

# Type A41 High-Performance Butterfly Valve

The Type A41 valve (figure 1) features an eccentrically mounted disc with a soft or stainless steel seal ring. Soft seals provide excellent sealing capabilities in both flow directions. The metal seal ring provides excellent shutoff against pressure applied in the recommended flow direction for both liquid and gas applications. The NOVEX and Phoenix III metal seals are available for demanding applications requiring excellent shutoff capabilities. The double D shaft combines with a variety of power and manual actuators to form a reliable, high-performance valve suitable for many power applications requiring tight shutoff.

Unless otherwise noted, all NACE references are to NACE MR0175-2002.

## Features

- **Exceptional Shutoff**—Patented bidirectional soft seal ring (see figure 3) with pressure-assisting action results in exceptional shutoff rates as shown in the specifications.
- **Shaft Retention**—Redundant shaft retention provides added protection. The packing follower and shaft step interact to hold the shaft securely in the valve body (see figure 2).
- **Easy Installation**—The valve body self-centers on the line flange bolts as a fast, accurate means of centering the valve in the pipeline.
- **Sour Service Capability**—Materials are available for applications handling sour fluids and gases. These materials comply with the requirements of NACE MR0175-2002.



W9269

Figure 1. Type A41 Valve

- **Improved Environmental Capabilities**—The optional ENVIRO-SEAL® packing system is designed with improved sealing, guiding, and loading force transmission. The ENVIRO-SEAL packing system can control emissions to below the EPA (Environmental Protection Agency) limit of 100 ppm (parts per million) for valves.
- **Low Cost Maintenance**—Individual disc/shaft components can be replaced after disassembly due to sleeve and taper pin connections (see figure 2).

### Note

**Neither Emerson, Emerson Process Management, nor any of their affiliated entities assumes responsibility for the selection, use and maintenance of any product. Responsibility for the selection, use, and maintenance of any product remains with the purchaser and end-user.**



# A41 Valve

## Specifications

### Valve Sizes and End Connection Styles

- 2, ■ 3, ■ 4, ■ 6, ■ 8, ■ 10, and ■ 12-inch valve sizes available in ■ wafer or ■ single-flanged style (2-inch only in wafer style)

### Maximum Inlet Pressures<sup>(1)</sup>

#### Carbon Steel and Stainless Steel Valve

**Bodies:** Consistent with Class 150 and 300 pressure-temperature ratings per ASME B16.34 unless limited by material temperature capabilities. 2-inch is also consistent with Class 600.

### Maximum Pressure Drops<sup>(1)</sup>

Consistent with Class 150 and 300 pressure/temperature ratings per ASME B16.34 except for PTFE, UHMWPE, and Phoenix III seals that are derated at some higher pressure/temperatures values. (See figure 4.)

### Shutoff Classifications

#### ■ PTFE, Reinforced PTFE, and UHMWPE

**Seal:<sup>(4)</sup>** No visible leakage for this bidirectional seal per MSS SP-61. See figure 5.

■ **2 Inch Metal Seal:** Bidirectional shutoff. 0.001% of maximum valve capacity (1/10) of Class IV per ANSI/FCI 70-2 and IEC 60534-4. Pressure Drop is 740 psig forward and 100 psig reverse.

■ **NOVEX Seal:** For 3 through 12- inch sizes. Unidirectional shutoff is MSS SP-61 in the preferred flow direction. See figure 5.

■ **Phoenix III Seal:** For 3 through 12- inch sizes. No visible leakage for this bidirectional seal per MSS SP-61. See figure 5. For optional Phoenix III Fire-Tested seal<sup>(3)</sup>, consult your Emerson Process Management™ sales office.

### Material Temperature Capabilities<sup>(1)</sup>

**PTFE and Reinforced PTFE Seals:** -46 to 232°C (-50 to 450°F)

**UHMWPE Seal:<sup>(4)</sup>** -18 to 93°C (0 to 200°F)

**2 Inch Metal Seal:** -46 to 538°C (-50 to 1000°F)

**NOVEX Seal:** -46 to 538°C (-50 to 1000°F)

**Phoenix III:** -46 to 232°C (-50 to 450°F)

See table 3 for component temperature ranges

### Construction Materials

Refer to table 3 for standard and optional material selections

### Flow Characteristic

Approximately linear

### Flow Direction

Refer to figure 5.

### Flow Coefficients

See table 2, the section titled Coefficients in this bulletin, and also Catalog 12.

### Noise Levels

See Catalog 12 for sound pressure level prediction

### Disc Rotation

Clockwise to close (when viewing from the drive shaft end) through 90 degrees of disc rotation

### Available Actuators

- Pneumatic piston, ■ manual handwheel or ■ handlever (handlevers are available for Class 150 up to an 8-inch valve, and for Class 300 up to a 6-inch valve)

### Actuator/Valve Action

With a pneumatic actuator, the valve action is reversible. Refer to the information provided in the Installation section and figure 5.

### Valve Classification

Face-to-face dimensions of 3- through 12-inch sizes in Class 150 or 300, and meets API 609 or MSS SP-68 standards for face-to-face dimensions of wafer style and single-flange valves (see figure 7)

(continued)

**Specifications (continued)**

**Mating Flange Capabilities**

All sizes compatible with appropriate Class 150 or 300, and 2- inch also compatible with Class 600, flanges (schedule 80 or lighter, see figure 7, dimension M)

**Shaft Diameters**

See figure 7

**Approximate Weights**

See table 1

**ENVIRO-SEAL Packing**

This optional PTFE or graphite packing system provides improved sealing, guiding, and transmission of loading force to control liquid and gas emissions (see figure 6). See Bulletin 59.3:041 ENVIRO-SEAL Packing Systems for Rotary Valves for more information.

1. The pressure/temperature limits in this bulletin and any applicable standard or code limitation for valve should not be exceeded.
2. Optional Class V shutoff is available by contacting your Emerson Process Management sales office.
3. For component selection and applicable fire-tested standards and codes, consult your Emerson Process Management sales office (see table 2).
4. UHMWPE stands for ultra high molecular weight polyethylene.

Table 1. Valve Weights

VALVE SIZE, INCHES	WAFER STYLE		SINGLE-FLANGE	
	Class 150	Class 300	Class 150	Class 300
<b>Kilograms</b>				
2	4	4	---	---
3	5	6	6	11
4	9	10	11	18
6	13	15	16	27
8	21	24	27	42
10	34	44	40	78
12	49	64	62	131
<b>Pounds</b>				
2 <sup>(1)</sup>	9.5	9.5	---	---
3	10	13	14	25
4	19	23	24	39
6	29	33	35	59
8	47	53	59	93
10	75	96	88	172
12	107	141	137	288

1. Weight of the Class 600 2 Inch valve is the same as the Class 150 and Class 300 values.

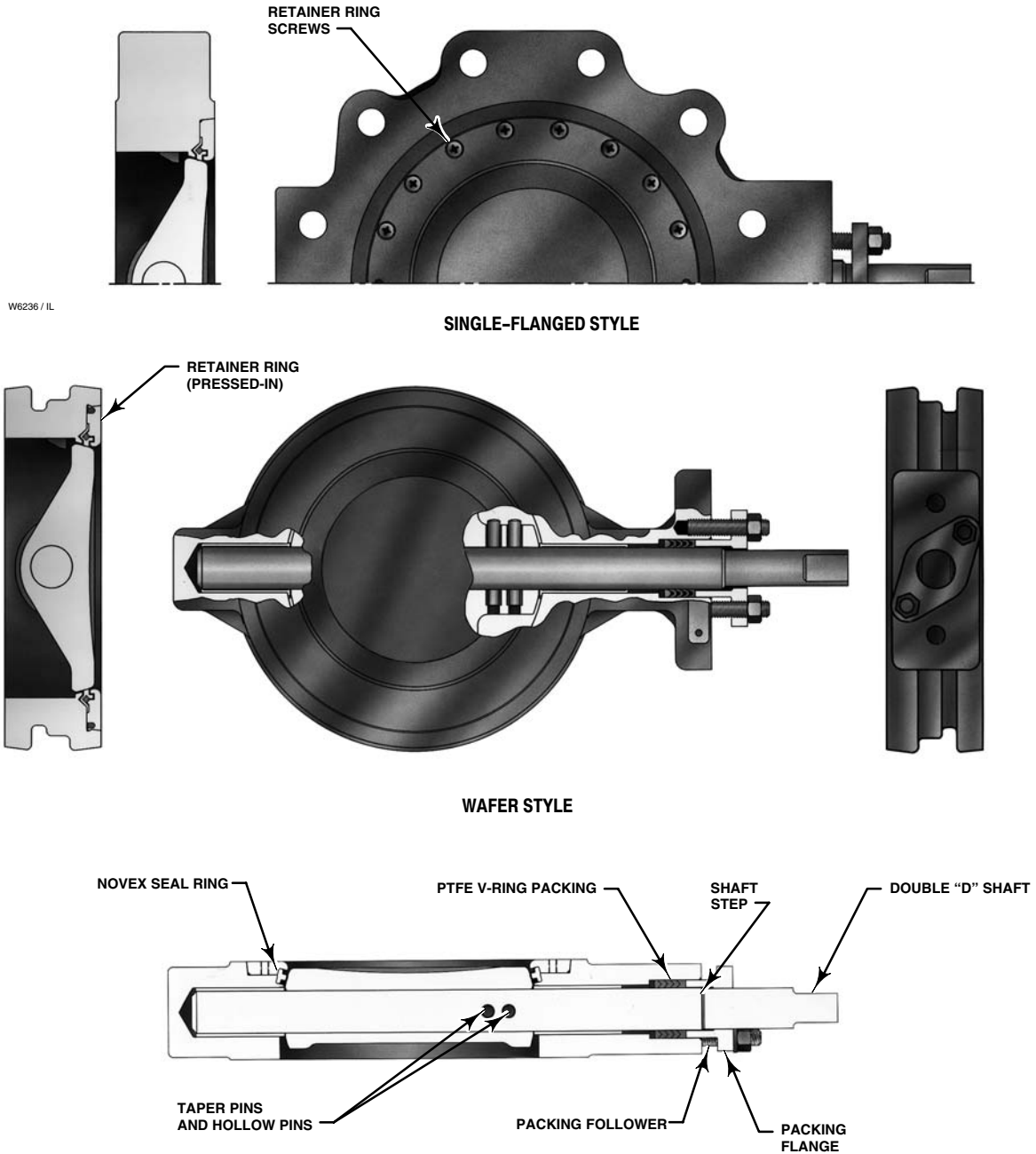


Figure 2. Typical Valve Construction

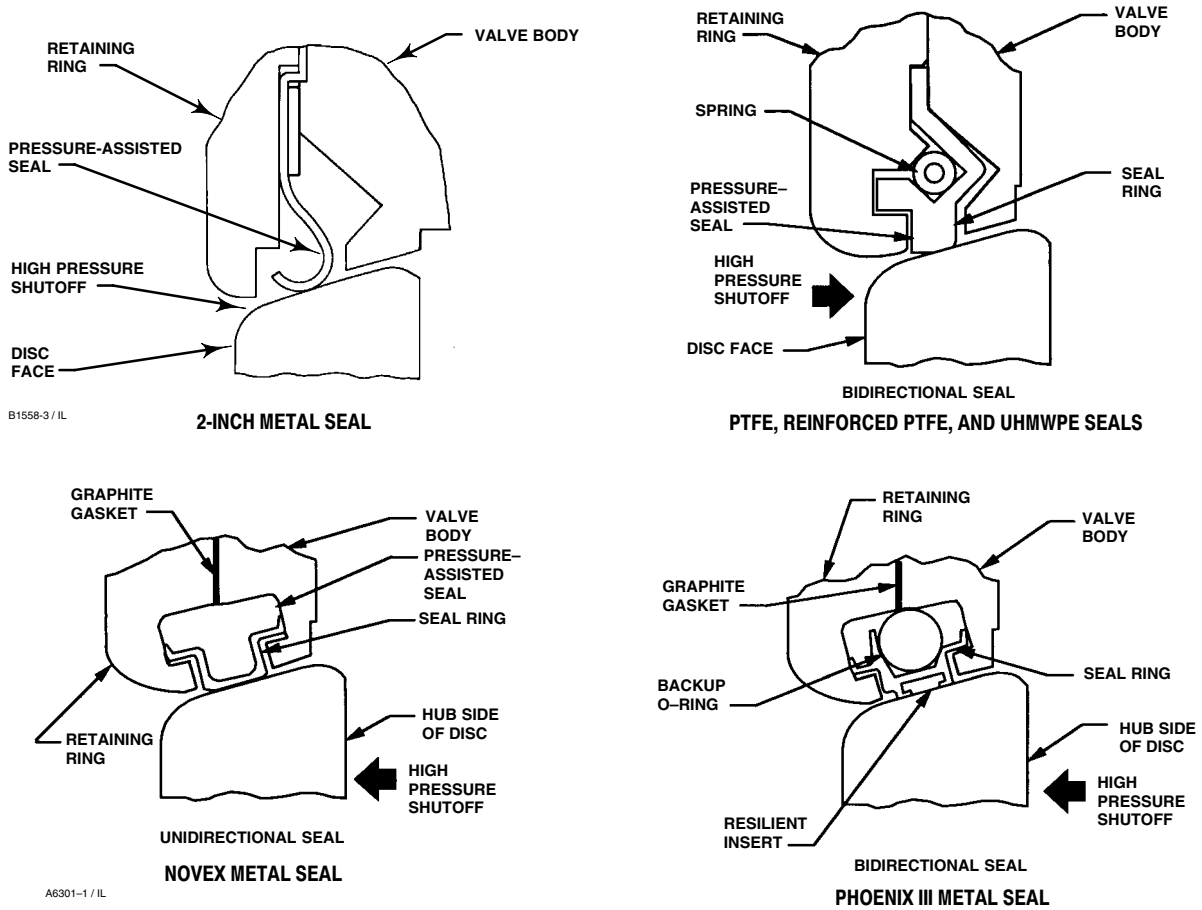
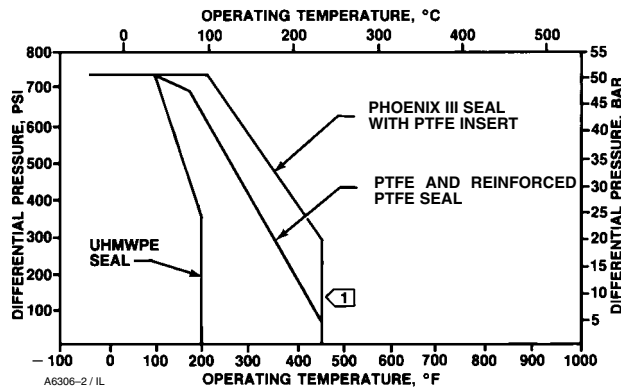


Figure 3. Available Seal Configurations



NOTE:  
 1) TEMPERATURE LIMITATIONS DO NOT ACCOUNT FOR THE ADDITIONAL LIMITATIONS IMPOSED BY THE BACKUP RING USED WITH THIS SEAL. TO DETERMINE THE EFFECTIVE TEMPERATURE LIMITATION OF THE APPROPRIATE SEAL/BACKUP RING COMBINATION, REFER TO TABLE 3.

Figure 4. Maximum Pressure-Temperature Ratings

Table 2. Flow Coefficients<sup>(1)</sup>

VALVE SIZE, INCHES	C <sub>v</sub> FORWARD FLOW WITH DISC WIDE OPEN (90 DEGREES ROTATION)	
	Class 150	Class 300
2	80.2	80.2
3	286	237
4	499	488
6	1250	1110
8	2180	2070
10	3600	3480
12	5400	5130

1. Refer to the section titled Coefficients in this bulletin, and also Catalog 12 for a complete listing of flow coefficients.

Table 3. Construction Material Temperature Limits

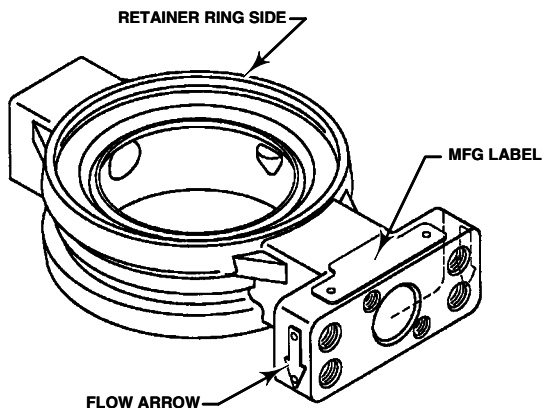
COMPONENTS AND MATERIALS OF CONSTRUCTION	TEMPERATURE LIMITS	
	°C	°F
<b>Valve Body Material</b>		
Carbon Steel	-29 to 427	-20 to 800
S31600	-198 to 538	-325 to 1000
S31700	-198 to 538	-325 to 1000
<b>Disc Material</b>		
316	-198 to 538	-325 to 1000
CG8M	-198 to 538	-325 to 1000
<b>Shaft Material</b>		
S20910	-198 to 538	-325 to 1000
17-4 PH	-62 to 427	-80 to 800
<b>Bearing Material</b>		
PEEK / PTFE lined	-73 to 260	-100 to 500
Metal	-198 to 538	-325 to 1000
<b>Packing Material</b>		
PTFE V-rings	-46 to 232	-50 to 450
Graphite rings	-198 to 438	-325 to 1000
<b>Seal Ring</b>		
PTFE (Standard)	-46 to 232	-50 to 450
Reinforced PTFE Soft Seal Ring	-46 to 232	-50 to 450
UHMWPE Soft Seal Ring	-18 to 93	0 to 200
NOVEX Metal Seal Ring	-46 to 538	-50 to 1000
2-inch Metal Seal ring	-46 to 538	-50 to 1000
Phoenix III Metal Seal Ring		
Fluorocarbon backup ring	-40 to 232	-40 to 450
Phoenix III Fire-Tested <sup>(1)</sup> Metal Seal Ring		
Fluorocarbon backup ring (Specify metal bearings and graphite packing)	(1)	(1)

1. For component selection and applicable fire-tested standards and codes, consult your Emerson Process Management sales office.

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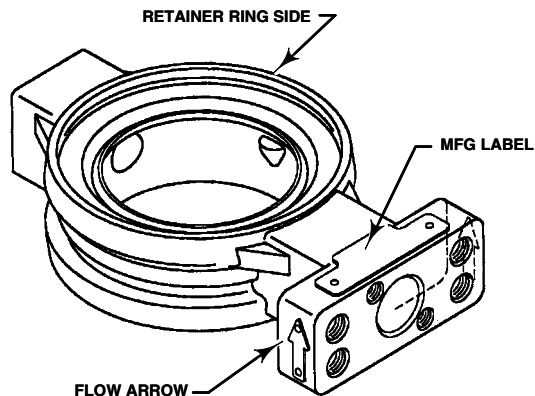
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# A41 Valve



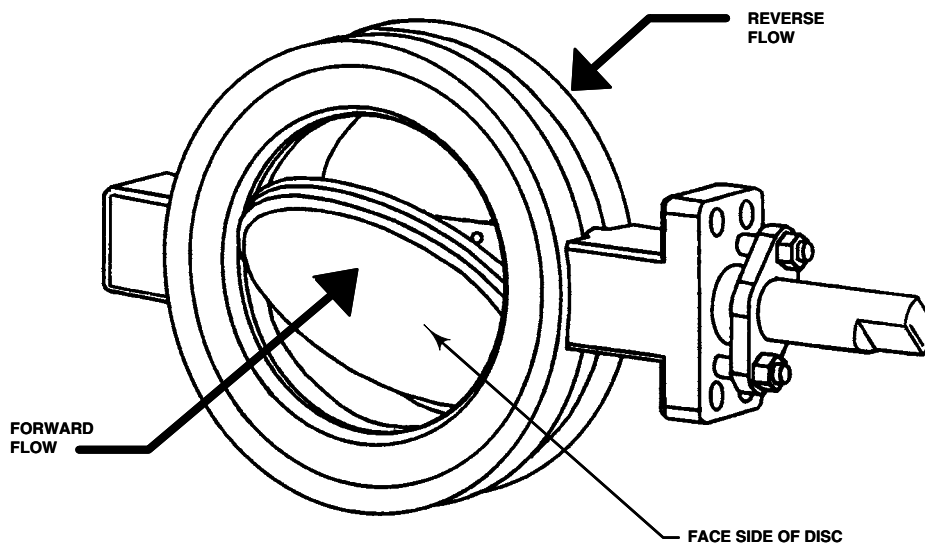
ARROW SHOWS PREFERRED FLOW DIRECTION FOR SOFT SEALS AND 2-INCH METAL SEAL

**FORWARD FLOW**



ARROW SHOWS FLOW DIRECTION FOR NOVEX METAL SEAL, AND PREFERRED FLOW DIRECTION FOR PHOENIX METAL SEAL

**REVERSE FLOW**



**NOTES:**

- 1. BY EMERSON PROCESS MANAGEMENT DEFINITION:  
FORWARD FLOW IS INTO THE FACE SIDE OF THE DISC.  
REVERSE FLOW IS INTO THE HUB SIDE OF THE DISC.

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A6881-2/IL

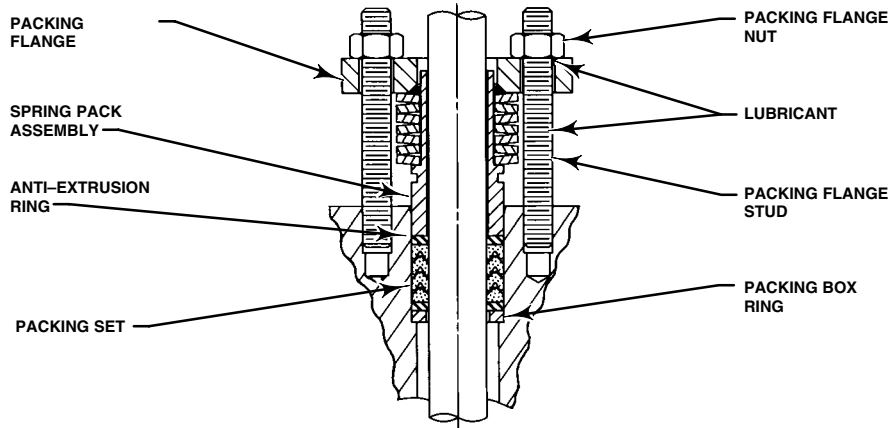
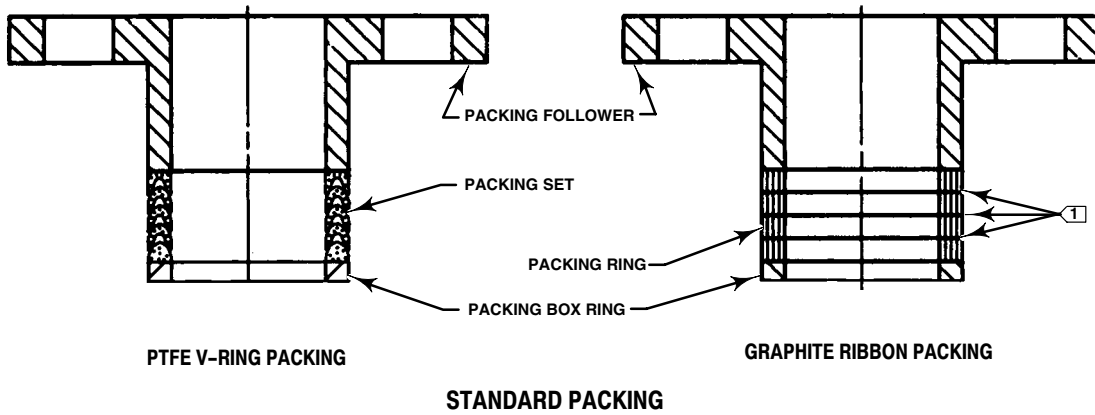
Figure 5. Flow Direction

## Installation

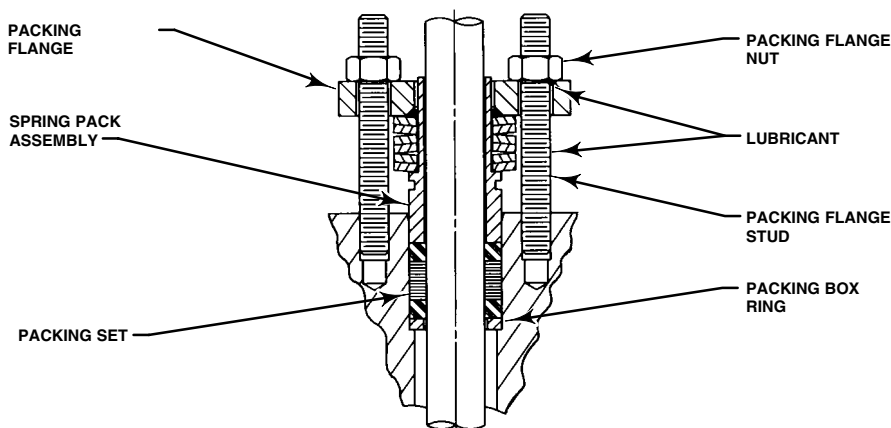
It is recommended that the valve drive shaft be mounted in a horizontal position (the one shown in figure 1 is in a vertical position). Operating conditions may require specific valve/actuator fail action, styles, positions and flow direction. Valves with NOVEX seal rings require mounting in the reverse flow direction. Refer to figure 5. Large valve/actuator assemblies may require additional support because of the combined weight.

**Fail Action:** For actuators with spring returns, spring fail action is available for: fail-to-open or fail-to-close valve action. The valve action is field reversible.

For assistance in selecting the valve/actuator mounting suited to your application, consult your Emerson Process Management sales office. Dimensions for wafer-style and single-flanged valves are shown in figure 7.



ENVIRO-SEAL PTFE PACKING SYSTEM



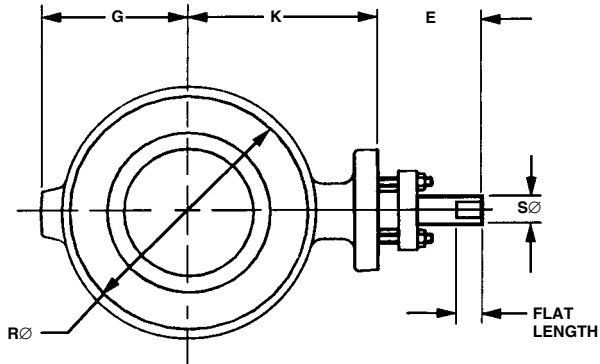
ENVIRO-SEAL GRAPHITE PACKING SYSTEM

NOTE:  
1 INCLUDES ZINC WASHERS FOR GRAPHITE  
RIBBON PACKING ONLY

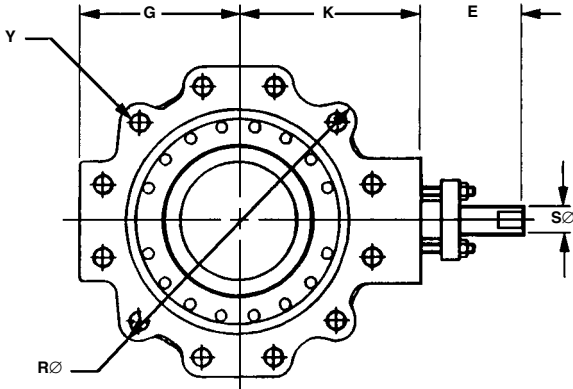
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Figure 6. Packing Arrangements

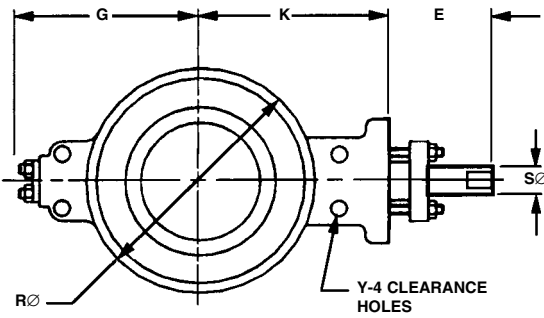
# A41 Valve



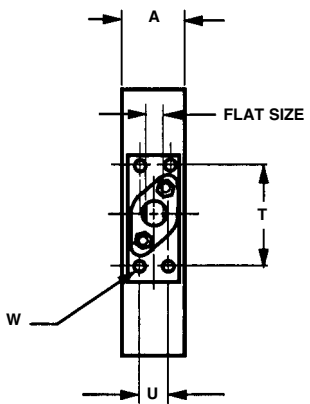
WAFER STYLE VALVE



SINGLE-FLANGE VALVE

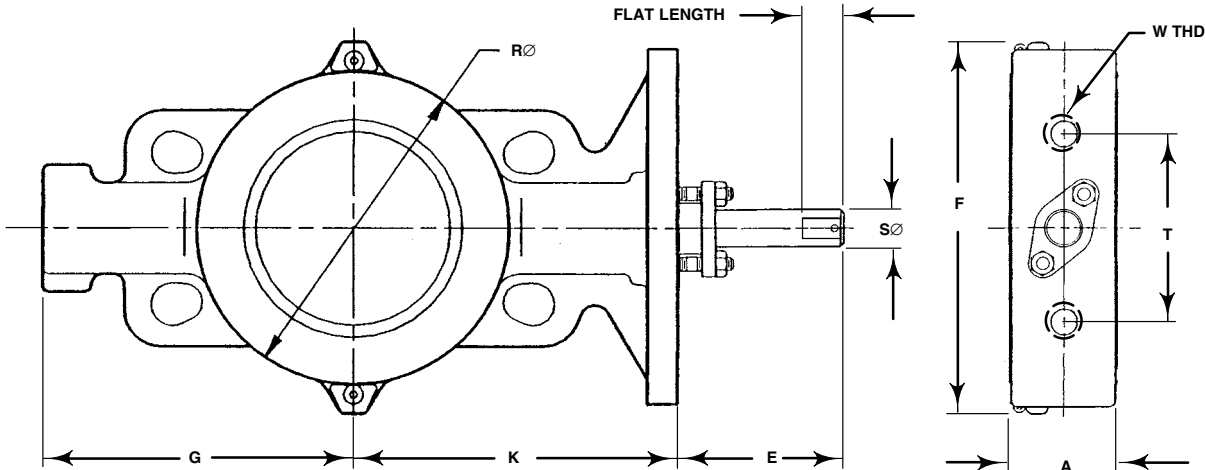


12-INCH CLASS 300 WAFER-STYLE VALVE



TYPICAL VALVE MOUNTING

14B0818-D  
14B0829-D  
14B0830-D  
B2437-2 / IL



2-INCH SIZE A41 WAFER STYLE VALVE

16A3110-E  
16A9075-C  
A7082 / IL

Figure 7. Typical Valve Dimensions (also see tables 4 and 5)

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# A41 Valve

Table 4. Class 150 Valve Dimensions

Valve Size, Inches	A	E	G		K	M <sup>(2)</sup>	R		S <sup>(1)</sup>	Flat Size	Flat Length	T	U	W	Y
			Wafer Style	Single Flange			Wafer Style	Single Flange							Single Flange Only
<b>mm</b>															
2	45	83	102	---	102	---	103	---		9.50	25.4	79	---	See thread information below	---
3	48	83	70	79	121	73	133	189	12.7	9.50	25.4	83	19		See thread information below
4	54	83	86	102	124	97	171	219	15.9	11.07	25.4	83	19		
6	57	83	121	129	152	146	219	273	19.1	14.25	25.4	95	25		
8	64	83	155	157	181	191	272	333	25.4	17.45	25.4	95	25		
10	71	89	186	198	229	238	330	406	31.8	20.60	25.4	133	38		
12	81	89	222	230	254	284	387	476	38.1	25.37	38.1	133	38		
<b>Inches</b>															
2	1.78	3.25	4.00	---	4.00	1.88	4.06	---	1/2	0.374	1	3.12	---	1/2-13	---
3	1.88	3.25	2.75	3.12	4.00	2.88	5.25	7.44	1/2	0.374	1	3.25	0.75	3/8-16	5/8-11 4-holes
4	2.12	3.25	3.38	4.00	4.88	3.81	6.75	8.62	5/8	0.436	1	3.25	0.75	3/8-16	5/8-11 8-holes
6	2.25	3.25	4.75	5.06	6.00	5.75	8.62	10.75	3/4	0.561	1	3.75	1.00	1/2-13	3/4-10 8-holes
8	2.50	3.25	6.12	6.19	7.12	7.50	10.69	13.12	1	0.687	1	3.75	1.00	1/2-13	3/4-10 8-holes
10	2.81	3.50	7.31	7.81	9.00	9.38	13.00	16.00	1-1/4	0.811	1	5.25	1.50	5/8-11	7/8-9 12-holes
12	3.19	3.50	8.75	9.06	10.00	11.19	15.25	18.75	1-1/2	0.999	1.5	5.25	1.50	5/8-11	7/8-9 12-holes

1. This nominal valve shaft diameter is the shaft diameter through the packing box. Use this diameter when selecting Fisher actuators.  
2. Disc chordal swing diameter at valve face. Please verify clearance with piping.

Table 5. Class 300 Valve Dimensions

Valve Size, Inches	A	E	G		K	M <sup>(2)</sup>	R		S <sup>(1)</sup>	Flat Size	Flat Length	T	U	W	Y
			Wafer Style	Single Flange			Wafer Style	Single Flange							Single Flange Only
<b>mm</b>															
2	45	83	102	---	102	---	103	---		9.50	25.4	79	---	See thread information below	---
3	48	83	89	95	119	73	132	206	15.7	11.07	25.4	83	19		See thread information below
4	54	83	114	121	146	97	162	238	19.0	14.25	25.4	95	25		
6	59	83	146	152	178	145	221	308	25.4	17.45	25.4	95	25		
8	73	89	175	183	210	188	276	375	31.8	20.60	25.4	133	38		
10	83	89	232	229	243	233	330	438	38.1	25.37	38.1	133	38		
12	92	89	308	308	279	278	389	508	44.4	28.55	38.1	146	38		
<b>Inches</b>															
2	1.78	3.25	4.00	---	4.00	1.88	4.06	---	1/2	0.374	1	3.12	---	1/2-13	---
3	1.88	3.25	3.50	3.75	4.69	2.88	5.19	8.12	5/8	0.436	1	3.25	0.75	3/8-16	3/4-10 8-holes
4	2.12	3.25	4.50	4.75	5.75	3.81	6.38	9.38	3/4	0.561	1	3.75	1.00	1/2-13	3/4-10 8-holes
6	2.31	3.25	5.75	6.00	7.00	5.69	8.69	12.12	1	0.687	1	3.75	1.00	1/2-13	3/4-10 12-holes
8	2.88	3.50	6.88	7.19	8.25	7.38	10.88	14.75	1-1/4	0.811	1	5.25	1.50	5/8-11	7/8-9 12-holes
10	3.25	3.50	9.12	9.00	9.56	9.19	13.00	17.25	1-1/2	0.999	1.5	5.25	1.50	5/8-11	1-8 16-holes
12	3.62	3.50	12.12	12.12	11.00	10.94	15.31	20.00	1-3/4	1.124	1.5	5.75	1.50	3/4-10	1 1/8-8 16-holes

1. This nominal valve shaft diameter is the shaft diameter through the packing box. Use this diameter when selecting Fisher actuators.  
2. Disc chordal swing diameter at valve face. Please verify clearance with piping.

## Coefficients

Table 6. Type A41 Class 150, Forward Flow

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

1. The 2-inch size is multirated to Class 150, 300 and 600.

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Table 7. Type A41 Class 150, Reverse Flow

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

1. The 2-inch size is multirated to Class 150, 300 and 600.

# A41 Valve

Table 8. Type A41 Class 300, Forward Flow

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

1. The 2-inch size is multirated to Class 150, 300 and 600.

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Table 9. Type A41 Class 300, Reverse Flow

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

1. The 2-inch size is multirated to Class 150, 300 and 600.

## Note

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