



88L-940 Series



Low Temperature Carbon Steel ASME Class 300 Flanged Full Port Ball Valve - 1/2" through 1"

STANDARDS COMPLIANCE

Refer to page D-A

MATERIALS OF CONSTRUCTION

Description (1/2" & 3/4" Valves)	Material
1. Body	ASTM A352-LCC
2. Retainer	ASTM A352-LCC
3. Ball	ASTM A276-316
4. Stem	ASTM A276-316
5. Packing Gland	ASTM A108 Type 1215
6. Stem Seals	PTFE
7. Seats	RPTFE
8. Stem Nut	300 Series Stainless Steel
9. Lever	300 Series Stainless Steel w/Vinyl Grip
10. Stem Bearing	RPTFE
11. Stop	300 Series Stainless Steel
12. Body Seal	RPTFE
13. Lock Washer	300 Series Stainless Steel
14. Grounding Spring	ASTM A313 Stainless Steel
15. Grounding Spring	ASTM A313 Stainless Steel

Description (1" Valves)	Material
1. Body	ASTM A352-LCC
2. Retainer	ASTM A352-LCC
3. Ball	ASTM A276-316
4. Stem	ASTM A276-316
5. Packing Gland	ASTM A108 Type 1215
6. Stem Seals	PTFE
7. Seats	RPTFE
8. Gland Screws	ASTM A193 B7
9. Gland Plate	302 or 304 SS
10. Stem Nut	316 SS
11. Lever	ASTM A366 Steel with Vinyl Grip
12. Stem Bearing	RPTFE
13. Stop	ASTM A108 Type 1215
14. Stop Screw	SAE J429 Grade 2
15. Lock Plate	ASTM A366 Steel
16. Body Seal	RPTFE
17. Lockwasher	302 or 304 SS
18. Grounding Spring	SS

STANDARD FEATURES

- Refer to page D-A
- Rated to -50°F (-46°C)

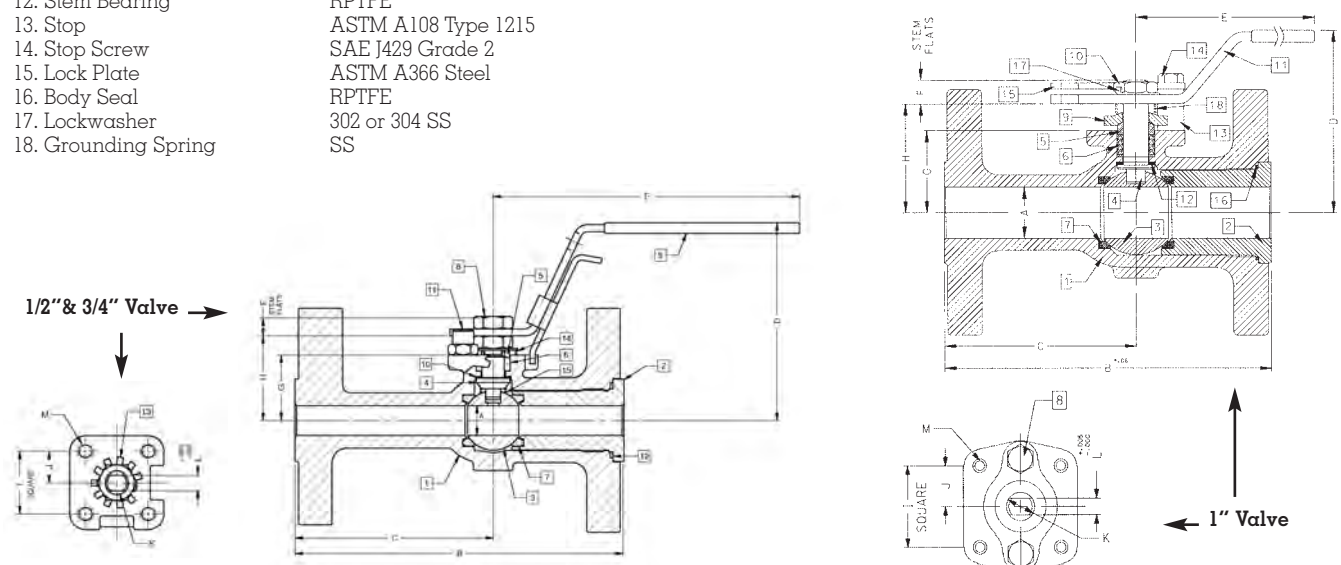
VARIATIONS AVAILABLE:

88L-930 Series (Ni-Cu Ball & Stem)

OPTIONS AVAILABLE:

(SUFFIX)	OPTION
-01-	Standard
-10-	SS Lever and Nut
-14-	Side Vented Ball (Uni-Directional)
-15-	Wheel Handle, Steel
-21-	UHMWPE Seats
-24-	Fire Safe (Graphite Packing and Seal)
-35-	PTFE Seats and Seals
-38-	PEEK Seats and Graphite Packing
-49-	Assembled Dry
-60-	Grounded Ball and Stem
-65-	MPTFE Seats and Graphite Packing
-67-	Cleaned For Industrial Gases
-69-	Drilled and Tapped Purge Port with Plug
-70-	4" Extended Bonnet
-73-	316 SS Spiral Wound Gaskets w/PTFE Filler
-76-	Live Loaded 87A/88A Series (Lever)
-77-	Live Loaded 87A/88A Series (Gear & Actuated)
-80-	Multi-Seal (Super TFE) 87A/88A Series
-TC-	With Test Certificate
-TD-	Tested to API Spec 6D

**For Pressure/Temperature Ratings,
Refer to Page M-9, Graph No. 5**



NUMBER	SIZE	A	B	C	D	E	F	G	H	I	J	K	L	M	WT.
88L-943-01	1/2"	0.50	5.50	3.31	3.31	5.11	0.30	1.09	1.38	1.000	0.500	0.375	0.245	10-24	7.0
88L-944-01	3/4"	0.75	6.00	3.56	3.89	5.53	0.36	1.65	1.99	1.392	0.696	0.500	0.287	1/4-20	9.0
88L-945-01	1"	1.00	6.50	3.82	4.62	6.53	0.47	1.62	2.15	1.392	0.696	0.500	0.287	1/4-20	10.5



88L-940 Series

Low Temperature Carbon Steel ASME Class 300
Flanged Full Port Ball Valve -
1-1/2" through 2-1/2"



STANDARDS COMPLIANCE

Refer to page D-A

STANDARD FEATURES

- Refer to page D-A
- Rated to -50°F (-46°C)

MATERIALS OF CONSTRUCTION

Description	Material
1. Body	ASTM A352-LCC
2. Retainer	ASTM A352-LCC
3. Ball	ASTM A276-316 or A351-CF8M
4. Stem	ASTM A276-316
5. Packing Gland	ASTM A108 Type 1215
6. Stem Seals	PTFE
7. Seats	RPTFE
8. Gland Screws	ASTM A193 B7
9. Gland Plate	302 & 304 SS
10. Stem Nut	ASTM A194 Grade 8l
11. Lever	ASTM A366 Steel with Vinyl Grip
12. Stem Bearing	RPTFE
13. Stop	ASTM A108 Type 1215
14. Stop Screw	SAE J429 Grade 2
15. Lock Plate	ASTM A366 Steel
16. Body Seal	RPTFE
17. Grounding Spring	SS
18. Body Joint Stud	ASTM A193 Grade B7
19. Body Joint Nut	ASTM A194 Grade 2H
20. Lockwasher	302 or 304 SS

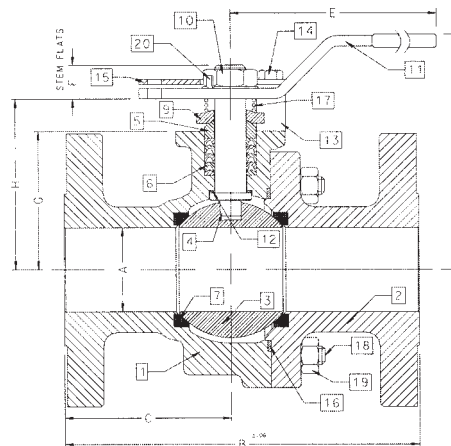
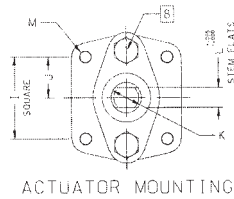
VARIATIONS AVAILABLE:

88L-930 Series (Ni-Cu Ball & Stem)

OPTIONS AVAILABLE:

(SUFFIX)	OPTION
-01-	Standard
-14-	Side Vented Ball (Uni-Directional)
-15-	Wheel Handle, Steel
-21-	UHMWPE Seats
-24-	Fire Safe (Graphite Packing and Seal)
-35-	PTFE Seats and Seals
-38-	PEEK Seats and Graphite Packing
-49-	Assembled Dry
-59-	SS External Trim
-60-	Grounded Ball and Stem
-65-	MPTFE Seats and Graphite Packing
-67-	Cleaned For Industrial Gases
-69-	Drilled and Tapped Purge Ports with Plugs
-70-	4" Extended Bonnet
-73-	316 SS Spiral Wound Gaskets w/PTFE Filler
-76-	Live Loaded 87A/88A Series (Lever)
-77-	Live Loaded 87A/88A Series (Gear & Actuated)
-80-	Multi-Seal (Super TFE) 87A/88A Series
-MG-	Gear Operator with Standard Handwheel
-MH-	Gear Operator with Standard Handwheel & Locking Device
-MJ-	Gear Operator with Oversize Handwheel
-MK-	Gear Operator with Oversize Handwheel & Locking Device
-TC-	With Test Certificate
-TD-	Tested to API Spec 6D

**For Pressure/Temperature Ratings,
Refer to Page M-9, Graph No. 5**



NUMBER	SIZE	A	B	C	D	E	F	G	H	I	J	K	L	M	WT.
88L-947-01	1-1/2"	1.50	7.50	3.50	4.62	6.65	0.72	2.41	3.09	1.949	0.974	0.625	0.412	5/16-18	21.0
88L-948-01	2"	2.00	8.50	4.00	5.61	8.41	0.80	3.31	4.08	1.949	0.974	0.750	0.477	5/16-18	37.0
88L-949-01	2-1/2"	2.50	9.50	4.44	6.24	8.41	0.80	3.94	4.71	1.949	0.974	0.750	0.477	5/16-18	57.0



88L-940 Series

Low Temperature Carbon Steel ASME Class 300
Flanged Full Port Ball Valve -
3" through 6"



STANDARDS COMPLIANCE

Refer to page D-A

MATERIALS OF CONSTRUCTION

Description	Material
1. Body	ASTM A352-LCC
2. Retainer	ASTM A352-LCC
3. Ball	ASTM A276-316 or A351-CF8M
4. Stem	ASTM A276-316
5. Packing Gland	ASTM A108 Type 1215
6. Stem Seals	PTFE
7. Seats	RPTFE
8. Gland Screws	ASTM A193 B7
9. Gland Plate	316 SS
10. Adapter Screw	316 SS
11. Handle Adapter	ASTM A366 Steel with Vinyl Grip
12. Stem Bearing	RPTFE
13. Stop	ASTM A108 Type 1215
14. Stop Screw	SAE J429 Grade 2
15. Lock Plate	ASTM A366 Steel
16. Body Seal	RPTFE
17. Grounding Spring	SS
18. Body Joint Stud	ASTM A193 Grade B7
19. Body Joint Nut	ASTM A194 Grade 2H
20. Pipe Handle	Galvanized Steel (not shown)

STANDARD FEATURES

- Refer to page D-A
- Rated to -50°F (-46°C)

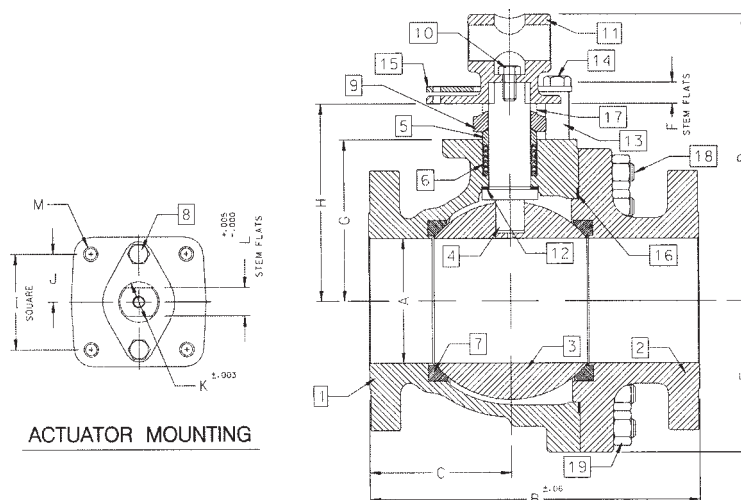
VARIATIONS AVAILABLE:

88L-930 Series (Ni-Cu Ball & Stem)

OPTIONS AVAILABLE:

(SUFFIX)	OPTION
-01-	Standard
-14-	Side Vented Ball (Uni-Directional)
-21-	UHMWPE Seats
-24-	Fire Safe (Graphite Packing and Seal)
-35-	PTFE Seats and Seals
-38-	PEEK Seats and Graphite Packing
-49-	Assembled Dry
-59-	SS External Trim
-60-	Grounded Ball and Stem
-65-	MPTFE Seats and Graphite Packing
-67-	Cleaned For Industrial Gases
-69-	Drilled and Tapped Purge Ports with Plugs
-70-	4" Extended Bonnet
-73-	316 SS Spiral Wound Gaskets w/PTFE Filler
-76-	Live Loaded 87A/88A Series (Lever)
-77-	Live Loaded 87A/88A Series (Gear & Actuated)
-80-	Multi-Seal (Super TFE) 87A/88A Series
-MG-	Gear Operator with Standard Handwheel
-MH-	Gear Operator with Standard Handwheel & Locking Device
-MJ-	Gear Operator with Oversize Handwheel
-MK-	Gear Operator with Oversize Handwheel & Locking Device
-TC-	With Test Certificate
-TD-	Tested to API Spec 6D

**For Pressure/Temperature Ratings,
Refer to Page M-9, Graph No. 5**



NUMBER	SIZE	A	B	C	D	E	F	G	H	I	J	K	L	M	WT.
88L-940-01	3"	3.00	11.12	5.24	8.80	4.06	0.50	4.75	5.95	2.840	1.420	1.250	0.725	3/8-16	78.0
88L-94A-01	4"	4.00	12.00	5.44	9.99	5.25	0.50	5.94	7.13	2.840	1.420	1.250	0.725	3/8-16	133.0
88L-94C-01	6"	6.00	15.88	6.82	13.73	7.30	1.00	7.75	9.48	4.596	2.296	2.000	1.375	3/4-10	329.0



88L-940 Series

Low Temperature Carbon Steel ASME Class 300
Flanged Full Port Ball Valve -
8" through 12"



STANDARDS COMPLIANCE

Refer to page D-A

MATERIALS OF CONSTRUCTION

Description	Material
1. Body	ASTM A352-LCC
2. Retainer	ASTM A352-LCC
3. Ball	ASTM A351-CF8M
4. Stem	ASTM A276-316
5. Packing Gland	ASTM A108 Type 1215
6. Stem Seals	PTFE
7. Seats	RPTFE
8. Gland Screws	ASTM A193 B7
9. Gland Plate	316 SS
10. Stem Bearing	RPTFE
11. Body Seal	RPTFE
12. Body Joint Stud	ASTM A193 Grade B7
13. Body Joint Nut	ASTM A194 Grade 2H

STANDARD FEATURES

- Refer to page D-A
- Rated to -50°F (-46°C)

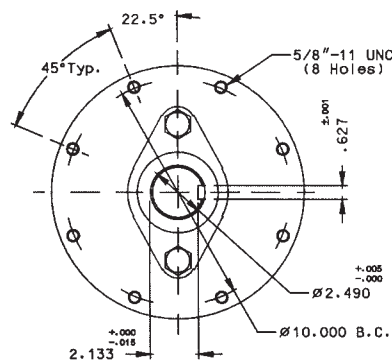
VARIATIONS AVAILABLE:

88L-930 Series (Ni-Cu Ball & Stem)

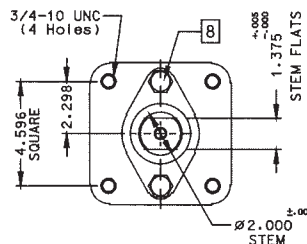
OPTIONS AVAILABLE:

(SUFFIX)	OPTION
-01-	Standard
-14-	Side Vented Ball (Uni-Directional)
-21-	UHMWPE Seats
-24-	Fire Safe (Graphite Packing and Seal)
-35-	PTFE Seats and Seals
-49-	Assembled Dry
-60-	Grounded Ball and Stem
-65-	MPTFE Seats and Graphite Packing
-67-	Cleaned for Industrial Gas - CS Valves
-69-	Drilled and Tapped Purge Ports with Plugs
-70-	Extended Bonnet (8" Only)
-76-	Live Loaded 87A/88A Series (Lever)
-77-	Live Loaded 87A/88A Series (Gear & Actuated)
-80-	Multi-Seal (Super TFE) 87A/88A Series
-MG-	Gear Operator with Standard Handwheel
-MH-	Gear Operator with Standard Handwheel & Locking Device
-MJ-	Gear Operator with Oversize Handwheel
-MK-	Gear Operator with Oversize Handwheel & Locking Device
-TC-	With Test Certificate
-TD-	Tested to API Spec 6D

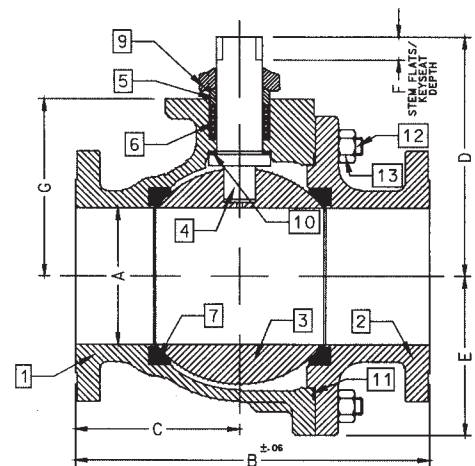
**For Pressure/Temperature Ratings,
Refer to Page M-9, Graph No. 5**



ACTUATOR MOUNTING: 10" & 12"



ACTUATOR MOUNTING: 8"



NUMBER	SIZE	A	B	C	D	E	F	G
88L-94E-01	8"	8.00	19.75	9.38	12.83	9.56	1.00	10.22
88L-94G-01	10"	10.00	22.38	10.95	18.57	11.33	2.31	12.80
88L-94H-01	12"	12.00	25.50	12.84	20.31	13.40	2.31	14.92



ASME Flanged Ball Valves

87A, 87B, 88A, 88B, & 88L Series

Features and Benefits

STANDARDS COMPLIANCE

Except where specifically noted all valves within this family of products complies with the requirements of this listed standard.

- ASME B16.5 - "Pipe Flanges and Flanged Fittings"
- ASME B16.10 - "Face to Face Dimensions of Valves"
- ASME B16.34 - "Valves - Flanged, Threaded, and Welding End"
- ASME B16.33 - "Manual Operated Metallic Gas Valves for Use in Gas Piping Systems up to 125 psig"
- ASME B16.38 - "Large Metallic Valves for Gas Distribution (Manually Operated NPS 2-1/2" to 12", 125 psig)"
- ASME B31.1 - "Power Piping"
- ASME B31.3 - "Chemical Plant and Petroleum Refinery Piping"
- ASME B31.8 - "Gas Transmission and Distribution Piping Systems"
- API 607 - "Fire Test - Soft Seated Quarter Turn Valves" (-24 Option Required)
- API 608 - "Ball Valves - Flanged, Threaded, and Welding End"
- MSS SP-25 - "Standard Marking System for Valves"
- MSS SP-61 - "Pressure Testing of Steel Valves"
- MSS SP-72 - "Ball Valves with Flanged or Butt Weld Ends"
- UL 125 - "Valves for Anhydrous Ammonia and LP-Gas (Other than Safety Relief)"

STANDARD FEATURES

Except where specifically noted all valves within this family of products include all listed features as standard.

- Two Position Locking Device (Valves 6" FP, 8" SP and smaller)
- CHV Style Adjustable Stem Seals
- Four Point ISO 5211 Mounting Pad Bolt Pattern
- Slot Vented Ball for Thermal Expansion
- Rated 150 psig Saturated Steam
- Anti-static Grounded Ball and Stem
- Blow-out Proof Stem Design
- Cast Boss for Bleed / Drain Port
- Vacuum Service to 29 inches of Hg
- NACE MR0175-2000 Compliance on all 87A/87B

PRODUCT APPROVALS

- CSA (Reference: ASME B16.33 & B16.38)
- UL (Reference: Control Number 195H)
 - UL (YSDT) LP-Gas Shut-Off Valves
 - UL (MHKZ) Manual Valves
 - UL (YRBX) Flammable Liquid Shut-Off Valves
 - UL (YRPV) Gas Shut-Off Valves
 - UL (YQNZ) Compressed Gas Shut-Off Valves
 - UL (YQAR) Anhydrous Ammonia Shut-Off Valves

FLOW DATA

For Apollo® Ball Valves

The listed Cv "factors" are derived from actual flow testing, in the Apollo® Ball Valve Division, Conbraco Industries, Inc., Pageland, South Carolina. These tests were completed using standard "off the shelf" valves with no special preparation and utilizing standard schedule 40 pipe. It should be understood that these factors are for the valve only and also include the connection configuration. The flow testing is done utilizing water as a fluid media and is a direct statement of the gallons of water flowed per minute with a 1 psig pressure differential across the valve/connection unit. Line pressure is not a factor. Because the Cv is a factor, the formula can be used to estimate flow of most media for valve sizing.

Flow of Liquid

$$Q = Cv \sqrt{\frac{\Delta P}{SpGr}}$$

$$\text{or } \Delta P = \frac{(Q)^2 (SpGr)}{(Cv)^2}$$

Where:

Q = flow in US gpm
 ΔP = pressure drop (psig)
 SpGr = specific gravity at flowing temperature
 Cv = valve constant

Flow of Gas

$$Q = 1360 Cv \sqrt{\frac{(\Delta P) (P_1)}{(SpGr) (T)}}$$

$$\text{or } \Delta P = \frac{5.4 \times 10^{-7} (SpGr) (T) (Q)^2}{(Cv)^2 (P_2)}$$

Where:

Q = flow in SCFH
 ΔP = pressure drop (psig)
 SpGr = specific gravity (based on air = 1.0)
 P₂ = outlet pressure-psia (psig + 14.7)
 T = (temp. °F + 460)
 Cv = valve constant

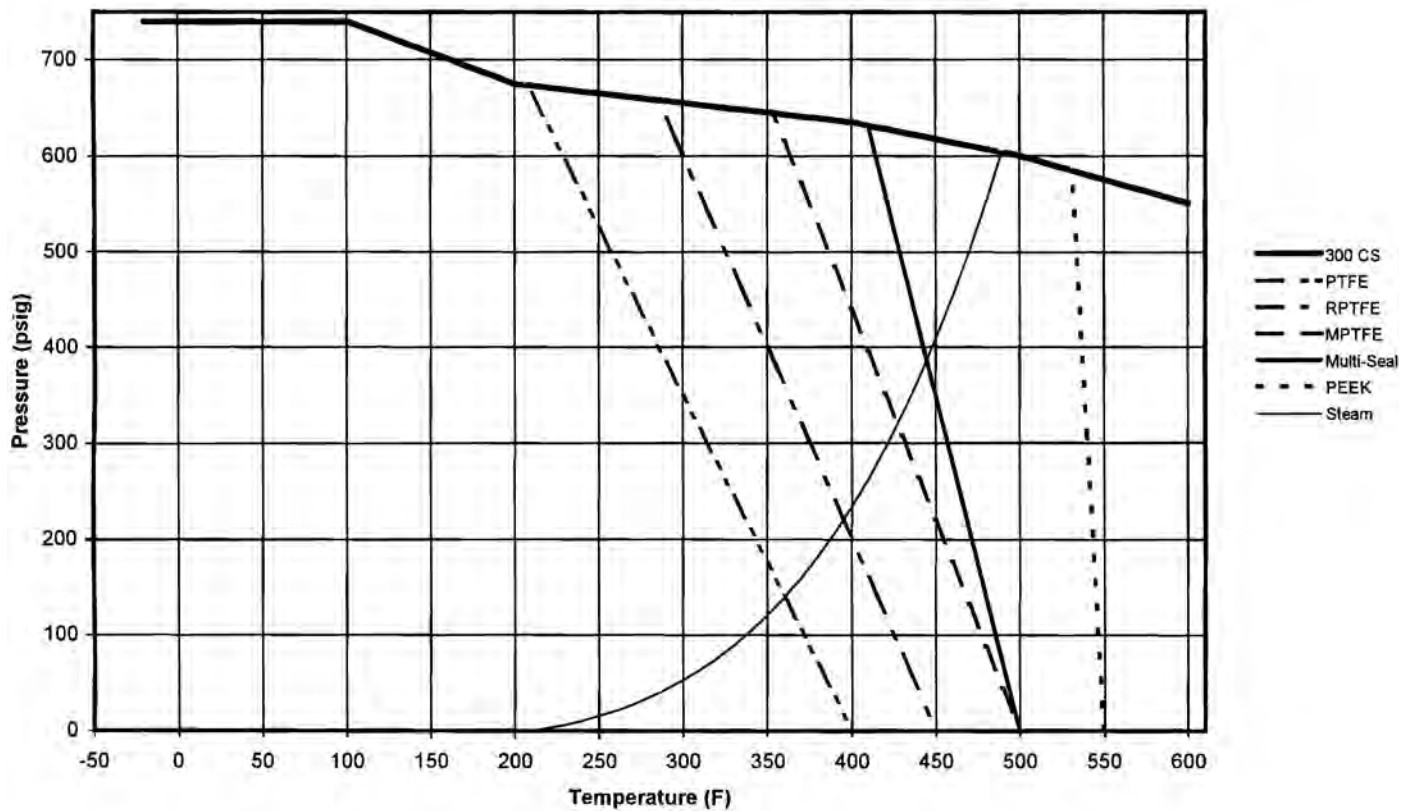
Cv FACTORS FOR APOLLO VALVES

Valve Size (inches)	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4	6	8	10	12
Ball Valves															
32-100/200 Series	5.1	6.6	8	24	30	45	55	95	--	--	--	--	--	--	--
64-100/200 Series	6	7	19	34	50	104	268	309	629	1018	1622	--	--	--	--
64W Series	--	--	--	--	--	--	--	--	629	1018	1622	--	--	--	--
70B-140 Series	8.4	7.2	15	30	43	48	84	108	190	370	670	--	--	--	--
70-100/200 Series	8.4	7.2	15	30	43	48	84	108	190	370	670	--	--	--	--
70-300/400 Series	--	--	15	30	43	48	84	108	--	--	--	--	--	--	--
70-600 Series	2.3	4.5	5.4	12	14	21	34	47	--	--	--	--	--	--	--
70-800 Series	8.4	7.2	15	30	43	48	84	--	--	--	--	--	--	--	--
71AR Series	--	--	--	30	43	48	84	108	190	370	--	--	--	--	--
71-100/200 Series	--	--	--	30	43	48	84	108	190	370	--	--	--	--	--
72-100/900 Series	--	--	26	48	65	125	170	216	--	--	--	--	--	--	--
73A-100 Series	8.4	7.2	15	30	43	48	84	108	--	--	--	--	--	--	--
73-300/400 Series	--	--	26	48	65	125	170	216	--	--	--	--	--	--	--
74-100 Series	8.4	7.2	15	30	43	48	84	108	190	370	670	--	--	--	--
75-100 Series	8.4	7.2	15	30	43	48	84	108	190	370	670	--	--	--	--
76AR Series	8.4	7.2	15	30	43	48	84	108	190	370	670	--	--	--	--
76F-100 Series	8.1	15	15	51	68	125	177	389	--	--	--	--	--	--	--
76-100 Series	8.4	7.2	15	30	43	48	84	108	190	370	--	--	--	--	--
76-300/400 Series	--	--	26	48	65	125	170	216	--	--	--	--	--	--	--
76-600 Series	2.3	4.5	5.4	12	14	21	34	47	--	--	--	--	--	--	--
7K-100 Series	--	--	15	51	68	125	177	389	503	--	--	--	--	--	--
77AR Series	8.1	15	15	51	68	125	177	389	--	--	--	--	--	--	--
77C-100/200 Series	4.5	7.2	16	36	68	125	177	389	503	--	--	--	--	--	--
77D-140 Series	4.5	7.2	16	36	68	125	177	389	--	--	--	--	--	--	--
77D-640 Series	--	--	--	11	24	35	--	--	--	--	--	--	--	--	--
77G-UL Series	4.5	7.2	16	36	68	125	177	389	503	--	--	--	--	--	--
77W Series	--	--	16	36	68	125	177	389	--	--	--	--	--	--	--
77X Series	--	--	16	36	68	--	--	--	--	--	--	--	--	--	--
77-100/200 Series	8.1	15	15	51	68	125	177	389	503	--	--	--	--	--	--

Cv FACTORS FOR APOLLO VALVES

Valve Size (inches)	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4	6	8	10	12
Ball Valves															
79 Series	8.5	8.5	9.8	32	44	66	148	218	440	390	--	--	--	--	--
80/81 Series	8.4	7.2	15	30	43	48	84	108	190	370	--	--	--	--	--
82-100/200 Series	8.1	14	26	51	68	120	170	376	510	996	1893	--	--	--	--
83A/83B Series	8.1	14	26	51	68	120	170	376	--	--	--	--	--	--	--
83R-100/200 Series	--	--	--	--	--	--	170	376	--	996	1893	--	--	--	--
86A/86B Series	8.1	14	26	51	68	120	170	376	--	--	--	--	--	--	--
86R-100/200 Series	--	--	--	--	--	--	170	376	--	996	1893	--	--	--	--
87A-100 Series	--	--	--	--	--	--	86	104	234	375	673	1099	1902	3890	--
87A-200 Series	--	--	15	19	75	--	195	410	545	1021	2016	4837	9250	15170	22390
87A-700 Series	--	--	--	--	--	--	86	104	234	375	673	1099	1902	3890	--
87A-900 Series	--	--	15	19	75	--	195	410	545	1021	2016	4837	9250	15170	22390
87B-100 Series	--	--	--	--	--	--	--	--	--	375	673	1099	1902	3890	--
88A-100 Series	--	--	--	--	--	--	86	104	234	375	673	1099	1902	3890	--
88A-200 Series	--	--	15	19	75	--	195	410	545	1021	2016	4837	9250	15170	22390
88A-700 Series	--	--	--	--	--	--	86	104	234	375	673	1099	1902	3890	--
88A-900 Series	--	--	15	19	75	--	195	410	545	1021	2016	4837	9250	15170	22390
88B-100 Series	--	--	--	--	--	--	--	--	--	375	673	1099	1902	3890	--
89-100 Series	8.4	7.2	15	30	43	48	84	108	190	370	--	--	--	--	--
9A-100 Series	8.3	6.7	5.7	10	16	25	40	62	--	--	--	--	--	--	--
91-100 Series	8.3	6.7	5.7	10	16	25	40	62	--	--	--	--	--	--	--
92-100 Series	8.3	6.7	5.7	10	16	25	40	62	--	--	--	--	--	--	--
93-100 Series	8.3	6.7	5.7	10	16	25	40	62	--	--	--	--	--	--	--
94A-100/200 Series	6	7	19	34	50	104	268	309	629	1018	1622	--	--	--	--
95-100/200 Series	--	--	15	51	68	--	--	--	--	--	--	--	--	--	--
95A-300/400 Series	--	--	19	34	50	--	--	--	--	--	--	--	--	--	--
96-100 Series	8.3	6.7	5.7	10	16	25	40	62	--	--	--	--	--	--	--
399-100 Series	8.4	7.2	15	30	43	48	84	108	190	370	--	--	--	--	--
489-100 Series	8.4	7.2	15	30	43	48	84	108	190	370	--	--	--	--	--

Class 300 CS P-T Rating (Graph 5)



Class 300 SS P-T Rating (Graph 6)

