	*4.36*	*6.37*	*8.19*	*9.69*	*11.3*	*12.6*	*13.4*	- - -
1-1/2	47.6	1-7/8	22.2	7/8	2.5	C_v	0.59	0.72	2.54	6.03	9.32	12.8	15.6	18.2	20.8	22.5	0.93
						K_v	*0.510*	*0.623*	*2.20*	*5.22*	*8.06*	*11.1*	*13.5*	*15.7*	*18.0*	*19.5*	- - -
2	58.7	2-5/16	28.6	1-1/8	3.9	C_v	0.84	1.49	6.68	12.3	17.3	22.1	26.7	30.9	34.4	36.1	0.93
						K_v	*0.727*	*1.29*	*5.78*	*10.6*	*15.0*	*19.1*	*23.1*	*26.7*	*29.8*	*31.2*	- - -
2-1/2	73.0	2-7/8	38.1(2)	1-1/2	4.2	C_v	0.84	6.83	16.2	25.0	33.0	41.2	48.8	55.5	61.7	64.4	0.91
						K_v	*0.727*	*5.91*	*14.0*	*21.6*	*28.5*	*35.6*	*42.2*	*48.0*	*53.4*	*55.7*	- - -
3	87.3	3-7/16	41.3(2)	1-5/8	4.6	C_v	1.65	10.8	22.3	34.3	45.3	55.5	64.7	72.7	80.0	86.7	0.89
						K_v	*1.43*	*9.34*	*19.3*	*29.7*	*39.2*	*48.0*	*56.0*	*62.9*	*69.2*	*75.0*	- - -
4	111.1	4-3/8	54.0(2)	2-1/8	5.2	C_v	3.64	22.4	41.7	60.1	78.3	96.5	115	129	136	140	0.90
						K_v	*3.15*	*19.4*	*36.1*	*52.0*	*67.8*	*83.6*	*99.6*	*112*	*118*	*121*	- - -
6(4)	177.8	7	57.2	2-1/4	10	C_v	4.6	30.0	65.3	99.7	134	165	195	219	241	259	0.91
						K_v	*4.0*	*25.9*	*56.5*	*86.2*	*116*	*143*	*169*	*189*	*208*	*224*	- - -
8	203.2	8	85.7	3-3/8	15	C_v	16.2	70.2	124	176	227	276	324	370	412	439	0.94
						K_v	*14.0*	*60.7*	*107*	*152*	*196*	*239*	*280*	*320*	*356*	*380*	- - -
Two Stage																	
1	25.4	1	25	1	0.28	C_v	0.11	0.41	1.08	1.75	2.43	3.10	3.78	4.45	5.12	5.80	0.98
						K_v	*0.095*	*0.355*	*0.934*	*1.51*	*2.10*	*2.68*	*3.27*	*3.85*	*4.43*	*5.02*	- - -
1-1/2	33.3	1-5/16	38	1-1/2	0.44	C_v	0.22	1.20	2.23	3.26	4.29	5.31	6.355	7.37	8.40	9.40	0.98
						K_v	*0.19*	*1.04*	*1.93*	*2.82*	*3.71*	*4.59*	*5.50*	*6.38*	*7.27*	*8.13*	- - -
2	47.6	1-7/8	51	2	0.92	C_v	0.80	3.05	5.29	7.56	9.83	12.1	14.3	16.5	18.8	21.0	0.98
						K_v	*0.692*	*2.64*	*4.58*	*6.54*	*8.50*	*10.5*	*12.4*	*14.3*	*16.3*	*18.2*	- - -
2-1/2	58.7	2-5/16	64	2-1/2	1.10	C_v	1.75	5.25	8.71	12.2	15.6	19.1	22.6	26.1	29.6	33.0	0.98
						K_v	*1.51*	*4.54*	*7.53*	*10.6*	*13.5*	*16.5*	*19.5*	*22.6*	*25.6*	*28.5*	- - -
3	73.0	2-7/8	76	3	1.20	C_v	3.14	8.23	13.3	18.5	23.5	28.7	33.8	38.9	44.0	49.0	0.98
						K_v	*2.72*	*7.12*	*11.5*	*16.0*	*20.3*	*24.8*	*29.2*	*33.6*	*38.1*	*42.4*	- - -
4	73.0	2-7/8	102	4	1.90	C_v	2.83	11.2	19.4	27.4	35.5	43.2	50.5	57.1	63.2	69.0	0.98
						K_v	*2.45*	*9.69*	*16.8*	*23.7*	*30.7*	*37.4*	*43.7*	*49.4*	*54.7*	*59.7*	- - -
6(4)	136.5	5-3/8	102	4	3.00	C_v	6.05	22.5	38.0	53.7	69.4	85.2	100	115	130	144	0.98
						K_v	*5.23*	*19.5*	*32.9*	*46.5*	*60.0*	*73.7*	*86.5*	*99.5*	*112*	*125*	- - -
8	177.8	7	152	6	7.00	C_v	19.8	47.5	74.5	101	129	156	184	211	238	265	0.98
						K_v	*17.1*	*41.1*	*64.4*	*87.4*	*112*	*135*	*159*	*183*	*206*	*229*	- - -

1. Valves should not be required to throttle at a C_v less than the specified minimum C_v for an extended period of time. Erosion damage to the valve seats may result.
2. Less than fully available travel.
3. At 100% travel.
4. These values are also used to size NPS 8 EAT valves.

CL300-CL600 - DST(4), Flow Down

Linear Characteristic

Valve Size, NPS	Port Diameter		Total Travel		Unbalanced Area, in^2	Minimum Throttling C_v(1)	Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(2)	K_n
	mm	Inches	mm	Inches				10	20	30	40	50	60	70	80	90	100		
								Two Stage											
3	63.50	2.5	19.05	0.75	0.041	1.00	C_V	(3)	1.4	7.8	15.9	24	31	36	41	45	48	0.95	3.0
4	87.31	3.437	31.75	1.25	0.118	1.70	C_V	(3)	3.6	11.9	25	39	51	61	70	77	82	0.95	3.0
6	111.13	4.375	38.10	1.5	0.154	2.80	C_V	0.92	9.2	28	56	84	108	129	146	160	172	0.95	3.0
								Three Stage											
3	63.50	2.5	19.05	0.75	0.041	0.80	C_V	(3)	1.0	5.1	10.5	15.9	21	26	30	33	36	0.97	3.0
4	87.31	3.437	31.75	1.25	0.118	1.50	C_V	(3)	2.5	8.3	17.4	28	37	45	52	57	62	0.97	3.0
6	111.13	4.375	38.10	1.5	0.154	2.20	C_V	0.71	6.1	18.2	36	55	73	89	104	116	128	0.97	3.0
8	136.53	5.375	50.80	2	0.206	5.00	C_V	2.6	11.4	32	60	87	111	133	153	170	185	0.97	4.0

1. Valves should not be required to throttle at a Cv less than the specified minimum Cv for an extended period of time. Erosion damage to the valve seats may result.
2. At 100% travel.
3. Clearance flow only.
4. For use with R31233 trim only, for additional capacities, contact your Emerson sales office.

Linear

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Construction	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L(1)
	mm	Inches	mm	Inches			Min(2)	10	20	30	40	50	60	70	80	90	100	
12	279.4	11	102	4	SNC	Cv	40	155	300	450	610	770	940	1100	1250	1390	1500	0.88
						Kv	34.6	134	260	389	528	666	813	952	1081	1202	1298	- - -
						Xt	0.391	0.609	0.678	0.676	0.645	0.654	0.693	0.746	0.789	0.799	0.792	- - -
			140	5.5		Cv	40	206	415	630	852	1079	1295	1465	1557	1570	1570	0.88
						Kv	34.6	178	359	545	737	933	1120	1267	1347	1358	1358	- - -
						Xt	0.391	0.644	0.683	0.644	0.654	0.704	0.769	0.792	0.775	0.818	0.82	- - -
14	279.4	11	102	4	SNC	Cv	40	106	222	368	541	727	922	1109	1283	1437	1560	0.88
						Kv	34.6	92	192	319	468	629	797	959	1110	1243	1350	- - -
						Xt	0.391	0.837	0.811	0.749	0.703	0.703	0.722	0.748	0.769	0.774	0.777	- - -
			140	5.5		Cv	40	206	415	629	838	1110	1420	1630	1760	1850	1860	0.88
						Kv	34.6	178	359	544	725	960	1228	1410	1522	1600	1609	- - -
						Xt	0.391	0.99	0.77	0.70	0.72	0.78	0.80	0.80	0.81	0.79	0.82	- - -
16x12	279.4	11	102	4	SNC	Cv	40	73	169	314	495	698	909	1115	1305	1468	1601	0.88
						Kv	34.6	63	146	272	428	604	786	965	1128	1270	1385	- - -
						Xt	0.391	0.989	0.899	0.797	0.742	0.735	0.741	0.749	0.756	0.758	0.767	- - -
			140	5.5		Cv	40	90	300	500	800	1100	1350	1550	1700	1800	1875	0.88
						Kv	34.6	78	260	433	692	952	1168	1341	1471	1557	1622	- - -
						Xt	0.391	0.989	0.899	0.797	0.742	0.735	0.741	0.749	0.756	0.758	0.767	- - -
16	374.7	14.75	102	4	SNC	Cv	76	202	456	709	963	1232	1534	1900	2234	2526	2772	0.85
						Kv	66	175	394	613	833	1066	1327	1644	1933	2185	2398	- - -
						Xt		0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	- - -
						Fd		0.19	0.26	0.29	0.31	0.31	0.27	0.27	0.28	0.35	0.30	- - -
			140	5.5		Cv	124	298	649	1000	1376	1846	2324	2701	2988	3188	3312	0.85
						Kv	107	258	562	865	1190	1597	2010	2337	2585	2757	2865	- - -
						Xt		0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	- - -
						Fd		0.22	0.28	0.31	0.29	0.27	0.29	0.30	0.30	0.31	0.31	- - -
18	374.7	14.75	102	4	SNC	Cv	82	218	492	765	1038	1310	1622	1989	2311	2583	2810	0.85
						Kv	71	189	426	662	899	1134	1404	1721	2000	2236	2431	- - -
						Xt		0.81	0.81	0.76	0.76	0.78	0.78	0.86	0.82	0.79	0.81	- - -
						Fd		0.18	0.22	0.23	0.20	0.19	0.20	0.20	0.20	0.20	0.21	- - -
			140	5.5		Cv	133	322	701	1078	1460	1935	2396	2745	3010	3208	3351	0.85
						Kv	115	279	606	933	1263	1674	2073	2375	2605	2776	2900	- - -
						Xt		0.81	0.81	0.76	0.76	0.78	0.78	0.86	0.82	0.79	0.81	- - -
						Fd		0.22	0.28	0.31	0.29	0.27	0.29	0.30	0.30	0.31	0.31	- - -
20 x 16	374.7	14.75	102	4	SNC	Cv	80	213	480	747	1038	1316	1644	2044	2413	2742	3026	0.85
						Kv	70	184	415	646	898	1139	1422	1768	2087	2371	2618	- - -
						Xt		0.81	0.81	0.76	0.76	0.78	0.78	0.86	0.82	0.79	0.81	- - -
						Fd		0.18	0.22	0.23	0.20	0.19	0.20	0.20	0.20	0.20	0.21	- - -
			140	5.5		Cv	130	314	683	1079	1472	1984	2514	2944	3286	3543	3721	0.85
						Kv	113	272	591	933	1274	1716	2174	2546	2842	3065	3219	- - -
						Xt		0.81	0.81	0.76	0.76	0.78	0.78	0.86	0.82	0.79	0.81	- - -
						Fd		0.22	0.28	0.31	0.29	0.27	0.29	0.30	0.30	0.31	0.31	- - -
24 x 16	374.7	14.75	102	4	SNC	Cv	80	213	480	747	1000	1283	1627	2065	2490	2888	3253	0.85
						Kv	70	184	415	646	865	1110	1407	1786	2153	2498	2814	- - -
						Xt	0.81	0.81	0.81	0.76	0.76	0.78	0.78	0.86	0.82	0.79	0.81	- - -
						Fd		0.18	0.22	0.23	0.20	0.19	0.20	0.20	0.20	0.20	0.21	- - -
			140	5.5		Cv	130	314	683	1041	1445	1998	2609	3145	3606	3982	4265	0.85
						Kv	113	272	591	900	1250	1728	2257	2720	3119	3444	3689	- - -
						Xt	0.81	0.81	0.81	0.76	0.76	0.78	0.78	0.86	0.82	0.79	0.81	- - -
						Fd		0.22	0.28	0.31	0.29	0.27	0.29	0.30	0.30	0.31	0.31	- - -

1. At 100% travel.
2. Clearance flow only

Valve Size, NPS	Port Diameter		Maximum Travel		Construction	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L(1)
	mm	Inches	mm	Inches			Min(2)	10	20	30	40	50	60	70	80	90	100	
20	464	18.25	203	8	SNC	Cv	270	647	1377	2089	2720	3274	3747	4309	4787	5196	5196	0.85
						Kv	234	560	1192	1808	2354	2833	3243	3729	4143	4497	4497	- - -
						Xt	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	- - -
						Fd		0.22	0.28	0.31	0.32	0.32	0.31	0.30	0.30	0.30	0.30	- - -
24x20	464	18.25	203	8	SNC	Cv	271	649	1394	2123	2827	3455	4010	4589	5157	5626	5841	0.85
						Kv	234	562	1206	1837	2446	2990	3470	3971	4463	4869	5055	- - -
						Xt	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	- - -
						Fd		0.22	0.28	0.31	0.32	0.32	0.31	0.30	0.30	0.30	0.30	- - -
30	610	24	302	11.88	SN	C_v	100	906	2000	3080	4230	5290	6690	7710	8450	9260	9530	0.99
						K_v	87	784	1730	2664	3659	4576	5787	6669	7309	8010	8243	- - -
						X_T		0.7	0.73	0.72	0.75	0.72	0.74	0.71	0.74	0.72	0.71	- - -

1. At 100% travel.
2. Clearance flow only

Equal Percentage

Equal Percentage Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Construction	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L(1)
	mm	Inches	mm	Inches			Min(2)	10	20	30	40	50	60	70	80	90	100	
12	279.4	11	140	5.5	SNC	Cv	22	50	91	141	222	352	540	797	1127	1361	1488	0.88
						Kv	19.0	43	79	122	192	304	467	689	975	1177	1287	- - -
						Xt	0.391	0.747	0.731	0.706	0.650	0.584	0.575	0.610	0.679	0.797	0.804	- - -
14	279.4	11	140	5.5	SNC	Cv	22	51	95	139	193	277	406	582	803	1079	1397	0.88
						Kv	19.0	44	82	120	167	240	351	503	695	933	1208	- - -
						Xt	0.391	0.894	0.891	0.883	0.855	0.788	0.711	0.674	0.696	0.728	0.780	- - -
16x12	279.4	11	140	5.5	SNC	Cv	21	58	109	158	220	317	463	664	917	1232	1595	0.88
						Kv	20.3	56.0	105	153	212	306	447	641	885	1189	1539	- - -
						Xt	0.391	0.99	0.994	0.995	0.987	0.916	0.805	0.738	0.743	0.752	0.764	- - -
16	374.7	14.75	102	4	SNC	Cv	7	22	54	86	136	213	321	477	695	1010	1414	0.85
						Kv	6	19	47	74	117	184	277	412	601	873	1223	- - -
						Xt		0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	- - -
						Fd		0.41	0.46	0.45	0.27	0.28	0.27	0.26	0.24	0.22	0.24	- - -
			140	5.5	SNC	Cv	13	35	79	145	263	454	765	1272	1808	2278	2664	0.85
						Kv	11	30	68	125	228	393	662	1100	1564	1971	2304	---
						Xt		0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	---
						Fd		0.45	0.46	0.39	0.28	0.26	0.24	0.23	0.26	0.27	0.28	---
			203	8	LNC	Cv	34	77	163	249	433	670	1003	1490	2154	2686	3054	0.85
						Kv	29	66	141	216	375	579	868	1289	1863	2323	2642	- - -
						Xt		0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	- - -
						Fd		0.46	0.45	0.42	0.25	0.32	0.25	0.21	0.23	0.25	0.26	- - -
18	374.7	14.75	102	4	SNC	Cv	8	24	58	93	146	230	346	514	750	1088	1499	0.85
						Kv	7	21	50	80	127	199	299	445	649	942	1297	---
						Xt		0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	---
						Fd		0.46	0.45	0.42	0.25	0.32	0.25	0.21	0.23	0.25	0.26	---
			140	5.5	SNC	Cv	14	38	85	156	284	490	825	1351	1897	2352	2711	0.85
						Kv	12	33	74	135	246	424	714	1169	1642	2036	2346	- - -
						Xt		0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	- - -
						Fd		0.46	0.45	0.42	0.25	0.32	0.25	0.21	0.23	0.25	0.26	- - -
			203	8	SNC	Cv	36	83	176	269	467	723	1082	1577	2234	2730	3073	0.85
						Kv	31	72	152	233	404	625	936	1364	1933	2363	2660	- - -
						Xt		0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	- - -
						Fd		0.46	0.45	0.42	0.25	0.32	0.25	0.21	0.23	0.25	0.26	- - -
20 x 16	374.7	14.75	102	4	SNC	Cv	8	23	57	90	143	224	338	502	732	1089	1513	0.85
						Kv	7	20	49	78	123	194	292	434	633	942	1309	---
						Xt	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	---
						Fd		0.46	0.45	0.42	0.25	0.32	0.25	0.21	0.23	0.25	0.26	---
			140	5.5	SNC	Cv	14	37	83	153	277	478	805	1359	1943	2462	2900	0.85
						Kv	12	32	72	132	240	413	696	1175	1681	2130	2509	- - -
						Xt	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	- - -
						Fd		0.46	0.45	0.42	0.25	0.32	0.25	0.21	0.23	0.25	0.26	- - -
			203	8	SNC	Cv	35	81	172	262	456	705	1082	1596	2324	2925	3369	0.85
						Kv	31	70	148	227	394	610	936	1380	2010	2530	2914	- - -
						Xt	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	- - -
						Fd		0.46	0.45	0.42	0.25	0.32	0.25	0.21	0.23	0.25	0.26	- - -
24 x 16	374.7	14.75	102	4	SNC	C_V	8	23	57	90	143	224	338	502	732	1089	1513	0.85
						K_V	7	20	49	78	123	194	292	434	633	942	1309	---
						X_T	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	---
						Fd		0.46	0.45	0.42	0.25	0.32	0.25	0.21	0.23	0.25	0.26	---
			140	5.5	SNC	Cv	14	37	83	153	277	478	805	1327	1952	2548	3089	0.85
						Kv	12	32	72	132	240	413	696	1148	1688	2204	2672	- - -
						Xt	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	- - -
						Fd		0.46	0.45	0.42	0.25	0.32	0.25	0.21	0.23	0.25	0.26	- - -
			203	8	SNC	Cv	34	77	165	252	437	676	1044	1575	2385	3121	3724	0.85
						Kv	29	67	142	218	378	585	903	1363	2063	2700	3221	- - -
						Xt	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	- - -
						Fd		0.46	0.45	0.42	0.25	0.32	0.25	0.21	0.23	0.25	0.26	- - -

1. At 100% travel.
2. Clearance flow only

Valve Size, NPS	**Port Diameter**		**Maximum Travel**		**Construction**	**Flow Coefficient**	**Valve Opening—Percent of Total Travel**											F_L[1]
	mm	**Inches**	**mm**	**Inches**			**Min**[2]	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**	
20	464	18.25	203	8	SNC	Cv	38	90	214	408	733	1276	2122	2954	3661	4270	4820	0.85
						Kv	33	78	185	353	634	1104	1836	2557	3168	3695	4171	- - -
						Xt	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	- - -
						Fd	- - -	0.31	0.28	0.25	0.24	0.22	0.23	0.25	0.27	0.28	0.29	- - -
24x20	464	18.25	203	8	SNC	Cv	38	91	215	410	736	1282	2159	3087	3891	4579	5182	0.85
						Kv	33	78	186	355	637	1109	1868	2671	3368	3963	4484	- - -
						Xt	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	- - -
						Fd	- - -	0.31	0.28	0.25	0.24	0.22	0.23	0.25	0.27	0.28	0.29	- - -
30	610	24	302	11.88	SN	C_V	70	126	305	520	876	1343	2200	3599	5150	6563	7690	0.99
						K_V	61	109	264	450	758	1162	1903	3113	4455	5677	6652	- - -
						X_T	- - -	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.65	0.68	0.7	- - -

1. At 100% travel.
2. Clearance flow only

Whisper Trim III - Level A1 - Flow Up

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Construction	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L[1]
	mm	Inches	mm	Inches			Min[2]	10	20	30	40	50	60	70	80	90	100	
12	279.4	11	140	5.5	SNC	Cv	25	144	295	441	576	696	803	904	991	1070	1137	0.89
						Kv		125	255	381	498	602	695	782	857	926	984	- - -
						Xt		0.62	0.62	0.62	0.65	0.7	0.75	0.81	0.86	0.86	0.86	- - -
			203	8	LNC	Cv	25	212	428	622	785	930	1052	1150	1229	1285	1315	0.89
						Kv		183	370	538	679	804	910	995	1063	1112	1137	- - -
						Xt		0.619	0.620	0.665	0.739	0.827	0.856	0.854	0.852	0.849	0.847	- - -
14	279.4	11	140	5.5	SNC	Cv	25	144	295	441	584	721	851	981	1104	1225	1318	0.89
						Kv		125	255	381	505	623	736	849	955	1059	1140	- - -
						Xt		0.62	0.62	0.62	0.63	0.65	0.67	0.70	0.72	0.72	0.73	- - -
			203	8	LNC	Cv	25	212	428	635	828	1016	1194	1332	1420	1482	1515	0.89
						Kv		183	370	549	716	879	1033	1153	1229	1282	1310	- - -
						Xt		0.619	0.620	0.639	0.668	0.703	0.715	0.739	0.800	0.823	0.824	- - -
16x12	279.4	11	140	5.5	SNC	Cv	25	144	295	441	589	737	883	1033	1179	1328	1439	0.89
						Kv		125	255	381	509	638	764	894	1020	1149	1245	- - -
						Xt		0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.65	- - -
			203	8	LNC	Cv	25	212	428	644	857	1073	1289	1454	1548	1613	1648	0.89
						Kv		183	370	557	741	928	1115	1258	1339	1395	1425	- - -
						Xt		0.619	0.620	0.621	0.621	0.621	0.621	0.663	0.765	0.805	0.809	- - -
16	374.7	14.75	203	8.00	LNC	Cv	38	335	677	1019	1298	1529	1721	1871	1985	2059	2095	089
						Kv		290	585	882	1123	1322	1488	1618	1717	1781	1812	- - -
						Xt		0.436	0.433	0.432	0.471	0.533	0.589	0.616	0.647	0.686	0.732	- - -
	412.7	16.25	203	8.00	LNC	Cv	42	353	732	1104	1389	1628	1817	1960	2057	2106	2113	0.89
						Kv		305	633	955	1201	1408	1572	1695	1779	1822	1828	- - -
						Xt		0.436	0.433	0.432	0.490	0.563	0.603	0.635	0.674	0.722	0.780	- - -
18	412.7	16.25	203	8.00	SNC	Cv	53	287	636	992	1335	1634	1896	2108	2278	2412	2512	0.84
						Kv	46	249	551	858	1156	1414	1641	1824	1972	2088	2174	- - -
						Xt		0.50	0.52	0.52	0.51	0.52	0.55	0.60	0.65	0.70	0.76	- - -
			276	10.88	LNC	Cv	53	416	892	1361	1754	2067	2301	2466	2580	2676	2731	0.84
						Kv	46	360	772	1178	1517	1789	1991	2134	2233	2316	2363	- - -
						Xt		0.51	0.52	0.51	0.54	0.59	0.66	0.73	0.82	0.90	0.92	- - -
			378	14.88	LNC	Cv	53	587	1243	1791	2187	2445	2599	2702	2809	2912	2959	0.84
						Kv	46	508	1075	1550	1893	2116	2249	2339	2431	2520	2561	- - -
						Xt		0.52	0.51	0.55	0.61	0.72	0.83	0.90	0.94	0.91	0.94	- - -
20x16	412.7	16.25	203	8.00	SNC	C_V	41	353	732	1104	1480	1859	2231	2508	2757	2973	3161	0.89
						K_V		305	633	955	1280	1608	1930	2170	2385	2572	2735	- - -
						X_T		0.436	0.433	0.432	0.432	0.432	0.432	0.466	0.506	0.550	0.572	- - -
			276	10.88	LNC	C_V	41	489	1001	1514	2026	2460	2797	3080	3309	3485	3607	0.89
						K_V		423	866	1309	1752	2128	2420	2664	2863	3014	3120	- - -
						X_T		0.434	0.433	0.432	0.432	0.459	0.513	0.565	0.587	0.612	0.642	- - -
			378	14.88	LNC	Cv	41	681	1376	2079	2626	3038	3353	3564	3678	3696	3696	0.89
						Kv		589	1190	1798	2272	2628	2900	3083	3181	3197	3197	- - -
						Xt		0.434	0.432	0.432	0.483	0.561	0.592	0.629	0.676	0.734	0.776	- - -
24x16	412.7	16.25	203	8.00	SNC	C_V	41	353	732	1104	1480	1859	2218	2501	2759	2986	3188	0.89
						K_V		305	633	955	1280	1608	1919	2163	2387	2583	2758	- - -
						X_T		0.436	0.433	0.432	0.432	0.432	0.436	0.469	0.505	0.545	0.564	- - -
			276	10.88	LNC	C_V	41	489	1001	1513	2025	2450	2799	3099	3350	3552	3705	0.89
						K_V		423	866	1309	1752	2119	2421	2681	2898	3072	3205	- - -
						X_T		0.434	0.433	0.432	0.432	0.462	0.511	0.558	0.576	0.595	0.618	- - -
			378	14.88	LNC	Cv	41	680	1374	2077	2621	3054	3399	3648	3809	3877	3880	0.89
						Kv		588	1189	1797	2267	2642	2940	3156	3295	3354	3356	- - -
						Xt		0.43	0.43	0.43	0.48	0.56	0.58	0.61	0.64	0.69	0.73	- - -

1. At 100% travel.
2. Clearance flow only

Valve Size, NPS	Port Diameter		Maximum Travel		Construction	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L(1)
	mm	Inches	mm	Inches			Min(2)	10	20	30	40	50	60	70	80	90	100	
20	502	19.75	276	10.88	SNC	Cv	50	593	1217	1841	2351	2767	3111	3382	3580	3706	3760	0.89
						Kv	43	513	1053	1593	2034	2394	2691	2925	3097	3206	3252	- - -
						Xt	- - -	0.434	0.433	0.432	0.475	0.538	0.592	0.619	0.652	0.692	0.741	- - -
			378	14.88	LNC	Cv	84	825	1672	2397	2939	3343	3615	3749	3766	3766	3766	0.89
						Kv	73	714	1446	2073	2542	2891	3127	3243	3258	3258	3258	- - -
						Xt	- - -	0.43	0.43	0.48	0.57	0.61	0.66	0.72	0.79	0.84	0.85	- - -
24x20	502	19.75	276	10.88	SNC	Cv	75	521	1069	1617	2106	2546	2949	3313	3640	3929	4180	0.89
						Kv	65	450	924	1398	1822	2203	2551	2866	3148	3398	3615	- - -
						Xt	- - -	0.53	0.53	0.52	0.55	0.56	0.58	0.59	0.61	0.63	0.65	- - -
			378	14.88	LNC	Cv	46	727	1478	2197	2879	3404	3841	4020	4245	4416	4657	0.89
						Kv	40	629	1278	1900	2490	2944	3322	3477	3672	3820	4028	- - -
						Xt	- - -	0.529	0.528	0.528	0.528	0.531	0.586	0.649	0.721	0.746	0.775	- - -
			429	16.88	LNC	Cv	46	825	1675	2488	3180	3687	4008	4213	4417	4706	5038	0.89
						Kv	40	714	1449	2152	2751	3190	3467	3645	3821	4071	4358	- - -
						Xt	- - -	0.529	0.528	0.528	0.528	0.567	0.636	0.719	0.748	0.781	0.821	- - -
30	660	26	302	11.88	SN	C_V	60	728	1490	2254	3018	3782	4543	5123	5638	6099	6505	0.99
						K_V	52	630	1289	1950	2611	3271	3930	4431	4877	5276	5627	- - -
						X_T	- - -	0.6	0.6	0.6	0.6	0.6	0.56	0.57	0.58	0.6	0.61	- - -
			505	19.88	LN	C_V	60	1380	2720	4040	5200	6040	6700	7040	7210	7440	7670	0.99
						K_V	52	1194	2353	3495	4498	5225	5796	6090	6237	6436	6635	- - -
						X_T	- - -	0.32	0.36	0.4	0.42	0.49	0.51	0.56	0.61	0.65	0.72	- - -

1. At 100% travel.
2. Clearance flow only

Whisper Trim - Level A3 - Flow Up

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Constr uction	Flow Coeffi-cient	Valve Opening—Percent of Total Travel											F_L(1)
	mm	Inches	mm	Inches			Min(2)	10	20	30	40	50	60	70	80	90	100	
12	279.4	11	140	5.5	SNC	Cv	17	123	253	381	508	617	719	813	901	978	1049	0.89
						Kv		106	219	330	439	534	622	703	779	846	907	---
						Xt		0.62	0.62	0.62	0.62	0.66	0.71	0.76	0.81	0.86	0.86	---
			203	8	LNC	Cv	17	181	371	550	705	839	960	1063	1149	1219	1272	0.89
						Kv		157	321	475	610	726	831	919	994	1055	1100	---
						Xt		0.619	0.620	0.638	0.700	0.769	0.851	0.856	0.854	0.852	0.850	---
14	279.4	11	140	5.5	SNC	Cv	17	123	253	381	509	630	748	863	978	1086	1192	0.89
						Kv		106	219	330	440	545	647	747	846	939	1031	---
						Xt		0.62	0.62	0.62	0.62	0.64	0.66	0.68	0.70	0.72	0.72	---
			203	8	LNC	Cv	17	181	371	554	731	896	1059	1212	1331	1410	1467	0.89
						Kv		157	321	479	632	775	916	1048	1152	1219	1269	---
						Xt		0.62	0.62	0.63	0.65	0.68	0.71	0.72	0.74	0.79	0.82	---
16x12	279.4	11	140	5.5	SNC	Cv	17	123	253	381	510	638	767	897	1029	1158	1287	0.89
						Kv		106	219	330	441	552	663	776	890	1002	1113	---
						Xt		0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	---
			203	8	LNC	Cv	17	181	371	557	748	934	1125	1311	1453	1537	1597	0.89
						Kv		157	321	482	647	808	973	1134	1256	1329	1381	---
						Xt		0.619	0.620	0.620	0.621	0.621	0.621	0.621	0.663	0.751	0.805	---
16	374.7	14.75	203	8.00	LNC	Cv	25	290	593	892	1178	1396	1590	1749	1880	1980	2049	0.89
						Kv		251	513	772	1019	1208	1375	1513	1626	1713	1772	- - -
						Xt		0.436	0.433	0.433	0.447	0.495	0.554	0.594	0.618	0.646	0.679	- - -
	412.7	16.25	203	8.00	LNC	Cv	28	317	652	979	1270	1497	1693	1849	1970	2054	2100	0.89
						Kv		274	564	847	1099	1295	1464	1599	1704	1777	1817	- - -
						Xt		0.436	0.433	0.433	0.463	0.520	0.584	0.609	0.638	0.673	0.714	- - -
18	412.7	16.25	203	8.00	SNC	Cv	27	244	554	867	1173	1466	1715	1937	2120	2271	2393	0.84
						Kv	23	211	479	751	1015	1269	1484	1676	1835	1965	2071	- - -
						Xt		0.50	0.52	0.52	0.52	0.52	0.53	0.56	0.60	0.64	0.69	- - -
			276	10.88	LNC	Cv	27	354	779	1197	1581	1893	2148	2336	2477	2575	2650	0.84
						Kv	23	306	674	1036	1368	1638	1858	2022	2143	2229	2293	- - -
						Xt		0.51	0.52	0.51	0.52	0.55	0.61	0.67	0.74	0.82	0.88	- - -
			378	14.88	LNC	Cv	27	514	1086	1613	2022	2311	2499	2620	2709	2792	2899	0.84
						Kv	23	444	940	1396	1750	2000	2162	2267	2344	2416	2509	- - -
						Xt		0.52	0.52	0.52	0.58	0.66	0.75	0.86	0.91	0.94	0.94	- - -
20x16	412.7	16.25	203	8.00	SNC	Cv	28	317	651	979	1315	1642	1978	2291	2531	2750	2938	0.89
						Kv		274	563	847	1138	1420	1711	1981	2189	2379	2541	- - -
						Xt		0.436	0.433	0.432	0.432	0.432	0.432	0.438	0.469	0.505	0.542	- - -
			276	10.88	LNC	Cv	28	438	886	1343	1790	2245	2569	2857	3099	3302	3461	0.89
						Kv		379	767	1161	1548	1942	2222	2472	2680	2856	2993	- - -
						Xt		0.435	0.433	0.432	0.432	0.432	0.475	0.525	0.566	0.586	0.608	- - -
			378	14.88	LNC	Cv	28	601	1223	1843	2403	2814	3148	3402	3576	3674	3695	0.89
						Kv		520	1058	1594	2079	2434	2723	2943	3093	3178	3196	- - -
						Xt		0.434	0.432	0.432	0.451	0.516	0.570	0.599	0.632	0.674	0.725	- - -
24x16	412.7	16.25	203	8.00	SNC	Cv	28	304	635	970	1297	1634	1961	2269	2515	2740	2914	0.89
						Kv		263	549	839	1122	1413	1696	1963	2175	2370	2521	- - -
						Xt		0.436	0.433	0.433	0.432	0.432	0.432	0.442	0.471	0.503	0.532	- - -
			276	10.88	LNC	Cv	28	421	877	1324	1781	2216	2557	2852	3114	3334	3519	0.89
						Kv		364	759	1145	1541	1917	2212	2467	2694	2884	3044	- - -
						Xt		0.435	0.433	0.432	0.432	0.436	0.476	0.520	0.559	0.574	0.592	- - -
			378	14.88	LNC	Cv	28	592	1205	1824	2383	2811	3163	3447	3660	3801	3870	0.89
						Kv		512	1042	1578	2061	2432	2736	2982	3166	3288	3348	- - -
						Xt		0.43	0.43	0.43	0.45	0.51	0.56	0.58	0.61	0.64	0.68	- - -

1. At 100% travel.
2. Clearance flow only

Valve Size, NPS	Port Diameter		Maximum Travel		Constr uction	Flow Coeffi-cient	Valve Opening—Percent of Total Travel											F_L[1]
	mm	Inches	mm	Inches			Min[2]	10	20	30	40	50	60	70	80	90	100	
20	502	19.75	276	10.88	SNC	Cv	33	509	1056	1592	2103	2498	2843	3132	3365	3547	3671	0.89
						Kv	29	440	914	1377	1819	2161	2459	2709	2911	3068	3175	- - -
						Xt	- - -	0.435	0.433	0.432	0.446	0.495	0.553	0.594	0.618	0.646	0.678	- - -
			378	14.88	LNC	Cv	50	711	1447	2144	2670	3091	3409	3628	3744	3765	3765	0.89
						Kv	43	615	1252	1855	2310	2674	2949	3138	3239	3256	3256	- - -
						Xt	- - -	0.43	0.43	0.45	0.52	0.59	0.62	0.66	0.72	0.78	0.83	- - -
24x20	502	19.75	276	10.88	SNC	Cv	45	448	928	1398	1877	2258	2632	2975	3290	3580	3837	0.89
						Kv	39	387	802	1209	1623	1953	2276	2574	2846	3096	3319	- - -
						Xt	- - -	0.53	0.53	0.52	0.52	0.57	0.56	0.58	0.59	0.61	0.62	- - -
			378	14.88	LNC	Cv	31	628	1275	1923	2537	3072	3502	3820	4037	4192	4338	0.89
						Kv	27	543	1103	1663	2194	2658	3029	3304	3492	3626	3753	- - -
						Xt	- - -	0.529	0.528	0.528	0.528	0.528	0.541	0.590	0.646	0.709	0.737	- - -
			429	16.88	LNC	Cv	31	718	1455	2175	2833	3373	3767	4026	4203	4374	4604	0.89
						Kv	27	621	1258	1881	2450	2918	3258	3482	3636	3784	3982	- - -
						Xt	- - -	0.529	0.528	0.528	0.528	0.528	0.580	0.642	0.714	0.742	0.770	- - -
30	660	26	302	11.88	SN	C_V	50	644	1316	1988	2660	3331	4003	4675	5153	5608	6021	0.99
						K_V	43	557	1138	1720	2301	2881	3463	4044	4457	4851	5208	- - -
						X_T	- - -	0.6	0.6	0.6	0.6	0.6	0.58	0.55	0.57	0.58	0.59	- - -
			505	19.88	LN	C_V	50	1092	2222	3352	4472	5335	6045	6639	7113	7462	7695	0.99
						K_V	43	945	1922	2899	3868	4615	5229	5743	6153	6455	6656	- - -
						X_T	- - -	0.6	0.6	0.6	0.56	0.57	0.59	0.62	0.65	0.68	0.72	- - -

1. At 100% travel.
2. Clearance flow only

Whisper Trim - Level B1 - Flow Up

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Construction	Flow Coeffi-cient	Valve Opening—Percent of Total Travel											F_L[1]
	mm	Inches	mm	Inches			Min[2]	10	20	30	40	50	60	70	80	90	100	
12	279.4	11	140	5.5	SNC	Cv	21	79	157	238	311	384	464	537	597	659	721	0.89
						Kv		68	136	206	269	332	401	465	516	570	624	---
						Xt		0.62	0.62	0.62	0.62	0.62	0.62	0.64	0.66	0.68	0.71	---
			203	8	LNC	Cv	21	120	228	337	453	557	646	730	813	889	949	0.89
						Kv		104	197	291	392	482	559	631	703	769	821	---
						Xt		0.618	0.619	0.620	0.620	0.641	0.675	0.713	0.756	0.803	0.846	---
14	279.4	11	140	5.5	SNC	Cv	21	79	157	238	311	384	464	541	607	678	751	0.89
						Kv		68	136	206	269	332	401	468	525	586	650	---
						Xt		0.62	0.62	0.62	0.62	0.62	0.62	0.63	0.64	0.64	0.66	---
			203	8	LNC	Cv	21	120	228	337	453	562	663	761	863	962	1044	0.89
						Kv		104	197	292	392	486	573	658	747	832	903	---
						Xt		0.62	0.62	0.62	0.62	0.63	0.64	0.66	0.68	0.69	0.71	---
16x12	279.4	11	140	5.5	SNC	Cv	21	79	157	238	311	384	464	543	614	690	771	0.89
						Kv		68	136	206	269	332	401	470	531	597	667	---
						Xt		0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	---
			203	8	LNC	Cv	21	120	228	337	453	566	674	782	897	1011	1107	0.89
						Kv		104	197	291	392	489	583	676	776	875	958	---
						Xt		0.618	0.619	0.620	0.620	0.621	0.621	0.621	0.621	0.621	0.621	---
16	374.7	14.75	203	8.00	LNC	Cv	32	197	374	554	746	933	1111	1248	1385	1509	1603	0.89
						Kv		170	324	479	645	807	961	1080	1198	1305	1387	- - -
						Xt		0.438	0.435	0.433	0.433	0.432	0.432	0.461	0.493	0.528	0.56	- - -
	412.7	16.25	203	8.00	LNC	Cv	35	215	408	605	814	1018	1190	1337	1477	1604	1699	0.89
						Kv		186	353	523	704	881	1029	1157	1278	1387	1470	- - -
						Xt		0.438	0.435	0.433	0.433	0.432	0.448	0.479	0.515	0.556	0.586	- - -
18	412.7	16.25	203	8.00	SNC	Cv	39	158	354	538	719	908	1105	1290	1453	1610	1762	0.84
						Kv	34	137	306	465	622	786	956	1116	1258	1393	1525	- - -
						Xt		0.48	0.51	0.52	0.52	0.52	0.52	0.51	0.52	0.52	0.54	- - -
			276	10.88	LNC	Cv	39	233	477	743	988	1256	1477	1692	1875	2040	2178	0.84
						Kv	34	202	413	643	855	1086	1278	1465	1622	1765	1885	- - -
						Xt		0.50	0.52	0.52	0.52	0.51	0.52	0.53	0.55	0.58	0.62	- - -
			378	14.88	LNC	Cv	39	316	671	1026	1367	1660	1910	2119	2287	2419	2519	0.84
						Kv	34	273	581	888	1183	1436	1653	1834	1979	2094	2180	- - -
						Xt		0.50	0.52	0.52	0.51	0.53	0.56	0.60	0.65	0.70	0.77	- - -
20x16	412.7	16.25	203	8.00	SNC	C_V	34	214	408	605	814	1018	1212	1407	1614	1821	1993	0.89
						K_V		185	353	523	704	880	1049	1217	1396	1575	1724	- - -
						X_T		0.438	0.435	0.433	0.433	0.432	0.432	0.432	0.431	0.431	0.431	- - -
			276	10.88	LNC	C_V	34	279	562	825	1109	1370	1655	1916	2201	2405	2603	0.89
						K_V		241	486	713	959	1185	1432	1658	1904	2081	2251	- - -
						X_T		0.437	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.452	0.480	- - -
			378	14.88	LNC	Cv	34	390	761	1131	1502	1874	2249	2527	2772	2986	3170	0.89
						Kv		337	658	979	1299	1621	1946	2186	2398	2583	2742	- - -
						Xt		0.435	0.433	0.432	0.432	0.432	0.433	0.469	0.509	0.553	0.573	- - -
24x16	412.7	16.25	203	8.00	SNC	C_V	34	214	408	605	814	1018	1212	1407	1614	1821	1993	0.89
						K_V		185	353	523	704	881	1048	1217	1396	1575	1724	- - -
						X_T		0.438	0.435	0.433	0.433	0.432	0.432	0.432	0.431	0.431	0.431	- - -
			276	10.88	LNC	C_V	34	279	561	824	1108	1369	1654	1915	2193	2394	2576	0.89
						K_V		241	485	713	958	1184	1431	1656	1897	2071	2228	- - -
						X_T		0.437	0.434	0.433	0.432	0.432	0.432	0.432	0.434	0.456	0.479	- - -
			378	14.88	LNC	Cv	34	384	752	1118	1484	1853	2217	2500	2753	2978	3177	0.89
						Kv		332	650	967	1284	1603	1918	2163	2381	2576	2748	- - -
						Xt		0.43	0.43	0.43	0.43	0.43	0.44	0.47	0.5	0.54	0.56	- - -

1. At 100% travel.
2. Clearance flow only

Valve Size, NPS	Port Diameter		Maximum Travel		Construction	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L(1)
	mm	Inches	mm	Inches			Min(2)	10	20	30	40	50	60	70	80	90	100	
20	502	19.75	276	10.88	SNC	Cv	42	337	679	996	1340	1656	1993	2239	2487	2695	2899	0.89
						Kv		292	587	862	1159	1432	1724	1937	2151	2331	2508	- - -
						Xt		0.437	0.434	0.433	0.432	0.432	0.435	0.462	0.494	0.526	0.565	- - -
			378	14.88	LNC	Cv	66	470	918	1366	1813	2200	2530	2822	3070	3278	3449	0.89
						Kv		406	794	1181	1568	1903	2189	2441	2656	2836	2983	- - -
						Xt		0.43	0.43	0.43	0.43	0.46	0.5	0.55	0.59	0.61	0.63	- - -
24x20	502	19.75	276	10.88	SNC	Cv	60	297	596	875	1177	1454	1756	1994	2247	2468	2697	0.89
						Kv		257	516	757	1018	1258	1519	1725	1943	2135	2333	- - -
						Xt		0.53	0.53	0.53	0.52	0.52	0.52	0.55	0.57	0.56	0.57	- - -
			378	14.88	LNC	Cv	38	414	811	1205	1598	1988	2371	2730	3051	3330	3565	0.89
						Kv		358	702	1042	1382	1720	2051	2361	2639	2880	3084	- - -
						Xt		0.529	0.529	0.528	0.528	0.528	0.528	0.528	0.528	0.528	0.549	- - -
			429	16.88	LNC	Cv	38	464	915	1365	1811	2245	2654	3023	3344	3608	3817	0.89
						Kv		401	792	1181	1567	1942	2295	2615	2892	3121	3302	- - -
						Xt		0.529	0.528	0.528	0.528	0.528	0.528	0.528	0.528	0.555	0.590	- - -

1. At 100% travel.
2. Clearance flow only

Whisper Trim - Level B3 - Flow Up

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Construction	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L(1)
	mm	Inches	mm	Inches			Min(2)	10	20	30	40	50	60	70	80	90	100	
12	279.4	11	140	5.5	SNC	Cv	15	78	152	230	305	381	458	528	595	654	716	0.89
						Kv		67	131	199	264	330	396	457	515	566	619	---
						Xt		0.62	0.62	0.62	0.62	0.62	0.62	0.63	0.66	0.68	0.71	---
			203	8	LNC	Cv	15	114	222	336	445	550	641	728	808	883	942	0.89
						Kv		99	192	291	385	476	554	630	699	764	815	---
						Xt		0.617	0.619	0.62	0.62	0.639	0.674	0.712	0.754	0.799	0.841	---
14	279.4	11	140	5.5	SNC	Cv	15	78	152	230	305	381	458	531	605	673	745	0.89
						Kv		67	131	199	264	330	396	459	523	582	645	---
						Xt		0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.64	0.64	0.66	---
			203	8	LNC	Cv	15	114	222	336	445	555	657	759	858	954	1045	0.89
						Kv		99	192	291	385	480	568	657	742	826	904	---
						Xt		0.62	0.62	0.62	0.62	0.63	0.64	0.66	0.67	0.69	0.71	---
16x12	279.4	11	140	5.5	SNC	Cv	15	78	152	230	305	381	458	533	612	685	765	0.89
						Kv		67	131	199	264	330	396	461	529	593	662	---
						Xt		0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	---
			203	8	LNC	Cv	15	114	222	336	445	558	668	780	891	1002	1114	0.89
						Kv		98	192	291	385	483	578	675	771	867	963	---
						Xt		0.617	0.619	0.620	0.620	0.621	0.621	0.621	0.621	0.621	0.621	---
16	374.7	14.75	203	8.00	LNC	Cv	21	178	349	528	700	878	1052	1201	1331	1451	1555	0.89
						Kv		154	302	457	606	759	910	1039	1151	1255	1345	- - -
						Xt		0.439	0.435	0.433	0.433	0.432	0.432	0.452	0.48	0.511	0.543	- - -
	412.7	16.25	203	8.00	LNC	Cv	24	195	382	578	767	962	1143	1291	1426	1549	1654	0.89
						Kv		169	330	500	663	832	989	1117	1233	1340	1431	- - -
						Xt		0.439	0.435	0.433	0.433	0.432	0.439	0.469	0.501	0.537	0.575	- - -
18	412.7	16.25	203	8.00	SNC	Cv	19	145	322	506	681	866	1041	1227	1391	1551	1692	0.84
						Kv	16	125	278	437	589	750	901	1062	1204	1343	1464	- - -
						Xt		0.48	0.50	0.52	0.52	0.52	0.52	0.51	0.52	0.52	0.53	- - -
			276	10.88	LNC	Cv	19	208	454	700	945	1191	1421	1627	1812	1976	2119	0.84
						Kv	16	180	393	606	818	1030	1230	1408	1568	1710	1834	- - -
						Xt		0.49	0.51	0.52	0.52	0.52	0.52	0.52	0.54	0.57	0.60	- - -
			378	14.88	LNC	Cv	19	301	633	965	1303	1595	1846	2060	2235	2371	2477	0.84
						Kv	16	261	548	835	1128	1380	1597	1783	1934	2052	2143	- - -
						Xt		0.50	0.52	0.52	0.51	0.52	0.55	0.59	0.63	0.68	0.74	- - -
20x16	412.7	16.25	203	8.00	SNC	C_V	23	194	382	578	767	962	1152	1345	1537	1729	1922	0.89
						K_V		168	330	500	663	832	996	1164	1329	1495	1663	- - -
						X_T		0.439	0.435	0.433	0.433	0.432	0.432	0.432	0.432	0.431	0.431	- - -
			276	10.88	LNC	C_V	23	258	520	782	1044	1307	1570	1833	2096	2328	2517	0.89
						K_V		223	450	676	903	1131	1358	1586	1813	2014	2177	- - -
						X_T		0.437	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.443	0.468	- - -
			378	14.88	LNC	Cv	23	357	719	1074	1431	1795	2153	2438	2683	2902	3086	0.89
						Kv		309	622	929	1238	1553	1862	2109	2321	2510	2670	- - -
						Xt		0.436	0.433	0.432	0.432	0.432	0.432	0.456	0.493	0.534	0.566	- - -
24x16	412.7	16.25	203	8.00	SNC	C_V	23	194	382	578	767	962	1152	1345	1537	1729	1910	0.89
						K_V		168	330	500	663	832	996	1163	1330	1496	1652	- - -
						X_T		0.439	0.435	0.433	0.433	0.432	0.432	0.432	0.431	0.431	0.431	- - -
			276	10.88	LNC	C_V	23	258	520	782	1044	1307	1570	1833	2096	2316	2496	0.89
						K_V		223	450	676	903	1131	1358	1586	1813	2003	2159	- - -
						X_T		0.437	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.447	0.469	- - -
			378	14.88	LNC	Cv	23	354	714	1067	1422	1784	2139	2417	2670	2899	3100	0.89
						Kv		306	618	923	1230	1543	1850	2091	2310	2508	2682	- - -
						Xt		0.43	0.43	0.43	0.43	0.43	0.43	0.46	0.49	0.53	0.56	- - -

1. At 100% travel.
2. Clearance flow only

Valve Size, NPS	Port Diameter		Maximum Travel		Construction	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L(1)
20	502	19.75	276	10.88	SNC	Cv	28	314	633	952	1271	1591	1911	2175	2411	2628	2825	0.89
						Kv		272	548	823	1100	1377	1653	1882	2086	2273	2444	- - -
						Xt		0.437	0.434	0.433	0.432	0.432	0.432	0.454	0.483	0.515	0.550	- - -
			378	14.88	LNC	Cv	39	434	874	1306	1741	2139	2459	2742	2995	3211	3389	0.89
						Kv		375	756	1130	1506	1850	2127	2372	2591	2778	2931	- - -
						Xt		0.44	0.43	0.43	0.43	0.45	0.49	0.53	0.58	0.6	0.62	- - -
24x20	502	19.75	276	10.88	SNC	Cv	36	277	556	836	1116	1397	1678	1933	2168	2395	2613	0.89
						Kv		239	481	723	966	1209	1452	1672	1875	2072	2260	- - -
						Xt		0.53	0.53	0.53	0.52	0.52	0.52	0.54	0.56	0.56	0.56	- - -
			378	14.88	LNC	Cv	27	382	773	1153	1535	1921	2286	2631	2954	3239	3482	0.89
						Kv		331	668	997	1328	1661	1978	2276	2555	2802	3012	- - -
						Xt		0.529	0.529	0.528	0.528	0.528	0.528	0.528	0.528	0.528	0.539	- - -
			429	16.88	LNC	Cv	27	433	873	1310	1745	2170	2571	2936	3257	3528	3747	0.89
						Kv		375	755	1133	1510	1877	2224	2540	2818	3052	3241	- - -
						Xt		0.529	0.529	0.528	0.528	0.528	0.528	0.528	0.528	0.545	0.576	- - -

1. At 100% travel.
2. Clearance flow only

Whisper Trim - Level C1 - Flow Up

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Construction	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L[1]
	mm	Inches	mm	Inches			Min[2]	10	20	30	40	50	60	70	80	90	100	
12	279.4	11	140	5.5	SNC	Cv	18	61	103	159	206	253	308	351	404	454	497	0.89
						Kv		53	89	138	178	219	266	304	349	393	430	---
						Xt		0.61	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	---
			203	8	LNC	Cv	18	84	153	222	293	368	444	512	571	628	688	0.89
						Kv		73	132	192	253	318	384	443	494	543	595	---
						Xt		0.616	0.619	0.620	0.620	0.620	0.621	0.627	0.647	0.670	0.695	---
14	279.4	11	140	5.5	SNC	Cv	18	61	103	159	206	253	308	351	404	454	498	0.89
						Kv		53	89	138	178	219	266	304	349	393	430	---
						Xt		0.61	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	---
			203	8	LNC	Cv	18	84	153	222	293	368	444	514	578	642	711	0.89
						Kv		73	132	192	253	318	384	444	500	556	615	---
						Xt		0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.63	0.64	0.65	---
16x12	279.4	11	140	5.5	SNC	Cv	18	61	103	159	206	253	308	351	404	454	498	0.89
						Kv		53	89	138	178	219	266	304	349	393	431	---
						Xt		0.61	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	---
			203	8	LNC	Cv	18	84	153	222	293	368	444	515	583	652	727	0.89
						Kv		73	133	192	253	318	384	445	504	564	629	---
						Xt		0.616	0.619	0.620	0.620	0.620	0.621	0.621	0.621	0.621	0.621	---
16	374.7	14.75	203	8.00	LNC	Cv	27	131	244	351	460	577	696	811	919	1026	1132	0.89
						Kv		113	211	304	398	499	602	702	795	887	979	- - -
						Xt		0.442	0.436	0.434	0.433	0.433	0.432	0.432	0.432	0.431	0.439	- - -
	412.7	16.25	203	8.00	LNC	Cv	30	146	272	392	513	645	778	906	1027	1138	1238	0.89
						Kv		126	235	339	444	558	673	784	888	984	1071	- - -
						Xt		0.442	0.436	0.434	0.433	0.433	0.432	0.432	0.432	0.438	0.458	- - -
18	412.7	16.25	203	8.00	SNC	Cv	31	99	219	344	468	583	695	812	937	1062	1180	0.84
						Kv	27	86	189	297	405	504	602	703	811	919	1021	- - -
						Xt		0.48	0.49	0.51	0.51	0.52	0.52	0.52	0.52	0.52	0.52	- - -
			276	10.88	LNC	Cv	31	153	313	469	626	792	959	1125	1281	1423	1560	0.84
						Kv	27	132	270	406	542	685	830	973	1109	1231	1350	- - -
						Xt		0.48	0.50	0.51	0.52	0.52	0.52	0.52	0.51	0.52	0.52	- - -
			378	14.88	LNC	Cv	31	210	434	656	875	1093	1310	1504	1682	1846	1992	0.84
						Kv	27	182	375	568	757	946	1134	1302	1456	1597	1724	- - -
						Xt		0.49	0.51	0.52	0.52	0.52	0.51	0.52	0.53	0.55	0.57	- - -
20x16	412.7	16.25	203	8.00	SNC	C_V	30	146	272	392	513	645	777	906	1027	1147	1276	0.89
						K_V		126	235	339	444	558	672	784	888	992	1104	- - -
						X_T		0.442	0.436	0.434	0.433	0.433	0.432	0.432	0.432	0.431	0.431	- - -
			276	10.88	LNC	C_V	30	180	355	534	712	880	1046	1216	1394	1573	1746	0.89
						K_V		156	307	462	616	761	905	1052	1206	1361	1510	- - -
						X_T		0.440	0.435	0.433	0.433	0.432	0.432	0.432	0.432	0.431	0.431	- - -
			378	14.88	LNC	Cv	30	247	481	717	956	1195	1435	1675	1913	2150	2347	0.89
						Kv		214	416	620	827	1034	1241	1448	1655	1860	2030	- - -
						Xt		0.437	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.431	0.445	- - -
24x16	412.7	16.25	203	8.00	SNC	C_V	21	116	235	343	458	573	681	800	911	1022	1140	0.89
						K_V		100	203	297	396	496	589	692	788	884	986	- - -
						X_T		0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	- - -
			276	10.88	LNC	C_V	21	161	311	470	623	774	934	1085	1238	1397	1547	0.89
						K_V		139	269	407	539	670	808	939	1071	1208	1338	- - -
						X_T		0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	- - -
			378	14.88	LNC	Cv	21	220	430	639	848	1061	1275	1489	1700	1909	2118	0.89
						Kv		190	372	553	734	918	1103	1288	1471	1651	1832	- - -
						Xt		0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	- - -

1. At 100% travel.
2. Clearance flow only

Valve Size, NPS	Port Diameter		Maximum Travel		Construction	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L[1]
	mm	Inches	mm	Inches			Min[2]	10	20	30	40	50	60	70	80	90	100	
20	502	19.75	276	10.88	SNC	Cv	36	218	430	647	861	1065	1266	1472	1688	1904	2082	0.89
						Kv		188	372	560	745	921	1095	1273	1460	1647	1801	- - -
						Xt		0.440	0.435	0.433	0.433	0.432	0.432	0.432	0.432	0.431	0.444	- - -
			378	14.88	LNC	Cv	55	298	581	867	1155	1445	1735	2013	2238	2446	2637	0.89
						Kv		258	502	750	999	1250	1501	1741	1936	2116	2281	- - -
						Xt		0.44	0.43	0.43	0.43	0.43	0.43	0.44	0.46	0.49	0.52	- - -
24x20	502	19.75	276	10.88	SNC	Cv	50	192	378	568	757	935	1112	1292	1481	1672	1855	0.89
						Kv		166	327	492	654	809	962	1118	1281	1446	1605	- - -
						Xt		0.53	0.53	0.53	0.53	0.52	0.52	0.52	0.52	0.52	0.52	- - -
			378	14.88	LNC	Cv	34	260	514	767	1022	1278	1533	1786	2036	2277	2506	0.89
						Kv		225	445	664	884	1105	1326	1545	1761	1969	2168	- - -
						Xt		0.530	0.529	0.529	0.528	0.528	0.528	0.528	0.528	0.528	0.528	- - -
			429	16.88	LNC	Cv	34	297	586	872	1157	1442	1727	2007	2281	2544	2792	0.89
						Kv		257	507	754	1001	1248	1494	1736	1973	2201	2415	- - -
						Xt		0.530	0.529	0.528	0.528	0.528	0.528	0.528	0.528	0.528	0.528	- - -

1. At 100% travel.
2. Clearance flow only

Whisper Trim - Level C3 - Flow Up

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Construction	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L(1)
	mm	Inches	mm	Inches			Min(2)	10	20	30	40	50	60	70	80	90	100	
12	279.4	11	140	5.5	SNC	Cv	14	52	99	144	191	241	289	334	380	430	479	0.89
						Kv		45	86	125	165	208	250	289	329	372	414	---
						Xt		0.61	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	---
			203	8	LNC	Cv	14	73	143	209	281	349	418	490	548	607	651	0.89
						Kv		63	124	181	243	302	362	424	474	525	563	---
						Xt		0.615	0.618	0.619	0.620	0.620	0.621	0.620	0.639	0.662	0.680	---
14	279.4	11	140	5.5	SNC	Cv	14	52	99	144	191	241	289	334	380	430	479	0.89
						Kv		45	86	125	165	208	250	289	329	372	414	---
						Xt		0.61	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	---
			203	8	LNC	Cv	14	73	143	209	282	349	418	490	553	619	679	0.89
						Kv		63	124	181	244	302	362	424	478	535	587	---
						Xt		0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.63	0.64	0.64	---
16x12	279.4	11	140	5.5	SNC	Cv	14	52	99	144	191	241	289	334	380	430	479	0.89
						Kv		45	86	125	165	208	250	289	329	372	414	---
						Xt		0.61	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	---
			203	8	LNC	Cv	14	73	143	209	282	349	418	490	556	627	697	0.89
						Kv		63	124	181	243	302	361	424	481	542	603	---
						Xt		0.615	0.618	0.619	0.620	0.620	0.621	0.621	0.621	0.621	0.621	---
16	374.7	14.75	203	8.00	LNC	Cv	20	116	226	339	456	564	681	794	904	1023	1120	0.89
						Kv		100	195	293	394	488	589	687	782	885	969	- - -
						Xt		0.444	0.437	0.435	0.433	0.433	0.432	0.432	0.432	0.431	0.437	- - -
	412.7	16.25	203	8.00	LNC	Cv	22	127	246	369	497	614	741	864	983	1113	1200	0.89
						Kv		109	213	319	430	531	641	747	851	963	1038	- - -
						Xt		0.444	0.437	0.435	0.433	0.433	0.432	0.432	0.432	0.431	0.450	- - -
18	412.7	16.25	203	8.00	SNC	Cv	15	91	213	324	441	560	670	791	906	1019	1140	0.84
						Kv	13	79	184	281	382	484	580	684	784	882	987	- - -
						Xt		0.47	0.49	0.50	0.51	0.52	0.52	0.52	0.52	0.52	0.52	- - -
			276	10.88	LNC	Cv	15	137	290	453	608	763	926	1080	1237	1389	1521	0.84
						Kv	13	119	251	392	526	660	802	935	1070	1202	1317	- - -
						Xt		0.48	0.50	0.51	0.52	0.52	0.52	0.52	0.51	0.52	0.52	- - -
			378	14.88	LNC	Cv	15	197	411	624	837	1054	1273	1469	1646	1807	1952	0.84
						Kv	13	170	355	540	724	912	1102	1271	1424	1564	1689	- - -
						Xt		0.49	0.51	0.52	0.52	0.52	0.51	0.52	0.53	0.54	0.56	- - -
20x16	412.7	16.25	203	8.00	SNC	C_v	21	126	246	369	497	614	741	864	983	1113	1226	0.89
						K_v		109	213	319	430	531	641	747	851	963	1060	- - -
						X_T		0.443	0.437	0.435	0.433	0.433	0.432	0.432	0.432	0.431	0.431	- - -
			276	10.88	LNC	C_v	21	170	338	502	676	840	1007	1180	1343	1513	1684	0.89
						K_v		147	292	434	584	727	871	1021	1162	1308	1456	- - -
						X_T		0.440	0.435	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.431	- - -
			378	14.88	LNC	Cv	21	229	462	695	923	1151	1379	1611	1845	2077	2288	0.89
						Kv		198	400	601	799	995	1193	1394	1596	1797	1979	- - -
						Xt		0.438	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.431	0.438	- - -
24x16	412.7	16.25	203	8.00	SNC	C_v	21	109	217	325	423	531	639	737	845	953	1034	0.89
						K_v		94	188	281	366	459	553	638	731	824	894	- - -
						X_T		0.445	0.438	0.435	0.434	0.433	0.432	0.432	0.432	0.431	0.431	- - -
			276	10.88	LNC	C_v	21	155	297	439	580	722	864	1006	1148	1290	1431	0.89
						K_v		134	257	380	502	625	747	870	993	1116	1238	- - -
						X_T		0.441	0.436	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.431	- - -
			378	14.88	LNC	Cv	21	219	424	632	846	1056	1262	1467	1680	1893	2083	0.89
						Kv		189	367	547	732	913	1092	1269	1453	1637	1802	- - -
						Xt		0.438	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.431	0.431	- - -

1. At 100% travel.
2. Clearance flow only

Valve Size, NPS	Port Diameter		Maximum Travel		Construction	Flow Coeffi-cient	Valve Opening—Percent of Total Travel											F_L(1)
	mm	Inches	mm	Inches			Min(2)	10	20	30	40	50	60	70	80	90	100	
20	502	19.75	276	10.88	SNC	Cv	26	213	412	623	825	1026	1237	1436	1641	1850	2030	0.89
						Kv		184	356	539	713	888	1070	1242	1419	1601	1756	- - -
						Xt		0.440	0.435	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.439	- - -
			378	14.88	LNC	Cv	35	290	568	845	1122	1404	1688	1971	2189	2393	2583	0.89
						Kv		251	492	731	971	1214	1460	1705	1893	2070	2234	- - -
						Xt		0.44	0.43	0.43	0.43	0.43	0.43	0.43	0.46	0.48	0.51	- - -
24x20	502	19.75	276	10.88	SNC	Cv	32	188	362	547	724	901	1086	1261	1441	1624	1797	0.89
						Kv		162	313	474	627	779	940	1091	1246	1405	1555	- - -
						Xt		0.53	0.53	0.53	0.53	0.52	0.52	0.52	0.52	0.52	0.52	- - -
			378	14.88	LNC	Cv	25	253	503	748	993	1241	1491	1739	1980	2214	2441	0.89
						Kv		219	435	647	859	1074	1290	1504	1713	1915	2111	- - -
						Xt		0.530	0.529	0.529	0.528	0.528	0.528	0.528	0.528	0.528	0.528	- - -
			429	16.88	LNC	Cv	25	286	571	853	1132	1411	1689	1963	2231	2488	2733	0.89
						Kv		248	494	737	979	1221	1461	1698	1929	2152	2364	- - -
						Xt		0.530	0.529	0.528	0.528	0.528	0.528	0.528	0.528	0.528	0.528	- - -

1. At 100% travel.
2. Clearance flow only

EMERSON

Whisper Trim - Level D3 - Flow Up

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Construction	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L[1]
	mm	Inches	mm	Inches			Min[2]	10	20	30	40	50	60	70	80	90	100	
12	254	10	203	8	LNC	Cv	12	67	132	192	259	321	384	445	496	549	594	0.89
						Kv		58	114	166	224	278	332	385	429	475	514	---
						Xt		0.615	0.618	0.619	0.620	0.620	0.621	0.636	0.658	0.685	0.710	---
14	254	10	203	8	LNC	Cv	12	67	132	192	259	321	384	449	505	566	622	
						Kv		58	114	166	224	278	332	388	437	489	538	---
						Xt		0.62	0.62	0.62	0.62	0.62	0.62	0.63	0.64	0.65	0.66	---
16x12	254	10	203	8	LNC	Cv	12	67	132	192	259	321	384	451	511	577	641	0.89
						Kv		58	114	166	224	278	332	390	442	499	554	---
						Xt		0.615	0.618	0.619	0.620	0.620	0.621	0.621	0.621	0.621	0.621	---
16	374.7	14.75	203	8.00	LNC	Cv	20	116	226	339	456	564	681	794	904	1023	1120	0.89
						Kv		100	195	293	394	488	589	687	782	885	969	- - -
						Xt		0.444	0.437	0.435	0.433	0.433	0.432	0.432	0.432	0.431	0.437	- - -
18	374.7	14.75	203	8.00	SNC	Cv	15	76	182	292	394	503	610	713	825	927	1036	0.84
						Kv	13	66	157	253	341	435	528	617	714	802	897	- - -
						Xt		0.47	0.49	0.50	0.51	0.52	0.52	0.52	0.52	0.52	0.52	- - -
			276	10.88	LNC	Cv	14	112	261	405	546	696	839	981	1125	1248	1366	0.84
						Kv	12	97	226	351	473	602	726	849	973	1080	1182	- - -
						Xt		0.48	0.50	0.51	0.52	0.52	0.52	0.52	0.52	0.51	0.51	- - -
			378	14.88	LNC	Cv	14	168	363	562	762	963	1151	1318	1469	1605	1725	0.84
						Kv	12	145	315	486	660	833	996	1140	1271	1389	1493	- - -
						Xt		0.49	0.51	0.52	0.52	0.52	0.52	0.51	0.52	0.52	0.53	- - -
20x16	374.7	14.75	203	8.00	SNC	Cv	19	116	235	344	458	574	682	800	912	1023	1141	0.89
						Kv		100	203	298	396	497	590	692	789	885	987	- - -
						Xt		0.443	0.437	0.434	0.433	0.433	0.432	0.432	0.432	0.431	0.431	- - -
			276	10.88	LNC	Cv	19	161	311	471	623	776	935	1085	1240	1398	1547	0.89
						Kv		139	269	408	539	671	809	939	1073	1209	1338	- - -
						Xt		0.440	0.435	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.431	- - -
			378	14.88	LNC	Cv	19	220	430	639	849	1063	1277	1490	1700	1893	2046	0.89
						Kv		191	372	553	734	919	1105	1289	1470	1637	1769	- - -
						Xt		0.438	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.439	0.463	- - -
24x16	374.7	14.75	203	8.00	SNC	Cv	19	116	235	344	458	574	682	800	912	1023	1127	0.89
						Kv		100	203	298	396	497	590	692	789	885	975	- - -
						Xt		0.443	0.437	0.434	0.433	0.433	0.432	0.432	0.432	0.431	0.431	- - -
			276	10.88	LNC	Cv	19	161	311	471	623	775	935	1085	1239	1398	1532	0.89
						Kv		139	269	407	539	670	809	939	1072	1209	1325	- - -
						Xt		0.440	0.435	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.431	- - -
			378	14.88	LNC	Cv	19	220	430	639	849	1062	1276	1490	1700	1882	2027	0.89
						Kv		190	372	553	734	919	1104	1289	1471	1628	1753	- - -
						Xt		0.438	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.444	0.464	- - -
20	464	18.25	276	10.88	SNC	Cv	24	194	375	568	752	935	1127	1309	1495	1686	1826	0.89
						Kv		168	325	491	650	809	975	1132	1293	1458	1579	- - -
						Xt		0.440	0.435	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.450	- - -
			378	14.88	LNC	Cv	32	264	518	770	1023	1279	1538	1772	1965	2144	2309	0.89
						Kv		229	448	666	885	1107	1330	1533	1700	1854	1997	- - -
						Xt		0.44	0.43	0.43	0.43	0.43	0.43	0.44	0.47	0.5	0.53	- - -

1. At 100% travel.
2. Clearance flow only

Valve Size, NPS	Port Diameter		Maximum Travel		Construction	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L(1)
	mm	Inches	mm	Inches			Min(2)	10	20	30	40	50	60	70	80	90	100	
24x20	464	18.25	276	10.88	SNC	Cv	30	171	330	499	660	821	990	1149	1313	1480	1638	0.89
						Kv		148	285	431	571	710	856	994	1135	1280	1417	- - -
						Xt		0.53	0.53	0.53	0.53	0.52	0.52	0.52	0.52	0.52	0.52	- - -
			378	14.88	LNC	Cv	23	231	458	681	904	1130	1358	1582	1800	2009	2210	0.89
						Kv		199	396	589	782	978	1174	1369	1557	1738	1912	- - -
						Xt		0.530	0.529	0.529	0.528	0.528	0.528	0.528	0.528	0.528	0.528	- - -
30	610	24	505	19.88	LN	Cv	35	400	792	1183	1575	1968	2362	2756	3150	3545	3939	0.99
						Kv		346	685	1023	1362	1702	2043	2384	2725	3066	3407	- - -
						Xt		0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.57	0.55	- - -

1. At 100% travel.
2. Clearance flow only

WhisperFlo Trim - Level X - Flow Up

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Construction	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L(1)
	mm	Inches	mm	Inches			Min(2)	10	20	30	40	50	60	70	80	90	100	
12	279.4	11	140	5.5	SNC	Cv	62.2	92	180	274	366	454	538	616	689	757	820	
						Xt	0.53	0.71	0.7	0.69	0.68	0.68	0.69	0.69	0.7	0.71	0.73	---
			203	8	LNC	Cv	62.2	128	257	382	508	633	728	820	901	978	1019	0.89
						Xt	0.886	0.886	0.777	0.799	0.737	0.688	0.727	0.776	0.734	0.721	0.758	---
14	279.4	11	140	5.5	SNC	Cv	62.2	92	180	276	370	461	549	633	714	791	863	
						Xt	0.53	0.71	0.70	0.69	0.68	0.67	0.68	0.67	0.68	0.68	0.69	---
			203	8	LNC	Cv	62.2	126	258	386	517	642	762	866	961	1049	1113	
						Xt	0.69	0.69	0.66	0.69	0.66	0.65	0.66	0.71	0.70	0.70	0.73	---
16x12	279.4	11	140	5.5	SNC	Cv	62.2	92	180	277	372	465	556	645	730	813	892	
						Xt	0.53	0.71	0.7	0.69	0.68	0.67	0.67	0.66	0.66	0.66	0.66	---
			203	8	LNC	Cv	62.2	124	258	388	523	648	784	896	1001	1096	1175	
						Xt	0.556	0.556	0.58	0.614	0.612	0.629	0.615	0.665	0.678	0.691	0.719	---
16	374.7	14.75	203	8.00	LNC	Cv	60.2	170	358	541	720	890	1052	1205	1348	1481	1604	---
						Xt	0.534	0.711	0.697	0.688	0.684	0.684	0.687	0.694	0.703	0.715	0.729	---
18	374.7	14.75	203	8.00	SNC	Cv	60.2	178	373	550	745	923	1110	1267	1419	1544	1661	---
						Xt	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	---
			276	10.88	LNC	Cv	60.2	248	513	781	1049	1284	1491	1666	1811	1927	2017	---
						Xt	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	---
			378	14.88	LNC	Cv	60.2	348	717	1080	1385	1638	1838	1983	2086	2159	2214	---
						Xt	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	---
20x16	374.7	14.75	203	8.00	SNC	Cv	60.2	170	359	546	731	912	1089	1260	1427	1587	1741	---
						Xt	0.534	0.713	0.699	0.687	0.677	0.669	0.663	0.659	0.656	0.655	0.654	---
			276	10.88	LNC	Cv	60.2	238	494	745	990	1226	1452	1667	1870	2061	2240	---
						Xt	0.534	0.708	0.690	0.676	0.666	0.659	0.656	0.654	0.655	0.658	0.662	---
			378	14.88	LNC	Cv	60.2	332	679	1015	1339	1633	1911	2165	2397	2606	2793	---
						Xt	0.534	0.701	0.679	0.665	0.657	0.654	0.656	0.660	0.667	0.676	0.686	---
24x16	374.7	14.75	203	8.00	SNC	Cv	60.2	170	360	548	735	921	1104	1285	1462	1636	1807	---
						Xt	0.534	0.716	0.703	0.692	0.682	0.673	0.665	0.658	0.652	0.647	0.642	---
			276	10.88	LNC	Cv	60.2	238	495	750	1001	1248	1490	1725	1953	2173	2385	---
						Xt	0.534	0.711	0.695	0.681	0.669	0.659	0.651	0.644	0.639	0.635	0.632	---
			378	14.88	LNC	Cv	60.2	333	683	1027	1363	1687	1999	2296	2578	2843	3092	---
						Xt	0.534	0.705	0.685	0.668	0.655	0.645	0.638	0.633	0.630	0.628	0.628	---
20	464	18.25	276	10.88	SNC	Cv	86.5	286	592	891	1179	1453	1712	1954	2179	2386	2576	- - -
						Xt	0.534	0.708	0.694	0.685	0.682	0.683	0.688	0.696	0.708	0.722	0.738	- - -
			378	14.88	LNC	Cv	86.5	399	813	1208	1577	1917	2223	2497	2740	2954	3141	- - -
						Xt	0.534	0.702	0.687	0.682	0.685	0.695	0.711	0.731	0.755	0.781	0.809	- - -
24x20	464	18.25	276	10.88	SNC	Cv	86.5	286	595	900	1200	1493	1779	2056	2322	2578	2823	- - -
						Xt	0.534	0.710	0.695	0.683	0.673	0.665	0.659	0.656	0.654	0.653	0.654	- - -
			378	14.88	LNC	Cv	86.5	400	820	1231	1630	2012	2376	2720	3043	3343	3622	- - -
						Xt	0.534	0.704	0.686	0.672	0.662	0.656	0.653	0.653	0.655	0.659	0.665	- - -

1. At 100% travel.
2. Clearance flow only

WhisperFlo Trim - Level Y - Flow Up

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Construction	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L(1)
	mm	Inches	mm	Inches			Min(2)	10	20	30	40	50	60	70	80	90	100	
12	279.4	11	140	5.5	SNC	Cv	35	55	109	168	225	282	338	392	445	496	546	0.89
						Xt	0.53	0.56	0.55	0.55	0.54	0.54	0.54	0.54	0.54	0.54	0.55	---
			203	8	LNC	Cv	35	90	180	270	360	450	540	630	720	810	900	0.89
						Xt	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	---
14	279.4	11	140	5.5	SNC	Cv	35	55	109	168	226	284	340	396	452	505	558	
						Xt	0.53	0.56	0.56	0.55	0.54	0.54	0.54	0.53	0.53	0.53	0.54	---
			203	8	LNC	Cv	35	90	180	270	360	450	540	630	720	810	900	
						Xt	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	---
16x12	279.4	11	140	5.5	SNC	Cv	35	55	109	168	227	285	342	399	456	511	566	
						Xt	0.53	0.56	0.56	0.55	0.54	0.54	0.54	0.53	0.53	0.53	0.53	---
			203	8	LNC	Cv	35	90	180	270	360	450	540	630	720	810	900	
						Xt	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	---
16	374.7	14.75	203	8.00	LNC	Cv	53.4	124	258	392	525	654	779	901	1018	1130	1238	---
						Xt	0.534	0.616	0.607	0.600	0.596	0.594	0.593	0.594	0.598	0.602	0.608	---
18	374.7	14.75	203	8.00	SNC	Cv	53.4	113	239	365	491	617	744	870	998	1113	1223	---
						Xt	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	---
			276	10.88	LNC	Cv	53.4	164	342	519	697	875	1053	1213	1360	1494	1614	---
						Xt	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	---
			378	14.88	LNC	Cv	53.4	229	473	716	957	1188	1389	1565	1715	1840	1941	---
						Xt	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	---
20x16	374.7	14.75	203	8.00	SNC	Cv	53.4	124	259	394	529	662	794	923	1051	1176	1298	---
						Xt	0.534	0.617	0.608	0.601	0.594	0.588	0.584	0.580	0.577	0.575	0.573	---
			276	10.88	LNC	Cv	53.4	171	356	539	720	897	1070	1239	1402	1560	1712	---
						Xt	0.534	0.614	0.603	0.594	0.586	0.581	0.577	0.574	0.573	0.573	0.574	---
			378	14.88	LNC	Cv	53.4	239	491	738	979	1212	1435	1648	1849	2038	2216	---
						Xt	0.534	0.609	0.596	0.586	0.579	0.574	0.573	0.573	0.575	0.579	0.585	---
24x16	374.7	14.75	203	8.00	SNC	Cv	53.4	125	259	395	531	666	800	933	1065	1195	1324	---
						Xt	0.534	0.619	0.611	0.604	0.598	0.592	0.587	0.582	0.578	0.574	0.570	---
			276	10.88	LNC	Cv	53.4	171	357	541	724	906	1085	1262	1436	1607	1774	---
						Xt	0.534	0.616	0.606	0.597	0.590	0.583	0.577	0.572	0.568	0.564	0.561	---
			378	14.88	LNC	Cv	53.4	240	492	743	991	1234	1472	1703	1928	2146	2356	---
						Xt	0.534	0.612	0.600	0.589	0.580	0.573	0.567	0.562	0.559	0.556	0.555	---
20	464	18.25	276	10.88	SNC	Cv	77.3	198	405	612	816	1016	1210	1397	1577	1750	1915	- - -
						Xt	0.534	0.576	0.568	0.562	0.559	0.557	0.557	0.559	0.562	0.567	0.574	- - -
			378	14.88	LNC	Cv	77.3	272	558	837	1108	1367	1614	1849	2063	2265	2452	- - -
						Xt	0.534	0.573	0.564	0.558	0.557	0.559	0.563	0.571	0.581	0.593	0.607	- - -
24x20	464	18.25	276	10.88	SNC	Cv	77.3	198	406	615	823	1029	1232	1433	1629	1822	2010	- - -
						Xt	0.534	0.577	0.569	0.562	0.556	0.552	0.548	0.544	0.542	0.540	0.539	- - -
			378	14.88	LNC	Cv	77.3	272	560	845	1125	1401	1669	1931	2183	2427	2662	- - -
						Xt	0.534	0.574	0.564	0.556	0.550	0.545	0.542	0.540	0.539	0.540	0.541	- - -

1. At 100% travel.
2. Clearance flow only

WhisperFlo Trim - Level Z - Flow Up

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Construction	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L(1)
	mm	Inches	mm	Inches			Min(2)	10	20	30	40	50	60	70	80	90	100	
12	279.4	11	140	5.5	SNC	Cv	21	42	80	119	160	202	242	282	322	361	399	
						Xt	0.53	0.44	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	---
			203	8	LNC	Cv	21	55	110	165	220	275	330	385	440	495	550	0.89
						Xt	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	---
14	279.4	11	140	5.5	SNC	Cv	21	42	80	119	161	202	243	284	324	364	404	
						Xt	0.53	0.44	0.44	0.43	0.43	0.43	0.43	0.42	0.42	0.42	0.42	---
			203	8	LNC	Cv	21	55	110	165	220	275	330	385	440	495	550	
						Xt	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	---
16x12	279.4	11	140	5.5	SNC	Cv	21	42	80	119	161	202	244	285	326	366	407	
						Xt	0.53	0.44	0.44	0.43	0.43	0.43	0.43	0.42	0.42	0.42	0.42	---
			203	8	LNC	Cv	21	55	110	165	220	275	330	385	440	495	550	
						Xt	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	---
16	374.7	14.75	203	8.00	LNC	Cv	48.1	91	179	273	366	458	548	638	725	811	895	---
						Xt	0.534	0.466	0.462	0.459	0.456	0.454	0.453	0.453	0.453	0.454	0.456	---
18	374.7	14.75	203	8.00	SNC	Cv	48.1	68	143	219	295	370	446	522	598	673	749	---
						Xt	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	---
			276	10.88	LNC	Cv	48.1	103	206	312	419	526	633	740	846	951	1059	---
						Xt	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	---
			378	14.88	LNC	Cv	48.1	137	281	429	576	721	868	1012	1150	1276	1394	---
						Xt	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	---
20x16	374.7	14.75	203	8.00	SNC	Cv	48.1	91	179	273	367	460	553	645	737	827	917	---
						Xt	0.534	0.467	0.463	0.459	0.456	0.453	0.450	0.448	0.446	0.445	0.444	---
			276	10.88	LNC	Cv	48.1	121	247	374	501	627	751	874	994	1113	1229	---
						Xt	0.534	0.465	0.460	0.456	0.452	0.449	0.446	0.444	0.443	0.442	0.442	---
			378	14.88	LNC	Cv	48.1	166	341	514	685	854	1019	1180	1336	1488	1634	---
						Xt	0.534	0.463	0.457	0.451	0.447	0.444	0.443	0.442	0.442	0.443	0.445	---
24x16	374.7	14.75	203	8.00	SNC	Cv	48.1	91	179	273	368	462	555	649	742	834	926	---
						Xt	0.534	0.468	0.464	0.461	0.458	0.455	0.453	0.450	0.448	0.446	0.444	---
			276	10.88	LNC	Cv	48.1	121	267	375	503	630	756	881	1006	1129	1251	---
						Xt	0.534	0.466	0.462	0.458	0.454	0.451	0.447	0.445	0.442	0.440	0.438	---
			378	14.88	LNC	Cv	48.1	166	341	516	689	861	1032	1200	1365	1528	1688	---
						Xt	0.534	0.465	0.459	0.454	0.449	0.445	0.442	0.439	0.437	0.435	0.434	---
20	464	18.25	276	10.88	SNC	Cv	71.8	148	288	437	585	731	875	1016	1155	1290	1422	- - -
						Xt	0.534	0.453	0.448	0.445	0.443	0.441	0.440	0.440	0.441	0.442	0.445	- - -
			378	14.88	LNC	Cv	71.8	200	403	607	808	1005	1196	1381	1560	1730	1894	- - -
						Xt	0.534	0.451	0.446	0.446	0.441	0.440	0.441	0.444	0.448	0.453	0.459	- - -
24x20	464	18.25	276	10.88	SNC	Cv	71.8	149	292	444	595	745	894	1042	1188	1333	1476	- - -
						Xt	0.534	0.453	0.449	0.446	0.442	0.440	0.437	0.435	0.433	0.432	0.431	- - -
			378	14.88	LNC	Cv	71.8	200	404	610	815	1018	1218	1416	1609	1800	1986	- - -
						Xt	0.534	0.452	0.442	0.442	0.438	0.435	0.433	0.431	0.430	0.430	0.430	- - -

1. At 100% travel.
2. Clearance flow only

Cavitrol III Trim - One Stage - Flow Down

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Construction	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L(1)
	mm	Inches	mm	Inches			Min(2)	10	20	30	40	50	60	70	80	90	100	
12	279.4	11	203	8	LNC	Cv	40	132	302	462	607	736	849	946	1030	1100	1160	0.91
						Kv	34.6	114	261	400	525	637	734	818	891	952	1003	---
14	279.4	11	203	8	LNC	Cv	40	132	303	467	620	759	886	996	1096	1184	1262	0.91
						Kv	34.6	114	262	404	536	657	766	862	948	1024	1092	---
16x12	279.4	11	203	8	LNC	Cv	40	132	304	471	628	775	910	1030	1140	1240	1330	0.91
						Kv	34.6	114	263	407	543	670	787	891	986	1073	1150	---
16	374.7	14.75	203	8.00	LNC	Cv	46	177	408	632	844	1040	1230	1390	1540	1670	1790	0.91
						Xt	39.8	153	353	547	730	900	1064	1202	1332	1445	1548	---
18	374.7	14.75	276	10.88	LNC	Cv	46	256	556	844	1115	1363	1590	1793	1973	2132	2268	0.91
						Xt	39.8	222	482	731	964	1180	1375	1550	1707	1844	1962	---
			378	14.88	LNC	Cv	46	357	748	1110	1436	1721	1966	2174	2349	2495	2610	0.91
						Xt	39.8	309	647	960	1242	1489	1701	1880	2032	2158	2258	---
20x16	374.7	14.75	276	10.88	LNC	Cv	46	262	576	877	1160	1420	1660	1880	2070	2240	2390	0.91
						Xt	39.8	227	498	759	1003	1228	1436	1626	1791	1938	2067	---
			378	14.88	LNC	Cv	46	379	800	1190	1540	1850	2110	2330	2510	2670	2800	0.91
						Xt	39.8	328	692	1029	1332	1600	1825	2015	2171	2310	2422	---
24x16	374.7	14.75	276	10.88	LNC	Cv	46	262	576	878	1160	1420	1160	1880	2070	2240	2390	0.91
						Xt	39.8	227	498	759	1003	1228	1003	1626	1791	1938	2067	---
			378	14.88	LNC	Cv	46	379	800	1190	1540	1850	2110	2330	2520	2670	2800	0.91
						Xt	39.8	328	692	1029	1332	1600	1825	2015	2180	2310	2422	---
20	464	18.25	276	10.88	SNC	Cv	56	323	710	1080	1430	1750	2030	2290	2520	2720	2890	0.91
						Kv	48.4	279	614	934	1237	1514	1756	1981	2180	2353	2500	- - -
			378	14.88	LNC	Cv	56	467	985	1460	1890	2260	2570	2830	3040	3220	3370	0.91
						Kv	48.4	404	852	1263	1635	1955	2223	2448	2630	2785	2915	- - -
24x20	464	18.25	276	10.88	SNC	Cv	56	329	701	1066	1421	1764	2092	2404	2698	2975	3157	0.91
						Kv	48.4	285	606	922	1229	1525	1809	2079	2334	2573	2731	- - -
			378	14.88	LNC	Cv	56	468	995	1490	1960	2370	2750	3070	3360	3600	3810	0.91
						Kv	48.4	405	861	1289	1695	2050	2379	2656	2906	3114	3296	- - -

1. At 100% travel.
2. Clearance flow only

The Fisher Large ET-C/EWT-C flow coefficients are identical to the Fisher Large ET/EWT and ED/EWD. However, some port diameters are not applicable to the Fisher Large ET-C/EWT-C.
For additional information, refer to Bulletin 51.1:ET/ED (Large).

The Fisher ET-C valve has flow coefficients identical to the NPS 3 through 8 Fisher ED valve with full-sized port. Please refer to those coefficients. For additional ET-C valve information, refer to Bulletin 51.1:easy-e™ Cryogenic.

The Fisher ETR valve has flow coefficients identical to the NPS 1 to 4, CL125-600 ED valve. Please refer to those coefficients. For additional ETR valve body information, refer to Bulletin 51.1:ET.

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Quick Opening

Quick Opening Characteristic

Valve Size, NPS(1)	Port Diameter		Coeffs. for 6 mm (0.25 in.) Travel (2)	Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L(3)
	mm	Inches		mm	Inches		10	20	30	40	50	60	70	80	90	100	
4 x 2	58.7	2.3125	29.8	29	1.125	C_v	13.8	26.5	42.7	61.8	78.1	93.3	105	114	119	124	0.82
						K_v	*11.9*	*22.9*	*36.9*	*53.5*	*67.6*	*80.7*	*90.8*	*98.6*	*103*	*107*	---
						X_T	0.571	0.651	0.662	0.648	0.687	0.708	0.714	0.709	0.713	0.693	---
6 x 4	111.1	4.375	49.3	51	2	C_v	40.8	85.3	140	196	242	277	306	326	340	340	0.88
						K_v	*35.3*	*73.8*	*121*	*170*	*209*	*240*	*265*	*282*	*294*	*294*	---
						X_T	0.577	0.594	0.612	0.656	0.732	0.779	0.793	0.791	0.804	0.818	---
8 x 4	111.1	4.375	52.7	51	2	C_v	43.2	88.7	147	202	252	294	328	354	371	379	0.89
						K_v	*37.4*	*76.7*	*127*	*175*	*218*	*254*	*284*	*306*	*321*	*328*	---
						X_T	0.629	0.650	0.631	0.677	0.726	0.797	0.809	0.817	0.815	0.817	---
8 x 6 10 x 6(4)	177.8	7	96.2	51	2	C_v	79.0	158	247	338	413	471	531	569	610	637	0.89
						K_v	*68.3*	*137*	*214*	*292*	*357*	*407*	*459*	*492*	*528*	*551*	---
						X_T	0.544	0.574	0.578	0.626	0.678	0.758	0.759	0.749	0.727	0.705	---
12 x 6	177.8	7	98.0	51	2	C_v	80.1	156	250	348	449	539	621	683	743	817	0.82
						K_v	*69.3*	*135*	*216*	*301*	*388*	*466*	*537*	*591*	*643*	*707*	---
						X_T	0.515	0.627	0.613	0.624	0.642	0.689	0.715	0.765	0.789	0.782	---
10 x 8	203.2	8	---	76	3	C_v	138	306	468	607	725	824	903	960	998	1040	0.88
						K_v	*119*	*265*	*405*	*525*	*627*	*713*	*781*	*830*	*863*	*900*	---
						X_T	0.665	0.632	0.651	0.685	0.708	0.722	0.741	0.761	0.791	0.787	---
12 x 8	203.2	8	---	76	3	C_v	149	315	481	640	780	898	1000	1100	1180	1260	0.79
						K_v	*129*	*272*	*416*	*554*	*675*	*777*	*865*	*952*	*1021*	*1090*	---
						X_T	0.687	0.735	0.727	0.745	0.754	0.784	0.744	0.754	0.711	0.636	---

Linear

Linear Characteristic

Valve Size, NPS(1)	Port Diameter		Coeffs. for 6 mm (0.25 in.) Travel (2)	Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L(3)
	mm	Inches		mm	Inches		10	20	30	40	50	60	70	80	90	100	
4 x 2	58.7	2.3125	---	29	1.125	C_v	6.80	14.6	23.0	32.7	43.9	56.6	70.8	85.0	97.2	107	0.79
						K_v	*5.88*	*12.6*	*19.9*	*28.3*	*38.0*	*49.0*	*61.2*	*73.5*	*84.1*	*92.6*	---
						X_T	0.625	0.659	0.691	0.682	0.645	0.604	0.582	0.603	0.632	0.654	---
6 x 4	111.1	4.375	---	51	2	C_v	21.4	49.0	78.7	109	137	166	201	245	286	320	0.86
						K_v	*18.5*	*42.4*	*68.1*	*94.3*	*119*	*144*	*174*	*212*	*247*	*277*	---
						X_T	0.686	0.717	0.651	0.648	0.654	0.661	0.672	0.670	0.695	0.725	---
8 x 4	111.1	4.375	---	51	2	C_v	23.2	51.0	80.6	111	141	173	211	254	299	340	0.82
						K_v	*20.1*	*44.1*	*69.7*	*96.0*	*122*	*150*	*183*	*220*	*259*	*294*	---
						X_T	0.694	0.711	0.691	0.661	0.668	0.669	0.676	0.688	0.727	0.753	---
8 x 6 10 x 6(4)	177.8	7	---	51	2	C_v	44.0	108	170	234	293	354	405	474	552	617	0.88
						K_v	*38.1*	*93.4*	*147.1*	*202*	*253*	*306*	*350*	*410*	*477*	*534*	---
						X_T	0.796	0.726	0.758	0.742	0.772	0.767	0.801	0.748	0.702	0.656	---
12 x 6	177.8	7	---	51	2	C_v	51.7	111	176	249	319	391	458	540	632	729	0.81
						K_v	*44.7*	*96.0*	*152*	*215*	*276*	*338*	*396*	*467*	*547*	*631*	---
						X_T	0.716	0.710	0.691	0.656	0.639	0.639	0.661	0.649	0.639	0.633	---
10 x 8	203.2	8	---	76	3	C_v	95.9	212	336	459	586	696	798	876	928	975	0.91
						K_v	*83.0*	*183*	*291*	*397*	*507*	*602*	*690*	*758*	*803*	*843*	---
						X_T	0.683	0.617	0.610	0.641	0.657	0.694	0.715	0.748	0.795	0.843	---
12 x 8	203.2	8	---	76	3	C_v	104	223	348	490	638	781	907	999	1080	1160	0.80
						K_v	*90.0*	*193*	*301*	*424*	*552*	*676*	*785*	*864*	*934*	*1003*	---
						X_T	0.700	0.694	0.647	0.692	0.697	0.693	0.711	0.741	0.738	0.696	---

1. The first number indicates both body inlet and outlet sizes. The second number indicates effective trim size.
2. When sizing self-operated regulators, use coefficients listed for 6 mm (0.25 inch) travel.
3. At 100% travel.
4. NPS 10x6 has a valve outlet area identical to the NPS 8x6.

Notes: The coefficients shown on this page are also appropriate for the EWT.
The linear trim coefficients shown on this page for NPS 6 x 4 through 10 x 8 apply to EWT-C valves.

Equal Percentage (Flow Down)

Equal Percentage Characteristic

Valve Size, NPS(1)	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L(2)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
4 x 2	58.7	2.3125	29	1.125	C_v	2.53	4.52	6.66	9.29	13.6	19.9	29.4	45.2	65.8	82.2	0.82
					K_v	*2.19*	*3.91*	*5.76*	*8.04*	*11.8*	*17.2*	*25.4*	*39.1*	*56.9*	*71.1*	- - -
					X_T	0.626	0.652	0.664	0.683	0.657	0.6.6	0.646	0.591	0.560	0.587	- - -
6 x 4	111.1	4.375	51	2	C_v	7.34	13.1	19.8	30.6	46.6	69.1	108	168	225	271	0.87
					K_v	*6.35*	*11.3*	*17.1*	*26.5*	*40.3*	*59.8*	*93.4*	*145*	*195*	*234*	- - -
					X_T	0.996	0.808	0.711	0.640	0.605	0.605	0.630	0.613	0.662	0.712	- - -
8 x 4	111.1	4.375	51	2	C_v	8.01	14.1	21.1	31.7	47.2	73.5	118	180	240	286	0.85
					K_v	*6.93*	*12.2*	*18.3*	*27.4*	*40.8*	*63.6*	*102*	*156*	*208*	*247*	- - -
					X_T	0.684	0.671	0.643	0.617	0.566	0.591	0.566	0.573	0.645	0.675	- - -
8 x 6 10 x 6(1)	177.8	7	51	2	C_v	13.2	26.4	45.4	71.1	112	178	256	342	431	508	0.91
					K_v	*11.4*	*22.8*	*39.3*	*61.5*	*96.9*	*154*	*221*	*296*	*373*	*439*	- - -
					X_T	0.837	0.837	0.719	0.683	0.596	0.573	0.626	0.682	0.688	0.684	- - -
12 x 6	177.8	7	51	2	C_v	23.6	36.2	52.8	76.3	110	164	248	348	453	565	0.79
					K_v	*20.4*	*31.3*	*45.7*	*66.0*	*95.2*	*142*	*215*	*301*	*392*	*489*	- - -
					X_T	0.628	0.664	0.694	0.714	0.703	0.739	0.695	0.683	0.658	0.627	- - -
10 x 8	203.2	8	76	3	C_v	32.3	65.7	111	184	303	462	635	778	876	924	0.89
					K_v	*27.9*	*56.8*	*96.0*	*159*	*262*	*400*	*549*	*673*	*758*	*799*	- - -
					X_T	0.725	0.720	0.687	0.634	0.585	0.582	0.595	0.615	0.652	0.802	- - -
12 x 8	203.2	8	76	3	C_v	28.4	61.0	112	196	311	481	687	839	992	1090	0.81
					K_v	*24.6*	*52.8*	*96.9*	*170*	*269*	*416*	*594*	*726*	*858*	*943*	- - -
					X_T	0.666	0.665	0.667	0.664	0.659	0.667	0.664	0.662	0.663	0.663	- - -

1. NPS 10x6 has a valve outlet area identical to the NPS 8x6.

Whisper Trim I (Flow Up)

Linear Characteristic

Valve Size, NPS(1)	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(2)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
4 x 2	58.7	2.3125	29	1.125	C_v	14.8	28.9	40.8	52.9	65.1	77.2	89.0	100	111	118	- - -
					K_v	*12.8*	*25.0*	*35.3*	*45.8*	*56.3*	*66.8*	*77.0*	*86.5*	*96.0*	*102*	- - -
					X_T	0.320	0.323	0.323	0.322	0.323	0.321	0.322	0.325	0.324	0.322	- - -
6 x 4	111.1	4.375	51	2	C_v	30.9	69.9	110	149	187	223	253	281	307	325	- - -
					K_v	*26.7*	*60.5*	*95.2*	*129*	*162*	*193*	*219*	*243*	*266*	*281*	- - -
					X_T	0.668	0.476	0.382	0.351	0.349	0.358	0.367	0.382	0.401	0.416	- - -
8 x 4	111.1	4.375	51	2	C_v	36.2	77.6	116	155	193	231	266	298	326	345	- - -
					K_v	*31.3*	*67.1*	*100*	*134*	*167*	*200*	*230*	*258*	*282*	*298*	- - -
					X_T	0.447	0.403	0.356	0.333	0.331	0.329	0.334	0.341	0.350	0.368	- - -
8 x 6 10 x 6(4)	177.8	7	51	2	C_v	42.8	99.7	164	224	290	352	422	473	523	545	- - -
					K_v	*37.0*	*86.2*	*142*	*194*	*251*	*304*	*365*	*409*	*452*	*471*	- - -
					X_T	0.550	0.409	0.364	0.350	0.334	0.326	0.310	0.326	0.329	0.350	- - -
			89	3.5	Cv	97.3	228	322	415	493	522	522	522	522	520	- - -
					Kv	84.2	197	279	359	426	452	452	452	452	450	- - -
					XT	0.412	0.317	0.330	0.356	0.397	0.510	0.650	0.777	0.844	0.903	- - -
			102	4(3)	C_v	113	266	355	475	522	522	522	522	519	522	- - -
					K_v	*97.7*	*230*	*307*	*411*	*452*	*452*	*452*	*452*	*449*	*452*	- - -
					X_T	0.412	0.285	0.357	0.354	0.469	0.632	0.777	0.854	0.919	0.917	- - -
12 x 6	177.8	7	51	2	C_v	49.0	126	196	269	340	406	476	540	598	641	- - -
					K_v	*42.4*	*109*	*170*	*233*	*294*	*351*	*412*	*467*	*517*	*554*	- - -
					X_T	0.547	0.300	0.286	0.270	0.264	0.267	0.263	0.264	0.273	0.273	- - -
			89	3.5	Cv	97	222	311	406	508	589	655	755	819	870	- - -
					Kv	83.905	192	269	351	439	509	567	653	708	753	- - -
					XT	0.432	0.348	0.366	0.378	0.369	0.391	0.422	0.408	0.433	0.460	- - -
			102	4(3)	C_v	113	258	343	469	572	641	755	828	884	953	- - -
					K_v	*97.7*	*223*	*297*	*406*	*495*	*554*	*653*	*716*	*765*	*824*	- - -
					X_T	0.432	0.320	0.393	0.363	0.380	0.424	0.408	0.437	0.468	0.476	- - -
10 x 8	203.2	8	76	3	C_v	82	186	297	414	486	580	673	743	803	851	- - -
					K_v	*70.6*	*160*	*257*	*358*	*420*	*501*	*582*	*643*	*695*	*736*	- - -
					X_T	0.619	0.475	0.410	0.408	0.425	0.423	0.427	0.464	0.487	0.538	- - -
			102	4	C_v	113	258	414	510	649	743	823	878	895	921	- - -
					K_v	*97.7*	*223*	*358*	*441*	*561*	*643*	*712*	*759*	*774*	*797*	- - -
					X_T	0.538	0.411	0.408	0.431	0.415	0.464	0.495	0.580	0.661	0.713	- - -
12 x 8	203.2	8	76	3	C_v	147	268	358	445	537	624	702	772	842	900	- - -
					K_v	*127*	*232*	*310*	*385*	*465*	*540*	*607*	*668*	*728*	*779*	- - -
					X_T	0.256	0.272	0.390	0.422	0.406	0.411	0.439	0.473	0.480	0.508	- - -
			102	4	C_v	181	329	449	563	674	778	866	931	972	1000	- - -
					K_v	*157*	*285*	*388*	*487*	*583*	*673*	*749*	*805*	*841*	*865*	- - -
					X_T	0.329	0.350	0.408	0.425	0.431	0.452	0.494	0.540	0.583	0.644	- - -

1. The first number indicates both body inlet and outlet size. The second number indicates effective trim size.
2. At 100% travel.
3. Travel limited to 3.5 inches when optional multiple piston ring is used. Reduce printed capacities accordingly.
4. NPS 10x6 has a valve outlet area identical to the NPS 8x6.

Notes: The coefficients shown on this page are also appropriate for the EWT.
The coefficients shown on this page for NPS 6 x 4 through 10 x 8 also apply to EWT-C valves.

Whisper Trim III

Linear Characteristic

Valve Size, NPS[2]	Port Diameter		Maximum Travel		Cage Level	Flow Coefficient	Valve Opening—Percent of Total Travel											X_T[1]
	mm	Inches	mm	Inches			Min.	10	20	30	40	50	60	70	80	90	100	
4x2	58.7	2.312	34.9	1.38	A1	Cv	7.4	8.7	18.7	28.7	36.7	41.6	45.3	47.4	48.4	48.9	49.4	0.890
						Kv	6.4	7.5	16.2	24.8	31.7	36.0	39.2	41.0	41.9	42.34	42.7	
	33.3	1.312	31.8	1.25	A3	Cv	2.2	0.4	3.1	7.7	12.8	17.1	21.6	24.5	27.3	28.5	29.7	0.880
						Kv	1.9	0.3	2.7	6.7	11.1	14.8	18.7	21.2	23.6	24.7	25.7	
	33.3	1.312	31.8	1.25	B1	Cv	2.8	2.2	6.2	9.2	12.0	14.7	17.3	19.9	22.3	24.6	26.0	0.750
						Kv	2.4	1.9	5.4	8.0	10.4	12.7	15.0	17.2	19.3	21.3	22.5	
	33.3	1.312	31.8	1.25	B3	Cv	1.5	0.5	1.3	4.4	7.0	9.5	11.8	14.1	16.3	18.5	19.8	0.750
						Kv	1.3	0.4	1.1	3.8	6.1	8.2	10.2	12.2	14.1	16.0	17.1	
	33.3	1.313	31.8	1.25	C1	Cv	2.2	0.5	3.0	4.6	5.9	7.5	9.1	10.7	12.3	13.9	14.0	0.780
						Kv	1.9	0.4	2.6	4.0	5.1	6.5	7.9	9.3	10.6	12.0	12.1	
	33.3	1.313	28.6	1.13	C3	Cv	1.2	0.4	0.7	2.1	3.9	5.5	7.2	9.0	10.7	12.4	13.8	0.780
						Kv	1.1	0.3	0.6	1.8	3.4	4.8	6.2	7.8	9.3	10.7	11.9	
	33.3	1.313	31.8	1.25	D1	Cv	2.2	0.5	3.0	4.6	5.9	7.5	9.1	10.7	12.3	13.9	14.0	0.780
						Kv	1.9	0.4	2.6	4.0	5.1	6.5	7.9	9.3	10.6	12.0	12.1	
	33.3	1.313	28.6	1.13	D3	Cv	1.2	0.4	0.7	2.1	3.9	5.5	7.2	9.0	10.7	12.4	13.8	0.780
						Kv	1.1	0.3	0.6	1.8	3.4	4.8	6.2	7.8	9.3	10.7	11.9	
6x4	111.1	4.375	50.8	2.00	A1	Cv	10.9	28.0	49.0	78.0	96.4	116.0	126.0	137.0	142.0	148.0	158.0	0.810
						Kv	9.4	24.2	42.4	67.5	83.4	100.3	109.0	118.5	122.8	128.0	136.7	
	111.1	4.375	50.8	2.00	A3	Cv	6.8	20.0	41.0	60.0	81.0	101.0	120.0	135.0	147.0	158.0	164.8	0.810
						Kv	5.8	17.3	35.5	51.9	70.1	87.4	103.8	116.8	127.2	136.7	142.6	
	111.1	4.375	50.8	2.00	B1	Cv	4.6	6.7	19.5	31.7	43.3	56.0	68.3	80.2	92.8	105.0	115.0	0.492
						Kv	3.9	5.8	16.9	27.4	37.5	48.4	59.1	69.4	80.3	90.8	99.5	
	111.1	4.375	50.8	2.00	B3	Cv	5.9	7.0	19.0	32.0	44.0	55.0	68.0	79.0	91.0	104.0	109.6	0.492
						Kv	5.1	6.1	16.4	27.7	38.1	47.6	58.8	68.3	78.7	90.0	94.8	
	87.3	3.438	50.8	2.00	C1	Cv	4.6	6.5	15.3	23.7	31.9	39.8	47.6	55.2	62.8	70.3	76.6	0.523
						Kv	4.0	5.6	13.2	20.5	27.6	34.4	41.2	47.8	54.3	60.8	66.3	
	87.3	3.438	76.2	3.00	C3	Cv	4.0	9.3	19.2	28.0	37.4	46.6	56.2	65.3	73.8	83.5	89.3	0.467
						Kv	3.5	8.0	16.6	24.2	32.4	40.3	48.6	56.5	63.8	72.2	77.2	
	87.3	3.438	50.8	2.00	D1	Cv	4.6	6.5	15.3	23.7	31.9	39.8	47.6	55.2	62.8	70.3	76.6	0.523
						Kv	4.0	5.6	13.2	20.5	27.6	34.4	41.2	47.8	54.3	60.8	66.3	
	87.3	3.438	76.2	3.00	D3	Cv	4.0	9.3	19.2	28.0	37.4	46.6	56.2	65.3	73.8	83.5	89.3	0.467
						Kv	3.5	8.0	16.6	24.2	32.4	40.3	48.6	56.5	63.8	72.2	77.2	
8x4	111.1	4.375	50.8	2.00	A1	Cv	10.9	28.0	49.0	78.0	96.4	116.0	126.0	137.0	142.0	148.0	158.0	0.770
						Kv	9.4	24.2	42.4	67.5	83.4	100.3	109.0	118.5	122.8	128.0	136.7	
	87.3	3.438	50.8	2.00	A3	Cv	5.9	11.2	27.4	49.4	70.0	90.6	110.0	125.0	135.0	139.0	137.0	0.492
						Kv	5.1	9.7	23.7	42.7	60.6	78.4	95.2	108.1	116.8	120.2	118.5	
	111.1	4.375	50.8	2.00	B1	Cv	4.6	6.7	19.5	31.7	43.3	56.0	68.3	80.2	92.8	105.0	115.0	0.770
						Kv	3.9	5.8	16.9	27.4	37.5	48.4	59.1	69.4	80.3	90.8	99.5	
	87.3	3.438	50.8	2.00	B3	Cv	4.4	8.4	21.2	32.9	43.7	54.2	64.5	74.8	85.1	95.5	102.0	0.492
						Kv	3.8	7.3	18.3	28.5	37.8	46.9	55.8	64.7	73.6	82.6	88.2	
	87.3	3.438	50.8	2.00	C1	Cv	4.6	6.5	15.3	23.7	31.9	39.8	47.6	55.2	62.8	70.3	76.6	0.523
						Kv	4.0	5.6	13.2	20.5	27.6	34.4	41.2	47.8	54.3	60.8	66.3	
	87.3	3.438	50.8	2.00	C3	Cv	4.0	10.1	18.4	26.2	33.5	40.5	47.3	54.0	60.6	67.2	73.8	0.523
						Kv	3.5	8.7	15.9	22.7	29.0	35.0	40.9	46.7	52.4	58.1	63.8	
	87.3	3.438	76.2	3.00	C3[2]	Cv	4.0	9.2	18.7	28.0	37.7	46.6	56.3	63.2	74.2	83.6	89.3	0.523
						Kv	3.5	8.0	16.2	24.2	32.6	40.3	48.7	54.7	64.2	72.3	77.2	
	87.3	3.438	50.8	2.00	D1	Cv	4.6	6.5	15.3	23.7	31.9	39.8	47.6	55.2	62.8	70.3	76.6	0.523
						Kv	4.0	5.6	13.2	20.5	27.6	34.4	41.2	47.8	54.3	60.8	66.3	
	87.3	3.438	50.8	2.00	D3	Cv	4.0	10.1	18.4	26.2	33.5	40.5	47.3	54.0	60.6	67.2	73.8	0.467
						Kv	3.5	8.7	15.9	22.7	29.0	35.0	40.9	46.7	52.4	58.1	63.8	
	87.3	3.438	76.2	3.00	D3[2]	Cv	4.0	9.2	18.7	28.0	37.7	46.6	56.3	63.2	74.2	83.6	89.3	0.467
						Kv	3.5	8.0	16.2	24.2	32.6	40.3	48.7	54.7	64.2	72.3	77.2	

Valve Size, NPS(2)	Port Diameter		Maximum Travel		Cage Level	Flow Coeffi-cient	Valve Opening—Percent of Total Travel											X_T(1)
	mm	Inches	mm	Inches			Min.	**10**	20	30	40	50	60	70	80	90	100	
8x6 10x6	136.5	5.375	127.0	5.00	A1	Cv	14.2	50.0	97.6	156.0	215.0	270.0	326.0	383.0	427.0	457.0	459.9	0.710
						Kv	12.3	43.3	84.4	134.9	186.0	233.6	282.0	331.3	369.4	395.3	397.8	
	177.8	7.000	76.2	3.00	A1	Cv	19.2	56.8	98.9	141.0	183.1	225.2	267.3	309.4	354.5	393.6	416.1	0.608
						Kv	16.6	49.1	85.6	122.0	158.4	194.8	231.2	267.6	306.7	340.5	359.9	
	177.8	7.000	95.3	3.75	A1(3)	Cv	18.4	94	158	217	272	322	369	411	446	474	491	0.823
						Kv	15.9	81	137	188	235	279	319	356	386	410	425	
	177.8	7.000	101.6	4.00	A1(3)	Cv	18.4	99.2	166.8	229.4	287.5	340.9	389.4	431.5	465.7	489.9	494.0	0.775
						Kv	15.9	85.8	144.3	198.4	248.7	294.9	336.9	373.3	402.9	423.8	427.3	
	136.5	5.375	127.0	5.00	A3	Cv	4.0	50.0	97.6	159.0	215.0	270.0	326.0	383.0	427.0	457.0	460.0	0.710
						Kv	3.5	43.3	84.4	137.5	186.0	233.6	282.0	331.3	369.4	395.3	397.9	
	177.8	7.000	95.3	3.75	A3(3)	Cv	13.4	49	104	154	201	246	290	334	377	421	460	0.78
						Kv	11.6	42	90	133	174	213	251	289	326	364	398	
	177.8	7.000	101.6	4.00	A3(3)	Cv	13.4	47.5	112.1	171.0	226.6	285.7	337.9	393.5	442.0	487.4	520.4	0.740
						Kv	11.6	41.1	97.0	147.9	196.0	247.1	292.3	340.4	382.4	421.6	450.2	
	136.5	5.375	127.0	5.00	B1	Cv	11.1	38.2	76.2	11.2	144.2	176.1	207.7	239.1	270.7	302.2	330.9	0.563
						Kv	9.6	33.0	65.9	9.7	124.7	152.3	179.7	206.8	234.2	261.4	286.2	
	136.5	5.375	127.0	5.00	B3	Cv	4.7	40.0	72.3	108.0	143.0	178.0	213.0	248.0	280.0	314.0	347.0	0.563
						Kv	4.0	34.6	62.5	93.4	123.7	154.0	184.3	214.5	242.2	271.6	300.2	
	136.5	5.375	127.0	5.00	C1	Cv	10.2	30.5	57.9	83.5	107.8	131.0	153.6	175.7	197.7	219.6	236.1	0.563
						Kv	8.8	26.4	50.1	72.2	93.3	113.3	132.9	152.0	171.0	190.0	204.2	
	136.5	5.375	127.0	5.00	C3	Cv	4.7	28.0	50.0	74.7	99.3	124.0	149.0	173.0	197.0	221.0	245.0	0.563
						Kv	4.0	24.2	43.3	64.6	85.9	107.3	128.9	149.7	170.4	191.2	211.9	
	136.5	5.375	127.0	5.00	D1	Cv	10.2	30.5	57.9	83.5	107.8	131.0	153.6	175.7	197.7	219.6	236.1	0.563
						Kv	8.8	26.4	50.1	72.2	93.3	113.3	132.9	152.0	171.0	190.0	204.2	
	136.5	5.375	127.0	5.00	D3	Cv	4.7	28.0	50.0	74.7	99.3	124.0	149.0	173.0	197.0	221.0	245.3	0.563
						Kv	4.0	24.2	43.3	64.6	85.9	107.3	128.9	149.7	170.4	191.2	212.2	
12x6	136.5	5.375	165.1	6.50	A1	Cv	15.2	62.0	151.0	238.0	324.0	407.0	492.0	573.0	651.0	697.0	698.0	0.589
						Kv	13.1	53.6	130.6	205.9	280.3	352.1	425.6	495.7	563.1	602.9	603.8	
	136.5	5.375	165.1	6.50	A3	Cv	4.0	62.0	151.0	238.0	324.0	407.0	492.0	573.0	651.0	697.0	698.0	0.589
						Kv	3.5	53.6	130.6	205.9	280.3	352.1	425.6	495.7	563.1	602.9	603.8	
	136.5	5.375	165.1	6.50	B1	Cv	4.7	51.0	94.0	141.0	187.0	233.0	278.0	324.0	370.0	413.0	457.0	0.563
						Kv	4.0	44.1	81.3	122.0	161.8	201.6	240.5	280.3	320.1	357.3	395.3	
	136.5	5.375	165.1	6.50	B3	Cv	4.7	51.0	94.0	141.0	187.0	233.0	278.0	324.0	370.0	413.0	457.0	0.563
						Kv	4.0	44.1	81.3	122.0	161.8	201.6	240.5	280.3	320.1	357.3	395.3	
	136.5	5.375	165.1	6.50	C1	Cv	10.2	39.1	73.7	105.7	136.0	165.2	194.0	222.6	251.2	280.0	301.8	0.563
						Kv	8.8	33.8	63.8	91.4	117.6	142.9	167.8	192.6	217.3	242.2	261.1	
	136.5	5.375	165.1	6.50	C3	Cv	4.7	4.0	64.0	96.0	127.0	160.0	191.0	222.0	254.0	284.0	315.0	0.563
						Kv	4.0	3.5	55.4	83.0	109.9	138.4	165.2	192.0	219.7	245.7	272.5	
	136.5	5.375	165.1	6.50	D1	Cv	10.2	39.1	73.7	105.7	136.0	165.2	194.0	222.6	251.2	280.0	301.8	0.563
						Kv	8.8	33.8	63.8	91.4	117.6	142.9	167.8	192.6	217.3	242.2	261.1	
	136.5	5.375	165.1	6.50	D3	Cv	4.7	4.0	64.0	96.0	127.0	160.0	191.0	222.0	254.0	284.0	315.3	0.563
						Kv	4.0	3.5	55.4	83.0	109.9	138.4	165.2	192.0	219.7	245.7	272.8	
10x8	203.2	8.000	152.4	6.00	A1	Cv	21.6	130.0	266.0	391.0	508.0	616.0	712.0	793.0	854.0	882.0	882.3	0.731
						Kv	18.7	112.5	230.1	338.2	439.4	532.9	615.9	686.0	738.8	763.0	763.2	
	203.2	8.000	152.4	6.00	A3	Cv	14.4	135.0	270.0	396.0	512.0	620.0	715.0	796.0	855.0	882.0	882.3	0.731
						Kv	12.5	116.8	233.6	342.6	442.9	536.3	618.5	688.6	739.6	763.0	763.2	
	203.2	8.000	152.4	6.00	B1	Cv	18.0	60.0	117.0	174.0	230.0	287.0	344.0	400.0	457.0	514.0	578.0	0.648
						Kv	15.6	51.9	101.2	150.5	199.0	248.3	297.6	346.0	395.3	444.6	500.0	
	203.2	8.000	152.4	6.00	B3	Cv	12.8	57.0	113.0	169.0	225.0	281.0	336.0	392.0	448.0	504.0	553.1	0.648
						Kv	11.1	49.3	97.8	146.2	194.6	243.1	290.7	339.1	387.5	436.0	478.5	
	203.2	8.000	152.4	6.00	C1	Cv	14.8	61.9	114.0	165.4	217.4	270.3	323.7	376.3	426.2	470.6	499.2	0.536
						Kv	12.8	53.5	98.6	143.1	188.1	233.8	280.0	325.5	368.7	407.1	431.8	
	203.2	8.000	152.4	6.00	C3	Cv	11.6	44.0	83.0	122.0	162.0	205.0	240.0	290.0	319.0	358.0	391.6	0.569
						Kv	10.0	38.1	71.8	105.5	140.1	177.3	207.6	250.9	276.0	309.7	338.8	

Valve Size, NPS(2)	Port Diameter		Maximum Travel		Cage Level	Flow Coeffi-cient	Valve Opening—Percent of Total Travel											X_T(1)
	mm	Inches	mm	Inches			Min.	10	20	30	40	50	60	70	80	90	100	
10x8	177.8	7.000	152.4	6.00	D1	Cv	11.6	44.0	83.0	122.0	162.0	205.0	240.0	290.0	319.0	358.0	392.0	0.569
						Kv	10.0	38.1	71.8	105.5	140.1	177.3	207.6	250.9	276.0	309.7	339.1	
	177.8	7.000	152.4	6.00	D3	Cv	9.8	39.0	75.0	110.0	145.0	180.0	216.0	251.0	286.0	321.0	347.5	0.569
						Kv	8.4	33.7	64.9	95.2	125.4	155.7	186.9	217.1	247.4	277.7	300.6	
12x8	203.2	8.000	152.4	6.00	A1	Cv	21.6	130.0	266.0	391.0	508.0	616.0	712.0	793.0	854.0	882.0	882.3	0.731
						Kv	18.7	112.5	230.1	338.2	439.4	532.9	615.9	686.0	738.8	763.0	763.2	
	203.2	8.000	152.4	6.00	A3	Cv	14.4	135.0	270.0	396.0	512.0	620.0	715.0	796.0	855.0	882.0	882.3	0.731
						Kv	12.5	116.8	233.6	342.6	442.9	536.3	618.5	688.6	739.6	763.0	763.2	
	203.2	8.000	152.4	6.00	B1	Cv	18.0	60.0	117.0	174.0	230.0	287.0	344.0	400.0	457.0	514.0	578.0	0.648
						Kv	15.6	51.9	101.2	150.5	199.0	248.3	297.6	346.0	395.3	444.6	500.0	
	203.2	8.000	152.4	6.00	B3	Cv	12.8	57.0	113.0	169.0	225.0	281.0	336.0	392.0	448.0	504.0	553.1	0.648
						Kv	11.1	49.3	97.8	146.2	194.6	243.1	290.7	339.1	387.5	436.0	478.5	
	203.2	8.000	152.4	6.00	C1	Cv	14.8	61.9	114.0	165.4	217.4	270.3	323.7	376.3	426.2	470.6	499.2	0.536
						Kv	12.8	53.5	98.6	143.1	188.1	233.8	280.0	325.5	368.7	407.1	431.8	
	203.2	8.000	152.4	6.00	C3	Cv	11.6	44.0	83.0	122.0	162.0	205.0	240.0	290.0	319.0	358.0	391.6	0.569
						Kv	10.0	38.1	71.8	105.5	140.1	177.3	207.6	250.9	276.0	309.7	338.8	
	177.8	7.000	152.4	6.00	D1	Cv	11.6	44.0	83.0	122.0	162.0	205.0	240.0	290.0	319.0	358.0	392.0	0.569
						Kv	10.0	38.1	71.8	105.5	140.1	177.3	207.6	250.9	276.0	309.7	339.1	
	177.8	7.000	152.4	6.00	D3	Cv	9.8	39.0	75.0	110.0	145.0	180.0	216.0	251.0	286.0	321.0	347.5	0.569
						Kv	8.4	33.7	64.9	95.2	125.4	155.7	186.9	217.1	247.4	277.7	300.6	

1. This column lists XT factors for Whisper Trim III cages at 100% travel
2. Not applicable for NPS 8x4 EWD with Class IV multiple piston ring
3. Travel limited to 3.75" for EWD valves with Class IV multiple piston rings and EWT with PEEK anti-extrusion seal ring

Notes: The coefficients shown on this page are also appropriate for Fisher EWT valves and coefficients for NPS 4x2 and 6x4 apply to Fisher EWS Valves. The coefficients for NPS 6x4 through 10x8 also apply to Fisher EWT-C valves.

Valve Size, NPS[1]	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L[2]
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
Quick Opening - Flow Down																**Quick Opening Characteristic**
8 x 6	177.8	7	51	2	C_v	83	166	259	355	434	495	558	597	641	670	0.89
					K_v	*71.8*	*144*	*224*	*307*	*375*	*428*	*483*	*516*	*554*	*580*	- - -
					X_T	0.501	0.569	0.607	0.633	0.688	0.772	0.787	0.811	0.798	0.809	- - -
12 x 8	203.2	8	76	3	C_v	149	315	481	640	780	898	1000	1100	1180	1260	0.79
					K_v	*129*	*272*	*416*	*554*	*675*	*777*	*865*	*952*	*1021*	*1090*	- - -
					X_T	0.687	0.735	0.727	0.745	0.754	0.784	0.744	0.754	0.711	0.636	- - -
Linear - Flow Down																**Linear Characteristic**
8 x 6	177.8	7	51	2	C_v	46	112	177	243	305	368	421	493	574	644	0.89
					K_v	*39.8*	*96.9*	*153*	*210*	*264*	*318*	*364*	*426*	*497*	*557*	- - -
					X_T	0.884	0.746	0.747	0.743	0.755	0.756	0.783	0.788	0.759	0.729	- - -
12 x 8	203.2	8	76	3	C_v	104	223	348	490	638	781	907	999	1080	1160	0.80
					K_v	*90.0*	*193*	*301*	*424*	*552*	*676*	*785*	*864*	*934*	*1003*	- - -
					X_T	0.700	0.694	0.647	0.692	0.697	0.693	0.711	0.741	0.738	0.696	- - -
Equal Percentage - Flow Down																**Equal Percentage Characteristic**
8 x 6	177.8	7	51	2	C_v	12.2	24.4	42.4	67.1	105	167	241	321	405	477	0.92
					K_v	*10.6*	*21.1*	*36.7*	*58.0*	*90.8*	*144*	*208*	*278*	*350*	*413*	- - -
					X_T	0.715	0.614	0.526	0.506	0.507	0.529	0.609	0.669	0.704	0.757	- - -
12 x 8	203.2	8	76	3	C_v	28.4	61.0	112	196	311	481	687	839	992	1090	0.81
					K_v	*24.6*	*52.8*	*96.9*	*170*	*269*	*416*	*594*	*726*	*858*	*943*	- - -
					X_T	0.666	0.665	0.667	0.664	0.659	0.666	0.664	0.662	0.663	0.663	- - -
Whisper Trim I - Flow Up																**Linear Characteristic**
8 x 6	177.8	7	51	2	C_v	44.8	104	171	233	302	366	439	492	544	568	- - -
					K_v	38.8	90.0	148	202	261	*317*	*380*	*426*	*471*	*491*	- - -
					X_T	0.516	0.384	0.342	0.330	0.315	0.308	0.292	0.307	0.309	0.327	- - -

1. The first number indicates both body inlet and outlet size. The second number indicates effective trim size.
2. At 100% travel.

Notes: The coefficients shown on this page are also appropriate for the EWT and EWT-1. EWD-1 and EWT-1 are available only in NPS 12 x 8 body size.

Whisper Trim III - Flow Up

Linear Characteristic

Valve Size, NPS[1]	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel											X_T at Max. Travel
	mm	Inches	mm	Inches		Minimum[2]	10	20	30	40	50	60	70	80	90	100	
A1 & A3																	
12 x 8	196.8	7.75	146	5.75	C_v	25	84	168	253	337	422	506	590	675	759	843	0.563
					K_v	*22*	*73*	*145*	*219*	*292*	*365*	*438*	*511*	*584*	*657*	*729*	- - -
B1 & B3																	
12 x 8	196.8	7.75	146	5.75	C_v	21	55	111	177	227	277	326	422	443	498	554	0.563
					K_v	*18*	*48*	*96*	*153*	*196*	*240*	*282*	*365*	*383*	*431*	*479*	- - -
C1 & C3																	
12 x 8	196.8	7.75	146	5.75	C_v	18	39	78	117	156	195	235	273	312	352	391	0.563
					K_v	*16*	*34*	*68*	*101*	*135*	*169*	*203*	*236*	*270*	*304*	*338*	- - -
D1 & D3																	
12 x 8	171.5	6.75	146	5.75	C_v	16	33	67	100	133	167	201	233	266	301	332	0.563
					K_v	*14*	*29*	*58*	*86*	*115*	*144*	*173*	*201*	*230*	*260*	*287*	- - -

1. The first number indicates both inlet and outlet size. The second number indicates effective trim size.
2. Valve should not be required to throttle at less than the specified minimum coefficient for an extended period of time or erosion damage to the valve seat may result.

Notes: The coefficients shown on this page are also appropriate for the EWT-1.

Linear Cast-Window Cage

Linear Characteristic

Valve Size, NPS(1)	Port Diameter		Maximum Travel		Con-Struc-tion(2)	Flow Coeffi-cient	Valve Opening—Percent of Total Travel											F_L
	mm	Inches	mm	Inches			Min(3)	10	20	30	40	50	60	70	80	90	100	
20 x 16	374.7	14.75	102	4.00	SNC	C_v	46	269	524	814	1100	1390	1730	2070	2380	2670	2960	0.88
						K_v	*39.8*	*233*	*453*	*704*	*952*	*1202*	*1496*	*1791*	*2059*	*2310*	*2560*	- - -
						X_T	0.391	0.989	0.901	0.804	0.750	0.742	0.742	0.748	0.755	0.759	0.767	- - -
20 x 16	374.7	14.75	127	5.00	SNC	C_v	46	321	670	1030	1390	1810	2230	2590	2960	3300	3580	0.88
						K_v	*39.8*	*278*	*580*	*891*	*1202*	*1566*	*1929*	*2240*	*2560*	*2855*	*3097*	- - -
						X_T	0.391	0.994	0.843	0.759	0.742	0.738	0.751	0.761	0.772	0.759	0.750	- - -
24 x 16	374.7	14.75	102	4.00	SNC	C_v	46	351	604	900	1183	1470	1770	2090	2450	2820	3190	0.88
						K_v	*39.8*	*304*	*522*	*779*	*1023*	*1272*	*1531*	*1808*	*2119*	*2439*	*2759*	- - -
						X_T	0.391	0.994	0.914	0.808	0.751	0.738	0.742	0.744	0.758	0.766	0.757	- - -
24 x 16	374.7	14.75	140	5.50	SNC	C_v	46	418	817	1220	1600	2040	2540	3050	3530	3850	4060	0.88
						K_v	*39.8*	*362*	*707*	*1055*	*1384*	*1765*	*2197*	*2638*	*3053*	*3330*	*3512*	- - -
						X_T	0.391	0.986	0.820	0.744	0.739	0.744	0.759	0.769	0.759	0.746	0.765	- - -

1. The first number indicates both inlet and outlet size. The second number indicates effective trim size.
2. Construction—SNC = short-neck, cast windows.
3. Do not allow the valve to throttle at less than the minimum coefficient shown for an extended time, or erosion damage to the valve seat might result.

Linear Drilled-Window Cage

Linear Characteristic

Valve Type	Valve Size, NPS(1)	Port Diameter		Maximum Travel		Con-Struc-tion(2)	Flow Coeffi-cient	Valve Opening—Percent of Total Travel											F_L
		mm	Inches	mm	Inches			Min(3)	10	20	30	40	50	60	70	80	90	100	
EWD, EWT	20 x 16	374.7	14.75	276	10.88	LND	C_v	46	262	550	874	1200	1560	1850	2190	2470	2760	3040	0.89
							K_v	*39.8*	*227*	*476*	*756*	*1038*	*1349*	*1600*	*1894*	*2137*	*2387*	*2630*	- - -
							X_T	0.391	0.985	0.894	0.791	0.740	0.738	0.743	0.745	0.758	0.762	0.760	- - -
	20 x 16	374.7	14.75	378	14.88	LN-SD	C_v	46	330	742	1160	1570	1970	2370	2740	3110	3430	3660	0.89
							K_v	*39.8*	*285*	*642*	*1003*	*1358*	*1704*	*2050*	*2370*	*2690*	*2967*	*3166*	- - -
							X_T	0.391	0.985	0.815	0.739	0.739	0.740	0.754	0.764	0.768	0.752	0.753	- - -
EWT-2	20 x 16	412.8	16.25	276	10.88	LND	C_v	52	322	679	1080	1480	1880	2210	2570	2880	3180	3480	0.89
							K_v	*45.0*	*279*	*587*	*934*	*1280*	*1626*	*1912*	*2223*	*2491*	*2751*	*3010*	- - -
							X_T	0.391	0.988	0.888	0.786	0.742	0.738	0.759	0.744	0.754	0.762	0.768	- - -
	20 x 16	412.8	16.25	378	14.88	LN-SD	C_v	52	390	868	1350	1850	2340	2810	3240	3670	4060	4370	0.89
							K_v	*45.0*	*337*	*751*	*1168*	*1600*	*2024*	*2431*	*2803*	*3175*	*3512*	*3780*	- - -
							X_T	0.391	0.990	0.823	0.751	0.736	0.742	0.754	0.760	0.760	0.754	0.746	- - -
EWD, EWT	24 x 16	374.7	14.75	378	14.88	LND	C_v	46	328	701	1140	1610	2060	2480	2860	3140	3340	3490	0.89
							K_v	*39.8*	*284*	*606*	*986*	*1393*	*1782*	*2145*	*2474*	*2716*	*2889*	*3019*	- - -
							X_T	0.391	0.997	0.934	0.828	0.767	0.745	0.734	0.743	0.753	0.767	0.764	- - -
	24 x 16	374.7	14.75	429	16.88	LN-SD	C_v	46	356	764	1240	1750	2210	2620	3030	3300	3500	3670	0.89
							K_v	*39.8*	*308*	*661*	*1073*	*1514*	*1912*	*2266*	*2621*	*2855*	*3028*	*3175*	- - -
							X_T	0.391	0.994	0.919	0.816	0.757	0.743	0.741	0.751	0.759	0.759	0.748	- - -
EWT-2	24 x 16	412.8	16.25	378	14.88	LND	C_v	52	363	765	1240	1750	2280	2740	3260	3670	3960	4150	0.89
							K_v	*45.0*	*314*	*662*	*1073*	*1514*	*1972*	*2370*	*2820*	*3175*	*3425*	*3590*	- - -
							X_T	0.391	0.997	0.955	0.853	0.787	0.745	0.739	0.738	0.748	0.759	0.763	- - -
	24 x 16	412.8	16.25	429	16.88	LN-SD	C_v	52	393	832	1350	1900	2440	2940	3480	3850	4110	4310	0.89
							K_v	*45.0*	*340*	*720*	*1168*	*1644*	*2111*	*2543*	*3010*	*3330*	*3555*	*3728*	- - -
							X_T	0.391	0.997	0.942	0.834	0.775	0.746	0.738	0.743	0.757	0.767	0.757	- - -
EWD, EWT	24 x 20	463.6	18.25	378	14.88	LND	C_v	56	457	995	1560	2130	2640	3310	3451	3650	3885	4115	0.89
							K_v	*48.4*	*395*	*861*	*1349*	*1842*	*2284*	*2863*	*2985*	*3157*	*3361*	*3559*	- - -
							X_T	0.391	0.991	.0850	0.763	0.738	0.739	0.743	0.753	0.757	0.769	0.766	- - -
	24 x 20	463.6	18.25	429	16.88	LN-SD	C_v	56	490	1080	1680	2300	2920	3420	3637	3903	4160	4357	0.89
							K_v	*48.4*	*424*	*934*	*1453*	*1990*	*2526*	*2958*	*3146*	*3376*	*3598*	*3769*	- - -
							X_T	0.391	0.990	0.832	0.753	0.735	0.733	0.748	0.755	0.767	0.766	0.754	- - -
EWT-2	24 x 20	501.7	19.75	378	14.88	LND	C_v	60	490	1163	1898	2561	3152	3672	4119	4494	4797	5028	0.89
							K_v	*51.9*	*434*	*1006*	*1642*	*2216*	*2727*	*3176*	*3563*	*3887*	*4149*	*4349*	- - -
							X_T	0.391	0.992	0.873	0.775	0.743	0.736	0.735	0.747	0.758	0.760	0.768	- - -
	24 x 20	501.7	19.75	429	16.88	LN-SD	C_v	60	591	1320	2050	2790	3470	4250	4530	4810	5010	5210	0.89
							K_v	*51.9*	*511*	*1142*	*1773*	*2413*	*3002*	*3676*	*3918*	*4161*	*4334*	*4507*	- - -
							X_T	0.391	0.988	0.816	0.741	0.735	0.747	0.748	0.765	0.770	0.758	0.749	- - -

1. The first number indicates both inlet and outlet size. The second number indicates effective trim size.
2. Construction—LND - long neck, drilled windows; LN-SD = long neck with bonnet spacer, drilled windows.
3. Do not allow the valve to throttle at less than the minimum coefficient shown for an extended time, or erosion damage to the valve seat might result.

Equal Percentage Cast-Window Cage

Equal Percentage Characteristic

Valve Size, NPS[1]	Port Diameter		Maximum Travel		Construction[2]	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L
	mm	Inches	mm	Inches			Min[3]	10	20	30	40	50	60	70	80	90	100	
20 x 16	374.7	14.75	102	4.00	SNC	C_v	23	29.8	61.3	99.1	152	233	355	544	818	1180	1630	0.88
						K_v	*19.9*	*25.8*	*53.0*	*85.7*	*131*	*202*	*307*	*471*	*708*	*1021*	*1410*	- - -
						X_T	0.391	0.997	0.990	0.993	0.990	0.987	0.986	0.896	0.802	0.744	0.735	- - -
20 x 16	374.7	14.75	127	5.00	SNC	C_v	23	37.2	77.4	132	233	388	652	1070	1630	2080	2460	0.88
						K_v	*19.9*	*32.2*	*67.0*	*114*	*202*	*336*	*564*	*926*	*1410*	*1799*	*2128*	- - -
						X_T	0.391	0.989	0.990	0.989	0.987	0.959	0.847	0.751	0.735	0.747	0.755	- - -
20 x 16	374.7	14.75	140	5.50	SNC	C_v	23	41.2	88.2	162	293	517	900	1470	2000	2420	2830	0.88
						K_v	*19.9*	*35.6*	*76.3*	*140*	*253*	*447*	*779*	*1272*	*1730*	*2093*	*2448*	- - -
						X_T	0.391	0.990	0.990	0.991	0.987	0.907	0.785	0.741	0.742	0.757	0.762	- - -
24 x 16	374.7	14.75	102	4.00	SNC	C_v	23	38.9	79.8	128	195	296	444	646	922	1290	1700	0.88
						K_v	*19.9*	*33.6*	*69.0*	*111*	*169*	*256*	*384*	*559*	*798*	*1116*	*1471*	- - -
						X_T	0.391	0.992	0.992	0.996	0.995	0.993	0.982	0.899	0.801	0.744	0.735	- - -
24 x 16	374.7	14.75	127	5.00	SNC	C_v	23	48.6	100	170	296	480	753	1180	1700	2130	2580	0.88
						K_v	*19.9*	*42.0*	*86.5*	*147*	*256*	*415*	*651*	*1021*	*1471*	*1842*	*2232*	- - -
						X_T	0.391	0.986	0.990	0.991	0.993	0.969	0.852	0.751	0.735	0.742	0.757	- - -
24 x 16	374.7	14.75	140	5.50	SNC	C_v	23	53.8	114	208	371	619	1010	1560	2030	2530	3040	0.88
						K_v	*19.9*	*46.5*	*98.6*	*180*	*321*	*535*	*874*	*1349*	*1756*	*2188*	*2630*	- - -
						X_T	0.391	0.989	0.990	0.993	0.995	0.908	0.781	0.732	0.745	0.758	0.774	- - -

1. The first number indicates both inlet and outlet size. The second number indicates effective trim size.
2. Construction—SNC = short-neck, cast windows.
3. Do not allow the valve to throttle at less than the minimum coefficient shown for an extended time, or erosion damage to the valve seat might result.

Equal Percentage Drilled-Window Cage

Equal Percentage Characteristic

Valve Type	**Valve Size, NPS(1)**	**Port Diameter**		**Maximum Travel**		Construction(2)	**Flow Coefficient**	**Valve Opening—Percent of Total Travel**											F_L
		mm	Inches	mm	Inches			Min(3)	10	20	30	40	50	60	70	80	90	100	
EWD, EWT	20 x 16	374.7	14.75	276	10.88	LND	C_V	23	42.8	93.5	170	278	445	750	1220	1810	2290	2700	0.89
							K_V	*19.9*	*37.0*	*80.9*	*147*	*240*	*385*	*649*	*1055*	*1566*	*1981*	2336	- - -
							X_T	0.391	0.986	0.995	0.991	0.996	0.934	0.816	0.741	0.743	0.751	0.764	- - -
	20 x 16	374.7	14.75	378	14.88	LN-SD	C_V	23	55.7	123	213	340	584	974	1580	2210	2750	3260	0.89
							K_V	*19.9*	*48.2*	*106*	*184*	*294*	*505*	*843*	*1367*	*1912*	*2379*	*2820*	- - -
							X_T	0.391	0.993	0.995	0.995	0.985	0.879	0.771	0.735	0.751	0.762	0.764	- - -
EWT-2	20 x 16	412.8	16.25	276	10.88	LND	C_V	25	48.1	105	189	318	500	841	1370	2070	2640	3100	0.89
							K_V	*21.6*	*41.6*	*90.8*	*163*	*275*	*433*	*727*	*1185*	*1791*	*2284*	*2682*	- - -
							X_T	0.391	0.996	0.990	0.995	0.997	0.951	0.833	0.748	0.739	0.744	0.759	- - -
	20 x 16	412.8	16.25	378	14.88	LN-SD	C_V	25	65.9	146	253	403	691	1150	1880	2640	3280	3890	0.89
							K_V	*21.6*	*57.0*	*126*	*219*	*349*	*598*	*995*	*1626*	*2284*	*2837*	*3365*	- - -
							X_T	0.391	0.995	0.990	0.996	0.985	0.885	0.783	0.736	0.746	0.737	0.754	- - -
EWD, EWT	24 x 16	374.7	14.75	378	14.88	LND	C_V	23	42.4	88.1	150	265	438	732	1250	2000	2650	3110	0.89
							K_V	*19.9*	*36.7*	*76.2*	*130*	*229*	*379*	*633*	*1081*	*1730*	*2292*	*2690*	- - -
							X_T	0.391	0.993	0.998	0.997	0.995	0.998	0.928	0.814	0.746	0.755	0.764	- - -
	24 x 16	374.7	14.75	429	16.88	LN-SD	C_V	23	46.8	97.4	166	293	484	820	1400	2210	2860	3270	0.89
							K_V	*19.9*	*40.5*	*84.3*	*144*	*253*	*419*	*709*	*1211*	*1912*	*2474*	*2829*	- - -
							X_T	0.391	0.998	0.992	0.991	0.997	0.994	0.905	0.797	0.739	0.743	0.760	- - -
EWT-2	24 x 16	412.8	16.25	378	14.88	LND	C_V	25	49.6	103	176	311	513	853	1460	2350	3120	3700	0.89
							K_V	*21.6*	*42.9*	*89.1*	*152*	*269*	*444*	*738*	*1263*	*2033*	*2699*	*3201*	- - -
							X_T	0.391	0.996	0.995	0.991	0.994	0.988	0.935	0.814	0.743	0.735	0.748	- - -
	24 x 16	412.8	16.25	429	16.88	LN-SD	C_V	25	53.1	110	188	332	549	921	1580	2510	3290	3830	0.89
							K_V	*21.6*	*45.9*	*95.2*	*163*	*287*	*475*	*797*	*1367*	*2171*	*2846*	*3313*	- - -
							X_T	0.391	0.996	0.995	0.995	0.988	0.995	0.918	0.802	0.742	0.737	0.754	- - -
EWD, EWT	24 x 20	463.6	18.25	378	14.88	LND	C_V	28	200	485	863	1505	2293	2900	3371	3610	3834	3839	0.89
							K_V	*24.2*	*173*	*420*	*746*	*1302*	*1983*	*2509*	*2916*	*3123*	*3316*	*3321*	- - -
							X_T	0.391	0.992	0.987	0.996	0.991	0.918	0.801	0.739	0.742	0.759	0.765	- - -
	24 x 20	463.6	18.25	429	16.88	LN-SD	C_V	28	227	550	979	1707	2601	3290	3824	4095	4349	4355	0.89
							K_V	*24.2*	196	*476*	*847*	*1477*	*2280*	*2846*	*3308*	*3543*	*3762*	*3767*	- - -
							X_T	0.391	0.994	0.994	0.984	0.986	0.889	0.776	0.735	0.742	0.761	0.762	- - -
EWT-2	24 x 20	501.7	19.75	378	14.88	LND	C_V	30	285	415	750	1523	2530	3174	3708	3963	4251	4608	0.89
							K_V	*25.9*	*247*	*359*	*649*	*1317*	*2188*	*2746*	*3207*	*3428*	*3677*	*3986*	- - -
							X_T	0.391	0.991	0.997	0.987	0.996	0.939	0.824	0.743	0.738	0.757	0.759	- - -
	24 x 20	501.7	19.75	429	16.88	LN-SD	C_V	30	310	500	924	1860	2780	3501	3948	4276	4684	5034	0.89
							K_V	*25.9*	*268*	*433*	*799*	*1609*	*2405*	*3028*	*3415*	*3699*	*4052*	*4354*	- - -
							X_T	0.391	0.992	0.991	0.997	0.985	0.882	0.776	0.735	0.748	0.758	0.763	- - -

1. The first number indicates both inlet and outlet size. The second number indicates effective trim size.
2. Construction—LND - long neck, drilled windows; LN-SD = long neck with bonnet spacer, drilled windows.
3. Do not allow the valve to throttle at less than the minimum coefficient shown for an extended time, or erosion damage to the valve seat might result.

EWT-2, EWD, and EWT Whisper Trim III—Level A1

Linear Characteristic

Valve Size, NPS[1]	Valve Type	Port Diameter		Maximum Travel		Construction[2]	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L
		mm	Inches	mm	Inches			Min[3]	10	20	30	40	50	60	70	80	90	100	
20x16	EWD, EWT	374.7	14.75	203	8.00	SN	C_v	38	320	663	1001	1341	1685	1977	2211	2417	2590	2736	0.89
							K_v		*277*	*574*	*865*	*1160*	*1457*	*1710*	*1912*	*2090*	*2241*	*2367*	---
							X_T		0.436	0.433	0.432	0.432	0.432	0.451	0.493	0.541	0.570	0.589	---
		374.7	14.75	276	10.88	LN	C_v	38	443	907	1372	1836	2171	2449	2675	2846	2964	3029	0.89
							K_v		*383*	*785*	*1186*	*1588*	*1878*	*2119*	*2314*	*2462*	*2564*	*2620*	---
							X_T		0.434	0.433	0.432	0.432	0.484	0.549	0.580	0.607	0.639	0.677	---
		374.7	14.75	378	14.88	LN-S	C_v	38	617	1247	1876	2309	2642	2878	3011	3046	3046	3046	0.89
							K_v		*534*	*1078*	*1622*	*1997*	*2286*	*2489*	*2605*	*2635*	*2635*	*2635*	---
							X_T		0.434	0.432	0.436	0.513	0.576	0.613	0.660	0.722	0.773	0.793	---
	EWT-2	412.8	16.25	203	8.00	SN	C_v	41	353	732	1104	1480	1859	2231	2508	2757	2973	3161	0.89
							K_v		*305*	*633*	*955*	*1280*	*1608*	*1930*	*2170*	*2385*	*2572*	*2735*	---
							X_T		0.436	0.433	0.432	0.432	0.432	0.432	0.466	0.506	0.550	0.572	---
		412.8	16.25	276	10.88	LN	C_v	41	489	1001	1514	2026	2460	2797	3080	3309	3485	3607	0.89
							K_v		*423*	*866*	*1309*	*1752*	*2128*	*2420*	*2664*	*2863*	*3014*	*3120*	---
							X_T		0.434	0.433	0.432	0.432	0.459	0.513	0.565	0.587	0.612	0.642	---
		412.8	16.25	378	14.88	LN-S	C_v	41	681	1376	2079	2626	3038	3353	3564	3678	3696	3696	0.89
							K_v		*589*	*1190*	*1798*	*2272*	*2628*	*2900*	*3083*	*3181*	*3197*	*3197*	---
							X_T		0.434	0.432	0.432	0.483	0.561	0.592	0.629	0.676	0.734	0.776	---
24X16	EWD, EWT	374.7	14.75	203	8.00	SN	C_v	38	335	676	1019	1356	1698	1982	2219	2433	2620	2749	0.89
							K_v		*290*	*585*	*881*	*1173*	*1469*	*1714*	*1919*	*2105*	*2266*	*2378*	---
							X_T		0.435	0.433	0.432	0.432	0.432	0.457	0.495	0.539	0.563	0.575	---
		374.7	14.75	276	10.88	LN	C_v	38	461	924	1387	1838	2176	2466	2707	2901	3045	3122	0.89
							K_v		*399*	*799*	*1200*	*1590*	*1882*	*2133*	*2342*	*2509*	*2634*	*2701*	---
							X_T		0.434	0.433	0.432	0.438	0.487	0.546	0.571	0.592	0.616	0.638	---
		374.7	14.75	378	14.88	LN	C_v	38	628	1264	1877	2319	2676	2938	3110	3191	3198	3198	0.89
							K_v		*543*	*1093*	*1624*	*2006*	*2315*	*2541*	*2690*	*2760*	*2766*	*2766*	---
							X_T		0.433	0.432	0.442	0.513	0.568	0.597	0.633	0.679	0.730	0.758	---
	EWT-2	412.8	16.25	203	8.00	SN	C_v	41	353	732	1104	1480	1859	2218	2501	2759	2986	3188	0.89
							K_v		*305*	*633*	*955*	*1280*	*1608*	*1919*	*2163*	*2387*	*2583*	*2758*	---
							X_T		0.436	0.433	0.432	0.432	0.432	0.436	0.469	0.505	0.545	0.564	---
		412.8	16.25	276	10.88	LN	C_v	41	489	1001	1513	2025	2450	2799	3099	3350	3552	3705	0.89
							K_v		*423*	*866*	*1309*	*1752*	*2119*	*2421*	*2681*	*2898*	*3072*	*3205*	---
							X_T		0.434	0.433	0.432	0.432	0.462	0.511	0.558	0.576	0.595	0.618	---
		412.8	16.25	403	15.88	LN	C_v	41	726	1474	2208	2746	3181	3512	3737	3858	3881	3881	0.89
							K_v		*628*	*1275*	*1910*	*2375*	*2752*	*3038*	*3233*	*3337*	*3357*	*3357*	---
							X_T		0.433	0.432	0.435	0.503	0.563	0.590	0.624	0.665	0.717	0.754	---

Valve Size, NPS[1]	Valve Type	**Port Diameter**		**Maximum Travel**		Con-struc-tion[2]	**Flow Coeffi-cient**	**Valve Opening—Percent of Total Travel**											F_L
		mm	**Inches**	**mm**	**Inches**			**Min[3]**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**	
24x20	EWD, EWT	436.6	18.25	378	14.88	LN	C_v	43	671	1358	2028	2614	3059	3369	3552	3708	3915	4187	0.89
							K_v		*580*	*1174*	*1754*	*2261*	*2646*	*2914*	*3073*	*3207*	*3386*	*3622*	- - -
							X_T		0.529	0.528	0.528	0.528	0.552	0.615	0.689	0.736	0.766	0.801	- - -
		436.6	18.25	429	16.88	LN-S	C_v	43	761	1544	2278	2873	3275	3513	3688	3917	4224	4385	0.89
							K_v		*658*	*1335*	*1970*	*2485*	*2833*	*3039*	*3190*	*3388*	*3654*	*3793*	- - -
							X_T		0.529	0.528	0.528	0.528	0.593	0.674	0.735	0.769	0.809	0.858	- - -
	EWT-2	501.7	19.75	378	14.88	LN	C_v	46	727	1478	2197	2879	3404	3841	4020	4245	4416	4657	0.89
							K_v		*629*	*1278*	*1900*	*2490*	*2944*	*3322*	*3477*	*3672*	*3820*	*4028*	- - -
							X_T		0.529	0.528	0.528	0.528	0.531	0.586	0.649	0.721	0.746	0.775	- - -
		501.7	19.75	429	16.88	LN-S	C_v	46	825	1675	2488	3180	3687	4008	4213	4417	4706	5038	0.89
							K_v		*714*	*1449*	*2152*	*2751*	*3190*	*3467*	*3645*	*3821*	*4071*	*4358*	- - -
							X_T		0.529	0.528	0.528	0.528	0.567	0.636	0.719	0.748	0.781	0.821	- - -

1. The first number indicates both inlet and outlet size. The second number indicates effective trim size.
2. Construction—SN = short-neck valve; LN = long-neck valve: LN-S = long-neck valve with bonnet spacer.
3. Do not allow the valve to throttle at less than the minimum coefficient shown for an extended time, or erosion damage to the valve seat might result.

EWT-2, EWD, and EWT Whisper Trim III—Level A3

Linear Characteristic

Valve Size, NPS(1)	Valve Type	Port Diameter		Maximum Travel		Con-struc-tion(2)	Flow Coeffi-cient	Valve Opening—Percent of Total Travel											F_L
		mm	Inches	mm	Inches			Min(3)	10	20	30	40	50	60	70	80	90	100	
20x16	EWD, EWT	374.7	14.75	203	8.00	SN	C_V	25	290	593	892	1198	1495	1800	2032	2236	2416	2571	0.89
							K_V		*251*	*513*	*772*	*1036*	*1293*	*1557*	*1758*	*1934*	*2089*	*2224*	- - -
							X_T		0.436	0.433	0.432	0.432	0.432	0.432	0.460	0.498	0.541	0.569	- - -
		374.7	14.75	276	10.88	LN	C_V	25	400	807	1223	1629	1994	2267	2503	2694	2844	2952	0.89
							K_V		*346*	*698*	*1058*	*1409*	*1725*	*1961*	*2165*	*2330*	*2460*	*2554*	- - -
							X_T		0.435	0.433	0.432	0.432	0.454	0.504	0.562	0.582	0.607	0.635	- - -
		374.7	14.75	378	14.88	LN-S	C_V	25	549	1114	1677	2128	2469	2732	2915	3018	3045	3045	0.89
							K_V		*475*	*964*	*1451*	*1840*	*2135*	*2363*	*2521*	*2611*	*2634*	*2634*	- - -
							X_T		0.434	0.432	0.432	0.476	0.554	0.587	0.622	0.666	0.721	0.765	- - -
	EWT-2	412.8	16.25	203	8.00	SN	C_V	28	317	651	979	1315	1642	1978	2291	2531	2750	2938	0.89
							K_V		*274*	*563*	*847*	*1138*	*1420*	*1711*	*1981*	*2189*	*2379*	*2541*	- - -
							X_T		0.436	0.433	0.432	0.432	0.432	0.432	0.438	0.469	0.505	0.542	- - -
		412.8	16.25	276	10.88	LN	C_V	28	438	886	1343	1790	2245	2569	2857	3099	3302	3461	0.89
							K_V		*379*	*767*	*1161*	*1548*	*1942*	*2222*	*2472*	*2680*	*2856*	*2993*	- - -
							X_T		0.435	0.433	0.432	0.432	0.432	0.475	0.525	0.566	0.586	0.608	- - -
		412.8	16.25	378	14.88	LN-S	C_V	28	601	1223	1843	2403	2814	3148	3402	3576	3674	3695	0.89
							K_V		*520*	*1058*	*1594*	*2079*	*2434*	*2723*	*2943*	*3093*	*3178*	*3196*	- - -
							X_T		0.434	0.432	0.432	0.451	0.516	0.570	0.599	0.632	0.674	0.725	- - -
24X16	EWD, EWT	374.7	14.75	203	8.00	SN	C_V	18	163	451	735	1025	1307	1597	1861	2075	2270	2425	0.89
							K_V		*141*	*390*	*636*	*887*	*1131*	*1381*	*1610*	*1795*	*1964*	*2098*	- - -
							X_T		0.440	0.434	0.433	0.432	0.432	0.432	0.441	0.471	0.505	0.537	- - -
		374.7	14.75	276	10.88	LN	C_V	19	281	688	1103	1509	1895	2188	2449	2666	2849	2918	0.89
							K_V		*243*	*595*	*954*	*1305*	*1639*	*1893*	*2118*	*2306*	*2464*	*2524*	- - -
							X_T		0.437	0.433	0.432	0.432	0.445	0.489	0.542	0.567	0.585	0.594	- - -
		374.7	14.75	378	14.88	LN	C_V	19	430	994	1558	2038	2410	2711	2939	3095	3180	3196	0.89
							K_V		*372*	*860*	*1348*	*1763*	*2085*	*2345*	*2542*	*2677*	*2751*	*2765*	- - -
							X_T		0.435	0.433	0.432	0.465	0.533	0.571	0.597	0.628	0.667	0.709	- - -
	EWT-2	412.8	16.25	203	8.00	SN	C_V	28	304	635	970	1297	1634	1961	2269	2515	2740	2914	0.89
							K_V		*263*	*549*	*839*	*1122*	*1413*	*1696*	*1963*	*2175*	*2370*	*2521*	- - -
							X_T		0.436	0.433	0.433	0.432	0.432	0.432	0.442	0.471	0.503	0.532	- - -
		412.8	16.25	276	10.88	LN	C_V	28	421	877	1324	1781	2216	2557	2852	3114	3334	3519	0.89
							K_V		*364*	*759*	*1145*	*1541*	*1917*	*2212*	*2467*	*2694*	*2884*	*3044*	- - -
							X_T		0.435	0.433	0.432	0.432	0.436	0.476	0.520	0.559	0.574	0.592	- - -
		412.8	16.25	403	15.88	LN	C_V	28	620	1274	1924	2476	2908	3261	3533	3727	3843	3879	0.89
							K_V		*536*	*1102*	*1664*	*2142*	*2515*	*2821*	*3056*	*3224*	*3324*	*3355*	- - -
							X_T		0.434	0.432	0.432	0.465	0.530	0.569	0.593	0.622	0.658	0.701	- - -

Valve Size, NPS[1]	Valve Type	**Port Diameter**		**Maximum Travel**		Con-struc-tion[2]	**Flow Coeffi-cient**	**Valve Opening—Percent of Total Travel**											F_L
		mm	**Inches**	**mm**	**Inches**			**Min**[3]	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**	
24x20	EWD, EWT	436.6	18.25	378	14.88	LN	C_v	29	579	1177	1772	2323	2785	3135	3376	3537	3670	3830	0.89
							K_v		*501*	*1018*	*1532*	*2010*	*2409*	*2711*	*2920*	*3060*	*3175*	*3313*	- - -
							X_T		0.529	0.528	0.528	0.528	0.528	0.564	0.621	0.686	0.732	0.756	- - -
		436.6	18.25	429	16.88	LN-S	C_v	29	662	1343	2000	2581	3032	3337	3528	3681	3873	4134	0.89
							K_v		*573*	*1162*	*1730*	*2233*	*2623*	*2886*	*3052*	*3184*	*3350*	*3576*	- - -
							X_T		0.529	0.528	0.528	0.528	0.548	0.609	0.682	0.733	0.762	0.796	- - -
	EWT-2	501.7	19.75	378	14.88	LN	C_v	31	628	1275	1923	2537	3072	3502	3820	4037	4192	4338	0.89
							K_v		*543*	*1103*	*1663*	*2194*	*2658*	*3029*	*3304*	*3492*	*3626*	*3753*	- - -
							X_T		0.529	0.528	0.528	0.528	0.528	0.541	0.590	0.646	0.709	0.737	- - -
		501.7	19.75	429	16.88	LN-S	C_v	31	718	1455	2175	2833	3373	3767	4026	4203	4374	4604	0.89
							K_v		*621*	*1258*	*1881*	*2450*	*2918*	*3258*	*3482*	*3636*	*3784*	*3982*	- - -
							X_T		0.529	0.528	0.528	0.528	0.528	0.580	0.642	0.714	0.742	0.770	- - -

1. The first number indicates both inlet and outlet size. The second number indicates effective trim size.
2. Construction—SN = short-neck valve; LN = long-neck valve: LN-S = long-neck valve with bonnet spacer.
3. Do not allow the valve to throttle at less than the minimum coefficient shown for an extended time, or erosion damage to the valve seat might result.

EWT-2, EWD, and EWT Whisper Trim III—Level B1

Linear Characteristic

Valve Size, NPS(1)	Valve Type	Port Diameter		Maximum Travel		Construction(2)	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L
		mm	Inches	mm	Inches			Min(3)	10	20	30	40	50	60	70	80	90	100	
20x16	EWD, EWT	374.7	14.75	203	8.00	SN	C_v	31	196	374	554	746	933	1111	1290	1480	1669	1827	0.89
							K_v		170	324	479	645	807	961	1116	1280	1444	1581	- - -
							X_T		0.438	0.435	0.433	0.433	0.432	0.432	0.432	0.431	0.431	0.431	- - -
		374.7	14.75	276	10.88	LN	C_v	31	256	515	756	1016	1256	1517	1757	1974	2141	2307	0.89
							K_v		221	445	654	879	1087	1313	1520	1707	1852	1995	- - -
							X_T		0.437	0.434	0.433	0.432	0.432	0.432	0.432	0.451	0.480	0.514	- - -
		374.7	14.75	378	14.88	LN-S	C_v	31	357	698	1037	1377	1718	2009	2243	2446	2617	2758	0.89
							K_v		309	603	897	1191	1486	1738	1941	2116	2263	2386	- - -
							X_T		0.435	0.433	0.432	0.432	0.432	0.456	0.500	0.549	0.573	0.592	- - -
	EWT-2	412.8	16.25	203	8.00	SN	C_v	34	214	408	605	814	1018	1212	1407	1614	1821	1993	0.89
							K_v		185	353	523	704	880	1049	1217	1396	1575	1724	- - -
							X_T		0.438	0.435	0.433	0.433	0.432	0.432	0.432	0.431	0.431	0.431	- - -
		412.8	16.25	276	10.88	LN	C_v	34	279	562	825	1109	1370	1655	1916	2201	2405	2603	0.89
							K_v		241	486	713	959	1185	1432	1658	1904	2081	2251	- - -
							X_T		0.437	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.452	0.480	- - -
		412.8	16.25	378	14.88	LN-S	C_v	34	390	761	1131	1502	1874	2249	2527	2772	2986	3170	0.89
							K_v		337	658	979	1299	1621	1946	2186	2398	2583	2742	- - -
							X_T		0.435	0.433	0.432	0.432	0.432	0.433	0.469	0.509	0.553	0.573	- - -
24X16	EWD, EWT	374.7	14.75	203	8.00	SN	C_v	31	196	374	554	746	933	1111	1290	1480	1669	1818	0.89
							K_v		170	324	479	645	807	961	1116	1280	1444	1573	- - -
							X_T		0.438	0.435	0.433	0.433	0.432	0.432	0.432	0.431	0.431	0.436	- - -
		374.7	14.75	276	10.88	LN	C_v	31	255	515	755	1016	1255	1516	1756	1964	2137	2290	0.89
							K_v		221	445	653	879	1086	1311	1519	1699	1849	1981	- - -
							X_T		0.437	0.434	0.433	0.432	0.432	0.432	0.432	0.455	0.481	0.509	- - -
		374.7	14.75	378	14.88	LN	C_v	31	357	697	1036	1376	1718	2001	2243	2456	2639	2789	0.89
							K_v		309	603	896	1190	1486	1731	1940	2124	2283	2412	- - -
							X_T		0.435	0.433	0.432	0.432	0.432	0.460	0.500	0.544	0.565	0.579	- - -
	EWT-2	412.8	16.25	203	8.00	SN	C_v	34	214	408	605	814	1018	1212	1407	1614	1821	1993	0.89
							K_v		185	353	523	704	881	1048	1217	1396	1575	1724	- - -
							X_T		0.438	0.435	0.433	0.433	0.432	0.432	0.432	0.431	0.431	0.431	- - -
		412.8	16.25	276	10.88	LN	C_v	34	279	561	824	1108	1369	1654	1915	2193	2394	2576	0.89
							K_v		241	485	713	958	1184	1431	1656	1897	2071	2228	- - -
							X_T		0.437	0.434	0.433	0.432	0.432	0.432	0.432	0.434	0.456	0.479	- - -
		412.8	16.25	403	15.88	LN	C_v	34	404	814	1201	1612	2000	2355	2638	2896	3123	3311	0.89
							K_v		349	704	1039	1394	1730	2037	2282	2505	2701	2864	- - -
							X_T		0.435	0.433	0.432	0.432	0.432	0.451	0.487	0.528	0.560	0.573	- - -

Valve Size, NPS[1]	Valve Type	Port Diameter		Maximum Travel		Construction[2]	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L
		mm	Inches	mm	Inches			Min[3]	10	20	30	40	50	60	70	80	90	100	
24x20	EWD, EWT	436.6	18.25	378	14.88	LN	C_v	36	385	754	1121	1486	1844	2191	2508	2783	3011	3196	0.89
							K_v		*333*	*652*	*969*	*1285*	*1595*	*1895*	*2169*	*2407*	*2605*	*2765*	- - -
							X_T		0.529	0.529	0.528	0.528	0.528	0.528	0.528	0.528	0.545	0.576	- - -
		436.6	18.25	429	16.88	LN-S	C_v	36	431	851	1269	1682	2078	2441	2759	3022	3229	3384	0.89
							K_v		*373*	*736*	*1098*	*1455*	*1797*	*2112*	*2387*	*2614*	*2793*	*2927*	- - -
							X_T		0.529	0.528	0.528	0.528	0.528	0.528	0.528	0.546	0.583	0.623	- - -
	EWT-2	501.7	19.75	378	14.88	LN	C_v	38	414	811	1205	1598	1988	2371	2730	3051	3330	3565	0.89
							K_v		*358*	*702*	*1042*	*1382*	*1720*	*2051*	*2361*	*2639*	*2880*	*3084*	- - -
							X_T		0.529	0.529	0.528	0.528	0.528	0.528	0.528	0.528	0.528	0.549	- - -
		501.7	19.75	429	16.88	LN-S	C_v	38	464	915	1365	1811	2245	2654	3023	3344	3608	3817	0.89
							K_v		*401*	*792*	*1181*	*1567*	*1942*	*2295*	*2615*	*2892*	*3121*	*3302*	- - -
							X_T		0.529	0.528	0.528	0.528	0.528	0.528	0.528	0.528	0.555	0.590	- - -

1. The first number indicates both inlet and outlet size. The second number indicates effective trim size.
2. Construction—SN = short-neck valve; LN = long-neck valve: LN-S = long-neck valve with bonnet spacer.
3. Do not allow the valve to throttle at less than the minimum coefficient shown for an extended time, or erosion damage to the valve seat might result.

EWT-2, EWD, and EWT Whisper Trim III—Level B3

Linear Characteristic

Valve Size, NPS(1)	Valve Type	Port Diameter		Maximum Travel		Construction(2)	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L
		mm	Inches	mm	Inches			Min(3)	10	20	30	40	50	60	70	80	90	100	
20x16	EWD, EWT	374.7	14.75	203	8.00	SN	C_V	21	178	349	528	701	878	1052	1228	1404	1578	1756	0.89
							K_V		*154*	*302*	*457*	*606*	*760*	*910*	*1062*	*1215*	*1365*	*1519*	- - -
							X_T		0.439	0.435	0.433	0.433	0.432	0.432	0.432	0.431	0.431	0.431	- - -
		374.7	14.75	276	10.88	LN	C_V	21	236	475	714	954	1194	1434	1674	1896	2070	2229	0.89
							K_V		*204*	*411*	*618*	*825*	*1032*	*1240*	*1448*	*1640*	*1791*	*1928*	- - -
							X_T		0.437	0.434	0.433	0.432	0.432	0.432	0.432	0.439	0.467	0.497	- - -
		374.7	14.75	378	14.88	LN-S	C_V	21	326	657	982	1307	1639	1936	2163	2367	2545	2689	0.89
							K_V		*282*	*569*	*849*	*1130*	*1418*	*1675*	*1871*	*2047*	*2201*	*2326*	- - -
							X_T		0.436	0.433	0.432	0.432	0.432	0.445	0.483	0.528	0.566	0.582	- - -
	EWT-2	412.8	16.25	203	8.00	SN	C_V	23	194	382	578	767	962	1152	1345	1537	1729	1922	0.89
							K_V		*168*	*330*	*500*	*663*	*832*	*996*	*1164*	*1329*	*1495*	*1663*	- - -
							X_T		0.439	0.435	0.433	0.433	0.432	0.432	0.432	0.432	0.431	0.431	- - -
		412.8	16.25	276	10.88	LN	C_V	23	258	520	782	1044	1307	1570	1833	2096	2328	2517	0.89
							K_V		*223*	*450*	*676*	*903*	*1131*	*1358*	*1586*	*1813*	*2014*	*2177*	- - -
							X_T		0.437	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.443	0.468	- - -
		412.8	16.25	378	14.88	LN-S	C_V	23	357	719	1074	1431	1795	2153	2438	2683	2902	3086	0.89
							K_V		*309*	*622*	*929*	*1238*	*1553*	*1862*	*2109*	*2321*	*2510*	*2670*	- - -
							X_T		0.436	0.433	0.432	0.432	0.432	0.432	0.456	0.493	0.534	0.566	- - -
24X16	EWD, EWT	374.7	14.75	203	8.00	SN	C_V	21	178	349	528	701	878	1052	1228	1404	1578	1744	0.89
							K_V		*154*	*302*	*457*	*606*	*759*	*910*	*1062*	*1214*	*1365*	*1509*	- - -
							X_T		0.439	0.435	0.433	0.433	0.432	0.432	0.432	0.431	0.431	0.431	- - -
		374.7	14.75	276	10.88	LN	C_V	21	236	475	714	953	1193	1433	1673	1886	2064	2217	0.89
							K_V		*204*	*411*	*618*	*824*	*1032*	*1240*	*1447*	*1631*	*1785*	*1918*	- - -
							X_T		0.437	0.434	0.433	0.432	0.432	0.432	0.432	0.444	0.470	0.495	- - -
		374.7	14.75	378	14.88	LN	C_V	21	326	657	981	1306	1639	1926	2159	2373	2561	2711	0.89
							K_V		*282*	*568*	*849*	*1130*	*1418*	*1666*	*1868*	*2053*	*2215*	*2345*	- - -
							X_T		0.436	0.433	0.432	0.432	0.432	0.449	0.485	0.525	0.559	0.571	- - -
	EWT-2	412.8	16.25	203	8.00	SN	C_V	23	194	382	578	767	962	1152	1345	1537	1729	1910	0.89
							K_V		*168*	*330*	*500*	*663*	*832*	*996*	*1163*	*1330*	*1496*	*1652*	- - -
							X_T		0.439	0.435	0.433	0.433	0.432	0.432	0.432	0.431	0.431	0.431	- - -
		412.8	16.25	276	10.88	LN	C_V	23	258	520	782	1044	1307	1570	1833	2096	2316	2496	0.89
							K_V		*223*	*450*	*676*	*903*	*1131*	*1358*	*1586*	*1813*	*2003*	*2159*	- - -
							X_T		0.437	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.447	0.469	- - -
		412.8	16.25	403	15.88	LN	C_V	23	379	762	1147	1532	1916	2271	2553	2807	3034	3222	0.89
							K_V		*328*	*659*	*992*	*1325*	*1657*	*1964*	*2208*	*2428*	*2624*	*2787*	- - -
							X_T		0.435	0.433	0.432	0.432	0.432	0.442	0.476	0.513	0.550	0.566	- - -

Valve Size, NPS[1]	Valve Type	**Port Diameter**		**Maximum Travel**		Construction[2]	**Flow Coefficient**	**Valve Opening—Percent of Total Travel**											F_L
		mm	**Inches**	**mm**	**Inches**			**Min[3]**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**	
24x20	EWD, EWT	436.6	18.25	378	14.88	LN	C_v	25	354	716	1070	1423	1778	2110	2416	2695	2933	3127	0.89
							K_v		*307*	*620*	*925*	*1231*	*1538*	*1825*	*2090*	*2331*	*2537*	*2705*	- - -
							X_T		0.529	0.529	0.528	0.528	0.528	0.528	0.528	0.528	0.534	0.562	- - -
		436.6	18.25	429	16.88	LN-S	C_v	25	402	809	1215	1618	2005	2363	2680	2948	3163	3329	0.89
							K_v		*348*	*700*	*1051*	*1399*	*1734*	*2044*	*2318*	*2550*	*2736*	*2879*	- - -
							X_T		0.529	0.529	0.528	0.528	0.528	0.528	0.528	0.535	0.569	0.607	- - -
	EWT-2	501.7	19.75	378	14.88	LN	C_v	27	382	773	1153	1535	1921	2286	2631	2954	3239	3482	0.89
							K_v		*331*	*668*	*997*	*1328*	*1661*	*1978*	*2276*	*2555*	*2802*	*3012*	- - -
							X_T		0.529	0.529	0.528	0.528	0.528	0.528	0.528	0.528	0.528	0.539	- - -
		501.7	19.75	429	16.88	LN-S	C_v	27	433	873	1310	1745	2170	2571	2936	3257	3528	3747	0.89
							K_v		*375*	*755*	*1133*	*1510*	*1877*	*2224*	*2540*	*2818*	*3052*	*3241*	- - -
							X_T		0.529	0.529	0.528	0.528	0.528	0.528	0.528	0.528	0.545	0.576	- - -

1. The first number indicates both inlet and outlet size. The second number indicates effective trim size.
2. Construction—SN = short-neck valve; LN = long-neck valve: LN-S = long-neck valve with bonnet spacer.
3. Do not allow the valve to throttle at less than the minimum coefficient shown for an extended time, or erosion damage to the valve seat might result.

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EWT-2, EWD, and EWT Whisper Trim III—Level C1

Linear Characteristic

Valve Size, NPS(1)	Valve Type	Port Diameter		Maximum Travel		Con-struc-tion(2)	Flow Coeffi-cient	Valve Opening—Percent of Total Travel											F_L
		mm	Inches	mm	Inches			Min(3)	10	20	30	40	50	60	70	80	90	100	
20x16	EWD, EWT	374.7	14.75	203	8.00	SN	C_v	27	131	244	351	459	577	696	811	919	1026	1142	0.89
							K_v		*113*	*211*	*303*	*397*	*499*	*602*	*701*	*795*	*888*	*987*	---
							X_T		0.442	0.436	0.434	0.433	0.433	0.432	0.432	0.432	0.431	0.431	---
		374.7	14.75	276	10.88	LN	C_v	27	161	318	478	637	787	936	1088	1247	1407	1562	0.89
							K_v		*139*	*275*	*414*	*551*	*681*	*810*	*941*	*1079*	*1217*	*1351*	---
							X_T		0.440	0.435	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.431	---
		374.7	14.75	276	14.88	LN-S	C_v	27	221	430	642	855	1069	1284	1498	1712	1904	2055	0.89
							K_v		*191*	*372*	*555*	*740*	*925*	*1111*	*1296*	*1481*	*1647*	*1778*	---
							X_T		0.438	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.440	0.464	---
	EWT-2	412.8	16.25	203	8.00	SN	C_v	30	146	272	392	513	645	777	906	1027	1147	1276	0.89
							K_v		*126*	*235*	*339*	*444*	*558*	*672*	*784*	*888*	*992*	*1104*	---
							X_T		0.442	0.436	0.434	0.433	0.433	0.432	0.432	0.432	0.431	0.431	---
		412.8	16.25	276	10.88	LN	C_v	30	180	355	534	712	880	1046	1216	1394	1573	1746	0.89
							K_v		*156*	*307*	*462*	*616*	*761*	*905*	*1052*	*1206*	*1361*	*1510*	---
							X_T		0.440	0.435	0.433	0.433	0.432	0.432	0.432	0.432	0.431	0.431	---
		412.8	16.25	276	14.88	LN-S	C_v	30	247	481	717	956	1195	1435	1675	1913	2150	2347	0.89
							K_v		*214*	*416*	*620*	*827*	*1034*	*1241*	*1448*	*1655*	*1860*	*2030*	---
							X_T		0.437	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.431	0.445	---
24X16	EWD, EWT	374.7	14.75	203	8.00	SN	C_v	27	131	244	351	459	577	696	811	919	1026	1142	0.89
							K_v		*113*	*211*	*304*	*397*	*499*	*602*	*702*	*795*	*887*	*988*	---
							X_T		0.442	0.436	0.434	0.433	0.433	0.432	0.432	0.432	0.431	0.431	---
		374.7	14.75	276	10.88	LN	C_v	27	161	318	478	636	787	936	1087	1246	1406	1562	0.89
							K_v		*139*	*275*	*413*	*550*	*681*	*810*	*940*	*1078*	*1216*	*1351*	---
							X_T		0.440	0.435	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.431	---
		374.7	14.75	378	14.88	LN	C_v	27	221	430	641	855	1069	1283	1497	1711	1893	2049	0.89
							K_v		*191*	*372*	*554*	*740*	*925*	*1110*	*1295*	*1480*	*1637*	*1772*	---
							X_T		0.438	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.445	0.467	---
	EWT-2	412.8	16.25	203	8.00	SN	C_v	30	146	272	392	513	645	777	906	1027	1147	1276	0.89
							K_v		*126*	*235*	*339*	*444*	*558*	*672*	*784*	*888*	*992*	*1104*	---
							X_T		0.442	0.436	0.434	0.433	0.433	0.432	0.432	0.432	0.431	0.431	---
		412.8	16.25	276	10.88	LN	C_v	30	180	355	534	711	880	1046	1215	1393	1572	1746	0.89
							K_v		*156*	*307*	*462*	*615*	*761*	*905*	*1051*	*1205*	*1360*	*1510*	---
							X_T		0.440	0.435	0.433	0.433	0.432	0.432	0.432	0.432	0.431	0.431	---
		412.8	16.25	403	15.88	LN	C_v	30	270	514	778	1017	1282	1525	1783	2034	2259	2454	0.89
							K_v		*234*	*445*	*673*	*880*	*1109*	*1319*	*1542*	*1759*	*1954*	*2123*	---
							X_T		0.437	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.441	0.463	---

Valve Size, NPS(1)	Valve Type	**Port Diameter**		**Maximum Travel**		Con-struc-tion(2)	**Flow Coeffi-cient**	**Valve Opening—Percent of Total Travel**											F_L
		mm	**Inches**	**mm**	**Inches**			**Min(3)**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**	
24x20	EWD, EWT	436.6	18.25	378	14.88	LN	C_v	31	238	469	700	932	1165	1398	1628	1853	2069	2272	0.89
							K_v		*206*	*405*	*605*	*806*	*1008*	*1209*	*1409*	*1603*	*1790*	*1965*	- - -
							X_T		0.530	0.529	0.529	0.528	0.528	0.528	0.528	0.528	0.528	0.528	- - -
		436.6	18.25	429	16.88	LN-S	C_v	31	271	534	795	1056	1316	1574	1828	2073	2305	2522	0.89
							K_v		*234*	*462*	*688*	*913*	*1138*	*1362*	*1581*	*1793*	*1994*	*2181*	- - -
							X_T		0.530	0.529	0.528	0.528	0.528	0.528	0.528	0.528	0.528	0.528	- - -
	EWT-2	501.7	19.75	378	14.88	LN	C_v	34	260	514	767	1022	1278	1533	1786	2036	2277	2506	0.89
							K_v		*225*	*445*	*664*	*884*	*1105*	*1326*	*1545*	*1761*	*1969*	*2168*	- - -
							X_T		0.530	0.529	0.529	0.528	0.528	0.528	0.528	0.528	0.528	0.528	- - -
		501.7	19.75	429	16.88	LN-S	C_v	34	297	586	872	1157	1442	1727	2007	2281	2544	2792	0.89
							K_v		*257*	*507*	*754*	*1001*	*1248*	*1494*	*1736*	*1973*	*2201*	*2415*	- - -
							X_T		0.530	0.529	0.528	0.528	0.528	0.528	0.528	0.528	0.528	0.528	- - -

1. The first number indicates both inlet and outlet size. The second number indicates effective trim size.
2. Construction—SN = short-neck valve; LN = long-neck valve: LN-S = long-neck valve with bonnet spacer.
3. Do not allow the valve to throttle at less than the minimum coefficient shown for an extended time, or erosion damage to the valve seat might result.

EWT-2, EWD, and EWT Whisper Trim III—Level C3

Linear Characteristic

Valve Size, NPS[1]	Valve Type	Port Diameter		Maximum Travel		Con-struc-tion[2]	Flow Coeffi-cient	Valve Opening—Percent of Total Travel											F_L
		mm	Inches	mm	Inches			Min[3]	10	20	30	40	50	60	70	80	90	100	
20x16	EWD, EWT	374.7	14.75	203	8.00	SN	C_V	19	116	235	344	458	574	682	800	912	1023	1141	0.89
							K_V		*100*	*203*	*298*	*396*	*497*	*590*	*692*	*789*	*885*	*987*	---
							X_T		0.443	0.437	0.434	0.433	0.433	0.432	0.432	0.432	0.431	0.431	---
		374.7	14.75	276	10.88	LN	C_V	19	161	311	471	623	776	935	1085	1240	1398	1547	0.89
							K_V		*139*	*269*	*408*	*539*	*671*	*809*	*939*	*1073*	*1209*	*1338*	---
							X_T		0.440	0.435	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.431	---
		374.7	14.75	276	14.88	LN-S	C_V	19	220	430	639	849	1063	1277	1490	1700	1893	2046	0.89
							K_V		*191*	*372*	*553*	*734*	*919*	*1105*	*1289*	*1470*	*1637*	*1769*	---
							X_T		0.438	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.439	0.463	---
	EWT-2	412.8	16.25	203	8.00	SN	C_V	21	126	246	369	497	614	741	864	983	1113	1226	0.89
							K_V		*109*	*213*	*319*	*430*	*531*	*641*	*747*	*851*	*963*	*1060*	---
							X_T		0.443	0.437	0.435	0.433	0.433	0.432	0.432	0.432	0.431	0.431	---
		412.8	16.25	276	10.88	LN	C_V	21	170	338	502	676	840	1007	1180	1343	1513	1684	0.89
							K_V		*147*	*292*	*434*	*584*	*727*	*871*	*1021*	*1162*	*1308*	*1456*	---
							X_T		0.440	0.435	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.431	---
		412.8	16.25	276	14.88	LN-S	C_V	21	229	462	695	923	1151	1379	1611	1845	2077	2288	0.89
							K_V		*198*	*400*	*601*	*799*	*995*	*1193*	*1394*	*1596*	*1797*	*1979*	---
							X_T		0.438	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.431	0.438	---
24X16	EWD, EWT	374.7	14.75	203	8.00	SN	C_V	19	116	235	344	458	574	682	800	912	1023	1127	0.89
							K_V		*100*	*203*	*298*	*396*	*497*	*590*	*692*	*789*	*885*	*975*	---
							X_T		0.443	0.437	0.434	0.433	0.433	0.432	0.432	0.432	0.431	0.431	---
		374.7	14.75	276	10.88	LN	C_V	19	161	311	471	623	775	935	1085	1239	1398	1532	0.89
							K_V		*139*	*269*	*407*	*539*	*670*	*809*	*939*	*1072*	*1209*	*1325*	---
							X_T		0.440	0.435	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.431	---
		374.7	14.75	378	14.88	LN	C_V	19	220	430	639	849	1062	1276	1490	1700	1882	2027	0.89
							K_V		*190*	*372*	*553*	*734*	*919*	*1104*	*1289*	*1471*	*1628*	*1753*	---
							X_T		0.438	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.444	0.464	---
	EWT-2	412.8	16.25	203	8.00	SN	C_V	21	109	217	325	423	531	639	737	845	953	1034	0.89
							K_V		*94*	*188*	*281*	*366*	*459*	*553*	*638*	*731*	*824*	*894*	---
							X_T		0.445	0.438	0.435	0.434	0.433	0.432	0.432	0.432	0.431	0.431	---
		412.8	16.25	276	10.88	LN	C_V	21	155	297	439	580	722	864	1006	1148	1290	1431	0.89
							K_V		*134*	*257*	*380*	*502*	*625*	*747*	*870*	*993*	*1116*	*1238*	---
							X_T		0.441	0.436	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.431	---
		412.8	16.25	403	15.88	LN	C_V	21	219	424	632	846	1056	1262	1467	1680	1893	2083	0.89
							K_V		*189*	*367*	*547*	*732*	*913*	*1092*	*1269*	*1453*	*1637*	*1802*	---
							X_T		0.438	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.431	0.431	---

Valve Size, NPS(1)	Valve Type	**Port Diameter**		**Maximum Travel**		Con-struc-tion(2)	**Flow Coeffi-cient**	**Valve Opening—Percent of Total Travel**											F_L
		mm	**Inches**	**mm**	**Inches**			**Min(3)**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**	
24x20	EWD, EWT	436.6	18.25	378	14.88	LN	C_v	23	231	458	681	904	1130	1358	1582	1800	2009	2210	0.89
							K_v		*199*	*396*	*589*	*782*	*978*	*1174*	*1369*	*1557*	*1738*	*1912*	- - -
							X_T		0.530	0.529	0.529	0.528	0.528	0.528	0.528	0.528	0.528	0.528	- - -
		436.6	18.25	429	16.88	LN-S	C_v	23	260	520	776	1031	1285	1537	1784	2024	2252	2466	0.89
							K_v		*225*	*450*	*671*	*892*	*1111*	*1329*	*1543*	*1750*	*1948*	*3122*	- - -
							X_T		0.530	0.529	0.528	0.528	0.528	0.528	0.528	0.528	0.528	0.528	- - -
	EWT-2	501.7	19.75	378	14.88	LN	C_v	25	253	503	748	993	1241	1491	1739	1980	2214	2441	0.89
							K_v		*219*	*435*	*647*	*859*	*1074*	*1290*	*1504*	*1713*	*1915*	*2111*	- - -
							X_T		0.530	0.529	0.529	0.528	0.528	0.528	0.528	0.528	0.528	0.528	- - -
		501.7	19.75	429	16.88	LN-S	C_v	25	286	571	853	1132	1411	1689	1963	2231	2488	2733	0.89
							K_v		*248*	*494*	*737*	*979*	*1221*	*1461*	*1698*	*1929*	*2152*	*2364*	- - -
							X_T		0.530	0.529	0.528	0.528	0.528	0.528	0.528	0.528	0.528	0.528	- - -

1. The first number indicates both inlet and outlet size. The second number indicates effective trim size.
2. Construction—SN = short-neck valve; LN = long-neck valve: LN-S = long-neck valve with bonnet spacer.
3. Do not allow the valve to throttle at less than the minimum coefficient shown for an extended time, or erosion damage to the valve seat might result.

EWT-2, EWD, and EWT Whisper Trim III—Level D1

Linear Characteristic

Valve Size, NPS(1)	Valve Type	Port Diameter		Maximum Travel		Con-struc-tion(2)	Flow Coeffi-cient	Valve Opening—Percent of Total Travel											F_L
		mm	Inches	mm	Inches			Min(3)	10	20	30	40	50	60	70	80	90	100	
20x16	EWT-2, EWD, EWT	355.6	14	203	8.00	SN	C_v	25	119	220	322	431	543	653	754	855	963	1074	0.89
							K_v		*103*	*190*	*278*	*373*	*470*	*564*	*653*	*740*	*833*	*929*	- - -
							X_T		0.442	0.437	0.434	0.433	0.433	0.432	0.432	0.432	0.431	0.431	- - -
		355.6	14	276	10.88	LN	C_v	25	152	292	441	592	740	881	1021	1165	1315	1466	0.89
							K_v		*131*	*253*	*381*	*512*	*640*	*762*	*883*	*1008*	*1138*	*1268*	- - -
							X_T		0.440	0.435	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.431	- - -
		355.6	14	276	14.88	LN-S	C_v	25	208	405	602	799	998	1199	1401	1603	1768	1909	0.89
							K_v		*180*	*350*	*521*	*691*	*863*	*1037*	*1212*	*1386*	*1529*	*1651*	- - -
							X_T		0.438	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.449	0.476	- - -
24x16	EWT-2, EWD, EWT	355.6	14	203	8.00	SN	C_v	25	123	230	331	433	543	655	764	865	966	1074	0.89
							K_v		*106*	*199*	*286*	*375*	*470*	*567*	*661*	*748*	*836*	*929*	- - -
							X_T		0.442	0.436	0.434	0.433	0.433	0.432	0.432	0.432	0.431	0.431	- - -
		355.6	14	276	10.88	LN	C_v	25	152	300	450	599	741	881	1023	1173	1324	1470	0.89
							K_v		*131*	*260*	*389*	*518*	*641*	*762*	*885*	*1015*	*1145*	*1272*	- - -
							X_T		0.440	0.435	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.431	- - -
		355.6	14	378	14.88	LN	C_v	25	208	405	604	805	1006	1208	1410	1610	1765	1907	0.89
							K_v		*180*	*350*	*522*	*696*	*870*	*1045*	*1220*	*1393*	*1527*	*1650*	- - -
							X_T		0.438	0.434	0.433	0.432	0.432	0.432	0.432	0.432	0.454	0.474	- - -
24x20	EWT-2, EWD, EWT	431.8	17	378	14.88	LN	C_v	29	229	444	661	881	1102	1322	1543	1763	1981	2196	0.89
							K_v		*198*	*384*	*572*	*762*	*953*	*1144*	*1335*	*1525*	*1713*	*1899*	- - -
							X_T		0.530	0.529	0.529	0.528	0.528	0.528	0.528	0.528	0.528	0.528	- - -
		431.8	17	429	16.88	LN-S	C_v	29	260	506	752	998	1244	1491	1739	1987	2235	2483	0.89
							K_v		*225*	*437*	*650*	*863*	*1076*	*1290*	*1504*	*1719*	*1933*	*2148*	- - -
							X_T		0.530	0.529	0.528	0.528	0.528	0.528	0.528	0.528	0.528	0.528	- - -

1. The first number indicates both inlet and outlet size. The second number indicates effective trim size.
2. Construction—SN = short-neck valve; LN = long-neck valve: LN-S = long-neck valve with bonnet spacer.
3. Do not allow the valve to throttle at less than the minimum coefficient shown for an extended time, or erosion damage to the valve seat might result.

EWT-2, EWD, and EWT
Whisper Trim III—Level D3

Linear Characteristic

Valve Size, NPS[1]	Valve Type	Port Diameter		Maximum Travel		Construction[2]	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L
		mm	Inches	mm	Inches			Min[3]	10	20	30	40	50	60	70	80	90	100	
20x16	EWT-2, EWD, EWT	355.6	14	203	8.00	SN	Cv	18	108	209	319	425	529	641	743	850	959	1060	0.89
							Kv		*93*	*181*	*276*	*368*	*457*	*554*	*643*	*736*	*830*	*917*	- - -
							Xt		0.444	0.437	0.435	0.433	0.433	0.432	0.432	0.432	0.431	0.431	- - -
		355.6	14	276	10.88	LN	Cv	18	143	292	432	580	727	867	1017	1161	1304	1442	0.89
							Kv		*123*	*252*	*374*	*502*	*629*	*750*	*880*	*1005*	*1128*	*1247*	- - -
							Xt		0.441	0.435	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.431	- - -
		355.6	14	276	14.88	LN-S	Cv	18	194	395	597	798	995	1192	1390	1591	1760	1901	0.89
							Kv		*168*	*342*	*517*	*690*	*861*	*1031*	*1202*	*1376*	*1522*	*1644*	- - -
							Xt		0.438	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.448	0.474	- - -
24X16	EWT-2, EWD, EWT	355.6	14	203	8.00	SN	C_V	18	109	216	319	431	534	641	750	852	962	1068	0.89
							K_V		*94*	*187*	*276*	*373*	*462*	*554*	*649*	*737*	*832*	*924*	- - -
							X_T		0.443	0.437	0.435	0.433	0.433	0.432	0.432	0.432	0.431	0.431	- - -
		355.6	14	276	10.88	LN	C_V	18	150	292	437	586	727	873	1021	1162	1310	1442	0.89
							K_V		*130*	*253*	*378*	*507*	*629*	*755*	*883*	*1005*	*1133*	*1247*	- - -
							X_T		0.440	0.435	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.431	- - -
		355.6	14	378	14.88	LN	C_V	18	194	395	597	798	995	1192	1390	1591	1751	1897	0.89
							K_V		*168*	*342*	*517*	*690*	*861*	*1031*	*1202*	*1376*	*1515*	*1641*	- - -
							X_T		0.438	0.434	0.433	0.432	0.432	0.432	0.432	0.431	0.452	0.476	- - -
24x20	EWT-2, EWD, EWT	431.8	17	378	14.88	LN	C_V	21	222	433	643	853	1067	1282	1496	1706	1916	2126	0.89
							K_V		*192*	*375*	*556*	*738*	*923*	*1109*	*1294*	*1476*	*1657*	*1839*	- - -
							X_T		0.530	0.529	0.529	0.528	0.528	0.528	0.528	0.528	0.528	0.528	- - -
		431.8	17	429	16.88	LN-S	C_V	21	250	492	733	973	1213	1453	1693	1932	2173	2414	0.89
							K_V		*216*	*425*	*634*	*842*	*1049*	*1257*	*1464*	*1672*	*1879*	*2088*	- - -
							X_T		0.530	0.529	0.528	0.528	0.528	0.528	0.528	0.528	0.528	0.528	- - -

1. The first number indicates both inlet and outlet size. The second number indicates effective trim size.
2. Construction—SN = short-neck valve; LN = long-neck valve: LN-S = long-neck valve with bonnet spacer.
3. Do not allow the valve to throttle at less than the minimum coefficient shown for an extended time, or erosion damage to the valve seat might result.

WhisperFlo Level X

Linear Characteristic

Valve Size, NPS(1)	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										
	mm	Inches	mm	Inches		Min	10	20	30	40	50	60	70	80	90	100
6x4	87.3	3.4375	102	4	C_V	6.4	16.7	35.3	52.5	69.5	87.6	105	121	136	154	164
					X_T	*0.763*	*0.763*	*0.783*	*0.751*	*0.726*	*0.696*	*0.691*	*0.699*	*0.738*	*0.719*	*0.72*
8x4	87.3	3.4375	102	4	C_V	6.4	17.8	35.8	52.5	69.7	86.9	104	121	137	153	165
					X_T	*0.705*	*0.705*	*0.79*	*0.763*	*0.747*	*0.72*	*0.722*	*0.717*	*0.701*	*0.691*	*0.676*
8x6 10 x 6(2)	136.5	5.375	127	5	C_V	10.4	45.7	92	138	181	223	265	299	331	350	365
					X_T	*0.64*	*0.64*	*0.648*	*0.633*	*0.617*	*0.624*	*0.642*	*0.682*	*0.71*	*0.769*	*0.803*
12x6	136.5	5.375	165	6.5	C_V	10.4	56.9	114	170	224	288	328	377	425	472	510
					X_T	*0.735*	*0.735*	*0.759*	*0.741*	*0.726*	*0.661*	*0.699*	*0.707*	*0.706*	*0.718*	*0.724*
10x8	177.8	7	152	6	C_V	30.4	61.4	120	179	238	296	352	408	459	508	550
					X_T	*0.694*	*0.694*	*0.713*	*0.662*	*0.641*	*0.629*	*0.637*	*0.632*	*0.64*	*0.667*	*0.673*
12x8	177.8	7	203	8	C_V	30.4	103	188	277	353	432	515	583	652	703	736
					X_T	*0.656*	*0.656*	*0.678*	*0.627*	*0.656*	*0.666*	*0.657*	*0.667*	*0.684*	*0.709*	*0.749*
WhisperFlo Level Y																**Linear Characteristic**
6x4	87.3	3.4375	102	4	C_V	6	16	31	47	63	79	94	110	126	141	157
					X_T	*0.536*	*0.536*	*0.532*	*0.525*	*0.51*	*0.503*	*0.507*	*0.514*	*0.528*	*0.532*	*0.575*
8x4	87.3	3.4375	102	4	C_V	6	16	31	47	63	79	94	110	126	141	157
					X_T	*0.536*	*0.536*	*0.532*	*0.525*	*0.51*	*0.503*	*0.507*	*0.514*	*0.528*	*0.532*	*0.575*
8x6 10 x 6(2)	136.5	5.375	127	5	C_V	10	31	61	92	123	154	184	215	246	276	307
					X_T	*0.536*	*0.536*	*0.532*	*0.525*	*0.51*	*0.503*	*0.507*	*0.514*	*0.528*	*0.532*	*0.575*
12x6	136.5	5.375	165	6.5	C_V	9	39	78	116	155	194	233	272	310	349	388
					X_T	*0.536*	*0.536*	*0.532*	*0.525*	*0.51*	*0.503*	*0.507*	*0.514*	*0.528*	*0.532*	*0.575*
10x8	177.8	7	152	6	C_V	11	42	84	125	167	209	251	293	334	376	418
					X_T	*0.51*	*0.51*	*0.543*	*0.547*	*0.536*	*0.46*	*0.496*	*0.496*	*0.514*	*0.547*	*0.609*
12x8	177.8	7	203	8	C_V	12	59	118	177	236	295	354	413	472	531	590
					X_T	*0.562*	*0.562*	*0.573*	*0.543*	*0.525*	*0.539*	*0.558*	*0.558*	*0.577*	*0.577*	*0.577*
WhisperFlo Level Z																**Linear Characteristic**
6x4	87.3	3.4375	102	4	C_V	3	9	17	26	34	43	52	60	69	77	86
					X_T	*0.600*	*0.600*	*0.539*	*0.521*	*0.528*	*0.528*	*0.547*	*0.539*	*0.525*	*0.507*	*0.525*
8x4	87.3	3.4375	102	4	C_V	3	9	17	26	34	43	52	60	69	77	86
					X_T	*0.600*	*0.600*	*0.539*	*0.521*	*0.528*	*0.528*	*0.547*	*0.539*	*0.525*	*0.507*	*0.525*
8x6 10 x 6(2)	136.5	5.375	127	5	C_V	5	17	35	52	69	87	104	121	138	156	173
					X_T	*0.600*	*0.600*	*0.539*	*0.521*	*0.528*	*0.528*	*0.547*	*0.539*	*0.525*	*0.507*	*0.525*
12x6	136.5	5.375	165	6.5	C_V	5	23	45	68	90	113	135	158	180	203	225
					X_T	*0.600*	*0.600*	*0.539*	*0.521*	*0.528*	*0.528*	*0.547*	*0.539*	*0.525*	*0.507*	*0.525*
10x8	177.8	7	152	6	C_V	7	26	52	78	104	130	156	182	208	234	260
					X_T	*0.600*	*0.600*	*0.539*	*0.521*	*0.528*	*0.528*	*0.547*	*0.539*	*0.525*	*0.507*	*0.525*
12x8	177.8	7	203	8	C_V	7	35	71	106	141	177	212	247	282	318	353
					X_T	*0.600*	*0.600*	*0.539*	*0.521*	*0.528*	*0.528*	*0.547*	*0.539*	*0.525*	*0.507*	*0.525*

1. The first number indicates both inlet and outlet size. The second number indicates effective trim size.
2. NPS 10x6 has a valve outlet area identical to the NPS 8x6.

WhisperFlo Level X

Linear Characteristic

Valve Size, NPS[1]	Port Diameter		Maximum Travel		Con-struction	Flow Coeffi-cient	Valve Opening—Percent of Total Travel										
	mm	Inches	mm	Inches			Min	10	20	30	40	50	60	70	80	90	100
20x16	374.7	14.75	203	8	SN	C_v	60.2	170	359	546	731	912	1089	1260	1427	1587	1741
						X_T	*0.534*	*0.713*	*0.699*	*0.687*	*0.677*	*0.669*	*0.663*	*0.659*	*0.656*	*0.655*	*0.654*
20x16	374.7	14.75	276	10.875	LN	C_v	60.2	238	494	745	990	1226	1452	1667	1870	2061	2240
						X_T	*0.534*	*0.708*	*0.690*	*0.676*	*0.666*	*0.659*	*0.656*	*0.654*	*0.655*	*0.658*	*0.662*
20x16	374.7	14.75	378	14.875	LN	C_v	60.2	332	679	1015	1339	1633	1911	2165	2397	2606	2793
						X_T	*0.534*	*0.701*	*0.679*	*0.665*	*0.657*	*0.654*	*0.656*	*0.660*	*0.667*	*0.676*	*0.686*
24x16	374.7	14.75	203	8	SN	C_v	60.2	170	360	548	735	921	1104	1285	1462	1636	1807
						X_T	*0.534*	*0.716*	*0.703*	*0.692*	*0.682*	*0.673*	*0.665*	*0.658*	*0.652*	*0.647*	*0.642*
24x16	374.7	14.75	276	10.875	LN	C_v	60.2	238	495	750	1001	1248	1490	1725	1953	2173	2385
						X_T	*0.534*	*0.711*	*0.695*	*0.681*	*0.669*	*0.659*	*0.651*	*0.644*	*0.639*	*0.635*	*0.632*
24x16	374.7	14.75	378	14.875	LN	C_v	60.2	333	683	1027	1363	1687	1999	2296	2578	2843	3092
						X_T	*0.534*	*0.705*	*0.685*	*0.668*	*0.655*	*0.645*	*0.638*	*0.633*	*0.630*	*0.628*	*0.628*
24x20	463.6	18.25	203	8	SN	C_v	86.5	207	431	658	882	1104	1322	1537	1747	1952	2152
						X_T	*0.534*	*0.714*	*0.703*	*0.692*	*0.683*	*0.676*	*0.669*	*0.664*	*0.660*	*0.657*	*0.655*
24x20	463.6	18.25	276	10.875	LN	C_v	86.5	286	595	900	1200	1493	1779	2056	2322	2578	2823
						X_T	*0.534*	*0.710*	*0.695*	*0.683*	*0.673*	*0.665*	*0.659*	*0.656*	*0.654*	*0.653*	*0.654*
24x20	463.6	18.25	378	14.875	LN	C_v	86.5	400	820	1231	1630	2012	2376	2720	3043	3343	3622
						X_T	*0.534*	*0.704*	*0.686*	*0.672*	*0.662*	*0.656*	*0.653*	*0.653*	*0.655*	*0.659*	*0.665*

WhisperFlo Level Y

Linear Characteristic

20x16	374.7	14.75	203	8	SN	C_v	53.4	124	259	394	529	662	794	923	1051	1176	1298
						X_T	*0.534*	*0.617*	*0.608*	*0.601*	*0.594*	*0.588*	*0.584*	*0.580*	*0.577*	*0.575*	*0.573*
20x16	374.7	14.75	276	10.875	LN	C_v	53.4	171	356	539	720	897	1070	1239	1402	1560	1712
						X_T	*0.534*	*0.614*	*0.603*	*0.594*	*0.586*	*0.581*	*0.577*	*0.574*	*0.573*	*0.573*	*0.574*
20x16	374.7	14.75	378	14.875	LN	C_v	53.4	239	491	738	979	1212	1435	1648	1849	2038	2216
						X_T	*0.534*	*0.609*	*0.596*	*0.586*	*0.579*	*0.574*	*0.573*	*0.573*	*0.575*	*0.579*	*0.585*
24x16	374.7	14.75	203	8	SN	C_v	53.4	125	259	395	531	666	800	933	1065	1195	1324
						X_T	*0.534*	*0.619*	*0.611*	*0.604*	*0.598*	*0.592*	*0.587*	*0.582*	*0.578*	*0.574*	*0.570*
24x16	374.7	14.75	276	10.875	LN	C_v	53.4	171	357	541	724	906	1085	1262	1436	1607	1774
						X_T	*0.534*	*0.616*	*0.606*	*0.597*	*0.590*	*0.583*	*0.577*	*0.572*	*0.568*	*0.564*	*0.561*
24x16	374.7	14.75	378	14.875	LN	C_v	53.4	240	492	743	991	1234	1472	1703	1928	2146	2356
						X_T	*0.534*	*0.612*	*0.600*	*0.589*	*0.580*	*0.573*	*0.567*	*0.562*	*0.559*	*0.556*	*0.555*
24x20	463.6	18.25	203	8	SN	C_v	77.3	148	294	449	603	757	909	1060	1209	1357	1503
						X_T	*0.534*	*0.579*	*0.573*	*0.568*	*0.563*	*0.558*	*0.554*	*0.551*	*0.548*	*0.545*	*0.543*
24x20	463.6	18.25	276	10.875	LN	C_v	77.3	198	406	615	823	1029	1232	1433	1629	1822	2010
						X_T	*0.534*	*0.577*	*0.569*	*0.562*	*0.556*	*0.552*	*0.548*	*0.544*	*0.542*	*0.540*	*0.539*
24x20	463.6	18.25	378	14.875	LN	C_v	77.3	272	560	845	1125	1401	1669	1931	2183	2427	2662
						X_T	*0.534*	*0.574*	*0.564*	*0.556*	*0.550*	*0.545*	*0.542*	*0.540*	*0.539*	*0.540*	*0.541*

1. The first number indicates both inlet and outlet size. The second number indicates effective trim size.

WhisperFlo Level Z

Linear Characteristic

Valve Size, NPS[1]	Port Diameter		Maximum Travel		Con-struction	Flow Coeffi-cient	Valve Opening—Percent of Total Travel										
	mm	Inches	mm	Inches			Min	10	20	30	40	50	60	70	80	90	100
20x16	374.7	14.75	203	8	SN	C_V	48.1	91	179	273	367	460	553	645	737	827	917
						X_T	*0.534*	*0.467*	*0.463*	*0.459*	*0.456*	*0.453*	*0.450*	*0.448*	*0.446*	*0.445*	*0.444*
20x16	374.7	14.75	276	10.875	LN	C_V	48.1	121	247	374	501	627	751	874	994	1113	1229
						X_T	*0.534*	*0.465*	*0.460*	*0.456*	*0.452*	*0.449*	*0.446*	*0.444*	*0.443*	*0.442*	*0.442*
20x16	374.7	14.75	378	14.875	LN	C_V	48.1	166	341	514	685	854	1019	1180	1336	1488	1634
						X_T	*0.534*	*0.463*	*0.457*	*0.451*	*0.447*	*0.444*	*0.443*	*0.442*	*0.442*	*0.443*	*0.445*
24x16	374.7	14.75	203	8	SN	C_V	48.1	91	179	273	368	462	555	649	742	834	926
						X_T	*0.534*	*0.468*	*0.464*	*0.461*	*0.458*	*0.455*	*0.453*	*0.450*	*0.448*	*0.446*	*0.444*
24x16	374.7	14.75	276	10.875	LN	C_V	48.1	121	267	375	503	630	756	881	1006	1129	1251
						X_T	*0.534*	*0.466*	*0.462*	*0.458*	*0.454*	*0.451*	*0.447*	*0.445*	*0.442*	*0.440*	*0.438*
24x16	374.7	14.75	378	14.875	LN	C_V	48.1	166	341	516	689	861	1032	1200	1365	1528	1688
						X_T	*0.534*	*0.465*	*0.459*	*0.454*	*0.449*	*0.445*	*0.442*	*0.439*	*0.437*	*0.435*	*0.434*
24x20	463.6	18.25	203	8	SN	C_V	71.8	113	214	324	435	546	657	767	877	986	1094
						X_T	*0.534*	*0.454*	*0.451*	*0.448*	*0.446*	*0.443*	*0.441*	*0.439*	*0.437*	*0.436*	*0.434*
24x20	463.6	18.25	276	10.875	LN	C_V	71.8	149	292	444	595	745	894	1042	1188	1333	1476
						X_T	*0.534*	*0.453*	*0.449*	*0.446*	*0.442*	*0.440*	*0.437*	*0.435*	*0.433*	*0.432*	*0.431*
24x20	463.6	18.25	378	14.875	LN	C_V	71.8	200	404	610	815	1018	1218	1416	1609	1800	1986
						X_T	*0.534*	*0.452*	*0.442*	*0.442*	*0.438*	*0.435*	*0.433*	*0.431*	*0.430*	*0.430*	*0.430*

1. The first number indicates both inlet and outlet size. The second number indicates effective trim size.

EWT-2, EWD, and EWT Cavitrol III Trim—One Stage

Linear Characteristic

Valve Size, NPS(1)	Port Diameter		Maximum Travel		Construction(2)	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L
	mm	Inches	mm	Inches			Min(3)	10	20	30	40	50	60	70	80	90	100	
16 x 12	279.4	11.00	203	8.00	LND	C_v	40	132	304	471	628	775	910	1030	1140	1240	1330	0.91
						K_v	*34.6*	*114*	*263*	*407*	*543*	*670*	*787*	*891*	*986*	*1073*	*1150*	- - -
20 x 16	374.7	14.75	276	10.88	LND	C_v	46	262	576	877	1160	1420	1660	1880	2070	2240	2390	0.91
						K_v	*39.8*	*227*	*498*	*759*	*1003*	*1228*	*1436*	*1626*	*1791*	*1938*	*2067*	- - -
	374.7	14.75	378	14.88	LN-SD	C_v	46	379	800	1190	1540	1850	2110	2330	2510	2670	2800	0.91
						K_v	*39.8*	*328*	*692*	*1029*	*1332*	*1600*	*1825*	*2015*	*2171*	*2310*	*2422*	- - -
24 x 16	374.7	14.75	276	10.88	LND	C_v	46	262	576	878	1160	1420	1160	1880	2070	2240	2390	0.91
						K_v	*39.8*	*227*	*498*	*759*	*1003*	*1228*	*1003*	*1626*	*1791*	*1938*	*2067*	- - -
	374.7	14.75	378	14.88	LND	C_v	46	379	800	1190	1540	1850	2110	2330	2520	2670	2800	0.91
						K_v	*39.8*	*328*	*692*	*1029*	*1332*	*1600*	*1825*	*2015*	*2180*	*2310*	*2422*	- - -
	374.7	14.75	429	16.88	LN-SD	C_v	46	437	909	1340	1710	2030	2290	2510	2680	2830	2940	0.91
						K_v	*39.8*	*378*	*786*	*1159*	*1479*	*1756*	*1981*	*2171*	*2318*	*2448*	*2543*	- - -
24 x 20	463.6	18.25	378	14.88	LND	C_v	56	468	995	1490	1960	2370	2750	3070	3360	3600	3810	0.91
						K_v	*48.4*	*405*	*861*	*1289*	*1695*	*2050*	*2379*	*2656*	*2906*	*3114*	*3296*	- - -
	463.6	18.25	429	16.88	LN-SD	C_v	56	540	1130	1690	2190	2630	3010	3340	3620	3860	4050	0.91
						K_v	*48.4*	*467*	*977*	*1462*	*1894*	*2275*	*2604*	*2889*	*3131*	*3339*	*3503*	- - -

1. The first number indicates both inlet and outlet size. The second number indicates effective trim size.
2. Construction—SND = short-neck valve, drilled windows; LND - long-neck valve, drilled windows; LN-SD = long-neck valve with bonnet spacer, drilled windows.
3. Do not allow the valve to throttle at less than the minimum coefficient shown for an extended time, or erosion damage to the valve seat might occur.

EMERSON

Valve Size, NPS(1)	Port Diameter		Maximum Travel		Flow Coeffi-cient	Coeffs. for 6 mm (0.25 in) Travel(2)	Valve Opening—Percent of Total Travel										F_L(3)
	mm	Inches	mm	Inches			10	20	30	40	50	60	70	80	90	100	
Quick Opening																	**Quick Opening Characteristic**
4 x 2	58.7	2.3125	29	1.125	C_V	29.9	13.7	26.9	42.1	60.0	76.8	90.2	101	110	117	123	0.89
					K_V		*11.9*	*23.3*	*36.4*	*51.9*	*66.4*	*78.0*	*87.4*	*95.2*	*101*	*106*	---
					X_T	0.660	0.639	0.663	0.652	0.660	0.705	0.777	0.843	0.868	0.860	0.793	---
6 x 4	111.1	4.375	51	2	C_V	48.1	39.4	85.2	147	208	268	321	355	373	379	382	0.88
					K_V		*34.1*	*73.7*	*127*	*180*	*232*	*278*	*307*	*323*	*328*	*330*	---
					X_T	0.600	0.619	0.587	0.591	0.633	0.662	0.682	0.726	0.748	0.770	0.781	---
8 x 4	111.1	4.375	51	2	C_V	51.3	42.1	88.2	149	212	269	314	365	405	437	450	0.85
					K_V		*36.4*	*76.3*	*129*	*183*	*233*	*272*	*316*	*350*	*378*	*389*	---
					X_T	0.585	0.578	0.573	0.560	0.579	0.640	0.726	0.733	0.726	0.727	0.704	---
8 x 6 and 10x6(4)	177.8	7	51	2	C_V	97.8	79.3	152	249	346	442	533	606	650	683	714	0.86
					K_V		*68.6*	*131*	*215*	*299*	*382*	*461*	*524*	*562*	*591*	*618*	---
					X_T	0.661	0.682	0.671	0.634	0.655	0.663	0.681	0.688	0.709	0.715	0.671	---
12 x 6	177.8	7	51	2	C_V	109	86.1	168	261	359	460	554	641	720	799	874	0.79
					K_V		*74.5*	*145*	*226*	*311*	*398*	*479*	*554*	*623*	*691*	*756*	---
					X_T	0.594	0.614	0.563	0.571	0.608	0.630	0.660	0.677	0.706	0.735	0.736	---
10 x 8	203.2	8	76	3	C_V	---	151	313	471	617	748	848	918	956	971	1000	0.93
					K_V		*131*	*271*	*407*	*534*	*647*	*734*	*794*	*827*	*840*	*865*	---
					X_T	---	0.632	0.606	0.625	0.663	0.698	0.751	0.798	0.838	0.864	0.842	---
12 x 8	203.2	8	76	3	C_V	---	157	322	480	632	760	860	957	1030	1080	1110	0.89
					K_V		*136*	*279*	*415*	*547*	*657*	*744*	*828*	*891*	*934*	*960*	---
					X_T	---	0.718	0.716	0.712	0.730	0.789	0.844	0.855	0.873	0.866	0.836	---
Linear																	**Linear Characteristic**
4 x 2	58.7	2.3125	29	1.125	C_V	---	6.88	13.7	21.5	29.9	39.1	49.0	60.0	72.2	84.5	96.2	0.89
					K_V		*5.95*	*11.9*	*18.6*	*25.9*	*33.8*	*42.4*	*51.9*	*62.5*	*73.1*	*83.2*	---
					X_T		0.599	0.662	0.728	0.742	0.745	0.743	0.744	0.761	0.777	0.794	---
6 x 4	111.1	4.375	51	2	C_V	---	26.2	52.5	78.4	105	133	162	197	236	281	320	0.89
					K_V		*22.7*	*45.4*	*67.8*	*90.8*	*115*	*140*	*170*	*204*	*243*	*277*	---
					X_T		0.713	0.640	0.661	0.667	0.659	0.666	0.666	0.676	0.690	0.725	---
8 x 4	111.1	4.375	51	2	C_V	---	25.1	51.5	78.1	104	130	157	192	234	281	328	0.89
					K_V		*21.7*	*44.5*	*67.6*	*90.0*	*112*	*136*	*166*	*202*	*243*	*284*	---
					X_T		0.610	0.657	0.682	0.688	.0700	0.715	0.716	0.711	0.716	0.729	---
8 x 6 and 10x6(4)	177.8	7	51	2	C_V	---	52.5	116	182	246	311	375	435	495	554	607	0.88
					K_V		*45.4*	*100*	*157*	*213*	*269*	*324*	*376*	*428*	*479*	*525*	---
					X_T		0.655	0.678	0.688	0.708	0.726	0.728	0.723	0.729	0.720	0.679	---
12 x 6	177.8	7	51	2	C_V	---	57.4	122	186	248	311	375	441	510	591	675	0.84
					K_V		*49.7*	*106*	*161*	*215*	*269*	*324*	*381*	*441*	*511*	*584*	---
					X_T		0.523	0.572	0.612	0.654	0.659	0.683	0.704	0.719	0.723	0.719	---
10 x 8	203.2	8	76	3	C_V	---	106	210	315	427	546	661	766	848	905	958	0.92
					K_V		*91.7*	*182*	*272*	*369*	*472*	*572*	*663*	*734*	*783*	*829*	---
					X_T		0.677	0.677	0.708	0.711	0.702	0.705	0.731	0.777	0.831	0.820	---
12 x 8	203.2	8	76	3	C_V	---	119	218	336	447	564	680	795	895	981	1050	0.89
					K_V		*103*	*189*	*291*	*387*	*488*	*588*	*688*	*774*	*849*	*908*	---
					X_T		0.678	0.768	0.811	0.791	0.802	0.811	0.809	0.819	0.837	0.836	---

1. The first number indicates both inlet and outlet sizes. The second number indicates effective trim size.
2. When sizing self-operated regulators, use coefficients listed for 6 mm (0.25 inch) travel.
3. At 100% travel.
4. NPS 10x6 has a valve outlet area identical to the NPS 8x6.

Equal Percentage

Equal Percentage Characteristic

Valve Size, NPS(1)	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(2)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
4 x 2	58.7	2.3125	29	1.125	C_v	2.40	4.16	5.97	8.37	12.2	17.6	26.3	38.1	52.7	67.5	0.90
					K_v	*2.08*	*3.60*	*5.16*	*7.24*	*10.6*	*15.2*	*22.7*	*33.0*	*45.6*	*58.4*	- - -
					X_T	0.751	0.770	0.781	0.776	0.769	0.773	0.732	0.739	0.754	0.777	- - -
6 x 4	111.1	4.375	51	2	C_v	7.18	12.3	18.2	26.7	39.8	61.0	100	158	217	271	0.88
					K_v	*6.21*	*10.6*	*15.7*	*23.1*	*34.4*	*52.8*	*86.5*	*137*	*188*	*234*	- - -
					X_T	0.794	0.778	0.775	0.773	0.773	0.776	0.718	0.687	0.707	0.694	- - -
8 x 4	111.1	4.375	51	2	C_v	8.37	12.8	20.0	28.5	42.2	64.6	102	156	214	269	0.90
					K_v	*7.24*	*11.1*	*17.3*	*24.7*	*36.5*	*55.9*	*88.2*	*135*	*185*	*233*	- - -
					X_T	0.761	0.731	0.716	0.745	0.758	0.724	0.701	0.684	0.709	0.704	- - -
8 x 6 and 10x6(1)	177.8	7	51	2	C_v	12.0	22.8	36.9	58.8	91.3	149	226	311	397	478	0.92
					K_v	*10.4*	*19.7*	*31.9*	*50.9*	*79.0*	*129*	*195*	*269*	*343*	*413*	- - -
					X_T	0.733	0.783	0.874	0.859	0.836	0.791	0.773	0.782	0.755	0.727	- - -
12 x 6	177.8	7	51	2	C_v	18.6	30.0	43.8	65.7	97.1	153	231	312	395	476	0.88
					K_v	*16.1*	*25.9*	*37.9*	*56.8*	*84.0*	*132*	*200*	*270*	*342*	*412*	- - -
					X_T	0.661	0.694	0.824	0.813	0.812	0.802	0.764	0.777	0.774	0.788	- - -
10 x 8	203.2	8	76	3	C_v	33.9	61.2	97.7	162	269	417	568	705	840	932	0.90
					K_v	*29.3*	*52.9*	*84.5*	*140*	*233*	*361*	*491*	*610*	*727*	*806*	- - -
					X_T	0.836	0.867	0.894	0.796	0.744	0.704	0.699	0.712	0.725	0.760	- - -
12 x 8	203.2	8	76	3	C_v	28.8	58.1	102	175	294	452	654	859	989	1020	0.88
					K_v	*24.9*	*50.3*	*88.2*	*151*	*254*	*391*	*566*	*743*	*855*	*882*	- - -
					X_T	0.769	0.832	0.928	0.930	0.797	0.744	0.651	0.581	0.646	0.766	- - -

1. NPS 10x6 has a valve outlet area identical to the NPS 8x6.

Whisper Trim I

Linear Characteristic

Valve Size, NPS(1)	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(2)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
4 x 2	58.7	2.3125	29	1.125	C_v	14.2	27.7	39.8	51.7	63.8	76.2	88.3	99.9	111	118	- - -
					K_v	*12.3*	*24.0*	*34.4*	*44.7*	*55.2*	*65.9*	*76.4*	*86.4*	*96.0*	*102*	- - -
					X_T	0.321	0.323	0.322	0.320	0.323	0.322	0.324	0.323	0.320	0.322	- - -
6 x 4	111.1	4.375	51	2	C_v	30.9	71.5	110	150	185	221	252	280	302	325	- - -
					K_v	*26.7*	*61.8*	*95*	*130*	*160*	*191*	*218*	*242*	*261*	*281*	- - -
					X_T	0.689	0.456	0.386	0.350	0.362	0.368	0.409	0.390	0.413	0.418	- - -
8 x 4	111.1	4.375	51	2	C_v	34.3	75.5	115	153	190	226	261	295	322	343	- - -
					K_v	*29.7*	*65.3*	*99*	*132*	*164*	*195*	*226*	*255*	*279*	*297*	- - -
					X_T	0.486	0.310	0.274	0.263	0.260	0.258	0.262	0.266	0.274	0.279	- - -
8 x 6 and 10x6(2)	177.8	7	51	2	C_v	42.0	95.5	157	223	282	346	411	474	528	575	- - -
					K_v	*36.3*	*82.6*	*136*	*193*	*244*	*299*	*356*	*410*	*457*	*497*	- - -
					X_T	0.571	0.460	0.386	0.358	0.358	0.345	0.331	0.324	0.334	0.319	- - -
			102	4	C_v	100	257	360	443	498	531	558	582	604	626	- - -
					K_v	*86.5*	*222*	*311*	*383*	*431*	*459*	*483*	*503*	*522*	*541*	--
					X_T	0.308	0.228	0.305	0.351	0.432	0.566	0.652	0.710	0.748	0.744	- - -
12 x 6	177.8	7	51	2	C_v	49.6	123	193	262	331	401	466	532	592	639	- - -
					K_v	*42.9*	*106*	*167*	*227*	*286*	*347*	*403*	*460*	*512*	*553*	--
					X_T	0.572	0.345	0.310	0.296	0.289	0.280	0.282	0.277	0.279	0.274	- - -
			102	4	C_v	94.0	229	345	450	544	650	765	835	855	940	- - -
					K_v	*81.3*	*198*	*298*	*389*	*471*	*562*	*662*	*722*	*740*	*813*	--
					X_T	0.357	0.292	0.336	0.334	0.363	0.384	0.369	0.410	0.490	0.462	- - -
10 x 8	203.2	8	76	3	C_v	88.1	230	361	469	559	654	739	808	851	881	- - -
					K_v	*76.2*	*199*	*312*	*406*	*484*	*566*	*639*	*699*	*736*	*762*	- - -
					X_T	0.507	0.393	0.348	0.338	0.359	0.379	0.409	0.434	0.469	0.536	- - -
			102	4	C_v	136	315	471	600	713	802	868	895	894	942	- - -
					K_v	*118*	*272*	*407*	*519*	*617*	*694*	*751*	*774*	*773*	*815*	- - -
					X_T	0.453	0.358	0.347	0.365	0.390	0.433	0.490	0.582	0.690	0.694	- - -

1. The first number indicates both body inlet and outlet size. The second number indicates effective trim size.
2. NPS 10x6 has a valve outlet area identical to the NPS 8x6.

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Quick Opening - Flow Up																**Quick Opening Characteristic**
Valve Size, NPS(1)	**Port Diameter**		**Maximum Travel**		**Flow Coeffi-cient**	**Valve Opening—Percent of Total Travel**										**F_L(2)**
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
8 x 6	177.8	7	51	2	C_v	78.3	150	247	343	438	528	600	643	676	706	0.87
					K_v	*67.7*	*130*	*214*	*297*	*379*	*457*	*519*	*556*	*585*	*611*	---
					X_T	0.760	0.745	0.697	0.715	0.733	0.751	0.758	0.786	0.787	0.747	---
12 x 8	203.8	8	76	3	C_v	157	322	480	632	760	860	957	1030	1080	1110	0.89
					K_v	*136*	*279*	*415*	*547*	*657*	*744*	*828*	*891*	*934*	*960*	---
					X_T	0.718	0.716	0.712	0.730	0.789	0.844	0.855	0.873	0.866	0.836	---
Linear - Flow Up																**Linear Characteristic**
8 x 6	177.8	7	51	2	C_v	51.5	115	181	245	310	374	434	494	553	606	0.89
					K_v	*44.5*	*99*	*157*	*212*	*268*	*324*	*375*	*427*	*478*	*524*	---
					X_T	0.764	0.775	0.781	0.803	0.830	0.826	0.818	0.821	0.809	0.772	---
12 x 8	203.8	8	76	3	C_v	119	218	336	447	564	680	795	895	981	1050	0.89
					K_v	*103*	*189*	*291*	*387*	*488*	*588*	*688*	*774*	*849*	*908*	---
					X_T	0.678	0.768	0.811	0.791	0.802	0.811	0.809	0.819	0.837	0.836	---
Equal Percentage - Flow Up																**Equal Percentage Characteristic**
8 x 6	177.8	7	51	2	C_v	11.0	21.8	34.9	54.8	86.3	140	212	292	373	447	0.92
					K_v	*9.5*	*18.9*	*30.2*	*47.4*	*74.6*	*121*	*183*	*253*	*323*	*387*	---
					X_T	0.839	0.823	0.935	0.953	0.897	0.859	0.844	0.855	0.819	0.791	---
12 x 8	203.8	8	76	3	C_v	28.8	58.1	102	175	294	452	654	859	989	1020	0.88
					K_v	*24.9*	*50.3*	*88*	*151*	*254*	*391*	*566*	*743*	*855*	*882*	---
					X_T	0.769	0.832	0.928	0.930	0.797	0.744	0.651	0.581	0.646	0.766	---

1. The first number indicates both body inlet and outlet size. The second number indicates effective trim size.
2. At 100% travel.

CL150, 300, and 600 - Flow Down

Linear Characteristic

Valve Size, NPS[1]	Port Diameter		Maximum Travel		Minimum Throttling C_v[2]	Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L[3]
	mm	Inches	mm	Inches			10	20	30	40	50	60	70	80	90	100	
One Stage																	
4 x 2	58.7	2.3125	29	1.125	3.90	C_v	0.52	1.87	5.71	11.7	17.4	23.0	28.9	35.1	41.1	43.6	0.91
						K_v	0.450	1.62	4.94	10.1	15.1	19.9	25.0	30.4	35.6	37.7	- - -
6 x 4	111.1	4.375	54	2.125	5.20	C_v	2.03	20.3	41.1	61.5	81.5	101	121	140	158	169	0.95
						K_v	1.76	17.6	35.6	53.2	70.5	87.4	105	121	137	146	- - -
8 x 4	111.1	4.375	54	2.125	5.20	C_v	2.57	21	42	62.6	82.9	103	124	143	161	171	0.95
						K_v	2.22	18.2	36.3	54.1	71.7	89.1	107.3	124	139	148	- - -
8 x 6 10 x 6(1)	177.8	7	57	2.25	10.0	C_v	4.40	29	63.9	99.9	136	171	205	237	269	293	0.93
						K_v	3.81	25.1	55.3	86.4	118	148	177	205	233	253	- - -
12 x 6	177.8	7	57	2.25	10.0	C_v	5.49	34.5	71.1	106	143	179	216	250	283	305	0.93
						K_v	4.75	29.8	61.5	91.7	124	155	187	216	245	264	- - -
12 x 8[4]	203.2	8	86	3.375	15.0	C_v	13.6	62.3	117	171	225	278	331	385	438	487	0.90
						K_v	11.8	53.9	101	148	195	240	286	333	379	421	- - -
12 x 8[5]	203.2	8	152	6	15.0	C_v	82.0	163	245	327	408	490	572	653	735	816	0.92
						K_v	70.9	141	212	283	353	424	495	565	636	706	- - -
Two Stage																	
4 x 2	4736	1.875	51	2	0.92	C_v	0.84	3.19	5.54	7.92	10.3	12.5	15.4	17.3	19.7	22.0	0.98
						K_v	0.73	2.76	4.79	6.85	8.91	10.8	13.3	15.0	17.0	19.0	- - -
6 x 4	73.0	2.875	102	4	1.90	C_v	3.48	11.0	18.5	26.0	33.4	41.0	48.5	56.0	63.2	71.0	0.98
						K_v	3.01	9.52	16.0	22.5	28.9	35.5	42.0	48.4	54.7	61.4	- - -
8 x 6 10 x 6(1)	136.5	5.375	127	5	3.00	C_v	10.9	29.4	47.9	66.6	85.1	104	122	140	160	178	0.98
						K_v	9.43	25.4	41.4	57.6	73.6	90.0	106	121	138	154	- - -
12 x 6	136.5	5.375	152	6	3.00	C_v	14.1	35.6	57.0	78.6	100	121	143	165	186	208	0.98
						K_v	12.2	30.8	49.3	68.0	86.5	105	124	143	161	180	- - -
12 x 8	177.8	7	152	6	7	C_v	27.7	54.7	81.6	109	137	163	190	218	245	272	0.98
						K_v	24.0	47.3	70.6	94.3	119	141	164	189	212	235	- - -

1. NPS 10x6 has a valve outlet area identical to the NPS 8x6.

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CL900 - Flow Down

Linear Characteristic

Valve Size, NPS(1)	Port Diameter		Maximum Travel		Minimum Throttling C_v(2)	Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L(3)
	mm	Inches	mm	Inches			10	20	30	40	50	60	70	80	90	100	
One Stage																	
8 x 6	177.8	7	51	2	10.0	C_v	3.96	26.0	51.9	77.9	104	130	156	181	207	236	0.93
						K_v	*3.43*	*22.5*	*44.9*	*67.4*	*90.0*	*112*	*135*	*157*	*179*	*204*	- - -
			127	5	10.0	C_v	24.8	79.2	131	183	238	292	344	396	451	495	0.93
						K_v	21.5	68.5	113	*158*	*206*	*253*	*298*	*343*	*390*	*428*	- - -
12 x 8(4)	203.3	8	60	3.375	15.0	C_v	13.6	62.3	117	171	225	278	331	385	438	487	0.90
						K_v	*11.8*	*53.9*	*101*	*148*	*195*	*240*	*286*	*333*	*379*	*421*	- - -
12 x 8(5)	203.3	8	152	6	15.0	C_v	69.0	138	207	276	345	414	483	552	622	690	0.92
						K_v	*59.7*	*119*	*179*	*239*	*298*	*358*	*418*	*477*	*538*	*597*	- - -
Two Stage																	
8 x 6	136.5	5.375	127	5	3.00	C_v	11.8	32.0	52.2	72.5	92.7	113	133	153	174	175	0.98
						K_v	*10.2*	*27.7*	*45.2*	*62.7*	*80.2*	*97.7*	*115*	*132*	*151*	*151*	- - -
12 x 8	177.8	7	152	6	7.0	C_v	27.2	54.4	81.6	109	136	163	190	218	245	272	0.98
						K_v	23.5	47.1	70.6	94.3	118	141	164	189	212	235	- - -

1. The first number indicates both body inlet and outlet size.The second number indicates effective trim size.
2. Valves should not be required to throttle at a C_v less than the specified minimum C_v for an extended period of time. Erosion damage to the valve seats may result.
3. At 100% travel.
4. This construction has an internal cage spacer and load ring.
5. This construction has a load ring.

Notes: All other *EWT* flow coefficients are identical to the *EWD*. Refer to the *EWD* information. For additional *EWT* valve body, information refer to Bulletin 51.1:EW.

The EWT-C has flow coefficients identical to the NPS 6 x 4 through 12 x 6 CL150 - 600 EWD. Please refer to those coefficients. For additional EWT-C valve information, please refer to Bulletin 51.1:easy-e™ Cryogenic.

The EWT-1 valve has flow coefficients identical to the EWD-1 valve. Refer to the EWD-1 information. For additional EWT-1 valve body information refer to Bulletin 51.1:EW.

CL300, 600, & 900--Flow Up																	**Linear Characteristic**
Valve Size, NPS[1]	**Port Diameter**		**Maximum Travel**		**Flow Coeffi-cient**	**Valve Opening—Percent of Total Travel**											**X_T at Max. Travel**
	mm	**Inches**	**mm**	**Inches**		**Minimum[2]**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**	
A1 & A3																	
12 x 8	196.8	7.75	203	8	C_v	22.4	138	315	523	665	801	897	962	1001	1008	1013	0.690
					K_v	19.4	119	272	452	575	693	776	832	866	872	876	- - -
					X_T	- - -	0.564	0.453	0.377	0.411	0.424	0.464	0.535	0.621	0.713	0.690	- - -
B1 & B3																	
12 x 8	196.8	7.75	203	8	C_v	16.6	77.0	154	231	308	385	462	539	616	693	770	0.563
					K_v	14.4	66.6	133	200	266	333	400	466	533	599	666	- - -
C1 & C3																	
12 x 8	196.8	7.75	203	8	C_v	15.4	54.3	109	163	217	272	326	380	435	489	543	0.563
					K_v	13.3	47.0	94.3	141	188	235	282	329	376	423	470	- - -
D1 & D3																	
12 x 8	196.8	6.75	203	8	C_v	13.6	46.3	92.7	139	185	232	278	324	371	417	463	0.563
					K_v	11.8	40.0	80.2	120.2	160	201	240	280	321	361	400	- - -
CL900 - Flow Up																	**Linear Characteristic**
A1																	
8 x 6	136.5	5.375	127	5	C_v	16.5	49.1	110	171	232	294	346	391	423	449	469	0.766
					K_v	14.3	42.5	95.2	148	201	254	299	338	366	388	406	- - -
A3																	
8 x 6	136.5	5.375	127	5	C_v	11.8	37.6	85.6	134	181	230	277	319	359	394	420	0.757
					K_v	10.2	32.5	74.0	116	157	199	240	276	311	341	363	- - -
B3[3]																	
8 x 6	136.5	5.375	127	5	C_v	11.2	33.0	69.3	106	142	178	215	251	288	324	353	0.563
					K_v	9.69	28.5	59.9	91.7	123	154	186	217	249	280	305	- - -
C3[3]																	
8 x 6	136.5	5.375	127	5	C_v	10.5	19.1	43.9	67.0	93.0	118	143	167	190	220	239	0.508
					K_v	9.08	16.5	38.0	58.0	80.4	102	124	144	164	190	207	- - -
D3[3, 4]																	
8 x 6	136.5	5.375	127	5	C_v	8.00	10.5	21.7	46.8	71.4	95.4	120	144	169	194	215	0.490
					K_v	6.92	9.08	18.8	40.5	61.8	82.5	104	125	146	168	186	- - -

1. The first number indicates both inlet and outlet size. The second number indicates nominal port size.
2. Valves should not be required to throttle at less than the specified minimum coefficient for an extended period of time or erosion damage to the valve seat may result.
3. Levels B1, C1, and D1 are not available in CL900 NPS 8 x 6 EWND valve body.
4. Equal percentage for first 1.5 inch of travel, then linear.

The coefficients shown on this page are also appropriate for CL300, 600, and 900 Fisher EWNT-2 and CL900 EWNT-1.

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Quick Opening -- Flow Up

Quick Opening Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel(1)		Flow Coefficient	Coeffs. for 6 mm (0.25 Inch) Travel(2)	Valve Opening—Percent of Total Travel										F_L(3)
	mm	Inches	mm	Inches			10	20	30	40	50	60	70	80	90	100	
1/2	25.4	1	19	0.75	C_v	- - -	1.76	3.29	4.29	4.44	4.44	4.44	4.44	4.44	4.44	4.44	0.83
					K_v	- - -	1.52	2.85	3.71	3.84	3.84	3.84	3.84	3.84	3.84	3.84	- - -
					X_T	- - -	0.364	0.649	0.764	0.863	0.894	0.894	0.894	0.894	0.894	0.894	- - -
3/4	25.4	1	19	0.75	C_v	- - -	3.85	7.19	9.40	9.72	9.72	9.72	9.72	9.72	9.72	9.72	0.88
					K_v	- - -	3.33	6.22	8.13	8.41	8.41	8.41	8.41	8.41	8.41	8.41	- - -
					X_T	- - -	0.314	0.559	0.654	0.742	0.769	0.769	0.769	0.769	0.769	0.769	- - -
1	25.4	1	19	0.75	C_v	14.7	4.39	10.3	14.0	15.5	16.2	16.6	16.8	16.8	16.9	16.9	0.94
					K_v	*12.7*	3.80	8.91	12.1	13.4	14.0	14.4	14.5	14.5	14.6	14.6	- - -
					X_T	14.7	0.400	0.449	0.523	0.539	0.535	0.512	0.500	0.500	0.494	0.494	- - -
					F_d	- - -	0.20	0.29	0.39	0.48	0.50	0.50	0.50	0.50	0.50	0.50	- - -
1-1/2	38.1	1.5	19	0.75	C_v	22.6	5.64	11.9	20.6	27.4	30.5	32.4	33.4	33.7	34.1	34.2	0.96
					K_v	*19.5*	4.88	10.3	17.8	23.7	26.4	28.0	28.9	29.2	29.5	29.6	- - -
					X_T	22.6	0.623	0.734	0.726	0.814	0.843	0.857	0.861	0.860	0.853	0.848	- - -
					F_d	- - -	0.16	0.24	0.32	0.39	0.45	0.50	0.50	0.50	0.50	0.50	- - -
	25.4(4)	1(4)	19	0.75	C_v	15.7	4.17	8.94	14.6	17.4	18.3	18.8	18.9	19.0	19.1	19.4	0.90
					K_v	*13.6*	3.61	7.73	12.6	15.1	15.8	16.3	16.3	16.4	16.5	16.8	- - -
					X_T	15.7	0.617	0.791	0.793	0.904	0.925	0.924	0.922	0.915	0.905	0.878	- - -
2	50.8	2	29	1.125	C_v	34.0	13.0	30.1	44.3	52.4	56.4	57.8	58.4	58.5	58.6	58.6	0.94
					K_v	*29.4*	11.2	26.0	38.3	45.3	48.8	50.0	50.5	50.6	50.7	50.7	- - -
					X_T	34.0	0.548	0.663	0.765	0.813	0.818	0.833	0.831	0.836	0.834	0.834	- - -
					F_d	- - -	0.17	0.28	0.36	0.43	0.49	0.50	0.50	0.50	0.50	0.50	- - -
	25.4(4)	1(4)	19	0.75	C_v	15.8	4.35	9.79	14.9	16.6	17.3	17.5	17.5	17.6	17.7	17.9	0.86
					K_v	*13.7*	3.76	8.47	12.9	14.4	15.0	15.1	15.1	15.2	15.3	15.5	- - -
					X_T	15.8	0.524	0.594	0.695	0.877	0.937	0.944	0.958	0.952	0.942	0.921	- - -
3	76.2	3	38	1.5	C_v	53.8	30.8	65.1	92.4	110	118	123	126	128	129	129	0.91
					K_v	*46.5*	26.6	56.3	79.9	95.2	102	106	109	111	112	112	- - -
					X_T	53.8	0.672	0.714	0.713	0.742	0.784	0.785	0.783	0.776	0.774	0.774	- - -
					F_d	- - -	0.17	0.27	0.35	0.42	0.47	0.50	0.50	0.50	0.50	0.50	- - -
	50.8(4)	2(4)	29	1.125	C_v	32.2	9.99	27.6	44.9	61.0	71.9	78.4	83.1	86.2	87.5	88.4	0.95
					K_v	*27.9*	8.64	23.9	38.8	52.8	62.2	67.8	71.9	74.6	75.7	76.5	- - -
					X_T	32.2	0.527	0.511	0.652	0.720	0.780	0.820	0.814	0.798	0.790	0.779	- - -
4	101.6	4	51	2	C_v	68.2	50.8	116	159	185	201	212	219	222	223	223	0.88
					K_v	*59.0*	43.9	100	138	160	174	183	189	192	193	193	- - -
					X_T	68.2	0.733	0.653	0.724	0.805	0.809	0.816	0.809	0.812	0.831	0.835	- - -
					F_d	- - -	0.18	0.28	0.36	0.42	0.48	0.50	0.50	0.50	0.50	0.50	- - -
	50.8(4)	2(4)	29	1.125	C_v	37.4	13.5	32.3	52.2	66.2	74.4	81.1	85.0	85.8	86.3	86.7	0.85
					K_v	*32.4*	11.7	27.9	45.2	57.3	64.4	70.2	73.5	74.2	74.6	75.0	- - -
					X_T	37.4	0.490	0.556	0.609	0.672	0.793	0.772	0.728	0.714	0.711	0.704	- - -

1. When using 655-EZ as a control valve for on-off service, the maximum travel for sizing purposes is 19 mm (0.75 inch).
2. When sizing self-operated regulators, use coefficients listed for 6 mm (0.25 inch) travel.
3. At 100% travel.
4. Restricted trim.

The flow coefficients shown on this page are appropriate for EZ-C valves.

Linear -- Flow Up

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1	25.4	1	19	0.75	C_V	2.21	3.87	5.29	6.56	8.2	9.82	11.1	12.1	13.0	13.6	0.96
					K_V	1.91	3.35	4.58	5.67	7.09	8.49	9.60	10.5	11.2	11.8	- - -
					X_T	0.638	0.601	0.638	0.634	0.638	0.629	0.636	0.680	0.769	0.834	- - -
1-1/2	38.1	1.5	19	0.75	C_V	3.99	7.53	11.1	14.8	18.7	22.5	25.8	29.2	31.2	31.9	0.96
					K_V	3.45	6.51	9.6	12.8	16.2	19.5	22.3	25.3	27.0	27.6	- - -
					X_T	0.633	0.651	0.657	0.691	0.674	0.674	0.696	0.704	0.757	0.818	- - -
	25.4(2)	1(2)	19	0.75	C_V	1.96	3.42	4.94	6.11	7.8	9.3	10.9	13	15.1	16.7	0.96
					K_V	1.70	2.96	4.27	5.29	6.75	8.04	9.43	11.2	13.1	14.4	- - -
					X_T	0.469	0.578	0.600	0.690	0.652	0.655	0.637	0.625	0.719	0.796	- - -
2	50.8	2	29	1.125	C_V	6.08	11.9	18.0	24.1	30.1	36.4	42.8	49.9	52.0	52.4	0.95
					K_V	5.26	10.3	15.6	20.8	26.0	31.5	37.0	43.2	45.0	45.3	- - -
					X_T	0.560	0.644	0.655	0.675	0.701	0.724	0.779	0.773	0.862	0.924	- - -
	25.4(2)	1(2)	19	0.75	C_V	1.88	3.41	4.95	6.49	8.06	9.67	11.23	12.79	14.35	15.7	0.94
					K_V	1.63	2.95	4.28	5.61	6.97	8.36	9.71	11.1	12.4	13.6	- - -
					X_T	0.609	0.593	0.597	0.624	0.621	0.626	0.642	0.633	0.750	0.910	- - -
3	76.2	3	38	1.5	C_V	15.4	29.6	43.4	58.3	71.8	83.9	93.8	103	108	110.4	0.92
					K_V	13.3	25.6	37.5	50.4	62.1	72.6	81.1	89.1	93.4	95.5	- - -
					X_T	0.622	0.642	0.692	0.691	0.690	0.721	0.759	0.788	0.839	0.888	- - -
	50.8(2)	2(2)	29	1.125	C_V	6.59	13.3	20.7	28.1	36.0	44.0	55.6	67.5	76.2	80.4	0.94
					K_V	5.70	11.5	17.9	24.3	31.1	38.1	48.1	58.4	65.9	69.5	- - -
					X_T	0.564	0.500	0.522	0.609	0.577	0.594	0.563	0.582	0.677	0.749	- - -
4	101.6	4	51	2	C_V	21.3	39.7	57.5	75.8	100	129	157	180	199	209	0.89
					K_V	18.4	34.3	49.7	65.6	86.5	112	136	156	172	181	- - -
					X_T	0.554	0.628	0.684	0.723	0.665	0.608	0.677	0.826	0.862	0.866	- - -
	50.8(2)	2(2)	29	1.125	C_V	6.16	12.8	20.0	27.8	36.1	45.1	58.8	67.5	78.8	86.8	0.90
					K_V	5.33	11.1	17.3	24.0	31.2	39.0	50.9	58.4	68.2	75.1	- - -
					X_T	0.740	0.644	0.642	0.619	0.602	0.605	0.552	0.614	0.644	0.736	- - -

1. At 100% travel.
2. Restricted trim.

Notes: The coefficients shown on this page are also appropriate for EZ-C valves.

EMERSON

Equal Percentage -- Flow Up

Equal Percentage Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1	25.4	1	19	0.75	C_v	0.79	1.25	1.80	2.53	3.63	5.28	7.59	10.7	12.7	13.2	0.96
					K_v	0.683	1.08	1.56	2.19	3.14	4.57	6.57	9.26	11.0	11.4	- - -
					X_T	0.641	0.634	0.598	0.586	0.584	0.596	0.646	0.680	0.757	0.886	- - -
					F_d	0.091	0.11	0.13	0.16	0.19	0.24	0.30	0.37	0.43	0.50	- - -
1-1/2	38.1	1.5	19	0.75	C_v	0.795	1.23	1.91	2.95	4.30	6.46	9.84	16.4	22.2	28.1	0.97
					K_v	0.688	1.06	1.65	2.55	3.72	5.59	8.51	14.2	19.2	24.3	- - -
					X_T	0.726	0.676	0.733	0.645	0.589	0.558	0.597	0.653	0.777	0.840	- - -
					F_d	0.077	0.086	0.10	0.12	0.15	0.17	0.22	0.27	0.34	0.40	- - -
	25.4(2)	1(2)	19	0.75	C_v	0.770	1.23	1.78	2.58	3.67	5.54	8.30	12.0	15.1	17.3	0.98
					K_v	0.666	1.06	1.54	2.23	3.17	4.79	7.18	10.4	13.1	15.0	- - -
					X_T	0.654	0.619	0.601	0.605	0.561	0.534	0.518	0.575	0.704	0.861	- - -
2	50.8	2	29	1.125	C_v	1.65	2.61	4.30	6.62	11.1	20.7	32.8	44.7	50.0	53.8	0.95
					K_v	1.43	2.26	3.72	5.73	9.60	17.9	28.4	38.7	43.3	46.5	- - -
					X_T	0.655	0.581	0.520	0.559	0.552	0.529	0.653	0.801	0.903	0.899	- - -
					F_d	0.069	0.085	0.11	0.13	0.18	0.23	0.30	0.37	0.44	0.50	- - -
	25.4(2)	1(2)	19	0.75	C_v	1.02	1.50	2.05	2.78	3.90	5.57	8.16	11.8	14.5	15.9	0.92
					K_v	0.882	1.30	1.77	2.40	3.37	4.82	7.06	10.2	12.5	13.8	- - -
					X_T	0.596	0.616	0.600	0.580	0.572	0.555	0.523	0.547	0.671	0.905	- - -
3	76.2	3	38	1.5	C_v	3.11	5.77	9.12	13.7	21.7	36.0	60.4	86.4	104	114	0.92
					K_v	2.69	4.99	7.89	11.9	18.8	31.1	52.2	74.7	90.0	98.6	- - -
					X_T	0.619	0.595	0.598	0.619	0.594	0.563	0.586	0.729	0.778	0.781	- - -
					F_d	0.062	0.081	0.10	0.12	0.16	0.20	0.26	0.33	0.40	0.46	- - -
	50.8(2)	2(2)	29	1.125	C_v	2.11	3.11	4.58	6.76	10.7	20.7	34.3	48.3	61.5	71.6	0.92
					K_v	1.83	2.69	3.96	5.85	9.26	17.9	29.7	41.8	53.2	61.9	- - -
					X_T	0.874	0.699	0.643	0.626	0.587	0.451	0.493	0.587	0.648	0.734	- - -
4	101.6	4	51	2	C_v	4.90	8.19	13.5	20.1	31.2	52.6	96.7	140	170	190	0.90
					K_v	4.24	7.08	11.7	17.4	27.0	45.5	83.6	121	147	164	- - -
					X_T	0.594	0.573	0.560	0.568	0.572	0.564	0.532	0.707	0.807	0.834	- - -
					F_d	0.052	0.065	0.080	0.10	0.13	0.17	0.23	0.31	0.38	0.44	- - -
	50.8(2)	2(2)	29	1.125	C_v	1.96	3.05	4.43	6.98	11.9	22.3	36.7	50.9	61.8	72.7	0.92
					K_v	1.70	2.64	3.83	6.04	10.3	19.3	31.7	44.0	53.5	62.9	- - -
					X_T	0.619	0.575	0.624	0.610	0.678	0.639	0.646	0.673	0.778	0.781	- - -

1. At 100% travel.
2. Restricted trim.

Notes: The coefficients shown on this page are appropriate for EZ-C valves.

Micro-Form--Flow Up

Equal Percentage Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel											F_L(1)
	mm	Inches	mm	Inches		5	10	20	30	40	50	60	70	80	90	100	
All Sizes 1/2 - 2	6.4	0.25	19	0.75	C_V	0.075	0.088	0.124	0.175	0.236	0.327	0.464	0.641	0.881	1.22	1.52	0.88
					K_V	*0.065*	0.076	0.107	0.151	0.204	0.283	0.401	0.554	0.762	1.06	1.31	- - -
					X_T	0.804	0.771	0.717	0.658	0.645	0.620	0.585	0.596	0.596	0.603	0.647	- - -
1/2	9.5	0.375	19	0.75	C_V	0.102	0.134	0.202	0.313	0.448	0.613	0.879	1.27	1.77	2.47	3.00	0.93
					K_V	0.088	0.116	0.175	0.271	0.388	0.530	0.760	1.10	1.53	2.14	2.59	- - -
					X_T	0.766	0.711	0.679	0.618	0.602	0.588	0.564	0.580	0.599	0.593	0.723	- - -
	12.7	0.5	19	0.75	C_V	0.137	0.193	0.324	0.496	0.737	1.07	1.52	2.13	2.93	3.89	4.52	0.94
					K_V	0.119	0.167	0.280	0.429	0.638	0.926	1.31	1.84	2.53	3.36	3.91	- - -
					X_T	0.739	0.689	0.631	0.595	0.603	0.602	0.592	0.604	0.636	0.687	0.754	- - -
3/4	9.5	0.375	19	0.75	C_V	0.101	0.131	0.205	0.312	0.446	0.618	0.882	1.28	1.80	2.45	3.03	0.93
					K_V	*0.087*	0.113	0.177	0.270	0.386	0.535	0.763	1.11	1.56	2.12	2.62	- - -
					X_T	0.807	0.751	0.642	0.655	0.616	0.597	0.603	0.601	0.607	0.650	0.736	- - -
	12.7	0.5	19	0.75	C_V	0.133	0.190	0.318	0.486	0.732	1.07	1.52	2.15	3.07	4.20	5.06	0.94
					K_V	*0.115*	0.164	0.275	0.420	0.633	0.926	1.31	1.86	2.66	3.63	4.38	- - -
					X_T	0.780	0.720	0.655	0.628	0.606	0.598	0.598	0.596	0.596	0.636	0.722	- - -
	19.1	0.75	19	0.75	C_V	0.276	0.373	0.617	0.948	1.44	2.14	3.10	4.43	6.14	7.58	8.35	0.87
					K_V	0.239	0.323	0.534	0.820	1.25	1.85	2.68	3.83	5.31	6.56	7.22	- - -
					X_T	0.734	0.702	0.618	0.634	0.605	0.607	0.646	0.670	0.699	0.730	0.693	- - -
1	9.5	0.375	19	0.75	C_V	0.099	0.129	0.199	0.308	0.448	0.620	0.882	1.29	1.80	2.43	3.07	0.89
					K_V	*0.086*	0.112	0.172	0.266	0.388	0.536	0.763	1.12	1.56	2.10	2.66	- - -
					X_T	0.795	0.747	0.663	0.641	0.593	0.569	0.568	0.560	0.571	0.624	0.662	- - -
	12.7	0.5	19	0.75	C_V	0.133	0.189	0.319	0.492	0.735	1.08	1.53	2.12	2.99	4.17	4.91	0.93
					K_V	*0.115*	0.163	0.276	0.426	0.636	0.934	1.32	1.83	2.59	3.61	4.25	- - -
					X_T	0.787	0.728	0.639	0.628	0.591	0.573	0.585	0.600	0.618	0.645	0.803	- - -
	19.1	0.75	19	0.75	C_V	0.276	0.374	0.622	0.965	1.47	2.17	3.15	4.57	6.52	8.17	8.84	0.97
					K_V	0.239	0.324	0.538	0.835	1.27	1.88	2.72	3.95	5.64	7.07	7.65	- - -
					X_T	0.723	0.687	0.614	0.588	0.560	0.571	0.596	0.603	0.624	0.750	0.919	- - -
1-1/2 and 2	9.5	0.375	19	0.75	C_V	0.096	0.121	0.190	0.302	0.435	0.600	0.864	1.26	1.80	2.56	3.20	0.84
					K_V	0.083	0.105	0.164	0.261	0.376	0.519	0.747	1.09	1.56	2.21	2.77	- - -
					X_T	0.923	0.915	0.763	0.699	0.657	0.640	0.624	0.608	0.596	0.594	0.648	- - -
	12.7	0.5	19	0.75	C_V	0.145	0.199	0.323	0.503	0.735	1.07	1.54	2.14	3.08	4.36	5.18	0.91
					K_V	*0.125*	0.172	0.279	0.435	0.636	0.926	1.33	1.85	2.66	3.77	4.48	- - -
					X_T	0.851	0.748	0.686	0.640	0.617	0.627	0.602	0.607	0.607	0.573	0.705	- - -
	19.1	0.75	19	0.75	C_V	0.336	0.434	0.683	1.00	1.49	2.21	3.18	4.61	6.73	8.88	10.2	0.92
					K_V	*0.291*	0.375	0.591	0.865	1.29	1.91	2.75	3.99	5.82	7.68	8.82	- - -
					X_T	0.784	0.747	0.625	0.636	0.596	0.578	0.603	0.593	0.591	0.680	0.796	- - -

1. At 100% travel.

Notes: The coefficients on this page are also appropriate for EZ-C valves.

Micro-Flute--Flow Up

Equal Percentage Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
All Sizes 1/2 - 2	6.4 1 Flute	0.25 1 Flute	19	0.75	C_V	0.0385	0.0455	0.0560	0.0719	0.0942	0.124	0.162	0.212	0.278	0.354	0.87
					K_V	0.033	0.039	0.048	0.062	0.081	0.107	0.140	0.183	0.240	0.306	- - -
					X_T	0.778	0.734	0.690	0.653	0.642	0.635	0.637	0.634	0.632	0.656	- - -
	6.4 3 Flutes	0.25 3 Flutes	19	0.75	C_V	0.0562	0.0725	0.101	0.146	0.216	0.312	0.433	0.588	0.802	1.07	0.90
					K_V	0.049	0.063	0.087	0.126	0.187	0.270	0.375	0.509	0.694	0.926	- - -
					X_T	0.692	0.648	0.639	0.625	0.600	0.586	0.597	0.613	0.620	0.624	- - -

1. At 100% travel.

Micro-Flow--Flow Up

Equal Percentage Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Angle "A" of Flat	Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	Inches	mm	Inches			10	20	30	40	50	60	70	80	90	100	
All Sizes 1/2 - 2	4.8	0.1875	19	0.75	1°55'	C_V	0.015	0.020	0.024	0.028	0.034	0.041	0.048	0.056	0.066	0.075	0.89
						K_V	0.013	0.017	0.021	0.024	0.029	0.035	0.042	0.048	0.057	0.065	- - -
						X_T	0.964	0.888	0.906	0.947	0.942	0.928	0.949	0.947	0.918	0.934	- - -
					3°25'	C_V	0.016	0.026	0.038	0.052	0.070	0.088	0.107	0.127	0.153	0.181	0.84
						K_V	0.014	0.022	0.033	0.045	0.061	0.076	0.093	0.110	0.132	0.157	- - -
						X_T	0.707	0.697	0.687	0.700	0.675	0.679	0.680	0.680	0.681	0.681	- - -

1. At 100% travel.

The EZ-C has flow coefficients identical to the EZ. Please refer to those coefficients. For additional EZ-C valve information, please refer to Bulletin 51.1:easy-e™ Cryogenic.

FBD and FBT

Whisper Trim™ III Cage
Level A

Valve Size, NPS			8 x 12	10 x 16	12 x 18	12 x 20	16 x 24	20 x 30	24 x 36	X_T at Max. Travel
Nominal Inlet Size, Inches			**8**	**10**	**12**	**12**	**16**	**20**	**24**	
Nominal Outlet Size, Inches			**12**	**16**	**18**	**20**	**24**	**30**	**36**	
Port Diameter		**mm**	**171**	**197**	**252**	**275**	**352**	**430**	**506**	
		Inches	**6.75**	**7.75**	**9.9375**	**10.8125**	**13.875**	**16.9375**	**19.9375**	
Recommended Actuator	**Plug Travel**		**Whisper III Level A1, Linear Characteristic, C_V Flow Coefficients**							
	mm	**Inches**								
667/657	102	4	522	600	*	*	*	*	*	0.647
585C	127	5	653	759	972	*	*	*	*	0.647
	152	6	756	888	1150	1270	*	*	*	0.647
	178	7	853	1000	1310	1450	*	*	*	0.647
	203	8	938	1110	1470	1630	*	*	*	0.647
585C Long Stroke	225	8.875	981	1170	1590	1770	2340	*	*	0.647
	251	9.875	1070	1280	1730	1930	2560	*	*	0.647
	276	10.875	-----	1375	1880	2100	2810	3500	4220	0.647
	302	11.875	-----	1440	1990	2240	3020	3780	4530	0.647
	327	12.875	-----	1500	2100	2370	3220	4030	4880	0.647
	352	13.875	-----	-----	2200	2490	3410	4310	5190	0.647
	378	14.875	-----	-----	2300	2600	3560	4530	5500	0.647
	403	15.875	-----	-----	-----	-----	3750	4780	5810	0.647
	429	16.875	-----	-----	-----	-----	3910	5000	6090	0.647
	454	17.875	-----	-----	-----	-----	4090	5250	6410	0.647
	479	18.875	-----	-----	-----	-----	4220	5470	6690	0.647
	505	19.875	-----	-----	-----	-----	-----	5660	6970	0.647
	530	20.875	-----	-----	-----	-----	-----	5840	7220	0.647
	556	21.875	-----	-----	-----	-----	-----	6030	7470	0.647
	581	22.875	-----	-----	-----	-----	-----	6190	7690	0.647
	606	23.875	-----	-----	-----	-----	-----	6375	7940	0.647
Min Throttling, Bevel Seat Plug			57.8	81.4	125	141	229	346	431	0.550
Min Throttling, Radius Plug			26.1	29.7	37	40.4	51.2	62.0	72.8	0.550

(*) Consult factory for flow at lower travels.

Whisper Trim III Cage
Level A

Valve Size, NPS			8 x 12	10 x 16	12 x 18	12 x 20	16 x 24	20 x 30	24 x 36	X_T at Max. Travel
Nominal Inlet Size, Inches			**8**	**10**	**12**	**12**	**16**	**20**	**24**	
Nominal Outlet Size, Inches			**12**	**16**	**18**	**20**	**24**	**30**	**36**	
Port Diameter		**mm**	**171**	**197**	**252**	**275**	**352**	**430**	**506**	
		Inches	**6.75**	**7.75**	**9.9375**	**10.8125**	**13.875**	**16.9375**	**19.9375**	
Recommended Actuator	**Plug Travel**		**Whisper III Level A3, Linear Characteristic, C_V Flow Coefficients**							
	mm	**Inches**								
667/657	102	4	528	613	*	*	*	(1)	(1)	0.647
585C	127	5	644	750	981	*	*	(1)	(1)	0.647
	152	6	750	878	1160	1260	*	(1)	(1)	0.647
	178	7	847	997	1330	1440	*	(1)	(1)	0.647
	203	8	931	1100	1480	1620	*	(1)	(1)	0.647
585C Long Stroke	225	8.875	981	1200	1620	1770	2340	(1)	(1)	0.647
	251	9.875	1070	1280	1760	1930	2560	(1)	(1)	0.647
	276	10.875	-----	1370	1900	2090	2790	(1)	(1)	0.647
	302	11.875	-----	1440	2020	2230	3000	(1)	(1)	0.647
	327	12.875	-----	1500	2130	2360	3190	(1)	(1)	0.647
	352	13.875	-----	-----	2230	2480	3380	(1)	(1)	0.647
	378	14.875	-----	-----	2320	2590	3560	(1)	(1)	0.647
	403	15.875	-----	-----	-----	-----	3750	(1)	(1)	0.647
	429	16.875	-----	-----	-----	-----	3910	(1)	(1)	0.647
	454	17.875	-----	-----	-----	-----	4060	(1)	(1)	0.647
	479	18.875	-----	-----	-----	-----	4220	(1)	(1)	0.647
	505	19.875	-----	-----	-----	-----	-----	(1)	(1)	0.647
	530	20.875	-----	-----	-----	-----	-----	(1)	(1)	0.647
	556	21.875	-----	-----	-----	-----	-----	(1)	(1)	0.647
	581	22.875	-----	-----	-----	-----	-----	(1)	(1)	0.647
	606	23.875	-----	-----	-----	-----	-----	(1)	(1)	0.647
Min Throttling, Beveled Seat Plug			57.8	81.4	125	141	229	(1)	(1)	0.550
Min Throttling, Radius Plug			20.5	23.3	29.2	31.8	40.4	(1)	(1)	0.550

1. Whisper A3 is not available in these sizes. Whisper A2 is available, consult your Emerson sales office for details.
(*) Consult factory for flow at lower travels.

Valve Size, NPS			**8 x 12**	**10 x 16**	**12 x 18**	**12 x 20**	**16 x 24**	**20 x 30**	**24 x 36**	**X_T at Max. Travel**
Nominal Inlet Size, Inches			**8**	**10**	**12**	**12**	**16**	**20**	**24**	
Nominal Outlet Size, Inches			**12**	**16**	**18**	**20**	**24**	**30**	**36**	
Port Diameter		**mm**	**171**	**197**	**252**	**275**	**352**	**430**	**506**	
		Inches	**6.75**	**7.75**	**9.9375**	**10.8125**	**13.875**	**16.9375**	**19.9375**	
Recommended Actuator	**Plug Travel**		**Whisper III Level B1, Linear Characteristic, C_V Flow Coefficients**							
	mm	**Inches**								
667/657	102	4	334	366	*	*	*	*	*	0.647
585C	127	5	422	463	581	*	*	*	*	0.647
	152	6	503	559	703	*	*	*	*	0.647
	178	7	578	647	828	*	*	*	*	0.647
	203	8	650	731	944	1050	*	*	*	0.647
585C Long Stroke	225	8.875	706	897	1030	1150	1410	*	*	0.647
	251	9.875	769	1000	1140	1270	1575	*	*	0.647
	276	10.875	-----	1090	1240	1380	1730	2180	2520	0.647
	302	11.875	-----	1160	1340	1490	1880	2380	2760	0.647
	327	12.875	-----	1230	1430	1600	2030	2580	3000	0.647
	352	13.875	-----	-----	1530	1700	2170	2770	3250	0.647
	378	14.875	-----	-----	1620	1810	2310	2950	3470	0.647
	403	15.875	-----	-----	-----	-----	2440	3120	3690	0.647
	429	16.875	-----	-----	-----	-----	2570	3310	3910	0.647
	454	17.875	-----	-----	-----	-----	2700	3470	4130	0.647
	479	18.875	-----	-----	-----	-----	2830	3660	4340	0.647
	505	19.875	-----	-----	-----	-----	-----	3810	4530	0.647
	530	20.875	-----	-----	-----	-----	-----	3970	4720	0.647
	556	21.875	-----	-----	-----	-----	-----	4090	4910	0.647
	581	22.875	-----	-----	-----	-----	-----	4250	5090	0.647
	606	23.875	-----	-----	-----	-----	-----	4410	5280	0.647
Min Throttling, Bevel Seat Plug			57.8	81.4	125	141	229	346	431	0.550
Min Throttling, Radius Plug			23.1	25.9	32.4	35.6	44.5	50.8	63.8	0.550

(*) Consult factory for flow at lower travels.

Valve Size, NPS			**8 x 12**	**10 x 16**	**12 x 18**	**12 x 20**	**16 x 24**	**20 x 30**	**24 x 36**	**X_T at Max. Travel**
Nominal Inlet Size, In			**8**	**10**	**12**	**12**	**16**	**20**	**24**	
Nominal Outlet Size, In			**12**	**16**	**18**	**20**	**24**	**30**	**36**	
Port Diameter		**mm**	**171**	**197**	**252**	**275**	**352**	**430**	**506**	
		Inches	**6.75**	**7.75**	**9.9375**	**10.8125**	**13.875**	**16.9375**	**19.9375**	
Recommended Actuator	**Plug Travel**		**Whisper III Level B3, Linear Characteristic, C_V Flow Coefficients**							
	mm	**Inches**								
667/657	102	4	334	366	*	*	*	*	*	0.647
585C	127	5	422	463	581	*	*	*	*	0.647
	152	6	497	553	694	*	*	*	*	0.647
	178	7	572	641	819	*	*	*	*	0.647
	203	8	644	722	934	1040	*	*	*	0.647
585C Long Stroke	225	8.875	706	797	1030	1150	1440	*	*	0.647
	251	9.875	769	872	1140	1270	1610	*	*	0.647
	276	10.875	-----	947	1240	1380	1780	2180	2520	0.647
	302	11.875	-----	1010	1330	1480	1910	2370	2740	0.647
	327	12.875	-----	1080	1430	1590	2060	2570	2980	0.647
	352	13.875	-----	-----	1520	1700	2200	2750	3220	0.647
	378	14.875	-----	-----	1610	1800	2340	2930	3470	0.647
	403	15.875	-----	-----	-----	-----	2480	3130	3690	0.647
	429	16.875	-----	-----	-----	-----	2620	3280	3910	0.647
	454	17.875	-----	-----	-----	-----	2740	3470	4090	0.647
	479	18.875	-----	-----	-----	-----	2870	3625	4310	0.647
	505	19.875	-----	-----	-----	-----	-----	3780	4500	0.647
	530	20.875	-----	-----	-----	-----	-----	3970	4720	0.647
	556	21.875	-----	-----	-----	-----	-----	4090	4910	0.647
	581	22.875	-----	-----	-----	-----	-----	4250	5090	0.647
	606	23.875	-----	-----	-----	-----	-----	4410	5280	0.647
Min Throttling, Bevel Seat Plug			57.8	81.4	125	141	229	346	431	0.550
Min Throttling, Radius Plug			19.0	21.4	26.7	29.4	37.2	43.5	52.9	0.550

(*) Consult factory for flow at lower travels.

Valve Size, NPS			**8 x 12**	**10 x 16**	**12 x 18**	**12 x 20**	**16 x 24**	**20 x 30**	**24 x 36**	**X_T at Max. Travel**
Nominal Inlet Size, Inches			**8**	**10**	**12**	**12**	**16**	**20**	**24**	
Nominal Outlet Size, Inches			**12**	**16**	**18**	**20**	**24**	**30**	**36**	
Port Diameter		**mm**	**171**	**197**	**252**	**275**	**352**	**430**	**506**	
		Inches	**6.75**	**7.75**	**9.9375**	**10.8125**	**13.875**	**16.9375**	**19.9375**	
Recommended Actuator	**Plug Travel**		**Whisper III Level C1, Linear Characteristic, C_V Flow Coefficients**							
	mm	**Inches**								
667/657	102	4	199	224	*	*	*	*	*	0.647
585C	127	5	254	286	*	*	*	*	*	0.647
	152	6	298	334	447	*	*	*	*	0.647
	178	7	353	397	531	*	*	*	*	0.647
	203	8	409	459	613	663	*	*	*	0.647
585C Long Stroke	225	8.875	447	509	678	734	953	*	*	0.647
	251	9.875	494	569	763	825	1060	*	*	0.647
	276	10.875	-----	613	828	897	1170	1460	1680	0.647
	302	11.875	-----	666	906	988	1270	1590	1830	0.647
	327	12.875	-----	716	981	1070	1380	1730	1980	0.647
	352	13.875	-----	-----	1050	1150	1490	1860	2140	0.647
	378	14.875	-----	-----	1120	1230	1590	1990	2290	0.647
	403	15.875	-----	-----	-----	-----	1700	2130	2440	0.647
	429	16.875	-----	-----	-----	-----	1790	2260	2600	0.647
	454	17.875	-----	-----	-----	-----	1890	2390	2750	0.647
	479	18.875	-----	-----	-----	-----	1960	2530	2900	0.647
	505	19.875	-----	-----	-----	-----	-----	2640	3060	0.647
	530	20.875	-----	-----	-----	-----	-----	2760	3210	0.647
	556	21.875	-----	-----	-----	-----	-----	2880	3360	0.647
	581	22.875	-----	-----	-----	-----	-----	3000	3520	0.647
	606	23.875	-----	-----	-----	-----	-----	3080	3610	0.647
Min Throttling, Bevel Seat Plug			57.8	81.4	125	141	229	346	431	0.550
Min Throttling, Radius Plug			20.8	23.7	30.1	32.9	41.5	50.8	59.3	0.550

(*) Consult factory for flow at lower travels.

Valve Size, NPS			**8 x 12**	**10 x 16**	**12 x 18**	**12 x 20**	**16 x 24**	**20 x 30**	**24 x 36**	**X_T at Max. Travel**
Nominal Inlet Size, Inches			**8**	**10**	**12**	**12**	**16**	**20**	**24**	
Nominal Outlet Size, Inches			**12**	**16**	**18**	**20**	**24**	**30**	**36**	
Port Diameter		**mm**	**171**	**197**	**252**	**275**	**352**	**430**	**506**	
		Inches	**6.75**	**7.75**	**9.9375**	**10.8125**	**13.875**	**16.9375**	**19.9375**	
Recommended Actuator	**Plug Travel**		**Whisper III Level C3, Linear Characteristic, C_V Flow Coefficients**							
	mm	**Inches**								
667/657	102	4	205	229	*	*	*	*	*	0.647
585C	127	5	264	295	*	*	*	*	*	0.647
	152	6	316	353	447	*	*	*	*	0.647
	178	7	375	419	531	*	*	*	*	0.647
	203	8	425	478	606	656	*	*	*	0.647
585C Long Stroke	225	8.875	466	531	672	728	922	*	*	0.647
	251	9.875	516	591	753	816	1090	*	*	0.647
	276	10.875	-----	647	838	906	1150	1390	1600	0.647
	302	11.875	-----	697	906	988	1250	1520	1750	0.647
	327	12.875	-----	750	981	1070	1370	1660	1910	0.647
	352	13.875	-----	-----	1040	1140	1470	1780	2050	0.647
	378	14.875	-----	-----	1120	1220	1590	1930	2220	0.647
	403	15.875	-----	-----	-----	-----	1700	2060	2370	0.647
	429	16.875	-----	-----	-----	-----	1800	2190	2530	0.647
	454	17.875	-----	-----	-----	-----	1890	2320	2670	0.647
	479	18.875	-----	-----	-----	-----	1990	2460	2830	0.647
	505	19.875	-----	-----	-----	-----	-----	2580	2980	0.647
	530	20.875	-----	-----	-----	-----	-----	2700	3130	0.647
	556	21.875	-----	-----	-----	-----	-----	2820	3280	0.647
	581	22.875	-----	-----	-----	-----	-----	2930	3430	0.647
	606	23.875	-----	-----	-----	-----	-----	3080	3610	0.647
Min Throttling, Bevel Seat Plug			57.8	81.4	125	141	229	346	431	0.550
Min Throttling, Radius Plug			18.0	20.5	25.6	28.1	35.7	43.3	50.7	0.550

(*) Consult factory for flow at lower travels.

Valve Size, NPS			**8 x 12**	**10 x 16**	**12 x 18**	**12 x 20**	**16 x 24**	**20 x 30**	**24 x 36**	**X_T at Max. Travel**
Nominal Inlet Size, Inches			**8**	**10**	**12**	**12**	**16**	**20**	**24**	
Nominal Outlet Size, Inches			**12**	**16**	**18**	**20**	**24**	**30**	**36**	
Port Diameter		**mm**	**132**	**171**	**197**	**224**	**275**	**378**	**430**	
		Inches	**5.1875**	**6.75**	**7.75**	**8.8125**	**10.8125**	**14.875**	**16.9375**	
Recommended Actuator	**Plug Travel**		**Whisper III Level D1, Linear Characteristic, C_V Flow Coefficients**							
	mm	**Inches**								
667/657	102	4	149	199	*	*	*	*	*	0.647
585C	127	5	191	254	*	*	*	*	*	0.647
	152	6	224	298	334	*	*	*	*	0.647
	178	7	262	353	397	*	*	*	*	0.647
	203	8	298	409	459	613	*	*	*	0.647
585C Long Stroke	225	8.875	325	447	509	678	775	*	*	0.647
	251	9.875	359	494	569	753	863	*	*	0.647
	276	10.875	-----	531	613	813	947	1240	1460	0.647
	302	11.875	-----	578	666	881	1030	1350	1590	0.647
	327	12.875	-----	622	716	950	1110	1470	1730	0.647
	352	13.875	-----	-----	766	1020	1190	1580	1860	0.647
	378	14.875	-----	-----	816	1080	1270	1690	1990	0.647
	403	15.875	-----	-----	-----	-----	1340	1810	2130	0.647
	429	16.875	-----	-----	-----	-----	1410	1920	2260	0.647
	454	17.875	-----	-----	-----	-----	1480	2030	2390	0.647
	479	18.875	-----	-----	-----	-----	1530	2130	2530	0.647
	505	19.875	-----	-----	-----	-----	-----	2230	2640	0.647
	530	20.875	-----	-----	-----	-----	-----	2320	2760	0.647
	556	21.875	-----	-----	-----	-----	-----	2420	2880	0.647
	581	22.875	-----	-----	-----	-----	-----	2520	3000	0.647
	606	23.875	-----	-----	-----	-----	-----	2580	3080	0.647
Min Throttling, Bevel Seat Plug			57.8	81.4	125	141	229	346	431	0.550
Min Throttling, Radius Plug			14.8	20.8	23.7	28.0	32.9	44.3	50.8	0.550

(*) Consult factory for flow at lower travels.

Valve Size, NPS			**8 x 12**	**10 x 16**	**12 x 18**	**12 x 20**	**16 x 24**	**20 x 30**	**24 x 36**	**X_T at Max. Travel**
Nominal Inlet Size, Inches			**8**	**10**	**12**	**12**	**16**	**20**	**24**	
Nominal Outlet Size, Inches			**12**	**16**	**18**	**20**	**24**	**30**	**36**	
Port Diameter		**mm**	**132**	**171**	**197**	**224**	**275**	**378**	**430**	
		Inches	**5.1875**	**6.75**	**7.75**	**8.8125**	**10.8125**	**14.875**	**16.9375**	
Recommended Actuator	**Plug Travel**		**Whisper III Level D3, Linear Characteristic, C_v Flow Coefficients**							
	mm	**Inches**								
667/657	102	4	157	205	*	*	376	*	497	0.647
585C	127	5	202	264	*	*	452	*	626	0.647
	152	6	242	316	353	*	529	*	755	0.647
	178	7	281	375	419	*	606	*	885	0.647
	203	8	316	425	478	553	682	*	1010	0.647
585C Long Stroke	225	8.875	344	466	531	616	728	*	1140	0.647
	251	9.875	381	516	591	725	863	*	1270	0.647
	276	10.875	-----	566	647	759	907	1220	1390	0.647
	302	11.875	-----	606	697	819	988	1330	1520	0.647
	327	12.875	-----	653	750	881	1070	1450	1660	0.647
	352	13.875	-----	-----	797	938	1140	1560	1780	0.647
	378	14.875	-----	-----	847	1030	1230	1690	1930	0.647
	403	15.875	-----	-----	-----	-----	1300	1800	2060	0.647
	429	16.875	-----	-----	-----	-----	1380	1920	2190	0.647
	454	17.875	-----	-----	-----	-----	1440	2020	2320	0.647
	479	18.875	-----	-----	-----	-----	1510	2130	2460	0.647
	505	19.875	-----	-----	-----	-----	-----	2230	2580	0.647
	530	20.875	-----	-----	-----	-----	-----	2330	2700	0.647
	556	21.875	-----	-----	-----	-----	-----	2430	2820	0.647
	581	22.875	-----	-----	-----	-----	-----	2530	2930	0.647
	606	23.875	-----	-----	-----	-----	-----	2640	3080	0.647
Min Throttling, Bevel Seat Plug			57.8	81.4	125	141	229	346	431	0.550
Min Throttling, Radius Plug			13.5	18.0	20.5	23.1	28.1	38.1	43.3	0.550

(*) Consult factory for flow at lower travels.

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Valve Size, NPS			**8 x 12**	**X_T at Travel for 8 x 12**	**10 x 16**	**X_T at Travel for 10 x 16**	**12 x 18**	**X_T at Travel for 12 x 18**	**12 x 20**	**X_T at Travel for 12 x 20**	**16 x 24**	**X_T at Travel for 16 x 24**	**20 x 30**	**X_T at Travel for 20 x 30**	**24 x 36**	**X_T at Travel for 24 x 36**
Nominal Inlet Size, Inches			**8**		**10**		**12**		**12**		**16**		**20**		**24**	
Nominal Outlet Size, Inches			**12**		**16**		**18**		**20**		**24**		**30**		**36**	
Port Diameter		**mm**	**178**		**178**		**178**		**279**		**375**		**463**		**463**	
		Inches	**7.00**		**7.00**		**7.00**		**11.00**		**14.75**		**18.25**		**18.25**	
Recommended Actuator	**Plug Travel**		**WhisperFlo Level X, Linear Characteristic, C_V Flow Coefficients**													
	mm	**Inches**														
667/657	102	4	450	0.69	450	0.69	450	0.69	698	0.70	930	0.71	1118	0.71	1118	0.71
585C	127	5	564	0.68	564	0.68	564	0.68	876	0.70	1168	0.71	1403	0.71	1403	0.71
	152	6	679	0.67	679	0.67	679	0.67	1054	0.69	1405	0.70	1689	0.71	0689	0.71
	178	7	794	0.66	794	0.66	794	0.66	1232	0.68	1643	0.70	1974	0.70	1974	0.70
	203	8	909	0.65	909	0.65	909	0.65	1410	0.68	1881	0.69	2260	0.70	2260	0.70
585C Long Stroke	225	8.875	1009	0.65	1009	0.65	1009	0.65	1566	0.67	2089	0.69	2510	0.69	2510	0.70
	251	9.875	1124	0.64	1124	0.64	1124	0.64	1744	0.66	2326	0.68	2795	0.69	2795	0.69
	276	10.875	-----	-----	1239	0.63	1239	0.63	1922	0.66	2564	0.68	3081	0.69	3081	0.69
	302	11.875	-----	-----	1354	0.62	1354	0.62	2101	0.65	2801	0.68	3366	0.68	3366	0.69
	327	12.875	-----	-----	1469	0.61	1469	0.61	2279	0.65	3039	0.67	3652	0.68	3652	0.68
	352	13.875	-----	-----	-----	-----	1583.3	0.60	2457	0.64	3277	0.67	3937	0.68	3937	0.68
	378	14.875	-----	-----	-----	-----	1698	0.59	2635	0.63	3514	0.66	4223	0.67	4223	0.68
	403	15.875	-----	-----	-----	-----	-----	-----	-----	-----	3752	0.66	4508	0.67	4508	0.67
	429	16.875	-----	-----	-----	-----	-----	-----	-----	-----	3989	0.65	4794	0.66	4794	0.67
	454	17.875	-----	-----	-----	-----	-----	-----	-----	-----	4227	0.65	5079	0.66	5079	0.67
	479	18.875	-----	-----	-----	-----	-----	-----	-----	-----	4465	0.65	5365	0.65	5365	0.66
	505	19.875	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	5650	0.65	5650	0.66
	530	20.875	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	5936	0.65	5936	0.65
	556	21.875	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	6221	0.65	6221	0.65
	581	22.875	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	6507	0.65	6507	0.65
	606	23.875	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	6792	0.65	6792	0.64
FB Minimum Travel, Inches			0.24	-----	0.24	-----	0.24	-----	0.42	-----	0.40	-----	0.47	-----	0.47	-----
Min Throttling, Radius Plug			12.9	0.72	12.9	0.72	12.9	0.72	43.3	0.72	60.2	0.72	86.5	0.72	86.5	0.72

Valve Size, NPS			**8 x 12**	**X_T at Travel for 8 x 12**	**10 x 16**	**X_T at Travel for 10 x 16**	**12 x 18**	**X_T at Travel for 12 x 18**	**12 x 20**	**X_T at Travel for 12 x 20**	**16 x 24**	**X_T at Travel for 16 x 24**	**20 x 30**	**X_T at Travel for 20 x 30**	**24 x 36**	**X_T at Travel for 24 x 36**
Nominal Inlet Size, Inches			**8**		**10**		**12**		**12**		**16**		**20**		**24**	
Nominal Outlet Size, Inches			**12**		**16**		**18**		**20**		**24**		**30**		**36**	
Port Diameter		**mm**	**178**		**178**		**178**		**279**		**375**		**463**		**463**	
		Inches	**7.00**		**7.00**		**7.00**		**11.00**		**14.75**		**18.25**		**18.25**	
Recommended Actuator	**Plug Travel**		**WhisperFlo Level Y, Linear Characteristic, C_V Flow Coefficients**													
	mm	**Inches**														
667/657	102	4	306	0.59	306	0.59	306	0.59	422	0.56	670	0.62	761	0.58	761	0.58
585C	127	5	384	0.58	384	0.58	384	0.58	529	0.55	840	0.61	955	0.58	955	0.58
	152	6	462	0.58	462	0.58	462	0.58	637	0.55	1011	0.61	1150	0.57	1150	0.57
	178	7	540	0.57	540	0.57	540	0.57	745	0.55	1192	0.61	1364	0.57	1364	0.57
	203	8	618	0.57	618	0.57	618	0.57	852	0.55	1353	0.61	1538	0.57	1538	0.57
585C Long Stroke	225	8.875	686	0.56	686	0.56	686	0.56	946	0.54	1502	0.60	1708	0.57	1708	0.57
	251	9.875	764	0.56	764	0.56	764	0.56	1054	0.54	1673	0.60	1903	0.57	1903	0.57
	276	10.875	-----	-----	843	0.55	843	0.55	1162	0.54	1844	0.60	2097	0.57	2097	0.57
	302	11.875	-----	-----	921	0.55	921	0.55	1269	0.54	2015	0.60	2292	0.56	2292	0.57
	327	12.875	-----	-----	999	0.54	999	0.54	1377	0.53	2186	0.59	2486	0.56	2486	0.56
	352	13.875	-----	-----	-----	-----	1077	0.54	1485	0.53	2357	0.59	2680	0.56	2680	0.56
	378	14.875	-----	-----	-----	-----	1155	0.54	1592	0.53	2527	0.59	2875	0.56	2875	0.56
	403	15.875	-----	-----	-----	-----	-----	-----	-----	-----	2698	0.59	3069	0.56	3069	0.56
	429	16.875	-----	-----	-----	-----	-----	-----	-----	-----	2869	0.58	3263	0.56	3263	0.56
	454	17.875	-----	-----	-----	-----	-----	-----	-----	-----	3040	0.58	3458	0.55	3458	0.55
	479	18.875	-----	-----	-----	-----	-----	-----	-----	-----	3211	0.58	3652	0.55	3652	0.55
	505	19.875	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	3846	0.55	3846	0.55
	530	20.875	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	4041	0.55	4041	0.55
	556	21.875	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	4235	0.55	4235	0.55
	581	22.875	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	4429	0.55	4429	0.55
	606	23.875	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	4624	0.54	4624	0.54
FB Minimum Travel, Inches			0.24	-----	0.24	-----	0.24	-----	0.42	-----	0.40	-----	0.47	-----	0.47	-----
Min Throttling, Radius Plug			11.7	0.63	11.7	0.63	11.7	0.63	36.2	0.56	53.4	0.62	77.3	0.58	77.3	0.58

Valve Size, NPS			8 x 12	X_T at Travel for 8 x 12	10 x 16	X_T at Travel for 10 x 16	12 x 18	X_T at Travel for 12 x 18	12 x 20	X_T at Travel for 12 x 20	16 x 24	X_T at Travel for 16 x 24	20 x 30	X_T at Travel for 20 x 30	24 x 36	X_T at Travel for 24 x 36
Nominal Inlet Size, Inches			**8**		**10**		**12**		**12**		**16**		**20**		**24**	
Nominal Outlet Size, Inches			**12**		**16**		**18**		**20**		**24**		**30**		**36**	
Port Diameter		**mm**	**178**		**178**		**178**		**279**		**375**		**463**		**463**	
		Inches	**7.00**		**7.00**		**7.00**		**11.00**		**14.75**		**18.25**		**18.25**	
Recommended Actuator	**Plug Travel**		**WhisperFlo Level Z, Linear Characteristic, C_V Flow Coefficients**													
	mm	**Inches**														
667/657	102	4	199	0.43	199	0.43	199	0.43	299	0.44	463	0.47	548	0.45	548	0.45
585C	127	5	250	0.43	250	0.43	250	0.43	375	0.44	581	0.47	689	0.45	689	0.45
	152	6	301	0.43	301	0.43	301	0.43	451	0.43	699	0.46	828	0.45	828	0.45
	178	7	352	0.43	352	0.43	352	0.43	527	0.43	817	0.46	968	0.45	968	0.45
	203	8	402	0.43	402	0.43	402	0.43	603	0.43	935	0.46	1107	0.45	1107	0.45
585C Long Stroke	225	8.875	447	0.42	447	0.42	447	0.42	670	0.43	1039	0.46	1230	0.45	1230	0.45
	251	9.875	498	0.42	498	0.42	498	0.42	746	0.43	1157	0.46	1370	0.45	1370	0.45
	276	10.875	-----	-----	549	0.42	549	0.42	823	0.43	1275	0.46	1510	0.45	1510	0.45
	302	11.875	-----	-----	599	0.42	599	0.42	899	0.43	1393	0.46	1650	0.45	1650	0.45
	327	12.875	-----	-----	650	0.42	650	0.42	975	0.43	1512	0.46	1790	0.45	1790	0.45
	352	13.875	-----	-----	-----	-----	701	0.41	1051	0.42	1630	0.46	1929	0.45	1929	0.45
	378	14.875	-----	-----	-----	-----	752	0.41	1128	0.42	1748	0.45	2069	0.44	2069	0.44
	403	15.875	-----	-----	-----	-----	-----	-----	-----	-----	1866	0.45	2209	0.44	2209	0.44
	429	16.875	-----	-----	-----	-----	-----	-----	-----	-----	1984	0.45	2349	0.44	2349	0.44
	454	17.875	-----	-----	-----	-----	-----	-----	-----	-----	2103	0.45	2489	0.44	2489	0.44
	479	18.875	-----	-----	-----	-----	-----	-----	-----	-----	2221	0.45	2629	0.44	2629	0.44
	505	19.875	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	2769	0.44	2769	0.44
	530	20.875	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	2909	0.44	2909	0.44
	556	21.875	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	3049	0.44	3049	0.44
	581	22.875	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	3189	0.44	3189	0.44
	606	23.875	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	3329	0.44	3329	0.44
FB Minimum Travel, Inches			0.24	-----	0.24	-----	0.24	-----	0.42	-----	0.40	-----	0.47	-----	0.47	-----
Min Throttling, Radius Plug			10.7	0.44	10.7	0.44	10.7	0.44	33.0	0.44	48.1	0.47	71.8	0.46	71.8	0.46

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Equal Percentage - Flow Up

Equal Percentage Characteristic

Valve Size	Port Diameter	Maximum Travel	Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	mm		10	20	30	40	50	60	70	80	90	100	
DN 15 (NPS 1/2)	9.5	20	C_v	0.118	0.191	0.309	0.457	0.607	0.941	1.39	2.00	2.77	3.34	0.98
			K_v	0.102	0.166	0.267	0.396	0.525	0.814	1.20	1.73	2.40	2.89	- - -
			X_T	0.67	0.59	0.58	0.56	0.57	0.55	0.57	0.57	0.61	0.69	- - -
			F_d	0.11	0.13	0.16	0.19	0.22	0.28	0.34	0.44	0.58	0.80	- - -
	9.5(2)	20	C_v	0.089	0.109	0.153	0.213	0.289	0.393	0.552	0.754	1.03	1.43	0.99
			K_v	0.077	0.094	0.132	0.185	0.250	0.340	0.478	0.652	0.891	1.24	- - -
			X_T	0.72	0.65	0.61	0.59	0.57	0.54	0.53	0.55	0.55	0.59	- - -
			F_d	0.09	0.09	0.09	0.11	0.13	0.14	0.20	0.24	0.28	0.35	- - -
DN 20 (NPS 3/4)	14	20	C_v	0.154	0.192	0.311	0.505	0.763	1.18	1.91	3.05	4.93	6.41	0.98
			K_v	0.133	0.166	0.269	0.437	0.660	1.02	1.65	2.64	4.27	5.55	- - -
			X_T	0.62	0.60	0.58	0.59	0.52	0.54	0.54	0.62	0.71	0.77	- - -
			F_d	0.08	0.08	0.10	0.13	0.16	0.20	0.26	0.33	0.47	0.59	- - -
	9.5	20	C_v	0.128	0.206	0.325	0.479	0.629	0.984	1.46	2.14	3.06	3.75	0.95
			K_v	0.111	0.178	0.281	0.415	0.544	0.851	1.27	1.85	2.65	3.25	- - -
			X_T	0.65	0.66	0.62	0.61	0.62	0.65	0.64	0.63	0.65	0.62	- - -
			F_d	0.11	0.13	0.16	0.19	0.22	0.28	0.34	0.44	0.58	0.80	- - -
	9.5(2)	20	C_v	0.127	0.149	0.176	0.222	0.311	0.440	0.599	0.828	1.14	1.65	0.97
			K_v	0.110	0.129	0.153	0.192	0.269	0.381	0.518	0.716	0.985	1.43	- - -
			X_T	0.69	0.77	0.68	0.81	0.76	0.71	0.72	0.67	0.75	0.79	- - -
			F_d	0.09	0.09	0.09	0.11	0.13	0.14	0.20	0.24	0.28	0.35	- - -

1. At 100% travel.
2. Restricted trim.
3. Balanced trim.
4. Balanced, restricted trim.

-continued-

Equal Percentage - Flow Up

Equal Percentage Characteristic

Valve Size	Port Diameter	Maximum Travel	Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	mm		10	20	30	40	50	60	70	80	90	100	
DN 25 (NPS 1)	22	20	C_v	0.673	0.937	1.32	1.89	2.25	3.13	5.05	7.39	10.5	13.7	0.93
			K_v	0.582	0.810	1.14	1.63	1.94	2.71	4.36	6.39	9.05	11.9	- - -
			X_T	0.61	0.59	0.58	0.57	0.74	0.82	0.64	0.58	0.68	0.77	- - -
			F_d	0.09	0.11	0.13	0.15	0.18	0.21	0.25	0.31	0.39	0.49	- - -
	14	20	C_v	0.139	0.186	0.315	0.511	0.776	1.23	1.97	3.28	5.35	6.89	0.97
			K_v	0.120	0.161	0.272	0.442	0.671	1.07	1.70	2.84	4.63	5.96	- - -
			X_T	0.78	0.71	0.59	0.59	0.58	0.51	0.57	0.51	0.67	0.81	- - -
			F_d	0.08	0.08	0.10	0.13	0.16	0.20	0.26	0.33	0.47	0.59	- - -
	9.5	20	C_v	0.133	0.222	0.347	0.501	0.699	1.04	1.50	2.15	2.98	3.57	0.95
			K_v	0.115	0.192	0.300	0.433	0.605	0.900	1.29	1.86	2.58	3.09	- - -
			X_T	0.77	0.68	0.65	0.61	0.55	0.55	0.58	0.55	0.59	0.68	- - -
			F_d	0.11	0.13	0.16	0.19	0.22	0.28	0.34	0.44	0.58	0.80	- - -
	9.5(2)	20	C_v	0.127	0.149	0.176	0.222	0.311	0.440	0.599	0.828	1.14	1.65	0.95
			K_v	0.110	0.129	0.152	0.192	0.269	0.381	0.518	0.716	0.986	1.43	- - -
			X_T	0.311	0.892	0.755	0.681	0.641	0.618	0.595	0.576	0.582	0.543	- - -
			F_d	0.09	0.09	0.09	0.11	0.13	0.14	0.20	0.24	0.28	0.35	- - -
DN 40 (NPS 1-1/2)	36	20	C_v	1.01	1.91	2.74	4.24	6.13	8.25	11.5	16.7	22.0	27.2	0.94
			K_v	0.874	1.65	2.37	3.67	5.30	7.14	9.95	14.4	19.0	23.5	- - -
			X_T	0.87	0.93	0.91	0.80	0.89	0.86	0.76	0.79	0.82	0.78	- - -
			F_d	0.64	0.80	0.87	0.54	0.55	0.50	0.41	0.40	0.43	0.45	- - -
	22	20	C_v	0.591	0.850	1.20	1.79	2.51	3.50	4.93	7.07	11.0	14.3	0.93
			K_v	0.511	0.735	1.04	1.55	2.17	3.03	4.26	6.12	9.52	12.4	- - -
			X_T	0.53	0.51	0.53	0.45	0.45	0.49	0.42	0.47	0.57	0.71	- - -
			F_d	0.09	0.11	0.13	0.15	0.18	0.21	0.25	0.31	0.39	0.49	- - -
	14	20	C_v	0.103	0.141	0.254	0.440	0.689	1.11	1.84	3.12	5.12	6.87	0.97
			K_v	0.0891	0.122	0.220	0.381	0.596	0.960	1.59	2.70	4.43	5.94	- - -
			X_T	1.00	0.80	0.68	0.67	0.60	0.54	0.55	0.52	0.64	0.77	- - -
			F_d	0.08	0.08	0.10	0.13	0.16	0.20	0.26	0.33	0.47	0.59	- - -
DN 50 (NPS 2)	46	20	C_v	1.08	1.75	3.75	6.04	9.5	14.9	21.8	30.9	37.7	43.7	0.91
			K_v	0.931	1.51	3.24	5.22	8.20	12.9	18.9	26.7	32.6	37.8	- - -
			X_T	0.73	0.70	0.79	0.81	0.78	0.81	0.76	0.71	0.82	0.85	- - -
			F_d	0.70	0.84	0.47	0.48	0.40	0.36	0.37	0.40	0.43	0.45	- - -
	36	20	C_v	1.08	2.01	2.80	4.26	6.31	8.38	11.6	17.2	23.1	28.6	0.93
			K_v	0.931	1.74	2.42	3.69	5.45	7.25	10.0	14.9	20.0	24.7	- - -
			X_T	0.71	0.79	0.86	0.81	0.79	0.79	0.73	0.69	0.75	0.75	- - -
			F_d	0.64	0.80	0.87	0.54	0.55	0.50	0.41	0.40	0.43	0.45	- - -
	22	20	C_v	0.591	0.850	1.20	1.79	2.51	3.50	4.93	7.07	11.0	14.3	0.96
			K_v	0.511	0.735	1.04	1.55	2.17	3.03	4.26	6.12	9.52	12.4	- - -
			X_T	0.71	0.68	0.61	0.62	0.60	0.60	0.57	0.45	0.60	0.71	- - -
			F_d	0.09	0.11	0.13	0.15	0.18	0.21	0.25	0.31	0.39	0.49	- - -

1. At 100% travel.
2. Restricted trim.
3. Balanced trim.
4. Balanced, restricted trim.

-continued-

Equal Percentage - Flow Up

Equal Percentage Characteristic

Valve Size	Port Diameter	Maximum Travel	Flow Coeffi- cient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	mm		10	20	30	40	50	60	70	80	90	100	
DN 80 (NPS 3)	70	40	C_v	2.38	6.92	11.5	16.4	22.4	31.9	46.5	63.6	80.6	95.1	0.94
			K_v	2.06	5.99	9.95	14.2	19.4	27.6	40.2	55.0	69.7	82.3	- - -
			X_T	0.83	0.81	0.85	0.83	0.80	0.76	0.72	0.75	0.77	0.80	- - -
			F_d	0.82	0.50	0.53	0.53	0.47	0.42	0.40	0.40	0.43	0.45	- - -
	70(3)	20	C_v	2.71	4.63	7.60	11.3	17.1	23.7	35.3	50.4	61.6	75.7	0.89
			K_v	2.34	4.00	6.57	9.79	14.7	20.5	30.5	43.6	53.3	65.5	- - -
			X_T	0.54	0.50	0.49	0.51	0.51	0.57	0.51	0.50	0.64	0.68	- - -
			F_d	0.06	0.07	0.10	0.12	0.15	0.18	0.22	0.26	0.30	0.34	- - -
	46	20	C_v	0.873	1.66	3.41	5.66	8.75	13.8	20.7	30.5	37.1	43.7	0.97
			K_v	0.755	1.44	2.95	4.90	7.57	11.9	17.9	26.4	32.1	37.8	- - -
			X_T	0.75	0.82	0.75	0.82	0.77	0.73	0.78	0.70	0.85	0.88	- - -
			F_d	0.70	0.84	0.47	0.48	0.40	0.36	0.37	0.40	0.43	0.45	- - -
	36	20	C_v	1.08	2.01	2.80	4.26	6.31	8.38	11.6	17.2	23.1	28.6	0.96
			K_v	0.934	1.74	2.42	3.68	5.46	7.25	10.0	14.9	20.0	24.7	- - -
			X_T	0.84	0.86	0.88	0.84	0.83	0.88	0.79	0.72	0.76	0.85	- - -
			F_d	0.64	0.80	0.87	0.54	0.55	0.50	0.41	0.40	0.43	0.45	- - -
DN 100 (NPS 4)	90	40	C_v	5.56	13.6	21.1	29.1	40.8	55.8	77.5	117	145	165	0.90
			K_v	4.81	11.7	18.3	25.1	35.3	48.3	67.0	101	126	143	- - -
			X_T	0.93	0.93	0.94	0.90	0.85	0.82	0.82	0.75	0.78	0.80	- - -
			F_d	0.39	0.49	0.52	0.48	0.45	0.44	0.33	0.36	0.39	0.41	- - -
	90(3)	20	C_v	5.88	9.43	13.1	17.5	27.3	42.4	63.4	85.5	107	128	0.87
			K_v	5.09	8.16	11.3	15.1	23.6	36.7	54.8	74.0	92.6	111	- - -
			X_T	0.55	0.54	0.54	0.55	0.43	0.52	0.57	0.58	0.63	0.67	- - -
			F_d	0.07	0.08	0.10	0.11	0.13	0.18	0.22	0.26	0.30	0.34	- - -
	90(4)	20	C_v	2.38	3.65	5.64	8.42	12.0	17.4	24.8	36.7	53.0	68.5	0.90
			K_v	2.06	3.16	4.88	7.28	10.4	15.1	21.5	31.7	45.8	59.3	- - -
			X_T	0.68	0.61	0.57	0.55	0.55	0.55	0.56	0.48	0.50	0.58	- - -
			F_d	0.04	0.05	0.06	0.08	0.09	0.11	0.14	0.16	0.20	0.24	- - -
	70	40	C_v	2.04	5.78	10.6	15.3	20.8	29.8	43.3	61.9	80.6	97.7	0.92
			K_v	1.76	5.00	9.17	13.2	18.0	25.8	37.5	53.5	69.7	84.5	- - -
			X_T	0.79	0.83	0.85	0.85	0.82	0.77	0.73	0.73	0.75	0.76	- - -
			F_d	0.82	0.50	0.53	0.53	0.47	0.42	0.40	0.40	0.43	0.45	- - -
	46	20	C_v	1.02	1.76	3.58	5.76	8.85	14.1	21.4	30.6	37.9	44.0	0.94
			K_v	0.88	1.52	3.10	4.98	7.66	12.2	18.5	26.5	32.8	38.1	- - -
			X_T	0.69	0.77	0.68	0.81	0.76	0.71	0.72	0.67	0.75	0.79	- - -
			F_d	0.70	0.84	0.47	0.48	0.40	0.36	0.37	0.40	0.43	0.45	- - -

1. At 100% travel.
2. Restricted trim.
3. Balanced trim.
4. Balanced, restricted trim.

-continued-

Equal Percentage - Flow Up

Equal Percentage Characteristic

Valve Size	Port Diameter	Maximum Travel	Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	mm		10	20	30	40	50	60	70	80	90	100	
DN 150 (NPS 6)	136	60	C_v	13.8	25.0	40.0	60.0	90.0	139	201	271	344	401	0.88
			K_v	11.9	21.6	34.6	51.9	77.9	120	174	234	298	347	- - -
			X_T	0.73	0.82	0.82	0.81	0.79	0.70	0.67	0.67	0.54	0.71	- - -
			F_d	0.45	0.39	0.33	0.28	0.24	0.22	0.20	0.18	0.17	0.16	- - -
	136(3)	60	C_v	19.5	35.0	49.0	65.0	92.0	133	194	252	322	374	0.90
			K_v	16.9	30.3	42.4	56.2	79.6	115	168	218	279	324	- - -
			X_T	0.58	0.51	0.55	0.56	0.58	0.55	0.53	0.66	0.72	0.76	- - -
			F_d	0.09	0.10	0.11	0.13	0.16	0.19	0.22	0.27	0.32	0.37	- - -
	90(2)	40	C_v	7.90	16.0	23.0	33.0	45.0	60.0	81.0	126	159	192	0.95
			K_v	6.83	13.8	19.9	28.5	38.9	51.9	70.1	109	138	166	- - -
			X_T	0.68	0.80	0.85	0.77	0.78	0.78	0.83	0.70	0.76	0.75	- - -
			F_d	0.39	0.49	0.52	0.48	0.45	0.44	0.33	0.36	0.39	0.41	- - -

1. At 100% travel.
2. Restricted trim.
3. Balanced trim.
4. Balanced, restricted trim.

Linear - Flow Up

Linear Characteristic

Valve Size	Port Diameter	Maximum Travel	Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	mm		10	20	30	40	50	60	70	80	90	100	
DN 15 (NPS 1/2)	9.5	20	C_v	0.179	0.415	0.713	1.03	1.35	1.70	2.09	2.53	3.01	3.45	0.93
			K_v	0.155	0.359	0.617	0.891	1.17	1.47	1.81	2.19	2.60	2.98	- - -
			X_T	0.55	0.57	0.64	0.63	0.67	0.68	0.71	0.67	0.71	0.71	- - -
			F_d	0.12	0.18	0.24	0.29	0.34	0.39	0.45	0.53	0.65	0.80	- - -
	4.8(4) 9°30'	20	C_v	0.0360	0.0880	0.160	0.246	0.341	0.436	0.524	0.618	0.726	0.785	0.94
			K_v	0.0311	0.0761	0.138	0.213	0.295	0.377	0.453	0.535	0.628	0.679	- - -
			X_T	0.52	0.55	0.50	0.50	0.53	0.50	0.52	0.53	0.49	0.55	- - -
			F_d	0.09	0.09	0.09	0.11	0.13	0.14	0.20	0.24	0.28	0.35	- - -
	4.8(4) 4°39'	20	C_v	0.0356	0.0524	0.0736	0.0984	0.127	0.158	0.191	0.224	0.257	0.294	0.93
			K_v	0.0308	0.0453	0.0637	0.0851	0.110	0.137	0.165	0.194	0.222	0.254	- - -
			X_T	0.55	0.54	0.57	0.58	0.57	0.55	0.55	0.56	0.57	0.55	- - -
			F_d	0.08	0.10	0.13	0.15	0.17	0.19	0.22	0.24	0.26	0.28	- - -
	4.8(4) 2°15'	20	C_v	0.0437	0.0512	0.0597	0.0694	0.0806	0.0929	0.105	0.116	0.126	0.139	0.86
			K_v	0.0378	0.0443	0.0516	0.0600	0.0697	0.0804	0.0908	0.100	0.109	0.120	- - -
			X_T	0.54	0.54	0.54	0.54	0.54	0.53	0.54	0.56	0.57	0.56	- - -
			F_d	0.08	0.08	0.09	0.11	0.12	0.13	0.14	0.15	0.16	0.17	- - -
	4.8(4) 1°8'	20	C_v	0.0037	0.0055	0.0085	0.0121	0.0163	0.0205	0.0246	0.0284	0.0326	0.0389	0.97
			K_v	0.0032	0.0047	0.0073	0.0105	0.0141	0.0177	0.0213	0.0246	0.0282	0.0336	- - -
			X_T	1.00	0.94	0.81	0.76	0.69	0.64	0.60	0.59	0.60	0.58	- - -
			F_d	0.05	0.06	0.06	0.07	0.07	0.08	0.09	0.09	0.10	0.11	- - -
DN 20 (NPS 3/4)	14	20	C_v	0.775	1.57	2.38	3.10	3.79	4.51	5.34	6.23	7.05	7.58	0.97
			K_v	0.670	1.36	2.06	2.68	3.28	3.90	4.62	5.39	6.10	6.55	- - -
			X_T	0.62	0.59	0.62	0.61	0.62	0.64	0.65	0.70	0.73	0.72	- - -
			F_d	0.16	0.24	0.30	0.35	0.39	0.45	0.52	0.60	0.71	0.79	- - -
	9.5	20	C_v	0.219	0.488	0.794	1.13	1.48	1.85	2.31	2.85	3.43	3.84	0.95
			K_v	0.190	0.422	0.687	0.981	1.28	1.60	2.00	2.47	2.96	3.33	- - -
			X_T	0.57	0.59	0.57	0.57	0.54	0.55	0.54	0.52	0.58	0.59	- - -
			F_d	0.12	0.18	0.24	0.29	0.34	0.39	0.45	0.53	0.65	0.80	- - -
	4.8(4) 9°30'	20	C_v	0.0360	0.0880	0.160	0.246	0.341	0.436	0.524	0.618	0.726	0.785	0.94
			K_v	0.0311	0.0761	0.138	0.213	0.295	0.377	0.453	0.535	0.628	0.679	- - -
			X_T	0.52	0.55	0.50	0.50	0.53	0.50	0.52	0.53	0.49	0.55	- - -
			F_d	0.10	0.15	0.19	0.24	0.29	0.33	0.38	0.42	0.47	0.51	- - -
	4.8(4) 4°39'	20	C_v	0.0356	0.0524	0.0736	0.0984	0.127	0.158	0.191	0.224	0.257	0.294	0.93
			K_v	0.0308	0.0453	0.0637	0.0851	0.110	0.137	0.165	0.194	0.222	0.254	- - -
			X_T	0.55	0.54	0.57	0.58	0.57	0.55	0.55	0.56	0.57	0.55	- - -
			F_d	0.08	0.10	0.13	0.15	0.17	0.19	0.22	0.24	0.26	0.28	- - -
	4.8(4) 2°15'	20	C_v	0.0437	0.0512	0.0597	0.0694	0.0806	0.0929	0.105	0.116	0.126	0.139	0.86
			K_v	0.0378	0.0443	0.0516	0.0600	0.0697	0.0804	0.0908	0.100	0.109	0.120	- - -
			X_T	0.54	0.54	0.54	0.54	0.54	0.53	0.54	0.56	0.57	0.56	- - -
			F_d	0.08	0.08	0.09	0.11	0.12	0.13	0.14	0.15	0.16	0.17	- - -
	4.8(4) 1°8'	20	C_v	0.0037	0.0055	0.0085	0.0121	0.0163	0.0205	0.0246	0.0284	0.0326	0.0389	0.97
			K_v	0.0032	0.0047	0.0073	0.0105	0.0141	0.0177	0.0213	0.0246	0.0282	0.0336	- - -
			X_T	1.00	0.94	0.81	0.76	0.69	0.64	0.60	0.59	0.60	0.58	- - -
			F_d	0.05	0.06	0.06	0.07	0.07	0.08	0.09	0.09	0.10	0.11	- - -

1. At 100% travel.
2. Balanced trim.
3. Balanced, restricted trim.
4. Micro-Flow trim.

-continued-

Linear - Flow Up

Linear Characteristic

Valve Size	Port Diameter	Maximum Travel	Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	mm		10	20	30	40	50	60	70	80	90	100	
DN 25 (NPS 1)	22	20	C_v	1.72	3.06	4.50	7.04	8.52	9.74	11.1	12.7	14.6	15.5	0.94
			K_v	1.49	2.64	3.90	6.09	7.37	8.43	9.58	10.9	12.6	13.4	- - -
			X_T	0.51	0.58	0.60	0.44	0.47	0.52	0.56	0.68	0.74	0.80	- - -
			F_d	0.14	0.19	0.24	0.29	0.33	0.37	0.42	0.46	0.53	0.61	- - -
	14	20	C_v	0.685	1.46	2.28	3.05	3.81	4.56	5.42	6.34	7.21	7.80	0.96
			K_v	0.592	1.26	1.97	2.64	3.29	3.95	4.69	5.48	6.24	6.75	- - -
			X_T	0.73	0.64	0.62	0.60	0.59	0.59	0.60	0.63	0.67	0.66	- - -
			F_d	0.16	0.24	0.30	0.35	0.39	0.45	0.52	0.60	0.71	0.79	- - -
	9.5	20	C_v	0.187	0.453	0.769	1.10	1.42	1.79	2.22	2.73	3.29	3.70	0.94
			K_v	0.161	0.392	0.665	0.952	1.23	1.55	1.92	2.36	2.85	3.20	- - -
			X_T	0.59	0.56	0.55	0.53	0.58	0.57	0.60	0.58	0.63	0.63	- - -
			F_d	0.12	0.18	0.24	0.29	0.34	0.39	0.45	0.53	0.65	0.80	- - -
	4.8(4) 9°30'	20	C_v	0.0360	0.0880	0.160	0.246	0.341	0.436	0.524	0.618	0.726	0.785	0.94
			K_v	0.0311	0.0761	0.138	0.213	0.295	0.377	0.453	0.535	0.628	0.679	- - -
			X_T	0.52	0.55	0.50	0.50	0.53	0.50	0.52	0.53	0.49	0.55	- - -
			F_d	0.10	0.15	0.19	0.24	0.29	0.33	0.38	0.42	0.47	0.51	- - -
	4.8(4) 4°39'	20	C_v	0.0356	0.0524	0.0736	0.0984	0.127	0.158	0.191	0.224	0.257	0.294	0.93
			K_v	0.0308	0.0453	0.0637	0.0851	0.110	0.137	0.165	0.194	0.222	0.254	- - -
			X_T	0.55	0.54	0.57	0.58	0.57	0.55	0.55	0.56	0.57	0.55	- - -
			F_d	0.08	0.10	0.13	0.15	0.17	0.19	0.22	0.24	0.26	0.28	- - -
	4.8(4) 2°15'	20	C_v	0.0437	0.0512	0.0597	0.0694	0.0806	0.0929	0.105	0.116	0.126	0.139	0.86
			K_v	0.0378	0.0443	0.0516	0.0600	0.0697	0.0804	0.0908	0.100	0.109	0.120	- - -
			X_T	0.54	0.54	0.54	0.54	0.54	0.53	0.54	0.56	0.57	0.56	- - -
			F_d	0.08	0.08	0.09	0.11	0.12	0.13	0.14	0.15	0.16	0.17	- - -
	4.8(4) 1°8'	20	C_v	0.0037	0.0055	0.0085	0.0121	0.0163	0.0205	0.0246	0.0284	0.0326	0.0389	0.97
			K_v	0.0032	0.0047	0.0073	0.0105	0.0141	0.0177	0.0213	0.0246	0.0282	0.0336	- - -
			X_T	1.00	0.94	0.81	0.76	0.69	0.64	0.60	0.59	0.60	0.58	- - -
			F_d	0.05	0.06	0.06	0.07	0.07	0.08	0.09	0.09	0.10	0.11	- - -
DN 40 (NPS 1-1/2)	36	20	C_v	1.18	4.50	7.46	11.0	14.1	16.8	20.3	24.4	28.8	32.0	0.93
			K_v	1.02	3.89	6.45	9.5	12.2	14.5	17.6	21.1	24.9	27.7	- - -
			X_T	0.88	0.75	0.88	0.82	0.80	0.88	0.85	0.80	0.78	0.78	- - -
			F_d	0.30	0.42	0.47	0.49	0.51	0.52	0.50	0.48	0.47	0.48	- - -
	22	20	C_v	1.41	2.76	4.20	5.76	7.32	8.85	10.5	12.9	15.1	17.2	0.95
			K_v	1.22	2.39	3.63	4.98	6.33	7.66	9.08	11.2	13.1	14.9	- - -
			X_T	0.68	0.58	0.58	0.59	0.58	0.59	0.65	0.60	0.68	0.75	- - -
			F_d	0.08	0.10	0.13	0.15	0.17	0.19	0.22	0.24	0.26	0.28	- - -
	14	20	C_v	0.676	1.55	2.27	3.03	3.77	4.55	5.44	6.47	7.36	8.25	0.96
			K_v	0.585	1.34	1.96	2.62	3.26	3.94	4.71	5.60	6.37	7.14	- - -
			X_T	0.58	0.50	0.59	0.62	0.59	0.58	0.60	0.63	0.67	0.64	- - -
			F_d	0.08	0.08	0.09	0.11	0.12	0.13	0.14	0.15	0.16	0.17	- - -

1. At 100% travel.
2. Balanced trim.
3. Balanced, restricted trim.
4. Micro-Flow trim.

-continued-

Linear - Flow Up

Linear Characteristic

Valve Size	Port Diameter	Maximum Travel	Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	mm		10	20	30	40	50	60	70	80	90	100	
DN 50 (NPS 2)	46	20	C_v	2.90	7.53	12.6	17.5	22.1	27.8	34.1	41.6	45.7	48.6	0.91
			K_v	2.51	6.51	10.9	15.1	19.1	24.0	29.5	36.0	39.5	42.0	- - -
			X_T	0.71	0.87	0.81	0.87	0.85	0.82	0.79	0.82	0.85	0.84	- - -
			F_d	0.25	0.36	0.42	0.46	0.47	0.46	0.46	0.47	0.48	0.50	- - -
	36	20	C_v	1.69	5.05	8.37	11.6	14.8	17.9	20.9	24.7	29.2	33.9	0.93
			K_v	1.47	4.37	7.24	10.0	12.8	15.5	18.0	21.3	25.3	29.3	- - -
			X_T	0.73	0.76	0.84	0.81	0.82	0.84	0.87	0.85	0.84	0.82	- - -
			F_d	0.30	0.42	0.47	0.49	0.51	0.52	0.50	0.48	0.47	0.48	- - -
	22	20	C_v	1.58	3.01	4.51	6.02	7.63	9.10	10.9	13.1	15.1	17.2	0.93
			K_v	1.37	2.60	3.90	5.21	6.60	7.87	9.40	11.3	13.0	14.9	- - -
			X_T	0.66	0.62	0.62	0.61	0.61	0.60	0.58	0.55	0.62	0.68	- - -
			F_d	0.08	0.10	0.13	0.15	0.17	0.19	0.22	0.24	0.26	0.28	- - -
DN 80 (NPS 3)	70	40	C_v	9.74	20.9	32.9	46.2	59.6	74.3	87.5	97.2	109	117	0.89
			K_v	8.43	18.1	28.5	40.0	51.6	64.3	75.7	84.1	94.3	101	- - -
			X_T	0.62	0.85	0.83	0.81	0.81	0.81	0.81	0.85	0.80	0.77	- - -
			F_d	0.33	0.43	0.47	0.48	0.49	0.50	0.50	0.51	0.51	0.51	- - -
	70(2)	20	C_v	10.6	21.3	31.9	42.7	53.6	63.8	74.1	85.0	94.4	102	0.85
			K_v	9.17	18.4	27.6	36.9	46.4	55.2	64.1	73.5	81.7	88.2	- - -
			X_T	0.67	0.68	0.66	0.65	0.64	0.67	0.66	0.63	0.63	0.65	- - -
			F_d	0.12	0.17	0.21	0.25	0.28	0.31	0.34	0.36	0.39	0.41	- - -
	46	20	C_v	2.09	7.74	12.0	16.5	21.2	26.6	33.0	40.6	46.5	51.8	0.97
			K_v	1.81	6.70	10.4	14.3	18.3	23.0	28.5	35.1	40.2	44.8	- - -
			X_T	0.65	0.62	0.79	0.85	0.88	0.85	0.88	0.83	0.88	0.90	- - -
			F_d	0.25	0.36	0.42	0.46	0.47	0.46	0.46	0.47	0.48	0.50	- - -
	36	20	C_v	1.17	4.87	7.76	11.1	14.3	17.3	19.3	23.2	27.8	33.3	0.97
			K_v	1.01	4.21	6.71	9.58	12.4	14.9	16.7	20.1	24.1	28.8	- - -
			X_T	0.74	0.59	0.81	0.80	0.82	0.83	0.94	0.96	0.93	0.87	- - -
			F_d	0.30	0.42	0.47	0.49	0.51	0.52	0.50	0.48	0.47	0.48	- - -
DN 100 (NPS 4)	90	40	C_v	18.2	39.6	59.0	82.4	104	124	141	156	171	184	0.91
			K_v	15.8	34.3	51.0	71.3	90.0	108	122	135	147	159	- - -
			X_T	0.78	0.84	0.90	0.85	0.86	0.91	0.91	0.90	0.85	0.82	- - -
			F_d	0.26	0.36	0.41	0.43	0.45	0.46	0.47	0.48	0.48	0.48	- - -
	90(2)	20	C_v	12.3	28.5	44.6	60.2	77.6	95.4	112	130	143	151	0.82
			K_v	10.6	24.7	38.6	52.1	67.1	82.5	96.9	112	124	131	- - -
			X_T	0.71	0.65	0.58	0.67	0.59	0.57	0.58	0.61	0.59	0.64	- - -
			F_d	0.11	0.16	0.20	0.23	0.27	0.29	0.31	0.34	0.36	0.39	- - -
	90(3)	20	C_v	5.99	13.6	22.3	31.5	40.4	49.6	59.2	69.0	79.6	92.3	0.82
			K_v	5.18	11.8	19.3	27.2	34.9	42.9	51.2	59.7	68.9	79.8	- - -
			X_T	0.60	0.59	0.61	0.58	0.59	0.62	0.59	0.58	0.57	0.52	- - -
			F_d	0.07	0.11	0.14	0.16	0.18	0.20	0.22	0.24	0.25	0.27	- - -
	70	40	C_v	9.04	22.1	33.8	47.0	60.8	76.9	92.0	107	119	128	0.94
			K_v	7.82	19.1	29.2	40.7	52.6	66.5	79.6	92.6	103	111	- - -
			X_T	0.80	0.82	0.84	0.83	0.81	0.80	0.79	0.81	0.81	0.82	- - -
			F_d	0.33	0.43	0.47	0.48	0.49	0.50	0.50	0.51	0.51	0.51	- - -
	46	20	C_v	2.37	7.98	13.1	17.3	21.9	27.1	33.2	40.3	46.8	52.2	0.96
			K_v	2.05	6.90	11.3	15.0	19.0	23.5	28.7	34.8	40.5	45.2	- - -
			X_T	0.70	0.70	0.78	0.88	0.90	0.88	0.85	0.83	0.83	0.83	- - -
			F_d	0.25	0.36	0.42	0.46	0.47	0.46	0.46	0.47	0.48	0.50	- - -

1. At 100% travel.
2. Balanced trim.
3. Balanced, restricted trim.
4. Micro-Flow trim.

-continued-

Linear - Flow Up

Linear Characteristic

Valve Size	Port Diameter	Maximum Travel	Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	mm		10	20	30	40	50	60	70	80	90	100	
DN 150 (NPS 6)	136	60	C_v	48.9	83.0	114	144	179	212	248	308	370	413	0.87
			K_v	42.3	71.8	98.6	125	155	183	215	266	320	357	- - -
			X_T	0.69	0.79	0.82	0.81	0.70	0.70	0.71	0.65	0.65	0.70	- - -
			F_d	0.29	0.27	0.24	0.22	0.20	0.19	0.17	0.16	0.15	0.14	- - -
	136(2)	60	C_v	59.0	105	153	203	249	301	334	362	375	391	0.90
			K_v	51.0	90.8	132	176	215	260	289	313	324	338	- - -
			X_T	0.55	0.64	0.63	0.63	0.65	0.66	0.72	0.72	0.78	0.80	- - -
			F_d	0.13	0.19	0.23	0.27	0.32	0.36	0.40	0.43	0.47	0.50	- - -
	90(3)	40	C_v	22.1	46.0	65.0	88.0	111	136	160	187	209	233	0.91
			K_v	19.1	39.8	56.2	76.1	96.0	118	138	162	181	202	- - -
			X_T	0.67	0.72	0.85	0.84	0.85	0.84	0.85	0.81	0.82	0.83	- - -
			F_d	0.26	0.36	0.41	0.43	0.45	0.46	0.47	0.48	0.48	0.48	- - -

1. At 100% travel.
2. Balanced trim.
3. Restricted trim.
4. Micro-Flow trim.

Whisper Trim III- Flow Up

Linear Characteristic

Valve Size	Port Diameter	Maximum Travel	Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	mm		10	20	30	40	50	60	70	80	90	100	
DN 80 (NPS 3) Level A1	70	40	C_v	2.2	11.2	22.4	31.6	40.4	51.2	60.2	68.5	76.9	85.5	0.818
			K_v	1.9	9.7	19.4	27.3	34.9	44.3	52.1	59.3	66.5	74.0	- - -
			X_T	0.861	0.714	0.584	0.600	0.589	0.572	0.590	0.616	0.637	0.646	- - -
			F_d	0.431	0.176	0.131	0.110	0.096	0.085	0.078	0.072	0.067	0.063	- - -
DN 100 (NPS 4) Level A1	90	40	C_v	2.6	14.0	29.1	41.5	53.6	67.9	81.3	93.8	107	119	0.785
			K_v	2.2	12.1	25.2	35.9	46.4	58.7	70.3	81.1	92.6	103	- - -
			X_T	0.870	0.726	0.573	0.561	0.558	0.533	0.537	0.548	0.581	0.602	- - -
			F_d	0.379	0.155	0.115	0.097	0.084	0.075	0.069	0.063	0.059	0.055	- - -
	70(2)	40	C_v	2.2	11.2	22.4	31.6	40.4	51.2	60.2	68.5	76.9	85.5	0.818
			K_v	1.9	9.7	19.4	27.3	34.9	44.3	52.1	59.3	66.5	74.0	- - -
			X_T	0.861	0.714	0.584	0.600	0.589	0.572	0.590	0.616	0.637	0.646	- - -
			F_d	0.431	0.176	0.131	0.110	0.096	0.085	0.078	0.072	0.067	0.063	- - -
DN 150 (NPS 6) Level A1	136	60	C_v	53.8	89	124	166	201	233	263	296	315	324	0.809
			K_v	46.5	77	107	144	174	202	227	256	272	280	- - -
			X_T	0.540	0.559	0.557	0.517	0.534	0.550	0.566	0.564	0.594	0.659	- - -
			F_d	0.134	0.087	0.070	0.060	0.053	0.048	0.044	0.041	0.039	0.037	- - -
	90(2)	40	C_v	2.6	14.0	29.1	41.5	53.6	67.9	81.3	93.8	107	119	0.785
			K_v	2.2	12.1	25.2	35.9	46.4	58.7	70.3	81.1	92.6	103	- - -
			X_T	0.870	0.726	0.573	0.561	0.558	0.533	0.537	0.548	0.581	0.602	- - -
			F_d	0.379	0.155	0.115	0.097	0.084	0.075	0.069	0.063	0.059	0.055	- - -

1. At 100% travel.
2. Unbalanced, restricted trim.

EMERSON

Cavitrol™ III, Flow Down

Linear Characteristic

Trim Stage	Valve Size	Port Diameter	Maximum Travel	Flow Coefficient	Minimum Throttling C_V(1)	Valve Opening—Percent of Total Travel										F_L(2)
		mm	mm			10	20	30	40	50	60	70	80	90	100	
One Stage	DN 25 (NPS 1)	22	20	C_V	0.4	0.4	1.1	2.0	2.9	3.7	4.6	5.2	5.9	6.5	7.1	0.97
				K_V	0.346	0.346	0.952	1.73	2.51	3.20	3.98	4.50	5.10	5.62	6.14	- - -
	DN 40 (NPS 1-1/2)	36	20	C_V	1.1	0.4	1.7	4.2	6.6	9.2	11.2	13.6	15.6	17.5	19.4	0.97
				K_V	0.952	0.346	1.47	3.63	5.71	7.96	9.69	11.8	13.5	15.1	16.8	- - -
	DN 50 (NPS 2)	46	20	C_V	2.0	0.8	3.2	5.9	9.1	12.6	15.3	17.8	20.4	22.8	25.2	0.95
				K_V	1.73	0.692	2.77	5.10	7.87	10.9	13.2	15.4	17.6	19.7	21.8	- - -

1. Valves should not be required to throttle at a C_V less than the specified minimum C_V for an extended period. Erosion damage to the valve seats may result.
2. At 100% travel.

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Side Port Common (SPC) Diverging

Linear Characteristic

Valve Size	Maximum Travel	Exit Port	Flow Coeffi-cient	Valve Opening—Percent of Total Travel											F_L(1)
	mm			0 (Plug Down)	10	20	30	40	50	60	70	80	90	100 (Plug Up)	
DN25/ NPS 1	19	Right	Cv	16.1	15.0	14.2	13.5	12.6	11.1	9.35	7.21	5.27	2.89	0	0.919
			Kv	14.0	13.0	12.3	11.7	10.9	9.56	8.09	6.23	4.56	2.50	0	---
			Xt	0.615	0.543	0.427	0.308	0.250	0.226	0.203	0.148	0.119	0.097	0	---
		Bottom	Cv	0	0.897	2.43	4.29	6.06	7.81	9.78	11.6	13.3	15.0	15.6	0.951
			Kv	0	0.776	2.10	3.71	5.25	6.75	8.46	10.0	11.5	13.0	13.5	---
			Xt	0	0.899	0.687	0.654	0.698	0.673	0.622	0.700	0.706	0.702	0.758	---
DN40/ NPS 1-1/2	19	Right	Cv	25.4	22.4	20.5	17.7	15.8	14.2	11.9	9.27	6.93	4.09	0	0.991
			Kv	22.0	19.4	17.7	15.3	13.7	12.3	10.3	8.01	6.00	3.54	0	---
			Xt	0.831	0.882	0.741	0.697	0.565	0.501	0.450	0.389	0.341	0.285	0	---
		Bottom	Cv	0	2.33	4.45	7.45	10.6	13.6	16.9	19.2	21.7	23.4	26.6	0.877
			Kv	0	2.01	3.84	6.45	9.18	11.8	14.6	16.6	18.8	20.2	23.0	---
			Xt	0	0.245	0.636	0.722	0.723	0.720	0.655	0.685	0.705	0.843	0.803	---
DN50/ NPS 2	19	Right	Cv	43.9	40.2	35.8	31.1	26.5	23.1	18.7	15.1	11.1	6.78	0	0.973
			Kv	38.0	34.7	30.9	26.9	22.9	20.0	16.2	13.1	9.63	5.87	0	---
			Xt	0.864	0.817	0.767	0.656	0.598	0.533	0.536	0.429	0.333	0.215	0	---
		Bottom	Cv	0	2.66	7.61	13.2	18.1	23.5	29.3	34.9	41.6	48.1	52.2	0.831
			Kv	0	2.30	6.58	11.4	15.6	20.3	25.4	30.2	36.0	41.6	45.1	---
			Xt	0	0.614	0.651	0.649	0.651	0.627	0.609	0.599	0.588	0.600	0.640	---
DN80/ NPS 3	38	Right	Cv	92.8	85.2	70.3	57.6	47.5	39.2	31.6	25.1	19.7	13.8	0	1.000
			Kv	80.3	73.7	60.8	49.8	41.1	33.9	27.3	21.8	17.0	11.9	0	---
			Xt	0.858	0.989	0.976	0.934	0.896	0.864	0.789	0.682	0.540	0.306	0	---
		Bottom	Cv	0	9.03	20.4	30.3	41.0	52.1	60.1	69.1	79.4	90.6	101.9	0.839
			Kv	0	7.81	17.7	26.2	35.4	45.1	52.0	59.8	68.7	78.3	88.1	---
			Xt	0	0.557	0.695	0.814	0.795	0.790	0.876	0.929	0.937	0.932	0.855	---
DN100/ NPS 4	38	Right	Cv	145.4	137.4	119.9	100.6	81.6	68.3	57.6	45.5	33.9	21.1	0	0.942
			Kv	125.8	118.9	103.7	87.0	70.6	59.1	49.9	39.4	29.3	18.2	0	---
			Xt	0.984	0.956	0.975	0.828	0.817	0.810	0.705	0.601	0.475	0.322	0	---
		Bottom	Cv	0	15.0	37.7	58.7	79.9	99.3	122.3	143.7	166.0	189.3	216.4	0.818
			Kv	0	13.0	32.6	50.8	69.1	85.9	105.8	124.3	143.6	163.8	187.2	---
			Xt	0	0.587	0.659	0.764	0.798	0.840	0.887	0.880	0.869	0.810	0.640	---

1. At maximum flow.

Side Port Common (SPC) Converging

Linear Characteristic

Valve Size	Maximum Travel	Inlet Port	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L(1)
	mm			0 (Plug Down)	10	20	30	40	50	60	70	80	90	100 (Plug Up)	
DN25/ NPS 1	19	Right	Cv	15.9	13.2	10.7	9.30	7.54	6.31	4.65	3.64	2.04	1.04	0	0.978
			Kv	13.7	11.4	9.28	8.04	6.52	5.46	4.02	3.15	1.77	0.898	0	---
			Xt	0.658	0.866	0.758	0.657	0.723	0.669	0.739	0.728	0.909	0.898	0	---
		Bottom	Cv	0	0.562	1.72	3.28	4.90	6.51	8.74	10.3	12.9	14.3	16.3	0.949
			Kv	0	0.486	1.49	2.84	4.24	5.63	7.56	8.89	11.1	12.4	14.1	---
			Xt	0	0.397	1.005	0.966	0.847	0.767	0.675	0.659	0.605	0.662	0.663	---
DN40/ NPS 1-1/2	19	Right	Cv	29.3	26.7	23.0	17.1	14.6	11.9	9.47	7.07	4.78	2.34	0	0.999
			Kv	25.3	23.1	19.9	14.8	12.6	10.3	8.19	6.12	4.13	2.03	0	---
			Xt	0.821	0.714	0.711	0.857	0.806	0.900	0.907	0.803	0.842	0.660	0	---
		Bottom	Cv	0	0.881	3.02	6.46	8.83	11.7	15.9	18.3	20.9	24.3	28.4	0.978
			Kv	0	0.762	2.61	5.58	7.64	10.1	13.7	15.8	18.1	21.1	24.5	---
			Xt	0	---	0.994	0.779	0.865	0.832	0.679	0.745	0.752	0.785	0.749	---
DN50/ NPS 2	19	Right	Cv	54.6	48.5	42.2	35.2	28.5	22.9	18.0	12.4	7.44	3.02	0	0.932
			Kv	47.2	42.0	36.5	30.4	24.6	19.8	15.6	10.7	6.43	2.61	0	---
			Xt	0.626	0.636	0.596	0.559	0.574	0.605	0.617	0.685	0.798	0.949	0	---
		Bottom	Cv	0	2.05	6.44	11.0	15.8	20.9	25.6	32.2	41.6	47.6	52.0	0.958
			Kv	0	1.78	5.57	9.50	13.7	18.1	22.2	27.9	36.0	41.2	45.0	---
			Xt	0	0.888	0.919	0.958	0.895	0.844	0.859	0.804	0.735	0.745	0.785	---
DN80/ NPS 3	38	Right	Cv	111.9	101.0	87.8	72.7	59.2	48.3	38.5	28.5	18.9	9.87	0	1.000
			Kv	96.8	87.4	75.9	62.9	51.2	41.8	33.3	24.7	16.4	8.53	0	---
			Xt	0.811	0.757	0.669	0.704	0.755	0.765	0.745	0.723	0.725	0.716	0	---
		Bottom	Cv	0	6.84	16.1	26.4	40.0	55.0	70.4	85.7	100.8	113.1	127.8	0.965
			Kv	0	5.91	13.9	22.8	34.6	47.6	60.9	74.1	87.2	97.8	110.6	---
			Xt	0	0.989	0.967	0.994	0.876	0.800	0.773	0.759	0.752	0.767	0.752	---
DN100/ NPS 4	38	Right	Cv	163.4	153.0	137.0	115.0	92.0	74.0	57.8	43.5	28.3	12.8	0	0.869
			Kv	141.4	132.3	118.5	99.4	79.6	64.0	50.0	37.7	24.5	11.1	0	---
			Xt	0.688	0.634	0.558	0.558	0.603	0.610	0.595	0.578	0.573	0.525	0	---
		Bottom	Cv	0	12.9	30.1	46.6	66.3	88.4	112.4	135.9	161.4	185.2	212.2	0.816
			Kv	0	11.2	26.0	40.3	57.3	76.4	97.2	117.5	139.7	160.2	183.6	---
			Xt	0	0.920	0.949	0.826	0.789	0.737	0.683	0.660	0.625	0.629	0.589	---

1. At maximum flow.

Bottom Port Common (BPC) Diverging

Linear Characteristic

Valve Size	Maximum Travel	Exit Port	Flow Coeffi-cient	Valve Opening—Percent of Total Travel											F_L(1)
	mm			0 (Plug Down)	10	20	30	40	50	60	70	80	90	100 (Plug Up)	
DN25/ NPS 1	19	Right	Cv	16.3	15.5	14.4	13.3	12.0	10.1	7.72	5.32	3.18	1.49	0	0.965
			Kv	14.1	13.4	12.5	11.5	10.4	8.70	6.68	4.61	2.75	1.29	0	---
			Xt	0.661	0.670	0.691	0.655	0.608	0.577	0.523	0.556	0.533	0.474	0	---
		Left	Cv	0	1.67	3.03	4.58	6.32	8.41	10.6	12.0	13.7	14.7	15.5	0.886
			Kv	0	1.45	2.62	3.96	5.46	7.27	9.18	10.4	11.9	12.8	13.4	---
			Xt	0	0.810	0.623	0.667	0.639	0.620	0.637	0.631	0.637	0.664	0.666	---
DN40/ NPS 1-1/2	19	Right	Cv	32.5	30.5	28.7	25.2	21.9	18.5	14.8	10.6	6.46	2.89	0	0.820
			Kv	28.1	26.4	24.8	21.8	18.9	16.0	12.8	9.16	5.58	2.50	0	---
			Xt	0.786	0.738	0.661	0.626	0.523	0.486	0.470	0.467	0.479	0.426	0	---
		Left	Cv	0	3.30	6.21	10.34	14.5	18.2	22.7	26.4	29.1	31.2	33.5	0.923
			Kv	0	2.85	5.37	8.94	12.56	15.7	19.7	22.9	25.1	27.0	29.0	---
			Xt	0	0.812	0.661	0.502	0.553	0.660	0.721	0.764	0.799	0.815	0.784	---
DN50/ NPS 2	19	Right	Cv	58.9	53.1	47.1	40.7	34.1	27.0	20.7	14.6	9.54	4.61	0	0.950
			Kv	50.9	45.9	40.7	35.2	29.5	23.4	17.9	12.6	8.26	3.99	0	---
			Xt	0.600	0.639	0.561	0.574	0.536	0.473	0.475	0.508	0.501	0.536	0	---
		Left	Cv	0	4.89	8.60	13.4	20.5	28.2	36.6	44.9	50.9	56.0	60.0	0.893
			Kv	0	4.23	7.43	11.6	17.8	24.4	31.7	38.8	44.0	48.4	51.9	---
			Xt	0	0.553	0.674	0.610	0.575	0.599	0.598	0.607	0.632	0.647	0.619	---
DN80/ NPS 3	38	Right	Cv	155.9	151.9	139.6	126.6	108.8	90.8	69.0	49.0	30.8	15.1	0	0.935
			Kv	134.9	131.4	120.7	109.5	94.1	78.5	59.7	42.4	26.6	13.1	0	---
			Xt	0.640	0.595	0.578	0.532	0.500	0.451	0.453	0.462	0.471	0.465	0	---
		Left	Cv	0	12.0	27.7	47.9	68.3	87.7	104.5	120.0	136.5	154.7	170.3	0.862
			Kv	0	10.4	24.0	41.4	59.1	75.8	90.4	103.8	118.1	133.8	147.3	---
			Xt	0	0.605	0.556	0.596	0.650	0.680	0.706	0.719	0.713	0.664	0.642	---
DN100/ NPS 4	38	Right	Cv	166.3	152.9	139.7	121.1	98.0	77.1	60.3	42.9	27.0	13.0	0	0.901
			Kv	143.9	132.3	120.8	104.8	84.8	66.7	52.2	37.1	23.3	11.2	0	---
			Xt	0.675	0.631	0.533	0.510	0.530	0.526	0.503	0.520	0.520	0.542	0	---
		Left	Cv	0	11.3	26.9	46.1	63.8	82.2	102.0	121.1	137.6	153.2	169.1	0.866
			Kv	0	9.8	23.2	39.9	55.2	71.1	88.2	104.8	119.0	132.5	146.3	---
			Xt	0	0.657	0.583	0.615	0.704	0.727	0.716	0.696	0.723	0.703	0.669	---

1. At maximum flow.

Bottom Port Common (BPC) Converging

Linear Characteristic

Valve Size	Maximum Travel	Inlet Port	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L(1)
	mm			0 (Plug Down)	10	20	30	40	50	60	70	80	90	100 (Plug Up)	
DN25/ NPS 1	19	Right	Cv	16.4	14.4	12.8	11.7	10.7	9.64	8.58	6.27	3.80	1.08	0	0.973
			Kv	14.2	12.4	11.1	10.1	9.23	8.34	7.42	5.42	3.29	0.93	0	---
			Xt	0.668	0.650	0.691	0.571	0.495	0.397	0.324	0.312	0.291	0.652	0	---
		Left	Cv	0	1.45	2.56	3.93	5.46	7.08	8.83	10.9	13.3	15.3	16.5	0.935
			Kv	0	1.25	2.22	3.40	4.73	6.12	7.64	9.39	11.5	13.2	14.3	---
			Xt	0	0.702	0.784	0.725	0.720	0.710	0.722	0.717	0.678	0.609	0.597	---
DN40/ NPS 1-1/2	19	Right	Cv	36.8	32.3	25.6	21.3	17.5	12.5	10.3	8.22	4.63	2.34	0	0.804
			Kv	31.9	28.0	22.1	18.4	15.1	10.8	8.94	7.11	4.00	2.02	0	---
			Xt	0.540	0.538	0.675	0.661	0.613	0.723	0.690	0.575	0.595	0.634	0	---
		Left	Cv	0	3.36	5.99	9.42	13.3	17.4	22.4	27.4	33.8	37.5	41.5	0.878
			Kv	0	2.91	5.18	8.15	11.5	15.0	19.4	23.7	29.2	32.5	35.9	---
			Xt	0	0.625	0.659	0.593	0.598	0.645	0.637	0.695	0.643	0.641	0.603	---
DN50/ NPS 2	19	Right	Cv	59.9	50.9	42.8	35.6	29.6	23.1	17.5	13.8	9.75	6.01	0	0.882
			Kv	51.8	44.0	37.0	30.8	25.6	20.0	15.2	11.9	8.43	5.20	0	---
			Xt	0.560	0.569	0.609	0.634	0.611	0.613	0.571	0.490	0.387	0.256	0	---
		Left	Cv	0	4.84	8.90	14.2	19.2	25.4	32.8	40.0	47.1	53.4	57.8	0.935
			Kv	0	4.19	7.70	12.3	16.6	21.9	28.4	34.6	40.7	46.2	50.0	---
			Xt	0	0.504	0.575	0.549	0.641	0.692	0.696	0.693	0.707	0.722	0.723	---
DN80/ NPS 3	38	Right	Cv	158.7	142.5	125.3	102.8	80.3	61.0	45.8	33.1	20.8	10.6	0	0.813
			Kv	137.2	123.3	108.4	88.9	69.5	52.8	39.6	28.7	18.0	9.18	0	---
			Xt	0.558	0.578	0.553	0.549	0.600	0.663	0.665	0.653	0.714	0.705	0	---
		Left	Cv	0	12.1	25.7	43.8	63.1	83.1	102.7	120.4	135.7	151.1	164.9	0.931
			Kv	0	10.5	22.2	37.9	54.6	71.9	88.9	104.1	117.4	130.7	142.6	---
			Xt	0	0.525	0.579	0.619	0.660	0.658	0.676	0.685	0.701	0.691	0.670	---
DN100/ NPS 4	38	Right	Cv	155.9	145.0	127.4	107.6	85.9	66.4	49.4	35.6	23.6	12.2	0	0.810
			Kv	134.9	125.4	110.2	93.0	74.3	57.5	42.7	30.8	20.4	10.5	0	---
			Xt	0.564	0.550	0.518	0.504	0.545	0.593	0.628	0.621	0.601	0.553	0	---
		Left	Cv	0	13.5	28.9	48.9	69.5	90.6	111.1	129.2	145.4	159.9	174.4	0.830
			Kv	0	11.7	25.0	42.3	60.1	78.4	96.1	111.8	125.8	138.3	150.8	---
			Xt	0	0.427	0.477	0.525	0.553	0.564	0.590	0.637	0.667	0.686	0.676	---

1. At maximum flow.

HPAD, CL900 and 1500, Linear, Flow Down

Linear Characteristic

Valve Size, NPS	Face to Face Stan-dard	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L(1)
		mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
2	Fisher Design	47.6	1.875	29	1.5	Cv	- - -	3.32	13.8	26.5	37.7	46.3	52.8	58.0	62	64.3	0.88
						Kv	- - -	2.87	11.9	22.9	32.6	40.0	45.7	50.2	53.6	55.6	- - -
						X_T	- - -	0.813	0.518	0.508	0.548	0.595	0.633	0.63	0.613	0.612	- - -
						Fd	0.89	0.62	0.44	0.30	0.24	0.22	0.19	0.17	0.16	0.15	- - -
3	Fisher Design	47.6	1.875	29	1.5	Cv	- - -	3.32	13.8	26.5	37.7	46.3	52.8	58.0	62	64.3	0.88
						Kv	- - -	2.87	11.9	22.9	32.6	40.0	45.7	50.2	53.6	55.6	- - -
						X_T	- - -	0.813	0.518	0.508	0.548	0.595	0.633	0.63	0.613	0.612	- - -
						Fd	0.89	0.62	0.44	0.30	0.24	0.22	0.19	0.17	0.16	0.15	- - -
4	Fisher Design	73.0	2.875	50	2	Cv	- - -	8.72	31.5	55.1	74.6	89.4	101	110	117	121	0.93
						Kv	- - -	7.54	27.2	47.7	64.5	77.3	87.4	95.2	101	105	- - -
						X_T	- - -	0.589	0.580	0.653	0.728	0.775	0.795	0.791	0.777	0.773	- - -
						Fd	0.48	0.28	0.21	0.17	0.15	0.13	0.12	0.11	0.11	0.10	- - -
6	Fisher Design	92.1	3.625	50	2	Cv	6.91	26.4	54.7	86.4	117	143	165	182	194	201	0.91
						Kv	5.98	22.8	47.3	74.7	101	124	143	157	168	174	- - -
						X_T	0.327	0.581	0.576	0.509	0.525	0.602	0.673	0.708	0.714	0.726	- - -
						Fd	0.28	0.21	0.15	0.13	0.11	0.098	0.090	0.082	0.077	0.073	- - -
8	Fisher Design	136.5	5.375	76	3	Cv	8.78	63.3	149	231	298	350	385	408	424	425	0.91
						Kv	7.59	54.8	129	200	258	303	333	353	367	368	- - -
						X_T	0.763	0.613	0.544	0.574	0.621	0.671	0.721	0.745	0.709	0.726	- - -
						Fd	0.24	0.12	0.094	0.076	0.067	0.058	0.054	0.050	0.047	0.046	- - -

HPAD, CL900 and 1500, Equal Percentage, Flow Down

Equal Percentage Characteristic

Valve Size, NPS	Face to Face Stan-dard	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L(1)
		mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
2	Fisher Design	47.6	1.875	29	1.125	Cv	- - -	1.13	3.51	7.94	13.8	20.7	29.0	37.3	42.6	48.8	0.87
						Kv	- - -	0.977	3.04	6.87	11.9	17.9	25.1	32.3	36.8	42.2	- - -
						X_T	- - -	0.579	0.566	0.573	0.526	0.495	0.513	0.57	0.598	0.638	- - -
						Fd	1.00	0.76	0.50	0.40	0.31	0.28	0.24	0.22	0.20	0.19	- - -
3	Fisher Design	47.6	1.875	29	1.125	Cv	- - -	1.13	3.51	7.94	13.8	20.7	29.0	37.3	42.6	48.8	0.87
						Kv	- - -	0.977	3.04	6.87	11.9	17.9	25.1	32.3	36.8	42.2	- - -
						X_T	- - -	0.579	0.566	0.573	0.526	0.495	0.513	0.57	0.598	0.638	- - -
						Fd	1.00	0.76	0.50	0.40	0.31	0.28	0.24	0.22	0.20	0.19	- - -
4	Fisher Design	73.0	2.875	38	1.5	Cv	- - -	1.21	4.21	11.3	23.0	37.6	53.2	69.5	85.3	92.7	0.92
						Kv	- - -	1.05	3.64	9.77	19.9	32.5	46.0	60.1	73.8	80.2	- - -
						X_T	- - -	0.954	0.761	0.600	0.558	0.592	0.661	0.705	0.706	0.768	- - -
						Fd	1.00	0.54	0.44	0.31	0.23	0.19	0.17	0.15	0.14	0.13	- - -
6	Fisher Design	92.1	3.625	38	1.5	Cv	3.12	7.35	13.9	23.4	37.9	60.1	90.6	123	147	165	0.85
						Kv	2.70	6.36	12.0	20.2	32.8	52.0	78.4	106	127	143	- - -
						X_T	0.676	0.551	0.524	0.488	0.449	0.443	0.463	0.509	0.569	0.683	- - -
						Fd	- - -	0.43	0.33	0.24	0.18	0.15	0.13	0.11	0.096	0.088	- - -
8	Fisher Design	136.5	5.375	63.5	2.5	Cv	3.90	13.3	23.1	36.2	63.0	105	156	217	280	319	0.82
						Kv	3.37	11.5	20.0	31.3	54.5	90.8	135	188	242	276	- - -
						X_T	0.961	0.686	0.615	0.584	0.540	0.513	0.496	0.480	0.513	0.593	- - -
						Fd	0.38	0.34	0.25	0.20	0.15	0.12	0.098	0.084	0.073	0.066	- - -

1. At 100% travel.

Notes: The coefficients on this page are also appropriate for the HPAT.

FISHER

EMERSON

HPAD, CL900 and 1500, Modified Equal Percentage, Flow Down

Modified Equal Percentage Characteristic

Valve Size, NPS	Face to Face Stand-ard	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L[1]
		mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
2	Fisher Design	47.6	1.875	38	1.5	Cv	- - -	2.45	7.82	16.5	26.2	35.8	45.1	52.8	57.1	61.1	0.90
						Kv	- - -	2.12	6.76	14.3	22.7	31.0	39.0	45.7	49.4	52.9	- - -
						X_T	- - -	0.572	0.533	0.522	0.531	0.555	0.610	0.656	0.657	0.586	- - -
						Fd	0.99	0.49	0.40	0.30	0.26	0.22	0.20	0.18	0.16	0.16	- - -
3	Fisher Design	47.6	1.875	38	1.5	Cv	- - -	2.45	7.82	16.5	26.2	35.8	45.1	52.8	57.1	61.1	0.90
						Kv	- - -	2.12	6.76	14.3	22.7	31.0	39.0	45.7	49.4	52.9	- - -
						X_T	- - -	0.572	0.533	0.522	0.531	0.555	0.610	0.656	0.657	0.586	- - -
						Fd	0.99	0.49	0.40	0.30	0.26	0.22	0.20	0.18	0.16	0.16	- - -
4	Fisher Design	73.0	2.875	50	2	Cv	0.475	3.07	11.8	26.8	46.6	69.3	89.5	100	103	114	0.95
						Kv	0.411	2.66	10.2	23.2	40.3	59.9	77.4	86.5	89.1	98.6	- - -
						X_T	0.949	0.712	0.550	0.604	0.682	0.697	0.706	0.762	0.856	0.783	- - -
						Fd	0.78	0.49	0.31	0.22	0.18	0.15	0.14	0.12	0.11	0.11	- - -
6	Fisher Design	92.1	3.625	50	2	Cv	4.33	11.3	23.3	45	79.6	121	155	176	192	203	0.99
						Kv	3.75	9.77	20.2	38.9	68.9	105.0	134	152	166	176	- - -
						X_T	0.624	0.523	0.482	0.450	0.453	0.502	0.599	0.696	0.723	0.735	- - -
						Fd	0.29	0.34	0.24	0.18	0.13	0.11	0.094	0.084	0.077	0.073	- - -
8	Fisher Design	136.5	5.375	76	3	Cv	5.22	16.6	30.8	55	100.0	168	241	299	351	378	0.89
						Kv	4.52	14.4	26.6	47.6	86.5	145.0	208	259	304	327	- - -
						X_T	0.883	0.725	0.571	0.597	0.592	0.514	0.526	0.623	0.667	0.725	- - -
						Fd	0.43	0.28	0.22	0.16	0.12	0.095	0.079	0.068	0.060	0.057	- - -

1. At 100% travel.

Notes: The coefficients on this page are also appropriate for the HPAT.

HPAD, CL2500, Linear, Flow Down

Linear Characteristic

Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(1)
		mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
2	Fisher Design	47.6	1.875	38	1.5	Cv	- - -	3.32	13.8	24.2	32.1	37.6	41.5	44.2	46.0	47.4	0.88
						Kv	- - -	2.87	11.9	20.9	27.8	32.5	35.9	38.2	39.8	41.0	- - -
						X_T	- - -	0.813	0.518	0.672	0.716	0.766	0.816	0.851	0.862	0.832	- - -
						Fd	0.89	0.62	0.44	0.30	0.24	0.22	0.19	0.17	0.16	0.15	- - -
6	ASME B16.10	73.7	2.9	69.9	2.75	Cv	9.0	36.7	64.7	97	134	163	183	198	209	217	0.72
						Kv	7.8	31.7	55.9	84	116	140	158	171	180	187	---
						X_T	0.515	0.548	0.49	0.47	0.48	0.522	0.509	0.493	0.473	0.469	---
						Fd	0.202	0.143	0.117	0.101	0.091	0.083	0.077	0.072	0.067	0.064	---
8	ASME B16.10	105.9	4.17	95.3	3.75	Cv	23.2	72	144	213	284	338	378	407	429	446	0.72
						Kv	20.0	62	125	184	245	292	326	352	371	385	---
						X_T	0.515	0.548	0.49	0.47	0.48	0.522	0.509	0.493	0.473	0.469	---
						Fd	0.144	0.102	0.083	0.072	0.065	0.059	0.055	0.051	0.048	0.046	---
12	ASME B16.10	165.1	6.5	101.6	4	Cv	65	166	268	373	478	602	745	865	958	1023	0.72
						Kv	56	143	232	322	413	520	644	747	828	884	---
						X_T	0.752	0.689	0.645	0.553	0.521	0.472	0.428	0.389	0.392	0.397	---
						Fd	0.23	0.30	0.33	0.34	0.34	0.33	0.32	0.32	0.32	0.32	---

HPAD, CL2500, Equal Percentage, Flow Down

Equal Percentage Characteristic

Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(1)
		mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
2	Fisher Design	47.6	1.875	29	1.125	Cv	- - -	1.13	3.51	7.94	13.8	20.7	26.4	31.7	35.5	38.2	0.87
						Kv	- - -	0.977	3.04	6.87	11.9	17.9	22.8	27.4	30.7	33.0	- - -
						X_T	- - -	0.579	0.566	0.573	0.526	0.495	0.589	0.669	0.747	0.848	- - -
						Fd	1.00	0.76	0.50	0.40	0.31	0.28	0.24	0.22	0.20	0.19	- - -

HPAD, CL2500, Modified Equal Percentage, Flow Down

Modified Equal Percentage Characteristic

Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(1)
		mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
2	Fisher Design	47.6	1.875	38	1.5	Cv	- - -	2.45	7.82	16.5	24.9	32.2	37.3	40.6	42.8	44.3	0.90
						Kv	- - -	2.12	6.76	14.3	21.5	27.9	32.3	35.1	37.0	38.3	- - -
						X_T	- - -	0.572	0.533	0.522	0.559	0.648	0.745	0.828	0.833	0.876	- - -
						Fd	0.99	0.49	0.40	0.30	0.26	0.22	0.20	0.18	0.16	0.16	- - -
6	ASME B16.10	73.7	2.9	69.9	2.75	Cv	7.2	12.2	24.4	39.6	71.7	113	147	172	190	203	0.72
						Kv	6.2	10.5	21.1	34.2	61.9	97.8	127	148	164	175	---
						X_T	0.515	0.548	0.490	0.470	0.480	0.522	0.509	0.493	0.473	0.469	---
						Fd	0.226	0.160	0.130	0.113	0.101	0.092	0.085	0.080	0.075	0.071	---
8	ASME B16.10	105.9	4.17	95.3	3.75	Cv	12.0	28	61	137	223	292	344	382	410	432	0.72
						Kv	10.4	24	53	119	193	252	297	330	355	373	---
						X_T	0.515	0.548	0.49	0.47	0.48	0.522	0.509	0.493	0.473	0.469	---
						Fd	0.152	0.108	0.088	0.076	0.068	0.062	0.058	0.054	0.051	0.048	---
12	ASME B16.10	165.1	6.5	127	5	Cv	36	75	114	194	304	452	635	798	926	1013	0.72
						Kv	32	65	99	168	263	391	549	690	801	876	---
						X_T	0.752	0.689	0.645	0.553	0.521	0.472	0.428	0.389	0.392	0.397	---
						Fd	0.33	0.44	0.45	0.34	0.33	0.29	0.29	0.30	0.30	0.29	---

1. At 100% travel.

Notes: The coefficients on this page are also appropriate for the HPAT.

HPAD, CL900 and 1500, Whisper Trim, Flow Up

Linear Characteristic

Cage Level	Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										
			mm	Inches	mm	Inches		Minimum(1)	10	20	30	40	50	60	70	80	90	100
A1(2)	2	Fisher Design	47.6	1.875	38	1.5	Cv	2.90	3.00	7.70	13.0	17.8	22.3	26.4	31.0	35.3	39.0	42.0
							Kv	2.51	2.59	6.66	11.2	15.4	19.3	22.8	26.8	30.5	33.7	36.3
							X_T	0.576	0.522	0.609	0.611	0.617	0.614	0.625	0.616	0.614	0.619	0.615
	3	Fisher Design	47.6	1.875	38	1.5	Cv	2.90	3.00	7.70	13.0	17.8	22.3	26.4	31.0	35.3	39.0	42.0
							Kv	2.51	2.59	6.66	11.2	15.4	19.3	22.8	26.8	30.5	33.7	36.3
							X_T	0.576	0.522	0.609	0.611	0.617	0.614	0.625	0.616	0.614	0.619	0.615
	4	Fisher Design	73	2.875	50	2	Cv	6.40	6.57	24.1	42.1	58.9	74.0	86.8	97.4	105	110	111
							Kv	5.54	5.68	20.8	36.4	50.9	64.0	75.1	84.3	90.8	95.2	96.0
							X_T	0.826	0.727	0.610	0.560	0.558	0.588	0.641	0.687	0.723	0.738	0.772
	6	Fisher Design	92.1	3.625	50	2	Cv	7.50	7.56	27.3	50.1	71.5	90.8	109	126	142	155	162
							Kv	6.49	6.54	23.6	43.3	61.8	78.5	94.3	109	123	134	140
							X_T	0.538	0.625	0.586	0.545	0.519	0.520	0.542	0.577	0.614	0.640	0.674
	8	Fisher Design	136.5	5.375	76	3	Cv	13.80	28.60	66.40	103.0	142	180	220	253.0	284.0	308.0	324.0
							Kv	11.9	24.7	57.4	89.1	123	156.0	190	219	246	266.0	280.0
							X_T	0.478	0.423	0.513	0.533	0.525	0.557	0.535	0.543	0.560	0.598	0.627
HPAD, CL2500, Whisper Trim, Flow Up																		**Linear Characteristic**
A1(2)	2	Fisher Design	47.6	1.875	38	1.5	Cv	2.90	3.00	7.70	13.0	17.8	22.3	26.4	28.7	31.4	34.0	36.2
							Kv	2.51	2.59	6.66	11.2	15.4	19.3	22.8	24.8	27.2	29.4	31.3
							X_T	0.576	0.522	0.609	0.611	0.586	0.576	0.562	0.597	0.595	0.592	0.584
HPAD, CL900 and 1500, Whisper Trim, Flow Up																		**Linear Characteristic**
B1	4	Fisher Design	73.0	2.875	50	2	Cv	3.00	3.00	9.00	14.4	18.6	23.4	28.5	34.6	40.2	45.0	48.8
							Kv	2.59	2.59	7.79	12.5	16.1	20.2	24.7	29.9	34.8	38.9	42.2
							X_T	0.796	0.615	0.618	0.592	0.622	0.622	0.633	0.620	0.624	0.622	0.622
B3	6	Fisher Design	92.1	3.625	50	2	Cv	3.50	8.00	20.0	30.0	40.0	52.0	62.0	73.0	82.0	88.9	88.9
							Kv	3.03	6.92	17.3	25.9	34.6	45.0	53.6	63.1	70.9	76.9	76.9
							X_T	0.617	0.591	0.531	0.524	0.517	0.513	0.509	0.517	0.527	0.522	0.522
							Fd	-	0.13	0.087	0.062	0.053	0.048	0.042	0.039	0.036	0.034	0.034
B3	8	Fisher Design	136.5	5.375	76	3	Cv	8.00	13	30	50	69	87	107	125	143	160	166
							Kv	6.92	11.2	25.9	43.3	59.7	75.3	92.6	108	124	138	144
							X_T	0.610	0.577	0.580	0.548	0.552	0.563	0.545	0.554	0.552	0.555	0.554
							Fd	-	0.087	0.051	0.042	0.034	0.031	0.028	0.026	0.024	0.022	0.022
C3	6	Fisher Design	92.1	3.625	50	2	Cv	3.50	8.00	15.0	21.5	28.0	34.4	41.0	47.3	53.5	56.5	56.8
							Kv	3.03	6.92	13.0	18.6	24.2	29.8	35.5	40.9	46.3	48.9	49.1
							X_T	0.617	0.526	0.516	0.530	0.530	0.539	0.535	0.540	0.538	0.540	0.540
							Fd	-	0.14	0.11	0.079	0.064	0.060	0.053	0.047	0.046	0.042	0.042
C3	8	Fisher Design	136.5	5.375	76	3	Cv	8.00	8.30	20.5	33.0	44.3	57.0	69.0	83.0	96.5	108	112
							Kv	6.92	7.18	17.7	28.5	38.3	49.3	59.7	71.8	83.5	93.4	96.9
							X_T	0.563	0.567	0.575	0.572	0.572	0.556	0.568	0.563	0.561	0.559	0.563
							Fd	-	0.093	0.067	0.051	0.045	0.039	0.036	0.032	0.031	0.029	0.028
D3	6	Fisher Design	73.0	2.875	50	2	Cv	2.30	4.00	7.90	11.5	15.2	18.8	22.8	27.0	30.8	33.7	37.1
							Kv	1.99	3.46	6.83	9.95	13.1	16.3	19.7	23.4	26.6	29.2	32.1
							X_T	0.554	0.517	0.525	0.540	0.526	0.533	0.536	0.534	0.530	0.533	0.530
D3	8	Fisher Design	111.1	4.375	76	3	Cv	4.20	7.00	14.0	20.7	28.0	34.8	41.6	48.5	55.7	62.5	69.6
							Kv	3.63	6.05	12.1	17.9	24.2	30.1	36	42.0	48.2	54.1	60.2
							X_T	0.579	0.563	0.557	0.572	0.557	0.569	0.564	0.566	0.562	0.566	0.564

1. Valve should not be required to throttle at less than the minimum coefficient for an extended time, or erosion damage to the valve seat may result.
2. Larger capacities may be available with level A1 cages depending on service conditions.

Notes: The coefficients in this table are also appropriate for the HPAT.

Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L[1]
		mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
HPAS, CL900 and 1500, Linear, Flow Up																	**Linear Characteristic**
2	Fisher Design	47.6	1.875	38	1.5	C_v	- - -	3.61	11.8	23.3	35.2	45.7	54.2	61.7	68.8	73.6	0.97
						K_v	- - -	*3.12*	*10.2*	*20.2*	*30.4*	*39.5*	*46.9*	*53.4*	*59.5*	*63.7*	- - -
						X_T	- - -	0.722	0.663	0.657	0.663	0.663	0.659	0.638	0.606	0.586	- - -
						F_d	0.89	0.62	0.44	0.30	0.24	0.22	0.19	0.17	0.16	0.15	- - -
HPAS, CL900 and 1500, Equal Percentage, Flow Up																	**Equal Percentage Characteristic**
2	Fisher Design	47.6	1.875	29	1.125	C_v	- - -	1.01	2.91	6.71	12.1	18.4	25.7	33.6	41.0	48.6	0.94
						K_v	- - -	*0.874*	*2.52*	*5.8*	*10.5*	*15.9*	*22.2*	*29.1*	*35.5*	*42.0*	- - -
						X_T	- - -	0.948	0.808	0.73	0.705	0.679	0.642	0.641	0.686	0.652	- - -
						F_d	1.00	0.76	0.50	0.40	0.31	0.28	0.24	0.22	0.20	0.19	- - -
HPAS, CL900 and 1500, Modified Equal Percentage, Flow Up																	**Modified Equal Percentage Characteristic**
2	Fisher Design	47.6	1.875	38	1.5	C_v	- - -	2.07	6.6	14.3	23.4	32.9	43.5	53.7	60.4	67.9	0.96
						K_v	- - -	*1.79*	*5.71*	*12.4*	*20.2*	*28.5*	*37.6*	*46.5*	*52.2*	*58.7*	- - -
						X_T	- - -	0.853	0.742	0.68	0.653	0.657	0.665	0.657	0.639	0.594	- - -
						F_d	0.99	0.49	0.40	0.30	0.26	0.22	0.20	0.18	0.16	0.16	- - -
HPAS, CL2500, Linear, Flow Up																	**Linear Characteristic**
2	Fisher Design	47.6	1.875	38	1.5	C_v	- - -	3.61	11.8	23.3	33.8	41.0	46.5	50.7	53.8	56.2	0.97
						K_v	- - -	*3.12*	*10.2*	*20.2*	*29.2*	*35.5*	*40.2*	*43.9*	*46.5*	*48.6*	- - -
						X_T	- - -	0.722	0.663	0.657	0.623	0.607	0.589	0.576	0.573	0.565	- - -
						F_d	0.89	0.62	0.44	0.30	0.24	0.22	0.19	0.17	0.16	0.15	- - -
HPAS, CL2500, Equal Percentage, Flow Up																	**Equal Percentage Characteristic**
2	Fisher Design	47.6	1.875	29	1.125	C_v	- - -	1.01	2.91	6.71	12.1	18.4	24.5	30.6	35.5	39.4	0.95
						K_v	- - -	*0.874*	*2.52*	*5.8*	*10.5*	*15.9*	*21.2*	*26.5*	*30.7*	*34.1*	- - -
						X_T	- - -	0.948	0.808	0.73	0.705	0.679	0.706	0.719	0.748	0.789	- - -
						F_d	1.00	0.76	0.50	0.40	0.31	0.28	0.24	0.22	0.20	0.19	- - -
HPAS, CL2500, Modified Equal Percentage, Flow Up																	**Modified Equal Percentage Characteristic**
2	Fisher Design	47.6	1.875	38	1.5	C_v	- - -	2.07	6.6	14.3	22.8	30.4	38.4	45.2	48.5	52.4	0.97
						K_v	- - -	*1.79*	*5.71*	*12.4*	*19.7*	*26.3*	*33.2*	*39.1*	*42.0*	*45.4*	- - -
						X_T	- - -	0.853	0.742	0.68	0.65	0.659	0.66	0.660	0.638	0.595	- - -
						F_d	0.99	.049	.040	.030	0.26	.022	0.20	0.18	0.16	0.16	- - -

1. At 100% travel.

HPAS, Equal Percentage, Flow Down																	**Equal Percentage Characteristic**
Valve Size, NPS	**Face to Face Standard**	**Port Diameter**		**Maximum Travel**		**Flow Coefficient**	**Valve Opening—Percent of Total Travel**										**F_L(1)**
		mm	**Inches**	**mm**	**Inches**		**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**	
1	Fisher Design	19.1	0.75	19	0.75	C_v	- - -	0.296	0.955	1.47	1.98	2.62	3.06	3.72	4.46	5.58	0.87
						K_v	- - -	*0.256*	*0.826*	*1.27*	*1.71*	*2.27*	*2.65*	*3.22*	*3.86*	*4.83*	- - -
						X_T	- - -	0.722	0.711	0.649	0.685	0.664	0.677	0.657	0.668	0.658	- - -
2	Fisher Design	19.1	0.75	19	0.75	C_v	- - -	0.296	0.955	1.47	1.98	2.62	3.06	3.72	4.46	5.58	0.87
						K_v	- - -	*0.256*	*0.826*	*1.27*	*1.71*	*2.27*	*2.65*	*3.22*	*3.86*	*4.83*	- - -
						X_T	- - -	0.722	0.711	0.649	0.685	0.664	0.677	0.657	0.668	0.658	- - -
HPAS, Modified Equal Percentage(2), Flow Down																	**Modified Equal Percentage Characteristic**
1	Fisher Design	19.1	0.75	29	1.125	C_v	0.269	1.07	1.67	2.30	3.28	4.51	5.73	7.07	9.11	10.7	0.70
						K_v	*0.233*	*0.926*	*1.44*	*1.99*	*2.84*	*3.90*	*4.96*	*6.12*	*7.88*	*9.26*	- - -
						X_T	0.964	0.688	0.709	0.715	0.699	0.690	0.688	0.641	0.531	0.455	- - -
2	Fisher Design	19.1	0.75	29	1.125	C_v	0.269	1.07	1.67	2.30	3.28	4.51	5.73	7.07	9.11	10.7	0.70
						K_v	*0.233*	*0.926*	*1.44*	*1.99*	*2.84*	*3.90*	*4.96*	*6.12*	*7.88*	*9.26*	- - -
						X_T	0.964	0.688	0.709	0.715	0.699	0.690	0.688	0.641	0.531	0.455	- - -
		25.4	1	29	1.125	C_v	- - -	0.100	0.890	1.90	3.50	6.50	11.0	15.0	19.0	21.0	0.81
						K_v	- - -	*0.087*	*0.770*	*1.64*	*3.03*	*5.62*	*9.52*	*13.0*	*16.4*	*18.2*	- - -
						X_T	- - -	0.689	0.666	0.691	0.692	0.667	0.646	0.686	0.646	0.690	- - -
		31.8	1.25	29	1.125	C_v	- - -	0.220	1.20	2.70	5.00	9.00	15.0	22.0	27.0	31.0	0.81
						K_v	- - -	*0.190*	*1.04*	*2.34*	*4.33*	*7.79*	*13.0*	*19.0*	*23.4*	*26.8*	- - -
						X_T	- - -	0.668	0.685	0.683	0.666	0.694	0.692	0.648	0.667	0.671	- - -
		38.1	1.5	38	1.5	C_v	- - -	0.880	2.80	6.30	13.5	22.5	31.0	38.0	43.5	48.0	0.81
						K_v	- - -	*0.761*	*2.42*	*5.45*	*11.7*	*19.5*	*26.8*	*32.9*	*37.6*	*41.5*	- - -
						X_T	- - -	0.682	0.670	0.677	0.678	0.703	0.698	0.684	0.703	0.703	- - -

1. At 100% travel.
2. Characteristic is equal percentage through 75% of travel.

HPAS, Equal Percentage, Flow Down

Equal Percentage Characteristic

Valve Size, NPS	Face to Face Stand-ard	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L(1)
		mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1	Fisher Design	19.1	0.75	19	0.75	C_V	- - -	0.296	0.955	1.47	1.98	2.62	3.02	3.66	4.36	5.38	0.87
						K_V	- - -	*0.256*	*0.826*	*1.27*	*1.71*	*2.27*	*2.61*	*3.17*	*3.77*	*4.65*	- - -
						X_T	- - -	0.722	0.711	0.649	0.685	0.664	0.662	0.658	0.653	0.648	- - -
2	Fisher Design	19.1	0.75	19	0.75	C_V	- - -	0.296	0.955	1.47	1.98	2.62	3.06	3.72	4.46	5.58	0.87
						K_V	- - -	*0.256*	*0.826*	*1.27*	*1.71*	*2.27*	*2.65*	*3.22*	*3.86*	*4.83*	- - -
						X_T	- - -	0.722	0.711	0.649	0.685	0.664	0.677	0.657	0.668	0.658	- - -
HPAS, Modified Equal Percentage(2), Flow Down																**Modified Equal Percentage Characteristic**	
1	Fisher Design	19.1	0.75	29	1.125	C_V	0.269	1.07	1.67	2.30	3.28	4.51	5.73	6.93	8.06	9.73	0.70
						K_V	*0.233*	*0.926*	*1.44*	*1.99*	*2.84*	*3.90*	*4.96*	*5.99*	*6.97*	*8.42*	- - -
						X_T	0.964	0.688	0.709	0.715	0.600	0.542	0.574	0.580	0.584	0.469	- - -
2	Fisher Design	19.1	0.75	29	1.125	C_V	0.269	1.07	1.67	2.30	3.28	4.51	5.73	7.07	9.11	10.7	0.70
						K_V	*0.233*	*0.926*	*1.44*	*1.99*	*2.84*	*3.90*	*4.96*	*6.12*	*7.88*	*9.26*	- - -
						X_T	0.964	0.688	0.709	0.715	0.699	0.690	0.688	0.641	0.531	0.455	- - -
		25.4	1	29	1.125	C_V	- - -	0.100	0.890	1.90	3.50	6.50	11.0	15.0	19.0	21.0	0.81
						K_V	- - -	*0.087*	*0.770*	*1.64*	*3.03*	*5.62*	*9.52*	*13.0*	*16.4*	*18.2*	- - -
						X_T	- - -	0.689	0.666	0.691	0.692	0.667	0.646	0.686	0.646	0.690	- - -
		31.8	1.25	29	1.125	C_V	- - -	0.220	1.20	2.70	5.00	9.00	15.0	22.0	27.0	31.0	0.81
						K_V	- - -	*0.190*	*1.04*	*2.34*	*4.33*	*7.79*	*13.0*	*19.0*	*23.4*	*26.8*	- - -
						X_T	- - -	0.668	0.685	0.683	0.666	0.694	0.692	0.648	0.667	0.671	- - -
		38.1	1.5	38	1.5	C_V	- - -	0.880	2.80	6.30	12.9	21.0	27.2	31.6	34.7	36.8	0.81
						K_V	- - -	*0.761*	*2.42*	*5.45*	*11.2*	*18.2*	*23.5*	*27.3*	*30.0*	*31.8*	- - -
						X_T	- - -	0.682	0.670	0.677	0.740	0.709	0.713	0.717	0.720	0.722	- - -

1. At 100% travel.
2. Characteristic is equal percentage through 75% of travel.

HPAS, Equal Percentage, Flow Down

Equal Percentage Characteristic

Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(1)
		mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1	Fisher Design	19.1	0.75	19	0.75	C_v	0.200	0.296	0.955	1.47	1.98	2.62	3.02	3.66	4.36	5.37	0.87
						K_v	*0.173*	*0.256*	*0.826*	*1.27*	*1.71*	*2.27*	*2.61*	*3.17*	*3.77*	*4.65*	- - -
						X_T	0.563	0.714	0.702	0.642	0.677	0.657	0.658	0.650	0.644	0.641	- - -
2	Fisher Design	19.1	0.75	19	0.75	C_v	0.200	0.296	0.955	1.47	1.98	2.62	3.06	3.72	4.46	5.58	0.87
						K_v	*0.173*	*0.256*	*0.826*	*1.27*	*1.71*	*2.27*	*2.65*	*3.22*	*3.86*	*4.83*	- - -
						X_T	0.563	0.714	0.702	0.642	0.677	0.657	0.669	0.649	0.660	0.651	- - -
HPAS, Modified Equal Percentage(2), Flow Down																**Modified Equal Percentage Characteristic**	
1	Fisher Design	19.1	0.75	29	1.125	C_v	0.269	1.07	1.67	2.30	3.28	4.51	5.73	6.93	8.06	9.73	0.70
						K_v	*0.233*	*0.926*	*1.44*	*1.99*	*2.84*	*3.90*	*4.96*	*5.99*	*6.97*	*8.42*	- - -
						X_T	0.952	0.680	0.700	0.706	0.593	0.535	0.570	0.574	0.577	0.464	- - -
2	Fisher Design	19.1	0.75	29	1.125	C_v	0.269	1.07	1.67	2.30	3.28	4.51	5.73	7.07	9.11	10.7	0.70
						K_v	*0.233*	*0.926*	*1.44*	*1.99*	*2.84*	*3.90*	*4.96*	*6.12*	*7.88*	*9.26*	- - -
						X_T	0.952	0.680	0.700	0.706	0.690	0.682	0.680	0.633	0.525	0.450	- - -
		25.4	1	29	1.125	C_v	- - -	0.100	0.890	1.90	3.50	6.50	11.0	15.0	19.0	20.0	0.81
						K_v	- - -	*0.087*	*0.770*	*1.64*	*3.03*	*5.62*	*9.52*	*13.0*	*16.4*	*17.3*	- - -
						X_T	- - -	0.681	0.658	0.682	0.684	0.659	0.639	0.678	0.638	0.682	- - -
		31.8	1.25	29	1.125	C_v	- - -	0.220	1.20	2.70	5.00	9.00	15.0	22.0	25.7	27.9	0.81
						K_v	- - -	*0.190*	*1.04*	*2.34*	*4.33*	*7.79*	*13.0*	*19.0*	*22.2*	*24.1*	- - -
						X_T	- - -	0.660	0.676	0.675	0.658	0.686	0.684	0.640	0.659	0.663	- - -
		38.1	1.5	38	1.5	C_v	- - -	0.880	2.80	6.30	13.2	21.2	27.6	33.1	37.4	40.8	0.81
						K_v	- - -	*0.761*	*2.42*	*5.45*	*11.4*	*18.3*	*23.9*	*28.6*	*32.4*	*35.3*	- - -
						X_T	- - -	0.674	0.662	0.669	0.670	0.695	0.690	0.691	0.689	0.694	- - -

1. At 100% travel.
2. Characteristic is equal percentage through 75% of travel.

HPAS, Equal Percentage, Flow Down

Equal Percentage Characteristic

Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(1)
		mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1	Fisher Design	19.1	0.75	19	0.75	C_V	0.200	0.296	0.955	1.47	1.98	2.62	3.02	3.66	4.36	5.37	0.87
						K_V	*0.173*	*0.256*	*0.826*	*1.27*	*1.71*	*2.27*	*2.61*	*3.17*	*3.77*	*4.65*	---
						X_T	0.569	0.722	0.711	0.649	0.685	0.664	0.665	0.658	0.653	0.648	---
2	Fisher Design	19.1	0.75	19	0.75	C_V	0.200	0.296	0.955	1.47	1.98	2.62	3.06	3.72	4.46	5.58	0.87
						K_V	*0.173*	*0.256*	*0.826*	*1.27*	*1.71*	*2.27*	*2.65*	*3.22*	*3.86*	*4.83*	---
						X_T	0.569	0.722	0.711	0.649	0.685	0.664	0.677	0.657	0.668	0.658	---
HPAS, Modified Equal Percentage(2), Flow Down																	**Modified Equal Percentage Characteristic**
1	Fisher Design	19.1	0.75	29	1.125	C_V	0.269	1.07	1.67	2.30	3.28	4.51	5.73	6.93	8.06	9.73	0.70
						K_V	*0.233*	*0.926*	*1.44*	*1.99*	*2.84*	*3.90*	*4.96*	*5.99*	*6.97*	*8.42*	---
						X_T	0.964	0.688	0.709	0.715	0.600	0.542	0.574	0.580	0.584	0.469	---
2	Fisher Design	19.1	0.75	29	1.125	C_V	0.269	1.07	1.67	2.30	3.28	4.51	5.73	7.07	9.11	10.7	0.70
						K_V	*0.233*	*0.926*	*1.44*	*1.99*	*2.84*	*3.90*	*4.96*	*6.12*	*7.88*	*9.26*	---
						X_T	0.964	0.688	0.709	0.715	0.699	0.690	0.688	0.641	0.531	0.455	---
		25.4	1	29	1.125	C_V	---	0.100	0.890	1.90	3.50	6.50	11.0	15.0	19.0	20.0	0.81
						K_V	---	*0.087*	*0.770*	*1.64*	*3.03*	*5.62*	*9.52*	*13.0*	*16.4*	*17.3*	---
						X_T	---	0.689	0.666	0.691	0.692	0.667	0.646	0.686	0.646	0.690	---
		31.8	1.25	29	1.125	C_V	---	0.220	1.20	2.70	5.00	9.00	15.0	22.0	25.7	27.9	0.81
						K_V	---	*0.190*	*1.04*	*2.34*	*4.33*	*7.79*	*13.0*	*19.0*	*22.2*	*24.1*	---
						X_T	---	0.668	0.685	0.683	0.666	0.694	0.692	0.648	0.667	0.671	---
		38.1	1.5	38	1.5	C_V	---	0.880	2.80	6.30	12.9	21.0	27.2	30.0	31.2	31.3	0.81
						K_V	---	*0.761*	*2.42*	*5.45*	*11.2*	*18.2*	*23.5*	*25.9*	*27.0*	*27.1*	---
						X_T	---	0.682	0.670	0.677	0.743	0.707	0.714	0.716	0.716	0.726	---

1. At 100% travel.
2. Characteristic is equal percentage through 75% of travel.

HPAS, CL900, 1500, and 2500 Micro-Flute, Flow Up

Equal Percentage Characteristic

Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(1)
		mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1	Fisher Design	9.5	0.375	19	0.75	C_v	0.066	0.121	0.200	0.314	0.470	0.674	0.945	1.30	1.74	2.24	0.81
						K_v	*0.057*	*0.105*	*0.173*	*0.272*	*0.407*	*0.583*	*0.817*	*1.12*	*1.51*	*1.94*	- - -
						X_T	0.944	0.744	0.652	0.600	0.586	0.585	0.583	0.584	0.582	0.585	- - -
		12.7	0.5	19	0.75	C_v	0.105	0.184	0.314	0.488	0.716	1.04	1.53	2.30	3.20	4.21	0.84
						K_v	*0.091*	*0.159*	*0.272*	*0.422*	*0.619*	*0.900*	*1.32*	*1.99*	*2.77*	*3.64*	- - -
						X_T	0.974	0.792	0.654	0.638	0.630	0.580	0.547	0.497	0.523	0.549	- - -

HPAS, CL900, 1500, and 2500 Micro-Flute, Flow Down With or Without Liner

Equal Percentage Characteristic

1 and 2	Fisher Design	6.4 1 Flute	0.25 1 Flute	19	0.75	C_v	0.0290	0.0377	0.0470	0.0624	0.0874	0.124	0.175	0.243	0.330	0.407	0.62
						K_v	*0.025*	*0.033*	*0.041*	*0.054*	*0.076*	*0.107*	*0.151*	*0.210*	*0.285*	*0.352*	- - -
						X_T	0.990	0.975	0.867	0.765	0.659	0.569	0.494	0.450	0.450	0.550	- - -
		9.5 1 Flute	0.375 1 Flute	19	0.75	C_v	0.054	0.06	0.073	0.097	0.13	0.174	0.238	0.340	0.503	0.746	0.75
						K_v	*0.047*	*0.052*	*0.063*	*0.084*	*0.112*	*0.151*	*0.206*	*0.294*	*0.435*	*0.645*	- - -
						X_T	0.984	0.979	0.978	0.896	0.820	0.760	0.706	0.638	0.570	0.511	- - -
		12.7 1 Flute	0.5 1 Flute	19	0.75	C_v	0.078	0.090	0.116	0.161	0.228	0.320	0.445	0.641	0.950	1.40	0.72
						K_v	*0.067*	*0.078*	*0.100*	*0.139*	*0.197*	*0.277*	*0.385*	*0.554*	*0.822*	*1.211*	- - -
						X_T	0.995	0.990	0.986	0.932	0.846	0.775	0.719	0.653	0.581	0.537	- - -
		12.7 2 Flutes	0.5 2 Flutes	19	0.75	C_v	0.128	0.161	0.257	0.394	0.539	0.700	0.947	1.38	2.07	2.93	0.71
						K_v	*0.111*	*0.139*	*0.222*	*0.341*	*0.466*	*0.605*	*0.819*	*1.19*	*1.79*	*2.53*	- - -
						X_T	0.678	0.736	0.552	0.484	0.516	0.586	0.610	0.556	0.490	0.488	- - -

1. At 100% travel.

HPAS, CL900, 1500, and 2500, Micro-Flat Anti-Cavitation, Flow Down With or Without Liner

Linear Characteristic

Valve Size, NPS	Face to Face Standard	Port Diameter(2)		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(1)
		mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1	Fisher Design	9.5 2 Flats	0.375 2 Flats	19	0.75	C_v	0.010	0.017	0.077	0.162	0.264	0.381	0.510	0.651	0.801	0.961	0.82
						K_v	*0.009*	*0.015*	*0.067*	*0.140*	*0.228*	*0.330*	*0.441*	*0.563*	*0.693*	*0.831*	- - -
						X_T	0.648	0.678	0.678	0.678	0.678	0.678	0.678	0.678	0.678	0.678	- - -
		12.7 2 Flats	0.5 2 Flats	19	0.75	C_v	0.027	0.031	0.144	0.301	0.491	0.708	0.947	1.21	1.48	1.71	0.82
						K_v	*0.023*	*0.027*	*0.125*	*0.260*	*0.425*	*0.612*	*0.819*	*1.05*	*1.28*	*1.48*	- - -
						X_T	0.703	0.678	0.678	0.678	0.678	0.678	0.678	0.678	0.678	0.678	- - -
		19.1 2 Flats	0.75 2 Flats	19	0.75	C_v	0.067	0.095	0.224	0.452	0.770	1.14	1.51	2.00	2.50	2.92	0.82
						K_v	*0.058*	*0.082*	*0.194*	*0.391*	*0.666*	*0.986*	*1.31*	*1.73*	*2.16*	*2.53*	- - -
						X_T	0.931	0.929	0.919	0.905	0.830	0.783	0.800	0.751	0.726	0.681	- - -
2	Fisher Design	25.4 2 Flats	1 2 Flats	29	1.125	C_v	0.018	0.237	0.728	1.40	2.18	3.05	4.06	5.26	6.58	7.61	0.81
						K_v	*0.016*	*0.205*	*0.630*	*1.21*	*1.89*	*2.64*	*3.51*	*4.55*	*5.69*	*6.58*	- - -
						X_T	0.911	0.763	0.676	0.671	0.680	0.679	0.659	0.615	0.579	0.588	- - -

1. At 100% travel.
2. Micro-Flat Anti-Cavitation trims use a shutoff port diameter which is 0.125 inch larger than the flowing port diameter. Use the shutoff port diameter for actuator sizing.

Note: If △P exceeds 1000 psig, the life span of the Micro-Flat trim may be shortened.

HPAS, Micro-Form, Flow Up

Equal Percentage Characteristic

Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L[1]
		mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1	Fisher Design	6.4	0.25	19	0.75	C_V	0.089	0.123	0.175	0.242	0.331	0.456	0.643	0.910	1.24	1.58	0.93
						K_V	*0.077*	*0.106*	*0.151*	*0.209*	*0.286*	*0.394*	*0.556*	*0.787*	*1.07*	*1.37*	- - -
						X_T	0.658	0.666	0.611	0.603	0.613	0.613	0.588	0.578	0.616	0.651	- - -
		12.7	0.5	19	0.75	C_V	0.259	0.391	0.570	0.815	1.15	1.59	2.22	3.13	4.39	5.75	0.98
						K_V	*0.224*	*0.338*	*0.493*	*0.705*	*0.995*	*1.38*	*1.92*	*2.71*	*3.80*	*4.97*	- - -
						X_T	0.633	0.606	0.576	0.572	0.576	0.593	0.604	0.624	0.662	0.691	- - -
		19.1	0.75	19	0.75	C_V	0.464	0.695	0.987	1.43	2.12	3.16	4.71	6.89	9.56	11.4	0.97
						K_V	*0.401*	*0.601*	*0.854*	*1.24*	*1.83*	*2.73*	*4.07*	*5.96*	*8.27*	*9.86*	- - -
						X_T	0.670	0.628	0.624	0.615	0.600	0.594	0.600	0.622	0.669	0.729	- - -
2	Fisher Design	6.4	0.25	19	0.75	C_V	0.089	0.123	0.175	0.242	0.331	0.456	0.643	0.910	1.24	1.58	0.93
						K_V	*0.077*	*0.106*	*0.151*	*0.209*	*0.286*	*0.394*	*0.556*	*0.787*	*1.07*	*1.37*	- - -
						X_T	0.658	0.666	0.611	0.603	0.613	0.613	0.588	0.578	0.616	0.651	- - -
		12.7	0.5	19	0.75	C_V	0.259	0.391	0.570	0.815	1.15	1.59	2.22	3.13	4.39	5.75	0.98
						K_V	*0.224*	*0.338*	*0.493*	*0.705*	*0.995*	*1.38*	*1.92*	*2.71*	*3.80*	*4.97*	- - -
						X_T	0.633	0.606	0.576	0.572	0.576	0.593	0.604	0.624	0.662	0.691	- - -
		19.1	0.75	19	0.75	C_V	0.464	0.695	0.987	1.43	2.12	3.16	4.71	6.89	9.56	11.4	0.97
						K_V	*0.401*	*0.601*	*0.854*	*1.24*	*1.83*	*2.73*	*4.07*	*5.96*	*8.27*	*9.86*	- - -
						X_T	0.670	0.628	0.624	0.615	0.600	0.594	0.600	0.622	0.669	0.729	- - -

[1] At 100% travel.

HPAS, Micro-Form, Flow Up

Modified Equal Percentage Characteristic

Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L[1]
		mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1	Fisher Design	19.1	0.75	29	1.125	C_V	0.610	1.10	1.79	3.01	5.75	9.07	11.2	12.1	13.4	14.5	0.95
						K_V	*0.528*	*0.952*	*1.55*	*2.60*	*4.97*	*9.07*	*9.69*	*10.5*	*11.6*	*12.5*	- - -
						X_T	0.563	0.559	0.567	0.567	0.567	0.567	0.567	0.567	0.555	0.567	- - -
		25.4	1	29	1.125	C_V	0.973	1.86	3.18	5.86	9.22	12.4	14.6	16.1	18.2	19.5	0.89
						K_V	*0.842*	*1.61*	*2.75*	*5.07*	*7.98*	*10.7*	*12.6*	*13.9*	*15.7*	*16.9*	- - -
						X_T	0.680	0.634	0.568	0.571	0.571	0.571	0.571	0.571	0.567	0.571	- - -
2	Fisher Design	25.4	1	29	1.125	C_V	0.973	1.86	3.18	5.86	10.5	16.6	21.8	24.8	26.3	27.5	0.89
						K_V	*0.842*	*1.61*	*2.75*	*5.07*	*9.08*	*14.4*	*18.9*	*21.5*	*22.7*	*23.8*	- - -
						X_T	0.680	0.634	0.568	0.571	0.591	0.635	0.667	0.660	0.602	0.553	- - -
		38.1	1.25	29	1.125	C_V	1.09	1.87	3.89	8.77	17.4	26.4	31.6	34.6	40.6	47.6	0.98
						K_V	*0.943*	*1.62*	*3.36*	*7.59*	*15.1*	*22.8*	*27.3*	*29.9*	*35.1*	*41.2*	- - -
						X_T	0.702	0.630	0.524	0.547	0.653	0.729	0.753	0.761	0.659	0.479	- - -
		31.8	1.5	38	1.5	C_V	2.43	4.43	9.01	17.2	27.9	37.5	44.2	50.0	56.9	58.3	0.97
						K_V	*2.10*	*3.83*	*7.79*	*14.9*	*24.1*	*32.4*	*38.2*	*43.3*	*49.2*	*50.4*	- - -
						X_T	0.619	0.520	0.499	0.583	0.691	0.749	0.758	0.723	0.640	0.623	- - -

[1] At 100% travel.

HPAS, Micro-Form, Flow Up

Equal Percentage Characteristic

Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(1)
		mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1	Fisher Design	6.4	0.25	19	0.75	C_V	0.089	0.123	0.175	0.242	0.331	0.456	0.643	0.910	1.24	1.58	0.93
						K_V	*0.077*	*0.106*	*0.151*	*0.209*	*0.286*	*0.394*	*0.556*	*0.787*	*1.07*	*1.37*	- - -
						X_T	0.658	0.666	0.611	0.603	0.613	0.613	0.588	0.578	0.616	0.651	- - -
		12.7	0.5	19	0.75	C_V	0.259	0.391	0.570	0.815	1.15	1.59	2.22	3.13	4.39	5.75	0.98
						K_V	*0.224*	*0.338*	*0.493*	*0.705*	*0.995*	*1.38*	*1.92*	*2.71*	*3.80*	*4.97*	- - -
						X_T	0.633	0.606	0.576	0.572	0.576	0.593	0.604	0.624	0.662	0.691	- - -
		19.1	0.75	19	0.75	C_V	0.464	0.695	0.987	1.43	2.12	3.16	4.71	6.89	9.37	10.9	0.97
						K_V	*0.401*	*0.601*	*0.854*	*1.24*	*1.83*	*2.73*	*4.07*	*5.96*	*8.11*	*9.43*	- - -
						X_T	0.670	0.628	0.624	0.615	0.600	0.594	0.600	0.622	0.670	0.737	- - -
2	Fisher Design	6.4	0.25	19	0.75	C_V	0.089	0.123	0.175	0.242	0.331	0.456	0.643	0.910	1.24	1.58	0.93
						K_V	*0.077*	*0.106*	*0.151*	*0.209*	*0.286*	*0.394*	*0.556*	*0.787*	*1.07*	*1.37*	- - -
						X_T	0.658	0.666	0.611	0.603	0.613	0.613	0.588	0.578	0.616	0.651	- - -
		12.7	0.5	19	0.75	C_V	0.259	0.391	0.570	0.815	1.15	1.59	2.22	3.13	4.39	5.75	0.98
						K_V	*0.224*	*0.338*	*0.493*	*0.705*	*0.995*	*1.38*	*1.92*	*2.71*	*3.80*	*4.97*	- - -
						X_T	0.633	0.606	0.576	0.572	0.576	0.593	0.604	0.624	0.662	0.691	- - -
		19.1	0.75	19	0.75	C_V	0.464	0.695	0.987	1.43	2.12	3.16	4.71	6.89	9.56	11.4	0.97
						K_V	*0.401*	*0.601*	*0.854*	*1.24*	*1.83*	*2.73*	*4.07*	*5.96*	*8.27*	*9.86*	- - -
						X_T	0.670	0.628	0.624	0.615	0.600	0.594	0.600	0.622	0.669	0.729	- - -
		25.4	1	19	0.75	C_V	0.927	1.35	1.87	2.64	3.88	5.81	8.66	12.6	16.6	18.9	0.91
						K_V	*0.802*	*1.17*	*1.62*	*2.28*	*3.36*	*5.03*	*7.49*	*10.9*	*14.4*	*16.3*	- - -
						X_T	0.431	0.636	0.594	0.603	0.615	0.600	0.566	0.540	0.581	0.676	- - -

1. At 100% travel.

HPAS, Micro-Form, Flow Up

Modified Equal Percentage Characteristic

Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(1)
		mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1	Fisher Design	25.4	1	29	1.125	C_V	0.973	1.86	3.18	5.86	8.94	11.9	13.9	14.1	14.2	14.3	0.89
						K_V	*0.842*	*1.61*	*2.75*	*5.07*	*7.73*	*10.3*	*12.0*	*12.2*	*12.3*	*12.4*	- - -
						X_T	0.680	0.634	0.568	0.571	0.568	0.569	0.569	0.569	0.569	0.569	- - -
2	Fisher Design	25.4	1	29	1.125	C_V	0.973	1.86	3.18	5.86	10.5	16.1	20.7	23.3	24.6	25.6	0.89
						K_V	*0.842*	*1.61*	*2.75*	*5.07*	*9.08*	*13.9*	*17.9*	*20.2*	*21.3*	*22.1*	- - -
						X_T	0.680	0.634	0.568	0.571	0.591	0.635	0.669	0.661	0.601	0.559	- - -
		31.8	1.25	29	1.125	C_V	1.09	1.87	3.89	8.77	16.9	24.6	29.1	31.1	34.5	36.6	0.98
						K_V	*0.943*	*1.62*	*3.36*	*7.59*	*14.6*	*21.3*	*25.2*	*26.9*	*29.8*	*31.7*	- - -
						X_T	0.702	0.630	0.524	0.547	0.651	0.734	0.747	0.763	0.655	0.614	- - -
		38.1	1.5	38	1.5	C_V	2.43	4.43	9.01	16.7	25.9	32.6	35.4	38.5	41.0	43.0	0.97
						K_V	*2.10*	*3.83*	*7.79*	*14.4*	*22.4*	*28.2*	*30.6*	*33.3*	*35.5*	*37.2*	- - -
						X_T	0.619	0.520	0.499	0.581	0.693	0.747	0.751	0.721	0.646	0.587	- - -

1. At 100% travel.

HPAS, CL900 and 1500, Whisper Trim III, Flow Up

Linear Characteristic

Cage Level	Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										
			mm	Inches	mm	Inches		Minimum(1)	10	20	30	40	50	60	70	80	90	100
A1(2)	2	Fisher Design	47.6	1.875	38	1.5	C_v	1.00	2.50	7.50	12.8	17.7	22.3	26.6	31.2	35.5	39.5	42.6
							K_v	*0.865*	*2.16*	*6.49*	*11.1*	*15.3*	*19.3*	*23.0*	*27.0*	*30.7*	*34.2*	*36.8*
							X_T	0.727	0.686	0.605	0.609	0.613	0.607	0.613	0.606	0.607	0.603	0.607

HPAS, CL2500, Whisper Trim III, Flow Up

Linear Characteristic

A1(2)	2	Fisher Design	47.6	1.875	38	1.5	C_v	1.00	2.50	7.50	12.8	17.7	22.3	26.6	28.7	31.4	34.0	36.2
							K_v	*0.865*	*2.16*	*6.49*	*11.1*	*15.3*	*19.3*	*23.0*	*24.8*	*27.2*	*29.4*	*31.3*
							X_T	0.727	0.686	0.605	0.609	0.593	0.576	0.554	0.597	0.595	0.592	0.595

HPAD, CL2500, Whisper Trim III, Flow Up

Linear Characteristic

A1(2)	6	ASME B16.10	73.7	2.9	69.9	2.75	Cv	6.11	12.89	32.2	53.1	74.0	94.2	113	131	148	163	178
							Kv	---	11.14	27.8	45.9	64.0	81.4	98	113	128	141	154
							X_T	---	0.544	0.533	0.533	0.535	0.538	0.558	0.581	0.606	0.641	0.673
	8	ASME B16.10	105.9	4.17	95.3	3.75	Cv	9.99	30.59	73.5	119.2	164.5	207.6	248	286	321	355	386
							Kv	---	26.43	63.5	103.0	142.1	179.4	214	247	278	306	333
							X_T	---	0.544	0.533	0.533	0.535	0.538	0.558	0.581	0.606	0.641	0.673
	12	ASME B16.10	165.1	6.5	127	5	Cv	31.6	107	206	305	400	491	576	656	730	798	856
							Kv	---	93	178	263	346	424	498	567	631	689	740
							X_T	---	0.557	0.526	0.52	0.514	0.526	0.558	0.598	0.591	0.652	0.653
A3	6	ASME B16.10	73.7	2.9	69.9	2.75	Cv	4.6	12.9	32.4	53.3	74	95	114	132	148	164	179
							Kv	---	11.2	28.0	46.1	64	82	98	114	128	142	155
							X_T	---	0.544	0.533	0.533	0.535	0.538	0.558	0.581	0.606	0.641	0.673
	8	ASME B16.10	105.9	4.17	95.3	3.75	Cv	7.2	29.06	69.4	112.6	155.8	197.2	236	273	307	340	370
							Kv	---	25.11	60.0	97.3	134.6	170.4	204	236	265	293	320
							X_T	---	0.544	0.533	0.533	0.535	0.538	0.558	0.581	0.606	0.641	0.673
	12	ASME B16.10	165.1	6.5	127	5	Cv	26.2	99	190	280	368	453	533	608	679	745	805
							Kv	---	86	164	242	318	391	460	526	587	644	696
							X_T	---	0.557	0.526	0.52	0.514	0.526	0.558	0.598	0.591	0.652	0.653
B1	6	ASME B16.10	73.7	2.9	69.9	2.75	Cv	5.4	8.5	19.3	31.2	44	56	69	81	93	105	116
							Kv	---	7.3	16.7	26.9	38	49	60	70	81	91	100
							X_T	---	0.544	0.533	0.533	0.535	0.538	0.558	0.581	0.606	0.641	0.673
	8	ASME B16.10	105.9	4.17	95.3	3.75	Cv	8.5	18.51	41.4	66.3	92.4	118.8	145	171	196	220	243
							Kv	---	15.99	35.8	57.3	79.8	102.6	125	148	169	190	210
							X_T	---	0.544	0.533	0.533	0.535	0.538	0.558	0.581	0.606	0.641	0.673
	12	ASME B16.10	165.1	6.5	127	5	Cv	29	67	120	174	229	282	335	387	437	486	533
							Kv	---	58	104	150	197	244	290	335	378	420	461
							X_T	---	0.557	0.526	0.52	0.514	0.526	0.558	0.598	0.591	0.652	0.653
B3	6	ASME B16.10	73.7	2.9	69.9	2.75	Cv	3.9	8.41	19.2	30.9	43.3	55.8	68	81	93	104	115
							Kv	---	7.27	16.6	26.7	37.4	48.2	59	70	80	90	99
							X_T	---	0.544	0.533	0.533	0.535	0.538	0.558	0.581	0.606	0.641	0.673
	8	ASME B16.10	105.9	4.17	95.3	3.75	Cv	6.1	18.12	40.4	64.7	90.0	115.8	141	167	191	215	237
							Kv	---	15.66	34.9	55.9	77.8	100.0	122	144	165	186	205
							X_T	---	0.544	0.533	0.533	0.535	0.538	0.558	0.581	0.606	0.641	0.673
	12	ASME B16.10	165.1	6.5	127	5	Cv	24.6	70	127	185	242	300	356	410	463	514	563
							Kv	---	60	110	159	210	259	307	355	400	444	487
							X_T	---	0.557	0.526	0.52	0.514	0.526	0.558	0.598	0.591	0.652	0.653

HPAD, CL2500, Whisper Trim III, Flow Up (cont.)

Linear Characteristic

Cage Level	Valve Size, NPS	Face to Face Stand-ard	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										
			mm	Inches	mm	Inches		Mini-mum(1)	10	20	30	40	50	60	70	80	90	100
C1	6	ASME B16.10	73.7	2.9	69.9	2.75	Cv	4.8	6.19	12.8	20.0	27.6	35.4	43	52	60	68	76
							Kv	---	5.35	11.1	17.3	23.8	30.6	38	45	52	59	66
							X_T	---	0.544	0.533	0.533	0.535	0.538	0.558	0.581	0.606	0.641	0.673
	8	ASME B16.10	105.9	4.17	95.3	3.75	Cv	7.3	12.33	25.3	39.2	54.0	69.3	85	101	117	133	148
							Kv	---	10.66	21.8	33.9	46.6	59.8	73	87	101	114	128
							X_T	---	0.544	0.533	0.533	0.535	0.538	0.558	0.581	0.606	0.641	0.673
	12	ASME B16.10	165.1	6.5	127	5	Cv	27.3	51	86	121	157	193	230	265	301	336	370
							Kv	---	44	74	105	136	167	198	229	260	290	320
							X_T	---	0.557	0.526	0.52	0.514	0.526	0.558	0.598	0.591	0.652	0.653
C3	6	ASME B16.10	73.7	2.9	69.9	2.75	Cv	3.6	6.12	12.6	19.7	27.1	34.8	43	51	59	67	75
							Kv	---	5.29	10.9	17.0	23.4	30.1	37	44	51	58	64
							X_T	---	0.544	0.533	0.533	0.535	0.538	0.558	0.581	0.606	0.641	0.673
	8	ASME B16.10	105.9	4.17	95.3	3.75	Cv	5.7	12.81	26.5	41.3	56.9	73.1	90	106	123	140	156
							Kv	---	11.07	22.9	35.7	49.2	63.2	77	92	106	121	135
							X_T	---	0.544	0.533	0.533	0.535	0.538	0.558	0.581	0.606	0.641	0.673
	12	ASME B16.10	165.1	6.5	127	5	Cv	23.6	50	84	119	154	189	225	260	295	329	363
							Kv	---	43	73	103	133	164	194	225	255	284	314
							X_T	---	0.557	0.526	0.52	0.514	0.526	0.558	0.598	0.591	0.652	0.653
D3	6	ASME B16.10	57.2	2.25	50.8	2	Cv	3.3	3.82	7.1	10.6	14.4	18.3	22	27	31	35	39
							Kv	---	3.30	6.1	9.2	12.5	15.9	19	23	27	30	34
							X_T	---	0.544	0.533	0.533	0.535	0.538	0.558	0.581	0.606	0.641	0.673
	8	ASME B16.10	105.9	4.17	76.2	3	Cv	5.3	9.49	18.9	29.0	39.7	50.7	62	74	86	98	110
							Kv	---	8.20	16.3	25.1	34.3	43.8	54	64	74	84	95
							X_T	---	0.544	0.533	0.533	0.535	0.538	0.558	0.581	0.606	0.641	0.673
	12	ASME B16.10	165.1	6.5	127	5	Cv	24.2	46	75	105	135	165	196	226	257	287	316
							Kv	---	40	65	90	117	143	169	195	222	248	273
							X_T	---	0.557	0.526	0.52	0.514	0.526	0.558	0.598	0.591	0.652	0.653

1. Valve should not be required to throttle at less than the minimum coefficient for an extended time, or erosion damage to the valve seat may result.
2. Larger capacities may be available with level A1 cages depending on service conditions.

HPAS, CL900 and 1500, Cavitrol III, Flow Down

Linear Characteristic

Trim Stage	Valve Size, NPS	Face to Face Stand-ard	Port Diameter		Maximum Travel		Flow Coeffi-cient	Minimum Throttling C_v(1)	Valve Opening—Percent of Total Travel										F_L(2)
			mm	Inches	mm	Inches			10	20	30	40	50	60	70	80	90	100	
Two Stage	1	Fisher Design	22.2	0.875	38	1.5	C_v	0.360	- - -	0.836	1.80	2.74	3.64	4.51	5.36	6.18	6.91	7.39	0.98
							K_v	*0.311*	- - -	*0.723*	*1.56*	*2.37*	*3.15*	*3.90*	*4.64*	*5.35*	*5.98*	*6.39*	- - -
Three Stage	2	Fisher Design	25.4	1	50	2	C_v	0.590	0.272	1.10	1.98	2.82	3.63	4.46	5.30	6.07	6.61	6.73	0.99
							K_v	*0.510*	0.235	0.952	1.71	2.44	3.14	3.86	4.58	5.25	5.72	5.82	- - -

HPAS, CL2500, Cavitrol III, Flow Down

Linear Characteristic

Two Stage	1	Fisher Design	22.2	0.875	38	1.5	C_v	0.360	- - -	0.836	1.80	2.74	3.64	4.51	5.36	5.87	6.53	6.91	0.98
							K_v	*0.311*	- - -	*0.723*	*1.56*	*2.37*	*3.15*	*3.90*	*4.64*	*5.08*	*5.65*	*5.98*	- - -
Three Stage	2	Fisher Design	25.4	1	50	2	C_v	0.590	0.272	1.10	1.98	2.82	3.63	4.46	5.30	6.07	6.61	6.73	0.99
							K_v	*0.510*	*0.235*	*0.952*	*1.71*	*2.44*	*3.14*	*3.86*	*4.58*	*5.25*	*5.72*	*5.82*	- - -

1. Valves should not be required to throttle at a C_v less than the specified minimum C_v for an extended period. Erosion damage to the valve seats may result.
2. At 100% travel.

HPAT, CL900 and 1500, Cavitrol™ III, Flow Down

Linear Characteristic

Trim Stage	Valve Size, NPS	Face to Face Stand-ard	Port Diameter		Maximum Travel		Flow Coeffi-cient	Minimum Throttling C_v(1)	Valve Opening—Percent of Total Travel										F_L(2)
			mm	Inch	mm	Inch			10	20	30	40	50	60	70	80	90	100	
Two Stage	2	Fisher Design	44.4	1.75	50	2	C_v	0.580	1.07	1.97	3.29	4.86	6.58	8.36	10.0	11.7	13.0	14.0	0.98
							K_v	*0.502*	*0.926*	*1.70*	*2.85*	*4.20*	*5.69*	*7.23*	*8.74*	*10.1*	*11.2*	*12.1*	- - -
	3		44.4	1.75	50	2	C_v	0.580	1.07	1.97	3.29	4.86	6.58	8.36	10.1	11.7	13.0	14.0	0.98
							K_v	*0.502*	*0.926*	*1.70*	*2.85*	*4.20*	*5.69*	*7.23*	*8.74*	*10.1*	*11.2*	*12.1*	- - -
	4		63.5	2.5	64	2.5	C_v	0.720	1.46	4.98	9.24	13.2	17.0	20.7	24.7	28.5	31.9	34.4	0.98
							K_v	*0.623*	*1.26*	*4.31*	*7.99*	*11.4*	*14.7*	*17.9*	*21.4*	*24.7*	*27.6*	*29.8*	- - -
	6		87.3	3.4375	76	3	C_v	0.900	2.61	9.01	15.6	21.8	28.3	34.8	40.4	46.4	52.2	58.1	0.98
							K_v	*0.778*	*2.26*	*7.79*	*13.5*	*18.9*	*24.5*	*30.1*	*34.9*	*40.1*	*45.2*	*50.3*	- - -
	8		133.3	5.25	102	4	C_v	1.72	7.50	20.7	33.8	47.0	60.1	73.3	87.0	100	112	123	0.98
							K_v	*1.49*	*6.49*	*17.9*	*29.2*	*40.7*	*52.0*	*63.4*	*75.3*	*86.5*	*96.9*	*106*	- - -
Three Stage	4	Fisher Design	47.6	1.875	64	2.5	C_v	1.20	0.747	2.02	3.92	6.15	8.01	9.5	11.0	12.8	14.9	16.5	0.99
							K_v	1.04	0.646	1.75	3.39	5.32	6.93	8.2	9.52	11.1	12.9	14.3	- - -
	6		73.0	2.875	76	3	C_v	1.70	2.80	5.50	8.30	11.0	13.9	16.7	19.4	22.2	25.0	27.8	0.99
							K_v	1.47	2.42	4.76	7.18	9.52	12.0	14.4	16.8	19.2	21.6	24.0	- - -
	8		115.9	4.5625	102	4	C_v	3.10	6.10	13.2	19.8	26.1	34.1	41.5	48.2	54.5	60.9	65.0	0.99
							K_v	2.68	5.28	11.4	17.1	22.6	29.5	35.9	41.7	47.1	52.7	56.2	- - -
HPAT, CL2500, Cavitrol III, Flow Down																			**Linear Characteristic**
Two Stage	2	Fisher Design	44.4	1.75	50	2	C_v	0.580	1.07	1.97	3.29	4.86	6.58	8.36	10.1	11.7	13.0	14.0	0.98
							K_v	*0.502*	*0.926*	*1.70*	*2.85*	*4.20*	*5.69*	*7.23*	*8.74*	*10.1*	*11.2*	*12.1*	- - -
	6	ASME B16.10	73.7	2.9	69.85	2.75	C_v	2.0	3.4	7.7	11.9	16.1	20.3	24.5	28.6	32.8	36.9	40.5	0.98
							K_v	1.7	3.0	6.6	10.3	13.9	17.5	21.1	24.7	28.3	31.9	35.0	- - -
	8		105.9	4.17	95.25	3.75	C_v	3.2	7.6	16.1	24.6	33.1	41.5	49.9	58.3	66.6	74.9	82.4	0.98
							K_v	2.8	6.6	13.9	21.2	28.6	35.9	43.1	50.4	57.6	64.7	71.2	- - -
	12		165.1	6.5	127	5	C_v	3.6	19.0	39.0	58.0	78	97	117	136	156	175	195	0.98
							K_v	3.1	16.4	33.7	50.1	67.4	83.8	101.1	117.5	134.8	151.2	168.5	- - -
Three Stage	6	ASME B16.10	57.2	2.25	69.9	2.75	C_v	1.93	2.78	4.60	6.90	9.90	11.7	13.4	16.3	18.7	20.5	22.3	0.98
							K_v	1.67	2.40	3.98	5.97	8.56	10.1	11.6	14.1	16.2	17.7	19.3	- - -
	8		105.9	4.17	95.3	3.75	C_v	3.99	5.71	11.8	18.2	23.8	27.7	34.0	40.3	45.0	49.7	55.9	0.98
							K_v	3.45	4.94	10.2	15.7	20.6	24.0	29.4	34.9	38.9	43.0	48.4	- - -
	12		165.1	6.5	127	5	C_v	6.81	14.4	24.5	38.4	50.0	60.1	72.5	85.4	95.4	106	121	0.98
							K_v	5.89	12.4	21.2	33.2	43.3	52.0	62.7	73.9	82.5	92.0	104	- - -

1. Valves should not be required to throttle at a C_v less than the specified minimum C_v for an extended period. Erosion damage to the valve seats may result.
2. At 100% travel.

HPD, HPT, CL900 and 1500, Linear, Flow Down

Linear Characteristic

Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(1)
		mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
2	ISA 75.08.06 (long)	47.6	1.875	38	1.5	C_V	- - -	3.49	12.5	22.9	31.8	38.4	43.0	46.7	49.9	52.2	0.91
						K_V	- - -	*3.02*	*10.8*	*19.8*	*27.5*	*33.2*	*37.2*	*40.4*	*43.2*	*45.2*	- - -
						X_T	- - -	0.811	0.632	0.682	0.743	0.829	0.780	0.743	0.726	0.695	- - -
						F_d	0.89	0.62	0.44	0.30	0.24	0.22	0.19	0.17	0.16	0.15	- - -
3	ISA 75.08.06 (long) or ISA 75.08.05 (long)	73.0	2.875	50	2	C_V	- - -	8.72	31.5	55.1	74.6	89.4	101	110	117	121	0.93
						K_V	- - -	*7.54*	*27.2*	*47.7*	*64.5*	*77.3*	*87.4*	*95.2*	*101*	*105*	- - -
						X_T	- - -	0.589	0.580	0.653	0.728	0.775	0.795	0.791	0.777	0.773	- - -
						F_d	0.48	0.28	0.21	0.17	0.15	0.13	0.12	0.11	0.11	0.10	- - -
4	ISA 75.08.06 (long) or ISA 75.08.05 (long)	92.1	3.625	50	2	C_V	6.91	26.4	54.7	86.4	117	143	165	182	194	201	0.91
						K_V	*5.98*	*22.8*	*47.3*	*74.7*	*101*	*124*	*143*	*157*	*168*	*174*	- - -
						X_T	0.327	0.581	0.576	0.509	0.525	0.602	0.673	0.708	0.714	0.726	- - -
						F_d	0.28	0.21	0.15	0.13	0.11	0.098	0.090	0.082	0.077	0.073	- - -
	ISA-75.08.06 (short) or ASME B16.10 (Short) or Fisher Design	91.4	3.6	50.8	2	C_V	2.53	23.2	52.6	81.7	114	146	169	185	199	208	0.82
						K_V	2.19	20.1	45.5	70.7	98.6	126	146	160	172	180	- - -
						X_T	0.534	0.538	0.526	0.530	0.513	0.543	0.603	0.643	0.627	0.598	- - -
						F_d	1.00	0.30	0.19	0.15	0.13	0.11	0.096	0.087	0.080	0.075	- - -
6	ISA 75.08.06 (long) or ISA 75.08.05 (long)	136.5	5.375	76	3	C_V	8.78	63.3	149	231	298	350	385	408	424	425	0.91
						K_V	*7.59*	*54.8*	*129*	*200*	*258*	*303*	*333*	*353*	*367*	*368*	- - -
						X_T	0.763	0.613	0.544	0.574	0.621	0.671	0.721	0.745	0.709	0.726	- - -
						F_d	0.24	0.12	0.094	0.076	0.067	0.058	0.054	0.050	0.047	0.046	- - -
	ISA-75.08.06 (short) or ASME B16.10 (Short) or Fisher Design	137.2	5.4	76.2	3	C_V	11.2	56.4	117	177	240	309	362	397	423	444	0.82
						K_V	9.69	48.8	101	153	208	267	313	343	366	384	- - -
						X_T	0.573	0.569	0.555	0.549	0.543	0.548	0.587	0.626	0.626	0.611	- - -
						F_d	0.52	0.18	0.12	0.10	0.083	0.073	0.065	0.059	0.054	0.051	- - -
8	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	152.4	6	76.2	3	Cv	26	83	156	236	318	409	515	601	699	767	0.73
						K_V	22	72	135	204	275	354	445	520	605	663	- - -
						X_T	0.629	0.719	0.671	0.613	0.578	0.541	0.538	0.531	0.497	0.486	- - -
						Fd	0.27	0.33	0.35	0.36	0.36	0.36	0.36	0.33	0.32	0.33	- - -
10	ISA-75.08.06 (short) or ISA-75.08.05 (short)	177.8	7	101.6	4	C_V	49	147	261	382	502	615	727	842	920	973	0.73
						K_V	42	127	226	330	434	532	629	728	796	842	- - -
						X_T	0.629	0.719	0.671	0.613	0.578	0.541	0.538	0.531	0.497	0.486	- - -
						F_d	0.29	0.34	0.36	0.36	0.36	0.35	0.35	0.33	0.32	0.32	- - -
12	ISA-75.08.06 (short) or ISA-75.08.05 (short)	203.2	8	101.6	4	C_V	63	181	316	466	624	783	967	1144	1264	1337	0.7
						K_V	54	157	273	403	540	677	836	990	1093	1157	- - -
						X_T	0.629	0.719	0.671	0.613	0.578	0.541	0.538	0.531	0.497	0.486	- - -
						F_d	0.27	0.33	0.35	0.36	0.36	0.36	0.35	0.34	0.32	0.33	- - -

HPD, HPT, CL900 and 1500, Equal Percentage, Flow Down

Equal Percentage Characteristic

Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L(1)
		mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
2	ISA 75.08.06 (long)	47.6	1.875	29	1.125	C_v	- - -	1.02	3.26	7.53	13.3	19.8	26.4	32.0	36.2	41.0	0.93
						K_v	- - -	*0.882*	*2.82*	*6.51*	*11.5*	*17.1*	*22.8*	*27.7*	*31.3*	*35.5*	- - -
						X_T	- - -	0.745	0.619	0.595	0.587	0.593	0.633	0.721	0.791	0.791	- - -
						F_d	1.00	0.76	0.50	0.40	0.31	0.28	0.24	0.22	0.20	0.19	- - -
3	ISA 75.08.06 (long) or ISA 75.08.05 (long)	73.0	2.875	38	1.5	C_v	- - -	1.21	4.21	11.3	23.0	37.6	53.2	69.5	85.3	92.7	0.92
						K_v	- - -	*1.05*	*3.64*	*9.77*	*19.9*	*32.5*	*46.0*	*60.1*	*73.8*	*80.2*	- - -
						X_T	- - -	0.954	0.761	0.600	0.558	0.592	0.661	0.705	0.706	0.768	- - -
						F_d	1.00	0.54	0.44	0.31	0.23	0.19	0.17	0.15	0.14	0.13	- - -
4	ISA 75.08.06 (long) or ISA 75.08.05 (long)	92.1	3.625	38	1.5	C_v	3.12	7.35	13.9	23.4	37.9	60.1	90.6	123	147	165	0.85
						K_v	*2.70*	*6.36*	*12.0*	*20.2*	*32.8*	*52.0*	*78.4*	*106*	*127*	*143*	- - -
						X_T	0.676	0.551	0.524	0.488	0.449	0.443	0.463	0.509	0.569	0.683	- - -
						F_d	- - -	0.43	0.33	0.24	0.18	0.15	0.13	0.11	0.096	0.088	- - -
6	ISA 75.08.06 (long) or ISA 75.08.05 (long)	136.5	5.375	63.5	2.5	C_v	3.90	13.3	23.1	36.2	63.0	105	156	217	280	319	0.82
						K_v	*3.37*	*11.5*	*20.0*	*31.3*	*54.5*	*90.8*	*135*	*188*	*242*	*276*	- - -
						X_T	0.961	0.686	0.615	0.584	0.540	0.513	0.496	0.480	0.513	0.593	- - -
						F_d	0.38	0.34	0.25	0.20	0.15	0.12	0.098	0.084	0.073	0.066	- - -
8	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	152.4	6	76.2	3	Cv	19	31	43	58	87	120	166	236	341	449	0.73
						Kv	16	27	37	50	75	104	144	204	295	388	- - -
						X_T	0.629	0.719	0.671	0.613	0.578	0.541	0.538	0.531	0.497	0.486	- - -
						F_d	0.24	0.26	0.25	0.32	0.33	0.33	0.31	0.29	0.30	0.31	- - -
10	ISA-75.08.06 (short) or ISA-75.08.05 (short)	177.8	7	101.6	4	Cv	26	42	58	84	124	176	261	401	569	723	0.73
						Kv	22	36	50	73	107	152	226	347	492	625	- - -
						X_T	0.629	0.719	0.671	0.613	0.578	0.541	0.538	0.531	0.497	0.486	- - -
						F_d	0.25	0.25	0.24	0.32	0.32	0.31	0.30	0.30	0.30	0.31	- - -
12	ISA-75.08.06 (short) or ISA-75.08.05 (short)	203.2	8	101.6	4	Cv	31	52	73	103	150	208	303	483	722	949	0.7
						Kv	27	45	63	89	130	180	262	418	625	821	- - -
						X_T	0.629	0.719	0.671	0.613	0.578	0.541	0.538	0.531	0.497	0.486	- - -
						F_d	0.24	0.26	0.25	0.32	0.33	0.31	0.32	0.31	0.31	0.32	- - -

HPD, CL900 and 1500, Modified Equal Percentage(2), Flow Down

Modified Equal Percentage Characteristic

Valve Size, NPS	Face to Face Standard	Port Diameter mm	Port Diameter Inches	Maximum Travel mm	Maximum Travel Inches	Flow Coeffi-cient	10	20	30	40	50	60	70	80	90	100	F_L(1)
2	ISA 75.08.06 (long)	47.6	1.875	38	1.5	C_v	- - -	2.28	7.52	15.7	24.1	31.6	38.2	43.5	46.7	49.0	0.93
						K_v	- - -	*1.97*	*6.50*	*13.6*	*20.8*	*27.3*	*33.0*	*37.6*	*40.4*	*42.4*	- - -
						X_T	- - -	0.641	0.571	0.584	0.634	0.698	0.778	0.803	0.771	0.770	- - -
						F_d	0.99	0.49	0.40	0.30	0.26	0.22	0.20	0.18	0.16	0.16	- - -
3	ISA 75.08.06 (long) or ISA 75.08.05 (long)	73.0	2.875	50	2	C_v	0.475	3.07	11.8	26.8	46.6	69.3	89.5	100	103	114	0.95
						K_v	*0.411*	*2.66*	*10.2*	*23.2*	*40.3*	*59.9*	*77.4*	*86.5*	*89.1*	*98.6*	- - -
						X_T	0.949	0.712	0.550	0.604	0.682	0.697	0.706	0.762	0.856	0.783	- - -
						F_d	0.78	0.49	0.31	0.22	0.18	0.15	0.14	0.12	0.11	0.11	- - -
4	ISA 75.08.06 (long) or ISA 75.08.05 (long)	92.1	3.625	50	2	C_v	4.33	11.3	23.3	45.0	79.6	121	155	176	192	203	0.89
						K_v	*3.75*	*9.77*	*20.2*	*38.9*	*68.9*	*105*	*134*	*152*	*166*	*176*	- - -
						X_T	0.624	0.523	0.482	0.450	0.453	0.502	0.599	0.696	0.723	0.735	- - -
						F_d	0.29	0.34	0.24	0.18	0.13	0.11	0.094	0.084	0.077	0.073	- - -
	ISA-75.08.06 (short) or ASME B16.10 (Short) or Fisher Design	91.4	3.6	50.8	2	C_v	3.70	10.8	21.0	40.5	72.2	116	151	177	198	212	0.82
						K_v	3.20	9.34	18.2	35.0	62.5	100	131	153	171	183	- - -
						X_T	0.534	0.538	0.526	0.530	0.513	0.543	0.603	0.643	0.627	0.598	- - -
						F_d	1.00	0.48	0.31	0.21	0.16	0.12	0.10	0.090	0.081	0.075	- - -

HPD, CL900 and 1500, Modified Equal Percentage[2], Flow Down

Modified Equal Percentage Characteristic

Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L[1]
		mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
6	ISA 75.08.06 (long) or ISA 75.08.05 (long)	136.5	5.375	76	3	C_v	5.22	16.6	30.8	55.0	100	168	241	299	351	378	0.89
						K_v	*4.52*	*14.4*	*26.6*	*47.6*	*86.5*	*145*	*208*	*259*	*304*	*327*	---
						X_T	0.883	0.725	0.571	0.597	0.592	0.514	0.526	0.623	0.667	0.725	---
						F_d	0.43	0.28	0.22	0.16	0.12	0.095	0.079	0.068	0.060	0.057	---
	ISA-75.08.06 (short) or ASME B16.10 (Short) or Fisher Design	137.2	5.4	76.2	3	Cv	10.0	22.3	34.0	61.3	111.0	172	250	319	373	412	0.82
						Kv	8.65	19.3	29.4	53.0	96.0	149	216	276	323	356	---
						X_T	0.573	0.569	0.555	0.549	0.543	0.548	0.587	0.626	0.626	0.611	---
						Fd	0.70	0.33	0.25	0.17	0.13	0.10	0.083	0.071	0.063	0.058	---

1. At 100% travel.
2. Characteristic is equal percentage through 75% of travel.

HPD, HPT, CL2500 and CL3200[2], Linear, Flow Down

Linear Characteristic

Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L[1]
		mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
2	ISA 75.08.06 (long) or ISA 75.08.05 (long)	47.6	1.875	25.4	1	C_v	0.686	0.937	4.03	10.1	17.3	24.0	29.0	32.6	35.5	37.9	0.81
						K_v	*0.593*	*0.811*	*3.49*	*8.74*	*15.0*	*20.8*	*25.1*	*28.2*	*30.7*	*32.8*	---
						X_T	0.888	0.675	0.533	0.566	0.616	0.656	0.702	0.733	0.747	0.722	---
3	ISA-75.08.06 (short) or ISA-75.08.05 (short)	57.2	2.25	38.1	1.5	Cv	7.00	24.5	41.1	51.9	62.9	70	79	85	88	88	0.826
						Kv	6.06	21.2	35.6	44.9	54.4	61	68	74	76	76	---
						X_T	0.508	0.528	0.557	0.627	0.689	0.695	0.692	0.684	0.669	0.659	---
						Fd	0.292	0.369	0.322	0.287	0.246	0.224	0.201	0.186	0.174	0.167	---
4	ISA-75.08.06 (short) or ASME B16.10 (Short)	73.7	2.9	50.8	2	Cv	2.70	17.3	35.2	53.2	70.1	94	118	136	147	153	0.837
						Kv	2.34	15.0	30.4	46.0	60.6	81	102	118	127	132	---
						X_T	0.638	0.585	0.541	0.538	0.563	0.611	0.661	0.671	0.67	0.663	---
						Fd	0.842	0.339	0.226	0.178	0.152	0.128	0.110	0.098	0.090	0.083	---
6	ISA-75.08.06 (short) or ISA-75.08.05 (short)	105.9	4.17	76.2	3	Cv	10.30	44.1	82.7	133.5	181.7	235	276	302	315	321	0.837
						Kv	8.91	38.1	71.5	115.5	157.2	203	239	261	272	278	---
						X_T	0.638	0.585	0.541	0.538	0.563	0.611	0.661	0.671	0.67	0.663	---
						Fd	0.437	0.208	0.145	0.110	0.092	0.079	0.070	0.063	0.058	0.055	---
8	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	139.7	5.5	76.2	3	Cv	20	66	130	199	266	328	385	440	506	560	0.77
						Kv	17	57	112	172	230	284	333	381	438	484	---
						X_T	0.629	0.719	0.671	0.613	0.578	0.541	0.538	0.531	0.497	0.486	---
						Fd	0.29	0.34	0.36	0.36	0.36	0.36	0.34	0.33	0.33	0.33	---
10	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	165.1	6.5	76.2	3	Cv	26	84	162	247	333	413	484	552	623	682	0.71
						Kv	22	73	140	214	288	357	419	477	539	590	---
						X_T	0.629	0.719	0.671	0.613	0.578	0.541	0.538	0.531	0.497	0.486	---
						Fd	0.27	0.33	0.35	0.36	0.36	0.36	0.35	0.34	0.33	0.33	---
12	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	190.5	7.5	127	5	Cv	67	184	315	455	596	733	859	995	1136	1232	0.71
						Kv	58	159	272	394	516	634	743	861	983	1066	---
						X_T	0.629	0.719	0.671	0.613	0.578	0.541	0.538	0.531	0.497	0.486	---
						Fd	0.32	0.36	0.36	0.36	0.35	0.34	0.33	0.31	0.30	0.30	---
14	Fisher Design	215.9	8.5	127	5	C_v	121	290	478	675	871	1053	1233	1411	1538	1627	0.7
						K_v	104	251	413	584	753	911	1067	1220	1330	1407	---
						X_T	0.63	0.72	0.67	0.61	0.58	0.54	0.54	0.53	0.50	0.49	---
						F_d	0.04	0.07	0.09	0.10	0.13	0.15	0.19	0.24	0.29	0.33	---

HPD, HPT, CL2500 and CL3200(2), Equal Percentage, Flow Down

Equal Percentage Characteristic

Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L(1)
		mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
2	ISA 75.08.06 (long) or ISA 75.08.05 (long)	47.6	1.875	25.4	1	Cv	0.596	1.09	2.58	5.61	10.1	15.4	20.9	26.2	30.8	34.7	0.83
						Kv	*0.516*	*0.943*	*2.23*	*4.85*	*8.74*	*13.3*	*18.1*	*22.7*	*26.6*	*30.0*	- - -
						X_T	0.816	0.667	0.631	0.602	0.588	0.594	0.633	0.686	0.721	0.719	- - -
8	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	139.7	5.5	76.2	4	Cv	23	46	73	116	183	249	330	429	516	582	0.77
						Kv	20	40	63	100	158	215	285	371	446	503	- - -
						X_T	0.629	0.719	0.671	0.613	0.578	0.541	0.538	0.531	0.497	0.486	- - -
						Fd	0.24	0.26	0.25	0.32	0.33	0.33	0.31	0.30	0.30	0.31	- - -
10	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	165.1	6.5	101.6	4	Cv	27	50	76	119	188	260	341	448	562	651	0.71
						Kv	23	43	66	103	163	225	295	388	486	563	- - -
						X_T	0.629	0.719	0.671	0.613	0.578	0.541	0.538	0.531	0.497	0.486	- - -
						Fd	0.20	0.24	0.25	0.32	0.34	0.35	0.33	0.33	0.32	0.33	- - -
12	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	190.5	7.5	101.6	4	Cv	40	77	115	177	264	358	490	704	918	1083	0.71
						Kv	35	67	99	153	228	310	424	609	794	937	- - -
						X_T	0.629	0.719	0.671	0.613	0.578	0.541	0.538	0.531	0.497	0.486	- - -
						Fd	0.25	0.25	0.24	0.32	0.32	0.32	0.31	0.30	0.30	0.30	- - -
14	Fisher Design	215.9	8.5	127	5	Cv	65	108	152	198	246	332	496	793	1094	1332	0.70
						Kv	56	93	132	172	213	287	429	686	946	1152	- - -
						X_T	0.63	0.72	0.67	0.61	0.58	0.54	0.54	0.53	0.50	0.49	- - -
						Fd	0.04	0.07	0.09	0.10	0.13	0.15	0.19	0.24	0.29	0.33	- - -

HPD, HPT, CL2500, Modified Equal Percentage, Flow Down

Modified Equal Percentage Characteristic

Valve Size, NPS	Face to Face Standard	Port Diameter mm	Port Diameter Inches	Maximum Travel mm	Maximum Travel Inches	Flow Coeffi-cient	10	20	30	40	50	60	70	80	90	100	F_L(1)
2	ISA 75.08.06 (long) or ISA 75.08.05 (long)	47.6	1.875	28.6	1.125	C_v	0.622	1.34	3.52	7.73	13.4	19.5	25.5	31.0	34.7	38.0	0.81
						K_v	*0.538*	*1.16*	*3.04*	*6.69*	*11.6*	*16.9*	*22.1*	*26.8*	*30.0*	*32.9*	- - -
						X_T	0.667	0.664	0.640	0.570	0.586	0.635	0.669	0.712	0.757	0.707	- - -
3	ISA-75.08.06 (short) or ISA-75.08.05 (short)	57.15	2.25	38.1	1.5	Cv	2.90	8.3	17.2	26.3	39.7	51	63	72	80	84	0.826
						Kv	2.51	7.2	14.9	22.7	34.3	44	54	62	69	73	- - -
						X_T	0.508	0.528	0.557	0.627	0.689	0.695	0.692	0.684	0.669	0.659	- - -
						Fd	0.584	0.738	0.591	0.478	0.354	0.293	0.243	0.219	0.197	0.186	- - -
4	ISA-75.08.06 (short) or ASME B16.10 (Short)	73.66	2.9	50.8	2	Cv	2.70	9.2	11.6	20	26.8	39	60	86	111	131	0.837
						Kv	2.34	8.0	10.0	17.3	23.2	34	52	74	96	113	- - -
						X_T	0.638	0.585	0.541	0.538	0.563	0.611	0.661	0.671	0.67	0.663	- - -
						Fd	0.842	0.505	0.438	0.313	0.264	0.212	0.166	0.135	0.115	0.101	- - -
6	ISA-75.08.06 (short) or ISA-75.08.05 (short)	105.9	4.17	76.2	3	Cv	7.60	20.0	31.2	62.0	114.5	176	231	273	300	314	0.837
						Kv	6.57	17.3	27.0	53.6	99.0	152	200	236	260	272	- - -
						X_T	0.638	0.585	0.541	0.538	0.563	0.611	0.661	0.671	0.67	0.663	- - -
						Fd	0.575	0.334	0.254	0.171	0.120	0.094	0.080	0.070	0.064	0.059	- - -

1. At 100% travel.
2. CL3200 available with NPS 8, 10 and 12.

HPD, HPT, Whisper Trim III--CL900 and 1500, Flow Up

Linear Characteristic

Cage Level	Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										
			mm	Inches	mm	Inches		Mini-mum(1)	10	20	30	40	50	60	70	80	90	100
A1(2)	2	ISA 75.08.06 (long)	47.6	1.875	38	1.5	C_v	2.90	3.00	7.70	13.0	17.8	22.3	26.4	31.0	35.3	39.0	42.0
							K_v	2.51	2.59	6.66	11.2	15.4	19.3	22.8	26.8	30.5	33.7	36.3
							X_T	0.569	0.516	0.602	0.604	0.610	0.607	0.618	0.608	0.607	0.612	0.608
	3	ISA 75.08.06 (long) or ISA 75.08.05 (long)	73.0	2.875	50	2	C_v	6.40	6.57	24.1	42.1	58.9	74.0	86.8	97.4	105	110	111
							K_v	5.54	5.68	20.8	36.4	50.9	64.0	75.1	84.3	90.8	95.2	96.0
							X_T	0.826	0.727	0.610	0.560	0.558	0.588	0.641	0.687	0.723	0.738	0.772
	4	ISA 75.08.06 (long) or ISA 75.08.05 (long)	92.1	3.625	50	2	C_v	7.50	7.56	27.3	50.1	71.5	90.8	109	126	142	155	162
							K_v	6.49	6.54	23.6	43.3	61.8	78.5	94.3	109	123	134	140
							X_T	0.538	0.625	0.586	0.545	0.519	0.520	0.542	0.577	0.614	0.640	0.674
		ISA-75.08.06 (short) or ASME B16.10 (Short) or Fisher Design	91.4	3.6	50.8	2	C_v	7.51	13.3	28.1	43.7	60	76.3	92	106	118	127	134
							K_v	6.50	11.5	24.3	37.8	51.9	66.0	79.6	91.7	102	110	116
							X_T	- - -	0.527	0.554	0.578	0.561	0.559	0.569	0.580	0.610	0.652	0.679
	6	ISA 75.08.06 (long) or ISA 75.08.05 (long)	136.5	5.375	76	3	C_v	13.8	28.6	66.4	103	142	180	220	253	284	308	324
							K_v	11.9	24.7	57.4	89.1	123	156	190	219	246	266	280
							X_T	0.478	0.423	0.513	0.533	0.525	0.557	0.535	0.543	0.560	0.598	0.627
		ISA-75.08.06 (short) or ASME B16.10 (Short) or Fisher Design	137.2	5.4	76.2	3	C_v	12.5	31.4	63.7	95.3	127	159	190	219	241	257	266
							K_v	10.8	27.2	55.1	82.4	110	138	164	189	208	222	230
							X_T	---	0.572	0.556	0.549	0.551	0.544	0.55	0.555	0.594	0.637	0.672
	8	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	152.4	6	101.6	4	Cv	26.85	66	123	181	239	294	345	392	434	470	502
							Kv	23.3	57	106	157	206	254	299	339	375	407	434
							X_T	- - -	0.515	0.487	0.5	0.517	0.527	0.553	0.603	0.678	0.777	0.799
	10	ISA-75.08.06 (short) or ISA-75.08.05 (short)	177.8	7	101.6	4	Cv	34.3	94	176	257	339	421	500	576	644	703	747
							Kv	29.7	81	152	222	293	364	433	498	557	608	646
							X_T	- - -	0.515	0.487	0.5	0.517	0.527	0.553	0.603	0.678	0.777	0.799
	12	ISA-75.08.06 (short) or ISA-75.08.05 (short)	203.2	8	127	5	Cv	42	156	299	438	568	685	786	870	935	981	1009
							Kv	36.4	135	259	379	491	592	680	753	809	849	873
							X_T	- - -	0.515	0.487	0.5	0.517	0.527	0.553	0.603	0.678	0.777	0.799

HPD, HPT, Whisper Trim III--CL900 and 1500, Flow Up (cont.)

Linear Characteristic

Cage Level	Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										
			mm	Inches	mm	Inches		Minimum(1)	10	20	30	40	50	60	70	80	90	100
A3	4	ISA-75.08.06 (short) or ASME B16.10 (Short) or Fisher Design	91.4	3.6	50.8	2	Cv	5.58	13.1	27.7	43.0	59.0	75.1	90.6	105	117	126	133
							K_v	4.83	11.3	24.0	37.2	51.0	65.0	78.4	90.8	101	109	115
							X_T	---	0.527	0.554	0.578	0.561	0.559	0.569	0.580	0.610	0.652	0.679
	6	ISA-75.08.06 (short) or ASME B16.10 (Short) or Fisher Design	137.2	5.4	76.2	3	Cv	9.74	32.4	65.9	98.8	132	165	197	225	247	260	270
							K_v	8.43	28.0	57.0	85.5	114	143	170	195	214	225	234
							X_T	---	0.572	0.556	0.549	0.551	0.544	0.55	0.555	0.594	0.637	0.672
	8	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	152.4	6	101.6	4	Cv	23.14	65	121	178	235	290	341	387	429	465	497
							K_v	20.1	56	105	154	203	251	295	335	371	402	430
							X_T	---	0.515	0.487	0.5	0.517	0.527	0.553	0.603	0.678	0.777	0.799
	10	ISA-75.08.06 (short) or ISA-75.08.05 (short)	177.8	7	101.6	4	Cv	28.3	89	165	241	318	394	469	541	608	668	718
							K_v	24.5	77	143	208	275	341	406	468	526	578	621
							X_T	---	0.515	0.487	0.5	0.517	0.527	0.553	0.603	0.678	0.777	0.799
	12	ISA-75.08.06 (short) or ISA-75.08.05 (short)	203.2	8	127	5	Cv	34	147	281	411	534	647	748	833	902	955	991
							K_v	29.5	127	243	356	462	560	647	720	780	826	857
							X_T	---	0.515	0.487	0.5	0.517	0.527	0.553	0.603	0.678	0.777	0.799
B1	3	ISA 75.08.06 (long) or ISA 75.08.05 (long)	73.0	2.875	50	2	C_v	3.00	3.00	9.00	14.4	18.6	23.4	28.5	34.6	40.2	45.0	48.8
							K_v	2.59	*2.59*	*7.79*	*12.5*	*16.1*	*20.2*	*24.7*	*29.9*	*34.8*	*38.9*	*42.2*
							X_T	0.796	0.615	0.618	0.592	0.622	0.622	0.633	0.620	0.624	0.622	0.622
	4	ISA-75.08.06 (short) or ASME B16.10 (Short) or Fisher Design	91.4	3.6	50.8	2	Cv	7.54	10.0	20.1	30.3	40.9	51.9	63.0	74.2	85.1	95.4	105
							K_v	6.52	8.65	17.4	26.2	35.4	44.9	54.5	64.2	73.6	82.5	90.8
							X_T	---	0.527	0.554	0.578	0.561	0.559	0.569	0.580	0.610	0.652	0.679
	6	ISA-75.08.06 (short) or ASME B16.10 (Short) or Fisher Design	137.2	5.4	76.2	3	Cv	12.4	23.7	46.5	69	91.2	113	136	158	180	201	220
							K_v	10.7	20.5	40.2	59.7	78.9	97.7	118	137	156	174	190
							X_T	---	0.572	0.556	0.549	0.551	0.544	0.55	0.555	0.594	0.637	0.672
	8	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	152.4	6	127	5	Cv	25.37	54	96	139	182	226	267	307	345	380	412
							K_v	22.0	47	83	120	157	195	231	266	298	329	356
							X_T	---	0.515	0.487	0.5	0.517	0.527	0.553	0.603	0.678	0.777	0.799
	10	ISA-75.08.06 (short) or ISA-75.08.05 (short)	177.8	7	127	5	Cv	31.2	72	128	183	238	291	343	393	440	483	521
							K_v	27.0	62	111	158	206	252	297	340	381	418	451
							X_T	---	0.515	0.487	0.5	0.517	0.527	0.553	0.603	0.678	0.777	0.799
	12	ISA-75.08.06 (short) or ISA-75.08.05 (short)	203.2	8	152.4	6	Cv	35.2	93	169	245	322	399	475	548	619	686	750
							Kv	30.5	80	146	212	279	345	411	474	535	594	648
							X_T	---	0.531	0.525	0.516	0.519	0.535	0.573	0.641	0.727	0.819	0.866

HPD, HPT, Whisper Trim III--CL900 and 1500, Flow Up (cont.)

Linear Characteristic

Cage Level	Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										
			mm	Inches	mm	Inches		Mini-mum(1)	10	20	30	40	50	60	70	80	90	100
B3	4	ISA 75.08.06 (long) or ISA 75.08.05 (long)	92.1	3.625	50	2	C_v	3.50	8.00	20.0	30.0	40.0	52.0	62.0	73.0	82.0	88.9	88.9
							K_v	*3.03*	*6.92*	*17.3*	*25.9*	*34.6*	*45.0*	*53.6*	*63.1*	*70.9*	*76.9*	*76.9*
							X_T	0.617	0.591	0.531	0.524	0.517	0.513	0.509	0.517	0.527	0.522	0.522
							F_d	- - -	0.13	0.087	0.062	0.053	0.048	0.042	0.039	0.036	0.034	0.034
		ISA-75.08.06 (short) or ASME B16.10 (Short) or Fisher Design	91.4	3.6	50.8	2	C_v	5.20	10.3	20.9	31.6	42.8	54.3	66.0	77.6	88.8	99.3	109
							K_v	4.50	8.91	18.1	27.3	37.0	47.0	57.1	67.1	76.8	85.9	94.3
							X_T	- - -	0.527	0.554	0.578	0.561	0.559	0.569	0.580	0.610	0.652	0.679
	6	ISA 75.08.06 (long) or ISA 75.08.05 (long)	136.5	5.375	76	3	C_v	8.00	13	30	50	69	87	107	125	143	160	166
							K_v	*6.92*	*11.2*	*25.9*	*43.3*	*59.7*	*75.3*	*92.6*	*108*	*124*	*138*	*144*
		ISA-75.08.06 (short) or ASME B16.10 (Short) or Fisher Design	137.2	5.4	76.2	3	C_v	9.31	25.4	50.4	75	99.3	124	148	173	196	218	236
							K_v	8.05	22.0	43.6	64.9	85.9	107	128	150	170	189	204
							X_T	- - -	0.572	0.556	0.549	0.551	0.544	0.55	0.555	0.594	0.637	0.672
	8	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	152.4	6	127	5	Cv	21.87	55	97	141	185	229	272	312	350	386	418
							K_v	19.0	48	84	122	160	198	235	270	303	334	362
							X_T	- - -	0.515	0.487	0.5	0.517	0.527	0.553	0.603	0.678	0.777	0.799
	10	ISA-75.08.06 (short) or ISA-75.08.05 (short)	177.8	7	127	5	C_v	26.3	73	130	186	241	296	349	399	446	489	527
							K_v	22.8	63	112	161	208	256	302	345	386	423	456
							X_T	- - -	0.515	0.487	0.5	0.517	0.527	0.553	0.603	0.678	0.777	0.799
	12	ISA-75.08.06 (short) or ISA-75.08.05 (short)	203.2	8	152.4	6	C_v	29.8	94	171	249	327	405	481	556	627	695	759
							K_v	25.8	81	148	215	283	350	416	481	542	601	656
							X_T	- - -	0.531	0.525	0.516	0.519	0.535	0.573	0.641	0.727	0.819	0.866
C1	4	ISA-75.08.06 (short) or ASME B16.10 (Short) or Fisher Design	91.4	3.6	50.8	2	C_v	6.78	7.66	14.5	21.2	28.1	35.2	42.4	49.8	57.3	64.8	72.4
							K_v	5.86	6.63	12.5	18.3	24.3	30.4	36.7	43.1	49.6	56.1	62.6
							X_T	- - -	0.527	0.554	0.578	0.561	0.559	0.569	0.580	0.610	0.652	0.679
	6	ISA-75.08.06 (short) or ASME B16.10 (Short) or Fisher Design	137.2	5.4	76.2	3	C_v	11.6	18.4	34.7	51	67	82.9	98.7	114	130	146	162
							K_v	10.0	15.9	30.0	44.1	58.0	71.7	85.4	98.6	112	126	140
							X_T	- - -	0.572	0.556	0.549	0.551	0.544	0.55	0.555	0.594	0.637	0.672
	8	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	152.4	6	127	5	C_v	24.33	43	70	97	124	152	179	206	233	260	287
							K_v	21.0	37	61	84	107	131	155	178	202	225	248
							X_T	- - -	0.515	0.487	0.5	0.517	0.527	0.553	0.603	0.678	0.777	0.799
	10	ISA-75.08.06 (short) or ISA-75.08.05 (short)	177.8	7	127	5	C_v	28.8	52	86	119	153	186	219	252	284	316	347
							K_v	24.9	45	74	103	132	161	189	218	246	273	300
							X_T	- - -	0.515	0.487	0.5	0.517	0.527	0.553	0.603	0.678	0.777	0.799
	12	ISA-75.08.06 (short) or ISA-75.08.05 (short)	203.2	8	152.4	6	C_v	32.66	65	110	156	202	249	295	342	388	434	479
							K_v	28.3	57	96	135	175	215	255	295	335	375	414
							X_T	- - -	0.531	0.525	0.516	0.519	0.535	0.573	0.641	0.727	0.819	0.866

HPD, HPT, Whisper Trim III--CL900 and 1500, Flow Up (cont.)

Linear Characteristic

Cage Level	Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										
			mm	Inches	mm	Inches		Mini-mum(1)	10	20	30	40	50	60	70	80	90	100
C3	4	ISA 75.08.06 (long) or ISA 75.08.05 (long)	92.1	3.625	50	2	C_v	3.50	8.00	15.0	21.5	28.0	34.4	41.0	47.3	53.5	56.5	56.8
							K_v	*3.03*	*6.92*	*13.0*	*18.6*	*24.2*	*29.8*	*35.5*	*40.9*	*46.3*	*48.9*	*49.1*
							X_T	0.617	0.526	0.516	0.530	0.530	0.539	0.535	0.540	0.538	0.540	0.540
							F_d	- - -	0.14	0.11	0.079	0.064	0.060	0.053	0.047	0.046	0.042	0.042
		ISA-75.08.06 (short) or ASME B16.10 (Short) or Fisher Design	91.4	3.6	50.8	2	C_v	4.83	7.66	14.5	21.2	28.1	35.2	42.4	49.8	57.3	64.8	72.4
							K_v	*4.18*	*6.63*	*12.5*	*18.3*	*24.3*	*30.4*	*36.7*	*43.1*	*49.6*	*56.1*	*62.6*
							X_T	- - -	0.527	0.554	0.578	0.561	0.559	0.569	0.580	0.610	0.652	0.679
	6	ISA 75.08.06 (long) or ISA 75.08.05 (long)	136.5	5.375	76	3	C_v	8.00	8.30	20.5	33.0	44.3	57.0	69.0	83.0	96.5	108	112
							K_v	*6.92*	*7.18*	*17.7*	*28.5*	*38.3*	*49.3*	*59.7*	*71.8*	*83.5*	*93.4*	*96.9*
							X_T	0.563	0.567	0.575	0.572	0.572	0.556	0.568	0.563	0.561	0.559	0.563
							F_d	- - -	0.093	0.067	0.051	0.045	0.039	0.036	0.032	0.031	0.029	0.028
		ISA-75.08.06 (short) or ASME B16.10 (Short) or Fisher Design	137.2	5.4	76.2	3	C_v	8.67	18.4	34.7	51	67	82.9	98.7	114	130	146	162
							K_v	*7.50*	*15.9*	*30.0*	*44.1*	*58.0*	*71.7*	*85.4*	*98.6*	*126*	*126*	*140*
							X_T	- - -	0.572	0.556	0.549	0.551	0.544	0.55	0.555	0.637	0.637	0.672
	8	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	152.4	6	127	5	C_v	21.13	41	66	93	120	147	175	202	230	256	282
							K_v	18.3	35	57	80	104	127	151	175	199	221	244
							X_T	- - -	0.515	0.487	0.5	0.517	0.527	0.553	0.603	0.678	0.777	0.799
	10	ISA-75.08.06 (short) or ISA-75.08.05 (short)	177.8	7	127	5	C_v	25.3	53	88	123	158	192	226	260	294	326	358
							K_v	21.9	46	76	106	137	166	195	225	254	282	310
							X_T	- - -	0.515	0.487	0.5	0.517	0.527	0.553	0.603	0.678	0.777	0.799
	12	ISA-75.08.06 (short) or ISA-75.08.05 (short)	203.2	8	152.4	6	C_v	28.74	68	117	166	215	265	315	365	414	463	511
							K_v	24.9	59	101	143	186	229	273	316	358	400	442
							X_T	- - -	0.531	0.525	0.516	0.519	0.535	0.573	0.641	0.727	0.819	0.866

HPD, HPT, Whisper Trim III--CL900 and 1500, Flow Up (cont.)

Linear Characteristic

Cage Level	Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										
			mm	Inches	mm	Inches		Mini-mum(1)	10	20	30	40	50	60	70	80	90	100
D3	4	ISA 75.08.06 (long) or ISA 75.08.05 (long)	73.0	2.875	50	2	C_v	2.30	4.00	7.90	11.5	15.2	18.8	22.8	27.0	30.8	33.7	37.1
							K_v	*1.99*	*3.46*	*6.83*	*9.95*	*13.1*	*16.3*	*19.7*	*23.4*	*26.6*	*29.2*	*32.1*
							X_T	0.554	0.517	0.525	0.540	0.526	0.533	0.536	0.534	0.530	0.533	0.530
	6	ISA 75.08.06 (long) or ISA 75.08.05 (long)	111.1	4.375	76	3	C_v	4.20	7.00	14.0	20.7	28.0	34.8	41.6	48.5	55.7	62.5	69.6
							K_v	3.63	*6.05*	*12.1*	*17.9*	*24.2*	*30.1*	*36.0*	*42.0*	*48.2*	*54.1*	*60.2*
							X_T	0.579	0.563	0.557	0.572	0.557	0.569	0.564	0.566	0.562	0.566	0.564
	8	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	152.4	6	127	5	Cv	21.47	37	58	79	101	124	147	170	192	215	237
							Kv	18.6	32	50	68	87	107	127	147	166	186	205
							X_T	- - -	0.515	0.487	0.5	0.517	0.527	0.553	0.603	0.678	0.777	0.799
	10	ISA-75.08.06 (short) or ISA-75.08.05 (short)	177.8	7	127	5	Cv	25.7	47	75	104	132	160	188	216	244	271	298
							Kv	22.3	41	65	90	114	138	163	187	211	234	258
							X_T	- - -	0.515	0.487	0.5	0.517	0.527	0.553	0.603	0.678	0.777	0.799
	12	ISA-75.08.06 (short) or ISA-75.08.05 (short)	203.2	8	152.4	6	Cv	29.35	62	103	145	187	230	272	315	357	400	442
							Kv	25.4	54	89	125	162	199	236	272	309	346	382
							X_T	- - -	0.531	0.525	0.516	0.519	0.535	0.573	0.641	0.727	0.819	0.866

1. Valve should not be required to throttle at less than the minimum coefficient for an extended time, or erosion damage to the valve seat may result.
2. Larger capacities may be available with level A1 cages depending on service conditions.
3. CL3200 available with NPS 8, 10, and 12.

HPD, HPT, Whisper Trim III--CL2500, CL3200(3), Flow Up

Linear Characteristic

Cage Level	Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										
			mm	Inches	mm	Inches		Mini-mum(1)	10	20	30	40	50	60	70	80	90	100
A1(2)	2	ISA 75.08.06 (long) or ISA 75.08.05 (long)	47.6	1.875	38	1.5	C_v	3.00	3.1	8.4	13.1	17.3	21.4	25.1	28.3	30.8	32.9	34.9
							K_v	*2.59*	*2.68*	*7.27*	*11.3*	*15.0*	*18.5*	*21.7*	*24.5*	*26.6*	*28.5*	*30.2*
							X_T	- - -	0.515	0.487	0.5	0.517	0.527	0.553	0.603	0.678	0.777	0.799
	3	ISA-75.08.06 (short) or ISA-75.08.05 (short)	57.15	2.25	38.1	1.5	Cv	5.98	7.25	15.7	23.7	31.0	37.9	44	50	56	61	66
							Kv	- - -	6.27	13.6	20.5	26.8	32.8	38	43	48	53	57
							X_T	- - -	0.512	0.541	0.545	0.564	0.564	0.592	0.626	0.671	0.702	0.711
	4	ISA-75.08.06 (short) or ASME B16.10 (short)	73.66	2.9	50.8	2	Cv	7.38	12.42	27.8	42.9	57.0	70.3	83	96	107	117	124
							Kv	- - -	10.74	24.0	37.1	49.3	60.8	72	83	93	101	107
							X_T	- - -	0.561	0.546	0.553	0.556	0.581	0.598	0.629	0.657	0.704	0.707
	6	ISA-75.08.06 (short) or ISA-75.08.05 (short)	105.9	4.17	76.2	3	Cv	12.68	30.39	64.9	98.1	128.8	158.1	187	214	237	254	266
							Kv	- - -	26.29	56.1	84.9	111.4	136.8	162	185	205	220	230
							X_T	- - -	0.561	0.546	0.553	0.556	0.581	0.598	0.629	0.657	0.704	0.707
	8	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	139.7	5.5	101.6	4	Cv	26.1	69	129	190	249	305	356	402	441	474	499
							Kv	22.6	60	112	164	215	264	308	348	381	410	432
							X_T	- - -	0.515	0.487	0.5	0.517	0.527	0.553	0.603	0.678	0.777	0.799
	10	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	165.1	6.5	101.6	4	Cv	29.6	74	135	196	255	314	371	427	480	530	578
							Kv	25.6	64	117	170	221	272	321	369	415	458	500
							X_T	- - -	0.515	0.487	0.5	0.517	0.527	0.553	0.603	0.678	0.777	0.799
	12	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	190.5	7.5	127	5	Cv	35.4	116	221	326	429	529	621	705	777	835	878
							Kv	30.7	100	191	282	371	457	537	610	672	722	759
							X_T	- - -	0.531	0.525	0.516	0.519	0.535	0.573	0.641	0.727	0.819	0.866
	14	Fisher Design	215.9	8.5	127	5	Cv	37.8	150	282	415	546	672	790	896	989	1065	1121
							Kv	- - -	130	244	359	472	581	683	775	856	921	969
							X_T	- - -	0.52	0.49	0.50	0.52	0.53	0.55	0.60	0.68	0.78	0.80
A3	3	ISA-75.08.06 (short) or ISA-75.08.05 (short)	57.15	2.25	38.1	1.5	Cv	4.51	7.97	17.5	26.4	34.6	42.0	49	55	61	67	72
							Kv	- - -	6.89	15.1	22.8	29.9	36.3	42	48	53	58	62
							X_T	- - -	0.512	0.541	0.545	0.564	0.564	0.592	0.626	0.671	0.702	0.711
	4	ISA-75.08.06 (short) or ASME B16.10 (short)	73.66	2.9	50.8	2	Cv	5.67	12.26	27.4	42.3	56.2	69.3	82	94	106	116	123
							Kv	- - -	10.60	23.7	36.6	48.6	59.9	71	81	92	100	106
							X_T	- - -	0.561	0.546	0.553	0.556	0.581	0.598	0.629	0.657	0.704	0.707
	6	ISA-75.08.06 (short) or ISA-75.08.05 (short)	105.9	4.17	76.2	3	Cv	9.68	28.31	60.1	91.1	119.9	147.2	174	200	223	243	257
							Kv	- - -	24.49	52.0	78.8	103.7	127.3	151	173	193	210	222
							X_T	- - -	0.561	0.546	0.553	0.556	0.581	0.598	0.629	0.657	0.704	0.707

HPD, HPT, Whisper Trim III--CL2500, CL3200(3), Flow Up (cont.)

Linear Characteristic

Cage Level	Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										
			mm	Inches	mm	Inches		Mini-mum(1)	10	20	30	40	50	60	70	80	90	100
A3	8	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	139.7	5.5	101.6	4	Cv	22.1	69	129	189	248	303	354	400	440	472	498
							Kv	19.2	60	112	163	215	262	306	346	381	408	431
							X_T	- - -	0.515	0.487	0.5	0.517	0.527	0.553	0.603	0.678	0.777	0.799
	10	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	165.1	6.5	101.6	4	Cv	25.1	71	128	184	240	296	350	402	453	502	548
							Kv	21.7	61	111	159	208	256	303	348	392	434	474
							X_T	- - -	0.515	0.487	0.5	0.517	0.527	0.553	0.603	0.678	0.777	0.799
	12	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	190.5	7.5	127	5	Cv	29.8	110	208	307	404	499	588	670	742	804	853
							Kv	25.8	95	180	265	350	431	508	579	642	696	738
							X_T	- - -	0.531	0.525	0.516	0.519	0.535	0.573	0.641	0.727	0.819	0.866
	14	Fisher Design	215.9	8.5	127	5	Cv	37.8	143	267	393	517	637	750	855	948	1027	1090
							Kv	- - -	124	231	340	447	551	649	740	820	889	943
							X_T	- - -	0.52	0.49	0.50	0.52	0.53	0.55	0.60	0.68	0.78	0.80
B1	3	ISA-75.08.06 (short) or ISA-75.08.05 (short)	57.15	2.25	38.1	1.5	Cv	5.02	4.81	9.4	14.0	18.3	22.5	27	30	34	38	41
							Kv	---	4.16	8.1	12.1	15.8	19.5	23	26	29	33	35
							X_T	---	0.512	0.541	0.545	0.564	0.564	0.592	0.626	0.671	0.702	0.711
	4	ISA-75.08.06 (short) or ASME B16.10 (short)	73.66	2.9	50.8	2	Cv	6.52	8.10	16.3	25.0	33.7	42.2	50	58	65	73	80
							Kv	- - -	7.01	14.1	21.6	29.2	36.5	43	50	56	63	69
							X_T	- - -	0.561	0.546	0.553	0.556	0.581	0.598	0.629	0.657	0.704	0.707
	6	ISA-75.08.06 (short) or ISA-75.08.05 (short)	105.9	4.17	76.2	3	Cv	10.99	18.51	36.4	55.2	73.8	91.7	109	125	141	157	172
							Kv	- - -	16.01	31.5	47.7	63.8	79.3	94	108	122	136	149
							X_T	- - -	0.561	0.546	0.553	0.556	0.581	0.598	0.629	0.657	0.704	0.707
	8	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	139.7	5.5	127	5	Cv	24.4	56	100	144	188	232	274	314	351	385	416
							Kv	21.1	48	87	125	163	201	237	272	304	333	360
							X_T	- - -	0.515	0.487	0.5	0.517	0.527	0.553	0.603	0.678	0.777	0.799
	10	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	165.1	6.5	127	5	Cv	27.5	59	101	144	186	228	270	311	352	391	429
							Kv	23.8	51	87	125	161	197	234	269	304	338	371
							X_T	- - -	0.515	0.487	0.5	0.517	0.527	0.553	0.603	0.678	0.777	0.799
	12	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	190.5	7.5	152.4	6	Cv	32.9	86	156	227	298	369	438	505	569	630	686
							Kv	28.5	75	135	196	258	319	379	437	492	545	593
							X_T	- - -	0.531	0.525	0.516	0.519	0.535	0.573	0.641	0.727	0.819	0.866
	14	Fisher Design	215.9	8.5	152.4	6	Cv	37.8	119	204	299	394	489	581	670	755	835	908
							Kv	- - -	103	176	258	341	423	503	580	653	722	785
							X_T	- - -	0.52	0.49	0.50	0.52	0.53	0.55	0.60	0.68	0.78	0.80

HPD, HPT, Whisper Trim III--CL2500, CL3200(3), Flow Up (cont.)

Linear Characteristic

Cage Level	Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										
			mm	Inches	mm	Inches		Minimum(1)	10	20	30	40	50	60	70	80	90	100
B3	3	ISA-75.08.06 (short) or ISA-75.08.05 (short)	57.15	2.25	38.1	1.5	Cv	3.79	5.51	11.3	16.8	22.1	27.2	32	37	41	45	49
							Kv	- - -	4.77	9.8	14.5	19.1	23.5	28	32	35	39	42
							X_T	- - -	0.512	0.541	0.545	0.564	0.564	0.592	0.626	0.671	0.702	0.711
	4	ISA-75.08.06 (short) or ASME B16.10 (short)	73.66	2.9	50.8	2	Cv	4.91	8.35	17.0	26.1	35.2	44.0	52	60	68	76	83
							Kv	- - -	7.22	14.7	22.6	30.4	38.1	45	52	59	66	72
							X_T	- - -	0.561	0.546	0.553	0.556	0.581	0.598	0.629	0.657	0.704	0.707
	6	ISA-75.08.06 (short) or ISA-75.08.05 (short)	105.9	4.17	76.2	3	Cv	8.69	18.92	37.4	56.8	76.0	94.3	112	129	145	161	177
							Kv	- - -	16.37	32.4	49.1	65.7	81.6	97	112	125	139	153
							X_T	- - -	0.561	0.546	0.553	0.556	0.581	0.598	0.629	0.657	0.704	0.707
	8	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	139.7	5.5	127	5	Cv	20.9	59	106	154	201	248	292	334	372	407	437
							Kv	18.1	51	92	133	174	215	253	289	322	352	378
							X_T	- - -	0.515	0.487	0.5	0.517	0.527	0.553	0.603	0.678	0.777	0.799
	10	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	165.1	6.5	127	5	Cv	23.9	61	107	152	197	242	286	330	372	414	454
							Kv	20.1	53	93	131	170	209	247	285	322	358	393
							X_T	- - -	0.515	0.487	0.5	0.517	0.527	0.553	0.603	0.678	0.777	0.799
	12	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	190.5	7.5	152.4	6	Cv	28.1	90	164	239	314	389	461	531	598	660	717
							Kv	24.3	78	142	207	272	336	399	460	517	571	620
							X_T	- - -	0.531	0.525	0.516	0.519	0.535	0.573	0.641	0.727	0.819	0.866
	14	Fisher Design	215.9	8.5	152.4	6	Cv	37.8	119	204	299	394	489	581	670	755	835	908
							Kv	- - -	103	176	258	341	423	503	580	653	722	785
							X_T	- - -	0.52	0.49	0.50	0.52	0.53	0.55	0.60	0.68	0.78	0.80
C1	3	ISA-75.08.06 (short) or ISA-75.08.05 (short)	57.15	2.25	38.1	1.5	Cv	5.02	4.44	8.5	12.4	16.3	20.0	24	27	30	34	37
							Kv	- - -	3.84	7.4	10.7	14.1	17.3	21	23	26	29	32
							X_T	- - -	0.512	0.541	0.545	0.564	0.564	0.592	0.626	0.671	0.702	0.711
	4	ISA-75.08.06 (short) or ASME B16.10 (short)	73.66	2.9	50.8	2	Cv	5.8	6.22	11.2	16.6	22.2	27.8	33	39	44	49	54
							Kv	- - -	5.38	9.7	14.4	19.2	24.0	29	34	38	42	47
							X_T	- - -	0.561	0.546	0.553	0.556	0.581	0.598	0.629	0.657	0.704	0.707
	6	ISA-75.08.06 (short) or ISA-75.08.05 (short)	105.9	4.17	76.2	3	Cv	9.54	12.95	22.5	32.8	43.5	54.4	65	76	86	96	106
							Kv	- - -	11.20	19.5	28.4	37.6	47.1	56	66	74	83	92
							X_T	- - -	0.561	0.546	0.553	0.556	0.581	0.598	0.629	0.657	0.704	0.707

HPD, HPT, Whisper Trim III--CL2500, CL3200(3), Flow Up (cont.)

Linear Characteristic

Cage Level	Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										
			mm	Inches	mm	Inches		Minimum(1)	10	20	30	40	50	60	70	80	90	100
C1	8	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	139.7	5.5	127	5	Cv	22.7	41	68	95	123	151	178	206	233	259	287
							Kv	19.6	35	59	82	106	131	154	178	202	224	248
							X_T	- - -	0.515	0.487	0.5	0.517	0.527	0.553	0.603	0.678	0.777	0.799
	10	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	165.1	6.5	127	5	Cv	26.1	46	74	102	130	158	186	214	242	269	297
							Kv	22.6	40	64	88	112	137	161	185	209	233	257
							X_T	- - -	0.515	0.487	0.5	0.517	0.527	0.553	0.603	0.678	0.777	0.799
	12	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	190.5	7.5	152.4	6	Cv	31.2	64	109	155	202	248	295	341	387	433	477
							Kv	27.0	55	95	134	175	215	255	295	335	374	412
							X_T	- - -	0.531	0.525	0.516	0.519	0.535	0.573	0.641	0.727	0.819	0.866
	14	Fisher Design	215.9	8.5	152.4	6	Cv	37.8	85	138	185	241	297	353	409	465	520	574
							Kv	- - -	73	119	160	209	257	306	354	402	449	496
							X_T	- - -	0.52	0.49	0.50	0.52	0.53	0.55	0.60	0.68	0.78	0.80
C3	3	ISA-75.08.06 (short) or ISA-75.08.05 (short)	57.15	2.25	38.1	1.5	Cv	3.54	4.44	8.5	12.4	16.3	20.0	24	27	30	34	37
							Kv	- - -	3.84	7.4	10.7	14.1	17.3	21	23	26	29	32
							X_T	- - -	0.512	0.541	0.545	0.564	0.564	0.592	0.626	0.671	0.702	0.711
	4	ISA-75.08.06 (short) or ASME B16.10 (short)	73.66	2.9	50.8	2	Cv	4.54	6.22	11.2	16.6	22.2	27.8	33	39	44	49	54
							Kv	- - -	5.38	9.7	14.4	19.2	24.0	29	34	38	42	47
							X_T	- - -	0.561	0.546	0.553	0.556	0.581	0.598	0.629	0.657	0.704	0.707
	6	ISA-75.08.06 (short) or ISA-75.08.05 (short)	105.9	4.17	76.2	3	Cv	8.13	13.72	24.4	36.0	47.9	59.9	72	83	94	105	116
							Kv	- - -	11.87	21.1	31.1	41.4	51.8	62	72	81	91	100
							X_T	- - -	0.561	0.546	0.553	0.556	0.581	0.598	0.629	0.657	0.704	0.707
	8	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	139.7	5.5	127	5	Cv	19.98	42	71	100	130	159	189	217	246	273	299
							Kv	17.3	36	61	87	112	138	163	188	213	236	259
							X_T	- - -	0.515	0.487	0.5	0.517	0.527	0.553	0.603	0.678	0.777	0.799
	10	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	165.1	6.5	127	5	Cv	23	45	73	100	128	155	183	210	237	264	291
							Kv	20.0	39	63	87	111	134	158	182	205	228	252
							X_T	- - -	0.515	0.487	0.5	0.517	0.527	0.553	0.603	0.678	0.777	0.799
	12	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	190.5	7.5	152.4	6	Cv	27.03	65	111	158	205	253	300	347	394	440	485
							Kv	23.4	56	96	137	178	219	260	301	341	381	419
							X_T	- - -	0.531	0.525	0.516	0.519	0.535	0.573	0.641	0.727	0.819	0.866
	14	Fisher Design	215.9	8.5	152.4	6	Cv	37.8	87	142	192	251	309	368	426	484	541	597
							Kv	- - -	75	123	166	217	267	318	369	418	468	516
							X_T	- - -	0.52	0.49	0.50	0.52	0.53	0.55	0.60	0.68	0.78	0.80

HPD, HPT, Whisper Trim III--CL2500, CL3200(3), Flow Up (cont.)

Linear Characteristic

Cage Level	Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										
			mm	Inches	mm	Inches		Mini-mum(1)	10	20	30	40	50	60	70	80	90	100
D3	3	ISA-75.08.06 (short) or ISA-75.08.05 (short)	34.925	1.375	50.8	2	Cv	1.90	3.37	6.8	9.9	12.8	15.5	18	20	22	24	26
							Kv	- - -	2.92	5.9	8.6	11.1	13.4	16	17	19	21	22
							X_T	- - -	0.512	0.541	0.545	0.564	0.564	0.592	0.626	0.671	0.702	0.711
	4	ISA-75.08.06 (short) or ASME B16.10 (short)	57.15	2.25	50.8	2	Cv	3.02	4.34	8.2	12.4	16.7	20.9	25	29	33	36	40
							Kv	- - -	3.75	7.1	10.7	14.4	18.1	22	25	29	31	35
							X_T	- - -	0.561	0.546	0.553	0.556	0.581	0.598	0.629	0.657	0.704	0.707
	6	ISA-75.08.06 (short) or ISA-75.08.05 (short)	105.9	4.17	76.2	3	Cv	8.13	13.72	24.4	36.0	47.9	59.9	72	83	94	105	116
							Kv	- - -	11.87	21.1	31.1	41.4	51.8	62	72	81	91	100
							X_T	- - -	0.561	0.546	0.553	0.556	0.581	0.598	0.629	0.657	0.704	0.707
	8	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	139.7	5.5	127	5	Cv	20.6	39	65	91	117	143	169	195	220	245	270
							Kv	17.9	34	56	79	101	124	146	169	190	212	234
							X_T	- - -	0.515	0.487	0.5	0.517	0.527	0.553	0.603	0.678	0.777	0.799
	10	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	165.1	6.5	127	5	Cv	23.5	41	65	89	113	136	160	183	207	230	253
							Kv	20.4	35	56	77	98	118	138	158	179	199	219
							X_T	- - -	0.515	0.487	0.5	0.517	0.527	0.553	0.603	0.678	0.777	0.799
	12	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	190.5	7.5	152.4	6	Cv	28.1	62	106	150	194	239	283	328	372	416	458
							Kv	24.4	54	91	129	168	207	245	284	322	360	396
							X_T	- - -	0.531	0.525	0.516	0.519	0.535	0.573	0.641	0.727	0.819	0.866
	14	Fisher Design	215.9	8.5	152.4	6	Cv	37.8	68	113	159	205	252	299	346	393	439	485
							Kv	- - -	59	98	137	178	218	259	299	340	380	420
							X_T	- - -	0.52	0.49	0.50	0.52	0.53	0.55	0.60	0.68	0.78	0.80

HPS, CL900 and 1500, Flow Up

Linear Characteristic

Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coeffi- cient	Valve Opening—Percent of Total Travel										F_L(1)
		mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
2	ISA 75.08.06 (long)	47.6	1.875	38	1.5	C_v	- - -	3.56	11.7	23.0	33.9	42.3	47.5	50.7	53.4	54.6	0.98
						K_v	- - -	*3.08*	*10.1*	*19.9*	*29.3*	*36.6*	*41.1*	*43.9*	*46.2*	*47.2*	- - -
						X_T	- - -	0.767	0.681	0.658	0.666	0.693	0.718	0.728	0.719	0.711	- - -
						F_d	0.89	0.62	0.44	0.30	0.24	0.22	0.19	0.17	0.16	0.15	- - -
3	ISA 75.08.06 (long) or ISA 75.08.05 (long)	73.0	2.875	50	2	C_v	- - -	9.01	30.6	55.6	78.9	97.7	111	120	125	127	0.96
						K_v	- - -	*7.79*	*26.5*	*48.1*	*68.2*	*84.5*	*96.0*	*104*	*108*	*110*	- - -
						X_T	- - -	0.660	0.636	.0663	0.687	0.713	0.734	0.742	0.742	0.739	- - -
						F_d	0.48	0.28	0.21	0.17	0.15	0.13	0.12	0.11	0.11	0.10	- - -

HPS, CL2500, Flow Up

Linear Characteristic

Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coeffi- cient	Valve Opening—Percent of Total Travel										F_L(1)
		mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
2	ISA 75.08.06 (long) or ISA 75.08.05 (long)	47.6	1.875	25	1	C_v	0.645	0.996	3.51	8.74	15.9	23.5	30.0	34.3	37.0	40.9	>0.96
						K_v	*0.558*	*0.862*	*3.04*	*7.56*	*13.8*	*20.3*	*26.0*	*29.7*	*32.0*	*35.4*	- - -
						X_T	0.905	0.813	0.715	0.701	0.703	0.704	0.701	0.699	0.699	0.710	- - -
3	ISA-75.08.06 (short) or ISA-75.08.05 (short)	57.15	2.25	38.1	1.5	C_v	2.80	15.6	33.5	50.7	64.6	74.3	82.9	86.8	88.7	88.8	0.94
						K_v	2.42	13.5	29.0	43.9	55.9	64.3	71.7	75.1	76.7	76.8	- - -
						X_T	0.519	0.646	0.619	0.672	0.702	0.741	0.750	0.757	0.753	0.752	- - -
						F_d	0.292	0.369	0.322	0.287	0.246	0.224	0.201	0.186	0.174	0.167	- - -

HPS, CL900 and 1500, Flow Up

Equal Percentage Characteristic

Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coeffi- cient	Valve Opening—Percent of Total Travel										F_L(1)
		mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
2	ISA 75.08.06 (long)	47.6	1.875	29	1.125	C_v	- - -	1.09	3.04	6.77	12.2	18.9	26.7	34.5	40.5	45.8	0.92
						K_v	- - -	*0.943*	*2.63*	*5.86*	*10.6*	*16.3*	*23.1*	*29.8*	*35.0*	*39.6*	- - -
						X_T	- - -	0.357	0.670	0.717	0.670	0.629	0.598	0.597	0.632	0.652	- - -
						F_d	1.00	0.76	0.50	0.40	0.31	0.28	0.24	0.22	0.20	0.19	- - -
3	ISA 75.08.06 (long) or ISA 75.08.05 (long)	73.0	2.875	38	1.5	C_v	- - -	1.23	4.08	10.7	21.7	36.5	53.7	72.2	90.2	101	0.88
						K_v	- - -	*1.06*	*3.53*	*9.26*	*18.8*	*31.6*	*46.5*	*62.5*	*78.0*	*87.4*	- - -
						X_T	- - -	0.967	0.821	0.685	0.634	0.628	0.641	0.659	0.672	0.730	- - -
						F_d	1.00	0.54	0.44	0.31	0.23	0.19	0.17	0.15	0.14	0.13	- - -

HPS, CL2500, Flow Up

Equal Percentage Characteristic

Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coeffi- cient	Valve Opening—Percent of Total Travel										F_L(1)
		mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
2	ISA 75.08.06 (long)	47.6	1.875	25	1	C_v	0.653	0.977	2.35	5.14	9.18	14.2	20.1	26.2	30.7	35.7	>0.96
						K_v	*0.565*	*0.845*	*2.03*	*4.45*	*7.94*	*12.3*	*17.4*	*22.7*	*26.6*	*30.9*	- - -
						X_T	0.997	0.912	0.785	0.708	0.680	0.690	0.733	0.763	0.768	0.751	- - -

HPS, CL900 and 1500, Flow Up

Modified Equal Percentage Characteristic

2	ISA 75.08.06 (long)	47.6	1.875	38	1.5	C_v	- - -	2.19	6.69	14.5	24.1	33.7	42.4	48.9	51.9	54.4	0.95
						K_v	- - -	*1.89*	*5.79*	*12.5*	*20.8*	*29.2*	*36.7*	*42.3*	*44.9*	*47.1*	- - -
						X_T	- - -	0.594	0.741	0.648	0.592	0.602	0.641	0.660	0.663	0.670	- - -
						F_d	0.99	0.49	0.40	0.30	0.26	0.22	0.20	0.18	0.16	0.16	- - -
3	ISA 75.08.06 (long) or ISA 75.08.05 (long)	73.0	2.875	50	2	C_v	- - -	2.78	10.6	26.3	47.9	71.5	93.6	109	116	124	0.95
						K_v	- - -	*2.40*	*9.17*	*22.7*	*41.4*	*61.8*	*81.0*	*94.3*	*100*	*107*	- - -
						X_T	- - -	0.902	0.690	0.625	0.637	0.666	0.689	0.725	0.783	0.757	- - -
						F_d	0.78	0.49	0.31	0.22	0.18	0.15	0.14	0.12	0.11	0.11	- - -

HPS, CL2500, Flow Up

Modified Equal Percentage Characteristic

2	ISA 75.08.06 (long) or ISA 75.08.05 (long)	47.6	1.875	29	1.125	C_v	0.654	1.21	3.18	7.07	12.4	18.4	25.1	31.5	35.6	40.0	>0.96
						K_v	*0.566*	*1.05*	*2.75*	*6.12*	*10.7*	*15.9*	*21.7*	*27.2*	*30.8*	*34.6*	- - -
						X_T	0.998	0.595	0.430	0.374	0.370	0.413	0.471	0.526	0.571	0.689	- - -
3	ISA-75.08.06 (short) or ISA-75.08.05 (short)	57.15	2.25	38.1	1.5	C_v	1.80	4.90	10.4	19.1	32.5	47.9	65.3	75.3	84.0	87.0	0.94
						K_v	1.56	4.2	9.0	16.5	28.1	41.4	56.5	65.1	72.7	75.3	- - -
						X_T	0.519	0.646	0.619	0.672	0.702	0.741	0.750	0.757	0.753	0.752	- - -
						F_d	0.584	0.738	0.591	0.478	0.354	0.293	0.243	0.219	0.197	0.186	- - -

1. At 100% travel.

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HPS, CL900, 1500, and 2500, Micro-Flute, Flow Up

Equal Percentage Characteristic

Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(1)
		mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1	ISA 75.08.06 (long)	6.4 1 Flute	0.25 1 Flute	19	0.75	C_v	0.039	0.046	0.056	0.072	0.094	0.124	0.162	0.212	0.278	0.354	0.87
						K_v	*0.034*	*0.040*	*0.048*	*0.062*	*0.081*	*0.107*	*0.140*	*0.183*	*0.240*	*0.306*	- - -
						X_T	0.778	0.734	0.690	0.653	0.642	0.635	0.637	0.634	0.632	0.656	- - -
	ISA 75.08.06 (long)	6.4 3 Flutes	0.25 3 Flutes	19	0.75	C_v	0.053	0.073	0.101	0.146	0.216	0.312	0.433	0.588	0.802	1.07	0.90
						K_v	*0.046*	*0.063*	*0.087*	*0.126*	*0.187*	*0.270*	*0.375*	*0.509*	*0.694*	*0.926*	- - -
						X_T	0.692	0.648	0.639	0.625	0.600	0.586	0.597	0.613	0.620	0.624	- - -
	ISA 75.08.06 (long)	12.7	0.5	19	0.75	C_v	0.105	0.184	0.314	0.488	0.716	1.04	1.53	2.30	3.20	4.21	0.84
						K_v	*0.091*	*0.159*	*0.272*	*0.422*	*0.619*	*0.900*	*1.32*	*1.99*	*2.77*	*3.64*	- - -
						X_T	0.974	0.792	0.654	0.638	0.630	0.580	0.547	0.497	0.523	0.549	- - -

1. At 100% travel.

HPS, CL900 and 1500, Micro-Form, Flow Up

Equal Percentage Characteristic

Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(1)
		mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1	ISA 75.08.06 (long)	6.4	0.25	19	0.75	C_v	0.072	0.102	0.138	0.209	0.309	0.438	0.630	0.894	1.22	1.61	0.96
						K_v	*0.062*	*0.088*	*0.119*	*0.181*	*0.267*	*0.379*	*0.545*	*0.773*	*1.06*	*1.39*	- - -
						X_T	0.972	0.971	0.986	0.792	0.668	0.611	0.611	0.609	0.606	0.610	- - -
	ISA 75.08.06 (long)	12.7	0.5	19	0.75	C_v	0.269	0.404	0.555	0.738	1.03	1.52	2.18	3.10	4.23	5.39	0.97
						K_v	*0.233*	*0.349*	*0.480*	*0.638*	*0.891*	*1.31*	*1.89*	*2.68*	*3.66*	*4.66*	- - -
						X_T	0.789	0.708	0.702	0.650	0.626	0.572	0.583	0.606	0.646	0.713	- - -
	ISA 75.08.06 (long)	19.1	0.75	19	0.75	C_v	0.384	0.577	0.941	1.39	2.02	2.93	4.40	6.58	8.45	9.61	0.95
						K_v	*0.332*	*0.499*	*0.814*	*1.20*	*1.75*	*2.53*	*3.81*	*5.69*	*7.31*	*8.31*	- - -
						X_T	0.532	0.774	0.714	0.587	0.579	0.584	0.588	0.607	0.672	0.773	- - -
2	ISA 75.08.06 (long)	6.4	0.25	19	0.75	C_v	0.072	0.102	0.138	0.209	0.309	0.438	0.630	0.894	1.22	1.61	0.96
						K_v	*0.062*	*0.088*	*0.119*	*0.181*	*0.267*	*0.379*	*0.545*	*0.773*	*1.06*	*1.39*	- - -
						X_T	0.972	0.971	0.986	0.792	0.668	0.611	0.611	0.609	0.606	0.610	- - -
	ISA 75.08.06 (long)	12.7	0.5	19	0.75	C_v	0.269	0.404	0.555	0.738	1.03	1.52	2.18	3.10	4.23	5.39	0.97
						K_v	*0.233*	*0.349*	*0.480*	*0.638*	*0.891*	*1.31*	*1.89*	*2.68*	*3.66*	*4.66*	- - -
						X_T	0.789	0.708	0.702	0.650	0.626	0.572	0.583	0.606	0.646	0.713	- - -
	ISA 75.08.06 (long)	19.1	0.75	19	0.75	C_v	0.450	0.713	1.07	1.52	2.12	3.05	4.57	6.87	9.66	11.9	0.93
						K_v	*0.389*	*0.617*	*0.926*	*1.31*	*1.83*	*2.64*	*3.95*	*5.94*	*8.36*	*10.3*	- - -
						X_T	0.740	0.640	0.578	0.589	0.636	0.648	0.612	0.589	0.636	0.718	- - -

1. At 100% travel.

HPS, CL2500, Micro-Form, Flow Up

Equal Percentage Characteristic

Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(1)
		mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1	ISA 75.08.06 (long)	6.4	0.25	19	0.75	C_v	0.072	0.102	0.138	0.209	0.309	0.438	0.630	0.894	1.22	1.61	0.96
						K_v	*0.062*	*0.088*	*0.119*	*0.181*	*0.267*	*0.379*	*0.545*	*0.773*	*1.06*	*1.39*	---
						X_T	0.972	0.971	0.986	0.792	0.668	0.611	0.611	0.609	0.606	0.610	---
	ISA 75.08.06 (long)	12.7	0.5	19	0.75	C_v	0.269	0.404	0.555	0.738	1.03	1.52	2.18	3.10	4.23	5.39	0.97
						K_v	*0.233*	*0.349*	*0.480*	*0.638*	*0.891*	*1.31*	*1.89*	*2.68*	*3.66*	*4.66*	---
						X_T	0.789	0.708	0.702	0.650	0.626	0.572	0.583	0.606	0.646	0.713	---
	ISA 75.08.06 (long)	19.1	0.75	19	0.75	C_v	0.384	0.577	0.941	1.39	2.02	2.93	4.40	6.58	8.45	9.61	0.95
						K_v	*0.332*	*0.499*	*0.814*	*1.20*	*1.75*	*2.53*	*3.81*	*5.69*	*7.31*	*8.31*	---
						X_T	0.532	0.774	0.714	0.587	0.579	0.584	0.588	0.607	0.672	0.773	---
2	ISA 75.08.06 (long) or ISA 75.08.05 (long)	6.4	0.25	19	0.75	C_v	0.062	0.095	0.137	0.209	0.309	0.438	0.630	0.894	1.22	1.61	0.96
						K_v	*0.054*	*0.082*	*0.119*	*0.181*	*0.267*	*0.379*	*0.545*	*0.773*	*1.06*	*1.39*	---
						X_T	0.972	0.971	0.986	0.792	0.668	0.611	0.611	0.609	0.606	0.610	---
	ISA 75.08.06 (long) or ISA 75.08.05 (long)	12.7	0.5	19	0.75	C_v	0.269	0.404	0.555	0.738	1.03	1.52	2.18	3.10	4.23	5.39	0.97
						K_v	*0.233*	*0.349*	*0.480*	*0.638*	*0.891*	*1.31*	*1.89*	*2.68*	*3.66*	*4.66*	---
						X_T	0.789	0.708	0.702	0.650	0.626	0.572	0.583	0.606	0.646	0.713	---
	ISA 75.08.06 (long) or ISA 75.08.05 (long)	19.1	0.75	19	0.75	C_v	0.450	0.713	1.07	1.52	2.12	3.05	4.57	6.87	9.66	11.9	0.93
						K_v	*0.389*	*0.617*	*0.926*	*1.31*	*1.83*	*2.64*	*3.95*	*5.94*	*8.36*	*10.3*	---
						X_T	0.740	0.640	0.578	0.589	0.636	0.648	0.612	0.589	0.636	0.718	---

1. At 100% travel.

HPS, CL900 and 1500, Extended Travel Micro-Form, Flow Up

Modified Equal Percentage Characteristic

Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(1)
		mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1	ISA 75.08.06 (long)	19.1	0.75	29	1.125	C_v	0.480	0.940	1.71	2.93	5.49	8.45	10.5	11.5	12.0	12.5	0.95
						K_v	*0.415*	*0.813*	*1.48*	*2.53*	*4.75*	*7.31*	*9.08*	*9.95*	*10.4*	*10.8*	---
						X_T	0.741	0.660	0.561	0.535	0.599	0.685	0.655	0.632	0.626	0.594	---
	ISA 75.08.06 (long)	25.4	1	29	1.125	C_v	0.85	1.73	3.22	5.71	8.81	11.6	13.7	15.5	16.5	17.1	0.85
						K_v	*0.735*	*1.50*	*2.79*	*4.94*	*7.62*	*10.0*	*11.9*	*13.4*	*14.3*	*14.8*	---
						X_T	0.741	0.660	0.561	0.535	0.600	0.685	0.699	0.632	0.626	0.594	---
2	ISA 75.08.06 (long)	25.4	1	29	1.125	C_v	0.884	1.67	2.86	4.96	9.08	15.6	20.9	23.0	23.9	24.2	0.92
						K_v	*0.765*	*1.44*	*2.47*	*4.29*	*7.85*	*13.5*	*18.1*	*19.9*	*20.7*	*20.9*	---
						X_T	0.696	0.700	0.698	0.700	0.696	0.700	0.697	0.745	0.714	0.700	---
	ISA 75.08.06 (long)	31.8	1.25	29	1.125	C_v	1.19	1.90	3.60	8.17	16.9	23.9	29.0	31.0	32.0	33.0	0.91
						K_v	*1.03*	*1.64*	*3.11*	*7.07*	*14.6*	*20.7*	*25.1*	*26.8*	*27.7*	*28.5*	---
						X_T	0.584	0.603	0.552	0.668	0.731	0.654	0.657	0.670	0.667	0.632	---
	ISA 75.08.06 (long)	38.1	1.5	38	1.5	C_v	1.98	3.83	7.96	16.0	27.2	37.4	43.3	46.9	51.5	52.2	0.97
						K_v	*1.71*	*3.31*	*6.89*	*13.8*	*23.5*	*32.4*	*37.5*	*40.6*	*44.5*	*45.2*	---
						X_T	0.584	0.603	0.554	0.668	0.731	0.654	0.682	0.691	0.634	0.632	---

1. At 100% travel.

HPS, CL2500, Extended Travel Micro-Form, Flow Up

Modified Equal Percentage Characteristic

Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L[1]
		mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1	ISA 75.08.06 (long)	19.1	0.75	29	1.125	C_v	0.480	0.940	1.71	2.93	5.49	8.45	10.5	11.5	12.0	12.5	0.95
						K_v	*0.415*	*0.813*	*1.48*	*2.53*	*4.75*	*7.31*	*9.08*	*9.95*	*10.4*	*10.8*	- - -
						X_T	0.741	0.660	0.561	0.535	0.599	0.685	0.655	0.632	0.626	0.594	- - -
	ISA 75.08.06 (long)	25.4	1	29	1.125	C_v	0.500	1.54	3.61	5.83	7.44	8.86	10.6	12.4	13.1	13.8	0.88
						K_v	*0.433*	*1.33*	*3.12*	*5.04*	*6.44*	*7.66*	*9.17*	*10.7*	*11.3*	*11.9*	- - -
						X_T	0.489	0.848	0.556	0.544	0.709	0.820	0.714	0.588	0.644	0.580	- - -
2	ISA 75.08.06 (long) or ISA 75.08.05 (long)	25.4	1	29	1.125	C_v	0.884	1.67	2.86	4.96	9.08	15.6	20.9	23.0	23.9	24.2	0.92
						K_v	*0.765*	*1.44*	*2.47*	*4.29*	*7.85*	*13.5*	*18.1*	*19.9*	*20.7*	*20.9*	- - -
						X_T	0.696	0.700	0.698	0.700	0.696	0.700	0.697	0.745	0.714	0.700	- - -
	ISA 75.08.06 (long) or ISA 75.08.05 (long)	31.8	1.25	29	1.125	C_v	1.19	1.90	3.60	8.17	16.9	23.9	29.0	31.0	32.0	33.0	0.91
						K_v	*1.03*	*1.64*	*3.11*	*7.07*	*14.6*	*20.7*	*25.1*	*26.8*	*27.7*	*28.5*	- - -
						X_T	0.584	0.603	0.552	0.668	0.731	0.654	0.657	0.670	0.667	0.632	- - -
	ISA 75.08.06 (long) or ISA 75.08.05 (long)	38.1	1.5	38	1.5	C_v	1.87	3.75	8.23	16.5	26.2	33.4	38.0	41.7	43.4	44.2	>0.96
						K_v	*1.62*	*3.24*	*7.12*	*14.3*	*22.7*	*28.9*	*32.9*	*36.1*	*37.5*	*38.2*	- - -
						X_T	0.609	0.515	0.520	0.626	0.751	0.790	0.718	0.653	0.668	0.644	- - -

1. At 100% travel.

HPS, Whisper Trim III--CL900 and 1500

Linear Characteristic

Cage Level	Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										
			mm	Inches	mm	Inches		Mini-mum[1]	10	20	30	40	50	60	70	80	90	100
A1[2]	2	ISA 75.08.06 (long)	47.6	1.875	38	1.5	C_v	1.00	2.50	7.50	12.8	17.7	22.3	26.6	31.2	35.5	39.5	42.6
							K_v	*0.865*	*2.16*	*6.49*	*11.1*	*15.3*	*19.3*	*23.0*	*27.0*	*30.7*	*34.2*	*36.8*
							X_T	0.718	0.68	0.60	0.60	0.61	0.60	0.61	0.60	0.60	0.60	0.60
	3	ISA 75.08.06 (long) or ISA 75.08.05 (long)	73.0	2.875	50	2	C_v	1.25	6.00	21.0	34.6	49.0	62.7	77.0	89.7	98.8	105	108
							K_v	*1.08*	*5.19*	*18.2*	*29.9*	*42.4*	*54.2*	*66.6*	*77.6*	*85.5*	*90.8*	*93.4*
							X_T	0.839	0.87	0.80	0.83	0.81	0.82	0.82	0.81	0.82	0.81	0.82

HPS, Whisper Trim III--CL2500

Linear Characteristic

Cage Level	Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										
			mm	Inches	mm	Inches		Mini-mum[1]	10	20	30	40	50	60	70	80	90	100
A1	2[2]	ISA 75.08.06 (long) or ISA 75.08.05 (long)	47.6	1.875	38	1.5	C_v	- - -	3.1	8.4	13.1	17.3	21.4	25.1	28.3	30.8	32.9	34.9
							K_v	- - -	*2.68*	*7.27*	*11.3*	*15.0*	*18.5*	*21.7*	*24.5*	*26.6*	*28.5*	*30.2*
							X_T	0.718	0.68	0.60	0.61	0.60	0.61	0.60	0.60	0.60	0.60	0.60
	3	ISA-75.08.06 (short) or ISA-75.08.05 (short)	57.15	2.25	38.1	1.5	C_v	5.98	7.25	15.7	23.7	31	37.9	44	50	56	61	66
							K_v	- - -	6.27	13.6	20.5	26.8	32.8	38	43	48	53	57
							X_T	- - -	0.512	0.541	0.545	0.564	0.564	0.592	0.626	0.671	0.702	0.711
A3	3	ISA-75.08.06 (short) or ISA-75.08.05 (short)	57.15	2.25	38.1	1.5	C_v	4.51	7.97	17.5	26.4	34.6	42	49	55	61	67	72
							K_v	- - -	6.89	15.1	22.8	29.9	36.3	42	48	53	58	62
							X_T	- - -	0.512	0.541	0.545	0.564	0.564	0.592	0.626	0.671	0.702	0.711

HPS, Whisper Trim III--CL900 and 1500

Linear Characteristic

Cage Level	Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										
			mm	Inches	mm	Inches		Minimum(1)	10	20	30	40	50	60	70	80	90	100
B1	3	ISA 75.08.06 (long) or ISA 75.08.05 (long)	73.0	2.875	50	2	C_v	0.900	3.00	9.00	14.0	18.6	23.4	28.6	34.7	40.0	45.0	48.7
							K_v	*0.778*	*2.59*	*7.79*	*12.1*	*16.1*	*20.2*	*24.7*	*30.0*	*34.6*	*38.9*	*42.1*
							X_T	0.622	0.62	0.62	0.63	0.62	0.62	0.63	0.62	0.63	0.62	0.63

HPS, Whisper Trim III--CL2500

Linear Characteristic

Cage Level	Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										
			mm	Inches	mm	Inches		Minimum(1)	10	20	30	40	50	60	70	80	90	100
B1	3	ISA-75.08.06 (short) or ISA-75.08.05 (short)	57.15	2.25	38.1	1.5	C_v	5.02	4.81	9.4	14	18.3	22.5	27	30	34	38	41
							K_v	- - -	4.16	8.1	12.1	15.8	19.5	23	26	29	33	35
							X_T	- - -	0.512	0.541	0.545	0.564	0.564	0.592	0.626	0.671	0.702	0.711
B3	3	ISA-75.08.06 (short) or ISA-75.08.05 (short)	57.15	2.25	38.1	1.5	C_v	3.79	5.51	11.3	16.8	22.1	27.2	32	37	41	45	49
							K_v	- - -	4.77	9.8	14.5	19.1	23.5	28	32	35	39	42
							X_T	- - -	0.512	0.541	0.545	0.564	0.564	0.592	0.626	0.671	0.702	0.711
C1	3	ISA-75.08.06 (short) or ISA-75.08.05 (short)	57.15	2.25	38.1	1.5	C_v	5.02	4.44	8.5	12.4	16.3	20	24	27	30	34	37
							K_v	- - -	3.84	7.4	10.7	14.1	17.3	21	23	26	29	32
							X_T	- - -	0.512	0.541	0.545	0.564	0.564	0.592	0.626	0.671	0.702	0.711
C3	3	ISA-75.08.06 (short) or ISA-75.08.05 (short)	57.15	2.25	38.1	1.5	C_v	3.54	4.44	8.5	12.4	16.3	20	24	27	30	34	37
							K_v	- - -	3.84	7.4	10.7	14.1	17.3	21	23	26	29	32
							X_T	- - -	0.512	0.541	0.545	0.564	0.564	0.592	0.626	0.671	0.702	0.711
D3	3	ISA-75.08.06 (short) or ISA-75.08.05 (short)	34.92	1.375	50.8	2	C_v	1.9	3.37	6.8	9.9	12.8	15.5	18	20	22	24	26
							K_v	- - -	2.92	5.9	8.6	11.1	13.4	16	17	19	21	22
							X_T	- - -	0.512	0.541	0.545	0.564	0.564	0.592	0.626	0.671	0.702	0.711
	4	ISA-75.08.06 (short) or ASME B16.10 (short)	57.15	2.25	50.8	2	C_v	3.02	4.34	8.2	12.4	16.7	20.9	25	29	33	36	40
							K_v	- - -	3.75	7.1	10.7	14.4	18.1	22	25	29	31	35
							X_T	- - -	0.561	0.546	0.553	0.556	0.581	0.598	0.629	0.657	0.704	0.707

1. Valve should not be required to throttle at less than the minimum coefficient for an extended time, or erosion damage to the valve seat may result.
2. Larger capacities may be available with level A1 cages depending on service conditions.

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HPS and HPT, CL900, 1500, and 2500, Cavitrol™ III, Flow Down

Linear Characteristic

Trim Stage	Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coeffi-cient	Minimum Throttling C_V(2)	Valve Opening—Percent of Total Travel										F_L(3)
			mm	Inches	mm	Inches			10	20	30	40	50	60	70	80	90	100	
Two Stage	1(1)	ISA 75.08.06 (long)	22.2	0.875(1)	38	1.5	C_V	0.360	0.163	0.836	1.80	2.74	3.64	4.51	5.36	6.18	6.91	7.39	0.98
							K_v	*0.311*	*0.141*	*0.723*	*1.56*	*2.37*	*3.15*	*3.90*	*4.64*	*5.35*	*5.98*	*6.39*	- - -
	2	ISA 75.08.06 (long) or ISA 75.08.05 (long)	44.4	1.75	50	2	C_V	0.580	1.07	1.97	3.29	4.86	6.58	8.36	10.1	11.7	13.0	14.0	0.98
							K_v	*0.502*	*0.926*	*1.70*	*2.85*	*4.20*	*5.69*	*7.23*	*8.74*	*10.1*	*11.2*	*12.1*	- - -
Three Stage	2(1)	ISA 75.08.06 (long) or ISA 75.08.05 (long)	25.4	1(1)	50	2	C_V	0.590	0.272	1.10	1.98	2.82	3.63	4.46	5.30	6.07	6.61	6.73	0.99
							K_v	*0.510*	*0.235*	*0.952*	*1.71*	*2.44*	*3.14*	*3.86*	*4.58*	*5.25*	*5.72*	*5.82*	- - -

HPT, CL900 and 1500, Cavitrol III, Flow Down

Linear Characteristic

Trim Stage	Valve Size, NPS	Face to Face Standard	Port Diameter mm	Port Diameter Inches	Maximum Travel mm	Maximum Travel Inches	Flow Coeffi-cient	Minimum Throttling C_V(2)	10	20	30	40	50	60	70	80	90	100	F_L(3)
Two Stage	3	ISA 75.08.06 (long) or ISA 75.08.05 (long)	63.5	2.5	64	2.5	C_V	0.720	1.46	4.98	9.24	13.2	17.0	20.7	24.7	28.5	31.9	34.4	0.98
							K_v	*0.623*	*1.26*	*4.31*	*7.99*	*11.4*	*14.7*	*17.9*	*21.4*	*24.7*	*27.6*	*29.8*	- - -
	4	ISA 75.08.06 (long) or ISA 75.08.05 (long)	87.3	3.4375	76	3	C_V	0.900	2.61	9.01	15.6	21.8	28.3	34.8	40.4	46.4	52.2	58.1	0.98
							K_v	*0.778*	*2.26*	*7.79*	*13.5*	*18.9*	*24.5*	*30.1*	*34.9*	*40.1*	*45.2*	*50.3*	- - -
	6	ISA 75.08.06 (long) or ISA 75.08.05 (long)	133.3	5.25	102	4	C_V	1.72	7.50	20.7	33.8	47.0	60.1	73.3	87.0	100	112	123	0.98
							K_v	*1.49*	*6.49*	*17.9*	*29.2*	*40.7*	*52.0*	*63.4*	*75.3*	*86.5*	*96.9*	*106*	- - -
Three Stage	3	ISA 75.08.06 (long) or ISA 75.08.05 (long)	47.6	1.875	64	2.5	C_V	1.20	0.747	2.02	3.92	6.15	8.01	9.50	11.0	12.8	14.9	16.5	0.99
							K_v	*1.04*	*0.646*	*1.75*	*3.39*	*5.32*	*6.93*	*8.22*	*9.52*	*11.1*	*12.9*	*14.3*	- - -
	4	ISA 75.08.06 (long) or ISA 75.08.05 (long)	73.0	2.875	76	3	C_V	1.70	2.80	5.50	8.30	11.0	13.9	16.7	19.4	22.2	25.0	27.8	0.99
							K_v	*1.47*	*2.42*	*4.76*	*7.18*	*9.52*	*12.0*	*14.4*	*16.8*	*19.2*	*21.6*	*24.0*	- - -
	6	ISA 75.08.06 (long) or ISA 75.08.05 (long)	115.9	4.5625	102	4	C_V	3.10	6.10	13.2	19.8	26.1	34.1	41.5	48.2	54.5	60.9	65.0	0.99
							K_v	*2.68*	*5.28*	*11.4*	*17.1*	*22.6*	*29.5*	*35.9*	*41.7*	*47.1*	*52.7*	*56.2*	- - -

1. Cavitrol III trim in the NPS 1, two stage and the NPS 2, three stage are unbalanced valve plugs. These sizes and constructions are HPS valves; all others in this table are HPT valves.
2. Valves should not be required to throttle at a C_V less than the specified minimum C_V for an extended period. Erosion damage to the valve seats may result.
3. At 100% travel.

HPD and HPT, CL900 and CL1500, Cavitrol III, Flow Down

Linear Characteristic

Trim Stage	Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coefficient	Minimum (2)	Valve Opening—Percent of Total Travel										F_L(3)
			mm	Inches	mm	Inches			10	20	30	40	50	60	70	80	90	100	
Two Stage	4	ISA-75.08.06 (short) or ASME B16.10 (Short) or Fisher Design	91.4	3.6	50.8	2	Cv	2.03	2.35	6.40	10.4	14.3	18.3	22.3	26.2	30.1	33.9	37.7	0.98
							Kv	1.76	2.03	5.54	9.00	12.4	15.8	19.3	22.7	26.0	29.3	32.6	- - -
	6	ISA-75.08.06 (short) or ASME B16.10 (Short) or Fisher Design	137.2	5.4	76.2	3	Cv	3.71	7.12	16.1	25.0	33.8	42.7	51.5	60.2	68.9	77.5	86.1	0.98
							Kv	3.21	6.16	13.9	21.6	29.2	36.9	44.5	52.1	59.6	67.0	74.5	- - -
	8	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	152.4	6	127	5	Hole Type	- - -	2 Stage	2 Stage	2 Stage	2 Stage	2 Stage	2 Stage	2 Stage	2 Stage	2 Stage	2 Stage	- - -
							Fl	- - -	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	- - -
							Cv	4.0	15	32	49	66	83	100	117	134	150	165	- - -
	10	ISA-75.08.06 (short) or ISA-75.08.05 (short)	177.8	7	127	5	Hole Type	- - -	2 Stage	2 Stage	2 Stage	2 Stage	2 Stage	2 Stage	2 Stage	2 Stage	2 Stage	2 Stage	- - -
							Fl	- - -	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	- - -
							Cv	4.7	17	37	57	77	97	116	136	155	174	192	- - -
	12	ISA-75.08.06 (short) or ISA-75.08.05 (short)	203.2	8	152.4	6	Hole Type	- - -	2 Stage	2 Stage	2 Stage	2 Stage	2 Stage	2 Stage	2 Stage	2 Stage	2 Stage	2 Stage	- - -
							Fl	- - -	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	- - -
							Cv	5.4	24	52	79	106	133	160	187	213	239	263	- - -

HPD and HPT, CL900 and CL1500, Cavitrol III, Flow Down (cont.)

Linear Characteristic

Trim Stage	Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coefficient	Minimum (2)	Valve Opening—Percent of Total Travel									
			mm	Inches	mm	Inches			10	20	30	40	50	60	70	80	90	100
Two Stage, 30% Characterized[1]	8	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	152.4	6	127	5	Hole Type	- - -	2 Stage	2 Stage	2 Stage	1 Stage	Thru Hole	Thru Hole	Thru Hole	Thru Hole	Thru Hole	Thru Hole
							Fl	- - -	0.96	0.96	0.96	0.91	0.89	0.89	0.89	0.89	0.89	0.89
							C_V	4.0	15	32	50	74	146	236	317	388	447	492
	10	ISA-75.08.06 (short) or ISA-75.08.05 (short)	177.8	7	127	5	Hole Type	- - -	2 Stage	2 Stage	2 Stage	1 Stage	Thru Hole	Thru Hole	Thru Hole	Thru Hole	Thru Hole	Thru Hole
							Fl	- - -	0.96	0.96	0.96	0.91	0.89	0.89	0.89	0.89	0.89	0.89
							C_V	4.7	18	38	58	86	172	280	380	470	550	612
	12	ISA-75.08.06 (short) or ISA-75.08.05 (short)	203.2	8	152.4	6	Hole Type	- - -	2 Stage	2 Stage	2 Stage	1 Stage	Thru Hole	Thru Hole	Thru Hole	Thru Hole	Thru Hole	Thru Hole
							Fl	- - -	0.96	0.96	0.96	0.91	0.89	0.89	0.89	0.89	0.89	0.89
							C_V	5.4	25	52	80	123	249	396	532	655	764	850
Two Stage, 50% Characterized[1]	8	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	152.4	6	127	5	Hole Type	- - -	2 Stage	2 Stage	2 Stage	2 Stage	2 Stage	1 Stage	Thru Hole	Thru Hole	Thru Hole	Thru Hole
							Fl	- - -	0.96	0.96	0.96	0.96	0.96	0.91	0.89	0.89	0.89	0.89
							C_V	4.0	15	32	50	67	84	130	221	304	376	410
	10	ISA-75.08.06 (short) or ISA-75.08.05 (short)	177.8	7	127	5	Hole Type	- - -	2 Stage	2 Stage	2 Stage	2 Stage	2 Stage	1 Stage	Thru Hole	Thru Hole	Thru Hole	Thru Hole
							Fl	- - -	0.96	0.96	0.96	0.96	0.96	0.91	0.89	0.89	0.89	0.89
							C_V	4.7	18	38	58	78	98	129	222	326	422	498
	12	ISA-75.08.06 (short) or ISA-75.08.05 (short)	203.2	8	152.4	6	Hole Type	- - -	2 Stage	2 Stage	2 Stage	2 Stage	2 Stage	1 Stage	Thru Hole	Thru Hole	Thru Hole	Thru Hole
							Fl	- - -	0.96	0.96	0.96	0.96	0.96	0.91	0.89	0.89	0.89	0.89
							C_V	5.4	25	52	80	107	134	174	283	427	560	671
Two Stage, 80% Characterized[1]	8	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	152.4	6	127	5	Hole Type	- - -	2 Stage	2 Stage	2 Stage	2 Stage	2 Stage	2 Stage	2 Stage	2 Stage	1 Stage	Thru Hole
							Fl	- - -	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.91	0.89
							C_V	4.0	15	32	49	67	84	101	118	134	166	254
	10	ISA-75.08.06 (short) or ISA-75.08.05 (short)	177.8	7	127	5	Hole Type	- - -	2 Stage	2 Stage	2 Stage	2 Stage	2 Stage	2 Stage	2 Stage	2 Stage	1 Stage	Thru Hole
							Fl	- - -	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.91	0.89
							C_V	4.7	18	38	58	77	97	117	137	156	214	309
	12	ISA-75.08.06 (short) or ISA-75.08.05 (short)	203.2	8	152.4	6	Hole Type	- - -	2 Stage	2 Stage	2 Stage	2 Stage	2 Stage	2 Stage	2 Stage	2 Stage	1 Stage	Thru Hole
							Fl	- - -	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.91	0.89
							C_V	5.4	25	52	79	107	134	161	188	214	299	427
Three Stage	8	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	152.4	6	127	5	Hole Type	- - -	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage
							Fl	- - -	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
							C_V	6.28	13.2	22.6	34.3	46.0	55.3	65.6	78.5	87.8	97.1	111
	10	ISA-75.08.06 (short) or ISA-75.08.05 (short)	177.8	7	127	5	Hole Type	- - -	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage
							Fl	- - -	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
							C_V	7.33	15.5	26.5	41.4	53.9	64.8	78.2	92.1	103	115	130
	12	ISA-75.08.06 (short) or ISA-75.08.05 (short)	203.2	8	152.4	6	Hole Type	- - -	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage
							Fl	- - -	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
							C_V	8.38	18.7	36.7	55.7	74.6	90.0	106	125	144	161	175

HPD and HPT, CL900 and CL1500, Cavitrol III, Flow Down (cont.)

Linear Characteristic

Trim Stage	Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coefficient	Minimum (2)	Valve Opening—Percent of Total Travel									
			mm	Inches	mm	Inches			10	20	30	40	50	60	70	80	90	100
Three Stage, 30% Characterized(1)	8	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	152.4	6	127	5	Hole Type	- - -	3 Stage	3 Stage	3 Stage	2 Stage	1 Stage	Thru Hole	Thru Hole	Thru Hole	Thru Hole	Thru Hole
							Fl	- - -	0.99	0.99	0.99	0.96	0.91	0.89	0.89	0.89	0.89	0.89
							C_V	6.28	13.4	23.0	34.9	47.4	73.9	119	210	294	368	430
	10	ISA-75.08.06 (short) or ISA-75.08.05 (short)	177.8	7	127	5	Hole Type	- - -	3 Stage	3 Stage	3 Stage	2 Stage	1 Stage	Thru Hole	Thru Hole	Thru Hole	Thru Hole	Thru Hole
							Fl	- - -	0.99	0.99	0.99	0.96	0.91	0.89	0.89	0.89	0.89	0.89
							C_V	7.33	15.7	26.9	42.1	55.8	87.1	137	245	348	441	523
	12	ISA-75.08.06 (short) or ISA-75.08.05 (short)	203.2	8	152.4	6	Hole Type	- - -	3 Stage	3 Stage	3 Stage	2 Stage	1 Stage	Thru Hole	Thru Hole	Thru Hole	Thru Hole	Thru Hole
							Fl	- - -	0.99	0.99	0.99	0.96	0.91	0.89	0.89	0.89	0.89	0.89
							C_V	8.38	19.0	37.3	56.6	78.8	134	236	384	521	645	752
Three Stage, 50% Characterized(1)	8	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	152.4	6	127	5	Hole Type	- - -	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	2 Stage	1 Stage	Thru Hole	Thru Hole	Thru Hole
							Fl	- - -	0.99	0.99	0.99	0.99	0.99	0.96	0.91	0.89	0.89	0.89
							C_V	6.28	13.4	22.9	34.7	46.5	56.0	67.8	90.8	131	216	295
	10	ISA-75.08.06 (short) or ISA-75.08.05 (short)	177.8	7	127	5	Hole Type	- - -	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	2 Stage	1 Stage	Thru Hole	Thru Hole	Thru Hole
							Fl	- - -	0.99	0.99	0.99	0.99	0.99	0.96	0.91	0.89	0.89	0.89
							C_V	7.33	15.6	26.7	41.9	54.5	65.5	79.8	107	153	253	347
	12	ISA-75.08.06 (short) or ISA-75.08.05 (short)	203.2	8	152.4	6	Hole Type	- - -	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	2 Stage	1 Stage	Thru Hole	Thru Hole	Thru Hole
							Fl	- - -	0.99	0.99	0.99	0.99	0.99	0.96	0.91	0.89	0.89	0.89
							C_V	8.38	18.9	37.1	56.3	75.5	91.1	112	162	248	394	525
Three Stage, 80% Characterized(1)	8	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	152.4	6	127	5	Hole Type	- - -	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	1 Stage	Thru Hole
							Fl	- - -	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.91	0.89
							C_V	6.28	13.3	22.7	34.5	46.3	55.6	66.0	79.0	88.2	113	189
	10	ISA-75.08.06 (short) or ISA-75.08.05 (short)	177.8	7	127	5	Hole Type	- - -	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	1 Stage	Thru Hole
							Fl	- - -	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.91	0.89
							C_V	7.33	15.5	26.6	41.6	54.1	65.1	78.6	92.5	104	133	218
	12	ISA-75.08.06 (short) or ISA-75.08.05 (short)	203.2	8	152.4	6	Hole Type	- - -	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	1 Stage	Thru Hole
							Fl	- - -	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.91	0.89
							C_V	8.38	18.8	36.9	55.9	74.9	90.4	107	125	144	173	269

1. Stage production notes in Fisher FIRST 2 Flow Coefficient Catalog calculated as follows:
30% characterized - 2 stage: Cv@ 30%, 1 stage: (Cv @ 40% - Cv @ 30%), 0 stage (Cv @ 100% - Cv @ 40%)
50% characterized - 2 stage: Cv@ 50%, 1 stage: (Cv @ 60% - Cv @ 50%), 0 stage (Cv @ 100% - Cv @ 60%)
80% characterized - 2 stage: Cv@ 80%, 1 stage: (Cv @ 90% - Cv @ 80%), 0 stage (Cv @ 100% - Cv @ 90%)
2. Valve should not be required to throttle at less than the minimum coefficient for an extended time or erosion damage to the valve seat may result.

HPD, HPT CL2500 and CL3200, Cavitrol III, Flow Down

Linear Characteristic

Trim Stage	Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coeffi-cient	Mini-mum (2)	Valve Opening—Percent of Total Travel										F_L(1)
			mm	Inches	mm	Inches			10	20	30	40	50	60	70	80	90	100	
Three Stage	3	ISA-75.08.06 (short) or ISA-75.08.05 (short)	34.925	1.375	63.5	2.5	C_v	1.19	1.71	2.80	3.90	4.90	6.20	7.90	9.20	10.3	11.3	12.4	0.99
							K_v	1.03	1.48	2.42	3.37	4.24	5.36	6.83	7.96	8.91	9.77	10.7	- - -
	4	ISA-75.08.06 (short) or ASME B16.10 (short)	57.15	2.25	69.85	2.75	C_v	1.93	2.78	4.60	6.90	9.90	11.6	13.4	16.3	18.7	20.4	22.1	0.99
							K_v	1.67	2.40	3.98	5.97	8.56	10.0	11.6	14.1	16.2	17.6	19.1	- - -
	6	ISA-75.08.06 (short) or ISA-75.08.05 (short)	105.92	4.17	95.25	3.75	C_v	3.99	5.71	11.8	18.2	23.7	27.6	33.9	40.1	44.7	49.4	55.5	0.99
							K_v	3.45	4.94	10.2	15.7	20.5	23.9	29.3	34.7	38.7	42.7	48.0	- - -
	8	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	139.7	5.5	127	5	Hole Type	- - -	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	- - -
							Fl	- - -	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	- - -
							C_v	5.76	12.1	20.7	32.4	42.1	50.6	61.1	71.8	80.2	89.5	101	- - -
	10	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	165.1	6.5	127	5	Hole Type	- - -	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	- - -
							Fl	- - -	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	- - -
							C_v	6.81	14.4	24.5	38.4	50.0	60.1	72.5	85.4	95.4	106	121	- - -
	12	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	190.5	7.5	152.4	6	Hole Type	- - -	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	- - -
							Fl	- - -	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	- - -
							C_v	7.86	16.7	34.4	52.2	69.8	82.9	99.3	117	134	149	164	- - -
	14	Fisher Design	215.9	8.5	152.4	6	C_v	9.73	20.7	39.7	59.8	79.8	96.1	113	133	153	171	186	0.96
							K_v	8.42	17.9	34.3	51.7	69.0	83.1	97.8	115	132	148	161	- - -
Three Stage, 30% Chara-cteriz-ed(1)	8	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	139.7	5.5	127	5	Hole Type	- - -	3 Stage	3 Stage	3 Stage	2 Stage	1 Stage	Thru Hole	Thru Hole	Thru Hole	Thru Hole	Thru Hole	- - -
							Fl	- - -	0.99	0.99	0.99	0.96	0.91	0.89	0.89	0.89	0.89	0.89	- - -
							C_v	5.76	12.3	21.1	33.0	44.8	71.8	115	205	285	351	405	- - -
	10	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	165.1	6.5	127	5	Hole Type	- - -	3 Stage	3 Stage	3 Stage	2 Stage	1 Stage	Thru Hole	Thru Hole	Thru Hole	Thru Hole	Thru Hole	- - -
							Fl	- - -	0.99	0.99	0.99	0.96	0.91	0.89	0.89	0.89	0.89	0.89	- - -
							C_v	6.81	14.6	24.9	39.1	52.5	83.6	134	241	342	433	512	- - -
	12	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	190.5	7.5	152.4	6	Hole Type	- - -	3 Stage	3 Stage	3 Stage	2 Stage	1 Stage	Thru Hole	Thru Hole	Thru Hole	Thru Hole	Thru Hole	- - -
							Fl	- - -	0.99	0.99	0.99	0.96	0.91	0.89	0.89	0.89	0.89	0.89	- - -
							C_v	7.86	16.9	34.9	53.0	74.5	129	228	373	506	623	723	- - -

HPD, HPT CL2500 and CL3200, Cavitrol III, Flow Down (cont.)

Linear Characteristic

Trim Stage	Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coefficient	Mini mum (2)	Valve Opening—Percent of Total Travel										F_L(1)
			mm	Inches	mm	Inches			10	20	30	40	50	60	70	80	90	100	
Three Stage, 50% Characterized(1)	8	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	139.7	5.5	127	5	Hole Type	- - -	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	2 Stage	1 Stage	Thru Hole	Thru Hole	Thru Hole	- - -
							Fl	- - -	0.99	0.99	0.99	0.99	0.99	0.96	0.91	0.89	0.89	0.89	- - -
							C_v	5.76	12.2	20.9	32.9	42.6	51.3	63.2	86.7	126	209	282	- - -
	10	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	165.1	6.5	127	5	Hole Type	- - -	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	2 Stage	1 Stage	Thru Hole	Thru Hole	Thru Hole	- - -
							Fl	- - -	0.99	0.99	0.99	0.99	0.99	0.96	0.91	0.89	0.89	0.89	- - -
							C_v	6.81	14.5	24.8	38.9	50.6	60.8	74.7	102	148	247	340	- - -
	12	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	190.5	7.5	152.4	6	Hole Type	- - -	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	2 Stage	1 Stage	Thru Hole	Thru Hole	Thru Hole	---
							Fl	- - -	0.99	0.99	0.99	0.99	0.99	0.96	0.91	0.89	0.89	0.89	---
							C_v	7.86	16.8	34.8	52.8	70.6	83.9	105	154	237	382	510	---
Three Stage, 80% Characterized(1)	8	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	139.7	5.5	127	5	Hole Type	- - -	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	1 Stage	Thru Hole	- - -
							Fl	- - -	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.89	0.89	- - -
							C_v	5.76	12.2	20.8	32.6	42.4	50.9	61.5	72.3	80.7	106	178	- - -
	10	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	165.1	6.5	127	5	Hole Type	- - -	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	Thru Hole	Thru Hole	- - -
							Fl	- - -	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.89	0.89	- - -
							C_v	6.81	14.4	24.7	38.6	50.2	60.4	73.0	85.9	96.0	125	210	- - -
	12	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	190.5	7.5	152.4	6	Hole Type	- - -	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	1 Stage	Thru Hole	- - -
							Fl	- - -	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.91	0.89	- - -
							C_v	7.86	16.7	34.5	52.4	70.1	83.2	99.7	117	135	154	259	- - -

1. Stage production notes in Fisher FIRST 2 Flow Coefficient Catalog calculated as follows:
30% characterized - 2 stage: Cv@ 30%, 1 stage: (Cv @ 40% - Cv @ 30%), 0 stage (Cv @ 100% - Cv @ 40%)
50% characterized - 2 stage: Cv@ 50%, 1 stage: (Cv @ 60% - Cv @ 50%), 0 stage (Cv @ 100% - Cv @ 60%)
80% characterized - 2 stage: Cv@ 80%, 1 stage: (Cv @ 90% - Cv @ 80%), 0 stage (Cv @ 100% - Cv @ 90%
2. Valve should not be required to throttle at less than the minimum coefficient for an extended time or erosion damage to the valve seat may result.

HPD, HPT CL2500 and CL3200, Cavitrol III, Flow Down (cont.)

Linear Characteristic

Trim Stage	Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coefficient	Minimum (2)	Valve Opening—Percent of Total Travel										F_L(1)
			mm	Inches	mm	Inches			10	20	30	40	50	60	70	80	90	100	
Three Stage	3	ISA-75.08.06 (short) or ISA-75.08.05 (short)	34.925	1.375	63.5	2.5	Cv	1.37	1.87	2.9	4	5.1	6.3	8	9.3	10.4	11.5	12.5	0.99
							Kv	1.19	1.62	2.5	3.5	4.4	5.4	6.9	8.0	9.0	9.9	10.8	- - -
	4	ISA-75.08.06 (short) or ASME B16.10 (short)	57.15	2.25	69.85	2.75	Cv	2.16	3.32	5.1	7.3	10.2	12	13.7	16.4	18.9	20.6	22.3	0.99
							Kv	1.87	2.87	4.4	6.3	8.8	10.4	11.9	14.2	16.3	17.8	19.3	- - -
	6	ISA-75.08.06 (short) or ISA-75.08.05 (short)	105.9	4.17	95.25	3.75	Cv	5.04	7.63	13.6	19.7	25	28.8	34.9	41	45.4	50.2	56.3	0.99
							Kv	4.36	6.60	11.8	17.0	21.6	24.9	30.2	35.5	39.3	43.4	48.7	- - -
	8	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	139.7	5.5	127	5	Hole Type	- - -	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	- - -
							Fl	- - -	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	- - -
							Cv	5.91	13	22	33	45	54	64	77	86	95	108	- - -
	10	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	165.1	6.5	127	5	Hole Type	- - -	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	- - -
							Fl	- - -	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	- - -
							Cv	4.17	15	26	41	53	64	77	91	102	114	129	- - -
	12	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	190.5	7.5	152.4	6	Hole Type	- - -	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	- - -
							Fl	- - -	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	- - -
							Cv	8.1	17	36	55	74	88	106	125	143	159	174	- - -
	14	Fisher Design	215.9	8.5	152.4	6	Cv	7.1	23	43	64	86	103	121	142	163	183	198	0.96
							Kv	6.17	20	37	55	74	89	105	123	141	158	171	- - -

HPD, HPT CL2500 and CL3200, Cavitrol III, Flow Down (cont.)

Linear Characteristic

Trim Stage	Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coefficient	Minimum (2)	Valve Opening—Percent of Total Travel										F_L(1)
			mm	Inches	mm	Inches			10	20	30	40	50	60	70	80	90	100	
Three Stage, 30% Characterized(1)	8	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	139.7	5.5	127	5	Hole Type	- - -	3 Stage	3 Stage	3 Stage	2 Stage	1 Stage	Thru Hole	Thru Hole	Thru Hole	Thru Hole	Thru Hole	- - -
							Fl	- - -	0.99	0.99	0.99	0.96	0.91	0.89	0.89	0.89	0.89	0.89	- - -
							Cv	5.91	13	22	34	46	73	115	204	284	351	405	- - -
	10	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	165.1	6.5	127	5	Hole Type	- - -	3 Stage	3 Stage	3 Stage	2 Stage	1 Stage	Thru Hole	Thru Hole	Thru Hole	Thru Hole	Thru Hole	- - -
							Fl	- - -	0.99	0.99	0.99	0.96	0.91	0.89	0.89	0.89	0.89	0.89	- - -
							Cv	6.99	15	26	42	55	86	136	244	344	435	513	- - -
	12	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	190.5	7.5	152.4	6	Hole Type	- - -	3 Stage	3 Stage	3 Stage	2 Stage	1 Stage	Thru Hole	Thru Hole	Thru Hole	Thru Hole	Thru Hole	- - -
							Fl	- - -	0.99	0.99	0.99	0.96	0.91	0.89	0.89	0.89	0.89	0.89	- - -
							Cv	8.1	18	37	56	78	132	231	376	508	625	725	- - -
Three Stage, 50% Characterized(1)	8	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	139.7	5.5	127	5	Hole Type	- - -	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	2 Stage	1 Stage	Thru Hole	Thru Hole	Thru Hole	- - -
							Fl	- - -	0.99	0.99	0.99	0.99	0.99	0.96	0.91	0.89	0.89	0.89	- - -
							Cv	5.91	13	22	34	45	55	66	89	128	209	285	- - -
	10	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	165.1	6.5	127	5	Hole Type	-	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	2 Stage	1 Stage	Thru Hole	Thru Hole	Thru Hole	- - -
							Fl	-	0.99	0.99	0.99	0.99	0.99	0.96	0.91	0.89	0.89	0.89	- - -
							Cv	6.99	15	26	41	54	65	79	106	152	251	344	- - -
	12	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	190.5	7.5	152.4	6	Hole Type	- - -	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	2 Stage	1 Stage	Thru Hole	Thru Hole	Thru Hole	- - -
							Fl	- - -	0.99	0.99	0.99	0.99	0.99	0.96	0.91	0.89	0.89	0.89	- - -
							Cv	8.1	18	37	56	75	89	111	160	243	387	515	- - -
Three Stage, 80% Characterized(1)	8	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	139.7	5.5	127	5	Hole Type	- - -	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	1 Stage	Thru Hole	- - -
							Fl	- - -	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.91	0.89	- - -
							Cv	5.91	13	22	34	45	54	64	77	86	110	182	- - -
	10	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	165.1	6.5	127	5	Hole Type	- - -	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	1 Stage	Thru Hole	- - -
							Fl	- - -	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.91	0.89	- - -
							Cv	6.99	15	26	41	53	64	78	92	102	131	216	- - -
	12	ISA-75.08.06 (short) or ISA-75.08.05 (short) or Fisher Design	190.5	7.5	152.4	6	Hole Type	- - -	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	3 Stage	1 Stage	Thru Hole	- - -
							Fl	- - -	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.91	0.89	- - -
							Cv	8.1	18	37	56	75	89	106	125	144	163	268	- - -

1. Stage production notes in Fisher FIRST 2 Flow Coefficient Catalog calculated as follows:
30% characterized - 2 stage: Cv@ 30%, 1 stage: (Cv @ 40% - Cv @ 30%), 0 stage (Cv @ 100% - Cv @ 40%)
50% characterized - 2 stage: Cv@ 50%, 1 stage: (Cv @ 60% - Cv @ 50%), 0 stage (Cv @ 100% - Cv @ 60%)
80% characterized - 2 stage: Cv@ 80%, 1 stage: (Cv @ 90% - Cv @ 80%), 0 stage (Cv @ 100% - Cv @ 90%
2. Valve should not be required to throttle at less than the minimum coefficient for an extended time or erosion damage to the valve seat may result.

HPT, CL900 and 1500, Cavitrol III, Protected Inside Seat Design, Flow Down

Linear Characteristic

Trim Stage	Valve Size, NPS	Face to Face Standard	Port Diameter		Maximum Travel		Flow Coef- ficient	Mini- mum Throt- tling C_v	Valve Opening - Percent of Total Travel									
			mm	Inch	mm	Inch			10	20	30	40	50	60	70	80	90	100
Two Stage	2(1)	ISA 75.08.06 (long)	29.4	1.159	50	2	C_v	0.58	0.03	1.7	3.5	5.2	6.8	8.3	9.7	10.9	12	12.9
							K_v	*0.502*	*0.026*	*1.47*	*3*	*4.5*	*5.9*	*7.2*	*8.4*	*9.4*	*10.4*	*11.1*
	3	ISA 75.08.06 (long) or ISA 75.08.05 (long)	48.5	1.909	64	2.5	C_v	0.72	0.05	4.4	8.3	12.2	15.9	19.4	22.8	26	28.9	31.5
							K_v	*0.623*	*0.04*	*3.8*	*7.2*	*10.5*	*13.7*	*16.8*	*19.7*	*22.5*	*25*	*27.2*
	4	ISA 75.08.06 (long) or ISA 75.08.05 (long)	72.3	2.847	76	3	C_v	0.9	1.6	7.9	14.1	20.3	26.3	32.3	38	43.7	49.1	54
							K_v	*0.778*	*1.4*	*6.8*	*12.2*	*17.5*	*22.7*	*27.9*	*32.8*	*37.8*	*42.4*	*46.6*
	6	ISA 75.08.06 (long) or ISA 75.08.05 (long)	118.3	4.659	102	4	C_v	1.72	6.1	19.4	32.6	45.7	58.7	71.4	84	96.4	108.4	119.6
							K_v	*1.49*	*5.3*	*16.8*	*28.2*	*39.5*	*50.7*	*61.7*	*72.6*	*83.3*	*93.6*	*103.3*
Three Stage	3	ISA 75.08.06 (long) or ISA 75.08.05 (long)	32.6	1.284	64	2.5	C_v	1.2	0.07	3	4.7	6.1	7.5	8.9	10.2	11.8	13.5	14.8
							K_v	*1.04*	*0.06*	*2.6*	*4.1*	*5.3*	*6.5*	*7.7*	*8.8*	*10.2*	*11.7*	*12.8*
	4	ISA 75.08.06 (long) or ISA 75.08.05 (long)	58	2.284	76	3	C_v	1.7	2.7	5	8.2	11.9	14	17.8	20.2	22.1	25.6	27.3
							K_v	*1.47*	*2.3*	*4.3*	*7.1*	*10.3*	*12.1*	*15.4*	*17.5*	*19.1*	*22.1*	*23.6*
	6	ISA 75.08.06 (long) or ISA 75.08.05 (long)	100.9	3.972	102	4	C_v	3.1	4.7	12	19.3	26.6	31.8	37.4	44.5	51.5	58.5	61.9
							K_v	*2.68*	*4.1*	*10.4*	*16.7*	*23*	*27.5*	*32.3*	*38.4*	*44.5*	*50.5*	*53.5*

1. Also CL2500

HPS, CL900, CL1500, CL2500, Cavitrol III 2-Stage Micro-Flat, Flow Down

Linear Characteristic

Valve Size, NPS	Face to Face Standard	Shutoff Port Diameter(2)		Maximum Travel		Flow Coeffi- cient	Valve Opening—Percent of Total Travel											F_L(1)
		mm	Inches	mm	Inches		Min.	10	20	30	40	50	60	70	80	90	100	
1(3)	ISA 75.08.06 (long)	22.2	0.875	19	0.75	C_v	0.04	0.02	0.04	0.05	0.07	0.09	0.12	0.16	0.21	0.26	0.30	0.97
						K_v	*0.03*	*0.02*	*0.03*	*0.04*	*0.06*	*0.08*	*0.10*	*0.14*	*0.18*	*0.22*	*0.26*	
1(3)	ISA 75.08.06 (long)	25.4	1	28.5	1.125	C_v	0.04	0.03	0.05	0.08	0.12	0.18	0.26	0.33	0.41	0.51	0.60	0.97
						K_v	*0.03*	*0.03*	*0.04*	*0.07*	*0.10*	*0.16*	*0.22*	*0.29*	*0.35*	*0.44*	*0.52*	
1(4)	ISA 75.08.06 (long)	25.4	1	38.1	1.5	C_v	0.04	0.02	0.02	0.04	0.25	0.49	0.70	0.94	1.36	1.76	2.23	0.97
						K_v	*0.03*	*0.02*	*0.02*	*0.03*	*0.22*	*0.42*	*0.61*	*0.81*	*1.18*	*1.52*	*1.93*	
2(4)	ISA 75.08.06 (long) or ISA 75.08.05 (long)	25.4	1	38.1	1.5	C_v	0.04	0.02	0.02	0.04	0.25	0.49	0.70	0.94	1.36	1.76	2.23	0.97
						K_v	*0.03*	*0.02*	*0.02*	*0.03*	*0.22*	*0.42*	*0.61*	*0.81*	*1.18*	*1.52*	*1.93*	

1. At 100% travel
2. Cavitrol III Micro-Flat trims use a shutoff port diameter which is larger than the flowing port diameter. Use the shutoff port diameter for actuator sizing.
3. Flowing port: 12.7 mm / 0.5 Inch, Unbalanced Area: 5.065 cm2 / 0.785 In2, 1/2" stem
4. Flowing port: 19 mm / 0.75 Inch, Unbalanced Area: 5.065 cm2 / 0.785 In2, 3/4" stem

EMERSON

HPS, CL900, CL1500, CL2500, Cavitrol III 3-Stage Micro-Flat, Flow Down

Linear Characteristic

Valve Size, NPS	Face to Face Standard	Shutoff Port Diameter[2]		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel											F_L[1]
		mm	Inches	mm	Inches		Min.	10	20	30	40	50	60	70	80	90	100	
2[3]	ISA 75.08.06 (long) or ISA 75.08.05 (long)	15.8	0.625	31.7	1.25	C_v	0.05	0.00	0.01	0.03	0.11	0.19	0.28	0.36	0.44	0.53	0.62	0.97
						K_v	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	
2[4]	ISA 75.08.06 (long) or ISA 75.08.05 (long)	25.4	1	38.1	1.5	C_v	0.05	0.01	0.06	0.09	0.16	0.34	0.46	0.62	0.89	1.06	1.18	0.97
						K_v	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	
2[5]	ISA 75.08.06 (long) or ISA 75.08.05 (long)	25.4	1	63.5	2.5	C_v	0.06	0.01	0.14	0.37	0.72	1.20	1.86	2.75	3.74	4.53	5.54	0.97
						K_v	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	

1. At 100% travel
2. Cavitrol III Micro-Flat trims use a shutoff port diameter which is larger than the flowing port diameter. Use the shutoff port diameter for actuator sizing.
3. Flowing port: 9.5 mm / 0.375 Inch (Unbalanced Area: 1.96 cm2 / 0.307 In2, 3/4" stem
4. Flowing port: 12.7 mm / 0.5 Inch (Unbalanced Area: 5.065 cm2 / 0.785 In2, 3/4" stem
5. Flowing port: 19 mm / 0.75 Inch (Unbalanced Area: 5.065 cm2 / 0.785 In2, 3/4" stem

The Fisher™ HPT-C valve has flow coefficients identical to the NPS 4 through 12 Fisher HPD valve. Please refer to those coefficients. For additional HPT-C valve body information, refer to Bulletin 51.2:HP Cryogenic, D104174X012.

The Fisher HPS-C valve has flow coefficients identical to the NPS 1 through 3 Fisher HPS valve. Please refer to those coefficients. For additional HPS-C valve body information, refer to Bulletin 51.2:HP Cryogenic, D104174X012.

CL600 -- Globe and Angle Valves 3-Stage, Level C - Flow Up

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Level	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L(1)
	mm	Inch	mm	Inch			Min	10	20	30	40	50	60	70	80	90	100	
1 Balanced	25.4	1.0	9.5	0.375	C	C_v	0.100	(2)	0.226	0.615	1.28	2.13	3.02	3.80	4.34	4.58	4.58	0.99
2 Balanced	38.1	1.5	9.5	0.375	C	C_v	0.150	(2)	0.545	1.45	2.64	3.85	5.17	6.50	7.75	8.75	9.30	0.99
3 Balanced	55.6	2.19	15.9	0.625	C	C_v	0.250	(2)	1.17	3.12	5.68	8.28	11.1	14.0	16.7	18.8	20.0	0.99
4 Balanced	73.2	2.88	19.1	0.75	C	C_v	0.430	(2)	1.99	5.30	9.65	14.1	18.9	23.8	28.3	32.0	34.0	0.99
6 Balanced	111.1	4.375	19.1	0.75	C	C_v	0.600	(2)	1.17	5.51	12.6	21.6	31.4	40.9	49.1	55.4	59.5	0.99
8 Balanced	136.5	5.375	25.4	1	C	C_v	0.800	(2)	2.07	10.5	23.4	38.5	56.6	75.3	92.6	109	122	0.99

1. At 100% travel.
2. Clearance flow only.

CL900 and CL1500, Globe and Angle Valves 4-Stage, Levels A, B, and C - Flow Up

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Level	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L(1)
	mm	Inch	mm	Inch			Min	10	20	30	40	50	60	70	80	90	100	
1 Unbalanced	17.8	0.7	6.4	0.25	A	C_v	0.040	(2)	0.030	0.150	0.270	0.390	0.520	0.640	0.76	0.88	1.00	0.99
					B		0.040	(2)	0.042	0.210	0.378	0.546	0.728	0.896	1.06	1.23	1.40	0.99
					C		0.040	(2)	0.051	0.255	0.459	0.663	0.884	1.09	1.29	1.50	1.70	0.99
1-1/2 Unbalanced	25.4	1.0	6.4	0.25	A	C_v	0.080	(2)	0.057	0.285	0.513	0.741	0.988	1.22	1.44	1.67	1.90	0.99
					B		0.080	(2)	0.075	0.375	0.675	0.975	1.30	1.60	1.90	2.20	2.50	0.99
					C		0.080	(2)	0.096	0.480	0.864	1.25	1.66	2.05	2.43	2.82	3.20	0.99
2 Balanced	38.1	1.5	9.5	0.375	A	C_v	0.120	(2)	0.400	0.960	1.54	2.20	2.86	3.42	3.92	4.32	4.55	0.99
					B		0.120	(2)	0.460	1.10	1.85	2.63	3.39	4.26	5.19	5.99	6.63	0.99
					C		0.120	(2)	0.570	1.53	2.62	3.85	5.00	6.16	7.29	8.19	8.85	0.99
3 Balanced	55.6	2.19	15.9	0.625	A	C_v	0.200	(2)	0.580	1.84	3.20	4.57	6.23	7.35	8.25	8.82	8.90	0.99
					B		0.200	(2)	0.620	2.00	3.78	5.45	7.30	9.32	11.5	13.4	14.6	0.99
					C		0.200	(2)	0.416	2.19	4.41	6.90	9.80	12.4	14.7	16.4	16.8	0.99
4 Balanced	73.2	2.88	19.1	0.75	A	C_v	0.350	(2)	0.462	2.31	4.16	6.01	8.01	9.86	11.7	13.6	15.4	0.99
					B		0.350	(2)	0.723	3.62	6.51	9.40	12.5	15.4	18.3	21.2	24.1	0.99
					C		0.350	(2)	0.879	4.40	7.91	11.4	15.2	18.8	22.3	25.8	29.3	0.99
6(3) Balanced	111.1	4.375	25.4	1.0	C	C_v	0.500	(2)	1.8	7.7	16	25	34	42	50	56	61	0.99
8(3) Balanced	136.5	5.375	31.8	1.25	C	C_v	0.700	(2)	3.5	16	32	50	67	82	96	107	117	0.99

1. At 100% travel.
2. Clearance flow only.
3. NPS 6 and 8 are only available as angle valve bodies with Level C trim.

CL1500, Globe Valve, 6-Stage, Level C - Flow Up

Linear Characteristic

Valve Size, NPS/ Rating	Port Diameter		Maximum Travel		Level	Flow Coeffi-cient	Valve Opening—Percent of Total Travel											F_L(1)
	mm	Inch	mm	Inch			Min	10	20	30	40	50	60	70	80	90	100	
1 Unbalanced	17.8	0.7	6.4	0.25	C	C_v	0.035	(2)	0.052	0.26	0.48	0.69	0.85	1.07	1.27	1.37	1.43	0.99
2 Balanced	38.1	1.5	9.5	0.375	C	C_v	0.11	(2)	0.17	0.88	1.55	2.03	2.71	3.79	4.51	5.31	6.09	0.99
3 Balanced	55.6	2.19	15.9	0.625	C	C_v	0.18	(2)	0.37	1.9	3.25	4.5	6.4	8.3	10.14	11.62	13.1	0.99
4 Balanced	73.2	2.88	19.1	0.75	C	C_v	0.3	(2)	0.7	2.8	5.6	8.8	12	15	18	21	23	0.99
6 Balanced	111.1	4.38	25.4	1	C	C_v	0.4	(2)	1.4	5.9	12	19	26	33	40	45	49	0.99

1. At 100% travel.
2. Clearance flow only.

CL2500, Angle Valve, 6-Stage, Level C - Flow Up

Linear Characteristic

Valve Size, NPS/ Rating	Port Diameter		Maximum Travel		Level	Flow Coeffi-cient	Valve Opening—Percent of Total Travel											F_L(1)
	mm	Inch	mm	Inch			Min	10	20	30	40	50	60	70	80	90	100	
1 Unbalanced	17.8	0.7	6.4	0.25	C	C_v	0.035	(2)	0.052	0.26	0.48	0.69	0.85	1.07	1.27	1.37	1.43	0.99
2 Balanced	38.1	1.5	9.5	0.375	C	C_v	0.11	(2)	0.17	0.88	1.55	2.03	2.71	3.79	4.51	5.31	6.09	0.99
3 Balanced	55.6	2.19	15.9	0.625	C	C_v	0.18	(2)	0.37	1.9	3.25	4.5	6.4	8.3	10.14	11.62	13.1	0.99
4 Balanced	73.0	2.88	19.1	0.75	C	C_v	0.3	(2)	0.7	2.8	5.6	8.8	12	15	18	21	23	0.99
6 Balanced	111.1	4.38	25.4	1	C	C_v	0.4	(2)	1.4	5.9	12	19	26	33	40	45	49	0.99

1. At 100% travel.
2. Clearance flow only.

CL2500, Globe Valve, 6-Stage, Level C - Flow Up

Linear Characteristic

Valve Size, NPS/ Rating	Port Diameter		Maximum Travel		Level	Flow Coeffi-cient	Valve Opening—Percent of Total Travel											F_L(1)
	mm	Inch	mm	Inch			Min	10	20	30	40	50	60	70	80	90	100	
1 Unbalanced	17.8	0.7	6.4	0.25	C	C_v	0.035	(2)	0.052	0.26	0.48	0.69	0.85	1.07	1.27	1.37	1.43	0.99
2 Balanced	38.1	1.5	9.5	0.375	C	C_v	0.11	(2)	0.17	0.88	1.55	2.03	2.71	3.79	4.51	5.31	6.09	0.99
3 Balanced	55.6	2.19	15.9	0.625	C	C_v	0.18	(2)	0.37	1.9	3.25	4.5	6.4	8.3	10.14	11.62	13.1	0.99
4 Balanced	73.2	2.88	19.1	0.75	C	C_v	0.3	(2)	0.7	2.8	5.6	8.8	12	15	18	21	23	0.99
6 Balanced	111.1	4.38	25.4	1	C	C_v	0.4	(2)	1.4	5.9	12	19	26	33	40	45	49	0.99

1. At 100% travel.
2. Clearance flow only.

Equal Percentage

Equal Percentage Characteristic

Valve Size, NPS	Port Diameter[1]		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										
	mm	Inches	mm	Inches		5	10	20	30	40	50	60	70	80	90	100
1	8	0.3125	15	0.591	C_v	0.050	0.073	0.117	0.156	0.215	0.390	0.546	0.715	0.934	1.28	1.91
					K_v	0.043	0.063	0.101	0.135	0.186	0.337	0.472	0.618	0.808	1.11	1.65
	15	0.5	15	0.591	C_v	0.139	0.182	0.262	0.427	0.559	0.684	0.842	1.08	1.48	2.23	3.57
					K_v	0.120	0.157	0.227	0.369	0.484	0.592	0.728	0.934	1.28	1.93	3.09
	20	0.75	15	0.591	C_v	0.443	0.585	0.917	1.28	1.77	2.43	3.25	4.52	5.61	7.21	8.41
					K_v	0.383	0.506	0.793	1.11	1.53	2.10	2.81	3.91	4.85	6.24	7.27
	25	1	15	0.591	C_v	0.562	0.632	0.842	1.12	1.55	2.20	2.99	4.03	5.92	8.66	11.5
					K_v	0.486	0.547	0.728	0.969	1.34	1.90	2.59	3.49	5.12	7.49	9.95
1-1/2	25	1	19.1	0.75	C_v	0.599	0.660	0.905	1.24	1.70	2.30	3.06	4.25	6.45	9.66	13.4
					K_v	0.518	0.571	0.783	1.07	1.47	1.99	2.65	3.68	5.58	8.36	11.6
	40	1.5	19.1	0.75	C_v	1.54	1.76	2.24	3.08	4.44	6.54	9.66	13.8	18.4	23.7	28.6
					K_v	1.33	1.52	1.94	2.66	3.84	5.66	8.36	11.9	15.9	20.5	24.7
2	30	1.1875	19.1	0.75	C_v	0.508	0.582	0.763	1.05	1.56	2.32	3.17	4.31	6.03	8.92	13.3
					K_v	0.439	0.503	0.660	0.908	1.35	2.01	2.74	3.73	5.22	7.72	11.5
	50	2	19.1	0.75	C_v	2.14	2.50	3.79	5.58	9.20	12.5	16.2	21.0	28.1	36.6	44.3
					K_v	1.85	2.16	3.28	4.83	7.96	10.8	14.0	18.2	24.3	31.7	38.3
3	50	2	28.6	1.125	C_v	1.37	2.09	3.50	5.19	7.21	9.92	13.8	19.0	26.1	34.7	43.3
					K_v	1.19	1.81	3.03	4.49	6.24	8.58	11.9	16.4	22.6	30.0	37.5
	80	3.1875	28.6	1.125	C_v	3.44	4.93	8.23	12.5	18.0	25.5	35.9	49.6	66.2	81.5	94.1
					K_v	2.98	4.26	7.12	10.8	15.6	22.1	31.1	42.9	57.3	70.5	81.4
4	65	2.5	28.6	1.125	C_v	2.07	3.12	5.17	7.99	11.3	15.5	21.4	29.3	40.9	55.8	69.3
					K_v	1.79	2.70	4.47	6.91	9.77	13.4	18.5	25.3	35.4	48.3	59.9
	96	4	28.6	1.125	C_v	7.12	10.3	16.6	25.1	35.9	51.5	71.7	94.4	116	133	145
					K_v	6.16	8.91	14.4	21.7	31.1	44.5	62.0	81.7	100	115	125

1. Inch equivalents of these metric port diameters have been rounded to common fractional diameters. Actual diameter of the 15 millimeter port is 0.591 inches, of the 40 millimeter port is 1.575 inches, and of the 96 millimeter port is 3.780 inches.

FISHER™

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Full Bore Max Cv

VALVE SIZE, NPS	CL150	CL300	CL600	CL900	CL1500
2	449	411	358	323	323
3	1222	1054	947	918	835
4	2374	2095	1788	1743	1606
6	5247	5196	4493	4320	3586
8	10192	9788	8686	8262	6887
10	16546	16106	13985	13602	-
12	24735	24116	21606	20318	-
14	30003	28710	26881	-	-
16	40855	39267	36597	-	-
18	52808	51588	47845	-	-
20	67883	65650	60699	-	-
24	101990	99164	91198	-	-

Reduced Bore Max Cv

VALVE SIZE, NPS	CL150	CL300	CL600	CL900	CL1500
3 x 2	126	145	143	138	136
4 x 3	333	366	405	405	404
6 x 4	604	601	593	568	613
8 x 6	1641	1587	1691	1554	1503
10 x 8	3643	3484	3447	3439	2974
12 x 10	6288	6255	6171	5959	-
14 x 10	4643	4600	4717	4844	-
14 x 12	12263	12155	11799	13369	-
16 x 12	7501	7447	7019	8021	-
16 x 14	12733	12685	12605	-	-
18 x 14	8438	8305	8444	-	-
18 x 16	18129	17811	17358	-	-
20 x 16	12481	12203	11821	-	-
20 x 18	24962	24422	24289	-	-
24 x 20	23139	22980	21872	-	-

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Whisper Trim™ III - Flow Up

Linear Characteristic

Valve Size,(2) and Inlet Class(1)	Port Diameter		Maximum Travel		Whisper III Levels	Flow Coeffi-cient	Valve Opening—Percent of Total Travel										X_T(3)	F_L(3)
	mm	Inches	mm	Inches			10	20	30	40	50	60	70	80	90	100		
4 x 8 CL600 to 1500	120	4.70	197	7.75	A1 and A3	C_v	59	131	188	228	253	259	259	259	259	259	0.65	0.89
						K_v	51	114	162	197	219	224	224	224	224	224		
					A1	F_d	0.063	0.045	0.036	0.031	0.028	0.026	0.024	0.022	0.021	0.020		
					A3		0.033	0.023	0.019	0.017	0.015	0.014	0.013	0.012	0.011	0.010		
					B1 and B3	C_v	36	81	122	156	184	209	228	244	253	259		
						K_v	31	70	105	135	159	181	197	211	219	224		
					B1	F_d	0.089	0.063	0.051	0.045	0.040	0.036	0.034	0.031	0.030	0.028		
					B3		0.043	0.030	0.025	0.022	0.019	0.018	0.016	0.015	0.014	0.014		
					C1 and C3	C_v	23	56	84	113	138	159	181	197	216	228		
						K_v	20	49	73	97	119	138	157	170	187	197		
					C1	F_d	0.108	0.076	0.062	0.054	0.048	0.044	0.041	0.038	0.036	0.034		
					C3		0.054	0.038	0.031	0.027	0.024	0.022	0.020	0.019	0.018	0.017		
4 x 8 CL2500	120	4.70	197	7.75	A1 and A3	C_v	59	128	178	206	216	219	219	219	219	219	0.65	0.89
						K_v	51	111	154	178	187	189	189	189	189	189		
					A1	F_d	0.063	0.045	0.036	0.031	0.028	0.026	0.024	0.022	0.021	0.020		
					A3		0.033	0.023	0.019	0.017	0.015	0.014	0.013	0.012	0.011	0.010		
					B1 and B3	C_v	36	78	119	150	175	194	206	216	219	209		
						K_v	31	68	103	130	151	168	178	187	189	181		
					B1	F_d	0.089	0.063	0.051	0.045	0.040	0.036	0.034	0.031	0.030	0.028		
					B3		0.043	0.030	0.025	0.022	0.019	0.018	0.016	0.015	0.014	0.014		
					C1 and C3	C_v	23	56	84	109	134	153	172	184	197	206		
						K_v	20	49	73	95	116	132	149	159	170	178		
					C1	F_d	0.108	0.076	0.062	0.054	0.048	0.044	0.041	0.038	0.036	0.034		
					C3		0.054	0.038	0.031	0.027	0.024	0.022	0.020	0.019	0.018	0.017		
6 x 8 CL600 to 1500 and 8 x 8 through 12 x 8 CL600 to 2500	120	4.70	197	7.75	A1 and A3	C_v	60	141	222	291	356	413	463	506	544	578	0.65	0.89
						K_v	52	122	192	251	308	357	400	438	470	500		
					A1	F_d	0.063	0.045	0.036	0.031	0.028	0.026	0.024	0.022	0.021	0.020		
					A3		0.033	0.023	0.019	0.017	0.015	0.014	0.013	0.012	0.011	0.010		
					B1 and B3	C_v	37	81	128	172	219	259	294	331	366	397		
						K_v	32	70	111	149	189	224	254	287	316	343		
					B1	F_d	0.089	0.063	0.051	0.045	0.040	0.036	0.034	0.031	0.030	0.028		
					B3		0.043	0.030	0.025	0.022	0.019	0.018	0.016	0.015	0.014	0.014		
					C1 and C3	C_v	23	56	84	119	147	178	213	238	266	291		
						K_v	20	49	73	103	127	154	184	205	230	251		
					C1	F_d	0.108	0.076	0.062	0.054	0.048	0.044	0.041	0.038	0.036	0.034		
					C3		0.054	0.038	0.031	0.027	0.024	0.022	0.020	0.019	0.018	0.017		
6 x 8 CL2500	120	4.70	197	7.75	A1 and A3	C_v	60	141	216	278	334	381	419	450	472	484	0.65	0.89
						K_v	52	122	187	241	289	330	362	389	408	419		
					A1	F_d	0.063	0.045	0.036	0.031	0.028	0.026	0.024	0.022	0.021	0.020		
					A3		0.033	0.023	0.019	0.017	0.015	0.014	0.013	0.012	0.011	0.010		
					B1 and B3	C_v	37	81	128	172	209	250	281	313	341	369		
						K_v	32	70	111	149	181	216	243	270	295	319		
					B1	F_d	0.089	0.063	0.051	0.045	0.040	0.036	0.034	0.031	0.030	0.028		
					B3		0.043	0.030	0.025	0.022	0.019	0.018	0.016	0.015	0.014	0.014		
					C1 and C3	C_v	23	56	84	119	147	178	206	231	256	278		
						K_v	20	49	73	103	127	154	178	200	222	241		
					C1	F_d	0.108	0.076	0.062	0.054	0.048	0.044	0.041	0.038	0.036	0.034		
					C3		0.054	0.038	0.031	0.027	0.024	0.022	0.020	0.019	0.018	0.017		

1. Reduction of standard inlet size may affect capacity. Consult your Emerson sales office for additional information.
2. Values given are Inlet versus Outlet, i.e. 6x8 is an NPS 6 inlet and an NPS 8 outlet.
3. At 100% travel.

Whisper Trim III - Flow Up

Linear Characteristic

Valve Size,(2) and Inlet Class(1)	Port Diameter		Maximum Travel		Whisper III Levels	Flow Coeffi-cient	Valve Opening—Percent of Total Travel										X_T(3)	F_L(3)
	mm	Inches	mm	Inches			10	20	30	40	50	60	70	80	90	100		
6 x 12 CL600 to 1500	159	6.25	264	10.38	A1 and A3	C_v	112	253	369	469	553	622	672	703	722	722	0.65	0.89
						K_v	97	219	319	405	478	538	581	608	624	624		
					A1	F_d	0.048	0.034	0.027	0.024	0.021	0.019	0.018	0.017	0.016	0.015		
					A3		0.025	0.018	0.015	0.013	0.011	0.010	0.010	0.009	0.008	0.008		
					B1 and B3	C_v	67	147	231	306	372	434	488	538	581	619		
						K_v	58	127	200	265	322	376	422	465	503	535		
					B1	F_d	0.064	0.045	0.037	0.032	0.029	0.026	0.024	0.023	0.021	0.020		
					B3		0.033	0.023	0.019	0.016	0.015	0.013	0.012	0.012	0.011	0.010		
					C1 and C3	C_v	43	97	147	200	250	297	338	381	419	456		
						K_v	37	84	127	173	216	257	292	330	362	395		
					C1	F_d	0.080	0.056	0.046	0.040	0.036	0.033	0.030	0.028	0.027	0.025		
					C3		0.041	0.029	0.024	0.021	0.019	0.017	0.016	0.015	0.014	0.013		
6 x 12 CL2500	159	6.25	264	10.38	A1 and A3	C_v	112	241	338	413	463	488	488	488	488	488	0.65	0.89
						K_v	97	208	292	357	400	422	422	422	422	422		
					A1	F_d	0.048	0.034	0.027	0.024	0.021	0.019	0.018	0.017	0.016	0.015		
					A3		0.025	0.018	0.015	0.013	0.011	0.010	0.010	0.009	0.008	0.008		
					B1 and B3	C_v	67	147	222	288	341	388	425	453	475	488		
						K_v	58	127	192	249	295	335	368	392	411	422		
					B1	F_d	0.064	0.045	0.037	0.032	0.029	0.026	0.024	0.023	0.021	0.020		
					B3		0.033	0.023	0.019	0.016	0.015	0.013	0.012	0.012	0.011	0.010		
					C1 and C3	C_v	43	97	147	197	238	278	313	347	375	403		
						K_v	37	84	127	170	205	241	270	300	324	349		
					C1	F_d	0.080	0.056	0.046	0.040	0.036	0.033	0.030	0.028	0.027	0.025		
					C3		0.041	0.029	0.024	0.021	0.019	0.017	0.016	0.015	0.014	0.013		
8 x 12 CL600 to 1500 and 10 x 12 through 14 x 12 CL600 to 2500	159	6.25	264	10.38	A1 and A3	C_v	113	253	394	513	622	722	809	888	953	1009	0.65	0.89
						K_v	97	219	341	443	538	624	700	768	824	873		
					A1	F_d	0.048	0.034	0.027	0.024	0.021	0.019	0.018	0.017	0.016	0.015		
					A3		0.025	0.018	0.015	0.013	0.011	0.010	0.010	0.009	0.008	0.008		
					B1 and B3	C_v	68	147	231	316	394	469	538	600	659	719		
						K_v	58	127	200	273	341	405	465	519	570	622		
					B1	F_d	0.064	0.045	0.037	0.032	0.029	0.026	0.024	0.023	0.021	0.020		
					B3		0.033	0.023	0.019	0.016	0.015	0.013	0.012	0.012	0.011	0.010		
					C1 and C3	C_v	43	97	147	200	250	303	353	406	450	497		
						K_v	37	84	127	173	216	262	305	351	389	430		
					C1	F_d	0.080	0.056	0.046	0.040	0.036	0.033	0.030	0.028	0.027	0.025		
					C3		0.041	0.029	0.024	0.021	0.019	0.017	0.016	0.015	0.014	0.013		
8 x 12 CL2500	159	6.25	264	10.38	A1 and A3	C_v	112	253	381	494	594	681	750	809	856	888	0.65	0.89
						K_v	97	219	330	427	514	589	649	700	741	768		
					A1	F_d	0.048	0.034	0.027	0.024	0.021	0.019	0.018	0.017	0.016	0.015		
					A3		0.025	0.018	0.015	0.013	0.011	0.010	0.010	0.009	0.008	0.008		
					B1 and B3	C_v	67	147	231	316	384	453	516	572	628	675		
						K_v	58	127	200	273	332	392	446	495	543	584		
					B1	F_d	0.064	0.045	0.037	0.032	0.029	0.026	0.024	0.023	0.021	0.020		
					B3		0.033	0.023	0.019	0.016	0.015	0.013	0.012	0.012	0.011	0.010		
					C1 and C3	C_v	43	97	147	200	250	303	350	394	438	478		
						K_v	37	84	127	173	216	262	303	341	378	414		
					C1	F_d	0.080	0.056	0.046	0.040	0.036	0.033	0.030	0.028	0.027	0.025		
					C3		0.041	0.029	0.024	0.021	0.019	0.017	0.016	0.015	0.014	0.013		

1. Reduction of standard inlet size may affect capacity. Consult your Emerson sales office for additional information.
2. Values given are Inlet versus Outlet, i.e. 6x12 is an NPS 6 inlet and an NPS 12 outlet.
3. At 100% travel.

Whisper Trim™ III - Flow Up

Linear Characteristic

Valve Size,(2) and Inlet Class(1)	Port Diameter		Maximum Travel		Whisper III Levels	Flow Coefficient	Valve Opening—Percent of Total Travel										X_T(3)	F_L(3)
	mm	Inches	mm	Inches			10	20	30	40	50	60	70	80	90	100		
8 x 16 CL600 to 1500	194	7.62	321	12.62	A1 and A3	C_v	170	372	556	716	853	972	1069	1147	1206	1244	0.65	0.89
						K_v	147	322	481	619	738	841	924	992	1043	1076		
					A1	F_d	0.039	0.027	0.022	0.019	0.017	0.016	0.015	0.014	0.013	0.012		
					A3		0.021	0.015	0.012	0.011	0.009	0.009	0.008	0.007	0.007	0.007		
					B1 and B3	C_v	102	225	347	466	569	666	753	834	909	978		
						K_v	88	195	300	403	492	576	651	722	787	846		
					B1	F_d	0.053	0.038	0.031	0.027	0.024	0.022	0.020	0.019	0.018	0.017		
					B3		0.027	0.019	0.016	0.014	0.012	0.011	0.010	0.010	0.009	0.009		
					C1 and C3	C_v	64	141	216	294	369	444	509	575	634	691		
						K_v	56	122	187	254	319	384	441	497	549	597		
					C1	F_d	0.069	0.049	0.040	0.034	0.031	0.028	0.026	0.024	0.023	0.022		
					C3		0.034	0.024	0.020	0.017	0.015	0.014	0.013	0.012	0.011	0.011		
8 x 16 CL2500	194	7.62	321	12.62	A1 and A3	C_v	170	366	525	656	763	841	891	913	913	913	0.65	0.89
						K_v	147	316	454	568	660	727	770	789	789	789		
					A1	F_d	0.039	0.027	0.022	0.019	0.017	0.016	0.015	0.014	0.013	0.012		
					A3		0.021	0.015	0.012	0.011	0.009	0.009	0.008	0.007	0.007	0.007		
					B1 and B3	C_v	102	225	341	444	534	616	688	750	803	844		
						K_v	88	195	295	384	462	533	595	649	695	730		
					B1	F_d	0.053	0.038	0.031	0.027	0.024	0.022	0.020	0.019	0.018	0.017		
					B3		0.027	0.019	0.016	0.014	0.012	0.011	0.010	0.010	0.009	0.009		
					C1 and C3	C_v	64	141	216	294	363	425	484	541	591	641		
						K_v	56	122	187	254	314	368	419	468	511	554		
					C1	F_d	0.069	0.049	0.040	0.034	0.031	0.028	0.026	0.024	0.023	0.022		
					C3		0.034	0.024	0.020	0.017	0.015	0.014	0.013	0.012	0.011	0.011		
10 x 16 CL600 to 1500 and 12 x 16 through 16 x 16 CL600 to 2500	194	7.62	321	12.62	A1 and A3	C_v	170	372	575	750	909	1053	1184	1297	1397	1481	0.65	0.89
						K_v	147	322	497	649	787	911	1024	1122	1208	1281		
					A1	F_d	0.039	0.027	0.022	0.019	0.017	0.016	0.015	0.014	0.013	0.012		
					A3		0.021	0.015	0.012	0.011	0.009	0.009	0.008	0.007	0.007	0.007		
					B1 and B3	C_v	103	225	347	469	588	694	794	891	978	1063		
						K_v	89	195	300	405	508	600	687	770	846	919		
					B1	F_d	0.053	0.038	0.031	0.027	0.024	0.022	0.020	0.019	0.018	0.017		
					B3		0.027	0.019	0.016	0.014	0.012	0.011	0.010	0.010	0.009	0.009		
					C1 and C3	C_v	65	141	216	294	369	444	522	594	663	725		
						K_v	56	122	187	254	319	384	451	514	573	627		
					C1	F_d	0.069	0.049	0.040	0.034	0.031	0.028	0.026	0.024	0.023	0.022		
					C3		0.034	0.024	0.020	0.017	0.015	0.014	0.013	0.012	0.011	0.011		
10 x 16 CL2500	194	7.62	321	12.62	A1 and A3	C_v	170	372	569	734	884	1016	1131	1231	1313	1375	0.65	0.89
						K_v	147	322	492	635	765	879	979	1065	1135	1189		
					A1	F_d	0.039	0.027	0.022	0.019	0.017	0.016	0.015	0.014	0.013	0.012		
					A3		0.021	0.015	0.012	0.011	0.009	0.009	0.008	0.007	0.007	0.007		
					B1 and B3	C_v	102	225	347	469	578	681	775	866	947	1025		
						K_v	88	195	300	405	500	589	670	749	819	887		
					B1	F_d	0.053	0.038	0.031	0.027	0.024	0.022	0.020	0.019	0.018	0.017		
					B3		0.027	0.019	0.016	0.014	0.012	0.011	0.010	0.010	0.009	0.009		
					C1 and C3	C_v	64	141	216	294	369	444	519	584	650	709		
						K_v	56	122	187	254	319	384	449	505	562	614		
					C1	F_d	0.069	0.049	0.040	0.034	0.031	0.028	0.026	0.024	0.023	0.022		
					C3		0.034	0.024	0.020	0.017	0.015	0.014	0.013	0.012	0.011	0.011		

1. Reduction of standard inlet size may affect capacity. Consult your Emerson sales office for additional information.
2. Values given are Inlet versus Outlet, i.e. 8x16 is an NPS 8 inlet and an NPS 16 outlet.
3. At 100% travel.

Whisper Trim III - Flow Up

Linear Characteristic

Valve Size,[2] and Inlet Class[1]	Port Diameter		Maximum Travel		Whisper III Levels	Flow Coefficient	Valve Opening—Percent of Total Travel										X_T[3]	F_L[3]
	mm	Inches	mm	Inches			10	20	30	40	50	60	70	80	90	100		
10 x 18 CL600 to 1500	234	9.20	391	15.38	A1 and A3	C_v	261	563	841	1078	1288	1469	1622	1747	1844	1913	0.65	0.89
						K_v	226	487	727	933	1114	1270	1403	1511	1595	1654		
					A1	F_d	0.032	0.023	0.019	0.016	0.014	0.013	0.012	0.011	0.011	0.010		
					A3		0.017	0.012	0.010	0.009	0.008	0.007	0.006	0.006	0.006	0.005		
					B1 and B3	C_v	153	325	497	675	825	966	1100	1222	1334	1441		
						K_v	132	281	430	584	714	835	952	1057	1154	1246		
					B1	F_d	0.044	0.031	0.026	0.022	0.020	0.018	0.017	0.016	0.015	0.014		
					B3		0.023	0.016	0.013	0.011	0.010	0.009	0.009	0.008	0.008	0.007		
					C1 and C3	C_v	101	213	325	441	550	666	769	863	956	1044		
						K_v	88	184	281	381	476	576	665	746	827	903		
					C1	F_d	0.056	0.039	0.032	0.028	0.025	0.023	0.021	0.020	0.019	0.018		
					C3		0.028	0.020	0.016	0.014	0.013	0.011	0.011	0.010	0.009	0.009		
10 x 18 CL2500	234	9.20	391	15.38	A1 and A3	C_v	261	556	800	1006	1172	1303	1394	1450	1466	1466	0.65	0.89
						K_v	226	481	692	870	1014	1127	1206	1254	1268	1268		
					A1	F_d	0.032	0.023	0.019	0.016	0.014	0.013	0.012	0.011	0.011	0.010		
					A3		0.017	0.012	0.010	0.009	0.008	0.007	0.006	0.006	0.006	0.005		
					B1 and B3	C_v	153	325	497	650	788	909	1022	1122	1209	1284		
						K_v	132	281	430	562	681	787	884	970	1046	1111		
					B1	F_d	0.044	0.031	0.026	0.022	0.020	0.018	0.017	0.016	0.015	0.014		
					B3		0.023	0.016	0.013	0.011	0.010	0.009	0.009	0.008	0.008	0.007		
					C1 and C3	C_v	101	213	325	441	547	644	734	819	903	975		
						K_v	88	184	281	381	473	557	635	708	781	843		
					C1	F_d	0.056	0.039	0.032	0.028	0.025	0.023	0.021	0.020	0.019	0.018		
					C3		0.028	0.020	0.016	0.014	0.013	0.011	0.011	0.010	0.009	0.009		
12 x 18 CL600 to 1500 and 14 x 18 through 18 x 18 CL600 to 2500	234	9.20	391	15.38	A1 and A3	C_v	261	563	863	1119	1353	1566	1753	1919	2063	2181	0.65	0.89
						K_v	226	487	746	968	1170	1354	1516	1660	1784	1887		
					A1	F_d	0.032	0.023	0.019	0.016	0.014	0.013	0.012	0.011	0.011	0.010		
					A3		0.017	0.012	0.010	0.009	0.008	0.007	0.006	0.006	0.006	0.005		
					B1 and B3	C_v	153	325	497	675	847	997	1144	1278	1406	1528		
						K_v	132	281	430	584	733	862	989	1106	1216	1322		
					B1	F_d	0.044	0.031	0.026	0.022	0.020	0.018	0.017	0.016	0.015	0.014		
					B3		0.023	0.016	0.013	0.011	0.010	0.009	0.009	0.008	0.008	0.007		
					C1 and C3	C_v	102	213	325	441	553	666	781	888	988	1081		
						K_v	88	184	281	381	478	576	676	768	854	935		
					C1	F_d	0.056	0.039	0.032	0.028	0.025	0.023	0.021	0.020	0.019	0.018		
					C3		0.028	0.020	0.016	0.014	0.013	0.011	0.011	0.010	0.009	0.009		
12 x 18 CL2500	234	9.20	391	15.38	A1 and A3	C_v	261	563	847	1091	1306	1497	1663	1797	1909	1994	0.65	0.89
						K_v	226	487	733	943	1130	1295	1438	1554	1652	1725		
					A1	F_d	0.032	0.023	0.019	0.016	0.014	0.013	0.012	0.011	0.011	0.010		
					A3		0.017	0.012	0.010	0.009	0.008	0.007	0.006	0.006	0.006	0.005		
					B1 and B3	C_v	153	325	497	675	831	975	1113	1241	1356	1466		
						K_v	132	281	430	584	719	843	962	1073	1173	1268		
					B1	F_d	0.044	0.031	0.026	0.022	0.020	0.018	0.017	0.016	0.015	0.014		
					B3		0.023	0.016	0.013	0.011	0.010	0.009	0.009	0.008	0.008	0.007		
					C1 and C3	C_v	101	213	325	441	550	666	772	869	966	1053		
						K_v	88	184	281	381	476	576	668	751	835	911		
					C1	F_d	0.056	0.039	0.032	0.028	0.025	0.023	0.021	0.020	0.019	0.018		
					C3		0.028	0.020	0.016	0.014	0.013	0.011	0.011	0.010	0.009	0.009		

1. Reduction of standard inlet size may affect capacity. Consult your Emerson sales office for additional information.
2. Values given are Inlet versus Outlet, i.e. 10x18 is an NPS 10 inlet and an NPS 18 outlet.
3. At 100% travel.

Whisper Trim ™ III - Flow Up

Linear Characteristic

Valve Size,[2] and Inlet Class[1]	Port Diameter		Maximum Travel		Whisper III Levels	Flow Coefficient	Valve Opening—Percent of Total Travel										X_T[3]	F_L[3]
	mm	Inches	mm	Inches			10	20	30	40	50	60	70	80	90	100		
12 x 20 CL600 to 1500	285	11.20	473	18.62	A1 and A3	C_v	383	813	1213	1553	1859	2125	2350	2538	2681	2791	0.65	0.89
						K_v	331	703	1049	1343	1608	1838	2033	2195	2319	2414		
					A1	F_d	0.027	0.019	0.016	0.014	0.012	0.011	0.010	0.010	0.009	0.009		
					A3		0.014	0.010	0.008	0.007	0.006	0.006	0.005	0.005	0.005	0.005		
					B1 and B3	C_v	232	491	747	1000	1225	1434	1631	1813	1978	2128		
						K_v	201	424	646	865	1060	1241	1411	1568	1711	1841		
					B1	F_d	0.037	0.026	0.021	0.018	0.016	0.015	0.014	0.013	0.012	0.012		
					B3		0.019	0.013	0.011	0.009	0.008	0.008	0.007	0.007	0.006	0.006		
					C1 and C3	C_v	149	309	469	634	797	959	1103	1244	1378	1503		
						K_v	129	268	405	549	689	830	954	1076	1192	1300		
					C1	F_d	0.047	0.033	0.027	0.023	0.021	0.019	0.018	0.017	0.016	0.015		
					C3		0.023	0.017	0.013	0.012	0.010	0.010	0.009	0.008	0.008	0.007		
14 x 20 through 20 x 20 CL600 to 1500	285	11.20	473	18.62	A1 and A3	C_v	383	813	1247	1616	1956	2263	2538	2784	2997	3181	0.65	0.89
						K_v	331	703	1079	1398	1692	1957	2195	2408	2592	2752		
					A1	F_d	0.027	0.019	0.016	0.014	0.012	0.011	0.010	0.010	0.009	0.009		
					A3		0.014	0.010	0.008	0.007	0.006	0.006	0.005	0.005	0.005	0.005		
					B1 and B3	C_v	233	491	747	1003	1259	1484	1697	1900	2091	2269		
						K_v	201	424	646	868	1089	1284	1468	1644	1808	1962		
					B1	F_d	0.037	0.026	0.021	0.018	0.016	0.015	0.014	0.013	0.012	0.012		
					B3		0.019	0.013	0.011	0.009	0.008	0.008	0.007	0.007	0.006	0.006		
					C1 and C3	C_v	150	309	469	634	797	959	1119	1278	1422	1556		
						K_v	129	268	405	549	689	830	968	1106	1230	1346		
					C1	F_d	0.047	0.033	0.027	0.023	0.021	0.019	0.018	0.017	0.016	0.015		
					C3		0.023	0.017	0.013	0.012	0.010	0.010	0.009	0.008	0.008	0.007		

1. Reduction of standard inlet size may affect capacity. Consult your Emerson sales office for additional information.
2. Values given are Inlet versus Outlet, i.e. 12x20 is an NPS 12 inlet and an NPS 20 outlet.
3. At 100% travel.

Whisper Trim III - Flow Up

Linear Characteristic

Valve Size,(2) and Inlet Class(1)	Port Diameter		Maximum Travel		Whisper III Levels	Flow Coefficient	Valve Opening—Percent of Total Travel										X_T(3)	F_L(3)
	mm	Inches	mm	Inches			10	20	30	40	50	60	70	80	90	100		
16 x 24 CL600 to 1500	349	13.75	581	22.88	A1 and A3	C_v	648	1291	1888	2403	2859	3263	3613	3900	4134	4300	0.65	0.89
						K_v	561	1116	1633	2079	2473	2822	3125	3374	3576	3720		
					A1	F_d	0.022	0.016	0.013	0.011	0.010	0.009	0.008	0.008	0.007	0.007		
					A3		0.012	0.008	0.007	0.006	0.005	0.005	0.004	0.004	0.004	0.004		
					B1 and B3	C_v	386	772	1156	1538	1872	2188	2484	2756	3009	3225		
						K_v	334	668	1000	1330	1619	1892	2149	2384	2603	2790		
					B1	F_d	0.030	0.022	0.018	0.015	0.014	0.012	0.012	0.011	0.010	0.010		
					B3		0.015	0.011	0.009	0.008	0.007	0.006	0.006	0.005	0.005	0.005		
					C1 and C3	C_v	251	497	741	984	1231	1478	1703	1913	2113	2291		
						K_v	217	430	641	851	1065	1279	1473	1654	1827	1981		
					C1	F_d	0.038	0.027	0.022	0.019	0.017	0.016	0.014	0.013	0.013	0.012		
					C3		0.019	0.013	0.011	0.010	0.009	0.008	0.007	0.007	0.006	0.006		
18 x 24 through 24 x 24 CL600 to 1500	349	13.75	581	22.88	A1 and A3	C_v	648	1291	1931	2481	2981	3438	3850	4213	4531	4781	0.65	0.89
						K_v	561	1116	1671	2146	2579	2973	3330	3644	3920	4136		
					A1	F_d	0.022	0.016	0.013	0.011	0.010	0.009	0.008	0.008	0.007	0.007		
					A3		0.012	0.008	0.007	0.006	0.005	0.005	0.004	0.004	0.004	0.004		
					B1 and B3	C_v	386	772	1156	1538	1916	2250	2569	2869	3150	3394		
						K_v	334	668	1000	1330	1657	1946	2222	2481	2725	2936		
					B1	F_d	0.030	0.022	0.018	0.015	0.014	0.012	0.012	0.011	0.010	0.010		
					B3		0.015	0.011	0.009	0.008	0.007	0.006	0.006	0.005	0.005	0.005		
					C1 and C3	C_v	252	497	741	984	1231	1478	1722	1956	2169	2359		
						K_v	218	430	641	851	1065	1279	1489	1692	1876	2041		
					C1	F_d	0.038	0.027	0.022	0.019	0.017	0.016	0.014	0.013	0.013	0.012		
					C3		0.019	0.013	0.011	0.010	0.009	0.008	0.007	0.007	0.006	0.006		

1. Reduction of standard inlet size may affect capacity. Consult your Emerson sales office for additional information.
2. Values given are Inlet versus Outlet, i.e. 16x24 is an NPS 16 inlet and an NPS 24 outlet.
3. At 100% travel.

Whisper Trim™ III - Flow Up

Linear Characteristic

Valve Size,(2) and Inlet Class(1)	Port Diameter		Maximum Travel		Whisper III Levels	Flow Coeffi-cient	Valve Opening—Percent of Total Travel										X_T(3)	F_L(3)
	mm	Inches	mm	Inches			10	20	30	40	50	60	70	80	90	100		
18 x 30 CL600 to 900	424	16.70	606	23.88	A1 and A3	C_v	768	1525	2253	2878	3447	3953	4400	4788	5116	5359	0.65	0.89
						K_v	664	1319	1949	2490	2982	3419	3806	4141	4425	4636		
					A1	F_d	0.022	0.015	0.013	0.011	0.010	0.009	0.008	0.008	0.007	0.007		
					A3		0.011	0.008	0.006	0.005	0.005	0.004	0.004	0.004	0.004	0.003		
					B1 and B3	C_v	486	969	1444	1928	2356	2756	3131	3481	3809	4088		
						K_v	420	838	1249	1668	2038	2384	2709	3011	3295	3536		
					B1	F_d	0.027	0.019	0.015	0.013	0.012	0.011	0.010	0.009	0.009	0.008		
					B3		0.014	0.010	0.008	0.007	0.006	0.006	0.005	0.005	0.005	0.004		
					C1 and C3	C_v	313	616	916	1222	1528	1831	2119	2384	2641	2866		
						K_v	271	533	792	1057	1322	1584	1833	2062	2284	2479		
					C1	F_d	0.033	0.024	0.019	0.017	0.015	0.014	0.013	0.012	0.011	0.011		
					C3		0.017	0.012	0.010	0.009	0.008	0.007	0.006	0.006	0.006	0.005		
20 x 30 CL600 to 900	424	16.70	606	23.88	A1 and A3	C_v	768	1525	2284	2966	3581	4147	4666	5134	5556	5891	0.65	0.89
						K_v	664	1319	1976	2565	3098	3587	4036	4441	4806	5095		
					A1	F_d	0.022	0.015	0.013	0.011	0.010	0.009	0.008	0.008	0.007	0.007		
					A3		0.011	0.008	0.006	0.005	0.005	0.004	0.004	0.004	0.004	0.003		
					B1 and B3	C_v	487	969	1444	1928	2403	2838	3238	3619	3984	4300		
						K_v	421	838	1249	1668	2079	2454	2800	3130	3446	3720		
					B1	F_d	0.027	0.019	0.015	0.013	0.012	0.011	0.010	0.009	0.009	0.008		
					B3		0.014	0.010	0.008	0.007	0.006	0.006	0.005	0.005	0.005	0.004		
					C1 and C3	C_v	313	616	916	1222	1528	1831	2131	2438	2713	2953		
						K_v	271	533	792	1057	1322	1584	1844	2108	2346	2554		
					C1	F_d	0.033	0.024	0.019	0.017	0.015	0.014	0.013	0.012	0.011	0.011		
					C3		0.017	0.012	0.010	0.009	0.008	0.007	0.006	0.006	0.006	0.005		
22 x 30 through 24 x 30 CL600 to 900	424	16.70	606	23.88	A1 and A3	C_v	768	1525	2284	3009	3650	4247	4797	5306	5775	6153	0.65	0.89
						K_v	665	1319	1976	2603	3157	3674	4149	4590	4995	5322		
					A1	F_d	0.022	0.015	0.013	0.011	0.010	0.009	0.008	0.008	0.007	0.007		
					A3		0.011	0.008	0.006	0.005	0.005	0.004	0.004	0.004	0.004	0.003		
					B1 and B3	C_v	487	969	1444	1928	2403	2875	3291	3691	4075	4406		
						K_v	421	838	1249	1668	2079	2487	2846	3192	3525	3811		
					B1	F_d	0.027	0.019	0.015	0.013	0.012	0.011	0.010	0.009	0.009	0.008		
					B3		0.014	0.010	0.008	0.007	0.006	0.006	0.005	0.005	0.005	0.004		
					C1 and C3	C_v	314	619	919	1222	1528	1831	2131	2438	2744	2997		
						K_v	271	535	795	1057	1322	1584	1844	2108	2373	2592		
					C1	F_d	0.033	0.024	0.019	0.017	0.015	0.014	0.013	0.012	0.011	0.011		
					C3		0.017	0.012	0.010	0.009	0.008	0.007	0.006	0.006	0.006	0.005		

1. Reduction of standard inlet size may affect capacity. Consult your Emerson sales office for additional information.
2. Values given are Inlet versus Outlet, i.e. 18x30 is an NPS 18 inlet and an NPS 30 outlet.
3. At 100% travel.

Whisper Trim III - Flow Up

Linear Characteristic

Valve Size,(2) and Inlet Class(1)	Port Diameter		Maximum Travel		Whisper III Levels	Flow Coeffi-cient	Valve Opening—Percent of Total Travel										X_T(3)	F_L(3)
	mm	Inches	mm	Inches			10	20	30	40	50	60	70	80	90	100		
22 x 36 CL600 to 900	506	19.94	606	23.88	A1 and A3	C_v	964	1922	2884	3725	4494	5194	5831	6400	6903	7131	0.65	0.89
						K_v	834	1662	2495	3222	3887	4493	5044	5536	5971	6169		
					A1	F_d	0.018	0.013	0.010	0.009	0.008	0.007	0.007	0.006	0.006	0.006		
					A3		0.010	0.007	0.006	0.005	0.004	0.004	0.004	0.003	0.003	0.003		
					B1 and B3	C_v	577	1150	1716	2291	2853	3372	3850	4306	4744	5119		
						K_v	499	995	1484	1981	2468	2917	3330	3725	4103	4428		
					B1	F_d	0.025	0.017	0.014	0.012	0.011	0.010	0.009	0.009	0.008	0.008		
					B3		0.012	0.009	0.007	0.006	0.006	0.005	0.005	0.004	0.004	0.004		
					C1 and C3	C_v	371	731	1084	1447	1809	2169	2525	2884	3216	3503		
						K_v	321	633	938	1252	1565	1876	2184	2495	2782	3030		
					C1	F_d	0.031	0.022	0.018	0.016	0.014	0.013	0.012	0.011	0.010	0.010		
					C3		0.016	0.011	0.009	0.008	0.007	0.006	0.006	0.006	0.005	0.005		
24 x 36 CL600 to 900	506	19.94	606	23.88	A1 and A3	C_v	965	1925	2884	3847	4700	5491	6234	6928	7572	7875	0.65	0.89
						K_v	835	1665	2495	3328	4066	4749	5393	5993	6550	6812		
					A1	F_d	0.018	0.013	0.010	0.009	0.008	0.007	0.007	0.006	0.006	0.006		
					A3		0.010	0.007	0.006	0.005	0.004	0.004	0.004	0.003	0.003	0.003		
					B1 and B3	C_v	578	1150	1716	2291	2856	3428	3994	4494	4978	5406		
						K_v	500	995	1484	1981	2471	2965	3455	3887	4306	4676		
					B1	F_d	0.025	0.017	0.014	0.012	0.011	0.010	0.009	0.009	0.008	0.008		
					B3		0.012	0.009	0.007	0.006	0.006	0.005	0.005	0.004	0.004	0.004		
					C1 and C3	C_v	372	731	1088	1447	1809	2169	2525	2884	3250	3581		
						K_v	321	633	941	1252	1565	1876	2184	2495	2811	3098		
					C1	F_d	0.031	0.022	0.018	0.016	0.014	0.013	0.012	0.011	0.010	0.010		
					C3		0.016	0.011	0.009	0.008	0.007	0.006	0.006	0.006	0.005	0.005		

1. Reduction of standard inlet size may affect capacity. Consult your Emerson sales office for additional information.
2. Values given are Inlet versus Outlet, i.e. 22x36 is an NPS 22 inlet and an NPS 36 outlet.
3. At 100% travel.

Coefficients	Valve Size, NPS	Valve Rotation, Degrees							Equal Percentage	
		10	20	30	40	50	60	70	80	90
Cv	1(2)	0.010(1)	0.738	2.53	5.00	8.40	12.4	18.3	29.2	34.6
Kv		0.009	0.638	2.19	4.33	7.27	10.7	15.8	25.3	29.9
Fl		0.93	0.90	0.90	0.88	0.83	0.84	0.81	0.66	0.69
X_T		0.392	0.469	0.571	0.592	0.529	0.507	0.441	0.292	0.275
Cv	1-1/2(2)	0.014(1)	2.07	6.15	11.9	19.2	27.8	38.8	59.2	76.0
Kv		0.012	1.79	5.32	10.3	16.6	24.0	33.6	51.2	65.7
Fl		0.87	0.89	0.86	0.87	0.83	0.82	0.82	0.71	0.73
X_T		0.492	0.460	0.548	0.557	0.534	0.516	0.481	0.344	0.328
Cv	2(2)	0.028(1)	2.64	9.60	19.1	31.4	46.1	67.2	93.6	123
Kv		0.024	2.28	8.30	16.5	27.2	39.9	58.1	81.0	106
Fl		0.94	0.89	0.90	0.85	0.84	0.83	0.78	0.75	0.75
X_T		0.386	0.490	0.585	0.628	0.597	0.559	0.474	0.409	0.366
Cv	3	1.91	12.5	28.4	49.9	78	116	168	229	364
Kv		1.65	10.8	24.6	43.2	67.5	100	145	198	315
Fd		0.51	0.65	0.75	0.82	0.87	0.92	0.95	0.98	0.99
Fl		0.90	0.90	0.89	0.87	0.83	0.78	0.75	0.75	0.65
X_T		0.455	0.619	0.667	0.618	0.555	0.490	0.424	0.388	0.235
Cv	4	5.21	25.4	52.6	90.4	135	189	260	352	523
Kv		4.51	22.0	45.5	78.2	117	163	225	304	452
Fd		0.51	0.65	0.75	0.82	0.87	0.92	0.95	0.98	0.99
Fl		0.87	0.88	0.87	0.84	0.82	0.79	0.77	0.74	0.65
X_T		0.546	0.677	0.684	0.603	0.561	0.516	0.446	0.371	0.255
Cv	6	9.45	41.9	88.8	153	230	329	461	646	1080
Kv		8.17	36.2	76.8	132	199	285	399	559	934
Fd		0.51	0.62	0.73	0.81	0.86	0.91	0.95	0.97	0.99
Fl		0.88	0.93	0.90	0.88	0.85	0.81	0.77	0.72	0.55
X_T		0.633	0.737	0.761	0.665	0.599	0.521	0.436	0.346	0.194
Cv	8	6.27	44	111	200	319	466	649	924	1750
Kv		5.42	38.1	96.0	173	276	403	561	799	1514
Fd		0.51	0.62	0.73	0.81	0.86	0.91	0.95	0.97	0.99
Fl		0.93	0.94	0.93	0.90	0.86	0.83	0.79	0.74	0.51
X_T		0.703	0.795	0.745	0.678	0.615	0.555	0.481	0.378	0.156

1. This coefficient was measured at 12 degrees of rotation.
2. NPS 1 through 2 are not available with Flat Metal Seals.

Coefficients	Valve Size, NPS	Valve Rotation, Degrees							Equal Percentage	
		10	20	30	40	50	60	70	80	90
Cv	10	21.8	110	251	433	659	947	1300	1780	2710
Kv		18.9	95.2	217	375	570	819	1125	1540	2344
Fd		0.51	0.64	0.75	0.82	0.87	0.91	0.95	0.98	0.99
Fl		0.95	0.95	0.92	0.87	0.84	0.80	0.77	0.72	0.61
X_T		0.733	0.759	0.697	0.661	0.594	0.499	0.433	0.367	0.233
Cv	12	34	163	359	619	936	1340	1860	2580	4100
Kv		29.4	141	311	535	810	1159	1609	2232	3547
Fd		0.51	0.65	0.75	0.82	0.87	0.92	0.95	0.98	0.99
Fl		0.94	0.98	0.94	0.91	0.88	0.83	0.80	0.75	0.60
X_T		0.766	0.819	0.795	0.723	0.653	0.559	0.471	0.389	0.233
C_V	14(1)	60.0	250	541	872	1230	1670	2290	3410	5610
K_V		51.9	216	468	754	1064	1445	1981	2950	4853
F_L		0.89	0.96	0.79	0.78	0.79	0.80	0.74	0.54	0.37
X_T		.999	.907	.605	.526	.563	.593	.526	.345	.198
C_V	16(1)	70.0	319	692	1150	1630	2380	3290	4680	8270
K_V		60.6	280	599	995	1410	2059	2846	4048	7154
F_D		0.51	0.67	0.76	0.83	0.88	0.92	0.95	0.98	1.00
F_L		0.89	0.96	0.79	0.78	0.79	0.80	0.74	0.54	0.37
X_T		.273	.731	.566	.469	.469	.452	.384	.265	.133
C_V	20(1)	110	459	993	1600	2260	3070	4200	6260	10,300
K_V		95.2	397	859	1384	1955	2656	3633	5415	8910
F_L		0.89	0.96	0.79	0.78	0.79	0.80	0.74	0.54	0.37
X_T		.999	.907	.605	.526	.563	.593	.526	.345	.198

1. NPS 14 through 20 V150 valves are not available with Flat Metal seals.

Coefficients	Valve Size, NPS	Valve Rotation, Degrees							Equal Percentage	
		10	20	30	40	50	60	70	80	90
Cv	1	3.48(1)	3.98	5.51	7.55	10.6	14.9	20.9	34.8	38.8
Kv		3.01	3.44	4.77	6.53	9.17	12.9	18.1	30.1	33.6
Fl		0.94	0.93	0.95	0.93	0.90	0.85	0.81	0.62	0.64
X_T		0.752	0.685	0.653	0.683	0.628	0.532	0.435	0.236	0.231
Cv	1-1/2	5.17(1)	6.40	9.69	14.7	21.6	30.7	41.5	61.5	81.4
Kv		4.47	5.54	8.38	12.7	18.7	26.6	35.9	53.2	70.4
Fl		0.95	0.96	0.95	0.93	0.90	0.87	0.85	0.76	0.74
X_T		0.637	0.618	0.619	0.625	0.589	0.529	0.494	0.366	0.316
Cv	2	8.00(1)	9.70	15.5	24.4	36.2	51.9	71.9	96.8	138
Kv		6.92	8.39	13.4	21.1	31.3	44.9	62.2	83.7	119
Fl		0.95	0.94	0.93	0.92	0.89	0.85	0.83	0.81	0.73
X_T		0.623	0.613	0.617	0.641	0.627	0.572	0.509	0.453	0.330
Cv	3	22.4	30.4	45.2	66.5	95.3	129	178	250	422
Kv		19.4	26.3	39.1	57.5	82.4	112	154	216	365
Fd		0.51	0.65	0.75	0.82	0.87	0.92	0.95	0.98	0.99
Fl		0.80	0.83	0.86	0.85	0.85	0.83	0.79	0.78	0.66
X_T		0.427	0.503	0.548	0.544	0.519	0.518	0.46	0.374	0.208
Cv	4	22.2	40.7	67.8	104	148	201	273	370	579
Kv		19.2	35.2	58.6	90.0	128	174	236	320	501
Fd		0.51	0.65	0.75	0.82	0.87	0.92	0.95	0.98	0.99
Fl		0.87	0.87	0.87	0.85	0.83	0.81	0.78	0.75	0.63
X_T		0.537	0.568	0.607	0.591	0.567	0.532	0.459	0.375	0.228
Cv	6	31.5	58.6	104	163	242	346	474	658	1150
Kv		27.2	50.7	90.0	141	209	299	410	569	995
Fd		0.51	0.62	0.73	0.81	0.86	0.91	0.95	0.97	0.99
Fl		0.86	0.90	0.91	0.88	0.85	0.81	0.78	0.74	0.55
X_T		0.499	0.644	0.656	0.651	0.611	0.539	0.461	0.356	0.182
Cv	8	47.8	83.0	144	240	358	506	693	1000	1880
Kv		41.3	71.8	125	208	310	438	599	865	1626
Fd		0.51	0.62	0.73	0.81	0.86	0.91	0.95	0.97	0.99
Fl		0.84	0.87	0.92	0.89	0.86	0.82	0.79	0.72	0.50
X_T		0.49	0.592	0.643	0.601	0.576	0.527	0.466	0.343	0.148

1. This coefficient was measured at 12 degrees of rotation.

Coefficients	Valve Size, NPS	Valve Rotation, Degrees							Equal Percentage	
		10	20	30	40	50	60	70	80	90
Cv	10	71.4	156	296	479	691	958	1360	1830	2820
Kv		61.8	135	256	414	598	829	1176	1583	2439
Fd		0.51	0.64	0.75	0.82	0.87	0.91	0.95	0.98	0.99
Fl		0.86	0.90	0.90	0.87	0.86	0.85	0.77	0.73	0.60
X_T		0.482	0.599	0.633	0.604	0.573	0.529	0.433	0.371	0.223
Cv	12	116	234	430	686	1000	1410	1970	2690	4400
Kv		100	202	372	593	865	1220	1704	2327	3806
Fd		0.51	0.65	0.75	0.82	0.87	0.92	0.95	0.98	0.99
Fl		0.84	0.88	0.88	0.86	0.84	0.81	0.76	0.72	0.57
X_T		0.506	0.635	0.656	0.637	0.605	0.544	0.454	0.37	0.207
C_V	14	201	357	643	966	1300	1720	2410	3530	5930
K_V		174	309	556	835	1125	1488	2085	3053	5129
F_L		0.89	0.96	0.79	0.78	0.79	0.80	0.74	0.54	0.37
X_T		.999	.907	.605	.526	.563	.593	.526	.345	.198
C_V	16	234	455	822	1270	1730	2460	3460	4850	8740
K_V		202	394	711	1099	1496	2128	2993	4195	7560
F_D		0.51	0.67	0.76	0.83	0.88	0.92	0.95	0.98	1.00
F_L		0.89	0.96	0.79	0.78	0.79	0.80	0.74	0.54	0.37
X_T		.273	.731	.566	.469	.469	.452	.384	.265	.133
C_V	20	368	655	1180	1770	2390	3170	4420	6480	10900
K_V		318	567	1021	1531	2067	2742	3823	5605	9429
F_L		0.89	0.96	0.79	0.78	0.79	0.80	0.74	0.54	0.37
X_T		.999	.907	.605	.526	.563	.593	.526	.345	.198

Coefficients	Valve Size, NPS	Valve Rotation, Degrees							Equal Percentage	
		10	20	30	40	50	60	70	80	90
Cv	1	2.58(1)	3.16	5.05	8.13	12.4	18.1	25.7	33.4	38.1
Kv		2.23	2.73	4.37	7.03	10.7	15.7	22.2	28.9	33.0
Fl		0.87	0.86	0.81	0.75	0.70	0.65	0.59	0.58	0.59
X_T		0.613	0.521	0.500	0.451	0.383	0.323	0.270	0.249	0.244
Cv	1-1/2	3.80(1)	5.11	8.82	15.1	24.1	35.3	49.9	65.5	79.3
Kv		3.29	4.42	7.63	13.1	20.8	30.5	43.2	56.7	68.6
Fl		0.89	0.89	0.85	0.79	0.74	0.69	0.64	0.60	0.60
X_T		0.641	0.612	0.562	0.503	0.435	0.381	0.319	0.285	0.277
Cv	2	5.55(1)	7.35	13.9	25.2	40.1	59.5	82.4	106	126
Kv		4.80	6.36	12.0	21.8	34.7	51.5	71.3	91.7	109
Fl		0.89	0.88	0.86	0.79	0.76	0.72	0.68	0.65	0.64
X_T		0.643	0.641	0.586	0.524	0.476	0.413	0.365	0.341	0.326
Cv	3	15.3	23.7	38.6	65.2	102	155	228	313	411
Kv		13.2	20.5	33.4	56.4	88.2	134	197	271	356
Fl		0.81	0.83	0.84	0.80	0.74	0.66	0.59	0.54	0.51
X_T		0.516	0.563	0.601	0.504	0.433	0.353	0.271	0.217	0.18
Cv	4	14.8	31.2	59.6	100	157	232	327	441	542
Kv		12.8	27.0	51.6	86.5	136	201	283	381	469
Fl		0.87	0.91	0.88	0.85	0.79	0.72	0.65	0.60	0.58
X_T		0.614	0.676	0.643	0.581	0.492	0.408	0.326	0.258	0.237
Cv	6	19.8	46.3	97	172	275	409	584	764	954
Kv		17.1	40.0	83.9	149	238	354	505	661	825
Fl		0.82	0.90	0.88	0.86	0.81	0.72	0.66	0.62	0.59
X_T		0.638	0.765	0.676	0.558	0.459	0.378	0.309	0.267	0.233
Cv	8	31.2	71.4	149	265	421	625	881	1190	1340
Kv		27.0	61.8	129	229	364	541	762	1029	1159
Fl		0.78	0.85	0.84	0.83	0.78	0.72	0.66	0.60	0.66
X_T		0.641	0.601	0.562	0.493	0.416	0.355	0.304	0.24	0.268

1. This coefficient was measured at 12 degrees of rotation.

Coefficients	**Valve Size, NPS**	**Valve Rotation, Degrees**							**Equal Percentage**	
		10	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**
Cv	10	40.4	127	293	529	839	1200	1660	2060	2500
Kv		34.9	110	253	458	726	1038	1436	1782	2163
Fl		0.76	0.85	0.85	0.82	0.76	0.72	0.67	0.66	0.64
X_T		0.738	0.759	0.593	0.482	0.404	0.362	0.311	0.297	0.267
Cv	12	74	199	438	784	1250	1820	2550	3250	4000
Kv		64.0	172	379	678	1081	1574	2206	2811	3460
Fl		0.76	0.85	0.84	0.81	0.76	0.70	0.65	0.62	0.59
X_T		0.650	0.723	0.599	0.490	0.406	0.35	0.295	0.268	0.237
C_V	14	121	297	646	1090	1600	2190	3030	4120	5320
K_V		105	257	559	943	1384	1894	2621	3564	4602
F_L		0.89	0.96	0.79	0.78	0.79	0.80	0.74	0.54	0.37
X_T		.999	.907	.605	.526	.563	.593	.526	.345	.198
C_V	16	141	379	826	1430	2130	3120	4360	5660	7850
K_V		122	328	715	1237	1842	2699	3771	4896	6790
F_D		0.51	0.67	0.76	0.83	0.88	0.92	0.95	0.98	1.00
F_L		0.89	0.96	0.79	0.78	0.79	0.80	0.74	0.54	0.37
X_T		.273	.731	.566	.469	.469	.452	.384	.265	.133
C_V	20	222	545	1190	1990	2950	4030	5560	7570	9780
K_V		192	472	1029	1721	2552	3486	4809	6548	8460
F_L		0.89	0.96	0.79	0.78	0.79	0.80	0.74	0.54	0.37
X_T		.999	.907	.605	.526	.563	.593	.526	.345	.198

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Coefficients	Valve Size, NPS	Valve Rotation, Degrees							Equal Percentage	
		10	20	30	40	50	60	70	80	90
Cv	1	0.0503(1)	1.01	2.53	4.68	7.60	11.3	16.5	28.0	33.1
Kv		0.0435	0.87	2.19	4.05	6.57	9.77	14.3	24.2	28.6
Fl		0.95	0.96	0.94	0.91	0.89	0.88	0.84	0.68	0.68
X_T		0.829	0.713	0.687	0.650	0.600	0.553	0.473	0.263	0.243
Cv	1-1/2	0.018(1)	1.56	4.20	8.90	15.1	23.2	32.8	50.4	70.8
Kv		0.016	1.35	3.63	7.70	13.1	20.1	28.4	43.6	61.2
Fl		0.91	0.86	0.94	0.86	0.89	0.87	0.85	0.75	0.70
X_T		0.591	0.622	0.683	0.540	0.549	0.561	0.531	0.347	0.265
Cv	2	0.020(1)	2.00	6.75	14.8	25.8	40.4	59.6	83.9	122
Kv		0.017	1.73	5.84	12.8	22.3	34.9	51.6	72.6	106
Fl		0.89	0.90	0.91	0.90	0.88	0.87	0.81	0.78	0.72
X_T		0.749	0.612	0.589	0.633	0.624	0.558	0.485	0.427	0.314
Cv	3	2.09	11.9	28.0	49.6	77.0	113	159	230	387
Kv		1.81	10.3	24.2	42.9	66.6	97.7	138	199	335
Fd		0.51	0.65	0.75	0.82	0.87	0.92	0.95	0.98	0.99
Fl		0.91	0.93	0.92	0.89	0.86	0.81	0.79	0.76	0.63
X_T		0.499	0.642	0.667	0.610	0.564	0.517	0.463	0.364	0.212
Cv	4	2.53	19.9	47.7	83.1	133	186	254	352	534
Kv		2.19	17.2	41.3	71.9	115	161	220	304	462
Fd		0.51	0.65	0.75	0.82	0.87	0.92	0.95	0.98	0.99
Fl		0.91	0.89	0.87	0.85	0.82	0.80	0.78	0.75	0.64
X_T		0.776	0.658	0.642	0.614	0.530	0.493	0.440	0.354	0.240
Cv	6	6.96	34.3	81.0	142	219	317	439	602	964
Kv		6.02	29.7	70.1	123	189	274	380	521	834
Fd		0.51	0.62	0.73	0.81	0.86	0.91	0.95	0.97	0.99
Fl		0.92	0.93	0.92	0.88	0.85	0.81	0.78	0.74	0.59
X_T		0.995	0.994	0.880	0.800	0.686	0.591	0.513	0.409	0.238
Cv	8	4.03	35.6	96.5	181	300	440	636	951	1710
Kv		3.49	30.8	83.5	157	260	381	550	823	1479
Fd		0.51	0.62	0.73	0.81	0.86	0.91	0.95	0.97	0.99
Fl		0.90	0.94	0.94	0.91	0.88	0.86	0.80	0.70	0.51
X_T		0.997	0.743	0.762	0.711	0.608	0.552	0.463	0.335	0.160

1. This coefficient was measured at 12 degrees of rotation.

Coefficients	**Valve Size, NPS**	**Valve Rotation, Degrees**							**Equal Percentage**	
		10	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**
Cv	10	11.9	87.6	214	388	599	875	1240	1720	2820
Kv		10.3	75.8	185	336	518	757	1073	1488	2439
Fd		0.51	0.64	0.75	0.82	0.87	0.91	0.95	0.98	0.99
Fl		0.95	0.97	0.94	0.90	0.86	0.80	0.76	0.70	0.54
X_T		0.773	0.767	0.728	0.646	0.590	0.525	0.437	0.359	0.206
Cv	12	25.0	143	343	611	943	1370	1920	2650	4290
Kv		21.6	124	297	529	816	1185	1661	2292	3711
Fd		0.51	0.65	0.75	0.82	0.87	0.92	0.95	0.98	0.99
Fl		0.93	0.94	0.93	0.89	0.85	0.81	0.76	0.71	0.56
X_T		0.784	0.802	0.733	0.659	0.582	0.510	0.433	0.350	0.204
C_V	14	56.0	232	502	809	1140	1550	2120	3160	5200
K_V		48.4	201	434	700	986	1341	1834	2733	4498
F_L		0.89	0.96	0.79	0.78	0.79	0.80	0.74	0.54	0.37
X_T		.999	.907	.605	.526	.563	.593	.526	.345	.198
C_V	16	26.6	237	600	1040	1500	2040	2900	4560	7840
K_V		22.5	177	449	778	1122	1526	2170	3411	5866
Fd		0.51	0.67	0.76	0.83	0.88	0.92	0.95	0.98	1.00
F_L		0.89	0.96	0.79	0.78	0.79	0.80	0.74	0.54	0.37
X_T		.965	.999	.593	.462	.487	.533	.462	.278	.135
C_V	20	105	436	942	1520	2140	2910	3990	5940	9770
K_V		78.6	326	705	1137	1601	2177	2985	4444	7310
F_L		0.89	0.96	0.79	0.78	0.79	0.80	0.74	0.54	0.37
X_T		.999	.907	.605	.526	.563	.593	.526	.345	.198

Coefficients	Valve Size, NPS	Valve Rotation, Degrees							Equal Percentage	
		10	20	30	40	50	60	70	80	90
Cv	1	0.063 (1)	0.982	2.26	4.65	8.57	14.8	22.0	32.2	36.9
Kv		0.054	0.849	1.95	4.02	7.41	12.8	19.0	27.9	31.9
Fl		0.87	0.84	0.88	0.83	0.76	0.66	0.61	0.52	0.50
X_T		0.54	0.706	0.738	0.590	0.440	0.309	0.252	0.181	0.168
Cv	1-1/2	0.016 (1)	1.45	3.92	8.33	15.9	27.4	43.6	59.8	77.5
Kv		0.014	1.25	3.39	7.21	13.8	23.7	37.7	51.7	67.0
Fl		0.95	0.87	0.88	0.86	0.80	0.71	0.61	0.58	0.52
X_T		0.642	0.642	0.664	0.584	0.471	0.353	0.262	0.230	0.186
Cv	2	0.019 (1)	2.16	6.85	16.0	30.0	50.5	77.7	106	129
Kv		0.016	1.87	5.93	13.8	26.0	43.7	67.2	91.7	112
Fl		0.95	0.82	0.89	0.86	0.80	0.71	0.64	0.60	0.59
X_T		0.448	0.589	0.635	0.534	0.460	0.375	0.299	0.260	0.241
Cv	3	3.1	13.1	26.8	55.0	96.0	154	232	320	417
Kv		2.68	11.3	23.2	47.6	83.0	133	201	277	361
Fl		0.99	0.96	0.94	0.84	0.74	0.65	0.56	0.51	0.49
X_T		0.265	0.538	0.737	0.535	0.402	0.308	0.238	0.19	0.155
Cv	4	2.93	18.9	46.0	89.0	151	239	351	480	599
Kv		2.53	16.3	39.8	77.0	131	207	304	415	518
Fl		0.93	1.0	0.93	0.87	0.79	0.67	0.59	0.53	0.51
X_T		0.504	0.895	0.709	0.569	0.464	0.349	0.259	0.203	0.176
Cv	6	7.95	37.8	91.2	177	290	440	639	886	1150
Kv		6.88	32.7	78.9	153	251	381	553	766	995
Fl		0.95	0.96	0.92	0.87	0.79	0.68	0.62	0.54	0.49
X_T		0.813	0.807	0.721	0.548	0.431	0.333	0.25	0.196	0.165
Cv	8	8.76	41.4	112	223	379	590	853	1150	1480
Kv		7.58	35.8	96.9	193	328	510	738	995	1280
Fl		0.86	0.86	0.91	0.85	0.81	0.73	0.66	0.61	0.56
X_T		0.162	0.643	0.654	0.537	0.449	0.361	0.285	0.242	0.203

1. This coefficient was measured at 12 degrees of rotation.

Coefficients	**Valve Size, NPS**	**Valve Rotation, Degrees**							**Equal Percentage**	
		10	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**
Cv	10	12.7	89.3	235	461	793	1170	1770	2400	2890
Kv		11.0	77.2	203	399	686	1012	1531	2076	2500
Fl		0.91	0.96	0.91	0.87	0.77	0.72	0.62	0.55	0.55
X_T		0.988	0.906	0.674	0.542	0.419	0.36	0.256	0.204	0.194
Cv	12	27.0	151	381	744	1250	1870	2770	3800	4750
Kv		23.4	131	330	644	1081	1618	2396	3287	4109
Fl		0.92	0.93	0.89	0.84	0.76	0.68	0.60	0.53	0.50
X_T		0.795	0.774	0.630	0.491	0.382	0.311	0.228	0.180	0.161

Coefficients	Valve Rotation, Degrees								
	10	20	30	40	50	60	70	80	90
Metal Micro-Notch Ball with Fisher TCM Plus or Heavy Duty (HD) Seal									
C_V	0.014	0.130	0.360	0.660	1.03	1.43	2.00	3.25	5.23
K_V	0.012	0.112	0.311	0.571	0.89	1.24	1.73	2.81	4.52
F_L	0.95	0.90	0.93	0.93	0.91	0.90	0.93	0.93	0.88
X_T	0.551	0.581	0.660	0.628	0.589	0.593	0.620	0.605	0.578
Ceramic Micro-Notch Ball with Heavy Duty (HD) Seal									
C_V	0.018	0.148	0.415	0.786	1.28	1.78	2.34	2.86	3.64
K_V	0.016	0.128	0.359	0.680	1.11	1.54	2.02	2.47	3.15
F_L	0.90	0.93	0.94	0.93	0.89	0.90	0.88	0.89	0.92
X_T	0.581	0.697	0.693	0.601	0.593	0.612	0.533	0.537	0.612
Metal Micro-Scratch Ball with TCM Plus or Heavy Duty (HD) Seal									
C_V	0.0033	0.0109	0.0232	0.0396	0.0542	0.2032	1.136	2.672	5.155
K_V	0.0029	0.0094	0.0201	0.0343	0.0469	0.1758	0.983	2.311	4.459
F_L	0.95	0.90	0.93	0.93	0.91	0.90	0.93	0.93	0.88
X_T	0.551	0.581	0.660	0.628	0.589	0.593	0.620	0.605	0.578
Metal Macro-Notch Ball with TCM Plus or Heavy Duty (HD) Seal									
C_V	- - -	0.206	1.11	2.79	5.23	7.64	9.18	9.56	9.57
K_V	- - -	0.178	0.96	2.41	4.52	6.61	7.94	8.27	8.28
F_L	0.91	0.95	0.91	0.85	0.85	0.84	0.85	0.85	0.85
X_T	1.00	0.65	0.79	0.64	0.60	0.56	0.56	0.56	0.58
Ceramic Macro-Notch Ball with Heavy Duty (HD) Seal									
C_V	0.0124	0.782	2.040	4.280	6.13	7.55	8.03	8.03	8.03
K_V	0.0107	0.676	1.765	3.702	5.30	6.53	6.95	6.95	6.95
F_L	0.91	0.95	0.91	0.85	0.85	0.84	0.85	0.85	0.85
X_T	1.00	0.65	0.79	0.64	0.60	0.56	0.56	0.56	0.58

Valve Size, NPS	Coefficient	Valve Rotation, Degrees								
		10°	20°	30°	40°	50°	60°	70°	80°	90°
4	Cv	4.9	23.1	49.8	87.2	129	178	245	332	389
	K_V	4.2	20.0	43.1	75.4	112	154	212	287	336
	F_L	- - -	- - -	0.91	- - -	0.79	- - -	0.73	- - -	0.71
	X_T	0.70	0.76	0.74	0.64	0.59	0.52	0.42	0.33	0.33
6	Cv	- - -	36.1	77.4	131	190	266	383	544	657
	K_V	- - -	31.2	67.0	113	164	230	331	471	568
	F_L	- - -	0.92	0.88	- - -	0.86	0.81	0.79	0.72	0.70
	X_T	- - -	0.38	0.50	0.51	0.51	0.46	0.37	0.29	0.31
8	Cv	7.9	48.4	112	186	268	380	553	802	1060
	K_V	6.8	41.9	96.9	161	232	329	478	694	917
	F_L	0.88	0.80	0.80	0.75	0.79	0.78	0.74	0.64	0.66
	X_T	0.68	0.95	0.79	0.68	0.64	0.58	0.44	0.31	0.30
10	Cv	13.3	84.7	181	294	452	633	894	1190	1620
	K_V	11.5	73.3	157	254	391	548	773	1030	1400
	F_L	0.89	0.87	0.83	0.79	0.77	0.77	0.75	0.69	0.66
	X_T	0.83	0.73	0.75	0.75	0.62	0.54	0.42	0.36	0.31
12	Cv	20.3	132	269	461	687	1010	1350	1920	2830
	K_V	17.6	114	233	399	594	874	1170	1660	2450
	F_L	0.87	0.80	0.83	0.78	0.79	0.71	0.73	0.69	0.63
	X_T	0.91	0.64	0.77	0.74	0.70	0.56	0.50	0.38	0.28
14	Cv	- - -	229	502	769	1120	1460	2040	2670	3340
	K_V	- - -	198	434	665	969	1260	1760	2320	2910
	F_L	- - -	0.88	- - -	0.75	- - -	0.76	- - -	0.65	0.65
	X_T	- - -	0.78	0.67	0.66	0.56	0.52	0.40	0.33	0.30
16	Cv	- - -	234	600	989	1472	1923	2792	3865	5064
	K_V	- - -	202	519	855	1270	1660	2420	3340	4380
	F_L	- - -	0.88	- - -	0.75	- - -	0.76	- - -	0.66	0.65
	X_T	- - -	0.86	0.66	0.58	0.49	0.47	0.35	0.26	0.20
20	Cv	- - -	430	942	1444	2104	2742	3841	5035	6312
	K_V	- - -	372	815	1250	1820	2370	3320	4360	5460
	F_L	- - -	0.88	- - -	0.75	- - -	0.76	- - -	0.66	0.65
	X_T	- - -	0.78	0.67	0.66	0.56	0.52	0.39	0.33	0.30

Valve Size, NPS	Coefficient	Valve Rotation, Degrees								
		10°	20°	30°	40°	50°	60°	70°	80°	90°
4	Cv	1.96	18.0	38.8	62.5	90.1	119	152	183	220
	F_L	0.862	0.944	0.967	0.961	0.924	0.883	0.85	0.817	0.789
	Fd	- - -	0.31	0.25	0.21	0.18	0.16	0.14	0.13	0.12
6	Cv	4.06	30.0	69.4	117	172	235	307	380	503
	F_L	0.946	0.947	0.966	0.969	0.936	0.915	0.876	0.864	0.804
	Fd	0.45	0.26	0.18	0.15	0.12	0.11	0.10	0.09	0.08
8	Cv	10.6	51.6	119	200	287	392	509	654	824
	F_L	0.925	0.939	0.938	0.923	0.927	0.877	0.849	0.81	0.779
	Fd	0.35	0.23	0.15	0.12	0.10	0.09	0.08	0.07	0.07
10	Cv	12.2	89.8	209	354	508	684	904	1150	1380
	F_L	0.935	0.935	0.935	0.890	0.857	0.843	0.808	0.756	0.757
	Fd	0.30	0.15	0.11	0.09	0.08	0.07	0.06	0.05	0.05
12	Cv	26.5	142	287	504	727	944	1250	1500	1760
	F_L	- - -	0.99	0.968	0.903	0.887	0.859	0.802	0.798	0.791
	Fd	0.23	0.13	0.09	0.07	0.06	0.05	0.05	0.05	0.04
14	Cv	55.7	225	452	715	1002	1288	1572	1835	1879
	F_L	0.959	0.944	0.924	0.901	0.875	0.850	0.824	0.801	0.797
	Fd	0.279	0.135	0.095	0.075	0.064	0.056	0.051	0.047	0.046
16	Cv	75.8	290	573	903	1259	1610	1967	2289	2324
	F_L	0.960	0.946	0.927	0.904	0.879	0.855	0.830	0.808	0.805
	Fd	0.234	0.118	0.083	0.066	0.056	0.050	0.045	0.042	0.041
	Xt	0.665	0.680	0.863	0.836	0.750	0.593	0.543	0.428	0.425
20	Cv	257	611	1051	1539	2048	2566	3084	3571	3642
	F_L	0.959	0.946	0.928	0.906	0.883	0.859	0.836	0.813	0.810
	Fd	0.124	0.080	0.061	0.050	0.044	0.039	0.036	0.033	0.033

Reverse Flow

Modified Equal Percentage Characteristic

Coefficients	**Valve Size, NPS**	**Valve Rotation, Degrees**								
		10	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**
C_v	3	10	20	30	50	70	90	115	140	170
K_v		9	17	26	43	61	78	99	121	147
F_L		0.96	0.91	0.79	0.73	0.70	0.64	0.57	0.54	0.53
C_v	4	15	30	55	85	130	180	240	310	380
K_v		13	26	48	74	112	156	208	268	329
F_L		0.98	0.93	0.84	0.72	0.67	0.65	0.62	0.62	0.61
C_v	6	30	60	110	180	275	380	500	600	705
K_v		26	52	111	156	238	329	433	519	610
F_L		0.70	0.80	0.84	0.80	0.71	0.67	0.63	0.59	0.49
C_v	8	50	75	125	225	350	510	700	900	1150
K_v		43	65	108	195	303	441	606	779	995
F_L		0.77	0.83	0.87	0.80	0.73	0.66	0.61	0.58	0.58
C_v	10	75	150	250	475	725	1000	1350	1750	2200
K_v		65	130	216	411	627	865	1168	1514	1903
F_L		0.84	0.86	0.90	0.79	0.74	0.64	0.58	0.57	0.49
C_v	12	100	225	425	700	1050	1450	1900	2350	2850
K_v		87	195	368	606	908	1254	1644	2033	2465
F_L		0.71	0.81	0.80	0.73	0.69	0.62	0.59	0.55	0.50

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Coefficients	Valve Size, DN	Valve Size, NPS	Valve Rotation, Degrees							Equal Percentage	
			10	20	30	40	50	60	70	80	90
Cv	80	3	3.74	14.2	31.3	51.1	82.4	117	161	213	339
Kv			3.24	12.3	27.1	44.2	71.3	101	139	184	293
Fd			0.51	0.65	0.75	0.82	0.87	0.92	0.95	0.98	0.99
Fl			0.88	0.90	0.89	0.87	0.84	0.84	0.80	0.81	0.68
X_T			0.513	0.656	0.641	0.672	0.562	0.560	0.406	0.388	0.221
Cv	100	4	2.53	19.9	47.7	83.1	133	186	254	352	534
Kv			2.2	17.2	41.3	71.9	115	161	220	304	462
Fd			0.51	0.65	0.75	0.82	0.87	0.92	0.95	0.98	0.99
Fl			0.91	0.89	0.87	0.85	0.82	0.80	0.78	0.75	0.64
X_T			0.776	0.658	0.642	0.614	0.530	0.493	0.440	0.354	0.240
Cv	150	6	6.96	34.3	81	142	219	317	439	602	964
Kv			6.0	29.7	70.1	123	189	274	380	521	834
Fd			0.51	0.62	0.73	0.81	0.86	0.91	0.95	0.97	0.99
Fl			0.92	0.93	0.92	0.88	0.85	0.81	0.78	0.74	0.59
X_T			0.995	0.994	0.880	0.800	0.686	0.591	0.513	0.409	0.238
Cv	200	8	5.86	45.3	111	202	322	467	674	885	1630
Kv			5.1	39.2	96	175	279	404	583	766	1410
Fd			0.51	0.62	0.73	0.81	0.86	0.91	0.95	0.97	0.99
Fl			0.90	0.94	0.94	0.91	0.88	0.86	0.80	0.70	0.51
X_T			0.997	0.743	0.762	0.711	0.608	0.552	0.463	0.335	0.160
Cv	250	10	11.9	87.6	214	388	599	875	1240	1720	2820
Kv			10.3	75.8	185	336	518	757	1073	1488	2439
Fd			0.51	0.64	0.75	0.82	0.87	0.91	0.95	0.98	0.99
Fl			0.95	0.97	0.94	0.90	0.86	0.80	0.76	0.70	0.54
X_T			0.773	0.767	0.728	0.646	0.590	0.525	0.437	0.359	0.206

Coefficients	Valve Size, DN	Valve Size, NPS	Valve Rotation, Degrees							Equal Percentage	
			10	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**
Cv	80	3	3.59	10.6	25.1	50.5	86.8	142	203	255	307
Kv			3.1	9.2	21.7	43.7	75.1	123	176	221	266
Fl			0.82	0.89	0.89	0.85	0.75	0.65	0.61	0.60	0.61
X_T			0.442	0.702	0.878	0.565	0.462	0.331	0.260	0.247	0.240
Cv	100	4	1.18	15.0	41.6	83.2	141	215	303	378	452
Kv			1.0	13.0	36.0	72.0	122	186	262	327	391
Fl			0.85	0.93	0.91	0.86	0.79	0.70	0.63	0.62	0.61
X_T			0.565	0.742	0.692	0.565	0.456	0.367	0.297	0.273	0.256
Cv	150	6	3.54	28.8	75.3	148	247	376	537	711	823
Kv			3.1	24.9	65.1	128	214	325	465	615	712
Fl			0.92	0.94	0.93	0.88	0.82	0.74	0.66	0.61	0.62
X_T			0.653	0.784	0.724	0.603	0.497	0.405	0.325	0.270	0.270
Cv	200	8	7.21	49.6	117	233	389	547	813	1070	1320
Kv			6.2	42.9	101	202	336	473	703	926	1142
Fl			0.86	0.86	0.91	0.85	0.81	0.73	0.66	0.61	0.56
X_T			0.162	0.643	0.654	0.537	0.449	0.361	0.285	0.242	0.203
Cv	250	10	9.23	83.2	224	437	729	1100	1540	2030	2320
Kv			8.0	72.0	194	378	631	952	1332	1756	2007
Fl			0.87	0.93	0.90	0.86	0.80	0.73	0.66	0.61	0.62
X_T			0.581	0.752	0.669	0.559	0.461	0.379	0.310	0.262	0.264

EMERSON.™

Forward or Reverse Flow

Approximately Equal Percentage Characteristic

Coefficients	Valve Size, NPS	Valve Rotation, Degrees								
		10	20	30	40	50	60	70	80	90
C_v	4	- - -	6.74	19.0	39.9	68.9	114	182	335	499
K_V		- - -	5.83	16.4	34.5	59.6	98.6	157	290	432
F_d		- - -	0.49	0.69	0.84	0.92	0.96	0.98	1.00	1.00
F_L		0.90	0.90	0.90	0.90	0.85	0.78	0.68	0.57	0.45
X_T		- - -	0.66	0.77	0.76	0.71	0.59	0.47	0.26	0.17
C_v	6	- - -	15.7	42.8	76.1	130	203	308	567	855
K_V		- - -	13.6	37.0	65.8	112	176	266	490	432
F_d		- - -	0.54	0.69	0.83	0.90	0.94	0.97	.098	0.99
F_L		0.90	0.90	0.90	0.90	0.85	0.78	0.68	0.57	0.45
X_T		- - -	0.99	0.83	0.90	0.76	0.64	0.54	0.28	0.17
C_v	8	1.48	27.9	91.8	177	308	478	720	1220	2190
K_V		1.28	24.1	79.4	153	266	413	623	1060	1890
F_d		- - -	0.59	0.75	0.85	0.92	0.96	0.98	0.99	0.99
F_L		0.90	0.90	0.90	0.90	0.85	0.78	0.68	0.57	0.45
X_T		0.35	0.92	0.81	0.85	0.63	0.58	0.48	0.29	0.14
C_v	10	42.8	85.5	174	306	484	764	1150	1800	3055
K_V		37.0	74.0	151	265	419	661	995	1560	2640
F_d		- - -	0.62	0.77	0.86	0.92	0.96	0.98	0.99	1.00
F_L		0.90	0.90	0.90	0.90	0.85	0.78	0.68	0.57	0.45
X_T		0.33	0.59	0.75	0.72	0.68	0.57	0.43	0.29	0.15
C_v	12	40.6	122	267	499	812	1230	1870	3060	5800
K_V		35.1	106	231	432	702	1060	1620	2650	5020
F_d		0.44	0.64	0.78	0.87	0.93	0.97	0.98	0.99	1.00
F_L		0.90	0.90	0.90	0.90	0.85	0.78	0.68	0.57	0.45
X_T		0.24	0.88	0.88	0.78	0.60	0.49	0.38	0.23	0.10
C_v	16	68.3	203	447	813	1340	2030	3010	4630	8130
K_V		59.1	176	387	703	1160	1760	2600	4000	7030
F_d		0.43	0.66	0.79	0.87	0.93	0.97	0.98	0.99	1.00
F_L		0.90	0.90	0.90	0.90	0.85	0.78	0.68	0.57	0.45
X_T		0.46	0.71	0.87	0.83	0.66	0.51	0.42	0.27	0.13
C_v	20	132	330	726	1320	2180	3300	4880	7520	13,200
K_V		114	285	628	1140	1890	2850	4220	6500	11,400
F_d		0.45	0.66	0.80	0.88	0.93	0.97	0.99	1.00	1.00
F_L		0.90	0.90	0.90	0.90	0.85	0.78	0.68	0.57	0.45
X_T		0.29	0.71	0.82	0.86	0.67	0.51	0.42	0.27	0.13
C_v	24	183	458	1010	1830	3020	4580	6770	10,400	18,300
K_V		158	396	874	1580	2610	3960	5860	9000	15,800
F_d		0.47	0.67	0.80	0.88	0.93	0.97	0.99	1.00	1.00
F_L		0.90	0.90	0.90	0.90	0.85	0.78	0.68	0.57	0.45
X_T		0.29	0.71	0.82	0.86	0.67	0.51	0.42	0.27	0.13

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Characterized(1) Aerodome

Modified Equal Percentage Characteristic

Valve Size, NPS	Minimum Throttling C_V(2)	Coefficients	Valve Rotation, Degrees								
			10	20	30	40	50	60	70	80	90
6	19.7	C_v	8.6	30.7	74.0	120	182	264	367	517	628
		K_V	7.48	26.6	64.0	104	158	228	317	447	543
		F_d	- - -	0.153	0.086	0.063	0.051	0.044	0.040	0.046	0.049
		F_L	0.90	0.88	0.79	0.74	0.71	0.66	0.69	0.69	0.65
		X_T	0.765	0.550	0.533	0.459	0.409	0.385	0.371	0.309	0.280
8	41.1	C_v	18.7	66.6	160	260	400	570	790	1120	1360
		K_V	16.2	57.6	138	225	346	493	683	970	1180
		Fd	- - -	0.10	0.060	0.046	0.038	0.032	0.032	0.035	0.039
		F_L	0.90	0.88	0.79	0.74	0.71	0.66	0.69	0.69	0.65
		X_T	0.764	0.549	0.534	0.457	0.395	0.387	0.374	0.308	0.280
10	64.8	C_v	29.4	104	251	407	618	894	1240	1750	2130
		K_V	25.4	90	217	352	535	773	1070	1510	1840
		Fd	- - -	0.081	0.048	0.037	0.030	0.025	0.025	0.028	0.031
		F_L	0.90	0.88	0.79	0.74	0.71	0.66	0.69	0.69	0.65
		X_T	0.764	0.548	0.534	0.462	0.408	0.387	0.373	0.309	0.280
12	93.3	C_v	42.2	150	360	584	887	1280	1780	2520	3060
		K_V	36.5	130	311	505	767	1110	1540	2180	2650
		Fd	- - -	0.064	0.040	0.030	0.025	0.021	0.021	0.023	0.026
		F_L	0.90	0.88	0.79	0.74	0.71	0.66	0.69	0.69	0.65
		X_T	0.758	0.548	0.538	0.457	0.411	0.388	0.373	0.308	0.279
16	167	C_v	75.5	268	647	1047	1592	2304	3201	4515	5480
		K_V	65.3	232	559	906	1380	1990	2770	3910	4740
		Fd	- - -	0.051	0.031	0.023	0.019	0.016	0.016	0.018	0.020
		F_L	0.90	0.88	0.79	0.74	0.71	0.66	0.69	0.69	0.65
		X_T	0.765	0.549	0.535	0.459	0.410	0.385	0.371	0.308	0.280
20	262	C_v	118	421	1010	1640	2490	3610	5020	7070	8590
		K_V	102.4	364	874	1420	2150	3120	4340	6120	7430
		Fd	- - -	0.041	0.026	0.019	0.016	0.014	0.014	0.015	0.016
		F_L	0.90	0.88	0.79	0.74	0.71	0.66	0.69	0.69	0.65
		X_T	0.766	0.549	0.536	0.459	0.410	0.385	0.368	0.308	0.281
24	536	C_v	241	865	1639	2585	3873	5558	7350	10449	12340
		K_V	209	748	1418	2236	3308	4808	6358	9038	10674
		Fd	- - -	0.041	0.026	0.019	0.016	0.014	0.014	0.015	0.016
		F_L	0.90	0.88	0.79	0.74	0.71	0.66	0.69	0.69	0.65
		X_T	0.766	0.549	0.536	0.459	0.410	0.385	0.368	0.308	0.281

1. Window starts at about 60 degrees.
2. Valves should not be required to throttle at a Cv less than the specified minimum Cv.

High Density Aerodome

Modified Linear Characteristic

Valve Size, NPS	Minimum Throttling C_V(1)	Coefficients	Valve Rotation, Degrees								
			10	20	30	40	50	60	70	80	90
6	20.3	C_v	8.28	32.3	78.8	131	200	284	379	472	511
		K_V	7.16	27.9	68.1	114	173	246	328	408	442
		F_d	- - -	0.194	0.093	0.067	0.054	0.045	0.040	0.036	0.036
		F_L	0.94	0.87	0.77	0.72	0.70	0.68	0.66	0.65	0.65
		X_T	0.752	0.615	0.529	0.464	0.406	0.364	0.332	0.302	0.290
8	41.1	C_v	16.1	62.9	153	256	390	553	737	919	996
		K_V	13.9	54.4	133	221	337	478	638	795	861
		Fd	- - -	0.10	0.060	0.046	0.038	0.032	0.028	0.026	0.024
		F_L	0.91	0.88	0.79	0.73	0.69	0.66	0.66	0.66	0.66
		X_T	0.752	0.615	0.528	0.463	0.406	0.366	0.332	0.302	0.290
10	64.8	C_v	25.5	100	243	405	618	876	1170	1460	1580
		K_V	22.1	87	210	350	535	758	1010	1260	1370
		Fd	- - -	0.081	0.048	0.037	0.030	0.025	0.023	0.021	0.019
		F_L	0.94	0.87	0.77	0.72	0.70	0.68	0.66	0.65	0.65
		X_T	0.751	0.612	0.528	0.467	0.408	0.364	0.332	0.300	0.288
12	93.3	C_v	36.9	144	351	586	893	1270	1690	2110	2280
		K_V	31.9	125	304	507	773	1099	1460	1830	1970
		Fd	- - -	0.064	0.040	0.030	0.025	0.021	0.019	0.017	0.016
		F_L	0.97	0.85	0.75	0.71	0.70	0.69	0.67	0.66	0.66
		X_T	0.617	0.505	0.434	0.383	0.333	0.297	0.273	0.247	0.238
16	167	C_v	65.9	257	627	1050	1590	2260	3020	3760	4070
		K_V	57.0	222	542	908	1380	1950	2610	3250	3520
		Fd	- - -	0.051	0.031	0.023	0.019	0.016	0.014	0.013	0.012
		F_L	0.94	0.87	0.77	0.72	0.70	0.68	0.66	0.65	0.65
		X_T	0.751	0.614	0.527	0.460	0.408	0.364	0.330	0.301	0.289
20	262	C_v	103	403	983	1640	2500	3540	4730	5890	6380
		K_V	89	349	850	1420	2160	3060	4090	5090	5520
		Fd	- - -	0.041	0.026	0.019	0.016	0.014	0.012	0.011	0.011
		F_L	0.94	0.87	0.77	0.72	0.70	0.68	0.66	0.65	0.65
		X_T	0.756	0.618	0.528	0.464	0.406	0.365	0.330	0.303	0.292
24	386	C_v	126	623	1287	2118	3265	4476	5915	7394	7993
		K_V	109	539	1113	1832	2824	3872	5116	6396	6914
		Fd	- - -	0.041	0.026	0.019	0.016	0.014	0.012	0.011	0.011
		F_L	0.94	0.87	0.77	0.72	0.70	0.68	0.66	0.65	0.65
		X_T	0.756	0.618	0.528	0.464	0.406	0.365	0.330	0.303	0.292

1. Valves should not be required to throttle at a Cv less than the minimum throttling Cv.

Characterized(1) Hydrodome

Modified Equal Percentage Characteristic

Valve Size, NPS	Minimum Throttling C_V(2)	Coefficients	Ball Angle of Opening, Degrees								
			10	20	30	40	50	60	70	80	90
6	20.8	C_v	6.06	35.5	71.3	118	182	216	355	513	615
		K_V	5.24	30.7	61.7	102	157	226	307	443	532
		F_L	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
8	46.6	C_v	13.6	79.6	160	265	408	585	797	1150	1380
		K_V	11.8	68.9	138	229	353	506	689	995	1190
		F_L	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
10	72.1	C_v	21.1	123	248	411	632	907	1240	1780	2140
		K_V	18.2	107	215	355	547	784	1070	1540	1850
		F_L	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
12	105	C_v	30.7	179	361	597	920	1320	1800	2590	3110
		K_V	26.5	155	312	517	796	1140	1550	2240	2690
		F_L	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
16	189	C_v	55.1	322	648	1070	1650	2370	3230	4660	5590
		K_V	47.6	279	560	928	1430	2050	2790	4030	4830
		F_L	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
20	292	C_v	85.1	498	1000	1660	2550	3660	4990	7190	8630
		K_V	73.6	431	866	1430	2210	3170	4310	6220	7470
		F_L	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
24	445	C_v	123	717	1441	2387	3675	5269	7179	10359	12430
		K_V	106	620	1246	2064	3179	4644	6210	8961	10752
		F_L	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62

1. Window starts at about 60 degrees.
2. Valves should not be required to throttle at a Cv less than the minimum throttling Cv.

High Density Hydrodome

Modified Equal Percentage Characteristic

Valve Size, NPS	Minimum Throttling C_V[1]	Coefficients	Ball Angle of Opening, Degrees								
			10	20	30	40	50	60	70	80	90
6	22.0	C_v	6.29	37.8	76.6	127	196	280	379	482	500
		K_V	5.44	32.7	66.3	110	170	242	328	417	433
		F_L	0.84	0.89	0.82	0.78	0.72	0.69	0.65	0.60	0.60
8	46.6	C_v	13.3	79.9	162	268	415	593	801	1020	1060
		K_V	11.5	69.1	140	232	359	513	693	882	917
		F_L	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
10	71.8	C_v	20.5	123	250	413	640	914	1230	1570	1630
		K_V	17.7	106	216	357	554	791	1060	1360	1410
		F_L	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
12	106	C_v	30.2	181	367	608	941	1350	1820	2310	2400
		K_V	26.1	157	317	526	814	1170	1570	2000	2080
		F_L	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
16	186	C_v	53.0	318	645	1070	1650	2360	3190	4060	4210
		K_V	45.8	275	558	926	1430	2040	2760	3510	3640
		F_L	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
20	292	C_v	83.2	500	1010	1680	2600	3710	5010	6380	6620
		K_V	72.0	432	877	1450	2250	3210	4330	5520	5730
		F_L	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
24	446	C_v	120	720	1459	2414	3738	5341	7215	9188	9530
		K_V	104	623	1262	2088	3233	4620	6241	7948	8243
		F_L	0.84	0.89	0.82	0.78	0.72	0.69	0.65	0.60	0.60

1. Valves should not be required to throttle at a Cv less than the minimum throttling Cv.

V260B - Two Characterized Hydrodomes

Modified Equal Percentage Characteristic

Valve Size, NPS	Coefficients	Ball Angle of Opening, Degrees								
		10	20	30	40	50	60	70	80	90
6	C_v	3.60	23.0	46.0	83	131	184	263	354	418
	K_v	3.11	19.9	39.8	72.1	113	159	227	306	362
	F_L	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
8	C_v	7.9	51	106	189	298	418	589	794	938
	K_V	6.8	44.1	91.7	163	258	362	509	687	811
	F_L	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
10	C_v	12.2	78	163	292	460	644	916	1228	1455
	K_V	10.6	67.5	141	253	398	557	792	1062	1259
	F_L	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
12	C_v	18.0	115	239	429	677	952	1330	1787	2115
	K_V	15.6	99.5	207	371	586	823	1150	1546	1829
	F_L	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
16	C_v	36.8	205	447	794	1250	1760	2387	3215	3801
	K_V	31.8	177	387	687	1081	1522	2065	2781	3288
	F_L	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
20	C_v	49.7	318	658	1186	1869	2616	3687	4961	5868
	K_V	43.0	275	569	1026	1617	2263	3189	4291	5076
	F_L	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
24	C_v	48.0	450	880	1600	2500	3500	5331	7148	8452
	K_V	41.5	389	761	1384	2163	3028	4611	6183	7311
	F_L	0.84	0.89	0.82	0.78	0.72	0.69	0.65	0.60	0.60

EMERSON

V260B-One High Density/One Characterized Hydrodome

Modified Equal Percentage Characteristic

Valve Size, NPS	Coefficients	Ball Angle of Opening, Degrees								
		10	20	30	40	50	60	70	80	90
6	C_v	4.00	24.0	50.0	90	141	197	271	343	379
	K_v	3.46	20.8	43.3	77.6	122	171	235	297	328
	F_L	0.84	0.89	0.82	0.78	0.72	0.69	0.65	0.60	0.60
8	C_v	7.9	51	106	189	298	418	590	749	830
	K_V	6.8	44.1	91.7	163	258	362	510	648	718
	F_L	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
10	C_v	12.2	78	163	292	460	644	912	1156	1282
	K_V	10.6	67.5	141	253	398	557	789	1000	1109
	F_L	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
12	C_v	18.0	115	239	429	677	952	1337	1691	1873
	K_V	15.6	99.5	207	371	586	823	1157	1463	1620
	F_L	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
16	C_v	36.8	205	447	794	1250	1760	2370	3190	3590
	K_V	31.8	177	387	687	1081	1522	2050	2759	3105
	F_L	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
20	C_v	49.7	318	658	1186	1869	2616	3694	4682	5185
	K_V	43.0	275	569	1026	1617	2263	3195	4050	4485
	F_L	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
24	C_v	48.0	450	880	1600	2500	3500	4990	6479	7476
	K_V	41.5	389	761	1384	2163	3028	4316	5604	6467
	F_L	0.84	0.89	0.82	0.78	0.72	0.69	0.65	0.60	0.60

V260B - Two High Density Hydrodomes

Modified Equal Percentage Characteristic

Valve Size, NPS	Coefficients	Ball Angle of Opening, Degrees								
		10	20	30	40	50	60	70	80	90
6	C_v	4.00	24.0	50.0	90	141	197	280	333	340
	K_v	3.46	20.8	43.3	77.6	122	171	242	288	294
	F_L	0.84	0.89	0.82	0.78	0.72	0.69	0.65	0.60	0.60
8	C_v	7.9	51	106	189	298	418	592	704	721
	K_V	6.8	44.1	91.7	163	258	362	512	609	624
	F_L	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
10	C_v	12.2	78	163	292	460	644	909	1083	1108
	K_V	10.6	67.5	141	253	398	557	786	937	958
	F_L	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
12	C_v	18.0	115	239	429	677	952	1345	1594	1632
	K_V	15.6	99.5	207	371	586	823	1163	1379	1412
	F_L	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
16	C_v	36.8	205	447	794	1250	1760	2357	2801	2863
	K_V	31.8	177	387	687	1081	1522	2039	2423	2476
	F_L	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
20	C_v	49.7	318	658	1186	1869	2616	3702	4402	4502
	K_V	43.0	275	569	1026	1617	2263	3202	3809	3894
	F_L	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
24	C_v	48.0	450	880	1600	2500	3500	4650	5810	6500
	K_V	41.5	389	761	1384	2163	3028	4022	5026	5623
	F_L	0.84	0.89	0.82	0.78	0.72	0.69	0.65	0.60	0.60

V260C - Gas or Liquid Flow

Modified Equal Percentage Characteristic

Valve Size, NPS	Minimum Throttling C_V(1)	Coefficients(2)	Valve Rotation, Degrees								
			10	20	30	40	50	60	70	80	90
6	22.7	C_{vnet}	17.8	27.5	83.1	140	252	443	766	1590	3190
		K_{vnet}	15.4	23.8	71.9	121	218	383	663	1380	2760
		F_{Lnet}	0.79	0.87	0.92	0.97	0.89	0.80	0.72	0.56	0.45
		F_d	0.34	0.65	0.79	0.88	0.94	0.96	0.99	1.00	1.00
		X_{Tnet}	0.52	0.85	0.81	0.98	0.77	0.57	0.38	0.19	0.10
8	86.7	Cv_{net}	47.3	126	236	383	607	986	1670	3530	10100
		K_{vnet}	40.9	109	204	331	525	853	1440	3050	8760
		F_{Lnet}	0.79	0.87	0.91	0.91	0.85	0.80	0.70	0.54	0.32
		F_d	0.37	0.64	0.78	0.88	0.94	0.97	0.98	0.99	1.00
		X_{Tnet}	0.44	0.64	0.77	0.77	0.66	0.50	0.35	0.15	0.03
10	136	Cv_{net}	74.1	197	369	599	951	1540	2610	5440	14100
		K_{vnet}	64.1	170	319	518	823	1330	2260	4710	12200
		F_{Lnet}	0.79	0.87	0.91	0.91	0.85	0.80	0.70	0.54	0.32
		F_d	0.37	0.64	0.78	0.87	0.94	0.97	0.99	0.99	1.00
		X_{Tnet}	0.44	0.64	0.77	0.77	0.66	0.50	0.35	0.15	0.03
12	196	Cv_{net}	107	284	532	863	1370	2220	3750	7840	20500
		K_{vnet}	92.6	246	460	746	1190	1920	3240	6780	17700
		F_{Lnet}	0.79	0.87	0.91	0.91	0.85	0.80	0.71	0.55	0.36
		F_d	0.39	0.67	0.79	0.87	0.93	0.97	0.99	1.00	1.00
		X_{Tnet}	0.44	0.64	0.77	0.77	0.66	0.50	0.35	0.15	0.04
16	347	Cv_{net}	189	505	946	1530	2440	3950	6690	14200	42900
		K_{vnet}	163	437	818	1320	2110	3420	5790	12300	37100
		F_{Lnet}	0.79	0.87	0.91	0.91	0.85	0.80	0.70	0.54	0.30
		F_d	0.38	0.64	0.79	0.87	0.93	0.97	0.99	0.99	1.00
		X_{Tnet}	0.44	0.64	0.77	0.77	0.66	0.50	0.35	0.14	0.03
20	542	Cv_{net}	296	788	1480	2400	3800	6170	10400	22100	62000
		K_{vnet}	256	682	1280	2070	3290	5340	9000	19100	53600
		F_{Lnet}	0.79	0.87	0.91	0.91	0.85	0.80	0.70	0.54	0.33
		F_d	0.42	0.66	0.79	0.87	0.94	0.97	0.99	1.00	1.00
		X_{Tnet}	0.44	0.63	0.76	0.76	0.65	0.49	0.35	0.15	0.03
24	704	Cv_{net}	426	1140	2130	3450	5470	8880	14900	31100	78000
		K_{vnet}	368	986	1840	2980	4730	7680	12900	26900	67500
		F_{Lnet}	0.79	0.87	0.91	0.91	0.85	0.80	0.71	0.55	0.37
		F_d	0.42	0.66	0.79	0.87	0.93	0.97	0.99	1.00	1.00
		X_{Tnet}	0.44	0.63	0.76	0.76	0.65	0.49	0.35	0.15	0.04

1. Valves should not be required to throttle at a Cv less than the minimum throttling Cv.
2. For a detailed explanation of Cv_{net}, F_{Lnet}, and X_{Tnet} please refer to Catalog 12, Section 2.

V270 - Gas or Liquid Flow

Modified Equal Percentage Characteristic

Valve Size, NPS	Coefficients(1)	Valve Rotation, Degrees								
		10	20	30	40	50	60	70	80	90
6	Cv_{net}	17.8	27.5	83.1	140	252	443	766	1590	3190
	Kv_{net}	15.4	23.8	71.9	121	218	383	663	1370	2760
	F_{Lnet}	0.79	0.87	0.92	0.97	0.89	0.80	0.72	0.56	0.45
	F_d	0.21	0.62	0.77	0.87	0.93	0.97	0.99	1.00	1.00
	X_{Tnet}	0.52	0.85	0.81	0.98	0.77	0.57	0.38	0.19	0.10
8	Cv_{net}	47.3	126	236	383	607	986	1670	3530	10100
	Kv_{net}	40.9	109	204	331	525	853	1440	3050	8760
	F_{Lnet}	0.79	0.87	0.91	0.91	0.85	0.80	0.70	0.54	0.32
	F_d	0.24	0.63	0.78	0.87	0.93	0.97	0.99	1.00	1.00
	X_{Tnet}	0.44	0.64	0.77	0.77	0.66	0.50	0.35	0.15	0.03
10	Cv_{net}	74.1	197	369	599	951	1540	2610	5440	14100
	Kv_{net}	64.1	170	319	518	823	1330	2260	4710	12200
	F_{Lnet}	0.79	0.87	0.91	0.91	0.85	0.80	0.70	0.54	0.32
	F_d	0.41	0.66	0.79	0.88	0.94	0.97	0.99	1.00	1.00
	X_{Tnet}	0.44	0.64	0.77	0.77	0.66	0.50	0.35	0.15	0.03
12	Cv_{net}	107	284	532	863	1370	2220	3750	7840	20500
	Kv_{net}	92.6	246	460	746	1190	1920	3240	6780	17700
	F_{Lnet}	0.79	0.87	0.91	0.91	0.85	0.80	0.71	0.55	0.36
	F_d	0.42	0.66	0.79	0.88	0.94	0.97	0.99	1.00	1.00
	X_{Tnet}	0.44	0.64	0.77	0.77	0.66	0.50	0.35	0.15	0.04
14	Cv_{net}	129	342	640	1040	1650	2670	4500	9380	23800
	Kv_{net}	112	296	554	900	1430	2310	3890	8110	20600
	F_{Lnet}	0.79	0.87	0.91	0.91	0.85	0.80	0.71	0.55	0.37
	F_d	0.44	0.67	0.80	0.88	0.94	0.97	0.99	1.00	1.00
	X_{Tnet}	0.44	0.64	0.77	0.77	0.66	0.50	0.35	0.15	0.04
16	Cv_{net}	189	505	946	1530	2440	3950	6690	14200	42900
	Kv_{net}	163	437	818	1320	2110	3420	5790	12300	37100
	F_{Lnet}	0.79	0.87	0.91	0.91	0.85	0.80	0.70	0.54	0.30
	F_d	0.45	0.67	0.80	0.88	0.94	0.97	0.99	1.00	1.00
	X_{Tnet}	0.44	0.64	0.77	0.77	0.66	0.50	0.35	0.14	0.03
20	Cv_{net}	296	788	1480	2400	3800	6170	10400	22100	62000
	Kv_{net}	256	682	1280	2070	3290	5340	9000	19100	53600
	F_{Lnet}	0.79	0.87	0.91	0.91	0.85	0.80	0.70	0.54	0.33
	F_d	0.47	0.68	0.80	0.88	0.94	0.97	0.99	1.00	1.00
	X_{Tnet}	0.44	0.63	0.76	0.76	0.65	0.49	0.35	0.15	0.03
24	Cv_{net}	426	1140	2130	3450	5470	8880	14900	31100	78000
	Kv_{net}	368	986	1840	2980	4730	7680	12900	26900	67500
	F_{Lnet}	0.79	0.87	0.91	0.91	0.85	0.80	0.71	0.55	0.37
	F_d	0.47	0.68	0.80	0.89	0.94	0.97	0.99	1.00	1.00
	X_{Tnet}	0.44	0.63	0.76	0.76	0.65	0.49	0.35	0.15	0.04

1. For a detailed explanation of Cv_{net}, F_{Lnet}, and X_{Tnet} please refer to Catalog 12, Section 2.

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V280 - Characterized Aerodome

Valve Size, NPS	Minimum Throttling	Coefficients	Valve Rotation, Degrees								
			10	20	30	40	50	60	70	80	90
6	19.7	Cv_{net}	8.6	30.7	74	120	182	264	367	517	628
		K_{vnet}	7.48	26.6	64	104	158	228	317	447	543
		F_d	- - -	0.153	0.086	0.063	0.051	0.044	0.040	0.046	0.049
		F_{Lnet}	0.90	0.88	0.79	0.74	0.71	0.66	0.69	0.69	0.65
		X_{Tnet}	0.765	0.550	0.533	0.459	0.409	0.385	0.371	0.309	0.280
8	41.1	Cv_{net}	18.7	66.6	160	260	400	570	790	1120	1360
		K_{vnet}	16.2	57.6	138	225	346	493	683	970	1180
		F_d	- - -	0.100	0.060	0.046	0.038	0.032	0.032	0.035	0.039
		F_{Lnet}	0.90	0.88	0.79	0.74	0.71	0.66	0.69	0.69	0.65
		X_{Tnet}	0.764	0.549	0.534	0.457	0.395	0.387	0.374	0.308	0.280
10	66.7	Cv_{net}	29.4	104	251	407	618	894	1240	1750	2130
		K_{vnet}	25.4	90	217	352	535	773	1070	1510	1840
		F_d	- - -	0.081	0.048	0.037	0.030	0.025	0.025	0.028	0.031
		F_{Lnet}	0.90	0.88	0.79	0.75	0.71	0.66	0.69	0.69	0.65
		X_{Tnet}	0.764	0.548	0.534	0.462	0.408	0.387	0.373	0.309	0.280
12	98.9	Cv_{net}	42.2	150	360	584	887	1280	1780	2520	3060
		K_{vnet}	36.5	130	311	505	767	1110	1540	2180	2650
		F_d	- - -	0.064	0.040	0.030	0.025	0.021	0.021	0.023	0.026
		F_{Lnet}	0.90	0.88	0.79	0.74	0.71	0.66	0.69	0.69	0.65
		X_{Tnet}	0.758	0.548	0.538	0.457	0.411	0.388	0.373	0.308	0.279
16	130	C_{Vnet}	56.9	202	487	789	1200	1730	2410	3400	4130
		K_{Vnet}	49.2	175	421	683	1040	1500	2090	2940	3570
		F_d	- - -	0.065	0.036	0.026	0.021	0.018	0.018	0.020	0.021
		F_{Lnet}	0.90	0.88	0.79	0.74	0.71	0.67	0.69	0.69	0.65
		X_{Tnet}	0.765	0.550	0.533	0.459	0.409	0.385	0.371	0.309	0.280

V280 - High Density Aerodome

Valve Size, NPS	Minimum Throttling	Coefficients	Valve Rotation, Degrees								
			10	20	30	40	50	60	70	80	90
6	20.3	Cv_{net}	8.28	32.3	78.8	131	200	284	379	472	511
		K_{vnet}	7.16	27.9	68.1	114	173	246	328	408	442
		F_d	- - -	0.194	0.093	0.067	0.054	0.045	0.040	0.036	0.036
		F_{Lnet}	0.94	0.87	0.77	0.72	0.70	0.68	0.66	0.65	0.65
		X_{Tnet}	0.752	0.615	0.529	0.464	0.406	0.364	0.332	0.302	0.290
8	41.1	Cv_{net}	16.10	62.9	153	256	390	553	737	919	996
		K_{vnet}	13.90	54.4	133.0	221	337	478	638	795	861
		F_d	- - -	0.100	0.060	0.046	0.038	0.032	0.028	0.026	0.024
		F_{Lnet}	0.91	0.88	0.79	0.73	0.69	0.66	0.66	0.66	0.66
		X_{Tnet}	0.752	0.615	0.528	0.463	0.406	0.366	0.332	0.302	0.290
10	60.5	Cv_{net}	25.5	100	243	405	618	876	1170	1460	1580
		K_{vnet}	22.1	87	210	350	535	758	1010	1260	1370
		F_d	- - -	0.081	0.048	0.037	0.030	0.025	0.023	0.021	0.019
		F_{Lnet}	0.94	0.87	0.77	0.72	0.70	0.68	0.66	0.65	0.65
		X_{Tnet}	0.751	0.612	0.528	0.467	0.408	0.364	0.332	0.300	0.288
12	87.2	Cv_{net}	36.9	144	351	586	893	1270	1690	2110	2280
		K_{vnet}	31.9	125	304	507	773	1099	1460	1830	1970
		F_d	- - -	0.064	0.040	0.030	0.025	0.021	0.019	0.017	0.016
		F_{Lnet}	0.97	0.85	0.75	0.71	0.70	0.69	0.67	0.66	0.66
		X_{Tnet}	0.617	0.505	0.434	0.383	0.333	0.297	0.273	0.247	0.238
16	128	C_{Vnet}	52.1	203	495	826	1260	1790	2380	2970	3210
		K_{Vnet}	45.1	176	429	715	1090	1550	2060	2570	2780
		F_d	- - -	0.065	0.036	0.026	0.021	0.018	0.016	0.014	0.014
		F_{Lnet}	0.94	0.87	0.77	0.72	0.70	0.68	0.66	0.65	0.65
		X_{Tnet}	0.752	0.615	0.529	0.464	0.406	0.364	0.332	0.302	0.290

V280 - Characterized Hydrodome 1-Stage

Valve Size, NPS	Minimum Throttling	Coefficients	Valve Rotation, Degrees								
			10	20	30	40	50	60	70	80	90
6	20.8	Cv_{net}	6.06	35.5	71.3	118	182	216	355	513	615
		K_{vnet}	5.24	30.7	61.7	102	157	226	307	443	532
		F_{Lnet}	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
8	46.6	Cv_{net}	13.60	79.6	160	265	408	585	797	1150	1380
		K_{vnet}	11.8	68.9	138	229	353	506	689	995	1190
		F_{Lnet}	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
10	72.1	Cv_{net}	21.1	123	248	411	632	907	1240	1780	2140
		K_{vnet}	18.2	107	215	355	547	784	1070	1540	1850
		F_{Lnet}	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
12	105.0	Cv_{net}	30.7	179	361	597	920	1320	1800	2590	3110
		K_{vnet}	26.5	155	312	517	796	1140	1550	2240	2690
		F_{Lnet}	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
16	143	C_{Vnet}	41.6	244	490	811	1250	1790	2440	3520	4220
		K_{Vnet}	36.0	211	424	702	1080	1550	2110	3050	3650
		F_{Lnet}	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62

V280 - High Density Hydrodome 1-Stage

Valve Size, NPS	Minimum Throttling	Coefficients	Valve Rotation, Degrees								
			10	20	30	40	50	60	70	80	90
6	22.0	Cv_{net}	6.29	37.8	76.6	127	196	280	379	482	500
		K_{vnet}	5.44	32.7	66.3	110	170	242	328	417	433
		F_{Lnet}	0.84	0.89	0.82	0.78	0.72	0.69	0.65	0.60	0.60
8	46.6	Cv_{net}	13.30	49.9	162	268	415	593	801	1020	1060
		K_{vnet}	11.50	69.1	140	232	359	513	693	882	917
		F_{Lnet}	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
10	71.8	Cv_{net}	20.5	123	250	413	640	914	1230	1570	1630
		K_{vnet}	17.7	106	216	357	554	791	1060	1360	1410
		F_{Lnet}	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
12	106.0	Cv_{net}	30.2	181	367	608	941	1350	1820	2310	2400
		K_{vnet}	26.1	157	317	526	814	1170	1570	2000	2080
		F_{Lnet}	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
16	149	Cv_{net}	42.6	256	518	857	1330	1900	2560	3260	3380
		K_{vnet}	36.9	221	448	742	1150	1640	2220	2820	2930
		F_{Lnet}	0.84	0.89	0.82	0.78	0.72	0.69	0.65	0.60	0.60

V280 - Two Characterized Hydrodomes 2-Stage

Valve Size, NPS	Coefficients	Valve Rotation, Degrees								
		10	20	30	40	50	60	70	80	90
6	Cv_{net}	3.60	23.0	46.0	83	131	184	263	354	418
	K_{vnet}	3.11	19.9	39.8	72.1	113	159	227	306	362
	F_{Lnet}	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
8	Cv_{net}	7.90	51.00	106.0	189.0	298	418	589	794	938
	K_{vnet}	6.80	44.10	91.7	163.0	258	362	509	687	811
	F_{Lnet}	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
10	Cv_{net}	12.2	78	163	292	460	644	916	1228	1455
	K_{vnet}	10.60	67.5	141	253	398	557	792	1062	1259
	F_{Lnet}	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
12	Cv_{net}	18.0	115	239	429	677	952	1330	1787	2115
	K_{vnet}	15.6	99.8	207	371	586	823	1150	1546	1829
	F_{Lnet}	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
16	C_{vnet}	24.9	155	319	573	898	1260	1800	2430	2870
	K_{vnet}	21.5	134	276	495	777	1090	1560	2100	2490
	F_{Lnet}	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62

V280 - One High Density/One Characterized Hydrodome 2-Stage

Valve Size, NPS	Coefficients	Valve Rotation, Degrees								
		10	20	30	40	50	60	70	80	90
6	Cv_{net}	4.00	24.0	50.0	90	141	197	271	343	379
	K_{vnet}	3.46	20.8	43.3	77.6	122	171	235	297	328
	F_{Lnet}	0.84	0.89	0.82	0.78	0.72	0.69	0.65	0.60	0.60
8	Cv_{net}	7.90	51.00	106.0	189.0	298	418	590	749	830
	K_{vnet}	6.80	44.10	91.7	163.0	258	362	510	648	718
	F_{Lnet}	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
10	Cv_{net}	12.2	78	163	292	460	644	912	1156	1282
	K_{vnet}	10.60	67.5	141	253	398	557	789	1000	1109
	F_{Lnet}	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
12	Cv_{net}	18.0	115.0	239	429	677	952	1337	1691	1872
	K_{vnet}	15.6	99.5	207	371	586	823	1157	1463	1620
	F_{Lnet}	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
16	Cv_{net}	25.1	159	329	589	926	1300	1850	2340	2590
	K_{vnet}	21.7	137	284	510	801	1130	1600	2020	2240
	F_{Lnet}	0.84	0.89	0.82	0.78	0.72	0.69	0.65	0.60	0.60

V280 - Two High Density Hydrodomes 2-Stage

Valve Size, NPS	Coefficients	Valve Rotation, Degrees								
		10	20	30	40	50	60	70	80	90
6	Cv_{net}	4.00	24.0	50.0	90	141	197	280	333	340
	K_{vnet}	3.46	20.8	43.3	77.6	122	171	242	288	294
	F_{Lnet}	0.84	0.89	0.82	0.78	0.72	0.69	0.65	0.60	0.60
8	Cv_{net}	7.90	51.00	106.0	189.0	298	418	592	704	721
	K_{vnet}	6.80	44.10	91.7	163.0	258	362	512	609	624
	F_{Lnet}	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
10	Cv_{net}	12.2	78.0	163	292	460	644	909	1083	1108
	K_{vnet}	10.6	67.5	141	253	398	557	786	937	958
	F_{Lnet}	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
12	Cv_{net}	18.0	115	239	429	677	952	1345	1594	1632
	K_{vnet}	15.6	99.5	207	371	586	823	1163	1379	1412
	F_{Lnet}	0.84	0.90	0.82	0.77	0.72	0.68	0.66	0.66	0.62
16	C_{vnet}	25.4	163	338	606	955	1340	1890	2250	2300
	K_{vnet}	22.0	141.0	292	524	826	1160	1640	1950	1990
	F_{Lnet}	0.84	0.89	0.82	0.78	0.72	0.69	0.65	0.60	0.60

V280 - Without Attenuation

Valve Size, NPS	Minimum Throttling	Coefficients	Valve Rotation, Degrees								
			10	20	30	40	50	60	70	80	90
6	22.7	Cv_{net}	17.8	27.5	83.1	140	252	443	766	1590	3190
		K_{vnet}	15.4	23.8	71.9	121	218	383	663	1380	2760
		F_{Lnet}	0.79	0.87	0.92	0.97	0.89	0.80	0.72	0.56	0.45
		F_d	0.34	0.65	0.79	0.88	0.94	0.96	0.99	1.00	1.00
		X_{Tnet}	0.52	0.85	0.81	0.98	0.77	0.57	0.38	0.19	0.10
8	86.7	Cv_{net}	47.3	126.0	236	383	607	986	1670	3530	10100
		K_{vnet}	40.9	109	204	331	525	853	1440	3050	8760
		F_{Lnet}	0.79	0.87	0.91	0.91	0.85	0.80	0.70	0.54	0.32
		F_d	0.37	0.64	0.78	0.88	0.94	0.97	0.98	0.99	1.00
		X_{Tnet}	0.44	0.64	0.77	0.77	0.66	0.50	0.35	0.15	0.03
10	135.55	Cv_{net}	74.1	197	369	599	951	1540	2610	5440	14100
		K_{vnet}	64.1	170	319	518	823	1330	2260	4710	12200
		F_{Lnet}	0.79	0.87	0.91	0.91	0.85	0.80	0.70	0.54	0.32
		F_d	0.37	0.64	0.78	0.87	0.94	0.97	0.99	0.99	1.00
		X_{Tnet}	0.44	0.64	0.77	0.77	0.66	0.50	0.35	0.15	0.03
12	195.5	Cv_{net}	107	284	532	863	1370	2220	3750	7840	20500
		K_{vnet}	92.6	246	460	746	1190	1920	3240	6780	17700
		F_{Lnet}	0.79	0.87	0.91	0.91	0.85	0.80	0.71	0.55	0.36
		F_d	0.39	0.67	0.79	0.87	0.93	0.97	0.99	1.00	1.00
		X_{Tnet}	0.44	0.64	0.77	0.77	0.66	0.50	0.35	0.15	0.04
16	293	C_{vnet}	160	426	798	1300	2050	3330	5650	11900	34100
		K_{vnet}	138	359	690	1120	1780	2880	4880	10300	29500
		F_{Lnet}	0.79	0.87	0.91	0.91	0.85	0.80	0.71	0.55	0.36
		F_d	0.30	0.64	0.79	0.87	0.93	0.96	0.99	1.00	1.00
		X_{Tnet}	0.44	0.64	0.77	0.76	0.66	0.50	0.35	0.15	0.03

The Fisher® V300 has flow coefficients identical to the V150. Refer to the V150 information.
Reminder: The V300 is available in NPS 1 through 16 only.
Reminder: The V300 NPS 14 and 16 are not available with Flat Metal seals.

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Coefficients	Valve Size, NPS	Valve Rotation, Degrees							Modified Linear Characteristic	
		10	20	30	40	50	60	70	80	90
C_V	1	1.22	2.89	5.05	7.63	9.94	11.3	11.8	12.0	12.2
K_V		1.06	2.50	4.37	6.60	8.60	9.77	10.2	10.4	10.6
Fd		0.49	0.64	0.73	0.81	0.87	0.92	0.96	0.99	1.00
F_L		0.89	0.89	0.88	0.85	0.85	0.85	0.85	0.85	0.85
X_T		0.480	0.497	0.508	0.548	0.597	0.632	0.636	0.612	0.593
C_V	1-1/2	2.07	6.15	11.5	16.6	20.7	23.5	25.3	26.1	26.6
K_V		1.79	5.32	9.95	14.4	17.9	20.3	21.9	22.6	23.0
Fd		0.48	0.63	0.73	0.81	0.87	0.92	0.96	0.99	1.00
F_L		0.95	0.85	0.85	0.84	0.84	0.84	0.84	0.84	0.84
X_T		0.770	0.476	0.483	0.555	0.616	0.636	0.632	0.601	0.589
C_V	2	4.11	8.73	16.7	27.0	37.2	43.4	45.8	46.2	46.2
K_V		3.56	7.55	14.4	23.4	32.2	37.5	39.6	40.0	40.0
Fd		0.49	0.63	0.73	0.81	0.87	0.92	0.96	0.99	1.00
F_L		0.97	0.92	0.84	0.79	0.77	0.75	0.75	0.74	0.74
X_T		0.439	0.442	0.442	0.422	0.422	0.462	0.452	0.442	0.442
C_V	3	8.80	22.7	43.3	71.3	96.8	116	130	138	142
K_V		7.61	19.6	37.5	61.7	83.7	100	112	119	123
Fd		0.46	0.62	0.73	0.81	0.87	0.92	0.96	0.99	1.00
F_L		0.86	0.84	0.83	0.83	0.83	0.82	0.78	0.77	0.77
X_T		0.469	0.544	0.574	0.526	0.497	0.526	0.508	0.476	0.456
C_V	4	16.6	41.3	79.1	123	166	203	230	247	255
K_V		14.3	35.7	68.4	106	144	176	199	214	221
Fd		0.45	0.61	0.72	0.81	0.87	0.92	0.96	0.99	1.00
F_L		0.85	0.82	0.81	0.81	0.80	0.79	0.77	0.76	0.76
X_T		0.439	0.555	0.501	0.466	0.473	0.490	0.480	0.459	0.442
C_V	6	17.5	79.1	155	270	363	434	492	540	565
K_V		15.1	68.4	134	234	314	375	426	467	489
Fd		0.44	0.60	0.72	0.81	0.87	0.92	0.96	0.99	1.00
F_L		0.97	0.93	0.88	0.82	0.76	0.73	0.72	0.71	0.71
X_T		0.879	0.585	0.540	0.456	0.439	0.432	0.436	0.426	0.416
C_V	8	51.5	146	298	481	646	775	879	981	1050
K_V		44.5	126	258	416	559	670	760	849	908
Fd		0.43	0.59	0.72	0.80	0.87	0.92	0.96	0.99	1.00
F_L		0.97	0.93	0.87	0.78	0.72	0.71	0.70	0.69	0.67
X_T		0.456	0.605	0.533	0.449	0.413	0.403	0.391	0.372	0.360

Coefficients	**Valve Size, NPS**	**Valve Rotation, Degrees**							**Modified Linear Characteristic**	
		10	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**
C_V	1	1.08	2.82	5.26	9.11	12.4	14.7	15.9	16.4	16.8
K_V		0.93	2.44	4.55	7.88	10.7	12.7	13.8	14.2	14.5
Fd		0.49	0.64	0.73	0.81	0.87	0.92	0.96	0.99	1.00
F_L		0.80	0.79	0.73	0.63	0.58	0.55	0.56	0.51	0.48
X_T		0.172	0.284	0.406	0.357	0.345	0.322	0.300	0.289	0.283
C_V	1-1/2	1.71	5.33	11.3	18.4	24.7	28.6	30.1	30.7	31.0
K_V		1.48	4.61	9.77	15.9	21.4	24.7	26.0	26.6	26.8
Fd		0.48	0.63	0.73	0.81	0.87	0.92	0.96	0.99	1.00
F_L		0.75	0.74	0.70	0.66	0.64	0.63	0.63	0.63	0.63
X_T		0.357	0.442	0.432	0.397	0.369	0.360	0.360	0.357	0.357
C_V	2	2.98	4.1	12.0	27.6	41.9	52.9	56.4	57.2	57.4
K_V		2.58	6.40	13.5	23.9	36.2	45.8	48.8	49.5	49.7
Fd		0.49	0.63	0.73	0.81	0.87	0.92	0.96	0.99	1.00
F_L		0.92	0.89	0.81	0.67	0.60	0.58	0.58	0.58	0.58
X_T		0.480	0.476	0.462	0.384	0.308	0.265	0.265	0.265	0.265
C_V	3	7.19	21.4	47.0	75.4	105	122	132	134	141
K_V		6.22	18.5	40.7	65.2	90.8	106	114	116	122
Fd		0.46	0.62	0.73	0.81	0.87	0.92	0.96	0.99	1.00
F_L		0.80	0.80	0.77	0.71	0.66	0.65	0.65	0.65	0.65
X_T		0.357	0.476	0.487	0.436	0.372	0.378	0.384	0.376	0.357
C_V	4	12.2	39.0	79.9	124	171	202	222	232	235
K_V		10.6	33.7	69.1	107	148	175	192	201	203
Fd		0.45	0.61	0.72	0.81	0.87	0.92	0.96	0.99	1.00
F_L		0.90	0.89	0.81	0.73	0.71	0.70	0.69	0.69	0.69
X_T		0.522	0.544	0.487	0.456	0.406	0.406	0.416	0.423	0.416
C_V	6	15.1	72.4	156	251	351	438	534	638	717
K_V		13.1	62.6	135	217	304	379	462	552	620
Fd		0.44	0.60	0.72	0.81	0.87	0.92	0.96	0.99	1.00
F_L		0.85	0.85	0.82	0.77	0.70	0.66	0.61	0.57	0.51
X_T		0.416	0.597	0.518	0.522	0.452	0.388	0.336	0.270	0.219
C_V	8	33.5	143	302	485	663	798	871	897	986
K_V		29.0	124	261	420	573	690	753	776	853
Fd		0.43	0.59	0.72	0.80	0.87	0.92	0.96	0.99	1.00
F_L		0.81	0.81	0.79	0.76	0.68	0.66	0.66	0.66	0.66
X_T		0.697	0.593	0.483	0.410	0.354	0.342	0.366	0.403	0.363

Coefficients	Valve Size, NPS	Valve Rotation, Degrees							Modified Linear Characteristic	
		10	20	30	40	50	60	70	80	90
C_V	1	0.777	2.09	3.02	3.62	4.53	4.90	4.93	4.96	5.01
K_V		0.672	1.81	2.61	3.13	3.92	4.24	4.26	4.29	4.33
Fd(1)		0.54	0.66	0.75	0.82	0.88	0.92	0.96	0.99	1.00
F_L		0.89	0.89	0.88	0.85	0.82	0.79	0.75	0.74	0.74
X_T		0.487	0.391	0.497	0.597	0.508	0.439	0.436	0.429	0.419
C_V	1-1/2	0.632	2.56	4.47	7.15	9.62	10.7	10.8	10.9	10.9
K_V		.547	2.21	3.87	6.18	8.32	9.26	9.34	9.43	9.43
Fd(1)		0.53	0.66	0.75	0.82	0.88	0.92	0.96	0.99	1.00
F_L		0.84	0.84	0.84	0.82	0.79	0.75	0.73	0.73	0.73
X_T		0.559	0.397	0.522	0.574	0.585	0.508	0.497	0.490	0.490
C_V	2	1.30	3.49	5.31	9.64	15.1	17.3	17.3	17.3	17.3
K_V		1.12	3.02	4.59	8.34	13.1	15.0	15.0	15.0	15.0
Fd(1)		0.54	0.66	0.75	0.82	0.88	0.92	0.96	0.99	1.00
F_L		0.85	0.85	0.84	0.84	0.82	0.79	0.79	0.79	0.79
X_T		0.391	0.336	0.452	0.563	0.529	0.462	0.462	0.462	0.462
C_V	3	6.78	11.5	16.0	26.7	40.2	47.7	48.4	48.4	48.4
K_V		5.86	9.95	13.8	23.1	34.8	41.3	41.9	41.9	41.9
Fd(1)		0.53	0.66	0.75	0.82	0.88	0.92	0.96	0.99	1.00
F_L		0.90	0.88	0.87	0.86	0.85	0.82	0.77	0.77	0.77
X_T		0.487	0.501	0.487	0.429	0.459	0.429	0.429	0.429	0.429
C_V	4	10.0	18.2	24.4	43.7	69.2	90.6	98.2	98.2	98.2
K_V		8.65	15.7	21.1	37.8	59.9	78.4	84.9	84.9	84.9
Fd(1)		0.52	0.65	0.74	0.82	0.88	0.92	0.96	0.99	1.00
F_L		0.95	0.89	0.85	0.84	0.84	0.81	0.77	0.77	0.77
X_T		0.426	0.459	0.570	0.504	0.487	0.462	0.426	0.426	0.426
C_V	6	9.50	26.6	41.8	76.0	129	170	200	200	200
K_V		8.22	23.0	36.2	65.7	112	147	173	173	173
Fd(1)		0.52	0.65	0.74	0.82	0.88	0.92	0.96	0.99	1.00
F_L		0.97	0.96	0.92	0.86	0.80	0.76	0.74	0.74	0.74
X_T		0.995	0.351	0.403	0.487	0.416	0.462	0.410	0.410	0.410
C_V	8	39.9	87.8	155	241	343	448	541	606	623
K_V		34.5	75.9	134	208	297	388	468	524	539
Fd(2)		0.48	0.63	0.73	0.81	0.87	0.92	0.96	0.99	1.00
F_L		0.96	0.81	0.80	0.79	0.78	0.76	0.74	0.72	0.70
X_T		0.400	0.446	0.459	0.449	0.429	0.413	0.413	0.413	0.391

1. Measured at 60% Port.
2. Measured at 40% Port.

Coefficients	**Valve Size, NPS**	**Valve Rotation, Degrees**							**Modified Linear Characteristic**	
		10	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**
C_V	1	.634	2.09	3.34	3.96	5.21	5.64	5.70	5.71	5.76
K_V		.548	1.81	2.89	3.43	4.51	4.88	4.93	4.94	4.98
Fd(1)		0.54	0.66	0.75	0.82	0.88	0.92	0.96	0.99	1.00
F_L		0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
X_T		0.230	0.216	0.207	0.406	0.366	0.348	0.339	0.345	0.342
C_V	1-1/2	.464	1.93	4.21	7.81	11.0	12.1	12.1	12.2	12.2
K_V		.401	1.67	3.64	6.76	9.52	10.5	10.5	10.6	10.6
Fd(1)		0.53	0.66	0.75	0.82	0.88	0.92	0.96	0.99	1.00
F_L		0.93	0.93	0.75	0.72	0.70	0.70	0.70	0.70	0.70
X_T		0.970	0.416	0.501	0.467	0.416	0.416	0.416	0.413	0.416
C_V	2	.965	2.68	4.82	12.0	17.7	18.7	18.8	18.9	18.9
K_V		.835	2.31	4.17	10.4	15.3	16.2	16.3	16.3	16.3
Fd(1)		0.54	0.66	0.75	0.82	0.88	0.92	0.96	0.99	1.00
F_L		0.96	0.96	0.77	0.67	0.62	0.62	0.62	0.62	0.62
X_T		0.518	0.508	0.559	0.354	0.351	0.360	0.357	0.354	0.354
C_V	3	5.95	10.6	14.7	29.9	49.0	56.0	56.2	56.2	56.7
K_V		5.15	9.17	12.7	25.9	42.4	48.4	48.6	48.6	49.0
Fd(1)		0.53	0.66	0.75	0.82	0.88	0.92	0.96	0.99	1.00
F_L		0.80	0.79	0.73	0.64	0.59	0.58	0.58	0.58	0.58
X_T		0.429	0.455	0.487	0.345	0.286	0.286	0.286	0.286	0.281
C_V	4	7.69	15.3	22.7	42.6	75.0	98.0	99.5	100	102
K_V		6.65	13.2	19.6	36.8	64.9	84.8	86.1	86.5	88.2
Fd(1)		0.52	0.65	0.74	0.82	0.88	0.92	0.96	0.99	1.00
F_L		0.83	0.82	0.81	0.77	0.60	0.59	0.58	0.58	0.58
X_T		0.504	0.548	0.555	0.529	0.375	0.322	0.336	0.334	0.319
C_V	6	5.10	20.6	34.6	71.9	123	170	230	231	232
K_V		4.41	17.8	29.9	62.2	106	147	199	200	201
Fd(1)		0.52	0.65	0.74	0.82	0.88	0.92	0.96	0.99	1.00
F_L		0.97	0.95	0.90	0.82	0.73	0.65	0.57	0.55	0.55
X_T		0.990	0.551	0.566	0.533	0.432	0.397	0.263	0.260	0.258
C_V	8	27.1	74.3	140	232	342	457	552	614	646
K_V		23.4	64.3	121	201	296	395	477	531	559
Fd(2)		0.48	0.63	0.73	0.81	0.87	0.92	0.96	0.99	1.00
F_L		0.92	0.91	0.88	0.76	0.69	0.66	0.62	0.60	0.58
X_T		0.636	0.494	0.494	0.490	0.442	0.388	0.369	0.339	0.311

1. Measured at 60% Port.
2. Measured at 40% Port.

Coefficients	Valve Size, NPS	Valve Rotation, Degrees							Modified Linear Characteristic	
		10	20	30	40	50	60	70	80	90
C_V	1	.30	1.91	4.68	7.3	9.17	10.3	11.0	11.5	11.6
K_V		.260	1.65	4.05	6.31	7.93	8.91	9.52	9.95	10.0
Fd		0.49	0.64	0.73	0.81	0.87	0.92	0.96	0.99	1.00
F_L		- - -	0.98	0.87	0.87	0.85	0.86	0.85	0.86	0.84
X_T		0.668	0.574	0.529	0.566	0.616	0.668	0.685	0.628	0.616
C_V	1-1/2	1.46	3.79	8.13	13.4	17.9	20.7	22.4	24.0	25.0
K_V		1.26	3.28	7.03	11.6	15.5	17.9	19.4	20.8	21.6
Fd		0.48	0.63	0.73	0.81	0.87	0.92	0.96	0.99	1.00
F_L		0.86	0.86	0.82	0.84	0.80	0.80	0.79	0.79	0.79
X_T		0.566	0.605	0.55	0.544	0.551	0.574	0.589	0.585	0.597
C_V	2	1.76	6.0	13.8	22.6	29.5	35.2	38.4	38.4	38.4
K_V		1.52	5.19	11.9	19.5	25.5	30.4	33.2	33.2	33.2
Fd		0.49	0.63	0.73	0.81	0.87	0.92	0.96	0.99	1.00
F_L		0.95	0.96	0.94	0.83	0.81	0.80	0.77	0.77	0.78
X_T		0.819	0.555	0.501	0.480	0.533	0.566	0.570	0.585	0.585
C_V	3	7.6	23.2	44.0	62.6	82.5	102	115	119	124
K_V		6.57	20.1	38.1	54.1	71.4	88.2	99.5	103	107
Fd		0.46	0.62	0.73	0.81	0.87	0.92	0.96	0.99	1.00
F_L		0.88	0.87	0.85	0.84	0.83	0.82	0.80	0.80	0.80
X_T		0.578	0.494	0.511	0.540	0.529	0.515	0.518	0.533	0.526
C_V	4	9.31	37.0	73.5	111	144	171	192	208	221
K_V		8.05	32.0	63.6	96.0	125	148	166	180	191
Fd		0.45	0.61	0.72	0.81	0.87	0.92	0.96	0.99	1.00
F_L		0.94	0.90	0.85	0.84	0.82	0.80	0.77	0.77	0.77
X_T		0.526	0.476	0.449	0.452	0.480	0.504	0.511	0.501	0.487
C_V	6	9.71	64.3	141	222	299	368	426	469	499
K_V		8.40	55.6	122	192	259	318	368	406	432
Fd		0.44	0.60	0.72	0.81	0.87	0.92	0.96	0.99	1.00
F_L		0.95	0.88	0.82	0.80	0.78	0.78	0.77	0.77	0.76
X_T		0.504	0.459	0.432	0.422	0.429	0.436	0.432	0.422	0.413
C_V	8	34.6	142	290	447	592	716	822	911	958
K_V		29.9	123	251	387	512	619	711	788	829
Fd		0.43	0.59	0.72	0.80	0.87	0.92	0.96	0.99	1.00
F_L		0.92	0.76	0.78	0.79	0.77	0.76	0.73	0.71	0.73
X_T		0.544	0.446	0.426	0.429	0.429	0.46	0.419	0.410	0.429

Coefficients	Valve Size, NPS	Valve Rotation, Degrees							Modified Linear Characteristic	
		10	20	30	40	50	60	70	80	90
C_V	1	.107	1.85	5.09	8.8	11.9	13.6	14.0	14.0	15.3
K_V		.093	1.60	4.40	7.61	10.3	11.8	12.1	12.1	13.2
Fd		0.49	0.64	0.73	0.81	0.87	0.92	0.96	0.99	1.00
F_L		- - -	0.88	0.65	0.60	0.54	0.54	0.60	0.62	0.61
X_T		0.334	0.526	0.426	0.360	0.334	0.345	0.372	0.384	0.334
C_V	1-1/2	.988	3.37	7.66	13.5	19.3	23.5	25.3	25.3	26.1
K_V		.854	2.92	6.63	11.7	16.7	20.3	21.9	21.9	22.6
Fd		0.48	0.63	0.73	0.81	0.87	0.92	0.96	0.99	1.00
F_L		0.98	0.92	0.75	0.73	0.62	0.58	0.59	0.61	0.61
X_T		0.473	0.585	0.563	0.487	0.432	0.403	0.400	0.426	0.429
C_V	2	1.42	4.92	11.8	20.9	29.8	36.7	40.9	42.7	43.0
K_V		1.23	4.26	10.2	18.1	25.8	31.7	35.4	36.9	37.2
Fd		0.49	0.63	0.73	0.81	0.87	0.92	0.96	0.99	1.00
F_L		0.97	0.93	0.86	0.77	0.72	0.62	0.64	0.63	0.66
X_T		0.403	0.718	0.616	0.518	0.473	0.452	0.452	0.446	0.439
C_V	3	7.64	20.6	41.3	62.4	80.5	94.8	105	109	111
K_V		6.61	17.8	34.9	54.0	69.6	82.0	90.8	94.3	96.0
Fd		0.46	0.62	0.73	0.81	0.87	0.92	0.96	0.99	1.00
F_L		0.93	0.91	0.89	0.81	0.73	0.72	0.71	0.74	0.76
X_T		0.616	0.656	0.537	0.497	0.501	0.508	0.504	0.515	0.511
C_V	4	8.07	31.3	67.1	102	129	153	174	189	192
K_V		6.98	27.1	58.0	88.2	112	132	151	163	166
Fd		0.45	0.61	0.72	0.81	0.87	0.92	0.96	0.99	1.00
F_L		0.86	0.85	0.84	0.80	0.75	0.75	0.75	0.75	0.74
X_T		0.456	0.664	0.533	0.490	0.515	0.526	0.522	0.504	0.515
C_V	6	10.5	58.6	134	218	294	356	406	445	461
K_V		9.08	50.7	116	189	254	308	351	385	399
Fd		0.44	0.60	0.72	0.81	0.87	0.92	0.96	0.99	1.00
F_L		0.80	0.76	0.72	0.70	0.68	0.69	0.69	0.69	0.69
X_T		0.511	0.551	0.459	0.406	0.391	0.397	0.410	0.416	0.429
C_V	8	25.4	136	266	413	554	686	818	895	897
K_V		22.0	118	230	357	479	593	708	774	776
Fd		0.43	0.59	0.72	0.80	0.87	0.92	0.96	0.99	1.00
F_L		0.75	0.77	0.75	0.72	0.73	0.69	0.70	0.70	0.72
X_T		0.731	0.439	0.483	0.469	0.439	0.397	0.360	0.375	0.426

V500
Forward Flow
Level 4 Trim Reduced Port

Coefficients	Valve Size, NPS	Valve Rotation, Degrees							Modified Linear Characteristic	
		10	20	30	40	50	60	70	80	90
C_V	1	2.14	3.70	4.65	5.25	5.50	5.57	5.66	5.66	5.66
K_V		1.84	3.18	4.00	4.52	4.73	4.79	4.87	4.87	4.87
Fd(1)		0.54	0.66	0.75	0.82	0.88	0.92	0.96	0.99	1.00
F_L		0.64	0.75	0.75	0.79	0.75	0.74	0.73	0.73	0.73
X_T		0.286	0.388	0.464	0.483	0.471	0.459	0.444	0.444	0.444
C_V	1-1/2	2.10	4.55	6.16	8.00	10.4	11.3	11.3	11.3	11.3
K_V		1.81	3.91	5.30	6.88	8.94	9.72	9.72	9.72	9.72
Fd(1)		0.53	0.66	0.75	0.82	0.88	0.92	0.96	0.99	1.00
F_L		0.82	0.79	≥0.79	0.79	0.79	0.72	0.72	0.72	0.72
X_T		0.469	0.397	0.454	0.500	0.502	0.482	0.482	0.482	0.482
C_V	2	2.75	5.15	6.70	9.65	13.7	16.8	18.8	18.8	17.9
K_V		2.37	4.43	5.76	8.30	11.8	14.5	16.2	16.2	15.4
Fd(1)		0.54	0.66	0.75	0.82	0.88	0.92	0.96	0.99	1.00
F_L		0.75	0.76	0.83	≥0.86	0.87	0.85	0.77	0.77	0.81
X_T		0.467	0.448	0.519	0.624	0.612	0.543	0.444	0.439	0.484
C_V	3	4.12	9.50	13.1	19.8	29.6	39.0	45.3	48.0	48.0
K_V		3.56	8.22	11.3	17.1	25.6	33.7	39.2	41.5	41.5
Fd(1)		0.53	0.66	0.75	0.82	0.88	0.92	0.96	0.99	1.00
F_L		0.80	0.80	0.88	0.86	0.84	0.82	0.81	0.79	0.77
X_T		0.469	0.551	0.605	0.522	0.518	0.551	0.515	0.466	0.466
C_V	4	2.26	11.2	20.1	33.3	50.8	69.1	83.0	89.3	90.1
K_V		1.95	9.69	17.4	28.8	43.9	59.8	71.8	77.2	77.9
Fd(1)		0.52	0.65	0.74	0.82	0.88	0.92	0.96	0.99	1.00
F_L		0.96	0.95	0.85	0.86	0.86	0.83	0.80	0.77	0.74
X_T		0.779	0.779	0.632	0.620	0.612	0.589	0.537	0.466	0.452
C_V	6	13.6	37.9	49.8	82.9	122	159	184	194	196
K_V		11.8	32.8	43.1	71.7	106	138	159	168	170
Fd(1)		0.52	0.65	0.74	0.82	0.88	0.92	0.96	0.99	1.00
F_L		0.97	0.69	0.72	0.74	0.77	0.81	0.81	0.77	0.77
X_T		0.518	0.280	0.381	0.357	0.397	0.452	0.476	0.452	0.442
C_V	8	19.7	63.6	134	228	334	438	526	587	605
K_V		17.0	55.0	116	197	289	379	455	508	523
Fd(2)		0.48	0.63	0.73	0.81	0.87	0.92	0.96	0.99	1.00
F_L		0.93	0.83	0.76	0.77	0.77	0.77	0.75	0.75	0.72
X_T		0.597	0.473	0.422	0.394	0.378	0.381	0.400	0.429	0.436

1. Measured at 60% Port.
2. Measured at 40% Port.

Coefficients	Valve Size, NPS	Valve Rotation, Degrees							Modified Linear Characteristic	
		10	20	30	40	50	60	70	80	90
C_V	1	1.90	3.80	4.85	5.82	5.90	5.90	5.90	5.90	5.90
K_V		1.63	3.27	4.17	5.01	5.07	5.07	5.07	5.07	5.07
Fd(1)		0.54	0.66	0.75	0.82	0.88	0.92	0.96	0.99	1.00
F_L		0.56	0.67	0.68	0.69	0.73	0.75	0.75	0.75	0.75
X_T		0.312	0.386	0.427	0.409	0.448	0.448	0.448	0.448	0.448
C_V	1-1/2	1.95	4.45	5.75	7.75	11.4	11.8	11.8	11.8	11.8
K_V		1.68	3.83	4.95	6.67	9.80	10.2	10.2	10.2	10.2
Fd(1)		0.53	0.66	0.75	0.82	0.88	0.92	0.96	0.99	1.00
F_L		0.83	0.77	0.78	0.76	0.68	0.72	0.73	0.73	0.73
X_T		0.395	0.415	0.527	0.519	0.421	0.459	0.459	0.459	0.459
C_V	2	2.70	4.65	6.30	11.1	18.3	19.8	20.2	20.4	21.0
K_V		2.32	4.00	5.42	9.55	15.7	17.0	17.4	17.5	18.1
Fd(1)		0.54	0.66	0.75	0.82	0.88	0.92	0.96	0.99	1.00
F_L		0.91	0.89	0.84	0.71	0.58	0.61	0.62	0.62	0.60
X_T		0.459	0.464	0.594	0.453	0.307	0.358	0.366	0.337	0.328
C_V	3	4.41	9.60	13.7	19.5	37.3	53.3	56.7	57.9	57.9
K_V		3.81	8.30	11.9	16.9	32.3	46.1	49.0	50.1	50.1
Fd(1)		0.53	0.66	0.75	0.82	0.88	0.92	0.96	0.99	1.00
F_L		0.96	0.93	0.93	0.87	0.73	0.64	0.62	0.62	0.63
X_T		0.469	0.578	0.578	0.537	0.319	0.258	0.265	0.268	0.268
C_V	4	9.78	11.1	19.4	32.1	49.7	67.8	80.5	84.6	86.6
K_V		8.46	9.60	16.8	27.8	43.0	58.6	69.6	73.2	74.9
Fd(1)		0.52	0.65	0.74	0.82	0.88	0.92	0.96	0.99	1.00
F_L		0.93	0.93	0.89	0.84	0.79	0.72	0.64	0.65	0.65
X_T		0.620	0.620	0.593	0.605	0.570	0.522	0.476	0.459	0.436
C_V	6	10.6	30.0	43.4	77.1	122	168	198	223	226
K_V		9.17	26.0	37.5	66.7	106	145	171	193	195
Fd(1)		0.52	0.65	0.74	0.82	0.88	0.92	0.96	0.99	1.00
F_L		0.77	0.79	0.77	0.75	0.69	0.64	0.63	0.58	0.58
X_T		0.640	0.369	0.476	0.410	0.381	0.357	0.336	0.284	0.278
C_V	8	19.8	55.8	125	222	323	413	488	549	569
K_V		17.1	48.3	108	192	279	357	422	475	492
Fd(2)		0.48	0.63	0.73	0.81	0.87	0.92	0.96	0.99	1.00
F_L		0.75	0.77	0.78	0.75	0.70	0.68	0.70	0.68	0.70
X_T		0.459	0.581	0.462	0.394	0.375	0.381	0.391	0.391	0.391

1. Measured at 60% Port.
2. Measured at 40% Port.

Converging Flow

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Path(1)	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L(2)
	mm	Inches	mm	Inches			0 (Plug Down)	10	20	30	40	50	60	70	80	90	100 (Plug Up)	
1/2	33.3	1.3125	19	0.75	R to B	C_v	8.37	7.10	6.68	5.94	4.97	4.03	3.10	2.15	1.49	1.30	0	0.81
						K_v	*7.24*	6.14	5.78	5.14	4.30	3.49	2.68	1.86	1.29	1.12	0.00	- - -
						X_T	0.562	0.452	0.432	0.442	0.456	0.473	0.494	0.504	0.529	0.574	- - -	- - -
					L to B	C_v	0	2.45	3.36	4.32	5.15	5.96	6.93	7.74	8.00	8.10	9.00	0.79
						K_v	*0.00*	2.12	2.91	3.74	4.45	5.16	5.99	6.70	6.92	7.01	7.79	- - -
						X_T	- - -	0.522	0.476	0.452	0.449	0.456	0.446	0.442	0.473	0.487	0.494	- - -
3/4	33.3	1.3125	19	0.75	R to B	C_v	12.3	10.7	10.1	8.94	7.42	5.83	4.24	2.77	1.85	1.59	0	0.77
						K_v	*10.6*	9.26	8.74	7.73	6.42	5.04	3.67	2.40	1.60	1.38	0.00	- - -
						X_T	0.494	0.466	0.446	0.442	0.446	0.452	0.469	0.490	0.551	0.616	- - -	- - -
					L to B	C_v	0	2.93	4.19	5.57	7.11	8.68	9.91	10.6	11.2	11.4	12.5	0.76
						K_v	*0.00*	2.53	3.62	4.82	6.15	7.51	8.57	9.17	9.69	9.86	10.8	- - -
						X_T	- - -	0.466	0.432	0.429	0.422	0.413	0.429	0.466	0.459	0.459	0.483	- - -
1	33.3	1.3125	19	0.75	R to B	C_v	19.4	17.1	15.3	12.6	9.70	6.82	4.34	2.48	1.46	1.14	0	0.91
						K_v	*16.8*	14.8	13.2	10.9	8.39	5.90	3.75	2.15	1.26	0.99	0.00	- - -
						X_T	0.655	0.656	0.681	0.714	0.745	0.768	0.717	0.682	0.751	0.848	- - -	- - -
					L to B	C_v	0	3.08	4.58	6.62	9.20	12.0	15.0	17.1	18.0	18.7	19.4	0.96
						K_v	*0.00*	2.66	3.96	5.73	7.96	10.4	13.0	14.8	15.6	16.2	16.8	- - -
						X_T	- - -	0.572	0.609	0.623	0.627	0.614	0.629	0.642	0.681	0.687	0.717	- - -
1-1/2	33.3	1.3125	19	0.75	R to B	C_v	22.2	19.7	17.6	14.5	11.1	7.82	5.97	2.85	1.68	1.30	0	0.87
						K_v	*19.2*	17.0	15.2	12.5	9.60	6.76	5.16	2.47	1.45	1.12	0.00	- - -
						X_T	0.552	0.545	0.566	0.621	0.629	0.644	0.590	0.569	0.624	0.719	- - -	- - -
					L to B	C_v	0	3.54	5.28	7.61	10.6	13.8	17.2	19.6	20.7	21.5	22.3	0.94
						K_v	*0.00*	3.06	4.57	6.58	9.17	11.9	14.9	17.0	17.9	18.6	19.3	- - -
						X_T	- - -	0.479	0.504	0.522	0.521	0.507	0.528	0.538	0.568	0.574	0.598	- - -
2	58.7	2.3125	29	1.125	R to B	C_v	74.2	69.8	64.6	57.3	46.7	35.3	24.8	15.8	9.03	5.05	0	0.81
						K_v	*64.2*	60.4	55.9	49.6	40.4	30.5	21.5	13.7	7.81	4.37	0.00	- - -
						X_T	0.670	0.655	0.660	0.659	0.697	0.759	0.778	0.794	0.761	0.742	- - -	- - -
					L to B	C_v	0	4.90	7.80	12.8	19.7	28.1	38.4	49.3	58.4	64.9	71.9	0.93
						K_v	*0.00*	4.24	6.75	11.1	17.0	24.3	33.2	42.6	50.5	56.1	62.2	- - -
						X_T	- - -	0.743	0.694	0.686	0.712	0.748	0.750	0.752	0.748	0.731	0.744	- - -
2-1/2	58.7	2.3125	29	1.125	R to B	C_v	81.6	78.8	70.0	62.9	51.7	38.5	27.5	17.6	9.9	5.5	0	0.79
						K_v	*70.6*	68.2	60.5	54.4	44.7	33.3	23.8	15.2	8.56	4.76	0.00	- - -
						X_T	0.610	0.565	0.623	0.601	0.629	0.702	0.698	0.707	0.699	0.692	- - -	- - -
					L to B	C_v	0	5.4	8.58	14.3	21.9	30.8	41.8	53.9	63.8	71.5	79.2	0.91
						K_v	*0.00*	4.67	7.42	12.4	18.9	26.6	36.2	46.6	55.2	61.8	68.5	- - -
						X_T	- - -	0.671	0.633	0.605	0.635	0.685	0.697	0.697	0.690	0.664	0.674	- - -

Converging Flow

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Path[1]	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L[2]
	mm	Inches	mm	Inches			0 (Plug Down)	10	20	30	40	50	60	70	80	90	100 (Plug Up)	
3	87.3	3.4375	38	1.5	R to B	C_V	143	133	121	107	91.1	73.7	56.6	39.0	20.9	8.64	0	0.74
						K_V	*124*	115	105	93	78.8	63.8	49.0	33.7	18.1	7.47	0.00	- - -
						X_T	0.594	0.632	0.680	0.696	0.714	0.754	0.734	0.673	0.711	0.873	- - -	- - -
					L to B	C_V	0	18.7	33.9	51.7	70.1	87.9	101	120	134	146	156	0.92
						K_V	*0.00*	16.2	29.3	44.7	60.6	76.0	87.4	104	116	126	135	- - -
						X_T	- - -	0.848	0.757	0.692	0.644	0.621	0.643	0.670	0.743	0.744	0.730	- - -
4	111.1	4.375	51	2	R to B	C_V	248	236	222	200	175	147	117	86.9	56.6	29.0	0	0.74
						K_V	*215*	204	192	173	151	127	101	75.2	49.0	25.1	0.00	- - -
						X_T	0.570	0.583	0.616	0.652	0.672	0.669	0.659	0.608	0.618	0.640	- - -	- - -
					L to B	C_V	0	10.2	26.5	49.7	78.4	113	154	189	216	241	265	0.92
						K_V	*0.00*	8.82	22.9	43.0	67.8	97.7	133	163	187	208	229	- - -
						X_T	- - -	0.658	0.622	0.616	0.625	0.631	0.643	0.683	0.704	0.711	0.752	- - -
6	177.8	7	51	2	R to B	C_V	451	424	387	338	282	223	162	108	60.1	22.9	0	0.84
						K_V	*390*	367	335	292	244	193	140	93.4	52.0	19.8	0.00	- - -
						X_T	0.757	0.721	0.727	0.749	0.750	0.747	0.776	0.770	0.749	0.774	- - -	- - -
					L to B	C_V	0	49.4	102	161	221	284	337	387	433	474	506	0.91
						K_V	*0.00*	42.7	88.2	139	191	246	292	335	375	410	438	- - -
						X_T	- - -	0.592	0.623	0.662	0.695	0.688	0.728	0.749	0.740	0.757	0.773	- - -
8 High Capacity	177.8	7	57.2	2.25	R to B	C_V	491	473	425	384	332	256	171	102	55	24	0	0.84
						K_V	425	409	368	332	287	221	148	88.2	47.6	20.8	0.00	- - -
						X_T	0.702	0.669	0.662	0.689	0.609	0.653	0.710	0.613	0.558	0.349	- - -	- - -
					L to B	C_V	0	10	34	62	103	170	264	361	446	527	588	0.91
						K_V	0.00	8.65	29.4	53.6	89.1	147	228	312	386	456	509	- - -
						X_T	- - -	0.731	0.891	0.838	0.861	0.900	0.850	0.712	0.654	0.629	0.735	- - -
8 Low Capacity	177.8	7	57.2	2.25	R to B	C_V	476	410	358	310	246	169	105	57.5	30.1	11.0	0	0.84
						K_V	412	355	310	268	213	146	91	49.7	26.0	9.52	0	- - -
						X_T	0.668	0.669	0.668	0.668	0.668	0.668	0.669	0.669	0.669	0.666	- - -	- - -
					L to B	C_V	0	12	25	47.9	88.1	144	213	283	376	461	542	0.91
						K_V	0	10.4	21.6	41.4	76.2	125	184	245	325	399	469	- - -
						X_T	- - -	0.655	0.603	0.607	0.608	0.608	0.608	0.608	0.608	0.608	0.608	- - -

1. The end connections are identified on the valve body.
2. At maximum flow.

Diverging Flow

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Path(1)	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L(2)
	mm	Inches	mm	Inches			0 (Plug Down)	10	20	30	40	50	60	70	80	90	100 (Plug Up)	
1/2	33.3	1.3125	19	0.75	B to R	C_V	9.25	8.47	8.19	7.74	6.97	5.92	4.54	3.08	2.19	2.02	0	0.80
						K_V	*8.00*	7.33	7.08	6.70	6.03	5.12	3.93	2.66	1.89	1.75	0.00	- - -
						X_T	0.518	0.473	422	0.410	0.439	0.515	0.620	0.714	0.689	0.727	- - -	- - -
					B to L	C_V	0	2.08	2.80	3.51	4.26	5.11	6.02	6.90	7.50	7.72	8.67	0.80
						K_V	*0.00*	1.80	2.42	3.04	3.68	4.42	5.21	5.97	6.49	6.68	7.50	- - -
						X_T	- - -	- - -	0.898	0.744	0.628	0.540	0.533	0.578	0.574	0.555	0.563	- - -
3/4	33.3	1.3125	19	0.75	B to R	C_V	13.0	12.1	11.5	10.5	9.17	7.48	5.49	3.57	2.49	2.34	0	0.77
						K_V	*11.2*	10.5	9.95	9.08	7.93	6.47	4.75	3.09	2.15	2.02	0.00	- - -
						X_T	0.537	0.537	0.522	0.529	0.574	0.628	0.648	0.636	0.620	0.648	- - -	- - -
					B to L	C_V	0	2.39	3.40	4.46	5.70	6.96	8.21	9.39	10.1	10.3	11.5	0.79
						K_V	*0.00*	2.07	2.94	3.86	4.93	6.02	7.10	8.12	8.74	8.91	9.95	- - -
						X_T	- - -	0.946	0.884	0.783	0.681	0.648	0.660	0.668	0.648	0.640	0.608	- - -
1	33.3	1.3125	19	0.75	B to R	C_V	19.4	18.1	16.3	14.5	12.5	9.68	6.58	4.04	2.73	2.40	0	0.89
						K_V	*16.8*	15.7	14.1	12.5	10.8	8.37	5.69	3.49	2.36	2.08	0.00	- - -
						X_T	0.632	0.666	0.694	0.674	0.614	0.616	0.549	0.455	0.537	0.515	- - -	- - -
					B to L	C_V	0	4.16	6.18	8.34	10.9	13.3	15.2	16.7	18.0	18.9	19.2	0.87
						K_V	*0.00*	3.60	5.35	7.21	9.43	11.5	13.1	14.4	15.6	16.3	16.6	- - -
						X_T	- - -	0.718	0.749	0.787	0.756	0.738	0.712	0.693	0.656	0.640	0.648	- - -
1-1/2	33.3	1.3125	19	0.75	B to R	C_V	23	20.9	18.9	16.8	13.3	9.90	6.90	4.36	2.53	2.06	0	0.89
						K_V	*19.9*	18.1	16.3	14.5	11.5	8.56	5.97	3.77	2.19	1.78	0.00	- - -
						X_T	0.604	0.604	0.599	0.599	0.565	0.559	0.525	0.522	0.492	0.487	- - -	- - -
					B to L	C_V	0	4.20	6.30	8.40	11.1	13.5	15.5	17.5	19.6	21.4	23	0.84
						K_V	*0.00*	3.63	5.45	7.27	9.60	11.7	13.4	15.1	17.0	18.5	19.9	- - -
						X_T	- - -	0.684	0.694	0.719	0.732	0.726	0.725	0.674	0.677	0.634	0.596	- - -
2	58.7	2.3125	29	1.125	B to R	C_V	74.2	73.1	69.7	64.2	55.0	44.5	32.6	21.0	12.7	8.77	0	0.90
						K_V	*64.2*	63.2	60.3	55.5	47.6	38.5	28.2	18.2	11.0	7.59	0.00	- - -
						X_T	0.750	0.756	0.760	0.754	0.762	0.739	0.712	0.734	0.680	0.651	- - -	- - -
					B to L	C_V	0	6.40	9.32	15.0	28.8	34.3	46.9	59.0	69.8	79.3	85.5	0.87
						K_V	*0.00*	5.54	8.06	13.0	24.9	29.7	40.6	51.0	60.4	68.6	74.0	- - -
						X_T	- - -	0.660	0.674	0.624	0.577	0.631	0.639	0.662	0.673	0.636	0.628	- - -
2-1/2	58.7	2.3125	29	1.125	B to R	C_V	77.9	76.7	73.2	67.4	57.7	46.7	34.4	22.1	13.3	9.21	0	0.89
						K_V	*67.4*	66.3	63.3	58.3	49.9	40.4	29.8	19.1	11.5	7.97	0.00	- - -
						X_T	0.723	0.729	0.735	0.734	0.743	0.715	0.680	0.710	0.659	0.628	- - -	- - -
					B to L	C_V	0	6.72	9.79	15.8	25.0	36.0	49.2	62.0	73.3	83.3	89.7	0.87
						K_V	*0.00*	5.81	8.47	13.7	21.6	31.1	42.6	53.6	63.4	72.1	77.6	- - -
						X_T	- - -	0.640	0.647	0.601	0.558	0.616	0.620	0.644	0.653	0.623	0.609	- - -

Diverging Flow

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Path[1]	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L[2]
	mm	Inches	mm	Inches			0 (Plug Down)	10	20	30	40	50	60	70	80	90	100 (Plug Up)	
3	87.3	3.4375	38	1.5	B to R	C_V	146	146	146	143	128	106	81.1	55.0	29.8	16.4	0	0.87
						K_V	*126*	126	126	124	111	91.7	70.2	47.6	25.8	14.2	0.00	- - -
						X_T	0.687	0.716	0.733	0.687	0.686	0.689	0.688	0.684	0.684	0.688	- - -	- - -
					B to L	C_V	0	26.9	44.3	64.5	84.0	103	122	140	153	165	174	0.90
						K_V	*0.00*	23.3	38.3	55.8	72.7	89.1	106	121	132	143	151	- - -
						X_T	- - -	0.673	0.679	0.675	0.674	0.673	0.672	0.672	0.676	0.674	0.671	- - -
4	111.1	4.375	51	2	B to R	C_V	252	249	246	241	227	203	172	135	94.6	52.1	0	0.76
						K_V	*218*	215	213	208	196	176	149	117	81.8	45.1	0.00	- - -
						X_T	0.670	0.671	0.674	0.672	0.673	0.673	0.674	0.643	0.671	0.673	- - -	- - -
					B to L	C_V	0	12.0	28.0	50.2	79.7	119	172	226	267	297	316	0.91
						K_V	*0.00*	10.4	24.2	43.4	68.9	103	149	195	231	257	273	- - -
						X_T	- - -	0.691	0.689	0.692	0.691	0.692	0.691	0.688	0.687	0.887	0.690	- - -
6	177.8	7	51	2	B to R	C_V	483	470	444	395	343	273	203	134	74.8	33.0	0	0.89
						K_V	*418*	407	384	342	297	236	176	116	64.7	28.5	0.00	- - -
						X_T	0.783	0.780	0.781	0.785	0.791	0.781	0.786	0.785	0.784	0.786	- - -	- - -
					B to L	C_V	0	58.4	106	164	230	301	374	437	491	534	567	0.89
						K_V	*0.00*	50.5	91.7	142	199	260	324	378	425	462	490	- - -
						X_T	- - -	0.726	0.729	0.729	0.728	0.732	0.732	0.727	0.732	0.726	0.732	- - -
8 High Capacity	177.8	7	57.5	2.25	B to R	C_V	546	525	472	427	369	284	190	114	61	26	0	0.89
						K_V	472	454	408	369	319	246	164	98.6	52.8	22.5	0.00	- - -
						X_T	0.700	0.670	0.734	0.688	0.609	0.655	0.710	0.606	0.559	0.367	- - -	- - -
					B to L	C_V	0	12	37	68	114	189	293	401	495	586	653	0.89
						K_V	0.00	10.4	32.0	58.8	98.6	163	253	347	428	507	565	- - -
						X_T	- - -	0.628	0.929	0.860	0.858	0.899	0.824	0.712	0.655	0.625	0.735	- - -
8 Low Capacity	177.8	7	57.5	2.25	B to R	C_V	529	456	398	341	273	188	117	63.9	33.5	12.2	0	0.89
						K_V	458	394	344	295	236	163	101	55.3	29.0	10.6	0	- - -
						X_T	0.660	0.667	0.668	0.668	0.668	0.668	0.668	0.668	0.667	0.661	- - -	- - -
					B to L	C_V	0	14	28	53.2	97.9	160	236	315	418	512	602	0.89
						K_V	0	12.1	24.2	46.0	84.7	138	204	272	362	443	521	- - -
						X_T	- - -	0.594	0.594	0.608	0.608	0.608	0.608	0.608	0.608	0.608	0.608	- - -

1. The end connections are identified on the valve body.
2. At maximum flow.

Converging Flow

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Path(1)	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L(2)
	mm	Inches	mm	Inches			0 (Plug Down)	10	20	30	40	50	60	70	80	90	100 (Plug Up)	
1/2	33.3	1.3125	19	0.75	R to L	C_V	8.43	7.37	6.62	6.11	5.66	5.20	4.73	4.25	3.65	2.48	0	0.80
						K_V	*7.29*	6.38	5.73	5.29	4.90	4.50	4.09	3.68	3.16	2.15	0.00	- - -
						X_T	0.518	0.473	0.446	0.422	0.416	0.429	0.442	0.449	0.459	0.501	- - -	- - -
					B to L	C_V	0	1.74	2.44	3.16	3.61	4.10	4.95	5.85	6.38	7.07	8.42	0.80
						K_V	*0.00*	1.51	2.11	2.73	3.12	3.55	4.28	5.06	5.52	6.12	7.28	- - -
						X_T	- - -	0.936	0.819	0.744	0.761	0.697	0.559	0.469	0.456	0.490	0.526	- - -
3/4	33.3	1.3125	19	0.75	R to L	C_V	11.8	10.4	9.37	8.71	8.07	7.25	6.27	5.32	4.40	2.78	0	0.79
						K_V	*10.2*	9.00	8.11	7.53	6.98	6.27	5.42	4.60	3.81	2.40	0.00	- - -
						X_T	0.508	0.508	0.490	0.462	0.452	0.452	0.459	0.459	0.436	0.452	- - -	- - -
					B to L	C_V	0	2.65	3.72	4.87	6.30	7.43	8.29	9.16	9.97	11.2	12.5	0.77
						K_V	*0.00*	2.29	3.22	4.21	5.45	6.43	7.17	7.92	8.62	9.69	10.8	- - -
						X_T	- - -	0.533	0.508	0.494	0.446	0.397	0.397	0.436	0.446	0.432	0.497	- - -
1	33.3	1.3125	19	0.75	R to L	C_V	18.4	16.5	15.3	13.8	12.0	9.84	7.63	5.37	3.38	1.64	0	0.93
						K_V	*15.9*	14.3	13.2	11.9	10.4	8.51	6.60	4.65	2.92	1.42	0.00	- - -
						X_T	0.682	0.664	0.665	0.668	0.674	0.694	0.704	0.702	0.736	0.845	- - -	- - -
					B to L	C_V	0	2.11	3.03	4.45	6.15	8.18	10.5	13.0	15.7	18.3	20.5	0.88
						K_V	*0.00*	1.83	2.62	3.85	5.32	7.08	9.08	11.2	13.6	15.8	17.7	- - -
						X_T	- - -	0.602	0.722	0.691	0.674	0.646	0.644	0.646	0.626	0.594	0.613	- - -
1-1/2	33.3	1.3125	19	0.75	R to L	C_V	20.6	18.0	16.2	14.3	12.4	9.90	7.70	5.42	3.30	1.65	0	0.91
						K_V	*17.8*	15.6	14.0	12.4	10.7	8.56	6.66	4.69	2.85	1.43	0.00	- - -
						X_T	0.603	0.616	0.656	0.690	0.700	0.759	0.763	0.768	0.854	0.926	- - -	- - -
					B to L	C_V	0	2.60	4.90	6.90	9.40	12.6	15.4	18.8	22.0	24.5	25.1	0.82
						K_V	*0.00*	2.25	4.24	5.97	8.13	10.9	13.3	16.3	19.0	21.2	21.7	- - -
						X_T	- - -	0.453	0.315	0.328	0.330	0.313	0.342	0.353	0.365	0.379	0.468	- - -
2	58.7	2.3125	29	1.125	R to L	C_V	66.1	63.6	61.9	59.3	53.7	47.0	37.7	27.6	17.1	6.68	0	0.92
						K_V	*57.2*	55.0	53.5	51.3	46.5	40.7	32.6	23.9	14.8	5.78	0.00	- - -
						X_T	0.757	0.762	0.747	0.725	0.734	0.743	0.743	0.733	0.724	0.848	- - -	- - -
					B to L	C_V	0	3.85	5.48	9.16	14.6	21.5	30.7	42.4	56.3	71.9	85.6	0.65
						K_V	*0.00*	3.33	4.74	7.92	12.6	18.6	26.6	36.7	48.7	62.2	74.0	- - -
						X_T	- - -	0.911	0.883	0.801	0.772	0.756	0.745	0.731	0.697	0.656	0.608	- - -

Converging Flow

Linear Characteristic

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Path[1]	Flow Coefficient	Valve Opening—Percent of Total Travel											F_L[2]
	mm	Inches	mm	Inches			0 (Plug Down)	10	20	30	40	50	60	70	80	90	100 (Plug Up)	
2-1/2	58.7	2.3125	29	1.125	R to L	C_V	72.8	70.0	68.0	65.3	59.2	51.7	41.5	30.3	18.8	7.35	0	0.89
						K_V	*63.0*	60.5	58.8	56.5	51.2	44.7	35.9	26.2	16.3	6.36	0.00	- - -
						X_T	0.691	0.677	0.684	0.659	0.664	0.676	0.681	0.667	0.662	0.662	- - -	- - -
					B to L	C_V	0	4.24	6.03	10.1	16.0	23.7	33.8	46.7	62.0	79.0	94.2	0.84
						K_V	*0.00*	3.67	5.22	8.74	13.8	20.5	29.2	40.4	53.6	68.3	81.5	- - -
						X_T	- - -	0.824	0.802	0.725	0.694	0.684	0.674	0.662	0.631	0.601	0.552	- - -
3	87.3	3.4375	38	1.5	R to L	C_V	140	131	121	111	99.3	85.3	68.3	46.1	23.9	9.07	0	0.86
						K_V	*121*	113	105	96.0	85.9	73.8	59.1	39.9	20.7	7.85	0.00	- - -
						X_T	0.713	0.714	0.714	0.713	0.716	0.712	0.715	0.716	0.713	0.711	- - -	- - -
					B to L	C_V	0	14.1	27.4	40.3	53.8	68.3	87.1	111	138	164	185	0.83
						K_V	*0.00*	12.2	23.7	34.9	46.5	59.1	75.3	96.0	119	142	160	- - -
						X_T	- - -	0.519	0.592	0.592	0.595	0.591	0.592	0.593	0.593	0.593	0.593	- - -
4	111.1	4.375	51	2	R to L	C_V	234	231	225	216	200	175	140	103	65.2	30.0	0	0.87
						K_V	*202*	200	195	187	173	151	121	89.1	56.4	25.9	0.00	- - -
						X_T	0.727	0.698	0.702	0.685	0.672	0.670	0.692	0.657	0.548	0.583	- - -	- - -
					B to L	C_V	0	2.81	11.9	25.0	43.1	69.0	106	149	200	256	312	0.84
						K_V	*0.00*	2.43	10.3	21.6	37.3	59.7	91.7	129	173	221	270	- - -
						X_T	- - -	0.754	0.866	0.805	0.747	0.725	0.729	0.715	0.695	0.659	0.590	- - -
6	177.8	7	51	2	R to L	C_V	413	386	363	331	296	252	207	157	102	49.5	0	0.87
						K_V	*357*	334	314	286	256	218	179	136	88	42.8	0.00	- - -
						X_T	0.770	0.764	0.729	0.716	0.699	0.665	0.607	0.537	0.488	0.465	- - -	- - -
					B to L	C_V	0	38.4	70.1	110	156	208	262	324	393	473	556	0.84
						K_V	*0.00*	33.2	60.6	95.2	135	180	227	280	340	409	481	- - -
						X_T	- - -	0.750	0.789	0.770	0.738	0.720	0.708	0.707	0.694	0.654	0.605	- - -

1. The end connections are identified on the valve body.
2. At maximum flow.

Diverging Flow

On-Off Service Only

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Path(1)	Flow Coefficient	Valve Opening—Percent of Total Travel		F_L(2)
	mm	Inches	mm	Inches			0 (Plug Down)	100 (Plug Up)	
1/2	33.3	1.3125	19	0.75	L to R	C_V	8.20	0	0.84
						K_V	*7.09*	0.00	- - -
						X_T	0.612	- - -	- - -
					L to B	C_V	0	8.89	0.82
						K_V	*0.00*	7.69	- - -
						X_T	- - -	0.544	- - -
3/4	33.3	1.3125	19	0.75	L to R	C_V	11.0	0	0.84
						K_V	*9.52*	0.00	- - -
						X_T	0.616	- - -	- - -
					L to B	C_V	0	11.8	0.81
						K_V	*0.00*	10.2	- - -
						X_T	- - -	0.597	- - -
1	33.3	1.3125	19	0.75	L to R	C_V	17.1	0	0.94
						K_V	*14.8*	0.00	- - -
						X_T	0.742	- - -	- - -
					L to B	C_V	0	19.3	0.89
						K_V	*0.00*	16.7	- - -
						X_T	- - -	0.696	- - -
1-1/2	33.3	1.3125	19	0.75	L to R	C_V	20.5	0	0.89
						K_V	*17.7*	0.00	- - -
						X_T	0.590	- - -	- - -
					L to B	C_V	0	23.2	0.85
						K_V	*0.00*	20.1	- - -
						X_T	- - -	0.550	- - -
2	58.7	2.3125	29	1.125	L to R	C_V	58.1	0	0.94
						K_V	*50.3*	0.00	- - -
						X_T	0.848	- - -	- - -
					L to B	C_V	0	72.7	0.93
						K_V	*0.00*	62.9	- - -
						X_T	- - -	0.757	- - -
2-1/2	58.7	2.3125	29	1.125	L to R	C_V	64.0	0	0.92
						K_V	*55.4*	0.00	- - -
						X_T	0.772	- - -	- - -
					L to B	C_V	0	80.0	0.91
						K_V	*0.00*	69.2	- - -
						X_T	- - -	0.691	- - -

Diverging Flow

On-Off Service Only

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Path[1]	Flow Coefficient	Valve Opening—Percent of Total Travel		F_L[2]
	mm	Inches	mm	Inches			0 (Plug Down)	100 (Plug Up)	
3	87.3	3.4375	38	1.5	L to R	C_V	118	0	0.93
						K_V	*102*	0.00	- - -
						X_T	0.830	- - -	- - -
					L to B	C_V	0	148	0.95
						K_V	*0.00*	128	- - -
						X_T	- - -	0.766	- - -
4	111.1	4.375	51	2	L to R	C_V	203	0	0.92
						K_V	*176*	0.00	- - -
						X_T	0.819	- - -	- - -
					L to B	C_V	0	265	0.94
						K_V	*0.00*	229	- - -
						X_T	- - -	0.757	- - -
6	177.8	7	51	2	L to R	C_V	386	0	0.94
						K_V	*334*	0.00	- - -
						X_T	0.849	- - -	- - -
					L to B	C_V	0	512	0.94
						K_V	*0.00*	443	- - -
						X_T	- - -	0.772	- - -

1. The end connections are identified on the valve body.
2. At maximum flow.

Full and Reduced Bore Max Cv

Valve Size, NPS	Bore Size	Max C_V(1)
1/2	0.65	50
3/4	0.65	50
1	0.65	25
	1.15	100
1-1/2	0.65	20
	1.15	95
	1.5	250
2	1.15	90
	1.5	185
	2	500
2-1/2	1.15	50
	1.5	160
	2	340
	2.5	450
3	1.5	155
	2	200
	3	1300
4	2	175
	3	800
	4	2400
6	3	400
	4	2000
	6	5500
8	6	2600
	8	10000

-continued-

Full and Reduced Bore Max Cv

Valve Size, NPS	Bore Size	Max C_v[1]
10	8	4400
	10	9000
12	10	8000
	12	24000
14	12	14000
	14	30000
16	14	19000
	16	42000
18	16	26000
	18	55000
20	18	33000
	20	70000
24	20	36000
	24	100000

1. Values shown for SCH40 piping.

Introduction

Standardization activities for control valve sizing can be traced back to the early 1960's when an American trade association, the Fluids Control Institute, published sizing equations for use with both compressible and incompressible fluids. The range of service conditions that could be accommodated accurately by these equations was quite narrow, and the standard did not achieve a high degree of acceptance. In 1967, the Instrument Society of America (ISA) established a committee to develop and publish standard equations. The efforts of this committee culminated in a valve sizing procedure that has achieved the status of American National Standard. Later, a committee of the International Electrotechnical Commission (IEC) used the ISA works as a basis to formulate international standards for sizing control valves. (Some information in this introductory material has been extracted from ANSI/ISA S75.01 standard with the permission of the publisher, the instrument Society of America.) Except for some slight differences in nomenclature and procedures, the ISA and IEC standards have been harmonized. ANSI/ISA Standard S75.01 is harmonized with IEC Standards 534-2-1 and 534-2-2. (IEC Publications 534-2, Sections One and Two for incompressible and compressible fluids, respectively.)

In the following sections, the nomenclature and procedures are explained, and sample problems are solved to illustrate their use.

Sizing Valves for Liquids

Following is a step-by-step procedure for the sizing of control valves for liquid flow using the IEC procedure. Each of these steps is important and must be considered during any valve sizing procedure. Steps 3 and 4 concern the determination of certain sizing factors that may or may not be required in the sizing equation depending on the service conditions of the sizing problem. If one, two, or all three of these sizing factors are to be included in the equation for a particular sizing problem, refer to the appropriate factor determination section(s) located in the text after the sixth step.

1. Specify the variables required to size the valve as follows:

- Desired design: refer to the appropriate valve flow coefficient table in this catalog.
- Process fluid (water, oil, etc.), and
- Appropriate service conditions
  q or w, P_1, P_2 or ΔP, T_1, G_f, P_v, Pc, and ν

The ability to recognize which terms are appropriate for a specific sizing procedure can only be acquired through experience with different valve sizing problems. If any of the above terms appears to be new or unfamiliar, refer to the table 1 for a complete definition.

2. Determine the equation constant N. N is a numerical constant contained in each of the flow equations to provide a means for using different systems of units. Values for these various constants and their applicable units are given in table 2.

Use N_1, if sizing the valve for a flow rate in volumetric units (gpm or m^3/h).

Use N_6 if sizing the valve for a flow rate in mass units (lb/h or kg/h).

3. Determine F_P, the piping geometry factor.

F_P is a correction factor that accounts for pressure losses due to piping fittings such as reducers, elbows, or tees that might be attached directly to the inlet and outlet connections of the control valve to be sized. If such fittings are attached to the valve, the F_P factor must be considered in the sizing procedure. If, however, no fittings are attached to the valve, F_P has a value of 1.0 and simply drops out of the sizing equation.

For rotary valves with reducers (swaged installations) and other valve designs and fitting styles, determine the F_P factors by using the procedure for *Determining F_P, the Piping Geometry Factor* on page 3.

Table 1. Abbreviations and Terminology

Symbol	Definition	Symbol	Definition
C_v	Valve sizing coefficient	P_2	Downstream absolute static pressure
Cv_{net}	Valve flow coefficient calculated from the net pressure loss through the valve only	P_C	Absolute thermodynamic critical pressure
d	Nominal valve size	P_V	Vapor pressure absolute of liquid at inlet temperature
D	Internal diameter of the piping	ΔP	Pressure drop (P_1-P_2) across the valve
F_d	Valve style modifier, dimensionless	$\Delta P_{max(L)}$	Maximum allowable liquid sizing pressure drop
F_F	Liquid critical pressure ratio factor, dimensionless	$\Delta P_{max(LP)}$	Maximum allowable sizing pressure drop with attached fittings
F_K	Ratio of specific heats factor, dimensionless	q	Volume rate of flow
F_L	Rated liquid pressure recovery factor, dimensionless	q_{max}	Maximum flow rate (choked flow conditions) at given upstream conditions
F_{Lnet}	Pressure recovery factor calculated from the net pressure loss through the valve only	Re_V	Valve Reynolds number, dimensionless
F_{LP}	Combined liquid pressure recovery factor and piping geometry factor of valve with attached fittings (when there are no attached fittings, F_{LP} equals F_L), dimensionless	T_1	Absolute upstream temperature (degrees K or degree R)
F_P	Piping geometry factor, dimensionless	w	Mass rate of flow
F_R	Reynolds number factor, dimensionless	x	Ratio of pressure drop to upstream absolute static pressure ($\Delta P/P_1$), dimensionless
G_F	Liquid specific gravity (ratio of density of liquid at flowing temperature to density of water at 60°F), dimensionless	x_T	Rated pressure drop ratio factor, dimensionless
G_G	Gas specific gravity (ratio of density of flowing gas to density of air with both at standard conditions(1), i.e., ratio of molecular weight of gas to molecular weight of air), dimensionless	x_{Tnet}	Pressure differential ratio factor calculate from the net pressure loss through the valve only
k	Ratio of specific heats, dimensionless	Y	Expansion factor (ratio of flow coefficient for a gas to that for a liquid at the same Reynolds number), dimensionless
K	Head loss coefficient of a device, dimensionless	Z	Compressibility factor, dimensionless
M	Molecular weight, dimensionless	$\gamma 1$	Specific weight at inlet conditions
N	Numerical constant	ν	Kinematic viscosity, centistokes
P_1	Upstream absolute static pressure		

1. Standard conditions are defined as 60°F (15.5°C) and 14.7 psia (101.3kPa).

4. Determine q_{max} (the maximum flow rate at given upstream conditions) or ΔP_{max} (the allowable sizing pressure drop).

The maximum or limiting flow rate (q_{max}), commonly called choked flow, is manifested by no additional increase in flow rate with increasing pressure differential with fixed upstream conditions. In liquids, choking occurs as a result of vaporization of the liquid when the static pressure within the valve drops below the vapor pressure of the liquid.

The IEC standard requires the calculation of an allowable sizing pressure drop (ΔP_{max}), to account for the possibility of choked flow conditions within the valve. The calculated ΔP_{max} value is compared with the actual pressure drop specified in the service conditions, and the lesser of these two values is used in the sizing equation. If it is desired to use ΔP_{max} to account for the possibility of choked flow conditions, it can be calculated using the procedure for Determining Δq_{max}, the Maximum Flow Rate, or ΔP_{max}, the Allowable Sizing Pressure Drop on page 4. If it can be recognized that choked flow conditions will not develop within the valve, ΔP_{max} need not be calculated.

5. Determine F_R, the Reynolds number factor.

F_R is a correction factor to account for nonturbulent flowing conditions within the control valve to be sized. Such conditions might occur due to high viscosity fluid, very low pressure differential, low flow rate, or some combination of these. If nonturbulent flow is suspected, determine the F_R factor according to the procedure for Determining F_R on page 6. For most valve sizing applications, however, nonturbulent flow will not occur. If it is known that nonturbulent flow conditions will not develop within the valve, F_R has a value of 1.0 and simply drops out of the equation.

Table 2. Equation Constants[1]

Numerical Constant with Subscript		N	w	q	p[2]	ρ	ν	T	d,D
N_1		0.0865	- - -	m^3/h	kPa	- - -	- - -	- - -	- - -
		0.865	- - -	m^3/h	bar	- - -	- - -	- - -	- - -
		1.00	- - -	gpm	psia	- - -	- - -	- - -	- - -
N_2		0.00214	- - -	- - -	- - -	- - -	- - -	- - -	mm
		890	- - -	- - -	- - -	- - -	- - -	- - -	inch
N_4		76000	- - -	m^3/h	- - -	- - -	centistokes	- - -	mm
		17300	- - -	gpm	- - -	- - -	centistokes	- - -	inch
N_5		0.00241	- - -	- - -	- - -	- - -	- - -	- - -	mm
		1000	- - -	- - -	- - -	- - -	- - -	- - -	inch
N_6		2.73	kg/h	- - -	kPa	kg/m^3	- - -	- - -	- - -
		27.3	kg/h	- - -	bar	kg/m^3	- - -	- - -	- - -
		63.3	lb/h	- - -	psia	lb/ft^3	- - -	- - -	- - -
N_7[3]	Normal Conditions $T_N = 0°C$	3.94	- - -	m^3/h	kPa	- - -	- - -	deg K	- - -
		394	- - -	m^3/h	bar	- - -	- - -	deg K	- - -
	Standard Conditions $T_s = 15.5°C$	4.17	- - -	m^3/h	kPa	- - -	- - -	deg K	- - -
		417	- - -	m^3/h	bar	- - -	- - -	deg K	- - -
	Standard Conditions $T_s = 60°F$	1360	- - -	scfh	psia	- - -	- - - - - -	deg R	- - -
N_8		0.948	kg/h	- - -	kPa	- - -	- - -	deg K	- - -
		94.8	kg/h	- - -	bar	- - -	- - -	deg K	- - -
		19.3	lb/h	- - -	psia	- - -	- - -	deg R	- - -
N_9[3]	Normal Conditions $T_N = 0°C$	21.2	- - -	m^3/h	kPa	- - -	- - -	deg K	- - -
		2120	- - -	m^3/h	bar	- - -	- - -	deg K	- - -
	Standard Conditions $T_s = 15.5°C$	22.4	- - -	m^3/h	kPa	- - -	- - -	deg K	- - -
		2240	- - -	m^3/h	bar	- - -	- - -	deg K	- - -
	Standard Conditions $T_S = 60°F$	7320	- - -	scfh	psia	- - -	- - -	deg R	- - -

1. Many of the equations used in these sizing procedures contain a numerical constant, N, along with a numerical subscript. These numerical constants provide a means for using different units in the equations. Values for the various constants and the applicable units are given in the above table. For example, if the flow rate is given in U.S. gpm and the pressures are psia, N_1 has a value of 1.00. If the flow rate is m^3/hr and the pressures are kPa, the N_1 constant becomes 0.0865.
2. All pressures are absolute.
3. Pressure base is 101.3 kPa (1.013 bar) (14.7 psia).

6. Solve for required C_v, using the appropriate equation:

- For volumetric flow rate units—

$$C_v = \frac{q}{N_1 F_p \sqrt{\frac{P_1 - P_2}{G_f}}}$$

- For mass flow rate units—

$$C_v = \frac{w}{N_6 F_p \sqrt{(P_1 - P_2)\gamma}}$$

In addition to C_v, two other flow coefficients, K_v and A_v, are used, particularly outside of North America. The following relationships exist:

$K_v = (0.865)(C_v)$

$A_v = (2.40 \times 10^{-5})(C_v)$

7. Select the valve size using the appropriate flow coefficient table and the calculated C_v value.

Determining F_p, the Piping Geometry Factor

Determine an F_p factor if any fittings such as reducers, elbows, or tees will be directly attached to the inlet and outlet connections of the control valve that is to be sized. When possible, it is recommended that F_p factors be determined experimentally by using the specified valve in actual tests.

Calculate the F_p factor using the following equation.

$$F_p = \left[1 + \frac{\Sigma K}{N_2} \left(\frac{C_v}{d^2} \right)^2 \right]^{-1/2}$$

where,

N_2 = Numerical constant found in table 2

d = Assumed nominal valve size

C_v = Valve sizing coefficient at 100-percent travel for the assumed valve size

In the above equation, ΣK is the algebraic sum of the velocity head loss coefficients of all of the fittings that are attached to the control valve. To calculate ΣK, use the following formula:

$$\Sigma K = K_1 + K_2 + K_{B1} - K_{B2}$$

where,

K_1 = Resistance coefficient of upstream fittings

K_2 = Resistance coefficient of downstream fittings

K_{B1} = Inlet Bernoulli coefficient

K_{B2} = Outlet Bernoulli coefficient

The Bernoulli coefficients, K_{B1} and K_{B2}, are used only when the diameter of the piping approaching the valve is different from the diameter of the piping leaving the valve:

$$K_{B1} \text{ or } K_{B2} = 1 - \left(\frac{d}{D}\right)^4$$

where,

d = Nominal valve size

D = Internal diameter of piping

If the inlet and outlet piping are of equal size, then the Bernoulli coefficients are also equal, $K_{B1} = K_{B2}$, and therefore they are dropped from the equation to calculate ΣK.

The most commonly used fitting in control valve installations is the short-length concentric reducer. The equations necessary to calculate ΣK for this fitting are as follows:

- For an inlet reducer—

$$K_1 = 0.5\left(1 - \frac{d^2}{D^2}\right)^2$$

- For an outlet reducer—

$$K_2 = 1.0\left(1 - \frac{d^2}{D^2}\right)^2$$

- For a valve installed between identical reducers—

$$K_1 + K_2 = 1.5\left(1 - \frac{d^2}{D^2}\right)^2$$

Once you have ΣK, calculate F_P according to the equation at the beginning of this section. A sample problem that finds for F_P is on page 9.

Determining q_{max} (the Maximum Flow Rate) or ΔP_{max} (the Allowable Sizing Pressure Drop)

Determine either q_{max} or ΔP_{max} if possible for choked flow to develop within the control valve that is to be sized. The values can be determined by using the following procedures.

Determining q_{max} (the Maximum Flow Rate)

$$q_{max} = N_1 F_L C_v \sqrt{\frac{P_1 - F_F\ P_v}{G_f}}$$

Values for F_F, the liquid critical pressure ratio factor, can be obtained from the following equation:

$$F_F = 0.96 - 0.28\sqrt{\frac{P_v}{P_c}}$$

Values for F_L, the recovery factor for valves installed without fittings attached, can be found in the flow coefficient tables. If the given valve is to be installed with fittings such as reducer attached to it, F_L in the equation must be replace by the quotient F_{LP}/F_p, where:

$$F_{LP} = \left[\frac{K_1}{N_2}\left(\frac{C_v}{d^2}\right)^2 + \frac{1}{F_L{}^2}\right]^{-1/2}$$

and

$K_1 = K_1 + K_{B1}$

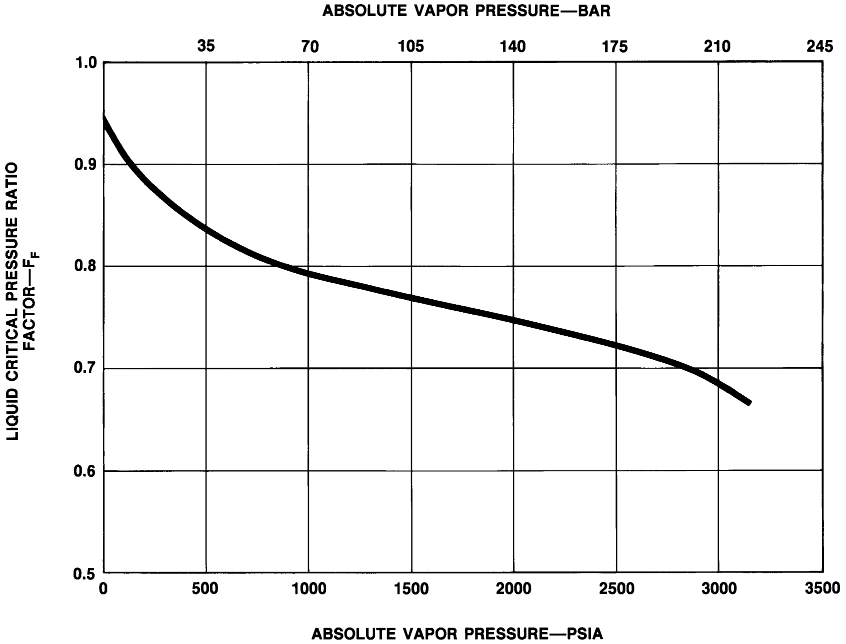
where,

K_1 = Resistance coefficient of upstream fittings

K_{B1} = Inlet Bernoulli coefficient

(See the procedure for Determining F_p, the Piping Geometry Factor, for definitions of the other constants and coefficients used in the above equations.)

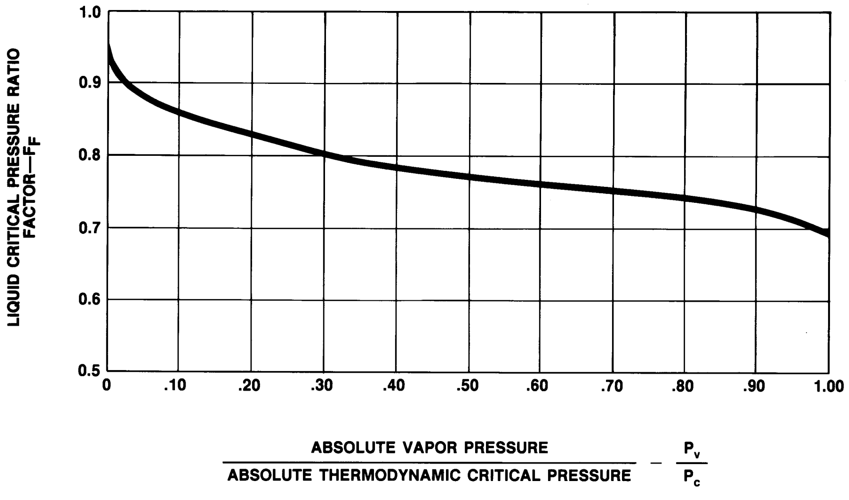
Figure 1. Liquid Critical Pressure Ratio Factor for Water



USE THIS CURVE FOR WATER. ENTER ON THE ABSCISSA AT THE WATER VAPOR PRESSURE AT THE VALVE INLET. PROCEED VERTICALLY TO INTERSECT THE CURVE. MOVE HORIZONTALLY TO THE LEFT TO READ THE CRITICAL PRESSURE RATIO, F_F, ON THE ORDINATE.

A2737-1

Figure 2. Liquid Critical Pressure Ratio Factor for All Fluids



$$\frac{\text{ABSOLUTE VAPOR PRESSURE}}{\text{ABSOLUTE THERMODYNAMIC CRITICAL PRESSURE}} - \frac{P_v}{P_c}$$

USE THIS CURVE FOR LIQUIDS OTHER THAN WATER. DETERMINE THE VAPOR PRESSURE/CRITICAL PRESSURE RATIO BY DIVIDING THE LIQUID VAPOR PRESSURE AT THE VALVE INLET BY THE CRITICAL PRESSURE OF THE LIQUID. ENTER ON THE ABSCISSA AT THE RATIO JUST CALCULATED AND PROCEED VERTICALLY TO INTERSECT THE CURVE. MOVE HORIZONTALLY TO THE LEFT AND READ THE CRITICAL PRESSURE RATIO, F_F, ON THE ORDINATE.

A2738-1

Determining ΔP_{max} (the Allowable Sizing Pressure Drop)

ΔP_{max} (the allowable sizing pressure drop) can be determined from the following relationships:

For valves installed without fittings—

$$\Delta P_{max(L)} = F_L{}^2 \left(P_1 - F_F P_v\right)$$

For valves installed with fittings attached—

$$\Delta P_{max(LP)} = \left(\frac{F_{LP}}{F_p}\right)^2 \left(P_1 - F_F P_v\right)$$

where,

P_1 = Upstream absolute static pressure

P_2 = Downstream absolute static pressure

P_v = Absolute vapor pressure at inlet temperature

Values of F_F, the liquid critical pressure ratio factor, can be obtained from figure 1 for water, or figure 2 for all other liquids.

Values of F_L, the recovery factor for valves installed without fittings attached, can be found in the flow coefficient tables. An explanation of how to calculate values of F_{LP}, the recovery factor for valves installed with fittings attached, is presented in the procedure for determining q_{max} (the Maximum Flow Rate).

Once the ΔP_{max} value has been obtained from the appropriate equation, it should be compared with the actual service pressure differential (i.e., $\Delta P = P_1 - P_2$). If ΔPmax is less than ΔP, this is an indication that choked flow conditions will exist under the service conditions specified. If choked flow conditions do exist (i.e., $\Delta P_{max} < P_1 - P_2$), then step 6 of the procedure for Sizing Valves for Liquids must be modified by replacing the actual service pressure differential (i.e., $P_1 - P_2$) in the appropriate valve sizing equation with the calculated ΔP_{max} value.

Note

Once it is known that choked flow conditions will develop within the specified valve design (ΔP_{max} is calculated to be less than ΔP), a further distinction can be made to determine whether the choked flow is caused by cavitation or flashing. The choked flow conditions are caused by flashing if the outlet pressure of the given valve is less than the vapor pressure of the flowing liquid. The choked flow conditions are caused by cavitation if the outlet pressure of the valve is greater than the vapor pressure of the flowing liquid.

Determining F_R, the Reynolds Number Factor(3)

Nonturbulent flow conditions can occur in applications where there is high fluid viscosity, very low pressure differential, or some combination of these conditions. In those instances where nonturbulent flow exists, F_R, the Reynolds number factor, must be introduced. Determine F_R using the following procedure.

A. Calculate Re_v, the Reynolds number, using the equation:

$$Re_v = \frac{N_4 F_d q}{\nu F_L{}^{1/2} C_v{}^{1/2}} \left[\frac{F_L{}^2 C_v{}^2}{N_2 D^4} + 1\right]^{1/4}$$

where,

N_2, N_4 = Numerical constants determined from table 2

D = Internal diameter of the piping

υ = Kinematic viscosity of the fluid

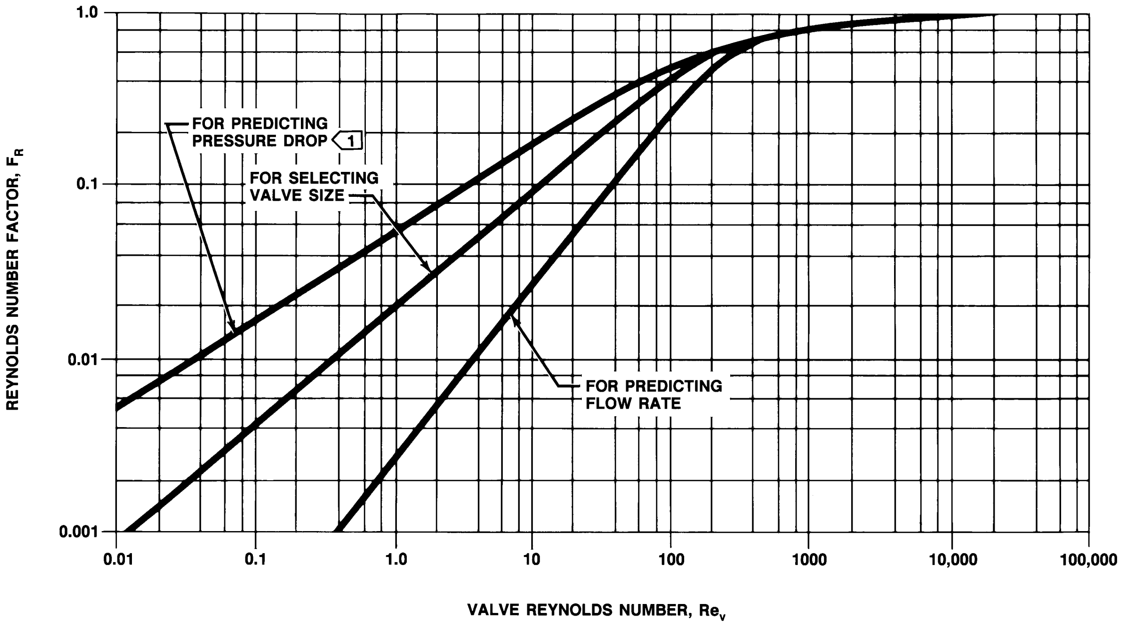
$C_v = C_{vt}$, the pseudo sizing coefficient

$$C_{vt} = \frac{q}{N_1 \sqrt{\frac{P_1 - P_2}{G_f}}}$$

F_d = Valve style modifier that is dependent on the valve style used. Valves that use two parallel flow paths, such as double-ported globe-style valves, butterfly valves, or 8500 Series valves, use an F_d of 0.7. For any other valve style, use an F_d of 1.0.

B. Once Re_v is known, use one of the following three approaches to obtain the desired information.

Figure 3. Reynolds Number Factor, F_R



NOTE:
1 THIS CURVE IS IN THE ISA/IEC STANDARD.
B2239

Determining Required Flow Coefficient for Selecting Valve Size

The following treatment is based on valves without attached fittings; therefore, $F_p = 1.0$.

1. Calculate a pseudo valve flow coefficient C_{vt}, assuming turbulent flow, using:

$$C_{vt} = \frac{q}{N_1\sqrt{\frac{P_1 - P_2}{G_f}}}$$

2. Calculate Re_v, substituting C_{vt} from step 1 for C_v. For F_L, select a representative value for the valve style desired.

3. Find F_R as follows:

a. If Re_v is less than 56, the flow is laminar, and F_R can be found by using either the curve in figure 3 labeled “FOR SELECTING VALVE SIZE” or by using the equation:

$$F_R = 0.019(Re_v)^{0.67}$$

b. If Re_v is greater than 40,000, the flow can be taken as turbulent, and $F_R = 1.0$.

c. If Re_v lies between 56 and 40,000, the flow is transitional, and F_R can be found by using either the curve in figure 3 or the column headed “Valve Size Selection” in table 3.

Table 3. Reynolds Number Factor, F_R, for Transitional Flow

F_R[1]	Valve Reynolds Number, Re_v[1]		
	Valve Size Selection	Flow Rate Prediction	Pressure Drop Prediction
0.284	56	106	30
0.32	66	117	38
0.36	79	132	48
0.40	94	149	59
0.44	110	167	74
0.48	130	188	90
0.52	154	215	113
0.56	188	253	142
0.60	230	298	179
0.64	278	351	224
0.68	340	416	280
0.72	471	556	400
0.76	620	720	540
0.80	980	1100	870
0.84	1560	1690	1430
0.88	2470	2660	2300
0.92	4600	4800	4400
0.96	10,200	10,400	10,000
1.00	40,000	40,000	40,000

1. Linear interpolation between listed values is satisfactory.

4. Obtain the required C_V from:

$$C_v = \frac{C_{vt}}{F_R}$$

5. After determining C_V, check the F_L value for the selected valve size and style. If this value is significantly different from the value selected in step 2, use the new value, and repeat steps 1 through 4.

Predicting Flow Rate

1. Calculate q_t, assuming turbulent flow, using:

$$q_t = N_1 C_v \sqrt{\frac{P_1 - P_2}{G_f}}$$

2. Calculate Re_V, substituting qt for q from step 1.

3. Find F_R as follows:

a. If Re_V is less than 106, the flow is laminar, and F_R can be found by using the curve in figure 3 labeled "FOR PREDICTING FLOW RATE" or by using the equation:

$$F_R = 0.0027\, Re_v$$

b. If Re_V is greater than 40,000, the flow can be taken as turbulent, and F_R = 1.0.

c. If Re_V lies between 106 and 40,000, the flow is transitional, and F_R can be found by using either the curve in figure 3 or the column headed "Flow Rate Prediction" in table 3.

4. Obtain the predicted flow rate from:

$$q = F_R\, q_t$$

Predicting Pressure Drop

1. Calculate Re_V.

2. Find F_R as follows:

a. If Re_V is less than 30, the flow is laminar, and F_R can be found by using the curve in figure 3 labeled "FOR PREDICTING PRESSURE DROP" or by using the equation:

$$F_R = 0.052(Re_v)^{0.5}$$

b. If Re_V is greater than 40,000, the flow can be taken as turbulent, and F_R = 1.0.

c. If Re_V lies between 30 and 40,000, the flow is transitional, and F_R can be found by using the curve in figure 3 or the column headed "Pressure Drop Prediction" in table 3.

3. Calculate the predicted pressure drop from:

$$\Delta p = G_f \left(\frac{q}{N_1\, F_R\, C_v} \right)^2$$

Liquid Sizing Sample Problems

Liquid Sizing Sample Problem No. 1

Assume an installation that, at initial plant start-up, will not be operating at maximum design capability. The lines are sized for the ultimate system capacity, but there is a desire to install a control valve now which is sized only for currently anticipated requirements. The line size is NPS 8, and a Fisher CL300 ES valve with an equal percentage cage has been specified. Standard concentric reducers will be used to install the valve into the line. Determine the appropriate valve size.

1. Specify the necessary variables required to size the valve:

- Desired valve design—CL300 ES valve with equal percentage cage and an assumed valve size of NPS 3.
- Process fluid—liquid propane
- Service conditions—

q = 800 gpm
P_1 = 300 psig = 314.7 psia
P_2 = 275 psig = 289.7 psia
ΔP = 25 psi
T_1 = 70°F
G_f = 0.50
P_v = 124.3 psia
P_v = 616.3 psia

2. Determine an N_1 value of 1.0 from table 2.

3. Determine F_p, the piping geometry factor.

Because it is proposed to install an NPS 3 valve in an NPS 8 line, it will be necessary to determine the piping geometry factor, F_p, which corrects for losses caused by fittings attached to the valve.

$$F_p = \left[1 + \frac{\Sigma K}{N_2} \left(\frac{C_v}{d^2} \right)^2 \right]^{-1/2}$$

where,

N_2 = 890, from table 2
d = 3 in., from step 1
C_v = 121, from the flow coefficient table for a CL300, NPS 3 ES valve with equal percentage cage

To compute ΣK for a valve installed between identical concentric reducers:

$$\Sigma k = K_1 + K_2$$

$$= 1.5\left(1 - \frac{d^2}{D^2}\right)^2$$

$$= 1.5\left(1 - \frac{(3)^2}{(8)^2}\right)^2$$

$$= 1.11$$

where,

D = NPS 8, the internal diameter of the piping so,

$$F_p = \left[1 + \frac{1.11}{890}\left(\frac{121}{3^2}\right)^2\right]^{-1/2}$$

$$= 0.90$$

4. Determine ΔP_{max} (the Allowable Sizing Pressure Drop).

Based on the small required pressure drop, the flow will not be choked (i.e., $\Delta P_{max} > \Delta P$).

5. Determine F_R, the Reynolds number factor.

Under the specified service conditions, no correction factor will be required for Re_v (i.e., $F_R = 1.0$).

6. Solve for C_v using the appropriate equation.

$$C_v = \frac{q}{N_1\, F_p \sqrt{\frac{P_1 - P_2}{G_f}}}$$

$$= \frac{800}{(1.0)(0.90)\sqrt{\frac{25}{0.5}}}$$

$$= 125.7$$

7. Select the valve size using the flow coefficient table and the calculated C_v value.

The required C_v of 125.7 exceeds the capacity of the assumed valve, which has a C_v of 121. Although for this example it may be obvious that the next larger size (NPS 4) would be the correct valve size, this may not always be true, and a repeat of the above procedure should be carried out.

Assuming an NPS valve, C_v = 203. This value was determined from the flow coefficient table for a CL300, NPS 4 ES valve with an equal percentage cage.

Recalculate the required C_v using an assumed C_v value of 203 in the F_p calculation.

where,

$$\Sigma k = K_1 + K_2$$

$$= 1.5\left(1 - \frac{d^2}{D^2}\right)^2$$

$$= 1.5\left(1 - \frac{16}{64}\right)^2$$

$$= 0.84$$

and

$$F_p = \left[1.0 + \frac{\Sigma K}{N_2}\left(\frac{C_v}{d_2}\right)^2\right]^{-1/2}$$

$$= \left[1.0 + \frac{0.84}{890}\left(\frac{203}{4^2}\right)^2\right]^{-1/2}$$

$$= 0.93$$

and

$$C_v = \frac{q}{N_q\, F_p \sqrt{\frac{P_1 - P_2}{G_f}}}$$

$$= \frac{800}{(1.0)(0.93)\sqrt{\frac{25}{0.5}}}$$

$$= 121.7$$

This solution indicates only that the NPS 4 valve is large enough to satisfy the service conditions given. There may be cases, however, where a more accurate prediction of the C_v is required. In such cases, the required C_v should be redetermined using a new F_p value based on the C_v value obtained above. In this example, C_v is 121.7, which leads to the following result:

$$F_p = \left[1.0 + \frac{\Sigma K}{N_2}\left(\frac{C_v}{d^2}\right)^2\right]^{-1/2}$$

$$= \left[1.0 + \frac{0.84}{890}\left(\frac{121.7}{4^2}\right)^2\right]^{-1/2}$$

= 0.97

The required C_v then becomes:

$$C_v = \frac{q}{N_1\, F_p \sqrt{\frac{P_1 - P_2}{G_f}}}$$

$$= \frac{800}{(1.0)(0.97)\sqrt{\frac{25}{0.5}}}$$

= 116.2

Because this newly determined C_v is very close to the C_v used initially for this recalculation (i.e., 116.2 versus 121.7), the valve sizing procedure is complete, and the conclusion is that an NPS 4 valve opened to about 75 percent of total travel should be adequate for the required specifications.

Liquid Sizing Sample Problem No. 2

Determine the appropriate valve size for the following application. A Fisher ED valve with a linear cage has been specified. Assume piping size will be the same as the valve size.

1. Specify the variables required to size the valve:

- Desired valve design—a CL300 ED valve with linear cage
- Process fluid—water
- Service conditions—

q = 2200 gpm
P_1 = 375 psig = 389.7 psia
P_2 = 100 psig = 114.7 psia
$\Delta P = P_1 - P_2$ = 275 psi
T_1 = 270°F
G_f = 0.93
P_v = 41.9 psia

2. Determine an N_1 value of 1.0 from table 2.

3. Determine F_p, the piping geometry factor.

Because valve size equals line size, F_p = 1.0

4. Determine ΔP_{max}, the allowable sizing pressure drop.

$$\Delta P_{max} = F_L{}^2(P_1 - F_F\, P_v)$$

where,

P_1 = 389.7 psia, given in step 1
P_2 = 114.7 psia, given in step 1
P_v = 41.9 psia, given in step 1
F_F = 0.90, determined from figure 1

Assume F_L = 0.84 (from the flow coefficient table, 0.84 appears to be a representative F_L factor for ED valves with a linear cage.) Therefore,

$$\Delta P_{max} = (0.84)^2\, [389.7 - (0.90)(41.9)]$$

= 248.4 psi

$\Delta P_{max} < \Delta P$ (i.e., 248.4 < 275.0) indicates that choked flow conditions will exist. Because, from the initial specifications, it is known that the outlet pressure (P_2 = 114.7 psia) is greater than the vapor pressure of the flowing water (P_v = 41.9 psia), the conditions of choked flow, in this case, are caused by cavitation. Therefore, some further consideration of valve style and trim selection might be necessary.

5. Determine F_R, the Reynolds number factor.

For water at the pressure drop given, no Re_v correction will be required (i.e., F_R = 1.0).

6. Solve for required C_v using ΔP_{max}.

$$C_v = \frac{q}{N_1\, F_p\, F_R \sqrt{\frac{\Delta P_{max}}{G_f}}}$$

$$= \frac{2200}{\sqrt{\frac{248.4}{0.93}}}$$

$$= 134.6$$

7. Select the valve size using the flow coefficient table and the calculated C_v value.

An NPS 3 CL300 ED valve with a linear cage has a C_v of 133 at 80 percent travel and should be satisfactory from a sizing standpoint. However, F_L was assumed to be 0.84, whereas for the NPS 3 ED valve at maximum travel, F_L is 0.82. Reworking the problem using the actual value of F_L yields ΔP_{max} = 236.7 psi. These result in required C_v values of 137.6 (using the assumed F_L of 0.84) and 137.9 (using the actual F_L value of 0.82), which would require the valve to be 85 percent open.

Liquid Sizing Sample Problem No. 3

Assume there is a desire to use a Fisher V100 valve in a proposed system controlling the flow of a highly viscous Newtonian lubricating oil. The system design is not yet complete, and the line size has not been established. Therefore, assume that the valve will be line size. Determine valve size.

1. Specify the variables required to size the valve:

- Desired valve—V100 valve
- Process fluid—lubricating oil
- Service conditions—

$q = 300\ m^3/h$
$P_1 = 7.0$ bar gauge = 8.01 bar absolute
$P_2 = 5.0$ bar gauge = 6.01 bar absolute
$\Delta P = 2.0$ bar
P_v = negligible
$T_1 = 15.6°C = 289°K$
$G_f = 0.908$
υ = 8000 centistokes

2. Determine N_1 from table 2.

For the specified units of m^3/h and bar, $N_1 = 0.865$

3. Determine F_p, the piping geometry factor.

Assuming valve size equals line size, $F_p = 1.0$.

4. Determine ΔP_{max}, the allowable sizing pressure drop.

Based on the required pressure drop, the flow will not be choked.

5. Determine F_R, the Reynolds number factor.

a. Calculate the pseudo sizing coefficient, C_{vt}:

$$C_{vt} = \frac{q}{N_1 \sqrt{\frac{P_1 - P_2}{G_f}}}$$

$$= \frac{300}{0.865 \sqrt{\frac{2.0}{0.908}}}$$

= 234

b. Calculate Re_v, the Reynolds number:

$$Re_v = \frac{N_4\, F_d\, q}{\nu\, F_L^{1/2}\, C_v^{1/2}} \left[\frac{(F_L\, C_v)^2}{N_2\, D^4} + 1 \right]^{1/4}$$

where,

$N_2 = 0.00214$, from table 2
$N_4 = 7600$, from table 2
$C_v = 234$, the value determined for the pseudo sizing coefficient, C_{vc}.

D = 80 mm. The pseudo sizing coefficient of 234 indicates that an 80 mm (NPS 3) V100 valve, which has a C_v of 372 at 90 degrees of ball rotation, is required (see the flow coefficient table). Assuming that line size will equal body size, the 80 mm (NPS 3) V100 will be used with 80 mm piping

$q = 300\ m^3/h$
υ = 8000 centistokes from step 1
$F_d = 1.0$ because the V100 valve has a single flow passage

From the flow coefficient table, the F_L value for an 80 mm (NPS 3) V100 valve is 0.68. Therefore,

$$Re_v = \frac{(7600)(1.0)(300)}{(8000)\sqrt{(0.68)(234)}} \left[\frac{(0.68)^2 (234)^2}{(0.00214)(80)^4} + 1 \right]^{1/4}$$

= 241

c. Read F_R off the curve, For Selecting Valve Size, in figure 3 using an Re_v of 241, $F_R = 0.62$.

6. Solve for required C_v using the appropriate equation.

$$C_v = \frac{q}{N_1\, F_p\, F_R \sqrt{\frac{P_1 - P_2}{G_f}}}$$

$$= \frac{300}{0.865(1.0)(0.62)\sqrt{\frac{2.0}{0.908}}}$$

= 377

7. Select the valve size using the flow coefficient table and the calculated C_v value.

The assumed valve (80 mm or NPS 3), which has a C_v of 372 at 90 degrees of ball rotation, is obviously too small for this application. For this example, it is also obvious that the next larger size (100 mm or NPS 4), which has a rated C_v of 575 and an F_L of 0.61, would be large enough.

To obtain a more precise valve sizing measurement, the problem can be reworked using the calculated C_v value of 377. For the required 100 mm (NPS 4) V100 valve, a C_v of 377 occurs at a valve travel of about 80 degrees, and this corresponds to an F_L value of 0.71. Reworking the problem using this corresponding value of

FL = 0.71 yields F_R = 0.61 and C_v = 383. Because the tabulated C_v value, 377, is very close to the recalculated C_v value, 383, the valve sizing procedure is complete, and the determined 100 mm (NPS 4) valve opened to 80 degrees valve travel should be adequate for the required specifications.

Sizing Valves for Compressible Fluids

Following is a six-step procedure for the sizing of control valves for compressible flow using the ISA standardized procedure. Each of these steps is important and must be considered during any valve sizing procedure. Steps 3 and 4 concern the determination of certain sizing factors that may or may not required in the sizing equation depending on the service conditions of the sizing problem. If it is necessary for one or both of these sizing factors to be included in the sizing equation for a particular sizing problem, refer to the appropriate factor determination section(s), which is referenced and located in the following text.

1. Specify the necessary variables required to size the valve as follows:

- Desired valve design (e.g., Fisher ED with linear cage); refer to the appropriate valve flow coefficient table in this catalog
- Process fluid (e.g., air, natural gas, steam, etc.) and
- Appropriate service conditions—

q, or w, P_1, P_2 or ΔP, T_1, G_g, M, k, Z, and γ_1

The ability to recognize which terms are appropriate for a specific sizing procedure can only be acquired through experience with different valve sizing problems. If any of the above terms appear to be new or unfamiliar, refer to table 1 for a complete definition.

2. Determine the equation constant, *N*.*N* is a numerical constant contained in each of the flow equations to provide a means for using different systems of units. values for these various constants and their applicable units are given in table 2.

Use either N_7 or N_9 if sizing the valve for a flow rate in volumetric units (i.e., scfh or m^3/h). Which of the two constants to use depends upon the specified service conditions. N_7 can be used only if the specific gravity, G_g, of the flowing gas has been specified along with the other required service conditions. N_9 can be used only if the molecular weight, *M*, of the gas has been specified.

Use either N_6 or N_8 if sizing the valve for a flow rate in mass units (i.e., lb/h or kg/h). Which of the two constants to use depends upon the specified service conditions. N_6 can be used only if the specific weight, γ_1 of the flowing gas has been specified along with the other required service conditions. N_8 can be used only if the molecular weight, M, of the gas has been specified.

3. Determine F_p, the piping geometry factor. F_p is a correction factor that accounts for any pressure losses due to piping fittings such as reducers, elbows, or tees that might be attached directly to the inlet and outlet connections of the control valves to be sized. If such fittings are attached to the valve, the F_p factor must be considered in the sizing procedure. If, however, no fittings are attached to the valve, F_p has a value of 1.0 and simply drops out of the sizing equation.

Also, for rotary valves valves with reducers, F_p factors are included in the appropriate flow coefficient table. For other valve designs and fitting styles, determine the F_p factors by using the procedure for Determining F_p the Piping Geometry Factor, which is located in the section for Sizing Valves for Liquids.

4. Determine Y, the expansion factor, as follows:

$$Y = 1 - \frac{x}{3\,F_k\,x_T}$$

where,

F_k = k/1.4 the ratio of specific heats factor

k = Ratio of specific heats

x = P/P1, the pressure drop ratio

x_T = The pressure drop ratio factor for valves installed without attached fittings. More definitively, x_T is the pressure drop ratio required to produce critical, or maximum, flow through the valve when F_k = 1.0.

If the control valve to be installed has fittings such as reducers or elbows attached to it, then their effect is accounted for in the expansion factor equation by replacing the x_T term with a new factor x_{TP}. A procedure for determining the x_{TP} factor is described in the section for Determining x_{TP}, the Pressure Drop Ratio Factor.

Note

Conditions of critical pressure drop are realized when the value of x become equal to or exceed the appropriate value of the product of either $F_k\,x_T$ or $F_k\,x_{TP}$ at which point:

$$y = 1 - \frac{x}{3\,F_k\,x_T} = 1 - 1/3 = 0.667$$

Although in actual service, pressure drop ratios can, and often will, exceed the indicated critical values, it should be kept in mind that this is the point where critical flow conditions develop. Thus, for a constant P_1, decreasing P_2 (i.e., increasing ΔP) will not result in an increase in the flow rate through the valve. Values of x, therefore, greater than the product of either $F_k x_T$ or $F_k x_{TP}$ must never be substituted in the expression for Y. This means that Y can never be less than 0.667. This same limit on values of x also applies to the flow equations that are introduced in the next section.

5. Solve for the required C_v using the appropriate equation:

For volumetric flow rate units—

- If the specific gravity, G_g, of the gas has been specified:

$$C_v = \frac{q}{N_7 F_p P_1 Y \sqrt{\frac{x}{G_g T_1 Z}}}$$

- If the molecular weight, M, of the gas has been specified:

$$C_v = \frac{q}{N_9 F_p P_1 Y \sqrt{\frac{x}{M T_1 Z}}}$$

For mass flow rate units—

- If the specific weight, γ_1, of the gas has been specified:

$$C_v = \frac{w}{N_6 F_p Y \sqrt{x P_1 \gamma_1}}$$

- If the molecular weight, M, of the gas has been specified:

$$C_v = \frac{w}{N_8 F_p P_1 Y \sqrt{\frac{x M}{T_1 Z}}}$$

In addition to C_v, two other flow coefficients, K_v and A_v, are used, particularly outside of North America. The following relationships exist:

$$K_v = (0.865)(C_v)$$

$$A_v = (2.40X10^{-5})(C_v)$$

6. Select the valve size using the appropriate flow coefficient table and the calculated C_v value.

Note

Once the valve sizing procedure is completed, consideration can be made for aerodynamic noise prediction. To determine the gas flow sizing coefficient (C_g) for use in the Fisher aerodynamic noise prediction technique, use the following equation:

$$\mathbf{C_g = 40C_v \sqrt{x_T}}$$

Determining x_{TP}, the Pressure Drop Ratio Factor

If the control valve is to be installed with attached fittings such as reducers or elbows, then their effect is accounted for in the expansion factor equation by replacing the x_T term with a new factor, x_{TP}.

$$x_{TP} = \frac{x_T}{F_p^{\,2}} \left[1 + \frac{x_T K_i}{N_5} \left(\frac{C_v}{d^2} \right)^2 \right]^{-1}$$

where,

N_5 = Numerical constant found in table 2

d = Assumed nominal valve size

C_v = Valve sizing coefficient from flow coefficient table at 100 percent travel for the assumed valve size

F_p = Piping geometry factor

x_T = Pressure drop ratio for valves installed without fittings attached. x_T values are included in the flow coefficient tables.

In the above equation, K_i, is the inlet head loss coefficient, which is defined as:

$$K_i = K_1 + K_{B1}$$

where,

K_1 = Resistance coefficient of upstream fittings (see the procedure for Determining F_p, the Piping Geometry Factor, which is contained in the section for Sizing Valves for Liquids).

K_{B1} = Inlet Bernoulli coefficient (see the procedure for Determining F_p the Piping Geometry Factor, which is contained in the section for Sizing Valves for Liquids).

Compressible Fluid Sizing Sample Problems

Compressible Fluid Sizing Sample Problem No. 1

Determine the size and percent opening for a Fisher V250 valve operating with the following service conditions. Assume that the valve and line size are equal.

1. Specify the necessary variables required to size the valve:

- Desired valve design—V250 valve
- Process fluid—Natural gas
- Service conditions—

P_1 = 200 psig = 214.7 psia
P_2 = 50 psig = 64.7 psia
ΔP = 150 psi
$x = \Delta P/P_1$ = 150/214.7 = 0.70
T_1 = 60°F = 520°R
M = 17.38
G_g = 0.60
k = 1.31
q = 6.0×10^6 scfh

2. Determine the appropriate equation constant, *N*, from table 2.

Because both G_g and *M* have been given in the service conditions, it is possible to use an equation containing either N_7 or N_9. In either case, the end result will be the same. Assume that the equation containing G_g has been arbitrarily selected for this problem. Therefore, N_7 = 1360.

3. Determine F_p, the piping geometry factor. Since valve and line size are assumed equal, F_p = 1.0.

4. Determine Y, the expansion factor.

$$F_k = \frac{k}{1.40}$$

$$= \frac{1.31}{1.40}$$

$$= 0.94$$

It is assumed that an NPS 8 V250 Valve will be adequate for the specified service conditions. From the flow coefficient table, x_T for an NPS 8 V250 valve at 100-percent travel is 0.137.

x = 0.70 (This was calculated in step 1.)

Since conditions of critical pressure drop are realized when the calculated value of x becomes equal to or exceeds the appropriate value of $F_k x_T$, these values should be compared.

$$F_k x_T = (0.94)(0.137)$$

$$= 0.129$$

Because the pressure drop ratio, x = 0.70 exceeds the calculated critical value, $F_k x_T$ = 0.129, choked flow conditions are indicated. Therefore, Y = 0.667and X_{LIM} to $F_k x_T$ = 0.129.

5. Solve for required C_v using the appropriate equation.

$$C_v = \frac{q}{N_7\, F_p\, P_1\, Y \sqrt{\frac{x}{G_g\, T_1\, Z}}}$$

The compressibility factor, Z, can be assumed to be 1.0 for the gas pressure and temperature given and F_p = 1 because valve size and line size are equal.

So,

$$C_v = \frac{6.0 \times 10^6}{(1360)(1.0)(214.7)(0.667)\sqrt{\frac{0.129}{(0.6)(520)(1.0)}}}$$

= 1515

6. Select the valve size using the appropriate flow coefficient table and the calculated C_v value.

The above result indicates that the valve is adequately sized (i.e., rated C_v = 2190). To determine the percent valve opening, note that the required C_v occurs at approximately 83 degrees for the NPS 8 V250 valve. Note also that, at 83 degrees opening, the x_T value is 0.525, which is substantially different from the rated value of 0.137 used initially in the problem. The next step is to rework the problem using the x_T value for 83 degrees travel.

The $F_k x_T$ product must now be recalculated.

$$x = F_k x_T$$

$$= (0.94)(0.252)$$

$$= 0.237$$

The required C_v now becomes:

$$C_v = \frac{q}{N_7\, F_p\, P_1\, Y \sqrt{\frac{x}{G_g\, T_1\, Z}}}$$

$$= \frac{6.0 \times 10^6}{(1360)(1.0)(214.7)(0.667)\sqrt{\frac{0.237}{(0.6)(520)(1.0)}}}$$

$$= 1118$$

The reason that the required C_v has dropped so dramatically is attributable solely to the difference in the x_T values at rated and 83 degrees travel. A C_v of 1118 occurs between 75 and 80 degrees travel.

The appropriate flow coefficient table indicates that x_T is higher at 75 degrees travel than at 80 degrees travel. Therefore, if the problem were to be reworked using a higher x_T value, this should result in a further decline in the calculated required C_v.

Reworking the problem using the x_T value corresponding to 78 degrees travel (i.e., $x_T = 0.328$) leaves:

$$x = F_k x_T$$

$$= (0.94)(0.328)$$

$$= 0.308$$

and,

$$C_v = \frac{q}{N_7 F_p P_1 Y \sqrt{\frac{x}{G_g T_1 Z}}}$$

$$= \frac{6.0 \times 10^6}{(1360)(1.0)(214.7)(0.667)\sqrt{\frac{0.308}{(0.6)(520)(1.0)}}}$$

$$= 980$$

The above C_v of 980 is quite close to the 75 degree travel C_v. The problem could be reworked further to obtain a more precise predicted opening; however, at this point it can be stated that, for the service conditions given, an NPS 8 V250 valve installed in an NPS 8 line will be approximately 75 degrees open.

Compressible Fluid Sizing Sample Problem No. 2

Assume steam is to be supplied to a process designed to operate at 250 psig. The supply source is a header maintained at 500 psig and 500°F. An NPS 6 line from the steam main to the process is being planned. Also, make the assumption that if the required valve size is less than NPS 6, it will be installed using concentric reducers. Determine the appropriate Fisher ED valve with a linear cage.

1. Specify the necessary variables required to size the valve:

a. Desired valve design—CL300 ED valve with a linear cage. Assume valve size is NPS 4.

b. Process fluid—superheated steam

c. Service conditions—

$w = 125{,}000$ lb/h
$P_1 = 500$ psig $= 514.7$ psia
$P_2 = 250$ psig $= 264.7$ psia
$\Delta P = 250$ psi
$x = \Delta P/P_1 = 250/514.7 = 0.49$
$T_1 = 500°F$
$\gamma_1 = 1.0434$ lb/ft^3 (from steam properties handbook)
$k = 1.28$ (from steam properties handbook)

2. Determine the appropriate equation constant, N, from table 2.

Because the specified flow rate is in mass units, (lb/h), and the specific weight of the steam is also specified, the only sizing equation that can be used in that which contains the N_6 constant. Therefore,

$$N_6 = 63.3$$

3. Determine F_p, the piping geometry factor.

$$F_p = \left[1 + \frac{\Sigma K}{N_2}\left(\frac{C_v}{d^2}\right)^2\right]^{-1/2}$$

where,

N2 = 890, determined from table 2
$d = 4$ in.
$C_v = 236$, which is the value listed in the flow coefficient table for an NPS 4 ED valve at 100-percent total travel.

and,

$$\Sigma k = K_1 + K_2$$

$$= 1.5\left(1 - \frac{d^2}{D^2}\right)^2$$

$$= 1.5\left(1 - \frac{4^2}{6^2}\right)^2$$

$$= 0.463$$

Finally:

$$F_p = \left[1 + \frac{0.463}{890}\left(\frac{(1.0)(236)}{(4)^2}\right)^2\right]^{-1/2}$$

$$= 0.95$$

4. Determine Y, the expansion factor.

$$Y = 1 - \frac{x}{3\,F_k\,x_{TP}}$$

where,

$$F_k = \frac{k}{1.40}$$

$$= \frac{1.28}{1.40}$$

$$= 0.91$$

$$x = 0.49 \text{(This was calculated in step 1.)}$$

Because the NPS 4 valve is to be installed in an NPS 6 line, the x_T term must be replaced by x_{TP},

$$x_{TP} = \frac{x_T}{F_p{}^2}\left[1 + \frac{x_T\,K_i}{N_5}\left(\frac{C_v}{d^2}\right)^2\right]^{-1}$$

where,

N_5 = 1000, from table 2
d = 4 in.
F_p = 0.95, determined in step 3
x_T = 0.688, a value determined from the appropriate listing in the flow coefficient table
C_v = 236, from step 3

and

$$K_i = K_1 + K_{B1}$$

$$= 0.5\left(1 - \frac{d^2}{D^2}\right)^2 + \left[1 - \left(\frac{d}{D}\right)^4\right]$$

$$= 0.5\left(1 - \frac{4^2}{6^2}\right)^2 + \left[1 - \left(\frac{4}{6}\right)^4\right]$$

$$= 0.96$$

where D = 6 in.

so:

$$x_{TP} = \frac{0.69}{0.95^2}\left[1 + \frac{(0.69)(0.96)}{1000}\left(\frac{236}{4^2}\right)^2\right]^{-1}$$

$$= 0.67$$

Finally:

$$Y = 1 - \frac{x}{3\,F_k\,x_{TP}}$$

$$= 1 - \frac{0.49}{(3)(0.91)(0.67)}$$

$$= 0.73$$

5. Solve for required C_v using the appropriate equation.

$$C_v = \frac{w}{N_6\,F_p\,Y\sqrt{x\,P_1\,\gamma_1}}$$

$$C_v = \frac{125,000}{(63.3)(0.95)(0.73)\sqrt{(0.49)(514.7)(1.0434)}}$$

$$= 176$$

6. Select the valve size using the appropriate flow coefficient table and the calculated C_v value.

Refer to the flow coefficient tables for ED valves with linear cage. Because the assumed NPS 4 valve has a C_v of 236 at 100-percent travel and the next smaller size (NPS 3) has a C_v of only 148, it can be surmised that the assumed size is correct. In the event that the calculated required C_v had been small enough to have been handled by the next smaller size or if it had been larger than the rated C_v for the assume size, it would have been necessary to rework the problem again using values for the new assumed size.

Version 1.4 of the Fisher Sizing Program offers the ability to estimate the vapor pressure of fluids at the given service temperature. These estimations are based on a correlation of actual P_V data for the specified fluid to the following form of the Wagner equation:

$$\ln P_{vpr} = \frac{a\tau + b\tau^{1.5} + c\tau^{3} + d\tau^{6}}{T_r} \quad T_{r\text{-min}} \leq T_r \leq T_{r\text{-max}} \tag{1}$$

where,
P_{vpr} = reduced vapor pressure = P_V/P_c
T_r = reduced temperature = T/T_c
P_V = saturated vapor pressure
P_c = thermodynamic critical pressure
$\tau = 1 - T_r$
$T_{r\text{-min}}$ = reduced minimum temperature - T_{min}/T_c
$T_{r\text{-max}}$ = reduced maximum temperature = T_{max}/T_c
T_{min} = minimum valid calculation temperature
T_{max} = maximum valid calculation temperature

This equation was selected because of it's overall superiority to more widely used but simpler equations. This equation replicates the actual shape of the vapor pressure curve well and yields accurate results over a fairly broad temperature range. For the fluids contained in the FSP v1.4 internal (non-editable) library, typical results fall within the lessor of ±1% or ±1 psi of the reference values for the individual fluids. Worst case results are usually within the lessor of ±3% or ±5 psi. While the Antoine equation is widely used for vapor pressure correlations, it is, in general, more limited in range over which accurate results can be obtained. Furthermore it is strictly limited to use within the prescribed temperature range.

The coefficients a, b, c, and d have been determined for all of the fluids contained in the internal fluids library (non-editable) by curve fitting to published data. Provisions to input these values for user defined fluids are provided in the external library (editable). While these coefficients can be found for some fluids in the general literature, they are not widely available. For select cases considered to be commercially strategic, support is available to determine these coefficients for customer fluids. To obtain this support, please complete the data form on the reverse side of this sheet and send to Applications Engineering. Please note that a minimum of ten data points are recommended to define a good baseline curve.

As is evident on inspection of equation (1), the value of the thermodynamic critical pressure is used in calculating the value of the vapor pressure. The P_V coefficients supplied in the internal library are based on the value of the critical pressure contained in the library. Therefore, in order to preserve the integrity of the P_V calculation, the value of P_c cannot be changed within a calculation case if the vapor pressure is being calculated. If it is desired to use an alternate value of P_c in lieu of the value supplied by the fluid library, it will be necessary to disable the “calculate P_v” option and manually input both the P_c and P_v values.

The temperatures T_{min} and T_{max} establish the limits of the temperature range over which the calculation is considered valid (this version of the program will not contend with extrapolations beyond these limits). Typically the upper temperature limit coincides with the thermodynamic critical pressure, although there are instances where this is not the case and $T_{max} < T_c$. In no case is T_{min} less than the triple point temperature.

Custom P_V Coefficient Request

The following information is required in order to determine the vapor pressure coefficients, a, b, c, and d, for use in the external fluids library. Please supply all required information and FAX or mail to your Emerson sales office.

Fluid Name: ____________

Chemical Formula: ____________

Physical Constants:
  Critical Temperature, T_c = ____________
  Critical Pressure, P_c = ____________
  Triple Point Temperature, T_{tp} = ____________
  Molecular Weight, MW = ____________
  Specific Heat Ratio, k_o = ____________

Data Source*:
☐ Lab Data ____________
☐ Technical Ref. ____________
____
☐ Other ____________

*Optional information not required for coefficient determination

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Customer ____________
Representative ____________
Office ____________

May this information be share with other Fisher Sizing Program users? ☐Yes ☐No

Vapor Pressure Data(1)

Data Point	T, (units)	P_v, (units)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

1. A minimum of ten data points are recommended.

Introduction

The behavior of flowing pulp stock is different from water or viscous Newtonian flows. It is necessary to account for this behavior when determining the required valve size. Methods have been developed to aid in determining correct valve size for these types of applications. The purpose of the following pages is to provide an overview of the current recommended sizing method and discuss specific implementations of the technology in the Fisher Sizing Program, Rev. 1.4.

Basic Method

The pulp stock sizing calculation uses the following modified form of the basic liquid sizing equation:

$$Q = C_v K_p \sqrt{\Delta P} \qquad (1)$$

where:
ΔP = sizing pressure drop, psid
C_v = valve flow coefficient
K_p = pulp stock correction factor
Q = volumetric flow rate, gpm

The crux of this calculation is the pulp stock correction factor, K_p. This factor is the ratio of the pulp stock flow rate to water flow rate under the same flowing conditions. It therefore modifies the relationship between Q, C_v, and ΔP to account for the effects of the pulp stock relative to that for water. The value of this parameter in theory depends on many factors such as pulp stock type, consistency, freeness, fiber length, valve type and pressure drop. However, in practice it appears that the dominant effects are due to three primary factors: pulp type, consistency and pressure differential. Values of K_p for three different pulp stock types are shown in Figures 1-3. These methods are based on the technology presented in reference (1).

Once the value of the pulp stock correction factor is known, determining the required flow coefficient or flow rate is equivalent to basic liquid sizing. For example, consider the following:

Q = 1000 gpm of 8% consistency kraft pulp stock
ΔP = 16 psid
P_1 = 150 psia

Kp $\approx$ 0.83 (from Figure 2), therefore,

$$C_v = \frac{Q}{K_p \sqrt{\Delta P}} = \frac{1000}{(0.83)\sqrt{16}} = 301$$

Effect of fluid vaporization and choked flow of pulp stock on the effective pulp stock correction factor is not known as of this writing. The effects of pulp stock on sound pressure level and cavitation are discussed below.

The uncertainty of this calculation is currently unknown, but should be considered to be greater than for normal liquid sizing. As noted above, only the major effects of stock type and consistency and pressure drop are accounted for. Tests conducted by Emerson Automation Solutions at Western Michigan University on low consistency stock affirm the general behavior reported in (1), although in some cases the degree of correction was not as significant. This suggests that the overall variance of this relatively simple method may be moderate (e.g., estimated to be in excess of $\pm$10%).

Fisher Sizing Program Implementation

The pulp stock correction factor is automatically calculated and utilized in sizing when Pulp Stock Sizing is selected. This value is determined on the basis of the pulp stock type, consistency and pressure drop. The equations used to calculate this value were used to generate the curves in Figures 1-3. This value is displayed in the Intermediate Results area of the screen and cannot be manually overridden. Checks for valid consistency range and minimum pressure drop are conducted. The calculation is aborted and an appropriate warning message is displayed if either of these conditions is not satisfied.

The sizing calculations are carried out in a manner equivalent to basic liquid sizing. The sizing ΔP is determined in the conventional manner, i.e., it is the lessor of ΔP_{actual} or $\Delta P_{allowable}$. [Note that for best accuracy the allowable pressure differential computations should be based on the K_m ($F_L{}^2$) associated with the valve at the actual opening.] The fluid vapor pressure and critical pressure drop ratio (P_v, r_c) are based on the properties of fresh water. The fluid vapor pressure may be input, but the critical pressure used in calculating r_c is that of fresh water. Whereas the effect of choked flow on K_p is unknown, the sizing program defaults to the conservative alternative and bases K_p on ΔP_{sizing} as determined above.

Pressure differential (ΔP) calculations are not currently offered because of the dependency of the Kp factor on ΔP. If this value is desired it will be necessary to estimate it manually. It may be included in future revisions of the program if this is perceived to be a critical calculation.

The basic sizing calculations are referenced to water, and therefore to not require a value of the specific gravity for the pulp stock. However, other calculations supported by the program, such as sound pressure level and velocity calculations do require this value. To satisfy the needs of these calculations, an estimate of the specific gravity is also produced and displayed in the Intermediate Results area of the basic calculation screen. This estimate is a function only of stock consistency (at 50 °F) and is shown graphically in Figure 4.

If the stock consistency is less than two percent (2%), there is no difference from conventional hydrodynamic noise prediction methods. The noise level is calculated in the same manner as for normal liquid sizing. If the consistency is greater than two percent, then the calculated noise level is adjusted by a constant value:

$$\text{Predicted } L_{pA} = \text{Calculated } L_{pA} - 5\text{dBA} \qquad (2)$$

The cavitation behavior of low consistency pulp stock (e.g., < 4%) is treated as equivalent to that of water. Generally, pulp stock of a consistency greater than four percent is not known to be problematic. Therefore, the sizing program indicates that $A_r > K_c$, but that no cavitation problems are likely to occur.

References:
1. Andrews, E. and M. Husu, “Sizing and Cavitation Damage Reduction for Stock and White Water Control Valves”, 1991 Process Control Conference, TAPPI Proceedings, pp. 65-73.

Figure 1. Pulp Stock Correction Factors for Kraft Pulp

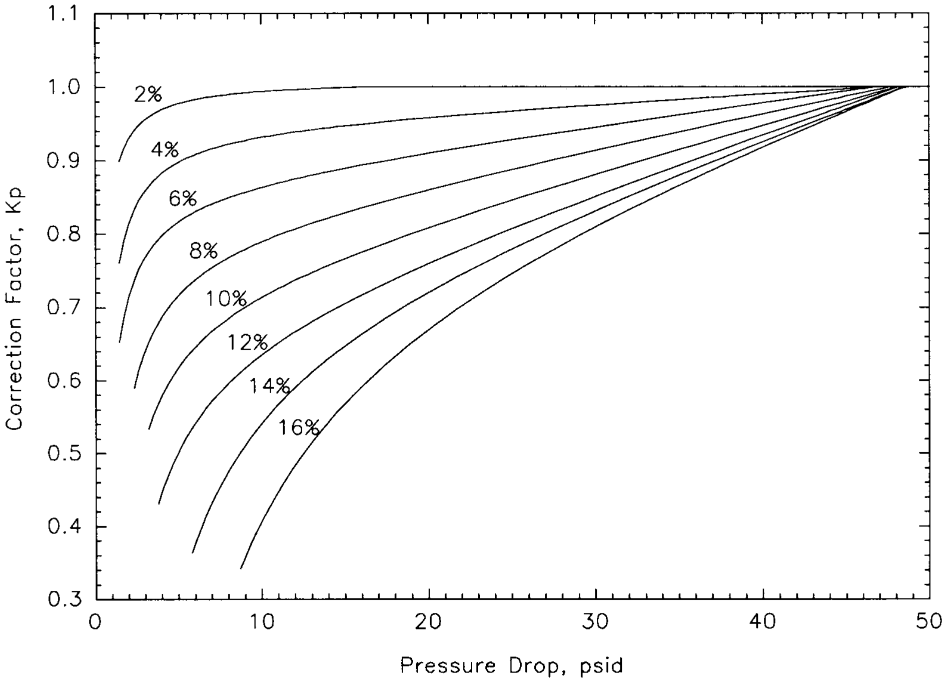


Figure 2. Pulp Stock Correction Factors for Mechanical Pulp

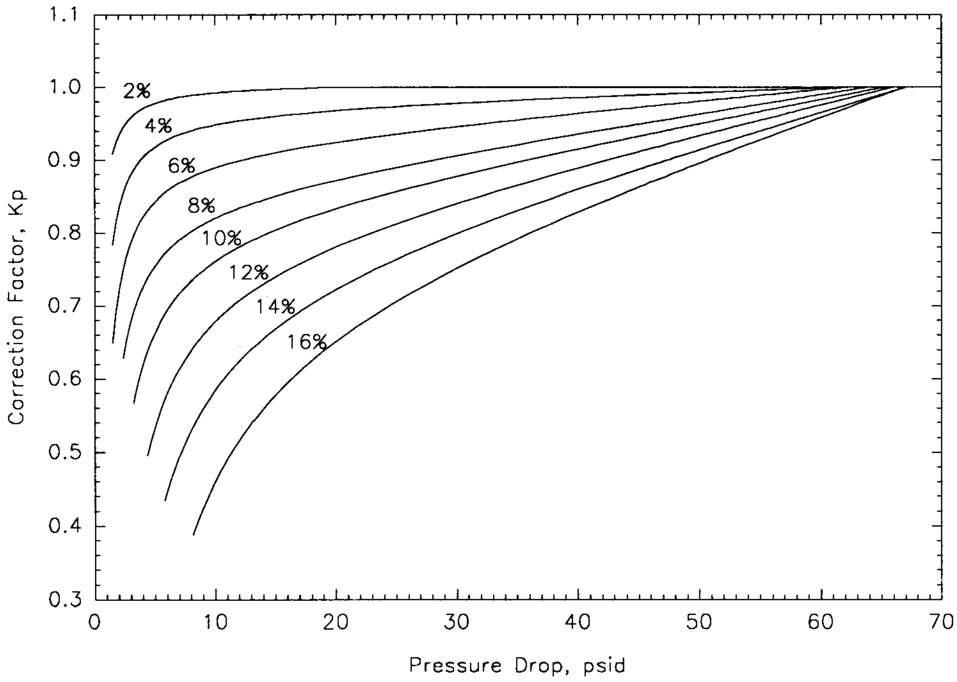


Figure 3. Pulp Stock Correction Factors for Recycled Pulp

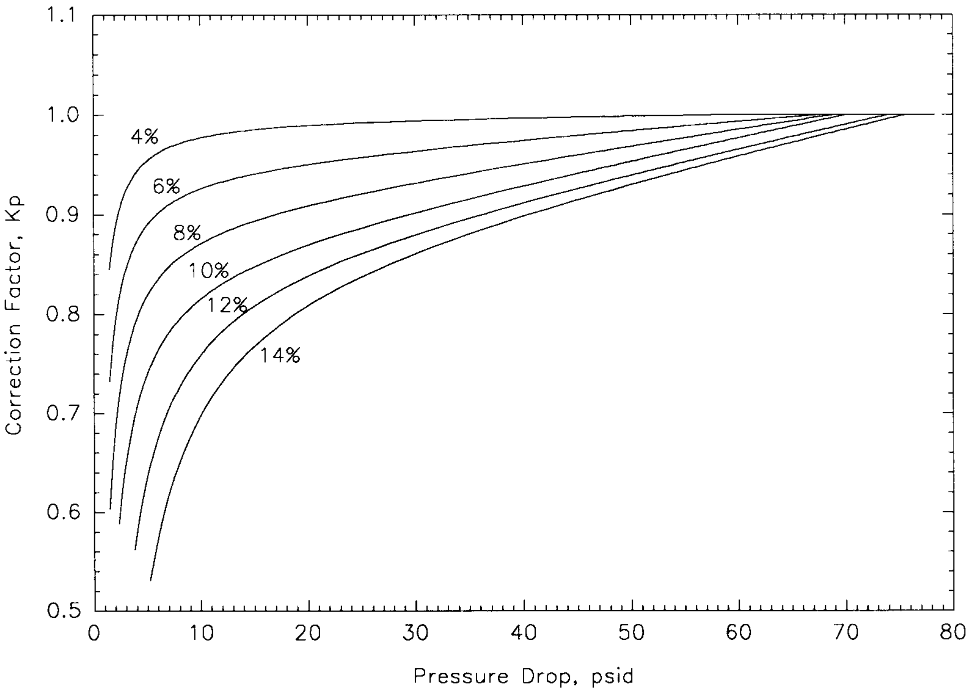
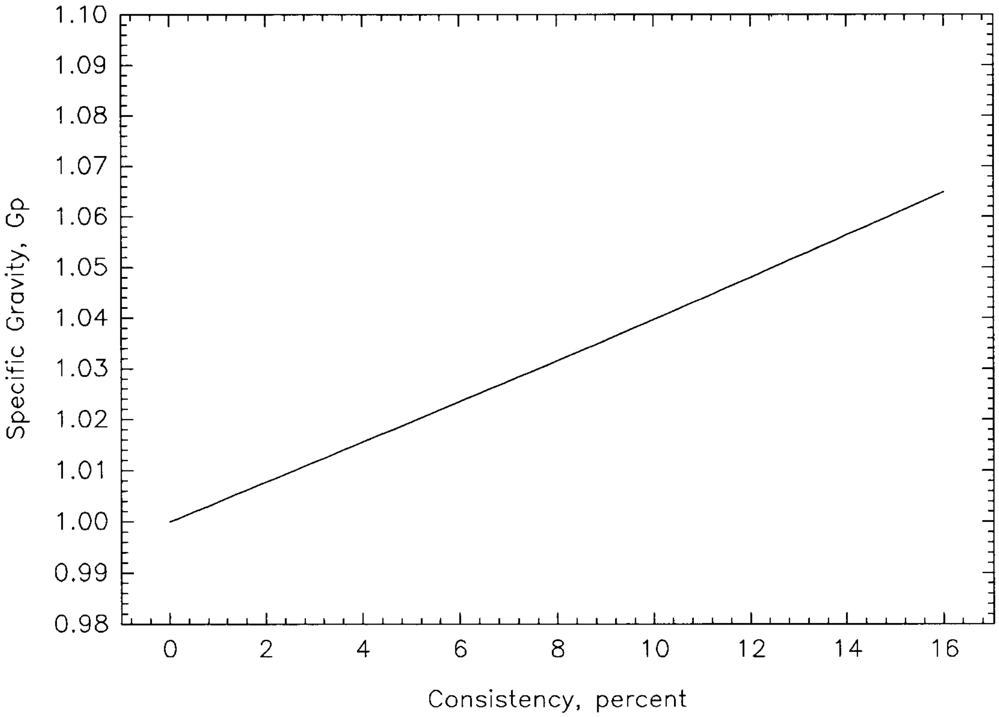


Figure 4. Specific Gravity for All Pulp Types

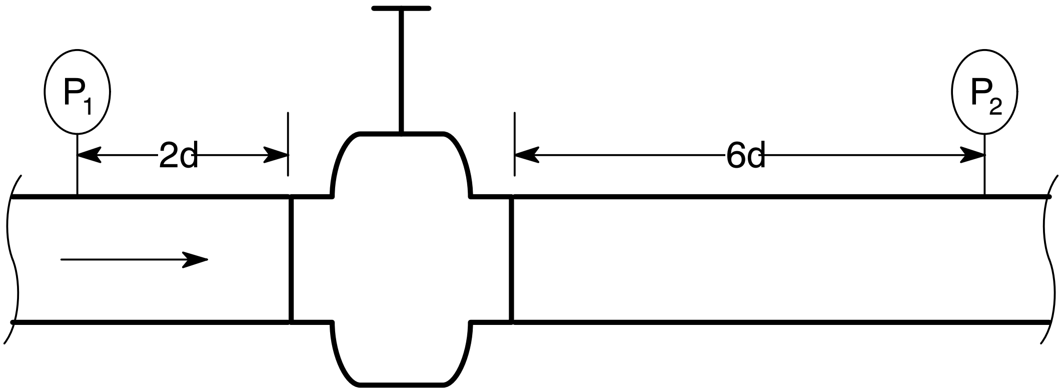


Full Bore Ball Valve Sizing Discussion

Cv_{net}, F_{Lnet}, and X_{Tnet} values presented in Catalog 12, Section 1 for the V260C and V270 valves are adjusted valve coefficients that differ from traditional ISA/IEC standards for C_V, F_L, and X_T as defined in ISA 75.01.01 and ISA 75.02.01, or, equivalently, IEC 60534-2-1 and IEC 60534-2-3.

The control valve sizing standard ISA 75.01.01 defines its limitations at a $C_V/d^2 \le 30$. Most full bore ball valves above about 80° open fall outside the scope of this limitation, with 90° greatly exceeding this ratio. At wide open a full bore ball valve is not a throttling device, so care must be used when attempting to determine valve flow or pressure drop using flow coefficients determined by direct implementation of ISA 75.01.01 and 75.02.01

Figure 1. ISA/IEC Valve Flow Test Manifold



The control volume as defined by ISA 75.01.01 includes two diameters of piping upstream of the valve and six diameters downstream. This allows the fluid to fully develop prior to entry into the valve and enough time to recover downstream of the valve when $C_V/d^2 \le 30$. For these cases where $C_V/d^2 > 30$, alternative methods need to be considered.

The basis of this alternative method is to analytically remove the additional pressure drop due to frictional losses in the upstream and downstream piping from the calculation of C_V, F_L, and X_T. The impacts of these frictional losses become significant when the C_V/d^2 ratio of the valve is greater than 30 with no inlet or outlet reducers.

The following equations are used to calculate Cv_{net}, F_{Lnet}, and X_{Tnet} given C_V, F_L, and X_T calculated using the standard ISA 75.02.01 test methods.

$$C_{Vnet} = \sqrt{\frac{1}{1-\frac{f}{112}\left(\frac{C_V}{d^2}\right)^2}} \cdot C_V \qquad F_{Lnet} = \sqrt{\frac{1-\frac{f}{112}\left(\frac{C_V}{d^2}\right)^2}{1-\frac{f}{447}\left(\frac{C_V}{d^2}\right)^2 F_L{}^2}} \cdot F_L \qquad x_{Tnet} = \frac{1-\frac{f}{112}\left(\frac{C_V}{d^2}\right)^2}{\left[1-\frac{f}{1004}\left(\frac{C_V}{d^2}\right)^2 x_T\right]^2} \cdot x_T$$

The friction factor values for schedule 40 clean commercial steel pipe provided in Crane Technical Paper 410 were used in calculating the net flow coefficients at various valve sizes.

The methods suggested align with ISA RP75.23-1995, Considerations for Evaluating Control Valve Cavitation, with an extension to support calculation of $F_L$net , and $X_T$net

Conversions for Units of Measure

Table 1. Length

To Obtain / by / Multiply Number of	millimeter mm	meter m	inch in	feet ft	yard yd
millimeters	1	0.001000	0.03937	0.003281	0.001094
meters	1000	1	39.37	3.281	1.094
inches	25.40	0.02540	1	0.08333	0.02778
feet	304.8	0.3048	12.00	1	0.3333
yards	914.4	0.9144	36.00	3.00	1
Note: 1 meter = 10 decimeters = 100 centimeters = 1000 millimeters = 0.001 kilometers = 1 x 10^6 microns					

Table 2. Area

To Obtain / by / Multiply Number of	square meter m^2	square millimeter mm^2	square inch in^2	square feet ft^2	square yard yd^2
square meters	1	1,000,000	1550	10.76	1.196
square millimeters	0.000001	1	0.001550	0.00001076	0.000001196
square inches	0.0006452	645.1	1	0.006944	0.0007716
square feet	0.09290	92,900	144.0	1	0.1111
square yards	0.8361	836,100	1296	9.000	1

Table 3. Volume

To Obtain / by / Multiply Number of	cubic meter m^3	cubic centimeter cm^3	liter l	cubic inch in^3	cubic foot ft^3	Imperial gallon Imp gal	U.S. gallon U.S. gal
m^3	1	1,000,000	1000	61,020	35.31	220.0	264.2
cm^3	0.000001000	1	0.001000	0.06102	0.00003531	0.0002200	0.0002642
liter	0.001000	1000	1	61.02	0.03531	0.2200	0.2642
in^3	0.00001639	16.39	0.01639	1	0.0005787	0.003605	0.004329
ft^3	0.02832	28,320	28.32	1728	1	6.229	7.480
Imp gal	0.004546	4546	4.546	277.4	0.1605	1	1.201
U.S. gal	0.003785	3785	3.785	231.0	0.1337	0.8327	1

Table 4. Mass

To Obtain by Multiply Number of	Ounce oz	Pound lb	Short ton sh ton	Long ton L ton	Kilogram Kg	Metric ton tonne
Ounces	1	0.06250	0.00003125	0.00002790	0.02835	0.00002835
Pounds	16.00	1	0.0005000	0.0004464	0.4536	0.0004536
Short tons	32,000	2000	1	0.8929	907.2	0.9072
Long tons	35,840	2240	1.120	1	1016	1.016
Kilograms	35.27	2.205	0.001102	0.0009842	1	0.001000
Metric tons	35,270	2205	1.102	0.9842	1000	1

Table 5. Density

To Obtain by Multiply Number of	gram per milliliter g/ml	kilogram per cubic meter kg/m^3	pound per cubic foot lb/ft^3	pound per cubic inch lb/in^3
g/ml	1	1000	62.43	0.03613
kg/m^3	0.001000	1	0.06243	0.00003613
lb/ft^3	0.01602	16.02	1	0.0005787
lb/in^3	27.68	27,680	1728	1

Table 6. Velocity

To Obtain by Multiply Number of	feet per second ft/sec	feet per minute ft/min	miles per hour mi/hr	meter per second m/sec	meter per minute m/min	kilometer per hour km/hr
ft/sec	1	60.00	0.6818	0.3048	18.29	1.097
ft/min	0.01667	1	0.01136	0.005080	0.3048	0.01829
mi/hr	1.467	88.00	1	0.4470	26.82	1.609
m/sec	3.280	196.9	2.237	1	60.00	3.600
m/min	0.05468	3.281	0.03728	0.01667	1	0.06000
km/hr	0.9113	54.68	0.6214	0.2778	16.67	1

Table 7. Heat Flow Rate

To Obtain by Multiply Number of	Watts W	calorie per second cal/sec	kilocalorie per hour kcal/hr	British thermal unit per hour Btu/hr
W	1	0.2390	0.8604	3.412
cal/sec	4.184	1	3.600	14.28
kcal/hr	1.162	0.2778	1	3.966
Btu/hr	0.2831	0.07000	0.2522	1

Table 8. Force

To Obtain by Multiply Number of	kilonewton KN	kilogram force kgf	pound force lbf	poundal pdl
kilonewtons	1	102.0	224.8	7233
kilogram force	0.009807	1	2.205	70.93
pound force	0.004448	0.4536	1	32.17
poundal	0.0001383	0.01410	0.03108	1

Table 9. Power

To Obtain by Multiply Number of	Watt W	kilogram force meter per second kgf m/sec	metric horsepower	foot pound force per second ft lbf/sec	horsepower hp
W	1	0.1020	.001360	0.7376	0.001341
kgfm/sec	9.807	1	0.01333	7.233	0.01315
metric hp	735.5	75.00	1	542.5	0.9863
ft lb/sec	1.356	0.1383	0.001843	1	0.001818
horsepower	745.7	76.04	1.014	550.0	1

Table 10. Torque

To Obtain by Multiply Number of	Newton Meter Nm	kilogram force meter kgf m	foot pound ft lb	inch pound in lb
Nm	1	0.1020	0.7376	8.851
kgf m	9.807	1	7.233	86.80
ft lb	1.356	0.1383	1	12.00
in lb	0.1130	0.01152	0.08333	1

Table 11. Pressure and Liquid Head

To Obtain by Multiply Number of	bar(1)	kilogram force per square centimeter kgf/cm^2(2)	pound per square inch psi or lbf/in^2	International Standard Atmosphere atm	foot of water (4 °C) ft H_2O	inch of water (4 °C) in H_2O	meter of water (4 °C) m H_2O	centimeter of Mercury (0 °C) cm Hg	inch of Mercury (0 °C) in Hg	millimeter of Mercury (0 °C) torr or mm Hg
bar	1	1.020	14.50	0.9869	33.45	401.5	10.20	75.01	29.53	750.1
kgf/cm^2	0.9807	1	14.22	0.9678	32.81	393.7	10.00	73.56	28.96	735.5
psi	0.06895	0.0703	1	0.06805	2.307	27.68	0.7031	5.171	2.036	51.71
atm	1.013	1.033	14.69	1	33.90	406.8	10.33	76.00	29.92	760.0
ft H_2O	0.02989	0.0305	0.4335	0.02950	1	12	0.3048	2.242	0.8826	22.42
in H_2O	0.002491	0.002540	0.0361	0.002458	0.8333	1	0.2540	0.1868	0.07355	1.868
m H_2O	0.09806	0.1000	1.422	0.09678	3.281	39.37	1	7.356	2.896	73.56
cm Hg	0.01333	0.01360	0.1934	0.01316	0.4460	5.352	0.1360	1	0.3937	10.00
in Hg	0.03386	0.03453	0.4911	0.03342	1.133	13.60	0.3453	2.540	1	25.40
torr	0.001333	0.001359	0.01934	0.001316	0.04460	0.5352	0.0136	0.1000	0.03937	1

1. The unit of pressure in the International System of Units (SI) is the pascal (Pa), which is 1 Newton per square meter (N/m^2). 1 bar = 10^5 Pa
2. Technical (metric) atmosphere (at)

Table 12. Volumetric Rate of Flow

To Obtain by Multiply Number of	liter per second l/sec	liter per minute l/min	cubic meter per hour m^3/hr	cubic foot per hour ft^3/hr	cubic foot per minute ft^3/min	Imp gallon per minute Imp gal/min	US gallon per minute US gal/min	US barrel per day (42 US gal) US barrel/d
l/sec	1	60	3.600	127.1	2.119	13.20	15.85	543.4
l/min	0.01667	1	0.06000	2.119	0.03532	0.2200	0.2642	9.057
m^3/hr	0.2778	16.67	1	35.31	0.5886	3.666	4.403	150.9
ft^3/hr	0.007865	0.4719	0.02832	1	0.01667	0.1038	0.1247	4.275
ft^3/min	0.4719	28.32	1.699	60.00	1	6.229	7.481	256.5
Imp gal/min	0.07577	4.546	0.2727	9.633	0.1606	1	1.201	41.17
US gal/min	0.06309	3.785	0.2271	8.021	0.1337	0.8327	1	34.29
US barrel/d	0.001840	0.1104	0.006624	0.2339	0.003899	0.02428	0.02917	1

Table 13. Temperature

degrees Celsius[1] °C	Kelvin K	degrees Fahrenheit °F	degrees Rankine °R
°C	K-273.15	5/9(°F-32)	5/9(°R-491.67)
°C + 273.15	K	5/9(°F + 459.67)	5/9°R
9/5°C + 32	9/5K-459.67	°F	°R-459.67
9/5°C + 491.67	9/5K	°F + 459.67	°R

[1] Formerly called Centigrade.

Table 14. Abbreviated Conversions of Degrees Fahrenheit to Degrees Celsius

°F	°C	°F	°C	°F	°C
–50	–45.6	220	104	670	354
–45	–42.8	230	110	680	360
–40	–40	240	116	690	366
–35	–37.2	250	121	700	371
–30	–34.4	260	127	710	377
–25	–31.7	270	132	720	382
–20	–28.9	280	138	730	388
–15	–26.1	290	143	740	393
–10	–23.3	300	149	750	399
–5	–20.6	310	154	760	404
0	–17.8	320	160	770	410
5	–15	330	166	780	416
10	–12.2	340	171	790	421
15	–9.4	350	177	800	427
20	–6.7	360	182	810	432
25	–3.9	370	188	820	438
30	–1.1	380	193	830	443
32	0	390	199	840	449
35	1.7	400	204	850	454
40	4.4	410	210	860	460
45	7.2	420	216	870	466
50	10	430	221	880	471
55	12.8	440	227	890	477
60	15.6	450	232	900	482
65	18.3	460	238	910	488
70	21.1	470	243	920	493
75	23.9	480	249	930	499
80	26.7	490	254	940	504
85	29.4	500	260	950	510
90	32.2	510	266	960	516
95	35	520	271	970	521
100	37.8	530	277	980	527
110	43	540	282	990	532
120	49	550	288	1000	538
130	54	560	293	1050	566
140	60	570	299	1100	593
150	66	580	304	1150	621
160	71	590	310	1200	649
170	77	600	316	1250	677
180	82	610	321	1300	704
190	88	620	327	1350	732
200	93	630	332	1400	760
210	99	640	338	1450	788
212	100	650	343	1500	816
		660	349		

Useful Equivalents

1 US Gallon of Water	= 8.33 pounds @ 60°F
1 Cubic Foot of Water	= 62.36 pounds @ 60°F
1 Cubic Meter of Water	= 1000 Kilograms @ 4°C
1 Cubic Foot of Air	= .076 pounds (Std. Press. and Temp.)
1 Pound of Air	= 13.1 Cubic Feet (Std. Press. and Temp.)
1 Kilogram of Air	= .77 Cubic Meters (Normal Press. and Temp.)
1 Cubic Meter of Air	= 1.293 Kilograms (Normal Press. and Temp.)

$$\frac{\text{Gas Molecular Weight}}{29} = \text{Sp. Gravity of that gas}$$

Molecular Wt. of Air = 29

1/Density = Specific Volume

Mass Rate

Where:

Standard Conditions (scfh) are 14.7 psia and 60°F
Normal Conditions (norm) are 760 mm Hg and 0°C
SG_1 Water = 1 at 60°F. SG_2 Water = 1 at 4°C
M = Molecular Weight
ρ_1 = Density lb/ft^3 (std); ρ_2 = Density kg/m^3 (norm)
G_1 = sp. gr. Air = 1 at (std); G_2 = sp. gr. Air. = 1 at (norm)

Gases

$$\text{scfh} = \frac{\text{lb/hr x 379}}{\text{M}} \qquad \text{m}^3\text{/hr (norm)} = \frac{\text{kg/hr x 22.40}}{\text{M}}$$

$$\text{scfh} = \frac{\text{lb/hr}}{\rho_1} \qquad \text{m}^3\text{/hr (norm)} = \frac{\text{kg/hr}}{\rho_2}$$

$$\text{scfh} = \frac{\text{lb/hr x 13.1}}{G_1} \qquad \text{m}^3\text{/hr (norm)} = \frac{\text{kg/hr x 0.773}}{G_2}$$

Liquids

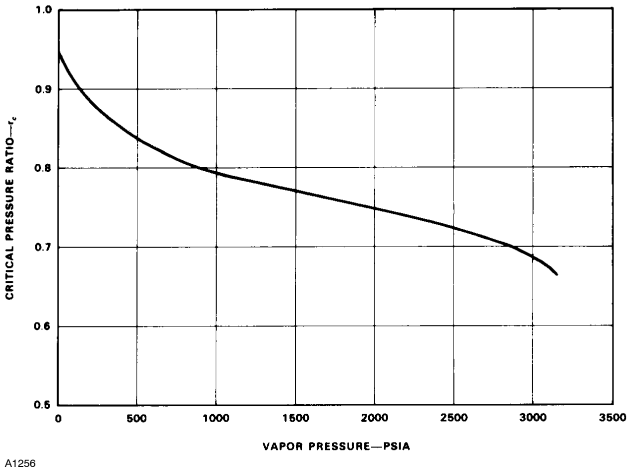
$$\text{US gal/min} = \frac{\text{lb/hr}}{500 \times SG_1} \qquad \text{m}^3\text{/hr} = \frac{\text{.001 kg/hr}}{SG_2}$$

EMERSON

The test classifications listed below are for factory acceptance tests under the conditions shown. Because of the complex interaction of many physical properties, extrapolation of very low leakage rates to other than test conditions can be extremely misleading. Consult the appropriate product bulletin for individual valve body leak classifications.

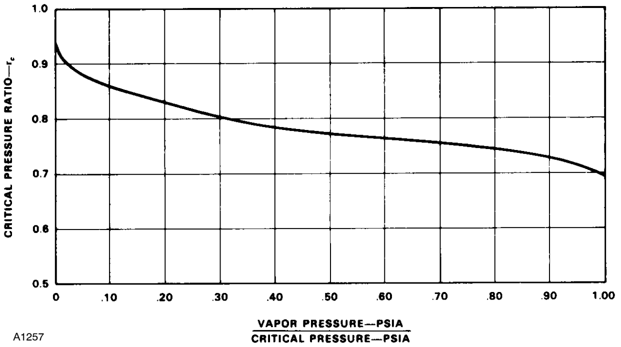
ANSI/FCI 70-2	Maximum Leakage(1)				Test Medium	Pressure and Temperature
Class II	0.5% valve capacity at full travel				Air	Service ΔP or 50 psid (3.4 bar differential), whichever is lower, at 50 to 125°F (10 to 52°C)
Class III	0.1% valve capacity at full travel				Air	Service ΔP or 50 psid (3.4 bar differential), whichever is lower, at 50 to 125°F (10 to 52°C)
Class IV	0.01% valve capacity at full travel				Air	Service ΔP or 50 psid (3.4 bar differential), whichever is lower, at 50 to 125°F (10 to 52°C)
Class V	5 x 10^{-4} mL/min/psid/in. port dia. (5 x 10^{-12} m^3/sec/bar differential/mm port dia)				Water	Service ΔP at 50 to 125°F (10 to 52°C)
Class VI	Nominal Port Diameter		Bubbles per Minute	mL per Minute	Air	Service ΔP or 50 psid (3.4 bar differential), whichever is lower, at 50 to 125°F (10 to 52°C)
	Inch	mm				
	1	25	1	0.15		
	1-1/2	38	2	0.30		
	2	51	3	0.45		
	2-1/2	64	4	0.60		
	3	76	6	0.90		
	4	102	11	1.70		
	6	152	27	4.00		
	8	203	45	6.75		

Figure 1. Critical Pressure Ratios for Water



Use this curve for water. Enter on the abscissa at the water vapor pressure at the valve inlet. Proceed vertically to intersect the curve. Move horizontally to the left to read the critical pressure ratio, r_c, on the ordinate.

Figure 2. Critical Pressure Ratios for Liquids Other than Water



Use this curve for liquids other than water. Determine the vapor pressure/critical pressure ratio by dividing the liquid vapor pressure at the valve inlet by the critical pressure of the liquid. Enter on the abscissa at the ratio just calculated and proceed vertically to intersect the curve. Move horizontally to the left and read the critical pressure ratio, r_c, on the ordinate.

Critical Pressure of Various Fluids, Psia*

Ammonia	1636
Argon	705.6
Butane	550.4
Carbon Dioxide	1071.6
Carbon Monoxide	507.5
Chlorine	1118.7
Dowtherm A	465
Ethane	708
Ethylene	735
Fluorine	808.5
Helium	33.2
Hydrogen	188.2
Hydrogen Chloride	1198
Isobutane	529.2
Isobutylene	580
Methane	673.3
Nitrogen	492.4
Nitrous Oxide	1047.6
Oxygen	736.5
Phosgene	823.2
Propane	617.4
Propylene	670.3
Refrigerant 11	635
Refrigerant 12	596.9
Refrigerant 22	716
Water	3206.2

* For values not listed, consult an appropriate reference book.

Introduction

Special consideration is required when sizing valves handling mixtures of liquid and gas or liquid and vapor. The equation for required valve C_v for liquid-gas or liquid-vapor mixtures is:

$$C_{vr} = (C_{vl} + C_{vg})\,(1 + F_m) \qquad (1)$$

The value of the correction factor, F_m, is given in figure 1 as a function of the gas volume ratio, V_r. The gas volume ratio for liquid-gas mixtures may be obtained by the equation:

$$V_r = \frac{V_g}{V_l + V_g} = \frac{Q_g}{\frac{284Q_1P_1}{T_1} + Q_g} \qquad (2)$$

or for liquid-vapor mixtures:

$$V_r = \frac{v_g}{v_g + v_l\left(\frac{1-x}{x}\right)} \qquad (3)$$

If the pressure drop ratio ($\Delta P/P_1$) exceeds the ratio required to give 100% critical gas flow as determined from figure 2, the liquid sizing drop should be limited to the drop required to give 100% critical gas flow.

Because of the possibility of choked flow occurring, the liquid sizing drop may also have to be limited by the equation:

$$\Delta P_{(allow)} = K_m(P_1 - r_c\,P_v)\ *$$

Nomenclature
C_v =Standard liquid sizing coefficient
C_{vr} =C_v required for mixture flow
C_{vl} =C_v for liquid phase
C_g =C_g for gas phase
C_{vg} = C_v required for gas phase = C_g/C_1
C_1 = C_g/C_v ratio for valve
F_m = C_v correction factor
K_m = Valve recovery coefficient
ΔP =Valve pressure drop, psi
P_1 =Valve inlet pressure, psia
P_v =Liquid vapor pressure, psia
Q_g= Gas flow, scfh
Q_l = Liquid flow, gpm
Q_s = Steam or vapor flow, lb/hr
r_c =Critical pressure ratio
T_1 =Inlet Temperature, °Rankine (°R = °F + 460°)
V_g = Gas flow, ft^3/sec
V_l = Liquid flow, ft^3/sec
V_r = Gas volume ratio
v_g = Specific volume of gas phase, ft^3/lb
v_l =Specific volume of liquid phase, ft^3/lb
x =Quality, lb vapor/lb mixture

Figure 1. C_v Correction Factor, F_m

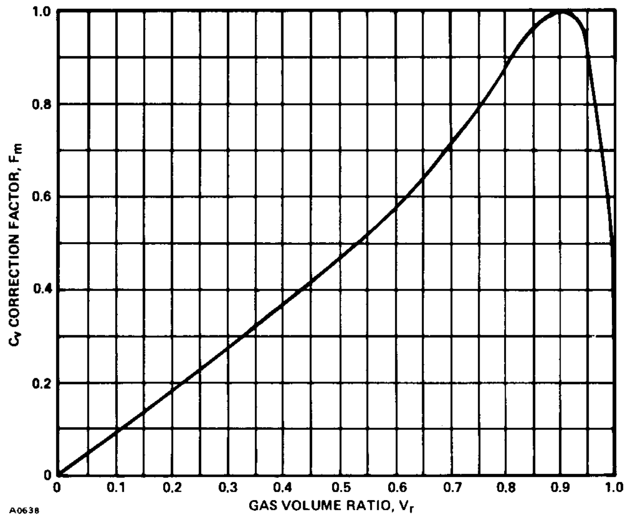
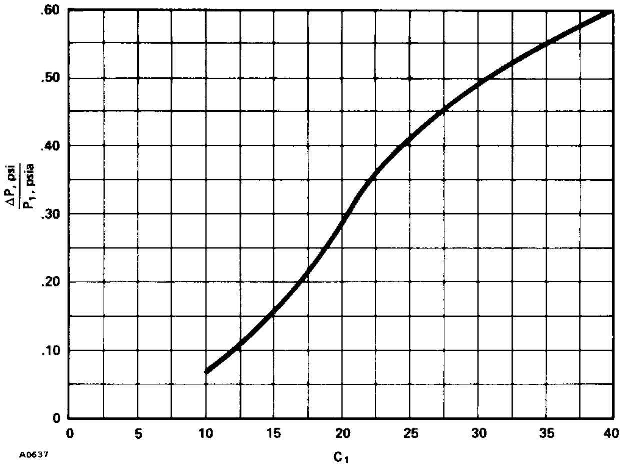


Figure 2. Pressure Drop Ratio Resulting in Critical Gas Flow



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* See equation 1 of "Valve Sizing for Cavitating and Flashing Liquids" in this section.

Sizing Examples

Liquid-Gas Mixture

Given:

Liquid flow (Q_i) = 3000 gpm
Gas flow (Q_g) = 625,000 scfh
Inlet temperature (T_1) = 100°F = 560°R
Inlet pressure (P_1) = 414.7 psia (400 psig)
Pressure drop (ΔP) = 40 psi
Liquid specific gravity (G_l) = 1.5
Vapor pressure of liquid (P_v) = 30 psia
Critical pressure of liquid = 200 psia
Gas specific gravity (G_g) = 1.4
C_1 of valve under consideration = 24.7
K_m of valve under consideration = 0.40

Solution:

1. The pressure drop ratio of the application ($\Delta P/P_1$ = 40/414.7 - 0.096) does not exceed that required for 100% critical flow (0.40 from figure 2). Check the maximum allowable liquid pressure drop:

$$\Delta P_{(allow)} = K_m(P_1 - r_c\,P_v)$$

The critical pressure ratio (r_c) is 0.84 from figure 2 of “Valve Sizing for Cavitating and Flashing Liquids” at Vapor Pressure/ Critical Pressure = 30/200 = 0.15.

$$\begin{aligned}\Delta P_{(allow)} &= 0.40\,[414.7 - (0.84)(30)]\\ &= 156\text{ psi}\end{aligned}$$

Since the pressure drop ratio is less than that required for 100% critical gas flow and the pressure drop is less than the maximum allowable liquid pressure drop, use the given pressure drop of 40 psi in the remaining steps.

2. Using the Universal Valve Sizing Slide Rule or sizing nomographs, the calculated required liquid sizing coefficient for the liquid phase (C_{vl}) is 581 and the calculated required gas sizing coefficient for the gas phase (C_g) is 2710.

3. Calculate the C_v required for gas phase:

$$\begin{aligned}C_{vg} &= C_g/C_1\\ &= \frac{2710}{24.7}\\ &= 110\end{aligned}$$

4. Calculate the gas volume ratio:

$$\begin{aligned}V_r &= \frac{Q_g}{\frac{284Q_iP_1}{T_1} + Q_g} \qquad (2)\\ &= \frac{625,000}{\frac{(284)(3000)(414.7)}{560} + 625,000}\\ &= 0.498\end{aligned}$$

Then from figure 1 at Vr = 0.498:

$$F_m = 0.475$$

5. Calculate the C_v required for the mixture:

$$\begin{aligned}C_{vr} &= (C_{vl} + C_{vg})(1 + F_m) \qquad (1)\\ &= (581 + 110)(1 + 0.475)\\ &= 1020\end{aligned}$$

Liquid-Vapor Mixture

Given:

Mixture flow (Q) = 200,000 lb/hr of wet steam
Quality (x) = 0.05
Inlet pressure (P_1) = 84.7 psia (70 psig)
Pressure drop (ΔP) = 50 psi
C_1 of valve under consideration = 21.0
K_m of valve under consideration = 0.50

Solution:

1. Calculate the flow of vapor (Q_S) and of liquid (Q_l):

$$
\begin{aligned}
Q_S &= (x)\ (\text{Mixture Flow}) \\
&= (0.05)\ (200{,}000) \\
&= 10{,}000 \text{ lb/hr of steam} \\
Q_l &= \text{Mixture Flow} - Q_S \\
&= 200{,}000 - 10{,}000 \\
&= 190{,}000 \text{ lb/hr of water} \\
&= 417 \text{ gpm}
\end{aligned}
$$

2. Using the sizing slide rule or the steam, vapor, and gas flow equation shown with the Universal Sizing Nomograph, find the calculated required gas sizing coefficient (C_g) for the vapor phase. Steam inlet density (0.193 lb/ft^3) can be calculated from steam table data.

$$C_g = 2330$$

3. Calculate C_v required for the vapor phase:

$$
\begin{aligned}
C_{vg} &= C_g/C_1 \\
&= \frac{2300}{21.0} \\
&= 111
\end{aligned}
$$

4. Before determining the C_v required for the liquid phase, calculate the maximum allowable liquid pressure drop:

$$\Delta P_{(allow)} = K_m\ (P_1 - r_c P_v)$$

Since this is a mixture of a liquid and its vapor, vapor pressure (P_v) equals inlet pressure (P_1). Find the critical pressure ratio (r_c) from figure 1 of "Valve Sizing for Cavitating and Flashing Liquids" in this section.

$$
\begin{aligned}
\Delta P_{(allow)} &= 0.50[84.7 - (.92)(84.7)] \\
&= 3.39 \text{ psi}
\end{aligned}
$$

Use this pressure drop and the specific gravity of the water (from steam tables) with the sizing slide rule or liquid nomograph to determine the required liquid sizing coefficient of the liquid phase (C_{vl}):

$$C_{vl} = 216$$

5. Calculate the gas volume ratio. specific volumes (v_g and v_l) can be found in steam tables:

$$V_r = \frac{v_g}{v_g\ v_l\left(\frac{1-x}{x}\right)} \qquad (3)$$

$$= \frac{5.185}{5.185 + 0.0176\left(\frac{1-0.05}{0.05}\right)}$$

$$= 0.939$$

The from figure 1 at $V_r = 0.939$:

$$F_m = 0.97$$

6. Calculate the C_v required for the mixture:

$$
\begin{aligned}
C_{vr} &= (C_{vl} + C_{vg})(1 + F_m) \qquad (1) \\
&= (216 + 111)\ (1 + 0.97) \\
&= 644
\end{aligned}
$$

Saturated Steam
Pressure and Temperature

VAPOR PRESSURE		TEMPERATURE DEGREES F	STEAM DENSITY LBS/CU.FT.	WATER SPECIFIC GRAVITY
Absolute, Psia	Vacuum, In. Hg.			
0.20	29.51	53.14	.000655	1.00
0.25	29.41	59.30	.000810	1.00
0.30	29.31	64.47	.000962	1.00
0.35	29.21	68.93	.00111	1.00
0.40	29.11	72.86	.00126	1.00
0.45	29.00	76.38	.00141	1.00
0.50	28.90	79.58	.00156	1.00
0.60	28.70	85.21	.00185	1.00
0.70	28.49	90.08	.00214	1.00
0.80	28.29	94.38	.00243	1.00
0.90	28.09	98.24	.00271	.99
1.0	27.88	101.74	.00300	.99
1.2	27.48	107.92	.00356	.99
1.4	27.07	113.26	.00412	.99
1.6	26.66	117.99	.00467	.99
1.8	26.26	122.23	.00521	.99
2.0	25.85	126.08	.00576	.99
2.2	25.44	129.62	.00630	.99
2.4	25.03	132.89	.00683	.99
2.6	24.63	135.94	.00737	.99
2.8	24.22	138.79	.00790	.98
3.0	23.81	141.48	.00842	.98
3.5	22.79	147.57	.00974	.98
4.0	21.78	152.97	.0110	.98
4.5	20.76	157.83	.0123	.98
5.0	19.74	162.24	.0136	.98
5.5	18.72	166.30	.0149	.98
6.0	17.70	170.06	.0161	.98
6.5	16.69	173.56	.0174	.97
7.0	15.67	176.85	.0186	.97
7.5	14.65	179.94	.0199	.97
8.0	13.63	182.86	.0211	.97
8.5	12.61	185.64	.0224	.97
9.0	11.60	188.28	.0236	.97
9.5	10.58	190.80	.0248	.97
10.0	9.56	193.21	.0260	.97
11.0	7.52	197.75	.0285	.97
12.0	5.49	201.96	.0309	.96
13.0	3.45	205.88	.0333	.96
14.0	1.42	209.56	.0357	.96

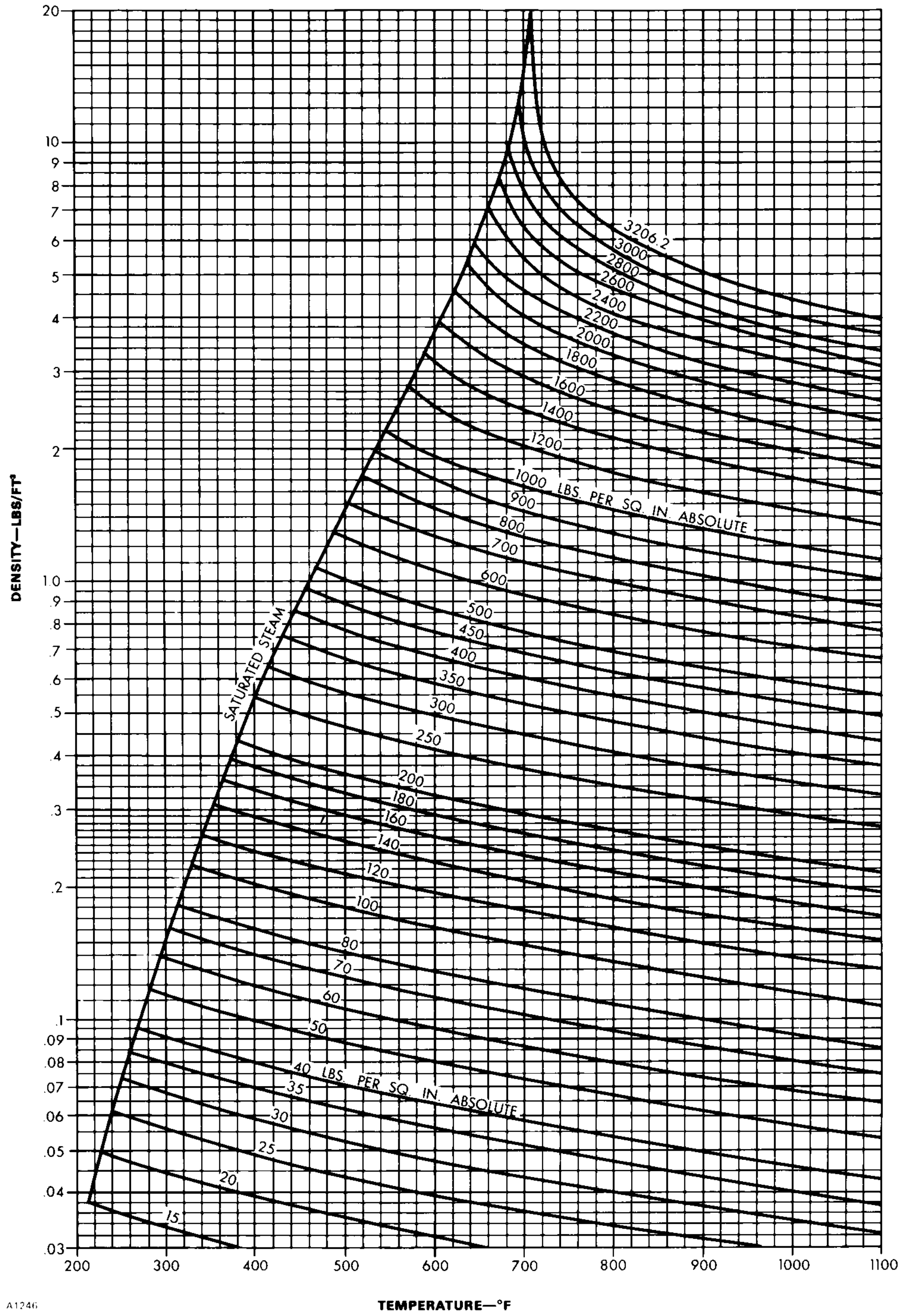
VAPOR PRESSURE		TEMPERATURE DEGREES F	STEAM DENSITY LBS/CU.FT.	WATER SPECIFIC GRAVITY
Absolute, Psia	Gauge, Psig			
14.696	0.0	212.00	.0373	.96
15.0	0.3	213.03	.0380	.96
16.0	1.3	216.32	.0404	.96
17.0	2.3	219.44	.0428	.96
18.0	3.3	222.41	.0451	.96
19.0	4.3	225.24	.0474	.95
20.0	5.3	227.96	.0498	.95
21.0	6.3	230.57	.0521	.95
22.0	7.3	233.07	.0544	.95
23.0	8.3	235.49	.0567	.95
24.0	9.3	237.82	.0590	.95
25.0	10.3	240.07	.0613	.95
26.0	11.3	242.25	.0636	.95
27.0	12.3	244.36	.0659	.95
28.0	13.3	246.41	.0682	.94
29.0	14.3	248.40	.0705	.94
30.0	15.3	250.33	.0727	.94
31.0	16.3	252.22	.0750	.94
32.0	17.3	254.05	.0773	.94
33.0	18.3	255.84	.0795	.94
34.0	19.3	257.38	.0818	.94
35.0	20.3	259.28	.0840	.94
36.0	21.3	260.95	.0863	.94
37.0	22.3	262.57	.0885	.94
38.0	23.3	264.16	.0908	.94
39.0	24.3	265.72	.0930	.94
40.0	25.3	267.25	.0953	.94
41.0	26.3	268.74	.0975	.93
42.0	27.3	270.21	.0997	.93
43.0	28.3	271.64	.102	.93
44.0	29.3	273.05	.104	.93
45.0	30.3	274.44	.106	.93
46.0	31.3	275.80	.109	.93
47.0	32.3	277.13	.111	.93
48.0	33.3	278.45	.113	.93
49.0	34.3	279.74	.115	.93
50.0	35.3	281.01	.117	.93
51.0	36.3	282.26	.120	.93
52.0	37.3	283.49	.122	.93
53.0	38.3	284.70	.124	.93
54.0	39.3	285.90	.126	.93
55.0	40.3	287.07	.128	.93
56.0	41.3	288.23	.131	.93
57.0	42.3	289.37	.133	.93
58.0	43.3	290.50	.135	.92
59.0	44.3	291.61	.137	.92
60.0	45.3	292.71	.139	.92
61.0	46.3	293.79	.142	.92
62.0	47.3	294.85	.144	.92
63.0	48.3	295.90	.146	.92
64.0	49.3	296.94	.148	.92
65.0	50.3	297.97	.150	.92
66.0	51.3	298.99	.152	.92
67.0	52.3	299.99	.155	.92
68.0	53.3	300.98	.157	.92
69.0	54.3	301.96	.159	.92
70.0	55.3	302.92	.161	.92
71.0	56.3	303.88	.163	.92
72.0	57.3	304.83	.165	.92
73.0	58.3	305.76	.168	.92
74.0	59.3	306.68	.170	.92
75.0	60.3	307.60	.172	.92
76.0	61.3	308.50	.174	.91
77.0	62.3	309.40	.176	.91
78.0	63.3	310.29	.178	.91
79.0	64.3	311.16	.181	.91
80.0	65.3	312.03	.183	.91
81.0	66.3	312.89	.185	.91
82.0	67.3	313.74	.187	.91
83.0	68.3	314.59	.189	.91
84.0	69.3	315.42	.191	.91
85.0	70.3	316.25	.193	.91
86.0	71.3	317.07	.196	.91
87.0	72.3	317.88	.198	.91
88.0	73.3	318.68	.200	.91
89.0	74.3	319.48	.202	.91
90.0	75.3	320.27	.204	.91
91.0	76.3	321.06	.206	.91
92.0	77.3	321.83	.209	.91
93.0	78.3	322.60	.211	.91
94.0	79.3	323.36	.213	.91
95.0	80.3	324.12	.215	.91
96.0	81.3	324.87	.217	.91
97.0	82.3	325.61	.219	.91
98.0	83.3	326.35	.221	.91
99.0	84.3	327.08	.224	.90
100.0	85.3	327.81	.226	.90
101.0	86.3	328.53	.228	.90
102.0	87.3	329.25	.230	.90
103.0	88.3	329.96	.232	.90
104.0	89.3	330.66	.234	.90
105.0	90.3	331.36	.236	.90
106.0	91.3	332.05	.238	.90
107.0	92.3	332.74	.241	.90
108.0	93.3	333.42	.243	.90
109.0	94.3	334.10	.245	.90

Saturated Steam
Pressure and Temperature (continued)

VAPOR PRESSURE		TEMPERATURE DEGREES F	STEAM DENSITY LBS/CU.FT.	WATER SPECIFIC GRAVITY
Absolute, Psia	Gauge, Psig			
110.0	95.3	334.77	.247	.90
111.0	96.3	335.44	.249	.90
112.0	97.3	336.11	.251	.90
113.0	98.3	336.77	.253	.90
114.0	99.3	337.42	.255	.90
115.0	100.3	338.07	.258	.90
116.0	101.3	338.72	.260	.90
117.0	102.3	339.36	.262	.90
118.0	103.3	339.99	.264	.90
119.0	104.3	340.62	.266	.90
120.0	105.3	341.25	.268	.90
121.0	106.3	341.88	.270	.90
122.0	107.3	342.50	.272	.90
123.0	108.3	343.11	.275	.90
124.0	109.3	343.72	.277	.90
125.0	110.3	344.33	.279	.90
126.0	111.3	344.94	.281	.89
127.0	112.3	345.54	.283	.89
128.0	113.3	346.13	.285	.89
129.0	114.3	346.73	.287	.89
130.0	115.3	347.32	.289	.89
131.0	116.3	347.90	.292	.89
132.0	117.3	348.48	.294	.89
133.0	118.3	349.06	.296	.89
134.0	119.3	349.64	.298	.89
135.0	120.3	350.21	.300	.89
136.0	121.3	350.78	.302	.89
137.0	122.3	351.35	.304	.89
138.0	123.3	351.91	.306	.89
139.0	124.3	352.47	.308	.89
140.0	125.3	353.02	.311	.89
141.0	126.3	353.57	.313	.89
142.0	127.3	354.12	.315	.89
143.0	128.3	354.67	.317	.89
144.0	129.3	355.21	.319	.89
145.0	130.3	355.76	.321	.89
146.0	131.3	356.29	.323	.89
147.0	132.3	356.83	.325	.89
148.0	133.3	357.36	.327	.89
149.0	134.3	357.89	.330	.89
150.0	135.3	358.42	.332	.89
152.0	137.3	359.46	.336	.89
154.0	139.3	360.49	.340	.89
156.0	141.3	361.52	.344	.88
158.0	143.3	362.53	.349	.88
160.0	145.3	363.53	.353	.88
162.0	147.3	364.53	.357	.88
164.0	149.3	365.51	.361	.88
166.0	151.3	366.48	.365	.88
168.0	153.3	367.45	.370	.88
170.0	155.3	368.41	.374	.88
172.0	157.3	369.35	.378	.88
174.0	159.3	370.29	.382	.88
176.0	161.3	371.22	.387	.88
178.0	163.3	372.14	.391	.88
180.0	165.3	373.06	.395	.88
182.0	167.3	373.96	.399	.88
184.0	169.3	374.86	.403	.88
186.0	171.3	375.75	.407	.88
188.0	173.3	376.64	.412	.88
190.0	175.3	377.51	.416	.88
192.0	177.3	378.38	.420	.87
194.0	179.3	379.24	.424	.87
196.0	181.3	380.10	.429	.87
198.0	183.3	380.95	.433	.87
200.0	185.3	381.79	.437	.87
205.0	190.3	383.86	.448	.87
210.0	195.3	385.90	.458	.87
215.0	200.3	387.89	.469	.87
220.0	205.3	389.86	.479	.87
225.0	210.3	391.79	.490	.87
230.0	215.3	393.68	.500	.87
235.0	220.3	395.54	.511	.86
240.0	225.3	397.37	.522	.86
245.0	230.3	399.18	.532	.86
250.0	235.3	400.95	.542	.86
255.0	240.3	402.70	.553	.86
260.0	245.3	404.42	.563	.86
265.0	250.3	406.11	.574	.86
270.0	255.3	407.78	.585	.86
275.0	260.3	409.43	.595	.85
280.0	265.3	411.05	.606	.85
285.0	270.3	412.65	.616	.85
290.0	275.3	414.23	.627	.85
295.0	280.3	415.79	.637	.85
300.0	285.3	417.33	.648	.85
320.0	305.3	423.29	.690	.85
340.0	325.3	428.97	.733	.84
360.0	345.3	434.40	.775	.84
380.0	365.3	439.60	.818	.83
400.0	385.3	444.59	.861	.83
420.0	405.3	449.39	.904	.83
440.0	425.3	454.02	.947	.82
460.0	445.3	458.50	.991	.82
480.0	465.3	462.82	1.03	.81
500.0	485.3	467.01	1.08	.81
520.0	505.3	471.07	1.12	.81
540.0	525.3	475.01	1.17	.81
560.0	545.3	478.85	1.21	.80
580.0	565.3	482.58	1.25	.80
600.0	585.3	486.21	1.30	.80
620.0	605.3	489.75	1.34	.79
640.0	625.3	493.21	1.39	.79
660.0	645.3	496.58	1.43	.79
680.0	665.3	499.88	1.48	.79
700.0	685.3	503.10	1.53	.78
720.0	705.3	506.25	1.57	.78
740.0	725.3	509.34	1.62	.77
760.0	745.3	512.36	1.66	.77
780.0	765.3	515.33	1.71	.77
800.0	785.3	518.23	1.76	.77
820.0	805.3	521.08	1.81	.77
840.0	825.3	523.88	1.85	.76
860.0	845.3	526.63	1.90	.76
880.0	865.3	529.33	1.95	.76
900.0	885.3	531.98	2.00	.76
920.0	905.3	534.59	2.05	.75
940.0	925.3	537.16	2.10	.75
960.0	945.3	539.68	2.14	.75
980.0	965.3	542.17	2.19	.75
1000.0	985.3	544.61	2.24	.74
1050.0	1035.3	550.57	2.37	.74
1100.0	1085.3	556.31	2.50	.73
1150.0	1135.3	561.86	2.63	.73
1200.0	1185.3	567.22	2.76	.72
1250.0	1235.3	572.42	2.90	.71
1300.0	1285.3	577.46	3.04	.71
1350.0	1335.3	582.35	3.18	.70
1400.0	1385.3	587.10	3.32	.69
1450.0	1435.3	591.73	3.47	.69
1500.0	1485.3	596.23	3.62	.68
1600.0	1585.3	604.90	3.92	.67
1700.0	1685.3	613.15	4.25	.66
1800.0	1785.3	621.03	4.59	.65
1900.0	1885.3	628.58	4.95	.64
2000.0	1985.3	635.82	5.32	.62
2100.0	2085.3	642.77	5.73	.61
2200.0	2185.3	649.46	6.15	.60
2300.0	2285.3	655.91	6.61	.59
2400.0	2385.3	662.12	7.11	.57
2500.0	2485.3	668.13	7.65	.56
2600.0	2585.3	673.94	8.24	.54
2700.0	2685.3	679.55	8.90	.53
2800.0	2785.3	684.99	9.66	.51
2900.0	2885.3	690.26	10.6	.49
3000.0	2985.3	695.36	11.7	.46
3100.0	3085.3	700.31	13.3	.43
3200.0	3185.3	705.11	17.2	.36
3206.2	3191.5	705.40	19.9	.32

Saturated and Superheated Steam Density/Temperature Curve

DENSITY VS. TEMPERATURE—SATURATED AND SUPERHEATED STEAM



The degree of superheat is the difference between the actual temperature and the saturation steam temperature.

Sonic Velocity

Sonic velocity for a fluid that obeys the perfect gas law can be found by using the flowing equation:

$$c = \sqrt{kgRT}$$

Mach Numbers

Inlet and outlet Mach numbers for a control valve can be calculated from:

$$\overline{M}_1 = \sqrt{\frac{5.97}{k+1}}\left(\frac{2}{k+1}\right)^{1/k-1}\left(\frac{1}{1900}\right)\left(\frac{C_g}{A_1}\right)\sin\left(\frac{3417}{C_1}\sqrt{\frac{\Delta P}{P_1}}\right)\text{ deg.}$$

$$\overline{M}_2 = \left\{\left[\left(\frac{1}{k-1}\right)^2 + \left(\frac{M_1}{1-\Delta P/P_1}\right)^2\left(\frac{A_1}{A_2}\right)^2\left(M_1^2 + \frac{2}{k-1}\right)\right]^{1/2} - \left(\frac{1}{k-1}\right)\right\}^{1/2}$$

Calculate Mean Velocity

Actual velocity at valve inlet or outlet can be determined by multiplying the sonic velocity times the Mach number.

$$\overline{V} = c\overline{M}$$

Simplified Steam Flow Velocity Equation

The following equation can be used to determine the velocity of steam at either the inlet or outlet of a valve.

$$\overline{V} = \frac{Q_v}{25\ A}$$

Note

To solve the equation, use steam tables to find the steam specific volume (v) for the pressure and temperature at the flow stream location where it is desired to determine velocity. Use the flow stream cross-sectional area at the same location.

Definition of Terms

A =Cross sectional area of the flow stream, square inches-- see tables 2, 3, 4, 5, and 6
c =Speed of sound in the fluid, feet per second
C_g =Gas Sizing Coefficient
C_v =Liquid Sizing Coefficient
$C_1 = C_g/C_v$
ΔP =Pressure drop
g =Gravitational constant, 32.2 feet per second squared
k =Specific heat ratio $\frac{\text{Specific heat at constant pressure}}{\text{Specific heat at constant volume}}$ see table 1 for common values
$\overline{M}$ =Mean Mach number
P =Pressure, psia
Q =Vapor flow rate, pounds per hour
R =Individual gas constant, $\frac{1545}{\text{molecular weight}}$
T =Temperature, Rankine—°R = °F + 460°
v =Vapor specific volume, cubic feet per pound
$\overline{V}$ =Mean velocity, feet per second
sub 1 =Upstream or inlet conditions
sub 2 =Downstream or outlet conditions

Table 1. Specific Heat Ratio (k)

Gas	Specific Heat Ratio (k)
Acetylene	1.38
Air	1.40
Argon	1.67
Butane	1.17
Carbon Monoxide	1.40
Carbon Dioxide	1.29
Ethane	1.25
Helium	1.66
Hydrogen	1.40
Methane	1.26
0.6 Natural Gas	1.32
Nitrogen	1.40
Oxygen	1.40
Propane	1.21
Propylene	1.15
Steam(1)	1.33

1. Use property tables if available for greater accuracy.

Table 2. Flow Area for easy-e™ Valves(1) (Square Inches), Not Appropriate for FB, EH, and HP Valves

VALVE SIZE, NPS	PRESSURE RATING								
	CL150 and 300			CL600			CL900(2)		
	Flow Area, Inch^2	Valve Diameter (dv)		Flow Area, Inch^2	Valve Diameter (dv)		Flow Area, Inch^2	Valve Diameter (dv)	
		mm	Inch		mm	Inch		mm	Inch
1	0.79	25.4	1.00	0.79	25.4	1.00	- - -	- - -	- - -
1-1/2	1.8	38.1	1.50	1.8	38.1	1.50	- - -	- - -	- - -
2	3.1	50.8	2.00	3.1	50.8	2.00	- - -	- - -	- - -
2-1/2	4.9	63.5	2.50	4.9	63.5	2.50	- - -	- - -	- - -
3	7.1	76.2	3.00	7.1	76.2	3.00	- - -	- - -	- - -
4	13	102	4.00	13	102	4.00	- - -	- - -	- - -
6	28	152	6.00	28	152	6.00	- - -	- - -	- - -
8	50	203	8.00	50	200	7.87	44	190	7.50
10	79	254	10.00	75	248	9.75	- - -	- - -	- - -
12	113	305	12.00	108	298	11.75	97	283	11.12
14	138	337	13.25	130	327	12.87	- - -	- - -	- - -
16	171	375	14.75	171	375	14.75	154	356	14.00
18	227	432	17.00	214	419	16.50	- - -	- - -	- - -
20	284	483	19.00	262	464	18.25	- - -	- - -	- - -
24	415	584	23.00	380	559	22.00	- - -	- - -	- - -
30	660	737	29.00	660	737	29.00	- - -	- - -	- - -
36	962	889	35.00	962	889	35.00	- - -	- - -	- - -

1. Use class rating of valve body shell. For example, an easy-e NPS 6, butt weld valve schedule 80 is available in CL600, 1500 and 2500 shells. Likewise, a Fisher easy-e NPS 8 x 6 butt weld valve body, schedule 80, is available in either shell CL600 or 900.
2. easy-e CL900, NPS 3 through 6 flanged valve body uses a CL1500 shell.

Table 3. Flow Area for ED-J and ET-J Valves (Square Inches)

VALVE SIZE, NPS	PRESSURE RATING		
	CL300		
	Flow Area, Inch^2	Valve Diameter (dv)	
		mm	Inch
10	79	254	10.00
12	113	305	12.00
16	183	387	15.25

Table 4. Flow Area for Pipe (Square Inches)

Valve Size, NPS	Schedule								
	10	20	30	40	80	120	160	XS	XXS
1/2	- - -	- - -	- - -	0.30	0.23	- - -	0.17	0.23	0.05
3/4	- - -	- - -	- - -	0.53	0.43	- - -	0.30	0.43	0.15
1	- - -	- - -	- - -	0.86	0.72	- - -	0.52	0.72	0.28
1-1/2	- - -	- - -	- - -	2.0	1.8	- - -	1.4	1.8	0.95
2	- - -	- - -	- - -	3.4	3.0	- - -	2.2	3.0	1.8
2-1/2	- - -	- - -	- - -	4.8	4.2	- - -	3.5	4.2	2.5
3	- - -	- - -	- - -	7.4	6.6	- - -	5.4	6.6	4.2
4	- - -	- - -	- - -	13	11	10	9.3	11	7.8
6	- - -	- - -	- - -	29	26	24	21	26	19
8	- - -	52	51	50	46	41	36	46	37
10	- - -	83	81	79	72	65	57	75	- - -
12	- - -	118	115	112	102	91	81	108	- - -
16	189	186	183	177	161	144	129	177	- - -
20	299	291	284	278	253	227	203	284	- - -
24	434	425	411	402	378	326	291	415	- - -

Table 5. Fisher FB Outlet Flow Area, Inch^2

OUTLET SIZE, NPS	PRESSURE RATINGS											
	CL150			CL300			CL600			CL900		
	Flow Area, Inch^2	Valve Diameter (dv)		Flow Area, Inch^2	Valve Diameter (dv)		Flow Area, Inch^2	Valve Diameter (dv)		Flow Area, Inch^2	Valve Diameter (dv)	
		mm	Inch		mm	Inch		mm	Inch		mm	Inch
10	75	248	9.75	72	243	9.56	65	230	9.06	57	216	8.5
12	108	298	11.75	102	289	11.37	91	273	10.75	81	257	10.13
16	177	381	15.00	161	363	14.31	145	344	13.56	129	325	12.81
18	224	429	16.88	204	409	16.12	183	387	15.25	164	367	14.44
20	278	478	18.81	253	456	17.94	227	432	17.00	203	408	16.06
24	402	575	22.62	365	548	21.56	326	518	20.38	293	490	19.31
30	638	724	28.50	594	699	27.50	521	654	25.75	- - -	- - -	- - -
36	921	870	34.25	855	838	33.00	755	787	31.00	- - -	- - -	- - -

Table 6. Fisher EH Flow Area, Inch^2

VALVE SIZE, NPS		PRESSURE RATINGS					
Globe	Angle	CL1500			CL2500		
		Flow Area, Inch^2	Valve Diameter (dv)		Flow Area, Inch^2	Valve Diameter (dv)	
			mm	Inch		mm	Inch
1, 1 1/2 x 1, or 2 x 1	1, 2	0.6	22.2	0.87	0.44	19.0	0.75
2 or 3 x 2	3	2.8	47.6	1.87	1.8	38.1	1.50
3 or 4 x 3	4	5.9	69.9	2.75	4.0	57.2	2.25
4 or 6 x 4	6	10	92.1	3.62	6.5(1) 10(2)	73(1) 92.1(2)	2.87(1) 3.62(2)
6 or 8 x 6	8	23	137	5.37	15(1) 26(2)	111(1) 146(2)	4.37(1) 5.75(2)
8 or 10 x 8	- - -	38	178	7.00	26	146	5.75
12 or 14 x 12	- - -	85	264	10.37	58	219	8.62

1. For Globe valve constructions (EH)
2. For Angle valve constructions (EHA)

Table 7. Fisher CHP Flow Area, Inch^2

VALVE SIZE, NPS	PRESSURE RATINGS		
	CL2500		
	Flow Area, Inch^2	Valve Diameter (dv)	
		mm	Inch
8	26	144	5.75

Table 8. Fisher HP Flow Area, Inch^2

VALVE SIZE, NPS		PRESSURE RATINGS											
Globe	Angle	CL900			CL1500			CL2500			CL3200		
		Flow Area, Inch^2	Valve Diameter (dv)		Flow Area, Inch^2	Valve Diameter (dv)		Flow Area, Inch^2	Valve Diameter (dv)		Flow Area, Inch^2	Valve Diameter (dv)	
			mm	Inch		mm	Inch		mm	Inch		Inch	mm
1	1	0.61	22.2	0.87	0.61	22.2	0.87	0.44	19	0.75	- - -	- - -	- - -
2	2, 3	2.8	47.6	1.87	2.8	47.6	1.87	1.77	38.1	1.5	- - -	- - -	- - -
3(1)	- - -	6.5	73.1	2.88	6.5	73.1	2.88	- - -	- - -	- - -	- - -	- - -	- - -
3(2) or 4x3(1,2)	4	5.9	69.9	2.75	5.9	69.9	2.75	- - -	- - -	- - -	- - -	- - -	- - -
4 or 6x4	6	10.3	92.1	3.62	10.3	92.1	3.62	- - -	- - -	- - -	- - -	- - -	- - -
6 or 8x6	8	22.7	136.5	5.37	22.7	136.5	5.37	- - -	- - -	- - -	- - -	- - -	- - -
8	- - -	44.18	190.5	7.5	38.48	177.8	7	25.99	146.05	5.75	25.99	146.05	5.75
10	- - -	68.96	238	9.37	60.16	222.3	8.75	41.3	184.2	7.25	41.3	184.2	7.25
12	- - -	97.12	282.4	11.12	84.46	263.4	10.37	58.36	219	8.62	58.36	219	8.62

1. Manufactured in U.S.A.
2. Manufactured in Europe and Japan.

Table 9. Diffuser Tube Cross-Sectional Area

Diffuser Tube Size, Inch	O.D., Inch	Area, Inch^2
2	2.375	4.43
2-1/2	2.875	6.49
3	3.500	9.62
3-1/2	4.000	12.60
4	4.500	15.9
5	5.563	24.3
6	6.625	34.5
8	8.625	58.4
10	11	90.8
12	13	128.0
14	14	154
16	16	201
18	18	254
20	20	314
24	24	452

Table 10. Flow Area for Pipe, Inch^2

VALVE SIZE, NPS	SCHEDULE									
	10	20	30	40	80	120	160	STD	XS	XXS
1/2	- - -	- - -	- - -	0.30	0.23	- - -	0.17	0.30	0.23	0.05
3/4	- - -	- - -	- - -	0.53	0.43	- - -	0.30	0.53	0.43	0.15
1	- - -	- - -	- - -	0.86	0.72	- - -	0.52	0.86	0.72	0.28
1-1/2	- - -	- - -	- - -	2.0	1.8	- - -	1.4	2.0	1.8	0.95
3	- - -	- - -	- - -	3.4	3.0	- - -	2.2	3.4	3.0	1.8
2-1/2	- - -	- - -	- - -	4.8	4.2	- - -	3.5	4.8	4.2	2.5
3	- - -	- - -	- - -	7.4	6.6	- - -	5.4	7.4	6.6	4.2
4	- - -	- - -	- - -	13	11	10	9.3	13	11	7.8
6	- - -	- - -	- - -	29	26	24	21	29	26	19
8	- - -	52	51	50	46	41	36	50	46	37
10	- - -	83	81	79	72	65	57	79	75	- - -
12	- - -	118	115	112	102	91	81	113	108	- - -
16	189	186	183	177	161	144	129	183	177	- - -
20	299	291	284	278	253	227	203	290	284	- - -
24	434	425	411	402	378	326	291	425	415	- - -
30	678	661	649	- - -	- - -	- - -	- - -	672	661	- - -
36	983	962	948	935	- - -	- - -	- - -	976	962	- - -

Table 11. Baumann 24000 Flow Area, Inch^2

VALVE SIZE, NPS	VALVE TYPE						
	Little Scotty	C	CVF/SVF ASME	CVF/SVF EN	S	F	SB
1/2	0.61	0.27	0.20	0.27	0.41	0.22	0.41
3/4	0.61	0.49	0.44	0.44	- - -	0.22	0.66
1	1.50	0.75	0.75	0.75	1.04	1.23	1.06
1-1/2	2.96	1.94	1.77	1.77	2.32	- - -	- - -
2	4.56	3.05	3.05	3.05	3.77	- - -	- - -
3	- - -	- - -	- - -	- - -	8.30	- - -	- - -

The current hydrodynamic noise prediction method differentiates valve style only though variation of the pressure recovery coefficient, Km (F_L^2). Separate noise prediction corrections have now been established for standard valves, Cavitrol™ III - 1 Stage valves, and the rotary attenuator. These differences are reflected in the ΔSPL_{Ar} term of the general sound pressure level prediction equation per the following equation:

$$\Delta SPL_{Ar} = a - b\left(\frac{K_m}{Ar}\right) + 10\log\left(\frac{1}{Ar} - 1\right)$$

where,
ΔSPL_{Ar} = Correction for effects of Ar and valve style
K_m = Pressure recovery coefficient
Ar = Application ratio

$$= \frac{\Delta P_{Actual}}{P_1 - P_v}$$

a, b = coefficients given in following table:

	a	b
Standard Valves	14.4	18.8
Cavitrol III - 1 stage	9.4	18.8
Rotary Attenuator	9.4	22.6

Line Source

Equal Noise levels are on an imaginary cylinder with the pipe centerline as the axis (figure 1). As an observer moves away from the pipeline, the sound pressure level (SPL) decreases inversely to the changes in surface area of the imaginary cylinder. Use the following equation to find the sound pressure level when other than 1 meter from the pipeline surface.

$$SPL = F + 10\text{Log}\,\frac{1 + r}{R + r}$$

where,
r = radius of pipe based on outside diameter (meters)
R = distance from pipe surface (meters)
F = noise level calculated at 1 meter

Example

What is the noise level 50 feet from a 12 inch pipeline (from table 1, radius is 6.38 inch or 0.16 m) when the Noise Prediction Technique calculates 95 dBA at 1 meter.

$$SPL = (95) + 10\text{Log}\frac{1 + 0.16}{15.24 + 0.16}$$
$$SPL = 95 - 11.2$$
$$SPL = 83.8\ \text{dBA}$$

Note

This procedure determines the noise level radiated only by the pipeline. Other noise sources could combine with the pipeline noise source to have a greater overall sound pressure level.

Point Source

Vent applications are typical examples of point source noise (figure 2). As an observer moves away from a point source, the sound level (SPL) decreases inversely to the changes in surface area of the imaginary sphere. Use the following equation to find the sound pressure level when other than 3 meters from the point source and below a horizontal plane through the point source.

$$SPL = F + 20\text{Log}\,\frac{3}{R}$$

Figure 1. Typical Line Source

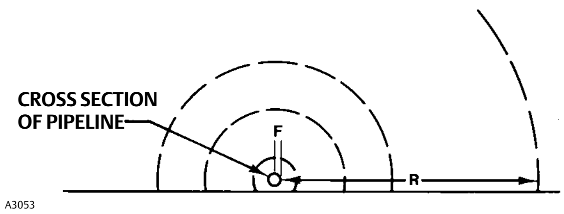
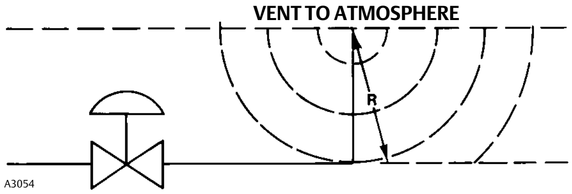


Figure 2. Typical Point Source



where,
R = distance from source (meters)
F = noise level calculated at 3 meters

Example

What is the noise level 50 feet (15 meters) from the point source when the Noise Prediction Technique calculates 100 dBA at 3 meters.

$$SPL = 100 + 20\text{Log}\frac{3}{15}$$
$$SPL = 100 - 14$$
$$SPL = 86\ \text{dBA}$$

Note

This procedure determines the noise level radiated only by the point source. Other noise sources could combine with the point source noise to have a greater overall sound pressure level.

Table 1. Radii of Nominal Pipe Sizes

RADIUS OF PIPE	NOMINAL PIPE SIZES, NPS																
	1/2	3/4	1	1-1/2	2	2-1/2	3	4	6	8	10	12	16	20	24	30	36
Inch	0.42	0.53	0.66	0.95	1.19	1.44	1.75	2.25	3.31	4.31	5.38	6.38	8.00	9.00	12.00	15.00	18.00
Meter	0.0107	0.0133	0.0168	0.0241	0.0302	0.0366	0.0445	0.0572	0.0841	0.11	0.14	0.16	0.20	0.23	0.30	0.38	0.46

Octave Band Sound Pressure Levels

Aerodynamic noise has an overall sound pressure level (measured one meter downstream of the valve and one meter away from the pipe-wall) which does not indicate the sound pressure level in each frequency band. Use the information in table 1 to determine octave band sound pressure levels and to construct a spectrum for a particular trim type and piping combination.

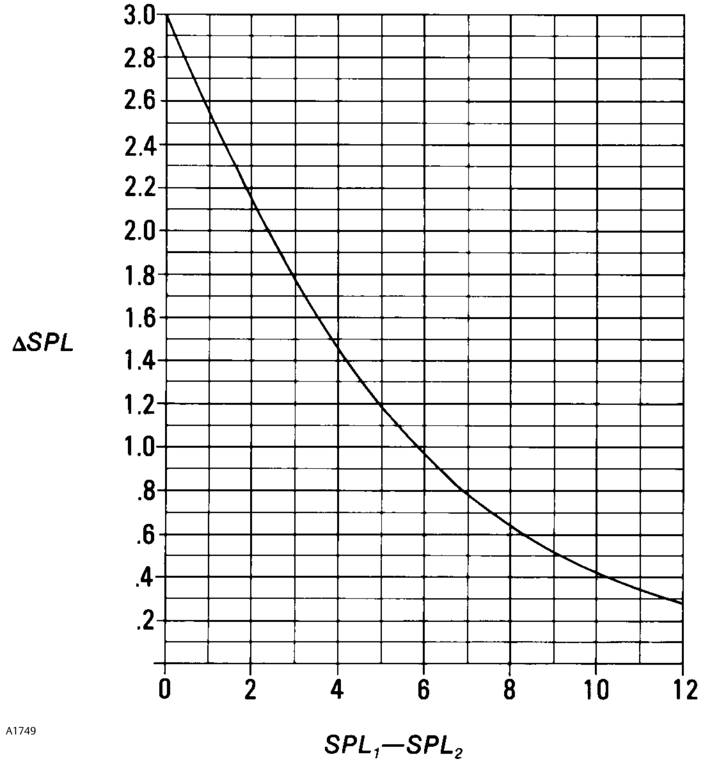
Example

An NPS 6 valve with Whisper Trim™ III cage has an overall SPL of 85 dBA. The octave band SPLs are as follows:
SPL at 63 Hz = 85 + (-50) = 35 dBA
125 Hz = 85 + (-50) = 35 dBA
250 Hz = 85 + (-45) = 40 dBA
500 Hz = 85 + (-33) = 52 dBA
1000 Hz = 85 + (-21) = 64 dBA
2000 Hz = 85 + (-9) = 76 dBA
4000 Hz = 85 + (-6) = 79 dBA
8000 Hz = 85 + (-3) = 82 dBA

Table 1. Octave Band Sound Pressure Level Corrections

PIPE SIZE NPS	PIPE SCHEDULE	FOR WHISPER TRIM III (OUTLET VELOCITY $\leq$ 0.3 MACH)								FOR ALL OTHERS							
		Octave Bands, Hz															
		63	125	250	500	1000	2000	4000	8000	63	125	250	500	1000	2000	4000	8000
1	5S to XXS	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	-50	-50	-50	-39	-27	-15	-6	-3
1-1/2	5S to XXS	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	-50	-50	-50	-39	-27	-15	-6	-3
2	5S to XXS	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	-50	-50	-50	-39	-27	-15	-3	-6
3	5S to XXS	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	-50	-50	-50	-39	-27	-15	-3	-6
4	5S to XXS	- - -	- - -	- - -	-45	-33	-21	-9	-6	-50	-50	-50	-39	-27	-15	-3	-6
6	5S to XXS	-50	-50	-45	-33	-21	-9	-6	-3	-50	-50	-39	-27	-15	-3	-6	-9
8	5S to 160	-50	-50	-45	-33	-21	-9	-6	-3	-50	-50	-29	-27	-15	-3	-6	-9
10	5S to 160	-50	-50	-45	-33	-21	-9	-6	-3	-50	-50	-39	-27	-15	-3	-6	-9
12	5S to 160	-50	-45	-33	-21	-9	-6	-3	-9	-50	-39	-27	-15	-3	-6	-9	-21
14	5S to 160	-50	-45	-33	-21	-9	-6	-3	-9	-50	-39	-27	-15	-3	-6	-9	-21
16	5S to 160	-50	-45	-33	-21	-9	-6	-3	-9	-50	-39	-27	-15	-3	-6	-9	-21
18	5S to 160	-50	-45	-33	-21	-9	-6	-3	-9	-50	-39	-27	-15	-3	-6	-9	-21
20	5S to 160	-50	-45	-33	-21	-9	-6	-3	-9	-50	-39	-27	-15	-3	-6	-9	-21
24	5S to 160	-45	-33	-21	-9	-6	-3	-9	-15	-39	-27	-15	-3	-6	-9	-21	-33
	120 to 160	-50	-45	-33	-21	-9	-6	-3	-9	-50	-39	-27	-15	-3	-6	-9	-21
30	5S to 30	-45	-33	-21	-9	-6	-3	-9	-15	-39	-27	-15	-3	-6	-9	-21	-33
36	10 to 40	-45	-33	-21	-9	-6	-3	-9	-15	-39	-27	-15	-3	-6	-9	-21	-33
42	10 to 30	-45	-33	-21	-9	-6	-3	-9	-15	-39	-27	-15	-3	-6	-9	-21	-33

Figure 1. Noise Source Combination Curve



Combining Noise Sources

Two noise levels, calculated separately, can be combined as one overall noise source. The sources can be point, line or a combination of both. Use the following technique.

1. Calculate the noise level of each source at the point where the combined noise level is desired. Use either the line source or point source techniques found on page 3-2.

2. Find the difference in the sound pressure level of the two sources at the new location.

3. Enter the abscissa of figure 1 with the difference found in step 2. Move vertically to intersect the curve. Read ΔSPL at this point.

4. The overall noise level of the two sources is the loudest noise source plus the ΔSPL found in step 3.

Introduction

The major cause of hydrodynamic noise (noise resulting from liquid flow) is cavitation. Cavitation is the process of the formation and subsequent collapse of vapor bubbles in a flowing liquid stream. The noise and damage produced by cavitation may be traced to the collapse of these vapor bubbles. When the vapor bubbles do not collapse, flashing occurs, potentially causing trim damage but little hydrodynamic noise.

Source Treatment

Cavitation and its associated noise and damage can often be avoided at the design phase of a project if proper consideration is given to service conditions. However, where service conditions are fixed, a valve may have to operate at pressure conditions normally resulting in cavitation. In such instances, noise control by source treatment can be employed by utilizing one of several methods: multiple valves in series, a special control valve, or a standard control valve body with special internal parts.

Cavitrol™ III one-stage trim utilizes specially-shaped, diametrically-opposed holes through the cage wall that reduce the fluid's tendency to cavitate and reduce fluid turbulence. When the application pressure drop is within stated values, the trim helps eliminate the cavitation noise and damage.

Cavitrol III two- and three-stage and Cavitrol IV trims eliminate cavitation noise and damage by taking the total pressure drop in a series of intermediate stages. In operation, fluid enters the first section of the cage through many orifices. In passing through orifices, each fluid stream undergoes a portion of the total pressure drop. The fluid then passes through a series of additional orifices and undergoes additional pressure drops at each stage. The number of stages required to prevent cavitation damage depends upon the total amount of pressure reduction that must be taken across the cage. A control valve using two- or three-stage Cavitrol III or Cavitrol IV trim will exhibit a sound pressure level of 90 dBA or less.

Cavitrol V trim, for use with Vee-Ball™ valves, minimizes cavitation noise and damage by controlling the formation and collapse of vapor bubbles. The trim consists of a carefully designed bundle of tubes installed within the valve, downstream of the V-notch ball. The tubes prevent the flow stream from reaching its potential minimum area, thus maintaining maximum pressure head and reducing the possibility of vapor bubble formation. Also, the tubes physically limit the size and number of vapor bubbles that can form. In many installations, Cavitrol V trim creates resistance to the flow stream, which produces a back pressure. This back pressure can keep the pressure head from falling below the vapor pressure of the process liquid. Cavitrol V trim can reduce control valve noise by as much as 15 dBA.

Table 1. Available Cavitrol Trim

Trim	Valve Body Pressure Rating	Valve Body Design
Cavitrol III One-Stage	CL125 to CL600	ET
	CL150 to CL900	EWT ELT
	CL900 through CL2500	DBAQ
	Note 1	CC
Cavitrol III Two-Stage	CL600	ET EWT
	CL900	EWT (NPS 8 x 6 & 12 x 8) ELT DBAQ EHT
	CL1500	DBAQ EHT
	CL2500	DBAQ EHT
Cavitrol III Three-Stage	CL900 through CL2500	DBAQ EHT
Cavitrol IV	CL2500	CAV 4
Cavitrol V	CL150 and CL300	U
	CL150 through CL600	V100

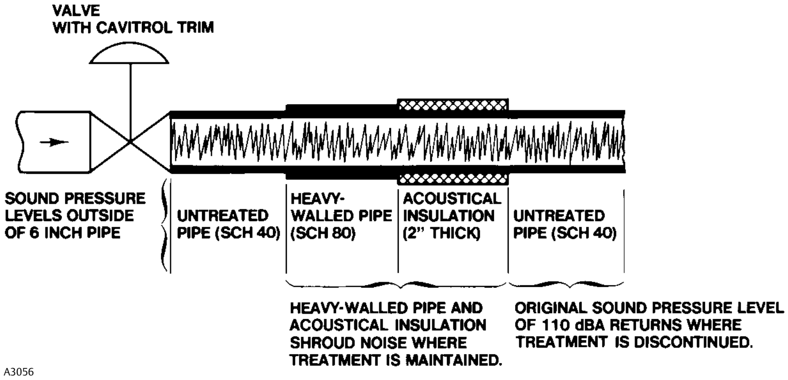
Note 1: 10,000 psig API (American Petroleum Institute).

Table 1 lists available Cavitrol trims.

Path Treatment

Path treatment of cavitation noise is not generally recommended since cavitation is usually accompanied by severe physical damage to the valve parts or piping components. Such cavitation should not go unchecked because of the potential hazard of eventual valve and piping failure. However, Cavitrol III one-stage trim in a properly-sized valve can be used to control cavitation damage, thus allowing use of the path treatment approach to reduce noise.

Figure 1. Typical Path Treatments



To help control cavitation damage, Cavitrol III one-stage trim utilizes a number of pairs of small, diametrically-opposed flow holes through the wall of the cage. Each specially shaped hole admits a jet of cavitating liquid which impacts at the center of the cage with the jet admitted from the opposing hole. Thus a continuous cushion is formed which prevents cavitating liquid from contacting the metal surfaces, ensuring the vapor bubble collapse takes place in the center of the flow stream.

Once the cavitation damage is controlled in this manner, it becomes practical to use the path treatment method (figure 1) to reduce the local noise caused by the cavitating liquid. This may be accomplished through the use of heavy-walled pipe and acoustical or thermal insulation.

Pipe wall attenuation varies with size and schedule. See page 3-9.

Thermal insulation

Unlike for acoustic insulation, an International Standard for noise reduction associated with thermal insulation does not currently exist. Therefore, when considering the use of thermal insulation as a means to reduce audible noise, it is recommended to abide by the guidelines suggested by the Flow Controls Institute (FCI). FCI Tech Sheet #CVR 401 “Insulation Systems Used as External Treatment for Control Valve and Regulator Noise” suggests that thermal insulation will typically provide 5 dBA of noise reduction per 1 inch of insulation thickness, with a maximum benefit of 12 dBA.

Acoustic insulation

When considering the use of acoustic insulation to reduce audible noise, the methods defined in the international standard ISO 15665 “Acoustics – Acoustic Insulation for pipes, valves, and flanges” should be referenced. Per this standard, noise reduction is a function of several factors including NPS, frequency spectrum, acoustic insulation class, and more.

Audible noise reductions calculated in the Fisher sizing tools are based on the prediction models expressed in ISO 15665, 2003-08-15.

While path treatment methods like insulation can provide significant reduction in observed noise levels, it is recommended that best practices for internal valve/pipe noise be adhered to at all times. Please consult manufacturer’s specifications for attenuating capability and application of specific insulation.
Note: Insulation may result in higher pipeline temperatures. Associated allowable stress limits of the piping at elevated temperatures should be considered in the decision of applying insulation for noise reduction.

Introduction

Use the following procedure to determine the A-weighted sound pressure level (SPL) noise generated by liquid flow through control valves. The information needed is:

- Valve style and type of trim
- Size and schedule of adjacent piping
- Inlet pressure (P_1, psia) and pressure drop (ΔP,psi)
- Vapor pressure of the liquid (P_v, psia)
- Calculated required C_v
- Recovery coefficient (K_m)
- Specific gravity if different from water

Hydrodynamic noise in a control valve is dependent on the nature of the pressure recovery downstream of the valve orifice. If the recovery is such that cavitation is present, the resultant noise is higher than if the fluid did not cavitate.

The transition from non-cavitating to cavitating is included in the prediction technique. Therefore, the user does not have to determine the onset of cavitation. This level of cavitation is not the same as the levels of cavitation determined by K_m and K_c.

To calculate the predicted hydrodynamic noise, solve both the non-cavitating and cavitating equations and use the greater of the two as the noise prediction. This procedure can be used for all designs except Cavitrol™ III two- and three-stage trims and Cavitrol IV trim. With Cavitrol III two- and three-stage trims and with Cavitrol IV trims, the sound pressure level will never exceed 90 dBA. For these trims, an additional upper limit of 90 dBA is placed on this procedure because these trims prevent cavitation.

Prediction Technique

Non-Cavitating

$$SPL = SPL_{\Delta P} + \Delta SPL_{Cv} + \Delta SPL_{k} + \Delta SPL_{km} + \Delta SPL_{g}$$

Where

SPL = Overall noise level (dBA) in decibels at a predetermined point (1 meter downstream of the valve outlet and 1 meter from the pipe surface)
$SPL_{\Delta P}$ = Base SPL in dB, determined as a function of pressure drop (ΔP)
ΔSPL_{Cv} = Correction in dB for required liquid sizing coefficient (C_v)
ΔSPL_{K} = Correction in dB achieved through the use of heavy-walled pipe and acoustical or thermal insulation
ΔSPL_{Km} = Correction in dB for given recovery coefficient (K_m)
ΔSPL_{G} = Correction in dB for fluids with a specific gravity value which differs from the water (for water, $\Delta SPL_G = 0$)

Cavitating

$$SPL = SPL_{\Delta p} + \Delta SPL_{Cv} + \Delta SPL_{K} + \Delta SPL_{AR}$$

Where

SPL = Overall noise level in decibels (dBA) at a predetermined point (1 meter downstream of the valve outlet and 1 meter from the pipe surface)
$SPL_{\Delta P}$ = Base SPL in dB determined as a function of pressure drop (ΔP)
ΔSPL_{Cv} = Correction in dB for required liquid sizing coefficient (C_v)
ΔSPL_{k} = Correction in dB achieved through the use of heavy-walled pipe and acoustical of thermal insulation
ΔSPL_{AR} = Correction in dB for applications ratio [$AR = \Delta P/(P_1 - P_v)$] and the recovery coefficient (K_m)

Prediction Example

Given:

Valve style—Fisher ED
Type of trim—standard
Adjacent piping—NPS 4 schedule 40 pipe
Recovery coefficient (K_m)—.7

Inlet pressure (P_1)—250 psia
Pressure drop (ΔP)—175 psi
Vapor pressure(P_v)—11.5 psia (water at 200°F)
Calculated required C_g—70

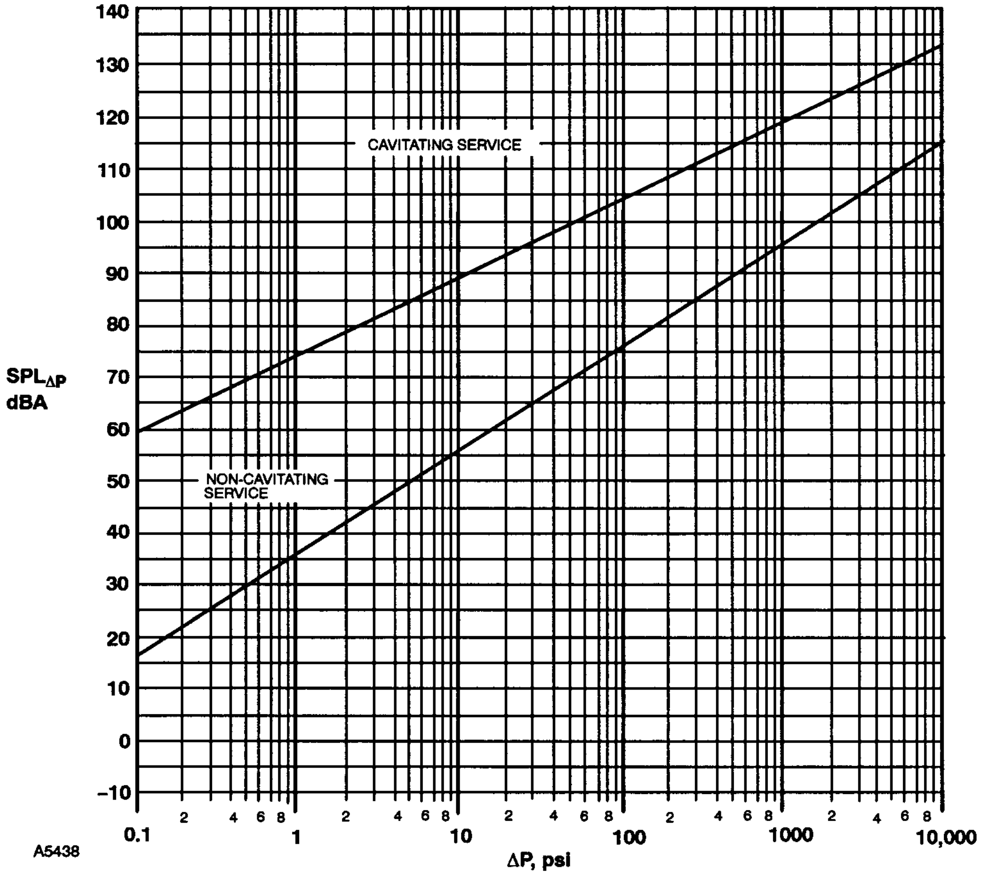
Non-Cavitating

$SPL_{\Delta P}$ = 81 (value from page 3-8)
SPL_{Cv} = 18 (value from page 3-9)
SPL_{K} = -32.9 (value from page 3-9)
SPL_{Km} = .7 (value from page 3-10)
SPL_{G} = 0 (value from page 3-11)
SPL = 66.8 dBA

Cavitating

$SPL_{\Delta P}$ = 107 (value from page 3-8)
SPL_{Cv} = 18 (value from page 3-9)
SPL_{K} = -32.9 (value from page 3-9)
SPL_{AR} = -8 (value from page 3-10)
SPL = 84.1 dBA

SPL$_{\Delta P}$ vs ΔP For All Valve Styles



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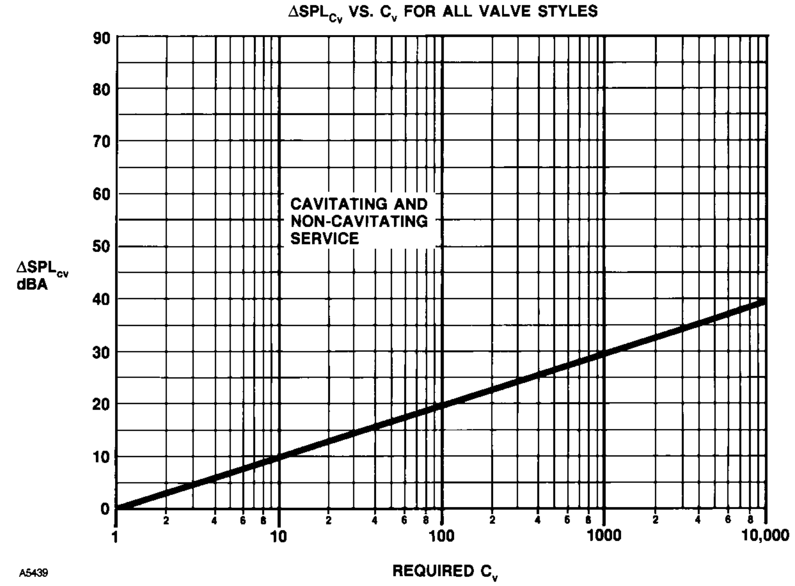
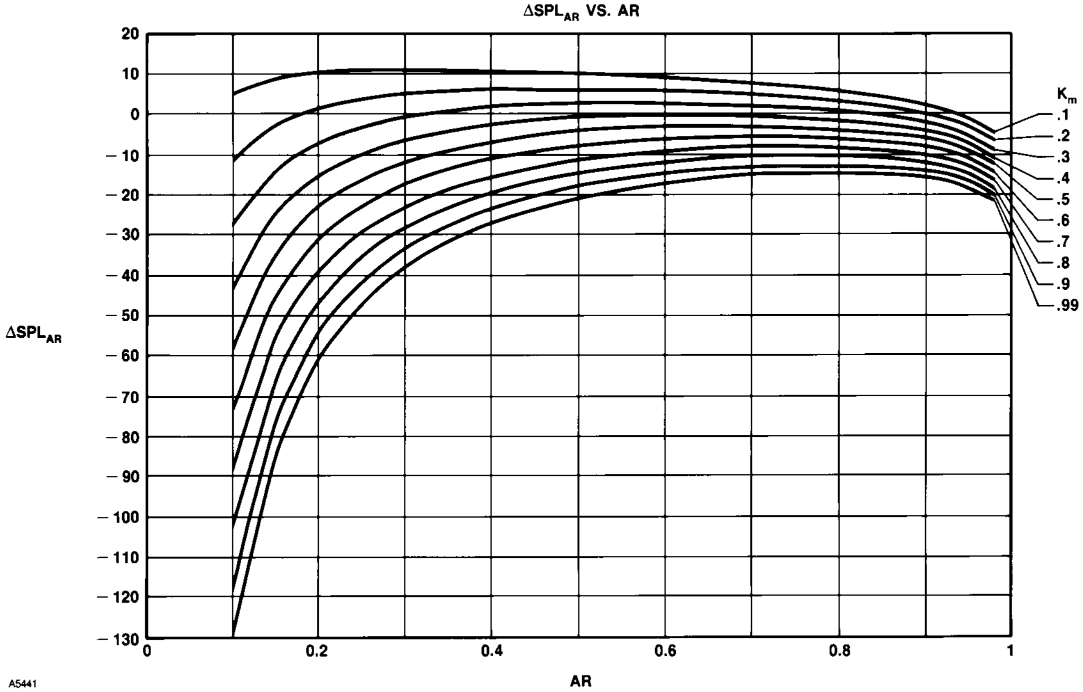
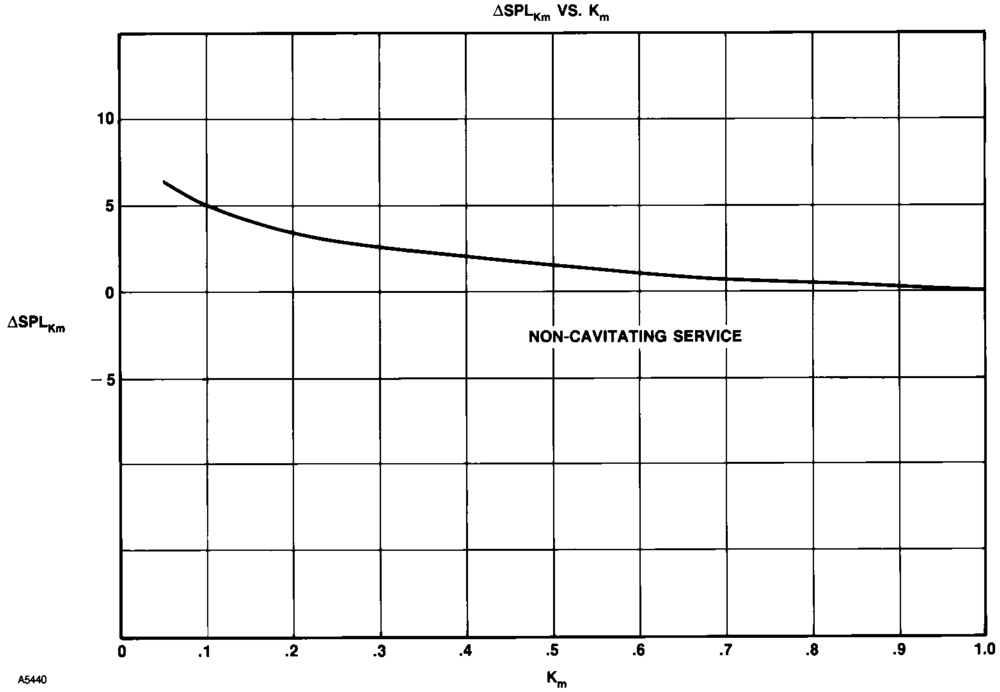


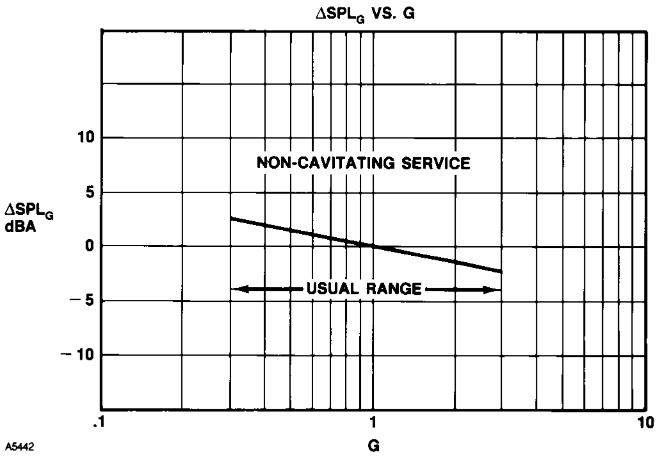
ΔSPL_K

Nominal Pipe Size, NPS	Pipe Schedule												
	10	20	30	40	60	80	100	120	140	160	STD	XS	XXS
1	- - -	- - -	- - -	-48.8	- - -	-52.1	- - -	- - -	- - -	-56.1	-48.8	-52.1	-61.1
1-1/2	- - -	- - -	- - -	-42.8	- - -	-46.1	- - -	- - -	- - -	-49.9	-42.8	-46.1	-54.3
2	- - -	- - -	- - -	-38.7	- - -	-42.8	- - -	- - -	- - -	-47.7	-39.3	-42.6	-50.6
3	- - -	- - -	- - -	-35.9	- - -	-39.2	- - -	- - -	- - -	-43.1	-35.9	-39.2	-46.7
4	- - -	- - -	- - -	-32.9	- - -	-36.3	- - -	-38.9	- - -	-40.9	-32.9	-36.3	-43.5
6	- - -	- - -	- - -	-29.5	- - -	-33.5	- - -	-36.1	- - -	-38.5	-29.5	-33.5	-40.4
8	- - -	-25.7	-26.6	-27.9	-30.1	-32.0	-33.6	-35.4	-36.6	-37.7	-27.9	-32.0	-37.3
10	- - -	-23.5	-25.4	-26.9	-29.8	-31.4	-33.1	-34.7	-36.3	-37.4	-26.9	-29.8	- - -
12	- - -	-22	-24.5	-26.3	-29.3	-31.1	-33.0	-34.6	-35.7	-37.2	-25.6	-28.2	- - -
14	-21.2	-23.1	-24.8	-26.2	-28.9	-31.1	-33.1	-34.4	-35.9	-37	-24.8	-27.4	- - -
16	-20.0	-22	-23.6	-26.2	-28.6	-30.9	-32.8	-34.4	-35.9	-36.9	-23.6	-26.2	- - -
18	-19	-21	-24	-26.2	-28.8	-30.9	-32.8	-34.4	-35.6	-36.9	-22.6	-25.2	- - -
20	-18.2	-21.8	-24.3	-25.8	-28.7	-30.8	-32.8	-34.3	-35.8	-36.9	-21.8	-24.3	- - -
24	-16.7	-20.3	-23.9	-25.8	-28.7	-30.8	-32.9	-34.5	-35.7	-37.0	-20.3	-22.8	- - -
30	-16.9	-21.1	-23.1	- - -	- - -	- - -	- - -	- - -	- - -	- - -	-18.6	-21.1	- - -
36	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	-17.2	-19.7	- - -
42	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	-16.1	-18.6	- - -
44	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	-15.7	-18.3	- - -
48	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	-15.1	-17.6	- - -
52	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	-14.6	-17.1	- - -
56	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	-14.1	-16.6	- - -
60	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	-13.6	-16.1	- - -

ΔSPL_{AR} vs AR and ΔSPL_{Km} vs K_m






ΔSPL_G VS. G
10
5
0
− 5
− 10
ΔSPL_G dBA
NON-CAVITATING SERVICE
USUAL RANGE
.1
1
10
G
A5442

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