

Fisher® 461

Increased Outlet Angle Sweep-Flo Valve

The Fisher 461 Sweep-Flo valve, figure 1, is a self-cleaning, increased outlet, angle valve that is typically used in the chemical and hydrocarbon industries where control of residual oils or other liquids with coking properties is necessary. The 461 features a venturi-type throat, which is useful in power plants or slurry services where high pressure drops and flashing might exist. Typical trim materials include an S44004 stainless steel plug, an S31600 stainless steel with CoCr-A hardfaced seat ring, and a hardened S41600 stainless steel liner.

For increased protection, the 461 valve is offered with tungsten carbide trim. Use this trim only in the most severe abrasive conditions or in moderately corrosive environments.

Tungsten carbide inserts are used for the plug tip, seat ring, and the seat ring retainer. Typically, S17400 stainless steel is used as the base material.

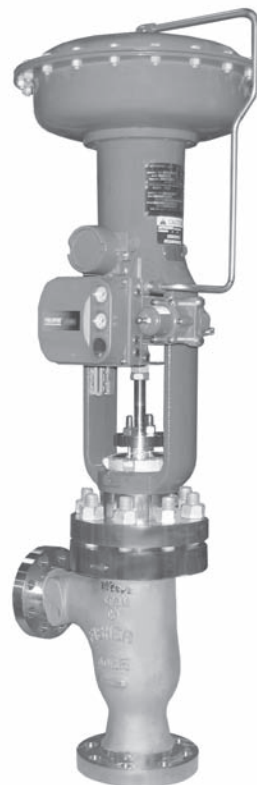
Features

- **Flashing, Outgassing, and Cavitation**

Control—Increased outlet size reduces outlet fluid velocity to reduce flashing, outgassing, and cavitation damage with proper trim material selection.

- **Flow Characteristic**—Special cylinder-guided contour valve plug furnishes an equal percentage Micro-Form flow characteristic in the 12.7 to 31.8 mm (0.5 to 1.25 inch) port size and a modified parabolic flow characteristic in the 38.1 to 114.3 mm (1.5 to 4.5 inch) port size.

- **Availability**—NPS 2x3, 3x4, 4x6, and 6x8 valves are available with either flanged or welding ends in ratings from CL150 to 1500. NPS 2x3, 3x4, and 4x6 valves are available with CL2500 rating. See figure 2.



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Figure 1. Fisher 461 Valve with 657 Actuator

- **Flushing Connection**—Connection on the side of the valve is furnished for flushing oil between liner and valve plug guide to prevent buildup of coke. An optional bonnet purge connection is also available with extension bonnet.

- **Extended Trim Life**—Tungsten carbide trim is available for the most severe conditions and may extend the life of your trim.

- **Excellent Sealing Capability**—ENVIRO-SEAL™ packing systems (figure 5) provide an improved stem seal to help prevent the loss of process fluid. These packing systems feature PTFE or Graphite ULF packing with live-loading for reduced packing maintenance.



Table 1. Maximum Trim Size and Flow Coefficients

VALVE SIZE, NPS	PORT DIAMETER		MAXIMUM PLUG TRAVEL		STEM SIZE		C _v AT MAXIMUM TRAVEL
	mm	Inches	mm	Inches	mm	Inches	
2x3	12.7	0.5	19	0.75	19	0.75	11.7
	19.1	0.75	19	0.75	19	0.75	25.4
	25.4	1	19	0.75	19	0.75	41.1
	31.8	1.25	29	1.125	19	0.75	74.9
	38.1	1.5	29	1.125	19	0.75	100
	41.3	1.625	29	1.125	19	0.75	106
3x4	25.4	1	19	0.75	19	0.75	45.2
	31.8	1.25	29	1.125	19	0.75	79.4
	38.1	1.5	29	1.125	19	0.75	104
	44.5	1.75	29	1.125	19	0.75	112
	50.8	2	29	1.125	19	0.75	122
	57.2	2.25	29	1.125	19	0.75	122
4x6	50.8	2	29	1.125	25.4	1	191
	57.2	2.25	29	1.125	25.4	1	217
	63.5	2.5	38	1.5	25.4	1	311
	69.9	2.75	38	1.5	25.4	1	331
	76.2	3	38	1.5	25.4	1	331
6x8	76.2	3	38	1.5	25.4	1	342
	88.9	3.5	51	2	25.4	1	475
	101.6	4	51	2	25.4	1	605
	114.3	4.5	51	2	25.4	1	764

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Special Constructions Available

- Extension bonnet to reduce conduction of heat to packing and actuator.
- Pressure equalization piping from valve inlet to the area above the valve plug is available to flush coke out of the extension bonnet cavity and back into the flowstream as the valve plug opens.
- Valve outlet extension nozzle can be provided to further reduce cavitation and erosion damage in tank-mounted installations.

Actuator Combinations

The 461 valve can be combined with Fisher 657 direct-acting, 667 reverse-acting, or 585C piston actuators. See the appropriate actuator bulletin.

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Table 2. Typical Trim Combinations⁽¹⁾

TRIM DESIGNATION	VALVE BODY MATERIAL	VALVE PLUG	SEAT RING	LINER (GUIDE CYLINDER)	RETAINER	TEMPERATURE CAPABILITIES			
						°C		°F	
						Min	Max	Min	Max
401	WCC WC9 SA-217-C5	S44004 HT	S31600/ CoCr-A	S41600 HT	416	-29	427	-20	800
402	WCC	S31600/ CoCr-A	S31600/ CoCr-A	S31600/ CoCr-A/ Chrome Coated	316/CoCr-A	-29	427	-20	800
403	CF8M CF8C	S31600/ CoCr-A	S31600/ CoCr-A	S31600/ CoCr-A/ Chrome Coated	316/CoCr-A	-198	593	-325	1100
404	WCC	17-4 SST/CoCr-A Tungsten Carbide	17-4 SST Tungsten Carbide	S41600 HT	17-4/ Tungsten Carbide	-29	427	-20	800
405	CF8M CF8C	N07718/CoCr-A Tungsten Carbide	N07718 Tungsten Carbide	S31600/ CoCr-A/ Chrome Coated	N07718/ Tungsten Carbide	-29	482	-20	900

1. Additional materials are available. Consult your local Emerson Process Management sales office for assistance.

Table 3. Construction Materials and Temperature Capabilities

PART	MATERIAL	TEMPERATURE CAPABILITIES					
		°C		°F			
		Minimum	Maximum	Minimum	Maximum		
Valve plug stem	S20910 (standard)	(1)	(1)	(1)	(1)		
	N07718 HT	(1)	(1)	(1)	(1)		
	S31600	(1)	417	(1)	800		
	Stud Nut Material	Body Material					
Valve Body-to-bonnet bolting	Studs Nuts	SST GR 660 Studs Steel SA194-7 Nuts	CF8M	-29	538	-20	1000
	Studs Nuts	Steel SA193-B7 Studs Steel SA194-2H Nuts	WCC, WC9, and SA-217-C5	-29	427	-20	800
			CF8M	-48	232	-55	450
Studs Nuts	SST SA479-XM-19 Studs Steel SA194-7 Nuts	CF8M and S31600	-46	593	-50	1100	
Body to bonnet gasket	Metal jacketed gasket N04400	(1)	(1)	(1)	(1)		
Packing	PTFE V-ring	-40	232	-40	450		
	Graphite ribbon filament (oxidizing service to 371°C [700°F])	-73	538	-100	1000		
	Graphite ULF (non-environmental service)	-198	538	-325	1000		
Packing follower, spring, or lantern ring	S31600 stainless steel	-198	593	-325	1100		
Packing box ring	S31600 stainless steel	-198	593	-325	1100		
Packing flange, studs, or nuts	S31600 stainless steel	-198	593	-325	1100		

1. These materials are not limiting factors.

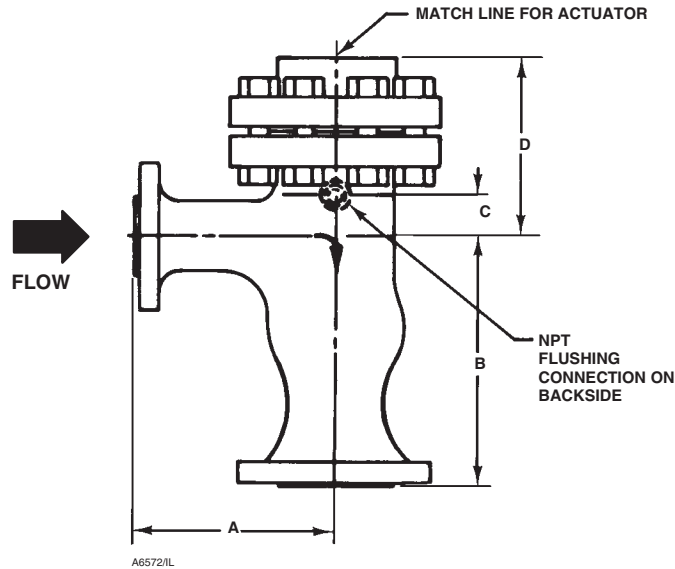


Figure 2. Dimensions (also see tables 4, 5, and 6)

Table 4. CL300 and CL600 Dimensions

SIZE	NPT	A INLET FLANGE				B OUTLET FLANGE				D ⁽¹⁾ STANDARD BONNET		D ⁽¹⁾ RADIATION FIN BONNET		C
		300 RF	300 RTJ	600 RF	600 RTJ	300 RF	300 RTJ	600 RF	600 RTJ	Yoke Boss Size		Yoke Boss Size		
										3-9/16	5	3-9/16	5	
mm														
2 x 3	1/2-14	213	221	222	224	283	291	292	294	200	318	364	421	13
3 x 4	1/2-14	238	246	248	249	337	344	349	351	267	321	377	435	24
4 x 6	3/4-14	241	249	254	256	425	433	443	445	283	419	441	500	13
6 x 8	3/4-14	305	313	322	324	533	541	554	556	---	---	522	579	44
Inch														
2 x 3	1/2-14	8.38	8.69	8.75	8.81	11.13	11.44	11.50	11.56	7.88	12.50	14.32	16.56	0.50
3 x 4	1/2-14	9.38	9.69	9.75	9.81	13.25	13.56	13.75	13.81	10.51	12.63	14.83	17.13	0.94
4 x 6	3/4-14	9.50	9.81	10.00	10.06	16.75	17.06	17.44	17.50	11.13	16.49	17.38	19.69	0.50
6 x 8	3/4-14	12.00	12.31	12.69	12.75	21.00	21.31	21.81	21.88	---	---	20.56	22.81	1.75

1. This is the largest dimension that is provided.

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Table 5. CL900 and CL1500 Dimensions

SIZE	NPT	A INLET FLANGE				B OUTLET FLANGE				D ⁽¹⁾ STANDARD BONNET		D ⁽¹⁾ RADIATION FIN BONNET		C
		900 RF	900 RTJ	1500 RF	1500 RTJ	900 RF	900 RTJ	1500 RF	1500 RTJ	Yoke Boss Size		Yoke Boss Size		
										3-9/16	5	3-9/16	5	
mm														
2 x 3	1/2-14	241	243	241	243	297	298	306	308	284	284	386	443	25
3 x 4	1/2-14	254	256	264	265	356	357	365	367	305	378	354	477	38
4 x 6	3/4-14	295	297	305	306	433	435	461	464	---	457	500	557	51
6 x 8	3/4-14	---	---	381	383	---	---	579	583	---	572	---	608	25
Inch														
2 x 3	1/2-14	9.50	9.56	9.50	9.56	11.69	11.75	12.06	12.13	11.19	11.18	15.19	17.44	1.00
3 x 4	1/2-14	10	10.06	10.38	10.44	14	14.06	14.38	14.44	12.00	14.88	13.94	18.76	1.50
4 x 6	3/4-14	11.63	11.69	12	12.06	17.06	17.13	18.13	18.25	---	18.00	19.69	21.94	2.00
6 x 8	3/4-14	---	---	15.00	15.06	---	---	22.81	22.94	---	22.50	---	23.94	1.00

1. This is the largest dimension that is provided.

Table 6. CL2500 Dimensions

SIZE	NPT	A INLET FLANGE		B OUTLET FLANGE		D ⁽¹⁾ STANDARD BONNET		D ⁽¹⁾ RADIATION FIN BONNET		C
		2500 RF	2500 RTJ	2500 RF	2500 RTJ	Yoke Boss Size		Yoke Boss Size		
						3-9/16	5	3-9/16	5	
mm										
2 x 3	1/2-14	260	262	327	330	276	419	443	502	32
3 x 4	1/2-14	327	330	367	372	414	437	530	584	32
4 x 6	3/4-14	375	379	461	467	---	468	---	---	51
Inch										
2 x 3	1/2-14	10.25	10.31	12.88	13	10.88	16.49	17.44	19.75	1.25
3 x 4	1/2-14	12.88	13	14.44	14.63	16.31	17.19	20.87	23.00	1.25
4 x 6	3/4-14	14.75	14.94	18.13	18.38	---	18.43	---	---	2.00

1. This is the largest dimension that is provided.

Table 7. Approximate Weights (includes valve body and bonnet)

VALVE SIZE, NPS	PRESSURE RATING	WEIGHT	
		kg	lb
2x3	CL300	100	219
	CL600	100	219
	CL900	120	265
	CL1500	136	300
	CL2500	168	370
3x4	CL300	130	286
	CL600	130	286
	CL900	152	335
	CL1500	169	371
	CL2500	286	630
4x6	CL300	218	480
	CL600	228	502
	CL900	405	890
	CL1500	448	985
	CL2500	673	1481
6x8	CL300	327	720
	CL600	382	841
	CL900	694	1526
	CL1500	776	1707

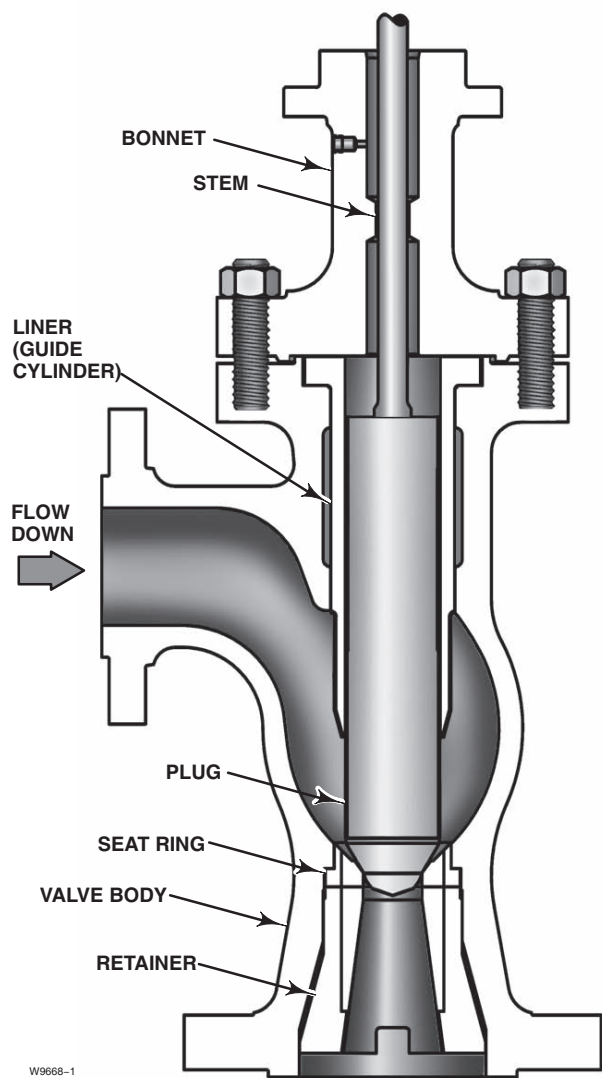


Figure 3. Fisher 461 Valve – Closed

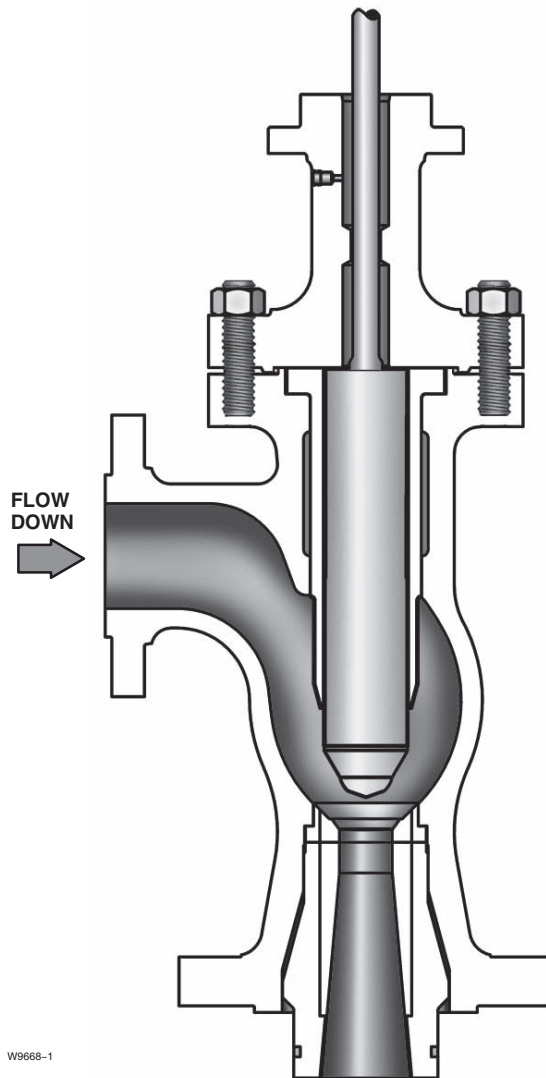
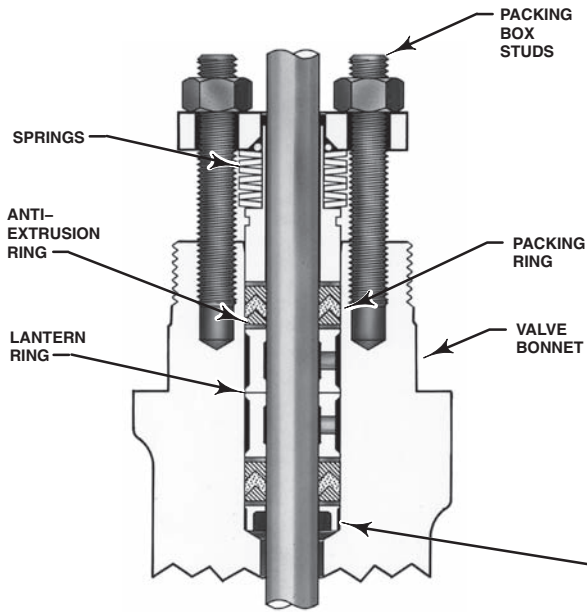
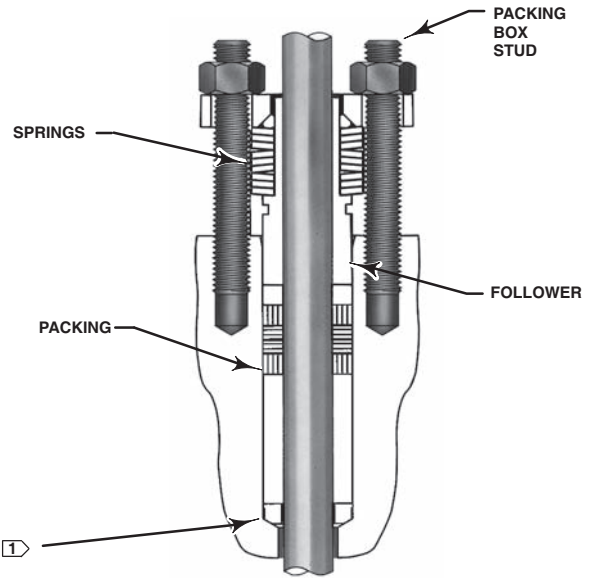


Figure 4. Fisher 461 Valve with Extended Retainer – Open



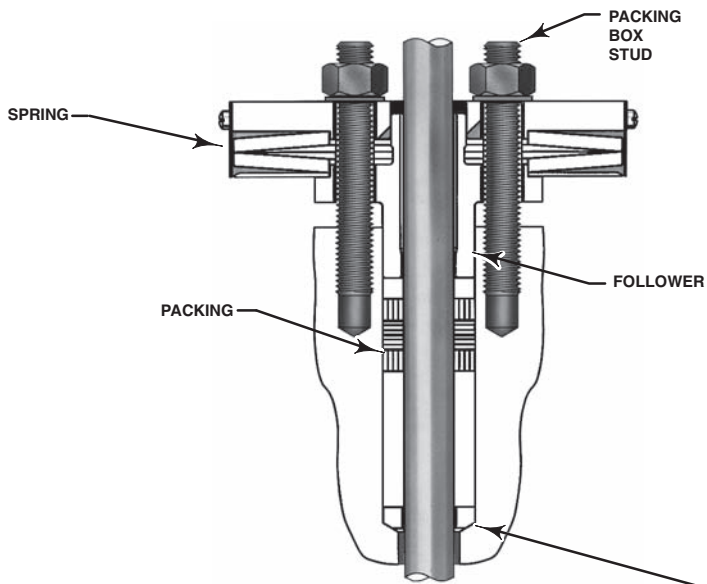
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TYPICAL ENVIRO-SEAL PACKING SYSTEM WITH PTFE PACKING



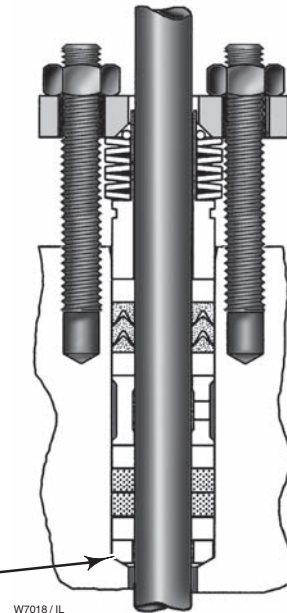
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TYPICAL ENVIRO-SEAL PACKING SYSTEM WITH GRAPHITE ULF PACKING



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TYPICAL HIGH-SEAL PACKING SYSTEM WITH GRAPHITE ULF PACKING

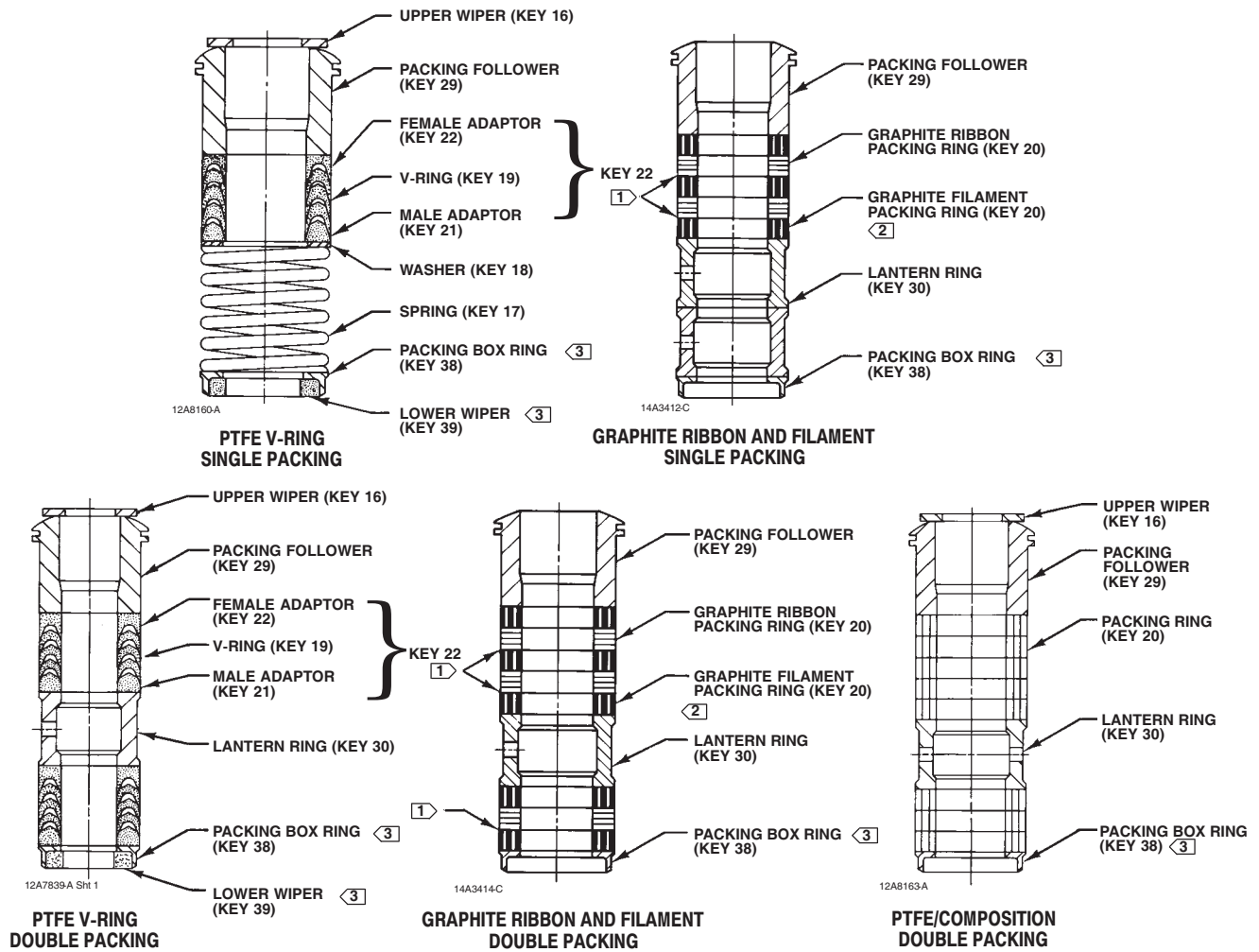


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TYPICAL ENVIRO-SEAL PACKING SYSTEM WITH DUPLEX PACKING

① FOR A FLAT BOTTOM PACKING BOX, THE PACKING BOX RING AND LOWER WIPER ARE NOT NEEDED.

Figure 5. ENVIRO-SEAL and HIGH-SEAL Packing Systems



NOTES:

- ① 0.102 mm (0.004 INCH) THICK SACRIFICIAL ZINC WASHERS. USE ONLY ONE BELOW EACH GRAPHITE RIBBON RING.
- ② HAS THE APPEARANCE OF A WOVEN OR BRAIDED RING.
- ③ FOR A FLAT BOTTOM PACKING BOX, THESE PARTS ARE NOT NEEDED.

C0747-1 / IL

Figure 6. Packing Arrangements

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Coefficients

Table 8. Fisher 461 (Flow Down)

461 - Flow Down																
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 x 3	12.7	0.5 ⁽²⁾	19	0.75	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	0.75 ⁽²⁾	19	0.75	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	0.75	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	1.25 ⁽²⁾	29	1.125	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	1.5 ⁽³⁾	29	1.125	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	1.625 ⁽³⁾	29	1.125	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	0.75	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	1.25 ⁽²⁾	29	1.125	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	1.5 ⁽³⁾	29	1.125	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	1.75 ⁽³⁾	29	1.125	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	1.125	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	2.25 ⁽³⁾	29	1.125	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	---

-continued-

Table 8. Fisher 461 (Flow Down) (continued)

461 - Flow Down (continued)																
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 x 6	50.8	2 ⁽³⁾	29	1.125	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	2.25 ⁽³⁾	29	1.125	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	2.5 ⁽³⁾	38	1.5	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	2.75 ⁽³⁾	38	1.5	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	1.5	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	1.5	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	3.5 ⁽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	4.5 ⁽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.

Specifications

Available Valve Sizes

See table 1

End Connections

■ CL150 to CL2500 raised-face (RF), ■ ring type joint (RTJ) or buttweld end (BWE)

Maximum Inlet Pressures and Temperatures⁽¹⁾

Consistent with applicable pressure/temperature rating according to ASME B16.34 ratings unless limited by temperature capabilities (see table 2)

Shutoff Classifications per ANSI/FCI 70-2 and IEC 60534-4

■ Class IV (standard), ■ Class V (optional)

Construction Materials

See table 2

Temperature Capabilities

Valve Body/Trim Combinations: See table 2

All Other Parts: See table 3

Flow Characteristic

■ Equal percentage (NPS 1/2 to 1-1/4 port sizes)

■ Modified parabolic flow (NPS 1-1/2 to 4-1/2 port sizes)

Flow Direction

Flow down (pressure tends to close)

Port Diameters, Valve Plug Travels, and Stem Sizes

See table 1

Typical Bonnet Styles

■ Plain (standard)

■ Extension (high temperature applications)

1. The pressure/temperature limits in this bulletin and any applicable standard or code limitation for valve should not be exceeded.

Note

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