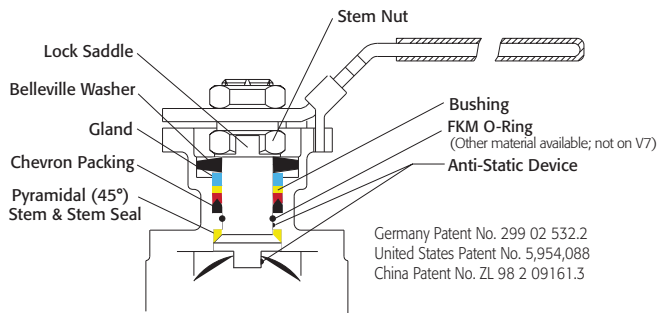


Triac "V" Series Ball Valves are ideal for achieving more precise control with the simplicity and sealing features of a ball valve. We offer 1/2" – 4" in a 3-piece design and 1/2" – 6" flanged. The standard "V" notch options are 15°, 30°, 60° & 90°. While they are available as manual valves, we specialize in automating them to suit your particular control requirements.



**Easy to Automate!**

See automated data sheets for pre-sized assemblies



Pneumatic



Electric



**"V" Series Control Port Ball Valves**

**Sizes 1/2"-4", 3-Piece (V7, V8)**  
 (Utilizes the Series 77 and 88 valve design)

**Sizes 1/2"-4", 150# Flanged (V9, FV9)**  
 (Utilizes the Series 90 valve design)

**Sizes 1/2"-6", 150# & 300# Flanged (VD9, FVD9)**  
 (Utilizes the Series D9 valve design)

**Sizes 1/2"-8", 150# Flanged (VL2)**  
 (Utilizes the Series L2 valve design)

**316SST or WCB (Other Materials Available)**

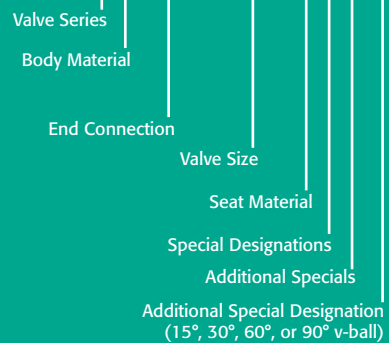
**15°, 30°, 60° & 90° "V" Notch Standard**

Others on Request

**HOW TO ORDER MANUAL VALVES**

SAMPLE PART #

**V8C-TH-0200-SXX-3**



See part number matrices for manual and automated options

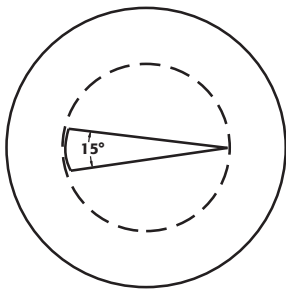
# "V" Series

## V-Notch Options: 15°, 30°, 60°, & 90°

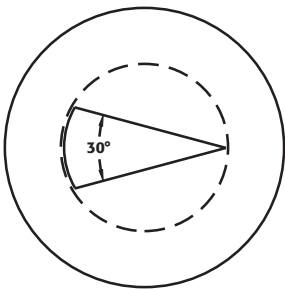
Triac "V" port control valves are available with 15°, 30°, 60°, & 90° V-notch options. V-port valves offer better and more consistent control than traditional round ported ball valves. We offer this valve with the control port cast and machined into the ball, not in the seat. This allows for much better flow characteristics and eliminates the need to replace seats. The 15° and 30° option allows for finer tapered control throughout the valve rotation, and the 60° & 90° offer a larger Cv in addition to controlled flow.



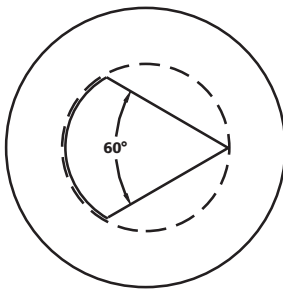
The PTFE seat is standard in the V7 valves, while the 50/50 STFE seat is standard with the V8, V9, and VD9 V-port valves (in all configurations). The 50% 316SST powder and 50% PTFE offers both strength and superior sealing properties. Additionally, we offer a PFA lined V-port ball used for fluid control in a variety of chemical applications.



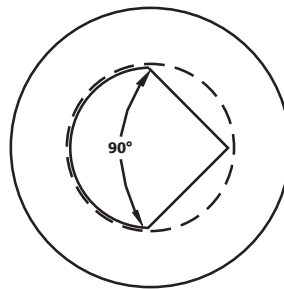
15° V-Port



30° V-Port



60° V-Port



90° V-Port



Note: May be customized; call factory for flow analysis design.

**Percent Open**

Valve Size	Ball Angle	0%	15%	20%	30%	40%	50%	60%	70%	80%	90%	100%
1/2"	15	0	0	0	0	0	0.01	0.06	0.17	0.31	0.52	0.75
	30	0	0	0	0	0	0	0.1	0.3	0.5	0.9	1.5
	60	0	0	0	0	0	0	0.1	0.3	0.8	1.7	3.2
	90	0	0	0	0	0	0	0.2	0.5	1.2	2.5	4.6
3/4"	15	0	0	0	0	0.1	0.29	0.54	0.88	1.27	1.81	2.43
	30	0	0	0	0	0.1	0.4	0.7	1.3	2	3	4.4
	60	0	0	0	0	0.1	0.5	1.1	2	3.4	5.7	9.5
	90	0	0	0	0	0.2	0.6	1.4	2.8	5	9	15.3
1"	15	0	0	0	0.2	0.5	1.1	2.0	2.9	4.0	5.3	7.1
	30	0	0	0	0.2	0.6	1.2	2	3.1	4.5	6.5	8.3
	60	0	0	0	0.2	0.8	1.6	3	5	8	12.3	19.7
	90	0	0	0	0.2	0.9	2.1	3.9	7	11.9	19.6	31.1
1-1/2"	15	0	0	0	0.6	1.6	2.8	4.3	6.3	8.6	11.5	15.0
	30	0	0	0	0.8	2.3	4.2	6.7	9.8	14.4	20.3	29.5
	60	0	0	0	0.9	2.6	4.9	8.3	13.6	22.4	34.2	50
	90	0	0	0	0.9	2.9	6	10.5	18	31.2	50.4	73
2"	15	0	0	0.7	2.5	5.0	7.7	11.2	15.7	21.0	27.3	35.4
	30	0	0	0.7	2.8	5.7	9.1	13.8	20.3	28.4	38.6	54.2
	60	0	0	0.7	3	6.4	11	17.5	28.2	43.9	65.4	104.6
	90	0	0	0.7	3.4	7.4	13.4	22.9	38.4	62.3	98.2	157
2-1/2"	15	0	0	0.1	2.4	5.5	9.6	14.6	20.6	28.7	37.8	49.6
	30	0	0	0.1	2.6	6.5	11.7	18.4	27.9	39.6	54.3	60
	60	0	0	0.1	2.8	7.7	14.6	24.5	40.7	64	97.1	139
	90	0	0	0.2	3.3	9.1	18	32.3	55.4	92.4	149.9	265
3"	15	0	0	0.7	3.7	8	14.2	21.1	30.1	41.1	53.8	69.6
	30	0	0	0.7	3.9	8.6	15.4	24.3	36.3	50.7	70	96.8
	60	0	0	0.7	4.6	11.3	21.1	35	56.4	89.4	134.2	207.1
	90	0	0	0.8	5.7	14.4	27.7	48.1	82.5	136.1	214.7	363.6
4"	15	0	0	3.8	9.2	16.2	25.3	35.9	49.0	65.1	83.1	104.1
	30	0	0	4.3	11.3	20.9	34.9	50.2	72.9	98.6	129.6	177.1
	60	0	0	4.9	14	27.2	46.3	73.2	112.1	170.5	251	375.3
	90	0	0	5.7	17.4	35.1	62.1	101.1	164.2	255.8	399.9	610
<b>F<sub>L</sub></b>		0	0.96	0.95	0.94	0.93	0.92	0.9	0.88	0.86	0.82	0.75
<b>X<sub>T</sub></b>		0	0.98	0.77	0.71	0.67	0.64	0.63	0.62	0.55	0.43	0.4
<b>F<sub>D</sub></b>		0	0.6	0.65	0.71	0.79	0.89	0.92	0.93	0.95	0.97	0.98

**Valve Standards**

V7 3-Piece	
Design	ASME B16.34
End Connections	ASME BPE-2019
Pressure Testing	API 598
Mounting	ISO 5211
Marking System for Valves	MSS SP-25, ISO 5209
CE Approval	PED 2014/68/EU Module H
Material Certification	EN 10204-3.1 MTR
Quality Assurance	ISO 9001:2015

### Percent Open

Valve Size	Ball Angle	0%	15%	20%	30%	40%	50%	60%	70%	80%	90%	100%
1/2"	15	0	0	0	0.1	0.2	0.3	0.5	0.8	1.1	1.5	1.9
	30	0	0.1	0.1	0.2	0.3	0.5	0.8	1.1	1.6	2.2	2.6
	60	0	0.1	0.1	0.3	0.5	0.9	1.4	2	3.3	4.4	6
	90	0	0.1	0.2	0.4	0.6	0.9	1.5	2.2	3.8	5.4	6.9
3/4"	15	0	0	0	0.1	0.3	0.6	1.0	1.5	2.1	2.8	3.6
	30	0	0.1	0.2	0.5	0.7	1.1	1.8	2.4	3.3	4.5	5.4
	60	0	0.1	0.2	0.7	1	1.7	2.8	4	6.5	9	12
	90	0	0.2	0.4	0.8	1.2	2	3.1	4.6	8	11.3	14
1"	15	0	0	0	0.2	0.7	1.4	2.2	3.2	4.5	6	8
	30	0	0.1	0.3	0.8	1.3	2.3	3.5	5.1	8.5	9.8	10
	60	0	0.2	0.4	1.1	1.8	3.4	5.3	7.9	12.3	15.3	21
	90	0	0.2	0.6	1.8	3.4	5.1	8.1	11.4	16	21	29
1-1/4"	15	0	0	0.03	0.6	1.4	2.4	3.6	5.2	7.1	9.4	12
	30	0	0.2	0.4	1.1	2	3.7	5.5	8	10	13	15
	60	0	0.2	0.6	1.8	3	5.5	9.5	12.8	19	26	39
	90	0	0.3	0.8	2	5	8	14	19	28	39	55
1-1/2"	15	0	0	0.3	1.2	2.4	3.9	5.7	7.9	10.7	14	18.1
	30	0	0.3	0.6	1.6	3	5	7.5	11	14	17	20
	60	0	0.4	0.8	2.5	4	8	13	19	27	40	52
	90	0	0.4	0.9	3.5	7	13	20	31	42	63	78
2"	15	0	0	0.8	2.4	4.4	7.0	10.2	14.1	18.8	24.4	30.9
	30	0	0.4	1.2	3.8	6	10	15	23	31	43	60
	60	0	0.4	1.5	4.6	9	16.5	27	39	55	83	110
	90	0	0.5	2	6	12	22	35	45	70	105	135
2-1/2"	15	0	0.0	0.8	3.9	7.1	11.2	16.2	22.3	29.8	38.3	48.1
	30	0	0.4	1	4	8	12	18	28	37	62	75
	60	0	0.4	1.5	5	10	21	34	53	75	103	150
	90	0	0.5	1.7	7	14	28	48	70	106	160	218
3"	15	0	0.4	1	3.9	7.5	13	20	31	41	58	72.2
	30	0	0.5	1.2	4	8	14	23	33	46	65	82
	60	0	0.5	2.5	6	14	25	40	65	91	128	165
	90	0	0.7	3.5	8	18	35	60	90	135	205	310
4"	15	0	0.5	1.5	5	14	25	41.5	56.4	74.7	94.5	118.9
	30	0	0.6	2	6	15	29	48	71	100	130	159
	60	0	0.7	3	11	25	40	59	90	141	212	356
	90	0	1	3.5	16	40	75	125	190	265	442	670
6"	30	0	0.9	3.2	14	33	60	103	155	220	280	350
	60	0	2	5	22	60	110	190	285	416	586	800
	90	0	3	8	35	90	160	280	425	650	970	1,480
<b>F<sub>L</sub></b>		0	0.96	0.95	0.94	0.93	0.92	0.9	0.88	0.86	0.82	0.75
<b>X<sub>T</sub></b>		0	0.98	0.77	0.71	0.67	0.64	0.63	0.62	0.55	0.43	0.4
<b>F<sub>D</sub></b>		0	0.6	0.65	0.71	0.79	0.89	0.92	0.93	0.95	0.97	0.98

V8 3-Piece		V9 Class 150 Flanged		FVD9 Class 300 Flanged	
Design	ASME B16.34	Design	ASME B16.34	Design	ASME B16.34
End Connections	ASME B16.25, B1.20.1, B16.11	Face to Face	ASME B16.10	Face to Face	ASME B16.10
Pressure Testing	API 598	Flange Dimensions	ASME B16.5	Flange Dimensions	ASME B16.5
Mounting	ISO 5211	Pressure Testing	API 598	Pressure Testing	API 598
Marking System for Valves	MSS SP-25, ISO 5209	Mounting	ISO 5211	Fire Testing	API 607 6th Ed. on 1/2"-4" SST & WCB and 6" WCB; API-607 4th Ed. on 6" SST
Material Certification	EN 10204-3.1 MTR	Marking System for Valves	MSS SP-25	Sulfide Stress Protection	NACE MR0175
Quality Assurance	ISO 9001:2015	Material Certification	EN 10204-3.1 MTR	Mounting	ISO 5211
		Quality Assurance	ISO 9001:2015	Marking System for Valves	MSS SP-25
				Material Certification	EN 10204-3.1 MTR
				Quality Assurance	ISO 9001:2015

**VL2 V-Ball Flow Coefficients - Cv Chart**

**Percent Open**

Valve Size	Ball Angle	0%	15%	20%	30%	40%	50%	60%	70%	80%	90%	100%
<b>1/2"</b>	30°	0.0	0.1	0.1	0.2	0.4	0.6	0.9	1.2	1.6	2.0	2.4
	60°	0.0	0.1	0.2	0.4	0.7	1.0	1.5	2.1	2.8	3.7	5.0
	90°	0.0	0.2	0.2	0.6	1.1	1.8	2.7	3.7	4.9	6.3	8.1
<b>3/4"</b>	30°	0.0	0.1	0.1	0.3	0.4	0.7	0.9	1.3	1.8	2.4	3.2
	60°	0.0	0.2	0.3	0.6	1.0	1.6	2.2	2.9	3.9	5.0	6.5
	90°	0.0	0.3	0.4	0.9	1.6	2.6	3.7	5.2	6.9	8.8	11.2
<b>1"</b>	30°	0.0	0.1	0.2	0.4	0.8	1.5	2.2	3.2	4.1	5.3	6.9
	60°	0.0	0.2	0.4	0.9	1.7	2.6	4.1	5.8	8.2	11.0	15.2
	90°	0.0	0.5	0.8	1.7	3.1	4.6	7.0	10.0	13.7	18.6	23.2
<b>1-1/2"</b>	30°	0.0	0.4	0.6	1.0	1.7	2.9	4.6	6.7	9.9	13.5	17.7
	60°	0.0	0.5	0.7	2.0	3.6	6.4	9.9	13.8	19.3	28.0	37.4
	90°	0.0	0.9	1.3	3.3	6.1	10.4	14.8	21.2	29.2	41.2	58.2
<b>2"</b>	30°	0.0	0.5	0.8	1.9	3.1	4.9	6.9	9.5	13.2	17.9	24.4
	60°	0.0	0.7	1.0	2.9	5.4	8.2	12.1	17.7	25.1	34.3	48.4
	90°	0.0	1.1	1.6	4.2	8.1	12.6	18.3	26.9	37.6	53.2	74.6
<b>2-1/2"</b>	30°	0.0	0.7	1.0	2.5	4.2	6.4	9.2	13.3	18.3	24.3	32.3
	60°	0.0	0.9	1.3	4.2	8.4	11.3	17.3	25.1	36.0	52.2	70.0
	90°	0.0	1.5	2.1	6.3	11.9	16.7	24.8	34.0	48.0	64.0	84.0
<b>3"</b>	30°	0.0	1.1	1.6	3.7	7.2	11.6	17.6	24.7	32.4	42.3	52.9
	60°	0.0	1.3	1.9	6.3	12.7	20.4	32.2	47.9	67.0	93.1	122.0
	90°	0.0	2.1	3.0	9.4	19.1	28.6	47.3	73.9	112.5	162.0	225.0
<b>4"</b>	30°	0.0	1.0	1.0	4.5	11.5	20.5	31.5	43.7	58.0	79.0	102.0
	60°	0.0	2.1	2.7	8.5	18.3	31.8	43.0	68.0	104.0	148.6	206.0
	90°	0.0	3.5	4.9	13.4	28.0	45.4	73.0	111.1	166.0	240.0	360.0
<b>6"</b>	30°	0.0	2.6	3.2	8.6	22.0	39.2	60.2	83.5	110.8	150.9	194.8
	60°	0.0	3.9	5.1	16.2	34.9	60.7	82.1	129.9	198.6	283.8	393.5
	90°	0.0	6.8	9.3	25.6	53.5	86.7	139.4	212.2	317.1	458.4	687.6
<b>8"</b>	30°	0.0	3.7	4.2	14.2	36.2	64.6	88.0	137.7	218.0	298.0	421.0
	60°	0.0	6.5	8.4	26.8	57.6	91.0	135.5	214.2	327.6	468.1	723.0
	90°	0.0	11.1	15.4	42.2	88.2	143.0	230.0	350.0	522.9	756.0	1134.0
<b>F<sub>L</sub></b>		0	0.96	0.95	0.94	0.93	0.92	0.9	0.88	0.86	0.82	0.75
<b>X<sub>T</sub></b>		0	0.98	0.77	0.71	0.67	0.64	0.63	0.62	0.55	0.43	0.4
<b>F<sub>D</sub></b>		0	0.60	0.65	0.71	0.79	0.89	0.92	0.93	0.95	0.97	0.98

**Valve Standards**

<b>L2 PFA Lined</b>	
Design	ASME B16.34
Face to Face Dimensions	ASME B16.10
Flange End Connections	ASME B16.5
Pressure Testing	API 598
Material Certification	EN 10204-3.1 MTR
Quality Assurance	ISO 9001:2015

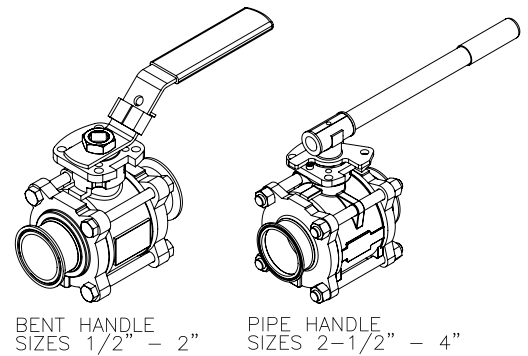
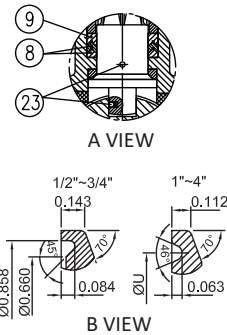
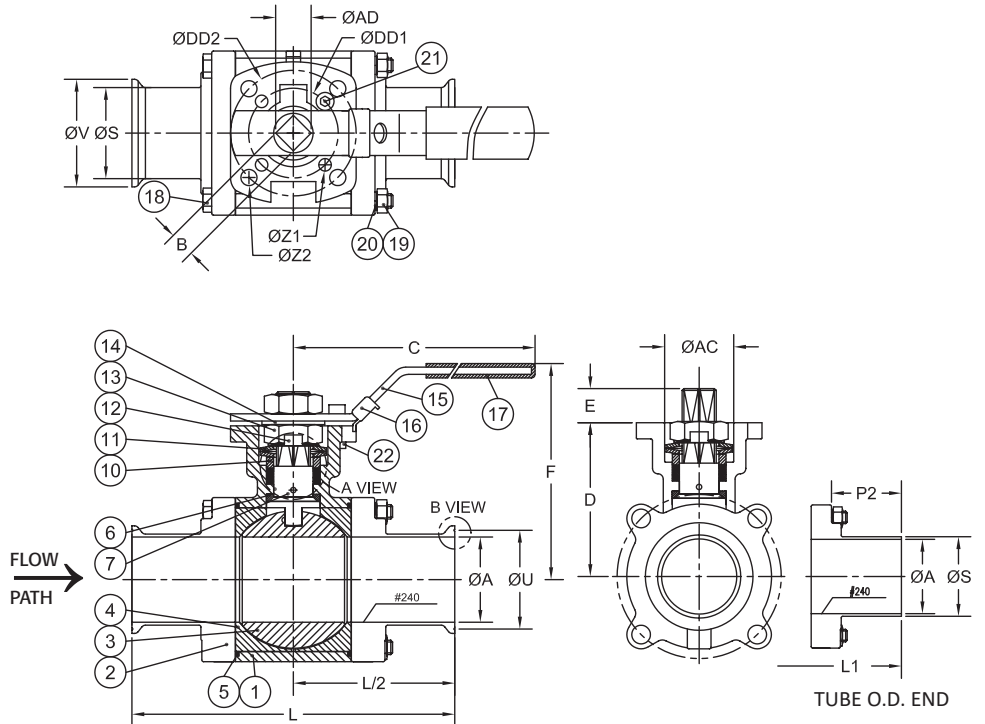
### V7 Series 3-Piece V-Port Control Valve

(V7 utilizes the reliable 77-Series design by adding a V-Ball for controllability)

#### MATERIALS LIST

NO.	PART NAME	QTY.	MATERIAL	REPAIR KIT
1	BODY	1	ASTM A351 GRADE CF3M	
2	END CAP	2	ASTM A351 GRADE CF3M	
3	BALL	1	ASTM A276 GRADE CF3M	
4	SEAT	2	PTFE	✓
5	JOINT GASKET	2	PTFE	✓
6	STEM SEAL	1	PTFE	✓
7	STEM	1	ASTM A276 SS 316L	
8	GLAND PACKING	1	PTFE	✓
9	GLAND WASHER	1	RTFE	✓
10	GLAND BUSHING	1	AISI 304	
11	BELLEVILLE WASHER	2	AISI 301	
12	LOCK SADDLE	1	AISI 304	
13	STEM NUT	2	AISI 304	
14	STEM WASHER	1	AISI 304	
15	HANDLE	1	AISI 304	
16	HANDLE LOCK	1	AISI 304	
17	HANDLE SLEEVE	1	VINYL	
18	BODY BOLT	#	**	
19	BODY BOLT NUT	&	##	
20	WASHER	&	AISI 304	
21	STOP BOLT	1	AISI 304	
22	BOLT NUT	1	AISI 304	
23	ANTI-STATIC DEVICE	2	AISI 316	

# FOR 1/2"-3" - 4 PCS ; FOR 4" - 6 PCS  
& FOR 1/2"-2" - 4 PCS ; FOR 2-1/2"-3" - 8 PCS ; FOR 4" - 12 PCS  
\*\*FOR 1/2"-2" - ASTM A193 GRADE B8; FOR 2-1/2"-4" - ISO 3506-1 A2-70  
## FOR 1/2"-2" - ASTM A194 GRADE 8; FOR 2-1/2"-4" - ISO 3506-2 A2-70  
Tube O.D. according to ASME BPE 2019



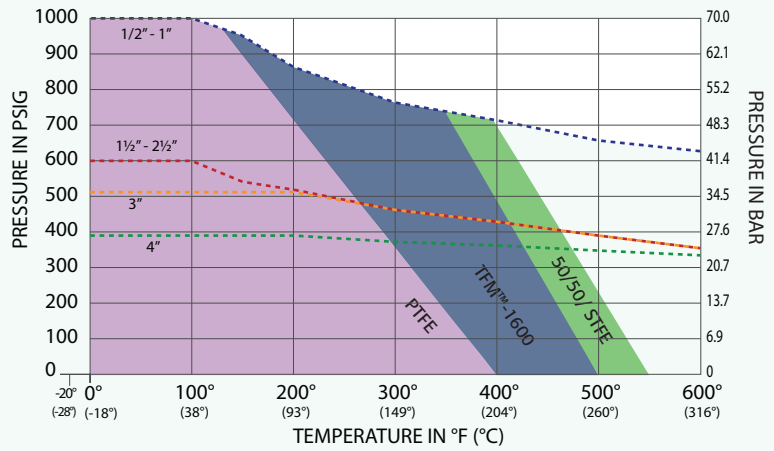
#### DIMENSIONS (IN)

SIZE	A	B	C	D	DD1	DD2	E	F	L	L1	P2	S	U	V	Z1	Z2	AC	AD	(LBS)	ISO 5211
1/2"	0.37	0.354	5.47	1.66	1.417	1.654	0.32	3.03	3.51	5.50	1.92	0.50	-	0.99	0.24	0.24	0.92	0.430	1.5	F03/F04
3/4"	0.62	0.354	5.47	1.89	1.417	1.654	0.32	3.27	4.00	5.75	1.96	0.75	-	0.99	0.24	0.24	0.92	0.430	1.8	F03/F04
1"	0.87	0.433	6.50	2.23	1.654	1.969	0.44	3.74	4.51	6.25	2.00	1.00	1.71	1.99	0.24	0.28	1.14	0.563	2.7	F04/F05
1-1/2"	1.37	0.551	8.47	3.05	1.969	2.756	0.56	5.00	5.52	7.50	2.23	1.50	1.71	1.99	0.28	0.34	1.54	0.744	7.0	F05/F07
2"	1.87	0.551	8.47	3.35	1.969	2.756	0.56	5.28	6.26	8.50	2.46	2.00	2.20	2.52	0.28	0.34	1.54	0.744	9.8	F05/F07
2-1/2"	2.37	0.669	11.81	4.28	2.756	4.016	0.67	6.54	6.85	9.75	2.55	2.50	2.78	3.05	0.34	0.47	2.07	0.885	19.6	F07/F10
3"	2.87	0.669	14.57	4.63	2.756	4.016	0.71	6.93	7.61	10.50	2.69	3.00	3.28	3.58	0.34	0.47	2.07	0.885	25.9	F07/F10
4"	3.83	0.748	14.57	5.22	2.756	4.016	0.67	7.48	8.90	12.50	3.14	4.00	4.34	4.68	0.34	0.47	2.07	0.885	47.4	F07/F10

**V7 Series 3-Piece V-Port Control Valve**

**Pressure vs. Temperature | Series V7  
Body/End Cap/Seat Pressure Ratings**

Temp	Pressure			
	1/2" - 1"	1 1/2" - 2 1/2"	3"	4"
-20°	1000	600	507	393
100°	1000	600	507	393
150°	946	539	507	393
200°	861	516	507	393
300°	778	467	467	382
400°	713	429	429	378
500°	665	396	396	352
600°	625	366	366	334



V7 Torque Values for PTFE Seats		
Size	Non-Cavity Filled	Cavity Filled
1/2"	46	56
3/4"	68	81
1"	113	135
1-1/2"	221	266
2"	370	444
2-1/2"	765	918
3"	849	1,019
4"	1,523	1,827

Published torques are based on full differential pressure with clean water with 25% safety added. Consult the Application Sizing Guide for assistance with sizing actuators.

Component Temperature Ratings		
Component	Material	Temp.
Stem Packing	PTFE	-50°F to 400°F
Stem Seal	PTFE	-50°F to 400°F
Gaskets	PTFE	-50°F to 400°F
Seats (Other Materials Available)	PTFE (standard)	-50°F to 400°F
	TFM™-1600	-75°F to 500°F
	50/50 STFE	-50°F to 550°F

NOTE: At temperature, valves are limited by either the valve body/end cap pressure ratings, seat pressure ratings, or packing/stem seal/gaskets; whichever is lower.

## V8 Series 3-Piece V-Port Control Valve

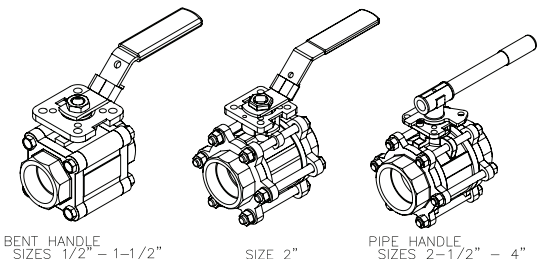
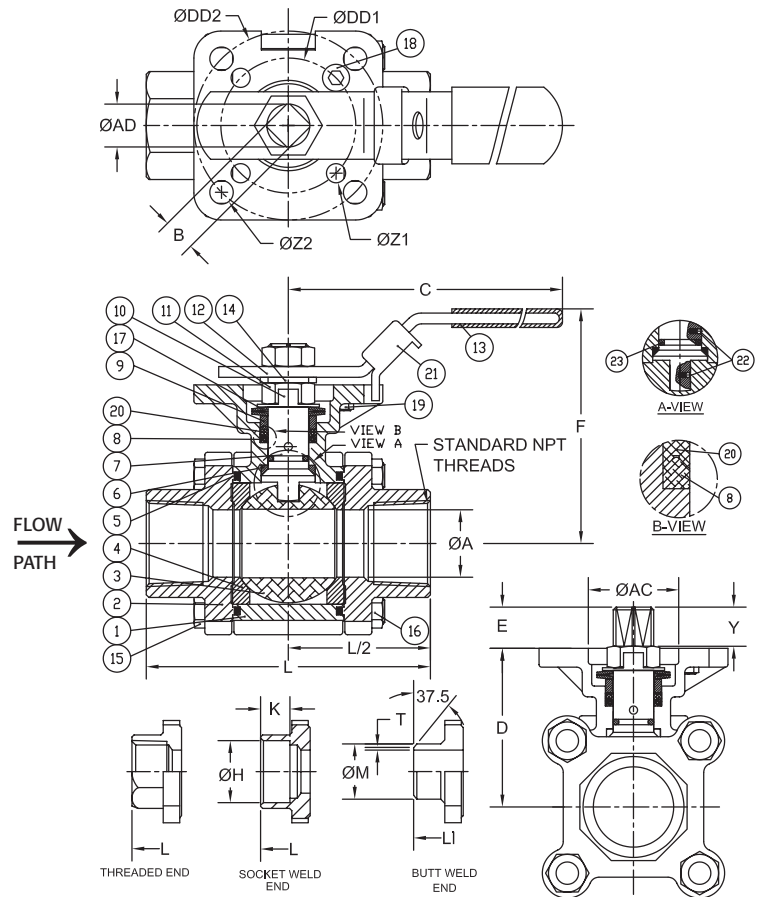
(V8 utilizes the reliable 88-Series design by adding a V-Ball for controllability)

### MATERIALS LIST

NO.	PART NAME	QTY	STAINLESS STEEL	CARBON STEEL	REPAIR KIT
1	BODY	1	ASTM A351 GRADE CF8M	ASTM A216 GRADE WCB	
2	TH END CAP	2	ASTM A351 GRADE CF8M	ASTM A216 GRADE WCB	
2	BW/SW END CAP	2	ASTM A351 GRADE CF3M	ASTM A216 GRADE WCB	
3	BALL	1	1/4" THRU 3/8" ASTM A276 SS316	1/4" THRU 3/8" ASTM A276 SS316	
3	BALL	1	1/2" THRU 4" ASTM A351 GRADE CF8M	1/2" THRU 4" ASTM A351 GRADE CF8M	
4	SEAT	2	50/50 STFE	50/50 STFE	✓
5	JOINT GASKET	2	TFM™-1600	TFM™-1600	✓
6	STEM SEAL	1	TFM™-1600	TFM™-1600	✓
7	STEM	1	ASTM A276 SS316	ASTM A276 SS316	
8	GLAND PACKING	1 <sup>^</sup>	PTFE	PTFE	✓
9	GLAND BUSHING	1	AISI 304	AISI 304	
10	LOCK SADDLE	1	AISI 304	AISI 304	
11	STEM NUT	1	AISI 304	AISI 304	
12	HANDLE	1	AISI 304	AISI 304	
13	HANDLE SLEEVE	1	VINYL	VINYL	
14	STEM WASHER	1	AISI 304	AISI 304	
15	BODY BOLT/STUD	*	ASTM A193 GRADE B8	ASTM A193 GRADE B8	
16	BODY NUT	#	ASTM A194 GRADE 8	ASTM A194 GRADE 8	
17	BELLEVILLE WASHER	2	AISI 301	AISI 301	
18	STOP BOLT	1	AISI 304	AISI 304	
19	STOP BOLT NUT	1	AISI 304	AISI 304	
20	GLAND WASHER	1	RTFE	RTFE	✓
21	HANDLE LOCK	1	AISI 304	AISI 304	
22	ANTI-STATIC DEVICE	2	AISI 316	AISI 316	
23	STEM O-RING	1	FKM	FKM	✓

NOTE: SIZES 2-1/2" THRU 4" INCLUDE SEAT RETAINER RINGS.

<sup>^</sup> PACKING SET  
 \* 1/2" THRU 1-1/2" QTY = 4 PCS  
 \* 2" THRU 4" QTY = 6 PCS  
 # 1/2" THRU 1-1/2" QTY = 4 PCS  
 # 2" QTY = 6 PCS  
 # 2-1/2" THRU 4" QTY = 12 PCS



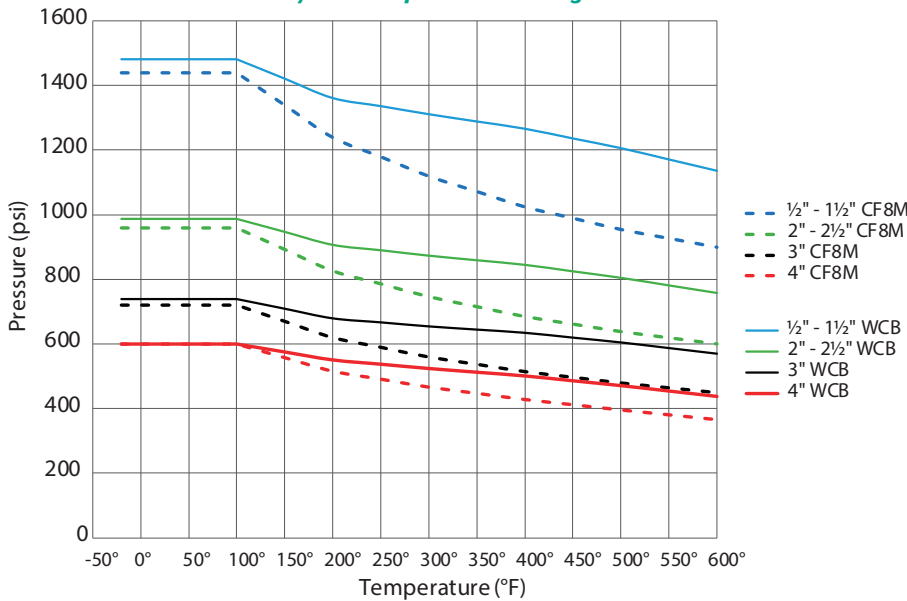
### DIMENSIONS (IN)

SIZE	øA	B	C	D	E	F	H	K	L	L1	M	T	Y	AC	AD	DD1	DD2	øZ2	øZ1	(LBS)	ISO 5211
1/2"	0.59	0.354	5.47	1.66	0.31	3.00	0.85	0.39	2.85	2.95	0.85	0.06	0.25	1.07	0.44	1.654	1.969	0.28	0.28	2.0	F04/F05
3/4"	0.79	0.354	5.47	1.83	0.33	3.20	1.07	0.51	3.36	3.54	1.07	0.06	0.33	1.07	0.44	1.969	2.756	0.34	0.28	3.0	F05/F07
1"	0.98	0.433	6.50	2.31	0.41	3.86	1.34	0.51	4.15	4.33	1.34	0.06	0.41	1.34	0.56	1.969	2.756	0.34	0.28	4.5	F05/F07
1-1/4"	1.26	0.433	6.50	2.46	0.41	4.00	1.69	0.51	4.37	4.53	1.68	0.06	0.41	1.34	0.56	1.969	2.756	0.34	0.28	6.0	F05/F07
1-1/2"	1.50	0.551	8.46	3.11	0.53	5.04	1.92	0.51	5.01	5.12	1.91	0.06	0.53	1.54	0.74	1.969	2.756	0.34	0.28	10.0	F05/F07
2"	1.97	0.551	8.46	3.42	0.53	5.35	2.40	0.63	5.62	5.62	2.38	0.06	0.53	1.54	0.74	1.969	2.756	0.35	0.30	13.0	F05/F07
2-1/2"	2.56	0.748	10.31	4.28	0.66	6.60	2.89	0.63	7.28	7.28	3.00	N/A	0.66	2.09	0.94	2.756	4.016	0.47	0.39	26.0	F07/F10
3"	3.15	0.748	10.31	4.63	0.70	6.96	3.54	0.63	8.07	8.07	3.54	N/A	0.70	2.09	0.94	2.756	4.016	0.47	0.39	34.0	F07/F10
4"	3.94	0.748	12.28	5.26	0.66	7.59	4.54	0.79	9.45	9.45	4.57	N/A	0.66	2.09	0.94	2.756	4.016	0.47	0.39	52.0	F07/F10



**V8 Series 3-Piece V-Port Control Valve**

**Pressure vs. Temperature | Series V8**  
Body & End Cap Pressure Ratings



Pressure Class/Rating		
Size	ASME B16.34-2020 Pressure Class	BPVC*-2019 Pressure Rating (psig)
1/2" - 1"	600	2000
1 1/4" - 1 1/2"	600	1500
2"	400	1500
2 1/2"	400	1000
3"	300	1000
4"	260 (88) 254 (88C)	1000

\*ASME Boiler Pressure Vessel Code

**V8 Torque Values for 50/50 STFE Seats**

SIZE	IN-LBS.
1/2"	73
3/4"	104
1"	150
1-1/4"	214
1-1/2"	294
2"	498
2-1/2"	840
3"	1118
4"	1886

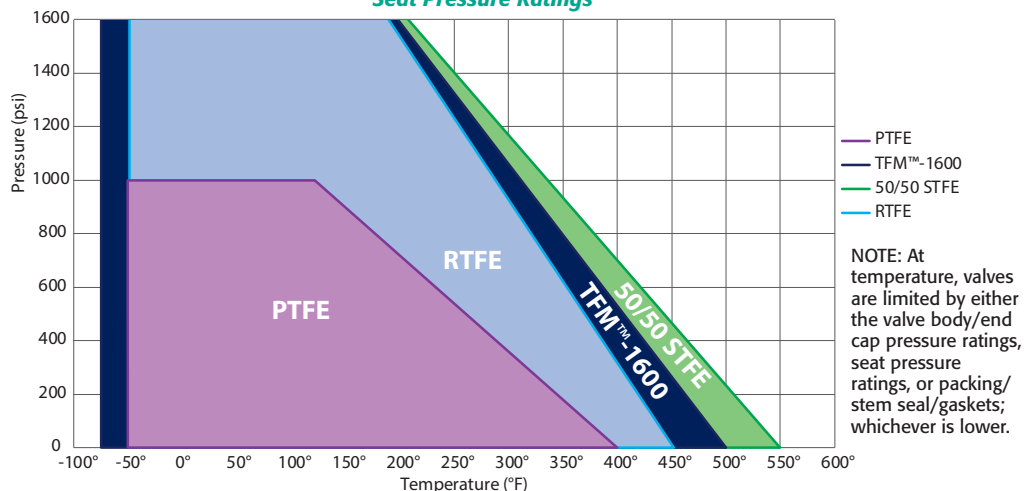
Published torques are based on full differential pressure with clean water with 25% safety added. Consult the Application Sizing Guide for assistance with sizing actuators.

Size	Pressure Class B16.34 (2020)			
	Stainless Steel		Carbon Steel	
	Class	Rating (psi)	Class	Rating (psi)
1/2"	600	1440	600	1480
3/4"	600	1440	600	1480
1"	600	1440	600	1480
1 1/4"	600	1440	600	1480
1 1/2"	600	1440	600	1480
2"	400	960	400	986
2 1/2"	400	960	400	986
3"	300	720	300	740
4"	260	600	254	600

Component Temperature Ratings		
Component	Material	Temperature
Stem Packing, Stem Seal, Gaskets	PTFE	-50°F to 400°F
	TFM™-1600	-75°F to 500°F
O-Rings	FKM (standard)	-20°F to 400°F
	Markez® Z1028	5°F to 608°F
	Kalrez® 4079	30°F to 600°F
	Chemraz® 505	-22°F to 446°F
	Kalrez® 6375	-4°F to 527°F
	Perlast® G75M	5°F to 500°F
	Chemraz® 564	-40°F to 445°F
	Low Temp Buna	-65°F to 275°F
	EPDM	-70°F to 250°F
	Silicone	-60°F to 400°F

**Pressure vs. Temperature | Series V8**  
Seat Pressure Ratings

Temp	Pressure - Seat Material			
	RTFE	STFE	PTFE	TFM-1600
-75°				2000
-50°	2000	2000	1000	2000
100°	2000	2000	1000	2000
122°	2000	2000	1000	2000
150°	1829	1869	899	1852
200°	1524	1636	719	1587
250°	1220	1402	540	1323
300°	915	1168	360	1058
350°	610	935	180	794
400°	305	701	0	529
450°	0	467		265
500°		234		0
550°		0		



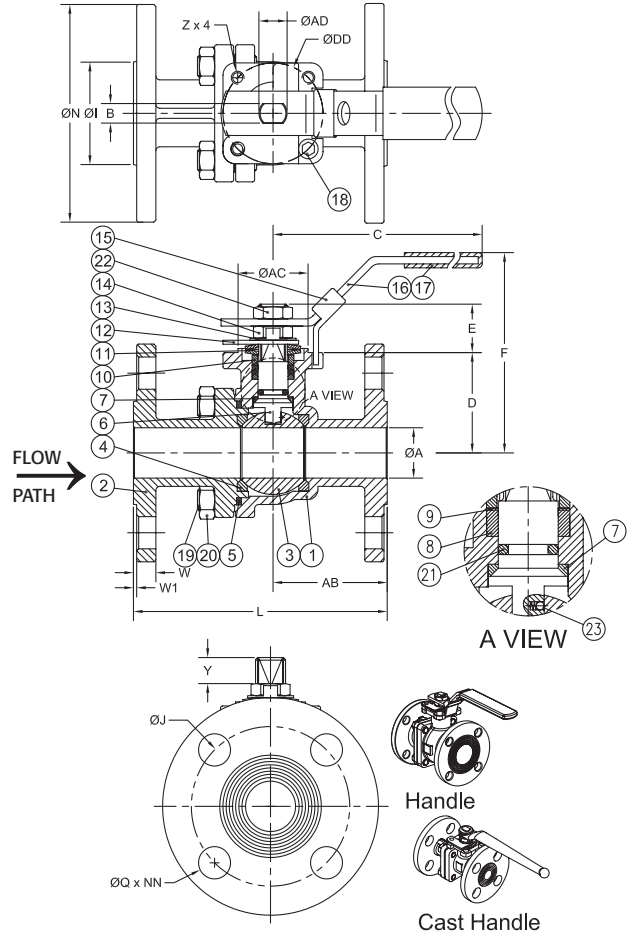
NOTE: At temperature, valves are limited by either the valve body/end cap pressure ratings, seat pressure ratings, or packing/stem seal/gaskets; whichever is lower.

### V9 Series ASME Class 150 Flanged V-Port Control Valve

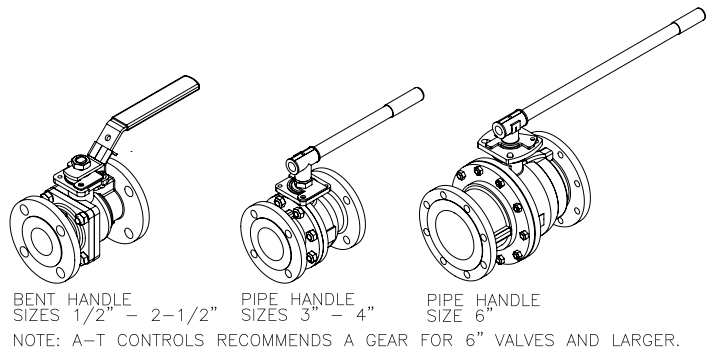
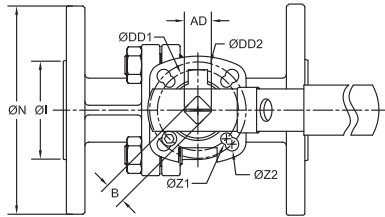
(V9 utilizes the reliable 90-Series design by adding a V-Ball for controllability)

#### MATERIALS LIST

NO.	PART NAME	QTY	STAINLESS STEEL	CARBON STEEL	REPAIR KIT
1	BODY	1	ASTM A351 GRADE CF8M	ASTM A216 GRADE WCB	
2	END CAP	1	ASTM A351 GRADE CF8M	ASTM A216 GRADE WCB	
3	BALL	1	ASTM A351 GRADE CF8M	ASTM A351 GRADE CF8M	
4	SEAT	2	50/50 STFE	50/50 STFE	✓
5	JOINT GASKET	1	TFM™-1600	TFM™-1600	✓
6	STEM	1	ASTM A276 316SST	ASTM A276 316SST	
7	STEM SEAL	1	TFM™-1600	TFM™-1600	✓
8	GLAND PACKING	1	PTFE	PTFE	✓
9	GLAND WASHER	1	RTFE	RTFE	✓
10	GLAND BUSHING	1	AISI 304	AISI 304	
11	BELLEVILLE WASHER	2	AISI 301	AISI 301	
12	LOCKING PLATE	1	AISI 304	AISI 304	
13	LOCK SADDLE	1	AISI 304	AISI 304	
14	STEM NUT	1	AISI 304	AISI 304	
15	HANDLE LOCK	1	AISI 304	AISI 304	
16	HANDLE	1	AISI 304	AISI 304	
17	HANDLE SLEEVE	1	VINYL	VINYL	
18	STOP BOLT	1	AISI 304	AISI 304	
19	Body Bolts	1/2"-2"	ASTM A193 GRADE B8		
		2 1/2"-4"	ISO 3506-1 A2-70		
		6"	ASTM A193 GRADE B8	ASTM A193 GRADE B7	
20	Body Nuts	1/2"-2"	ASTM A194 GRADE 8		
		2 1/2"-4"	ISO 3506-2 A2-70		
		6"	ASTM A194 GRADE 8	ASTM A194 GRADE 2H	
21	O-RING	1	FKM	FKM	✓
22	HANDLE NUT	1	AISI 304	AISI 304	
23	ANTI-STATIC DEVICE	2	AISI 316	AISI 316	



#### "V" Series 6" 150# Flanged Mounting Dimensions



#### DIMENSIONS (IN)

##### INVESTMENT CAST BODY (Series V9)

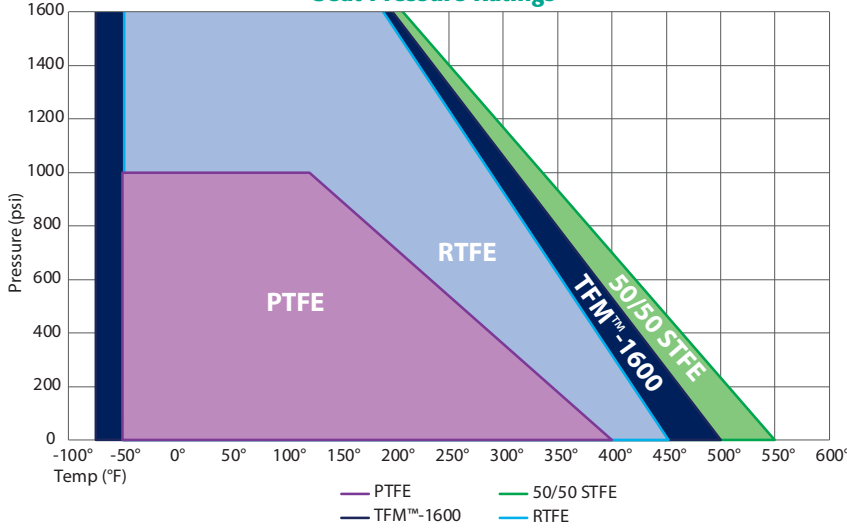
SIZE	A	B	C	D	E	F	I	J	L	N	Q	W	W1	Y	Z	AB	AC	AD	DD	NN (LBS)	ISO 5211	
1/2"	0.59	0.315	6.69	1.34	0.92	3.15	1.47	2.38	4.26	3.50	0.63	0.44	0.06	0.36	M5	1.82	1.17	0.43	1.654	4	3.7	F04
3/4"	0.79	0.315	6.69	1.65	0.94	3.43	1.82	2.75	4.62	3.88	0.63	0.44	0.06	0.40	M5	2.17	1.17	0.43	1.654	4	4.6	F04
1"	0.98	0.382	8.05	1.95	0.94	3.85	2.08	3.13	5.00	4.26	0.63	0.44	0.06	0.42	M6	2.20	1.37	0.56	1.969	4	6.8	F05
1-1/2"	1.50	0.472	10.28	3.08	1.37	6.02	2.88	3.88	6.50	5.00	0.63	0.56	0.06	0.58	M8	2.81	2.17	0.75	2.756	4	13.6	F07
2"	1.97	0.472	10.28	3.40	1.37	6.38	3.62	4.75	7.02	6.00	0.75	0.63	0.06	0.58	M8	3.38	2.17	0.75	2.756	4	19.2	F07
2-1/2"	2.56	0.472	10.28	3.83	1.37	6.81	4.12	5.50	7.49	7.00	0.75	0.69	0.06	0.58	M8	3.02	2.17	0.75	2.756	4	30.0	F07
3"	3.15	0.591	13.94	4.23	1.81	6.95	5.00	6.00	8.01	7.50	0.75	0.75	0.06	0.93	M10	4.01	2.76	0.94	4.016	4	41.0	F10
4"	3.94	0.591	13.94	4.82	1.79	7.52	6.19	7.50	9.04	9.00	0.75	0.94	0.06	0.93	M10	4.06	2.76	0.94	4.016	8	65.0	F10

SIZE	A	B	C	D	E	F	I	J	L	N	Q	W	W1	Z1	Z2	AB	AC	AD	DD1	DD2	NN (LBS)	ISO 5211	
6"	5.91	1.063	29.53	8.28	1.12	12.50	8.50	9.50	15.50	11.00	0.87	1.00	0.06	0.55	0.71	7.00	2.97	1.41	4.921	5.511	8	145.0	F12/F14

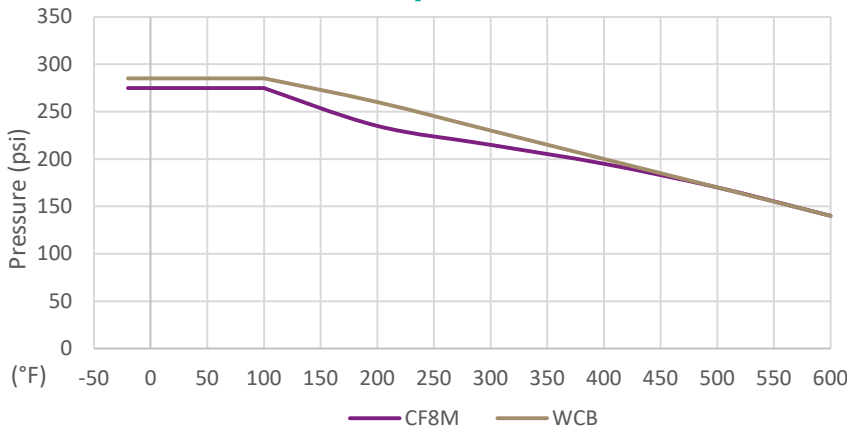
**V9 Series ASME Class 150 Flanged V-Port Control Valve**

**Pressure vs. Temperature - Series V9  
Seat Pressure Ratings**



Temp	Pressure - Seat Material			
	RTFE	STFE	PTFE	TFM™-1600
-75°				2000
-50°	2000	2000	1000	2000
100°	2000	2000	1000	2000
122°	2000	2000	1000	2000
150°	1829	1869	899	1852
200°	1524	1636	719	1587
250°	1220	1402	540	1323
300°	915	1168	360	1058
350°	610	935	180	794
400°	305	701	0	529
450°	0	467		265
500°		234		0
550°		0		

**Pressure vs. Temperature - Series V9**



Temp	CF8M psi	WCB psi
-20°	275	285
100°	275	285
200°	235	260
300°	215	230
400°	195	200
500°	170	170
600°	140	140

V9 Component Temperature Ratings		
COMPONENT	MATERIAL	TEMPERATURE
Stem Packing	PTFE	-50°F to 450°F
Stem Seal	TFM™-1600	-75°F to 500°F
Gaskets	TFM™-1600	-75°F to 500°F
Seats (Other Materials Available)	PTFE	-50°F to 400°F
	RTFE	-50°F to 450°F
	TFM™-1600	-75°F to 500°F
	50/50 STFE (standard)	-50°F to 550°F
O-Rings	FKM (standard)	-20°F to 450°F
	Markez® Z1028	5°F to 608°F
	Kalrez® 4079	30°F to 600°F
	Chemraz® 505	-22°F to 446°F
	Kalrez® 6375	-4°F to 527°F
	Perlast® G75M	5°F to 500°F
	Chemraz® 564	-40°F to 445°F
	Low Temp Buna	-65°F to 275°F
	EPDM	-70°F to 250°F
	Silicone	-60°F to 400°F

NOTE: At temperature, valves are limited by either the valve body/end cap pressure ratings, seat pressure ratings, or packing/stem seal/gaskets; whichever is lower.

V9 Torque Values for 50/50 STFE Seats	
SIZE	IN-LBS
1/2"	56
3/4"	91
1"	114
1-1/2"	288
2"	371
2-1/2"	669
3"	960
4"	1563
6"	3750

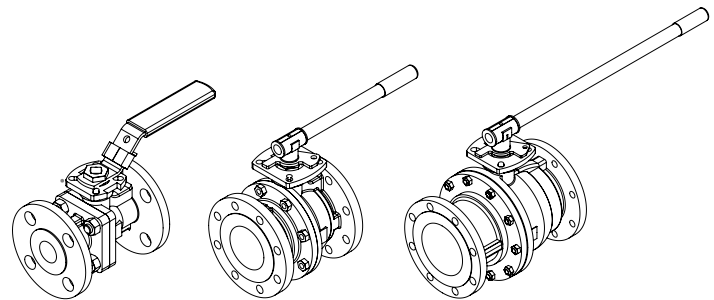
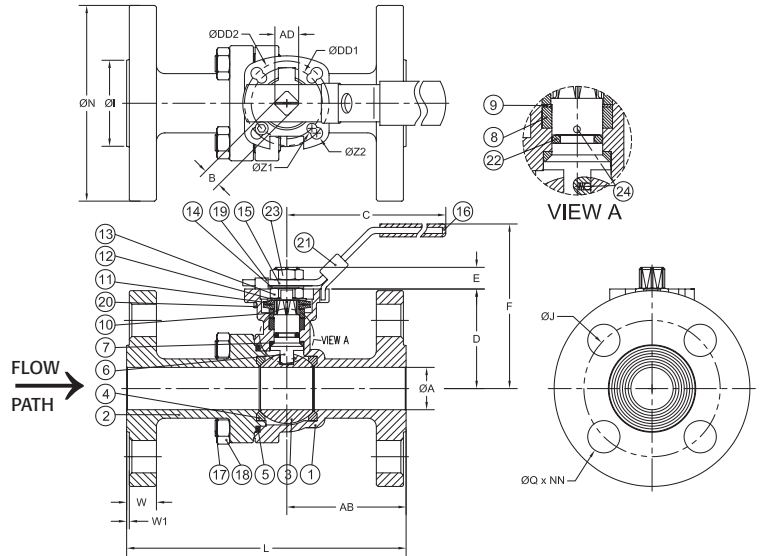
Published torques are based on full differential pressure with clean water with 25% safety added. Consult the Application Sizing Guide for assistance with sizing actuators.

FVD9 Series ASME Class 300 Flanged V-Port Control Valve  
(FVD9 utilizes the reliable FD9-Series design by adding a V-Ball for controllability)

MATERIALS LIST

NO.	PART NAME	QTY	STAINLESS STEEL	CARBON STEEL	REPAIR KIT
1	BODY	1	ASTM A351 GRADE CF8M	ASTM A216 GRADE WCB	
2	END CAP	1	ASTM A351 GRADE CF8M	ASTM A216 GRADE WCB	
3	BALL	1	ASTM A351 GRADE CF8M	ASTM A351 GRADE CF8M	
4	SEAT	2	50/50 STFE	50/50 STFE	✓
5	JOINT GASKET	1	GRAPHITE	GRAPHITE	✓
6	STEM	1	ASTM A276 SS316	ASTM A276 SS316	
7	STEM SEAL	1	TFM™-1600	TFM™-1600	✓
8	GLAND PACKING	1	GRAPHITE	GRAPHITE	✓
9	GLAND WASHER	1	RTFE	RTFE	✓
10	GLAND BUSHING	1	AISI 304	AISI 304	
11	BELLEVILLE WASHER	2	AISI 301	AISI 301	
12	LOCK SADDLE	1	AISI 304	AISI 304	
13	STEM NUT	1	AISI 304	AISI 304	
14	STEM WASHER	1	AISI 304	AISI 304	
15	HANDLE	1	AISI 304	AISI 304	
16	HANDLE SLEEVE	1	VINYL	VINYL	
17	BODY STUD	*	ASTM A193 GRADE B8M	ASTM A193 GRADE B7M	
18	BODY NUT	*	ASTM A194 GRADE 8M	ASTM A194 GRADE 2HM	
19	STOP BOLT	1	AISI 304	AISI 304	
20	STOP BOLT NUT	1	AISI 304	AISI 304	
21	HANDLE LOCK	1	AISI 304	AISI 304	
22	O-RING	1	FKM	FKM	✓
23	HANDLE NUT	1	AISI 304	AISI 304	
24	ANTI-STATIC DEVICE	2	AISI 316	AISI 316	

\* 1/2" THRU 2" QTY = 4 PCS \* 2-1/2" THRU 4" QTY = 8 PCS \* 6" QTY = 12 PCS



BENT HANDLE SIZES 1/2" - 2-1/2" PIPE HANDLE SIZES 3" - 4" PIPE HANDLE SIZE 6"

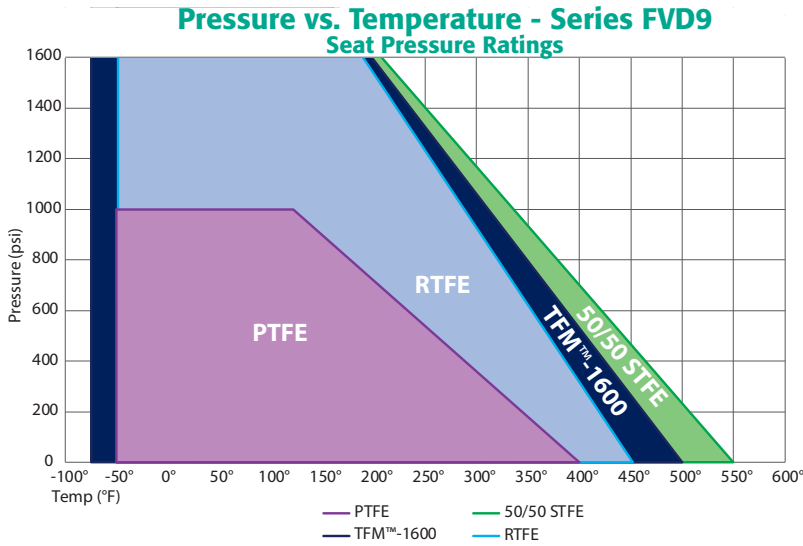
NOTE: A-T CONTROLS RECOMMENDS A GEAR FOR 6" VALVES AND LARGER

DIMENSIONS (IN)

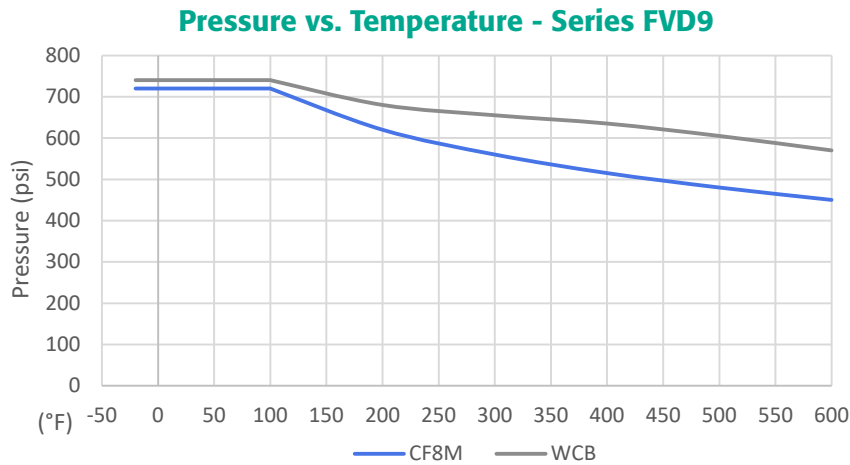
SIZE	A	B	C	D	E	F	I	J	L	N	Q	W	W1	Z1	Z2	AB	AC	AD	DD1	DD2	NN	ISO 5211	LBS
1/2"	0.59	0.433	6.50	1.92	0.39	3.40	1.38	2.62	5.50	3.75	0.63	0.56	0.06	0.26	0.28	2.32	1.17	0.55	1.654	1.969	4	F04/F05	5
3/4"	0.79	0.433	6.50	2.50	0.41	4.04	1.69	3.25	6.00	4.62	0.75	0.62	0.06	0.26	0.28	2.59	1.17	0.55	1.654	1.969	4	F04/F05	8
1"	0.98	0.433	6.50	2.50	0.41	4.06	2.00	3.50	6.50	4.88	0.75	0.69	0.06	0.26	0.28	2.78	1.17	0.55	1.654	1.969	4	F04/F05	10.5
1-1/2"	1.50	0.748	10.32	3.51	0.75	5.41	2.88	4.50	7.50	6.12	0.87	0.81	0.06	0.39	0.47	3.13	2.08	0.94	2.756	4.016	4	F07/F10	22
2"	1.97	0.748	10.32	3.80	0.75	5.87	3.62	5.00	8.50	6.50	0.75	0.88	0.06	0.39	0.47	3.81	2.08	0.94	2.756	4.016	8	F07/F10	28.5
2-1/2"	2.56	0.748	10.32	4.57	0.75	6.44	4.12	5.88	9.50	7.50	0.87	1.00	0.06	0.39	0.47	4.20	2.08	0.94	2.756	4.016	8	F07/F10	42
3"	3.15	0.866	14.37	5.22	0.91	8.10	5.00	6.62	11.12	8.25	0.87	1.12	0.06	0.47	0.55	5.10	2.55	1.17	4.016	4.921	8	F10/F12	59
4"	3.94	0.866	14.37	6.18	0.91	8.70	6.19	7.88	12.00	10.00	0.87	1.25	0.06	0.47	0.55	5.50	2.55	1.17	4.016	4.921	8	F10/F12	96
6"	5.91	1.063	29.53	8.28	1.12	13.00	8.50	10.62	15.87	12.50	0.87	1.44	0.06	0.55	0.71	7.30	3.07	1.40	4.921	5.512	12	F12/F14	213

**API 607 - 6th Edition**  
CERTIFIED FIRESAFE

**FVD9 Series ASME Class 300 Flanged V-Port Control Valve**



Temp	Pressure - Seat Material			
	RTFE	STFE	PTFE	TFM™-1600
-75°				2000
-50°	2000	2000	1000	2000
100°	2000	2000	1000	2000
122°	2000	2000	1000	2000
150°	1829	1869	899	1852
200°	1524	1636	719	1587
250°	1220	1402	540	1323
300°	915	1168	360	1058
350°	610	935	180	794
400°	305	701	0	529
450°	0	467		265
500°		234		0
550°		0		



FVD9 Component Temperature Ratings		
COMPONENT	MATERIAL	TEMPERATURE
Stem Packing	Graphite	-100°F to 1100°F
Stem Seal	TFM™-1600	-75°F to 500°F
Gaskets	Graphite	-100°F to 1100°F
Seats (Other Materials Available)	PTFE	-50°F to 400°F
	RTFE	-50°F to 450°F
	TFM™-1600	-75°F to 500°F
	50/50 STFE (standard)	-50°F to 550°F
O-Rings	FKM (standard)	-20°F to 450°F
	Markez® Z1028	5°F to 608°F
	Kalrez® 4079	30°F to 600°F
	Chemraz® 505	-22°F to 446°F
	Kalrez® 6375	-4°F to 527°F
	Perlast® G75M	5°F to 500°F
	Chemraz® 564	-40°F to 445°F
	Low Temp Buna	-65°F to 275°F
EPDM	-70°F to 250°F	
Silicone	-60°F to 400°F	

NOTE: At temperature, valves are limited by either the valve body/end cap pressure ratings, seat pressure ratings, or packing/stem seal/gaskets; whichever is lower.

**FVD9 Torque Values for 50/50 STFE Seats**

Size	Torque (In-lbs) @ 285 PSID	Torque (In-lbs) @ 740 PSID
1/2"	56	56
3/4"	91	91
1"	114	126
1-1/2"	288	291
2"	371	450
2-1/2"	669	721
3"	960	1065
4"	1,563	1,941
6"	3,750	7,748

Published torques are based on full differential pressure with clean water with 25% safety added. Consult the Application Sizing Guide for assistance with sizing actuators.

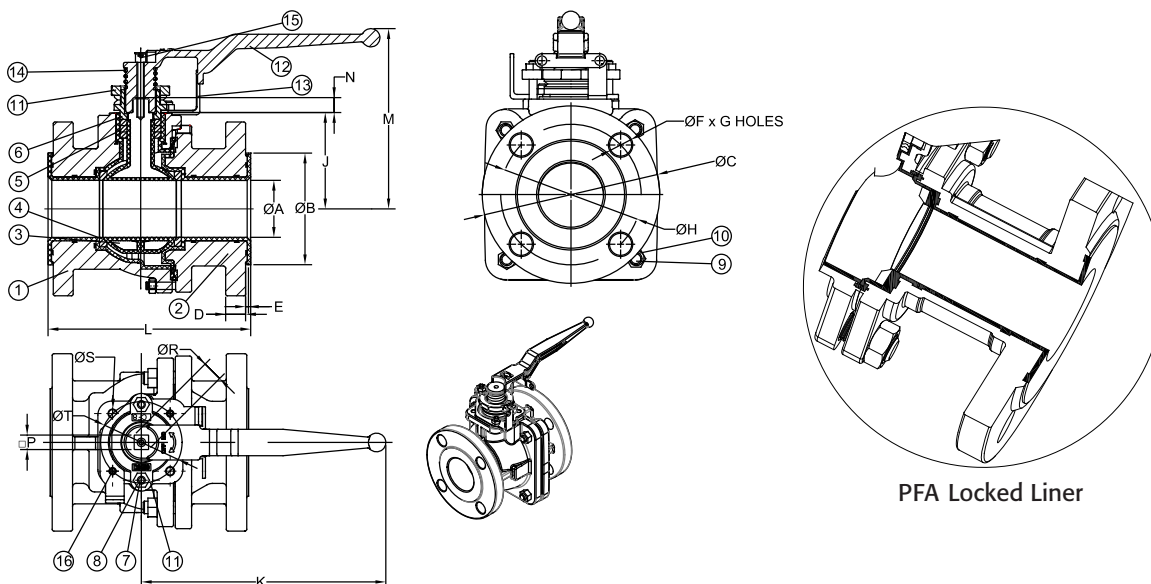
### VL2 Series V-Port Control Valve

(Utilizes the L2 Series design by adding a V-Ball for controllability)

#### MATERIALS LIST: 1/2" - 4"

NO.	PART NAME	QTY	MATERIALS	
			STAINLESS STEEL	CARBON STEEL
1	Body	1	ASTM A351 GRADE CF8M + PFA	ASTM A216 GRADE WCB + PFA
2	End Cap	1	ASTM A351 GRADE CF8M + PFA	ASTM A216 GRADE WCB + PFA
3	Ball/Stem	1	ASTM A351 GRADE CF8M/XM-19	ASTM A351 GRADE CF8/XM-19
4	Seat	2	PTFE	PTFE
5	Packing	1 Set	PTFE	PTFE
6	Gland Bushing	1	304SST	304SST
7	Packing Gland Bolt	2	ASTM A193 GRADE B8	ASTM A193 GRADE B8
8	Packing Gland Nut	2	ASTM A193 GRADE 8	ASTM A193 GRADE 8
9	Body Stud	*	ASTM A193 GRADE B8	ASTM A193 GRADE B8
10	Body Stud Nut	*	ASTM A193 GRADE 8	ASTM A193 GRADE 8
11	Packing Gland	1	304SST	304SST
12	Handle	1	304SST	304SST
13	Locking Plate	1	304SST	304SST
14	Anti-Static Spring	1	304SST	304SST
15	Handle Screw	1	304SST	304SST
16	Locking Plate Bolt	2	304SST	304SST

\* 1/2" THRU 2" - QTY 4  
 \* 2-1/2" THRU 4" - QTY 6



PFA Locked Liner

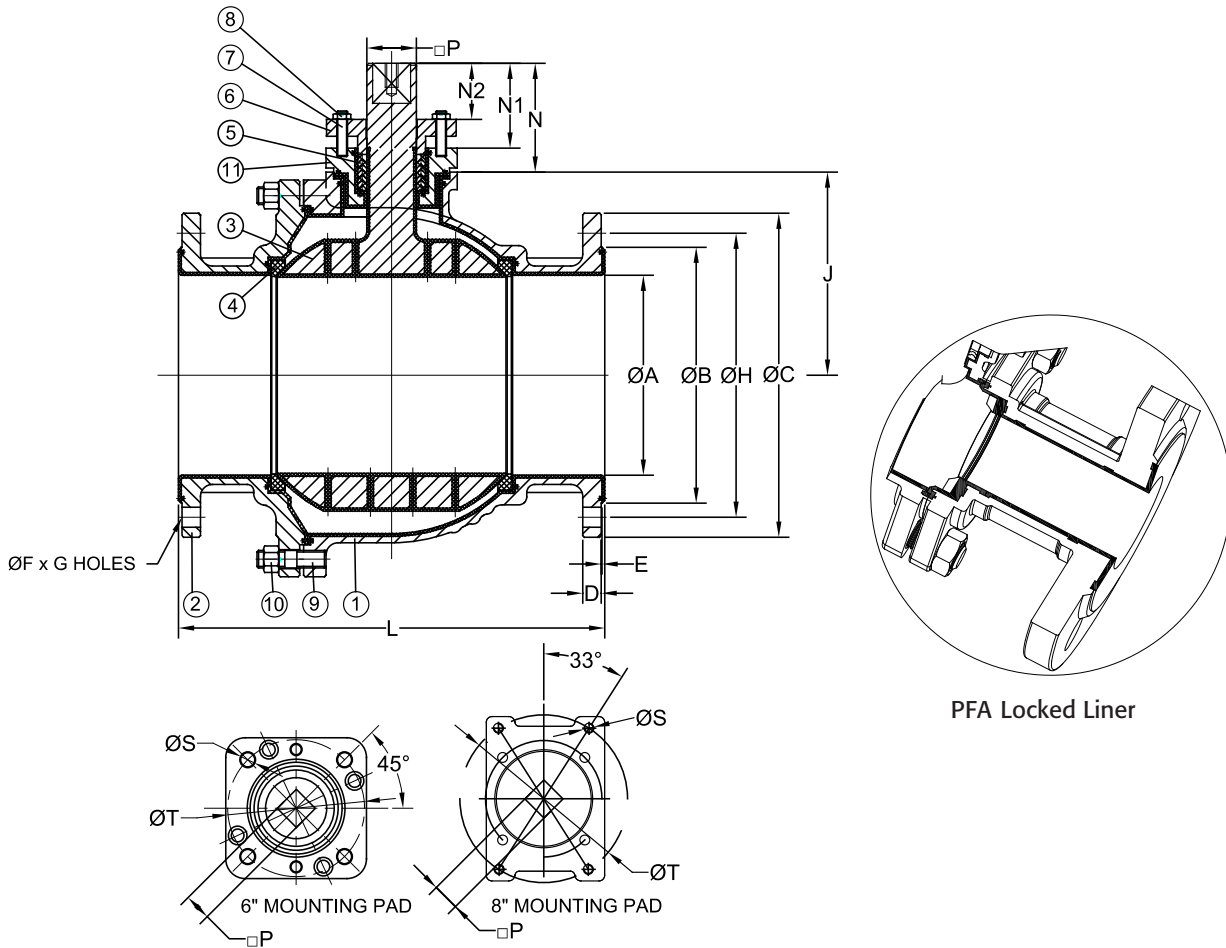
SIZE	VALVE DIMENSIONS													ACTUATOR MOUNTING DIMENSIONS					
	ØA	ØB	ØC	D	E	ØF	G	H	J	K	L	M	N	ØP	ØR	ØS	T	ISO 5211	(LBS)
1/2"	0.59	1.38	3.50	0.38	0.06	0.63	4	2.38	2.01	6.79	4.25	4.47	0.37	0.433	0.612	M6	1.969	F05	7.3
3/4"	0.79	1.69	3.90	0.44	0.06	0.63	4	2.75	2.01	6.79	4.61	4.47	0.37	0.433	0.612	M6	1.969	F05	7.9
1"	0.98	2.00	4.25	0.50	0.06	0.63	4	3.12	2.01	6.79	5.00	4.47	0.37	0.433	0.612	M6	1.969	F05	8.8
1-1/2"	1.50	2.87	5.00	0.63	0.06	0.63	4	3.88	2.93	8.27	6.50	6.05	0.59	0.551	0.779	M8	2.756	F07	20.9
2"	1.97	3.62	5.98	0.68	0.06	0.75	4	4.75	3.23	8.27	7.01	6.05	0.59	0.551	0.779	M8	2.756	F07	23.6
2-1/2"	2.50	4.12	7.01	0.81	0.06	0.75	4	5.50	4.76	12.6	7.48	8.02	0.80	0.748	1.058	M10	4.016	F10	39.7
3"	2.99	5.00	7.48	0.88	0.06	0.75	4	6.00	4.76	12.6	7.99	8.02	0.80	0.866	1.225	M10	4.016	F10	50.7
4"	3.90	6.19	9.02	0.88	0.06	0.75	8	7.50	5.37	20.00	9.02	8.57	0.74	0.866	1.225	M10	4.016	F10	85.8

**VL2 Series V-Port Control Valve**

(Utilizes the L2 Series design by adding a V-Ball for controllability)

MATERIALS LIST: 6" - 8"				
NO.	PART NAME	QTY	STAINLESS STEEL	CARBON STEEL
1	Body	1	ASTM A351 GRADE CF8M + PFA	ASTM A216 GRADE WCB + PFA
2	End Cap	1	ASTM A351 GRADE CF8M + PFA	ASTM A216 GRADE WCB + PFA
3	Ball/Stem	1	ASTM A351 GRADE CF8M/XM-19 + PFA	ASTM A351 GRADE CF8/XM-19 + PFA
4	Seat	2	PTFE	PTFE
5	Packing	1 Set	PTFE	PTFE
6	Packing Gland	1	304SST	ASTM A216 GRADE WCB
7	Packing Gland Bolt	2	ASTM A193 GRADE B8	ASTM A193 GRADE B8
8	Packing Gland Nut	2	ASTM A193 GRADE 8	ASTM A193 GRADE 8
9	Body Stud	*	ASTM A193 GRADE B8	ASTM A193 GRADE B8
10	Body Stud Nut	*	ASTM A193 GRADE 8	ASTM A193 GRADE 8
11	Gland	1	304SST	ASTM A216 GRADE WCB

\* 6" - QTY 10  
\* 8" - QTY 12



SIZE	VALVE DIMENSIONS										ACTUATOR MOUNTING DIMENSIONS							
	ØA	ØB	ØC	D	E	ØF	G	H	J	L	N	N1	N2	□P	ØS	T	ISO 5211	(LBS)
6"	5.89	8.50	10.98	0.94	0.06	0.88	8	9.50	6.73	15.51	3.23	2.54	1.57	1.417	M16	5.512	F14	194
8"	7.87	10.62	13.50	1.06	0.06	0.88	8	11.75	8.71	17.99	4.00	3.01	1.57	1.417	M16	9.380	N/A	299.8

### VL2 Series V-Port Control Valve

(Utilizes the L2 Series design by adding a V-Ball for controllability)

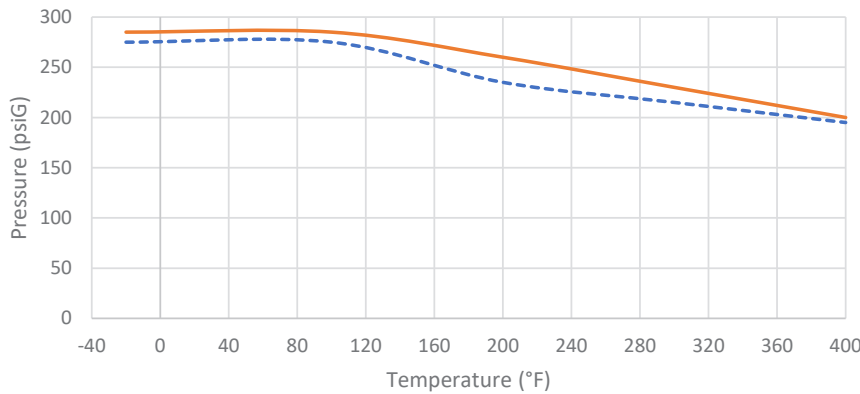
#### Break Away Torques

SIZE	IN-LBS.
1/2"	89
3/4"	89
1"	133
1-1/2"	248
2"	407
2-1/2"	611
3"	797
4"	1,195
6"	2,655
8"	5,311

#### Component Temperature Ratings

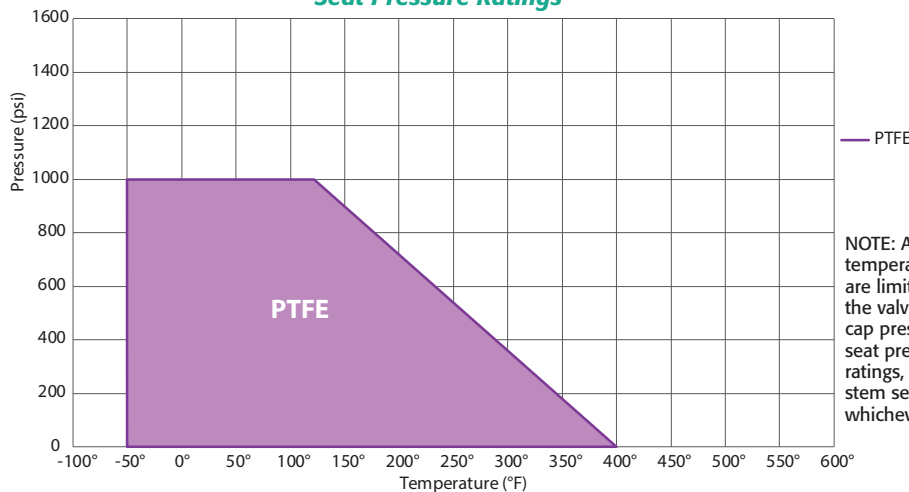
Component	Material	Temperature
Stem Packing	PTFE	-50°F to 400°F

#### Body & End Cap Ratings - ASME B16.34



Temp (°F)	CF8M (psig)	WCB (psig)
-20	275	285
100	275	285
200	235	260
300	215	230
400	195	200

#### Pressure vs. Temperature Seat Pressure Ratings



NOTE: At temperature, valves are limited by either the valve body/end cap pressure ratings, seat pressure ratings, or packing/stem seal/gaskets; whichever is lower.

Temp (°F)	Pressure (psig)
-50	1000
100	1000
122	1000
150	899
200	719
250	540
300	360
350	180
400	60