High Pressure Control Valves

Models PO, PC

Product Bulletin

PB0002

Dec. 2017



Through Body



Angle Body

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NOTE

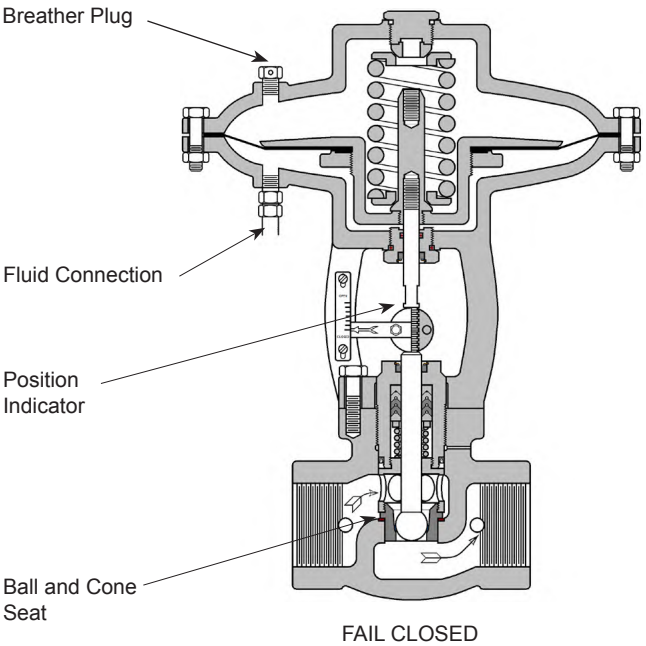
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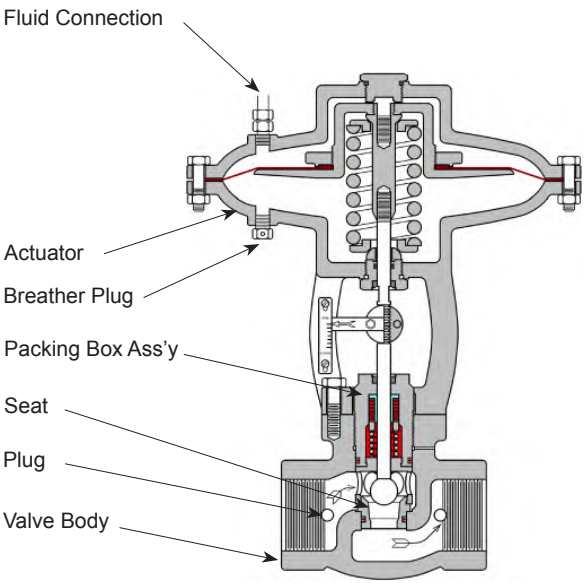
Introduction

The Kimray High Pressure Control Valve is designed for controlling a variety of fluids at pressures up to 6000 psig (413 bar) and can be used for the discharge of liquid or gas from vessels, separators, treaters, knockouts, similar liquid accumulators and other areas of natural gas production. The Kimray High Pressure Control Valve comes with a variety of connection types in 1 inch and 2 inch (25 mm and 50 mm).

Summary:	
Valve Description	**Stem Guided** control valve
Normal Service	Liquid, Gas
Connection Size:	1”, 2”
Body Style:	Through or Angle
Connection Type:	NPT, Flanged, Socket Weld
Actuation:	Pressure Opening or Pressure Closing, Pneumatic, single acting
Control:	Upstream or Downstream
Temperature:	-20°F , 250°F (Options available for higher temperatures)
Cold Working Maximum Pressure:	1” HPCV, 2” HPCV up to 6000 psig
Options:	Reduced trim capacity Trim material Adjustable topworks 65”



FAIL CLOSED
Figure 1



FAIL OPEN
Figure 2

Features

Rugged Actuator Design

- Standard actuator is made from Ductile Iron (ASTM-A395).
- Capable of 45 psig (3.1 bar) diaphragm pressure for actuation.
- Multiple spring options make it ideal for operation with I/P or electro-pneumatic positioners.
- An optional “65 Topworks” actuator is available with an adjustable spring from 10 psig to 30 psig (0.68 bar to 2 bar) and is made from 1018CW, ASTM 108 steel.
- Reversible Actuator allows simple change from “fail open” to “fail close” with no extra parts required.
- Equal percentage trim for throttling service.
- Quick opening for on / off service.
- Linear trim (Nominal).
- Class IV seat FCI 70.2.
- Non lube stem seal.
- Live load packing

Open Yoke Design

- Allows for position indicator to be easily seen from any direction.
- Stem position scale on all models.
- Allows trapped process gas to escape to the atmosphere if packing box assembly leaks.
- Four bolts hold actuator to the valve body for easy access to trim components.

Steel Body

- Standard globe valve body is made from cast steel A216-WCB, CF8M & LCC.

NACE Compliance

- Special material available for sour service application in accordance with the requirements of NACE specification MR0175

Table 1 - Body Materials and End Connections			
Main Valve Body Size	Material Group	ASTM Group	Available Connections
1 inch (25 mm)	WCB	A216-WCB	4000 psig, or 6000 psig NPT (275 bar, 413 bar)
	LCC	A352-LCC	4000 psig, or 6000 psig NPT (275 bar, 413 bar)
	CF8M	A351-CF8M	4000 psig, or 6000 psig NPT (275 bar, 413 bar)
	WCB	A216-WCB	150RF, 300RF, 600RF, 1500RF
	LCC	A352-LCC	150RF, 300RF, 600RF, 1500RF
	CF8M	A351-CF8M	150RF, 300RF, 600RF, 1500RF
	WCB	A216-WCB	300RTJ, 600RTJ, 1500RTJ
	LCC	A352-LCC	300RTJ, 600RTJ, 1500RTJ
	CF8M	A351-CF8M	300RTJ, 600RTJ, 1500RTJ
2 in (50 mm)	WCB	A216-WCB	2000 psig, 4000 psig, or 6000 psig NPT (275 bar, 413 bar, 137 bar)
	LCC	A352-LCC	2000 psig, 4000 psig, or 6000 psig NPT (275 bar, 413 bar, 137 bar)
	CF8M	A351-CF8M	2000 psig, 4000 psig, or 6000 psig NPT (275 bar, 413 bar, 137 bar)
	WCB	A216-WCB	150RF, 300RF, 600RF, 1500RF
	LCC	A352-LCC	150RF, 300RF, 600RF, 1500RF
	CF8M	A351-CF8M	150RF, 300RF, 600RF, 1500RF
	WCB	A16-WCB	300RTJ, 600RTJ, 1500RTJ, 2500
	LCC	A352-LCC	300RTJ, 600RTJ, 1500RTJ, 2500
	CF8M	A351-CF8M	300RTJ, 600RTJ, 1500RTJ, 2500

* Standard body is A216-WCB
* KIMCOAT coating available for any body material

Kimray body materials conform to ASME B16.5-1996 for external dimensions, working pressure class rating per ASME B16.34 and face to face per ANSI 75-08.01-2002

Flanges available upon request.

Table 2 - Temperature vs. Pressure Rating						
Temperature °F (°C)	Flange Class					
	150	300	600	900	1500	2500
	Hydrostatic Test Pressure (psig)					
	450 (31 bar)	1125 (77.5 bar)	2225 (153.4 bar)	3350 (230.9 bar)	5575 (384.3 bar)	9275 (639.4 bar)
	Maximum Allowable Non-Shock Pressure (psig)					
WCB - A216-WCB						
-20 to 100 (-28 to 37)	285 (19.7 bar)	740 (51.0 bar)	1480 (102 bar)	2220 (153.1 bar)	3705 (255.5 bar)	6170 (425.4 bar)
200 (93)	260 (17.9 bar)	680 (46.9 bar)	1360 (93.8 bar)	2035 (140.3 bar)	3395 (234.1 bar)	5655 (389.9 bar)
300 (148)	230 (15.9 bar)	655 (45.2 bar)	1310 (90.3 bar)	1965 (135.5 bar)	3270 (225.5 bar)	5450 (375.8 bar)
400 (204)	200 (13.8 bar)	635 (43.8 bar)	1265 (87.2 bar)	1900 (131.0 bar)	3170 (218.6 bar)	5280 (364.0 bar)
500 (260)	170 (11.7 bar)	605 (41.7 bar)	1205 (83.1 bar)	1810 (124.8 bar)	3015 (207.9 bar)	5025 (346.5 bar)
600 (315)	140 (9.7 bar)	570 (39.3 bar)	1135 (78.3 bar)	1705 (117.6 bar)	2840 (195.8 bar)	4730 (326.1 bar)
650 (343)	125 (8.6 bar)	550 (37.9 bar)	1100 (75.8 bar)	1650 (113.8 bar)	2745 (189.3 bar)	4575 (315.4 bar)
700 (371)	110 (7.6 bar)	530 (36.5 bar)	1060 (73.1 bar)	1590 (109.6 bar)	2665 (183.7 bar)	4425 (305.1 bar)
LCC - A352-LCC						
	Flange Class					
	150	300	600	900	1500	2500
-20 to 100 (-28 to 37)	290 (20.0 bar)	750 (51.7 bar)	1500 (103.4 bar)	2250 (155.1 bar)	3750 (258.6 bar)	6250 (430.9 bar)
200 (93)	260 (17.9 bar)	750 (51.7 bar)	1500 (103.4 bar)	2250 (155.1 bar)	3750 (258.6 bar)	6250 (430.9 bar)
300 (148)	230 (15.9 bar)	730 (50.3 bar)	1455 (100.3 bar)	2185 (150.7 bar)	3640 (251.0 bar)	6070 (418.5 bar)
400 (204)	200 (13.8 bar)	705 (48.6 bar)	1405 (96.9 bar)	2110 (145.5 bar)	3520 (242.7 bar)	5865 (404.4 bar)
500 (260)	170 (11.7 bar)	665 (45.9 bar)	1330 (91.7 bar)	1995 (137.6 bar)	3325 (229.3 bar)	5540 (382.0 bar)
600 (315)	140 (9.7 bar)	605 (41.7 bar)	1210 (83.4 bar)	1815 (125.1 bar)	3025 (208.6 bar)	5040 (347.5 bar)
650 (343)	125 (8.6 bar)	590 (40.7 bar)	1175 (81.0 bar)	1765 (121.7 bar)	2940 (202.7 bar)	4905 (338.2 bar)
700 (371)	110 (7.6 bar)	555 (38.3 bar)	1110 (76.5 bar)	1665 (114.8 bar)	2775 (191.3 bar)	4630 (319.2 bar)
CF8M - A351-CF8M						
	Flange Class					
	150	300	600	900	1500	2500
-20 to 100 (-28 to 37)	275 (19.0 bar)	720 (49.6 bar)	1440 (99.3 bar)	2160 (148.9 bar)	3600 (248.2 bar)	6000 (413.7 bar)
200 (93)	235 (16.2 bar)	620 (42.7 bar)	1240 (85.5 bar)	1860 (128.2 bar)	3095 (213.4 bar)	5160 (355.8 bar)
300 (148)	215 (14.8 bar)	560 (38.6 bar)	1120 (77.2 bar)	1680 (115.8 bar)	2795 (192.7 bar)	4660 (321.3 bar)
400 (204)	195 (13.4 bar)	515 (35.5 bar)	1025 (70.7 bar)	1540 (106.2 bar)	2570 (177.2 bar)	4280 (295.1 bar)
500 (260)	170 (11.7 bar)	480 (33.1 bar)	955 (65.8 bar)	1435 (98.9 bar)	2390 (164.8 bar)	3980 (274.4 bar)
600 (315)	140 (9.7 bar)	450 (31.0 bar)	900 (62.1 bar)	1355 (93.4 bar)	2255 (155.5 bar)	3760 (259.2 bar)
650 (343)	125 (8.6 bar)	440 (30.3 bar)	885 (61.0 bar)	1325 (91.4 bar)	2210 (152.4 bar)	3680 (253.7 bar)
700 (371)	110 (7.6 bar)	435 (30 bar)	870 (60.0 bar)	1305 (90.0 bar)	2170 (149.6 bar)	3620 (249.6 bar)

Kimray conform to ASME B16.34-2009 for working pressure vs working temperature and ASME B16.5-1996 for flanges and flanged fittings.

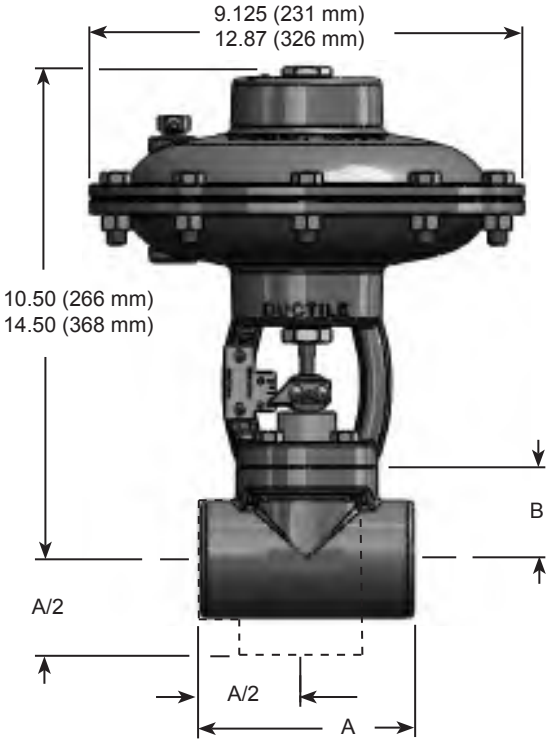


Figure 3

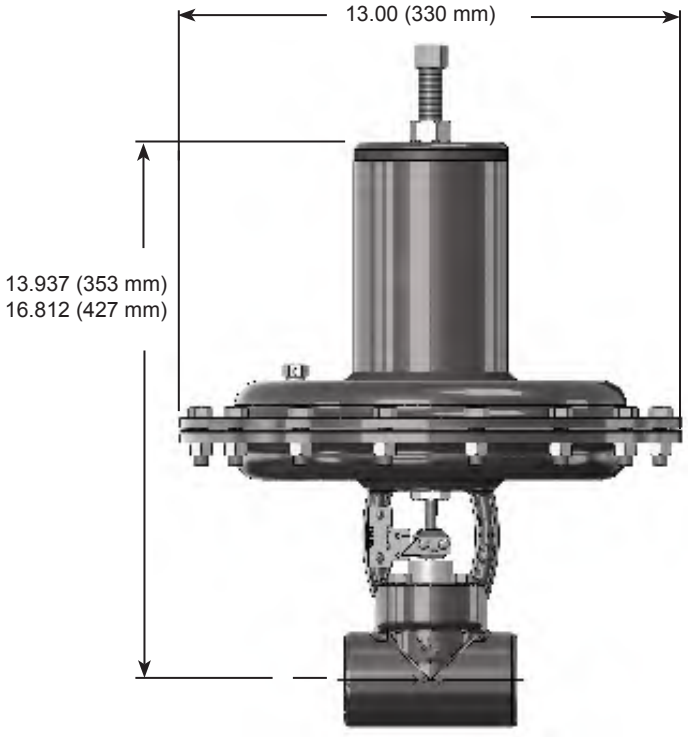


Figure 4

Table 3 - Valve Dimensions

		End Connection	A	A/2	B	Approximate Weights w/ Standard	Approximate Weights w/ 65 TopWorks
Ball & Stem	1”	NPT	4.437 in (112 mm)	2.218 in (56 mm)	1.937 in (49 mm)	24 lbs (10.88 kg)	31 lbs (14.06 kg)
		150RF	7.250 in (184 mm)	3.625 in (92 mm)	1.937 in (49 mm)	29 lbs (13.15 kg)	36 lbs (16.32 kg)
		150RTJ	7.625 in (193 mm)	3.812 in (96 mm)	1.937 in (49 mm)	29 lbs (13.15 kg)	36 lbs (16.32 kg)
		300RF	7.750 in (196 mm)	3.875 in (98 mm)	1.937 in (49 mm)	32 lbs (14.51 kg)	39 lbs (17.69 kg)
		300RTJ	8.125 in (206 mm)	4.062 in (103 mm)	1.937 in (49 mm)	31 lbs (14.06 kg)	38 lbs (17.23 kg)
		600RF	8.250 in (209 mm)	4.125 in (104 mm)	1.937 in (49 mm)	33 lbs (14.96 kg)	40 lbs (18.14 kg)
		600RTJ	8.250 in (209 mm)	4.125 in (104 mm)	1.937 in (49 mm)	33 lbs (14.96 kg)	56 lbs (25.40 kg)
		1500RF	10.75 in (273 mm)	5.375 in (104 mm)	1.937 in (49 mm)	42 lbs (19.05 kg)	48 lbs (21.77 kg)
		1500RTJ	10.75 in (273 mm)	5.375 in (104 mm)	1.937 in (49 mm)	42 lbs (19.05 kg)	48 lbs (21.77 kg)
	2”	2000 NPT	6.562 in (166 mm)	3.281 in (83 mm)	3.187 in (80 mm)	60 lbs (27.21 kg)	60 lbs (27.21 kg)
		4000 NPT	6.875 in (174 mm)	3.437 in (87 mm)	3.187 in (80 mm)	64 lbs (29.02 kg)	64 lbs (29.21 kg)
		150RF	10.00 in (254 mm)	5.00 in (127 mm)	3.187 in (80 mm)	69 lbs (31.29 kg)	69 lbs (31.29 kg)
		150RTJ	10.37 in (263 mm)	5.187 in (131 mm)	3.187 in (80 mm)	70 lbs (31.75 kg)	70 lbs (31.75 kg)
		300RF	10.50 in (266 mm)	5.250 in (133 mm)	3.187 in (80 mm)	72 lbs (32.65 kg)	72 lbs (32.65 kg)
		300RTJ	11.00 in (279 mm)	5.50 in (139 mm)	3.187 in (80 mm)	73 lbs (33.11 kg)	73 lbs (33.11 kg)
		600RF	11.25 in (285 mm)	5.625 in (142 mm)	3.187 in (80 mm)	75 lbs (34.01 kg)	75 lbs (34.01 kg)
		600RTJ	11.37 in (288 mm)	5.685 in (144 mm)	3.187 in (80 mm)	75 lbs (34.01 kg)	75 lbs (34.01 kg)
		1500RF	13.37 in (339 mm)	6.687 in (169 mm)	3.187 in (80 mm)	105 lbs (47.62 kg)	105 lbs (47.62 kg)
		1500RTJ	13.50 in (342 mm)	6.750 in (171 mm)	3.187 in (80 mm)	106 lbs (48.08 kg)	106 lbs (47.62 kg)

Kimray valve dimensions conform to ANSI/ISA 75 series.

Table 4 - Materials of Construction			
Valve Components	**Standard**	**NACE *Compliant**	**Optional**
Body	ASTM-A216 WCB	ASTM-A216 WCB	A352 LCC A351 CF8M
Actuator	ASTM-A395	ASTM-A395	ASTM-A395
Stuffing Box	ASTM-A105	316SS6 (ASTM-A479)	
Stem	303SS (ASTM-A582)	316SS6 (ASTM-A479)	17-4PH (ASTM-A564)
Cage	ASTM-A108	316SS6 (ASTM-A479)	17-4PH (ASTM-A564) 0-2 (ASTM-A681)
Seat Material	D-2 (ASTM-A681) Carbide (Quick Opening)	316SS6 (ASTM-A479)	17-4PH (ASTM-A564) 440C Zirconia
Plug	Chrome Alloy	316SS6 (ASTM-A479)	17-4PH (ASTM-A564) 440C Tungsten Carbide
Diaphragm	Nitrile/Nylon	Aflas, FKM (ASTM-A479)	
Packing	Nitrile	Aflas, FKM (ASTM-A479)	Aflas Low Temp Nitrile FKM Graphoil, Vee Packing
O-rings	Nitrile	Aflas, FKM (ASTM-A479)	Aflas
Packing Sleeve	PTFE	PTFE	Graphite

* NACE MR0-175 certification upon request

Table 5 - Material Specification							
	Body			Inner Parts			
	CAST STEEL	CAST STEEL	CAST 316 STAINLESS STEEL	316 STAIN-LESS STEEL	17-4 PH STAINLESS STEEL	D-2 TOOL STEEL	440C STAIN-LESS STEEL
KIMRAY SUFFIX	CS	LCC	C6	SS6	PH	-	
ASTM GROUP	ASTM A216	ASTM A352	ASTM A351	ASTM A276	ASTM A564	ASTM A681	ASTM A276
GRADE	WCB	LCC	CF8M	316	630	D-2	
UNS	J03002	J02505	J92900	S31600	S17400	T30402	S44004
NACE Compliant	Yes	Yes	Yes	Yes	Yes	No	
Mechanical Properties							
Allowable Stress (ksi)	20	20	20	N/A	N/A	N/A	
Tensile min (ksi)	70	70	70	80	130	HT Dependability	110
Yield min (ksi)	36	40	30	35	105	HT Dependability	65
Hardness HB				170	310	209-217	230
Physical Properties							
Density (lbs/in3)				0.29	0.28	0.283	0.275
Electrical Resistivity @ 68°F (microhn-in)				29.4	38.6		23.6
Specific Heat @ 32-212°F (BTU/lb/°F)				0.12	0.11		0.11
Thermal Conductivity BTU/hr/ft2/ft/°F @ 212°F				9.4			14
Coeff. of Thermal Expansion (in/in/°F) 32-212°F				8.9x10-6	6.0x10-6	5.83x10-6	5.6x10-6
Coeff. of Thermal Expansion (in/in/°F) 32-600°F				9.0x10-6	6.2x10-6	6.56x10-6	
Modulus of Elasticity (ksi) Tension				28.0 x 103			29.0 x 103
Modulus of Elasticity (ksi) Torsion				11.2 x 103	9.68 x 103		
Magnetic Permeability, H Oersteds				200	200		
Chemical Composition							
Al	0.03-.06	.03-.06	.03-.09	-	-	-	-
C	0.30 max	0.25 max	0.08 max	0.08 max	0.07 max	1.40-1.60	0.95-1.20
Cb	-	-	-	-	0.15-0.45	-	-
Co	-	-	-	-	-	1.00 max	-
Cr	0.50 max	0.05 max	18.0-21.0	16.00-18.00	15.50-17.50	11.00-13.00	16.00-18.00
Cu	0.30 max	0.30 max	-	-	3.00-5.00	-	-
Mg	-	-	-	-	-	-	-
Mn	1.00 max	1.20 max	1.20 max	2.00 max	1.00 max	0.60 max	1.00 max
Mo	0.20 max	0.20 max	2.0-3.0	2.00-3.00	-	0.70-1.20	0.75 max
Ni	0.50 max	0.50 max	9.0-12.0	10.00-14.00	3.00-5.00	-	-
P	0.04 max	0.04 max	0.04 max	0.045 max	0.040 max	0.030 max	0.040 max
Pb	-	-	-	-	-	-	-
S	0.045 max	0.045 max	0.04 max	0.030 max	0.030 max	0.030 max	0.030 max
Si	0.60 max	0.60 max	1.5 max	1.00 max	1.00 max	0.60 max	1.00 max
V	0.03 max	.03 max	-	-	-	1.10 max	-
Zn	-	-	-	-	-	-	-
Temp. Range (°F)	-20 to 800	-50 to 700	-20 to 1000	-20 to 850	-20 to 650	-20 to 800	
Temp. Range (°C)	-28 to 426	-45 to 371	-28 to 537	-28 to 454	-28 to 343	-28 to 426	

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Table 6 - Elastomer Options		
Part	**Standard Material**	**Optional Material**
Actuator Diaphragm	Buna-N	FKM
Actuator seal rings	Buna-N	FKM, Aflas, Peek
Packing Box / Body	Buna-N	Aflas, Low Temp Nitrile, FKM
Stem Packing	Buna-N	Aflas, Low Temp Nitrile, FKM

Table 7 - Elastomer Specifications

		ELASTOMERS								PLASTICS				
		AFLAS	ETHYLENE PROPYLENE	FKM	HIGHLY SATURATED NITRILE	BUNA-N	LOW TEMP. BUNA-N	POLY-ACRY-LATE	GEO-THERMAL EPDM	POLY-URETHANE	GYLON	PEEK	PPDI	TEFLON
	Kimray Suffix	AF	EP	-	HSN	-	LTN	H	GEP	P	GY	PK	PPDI	T
Resistance	Abrasion	GE	GE	G	G	G	G	G	GE	E	E	E	E	E
	Acid	E	G	E	E	F	F	P	G	P	E	G	P	E
	Chemical	E	E	E	FG	FG	FG	P	E	FG	E	G	FG	E
	Cold	P	GE	PF	G	G	E	P	GE	G	E	P	G	E
	Flame	E	P	E	P	P	P	P	P	P	P	P	P	P
	Heat	E	G	E	E	G	G	E	E	F	E	G	G	E
	Oil	E	P	E	E	E	E	E	F	G	E	G	G	E
	Ozone	E	E	E	G	P	P	E	E	E	E	G	E	E
	Set	PF	GE	E	GE	GE	GE	F	GE	F	P	P	F	P
	Tear	PF	GE	F	FG	FG	FG	FG	GE	GE	E	E	GE	E
	Water/Steam	GE	E	P	E	FG	FG	P	E	P	E	E	P	E
	Weather	E	E	E	G	F	F	E	E	E	E	G	E	E
	CO2	GE	GE	PG	GE	FG	FG	P	GE	G	E	G	G	E
	H2S	E	P	P	FG	P	P	P	F	G	E	G	G	E
	Methanol	PF	G	PF	P	P	P	P	G	P	E	G	G	E
Properties	Dynamic	GE	GE	GE	GE	GE	GE	F	GE	E	P	G	G	P
	Electrical	E	E	F	F	F	F	F	E	FG	E	E	FG	E
	Impermeability	G	G	G	G	G	G	E	G	G	E	E	G	E
	Tensile Strength	FG	GE	GE	E	GE	GE	F	GE	E	E	E	E	E
	Temp. Range (°F)	25 to 450	-65 to 300	-15 to 350	-20 to 300	-30 to 250	-65 to 225	0 to 300	0 to 500	-40 to 180	-350 to 500	-30 to 400	-65 to 275	-40 to 400
	Temp. Range (°C)	-3 to 232	-53 to 148	-26 to 176	-28 to 148	-34 to 121	-53 to 107	-17 to 148	-17 to 260	-40 to 82	-212 to 260	-34 to 204	-53 to 135	-40 to 204
	Form	O,S,D	O,S,D	O,S,D	O,S,D	O,S,D	O,D	O,S,D	O, S	S,D	S,D	S	S	O, S

RATINGS: P-POOR, F-FAIR, G-GOOD, E-EXCELLENT

Responsibility for the selection, use and maintenance of any Kimray products remain with the purchaser and end-user

Quick Opening

The seat is designed so that the maximum Cv is reached with a minimal amount of closure member travel. Quick opening will have a carbide ring brazed in the bottom of the seat and the stem ball will have one lapping ring around it.

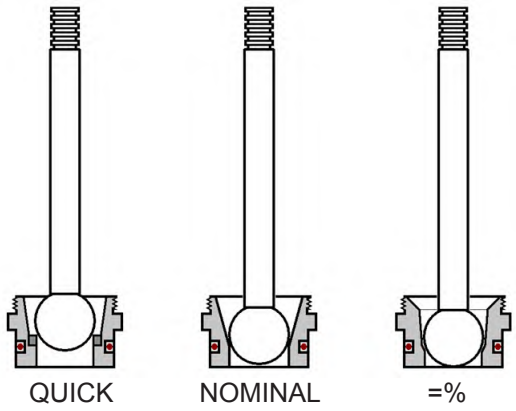


Figure 5

Linear Trim (Nominal)

The linear trim seat is designed to produce an equal increase in Cv with an equal percentage of closure member travel. This characteristic is true through the first 60 percent of stem travel.

Equal Percentage Trim

The closure member is designed to produce an equal percentage of increased flow when the closure member is moved in equal increments of distance. With equal percentage trim, an equal increment of change in stem position will produce an equal percent of change in Cv. For every 10 percent increase in valve position, the flow coefficient changes 154 percent, see table 8.

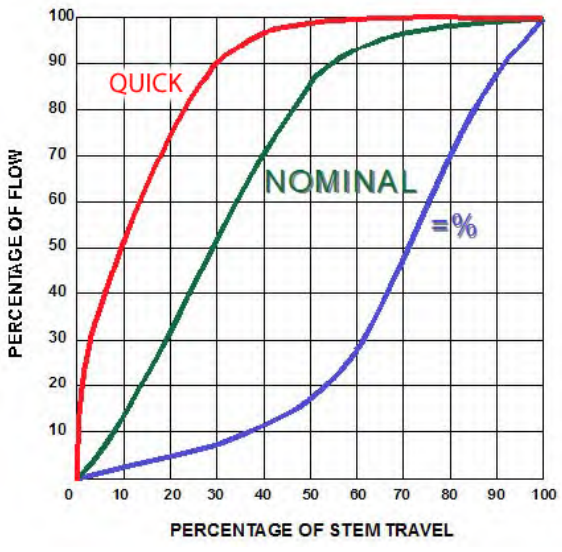


Figure 6

Kimray inherent flow characteristics conform to ANSI/ISA 75.11.01 -1985

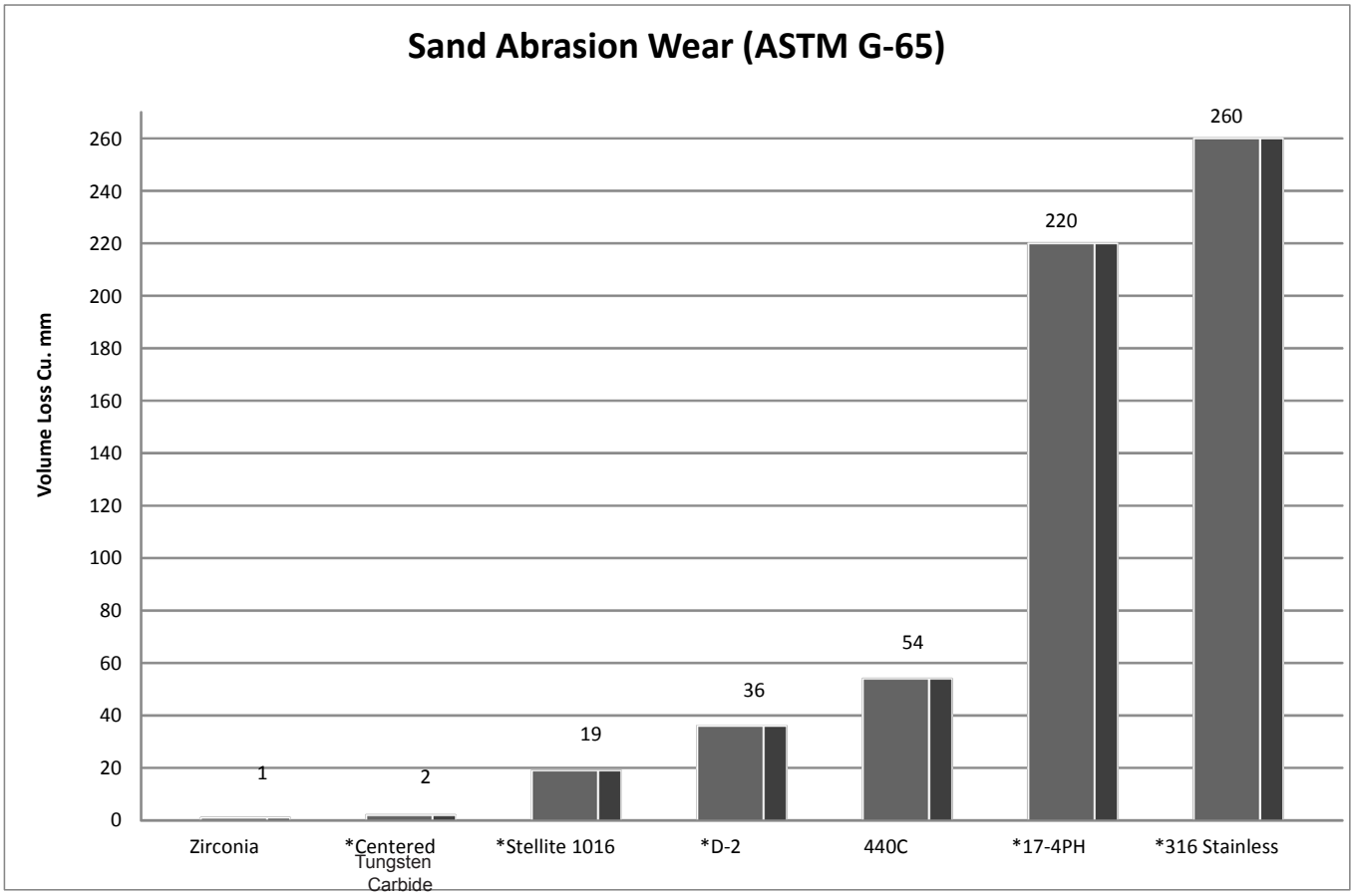


Figure 7

Valve Trim & Inner Valve Material Abrasion Resistance

The abrasion resistance of common inner valve materials varies (seat, ball, trim sets, ratio plug, piston). A standard ASTM G-65 test can be used to compare the abrasion resistance of valve plug materials using silica sand as abrasive.

In the ASTM G-65 procedure A, fine silica sand is introduced at a specified rate between the wear sample and a rubber wheel that is spinning in contact with the wear sample. The rubber wheel carries the sand across the surface of the wear sample for a specified period of time, abrading the surface. Volume loss is then calculated for the wear sample.

References

Budinski, Kenneth G., and Michael K. Budinski. Engineering Materials: Properties and Selection. 8th ed. Upper Saddle River, NJ: Prentice Hall, 2005. Print.

*(ASTM G-65, table x1.2 Volume Loss Range) .

Table 8 - Flow Coefficient(Cv) at Valve Position											
1" High Pressure Control Valve											
Flow Characteristic	**Trim Size in.(mm)**	**CF**	**Valve Opening Percentage**								
			10	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
Nominal	**.125 (3.17)**	**0.58**	0.10	0.40	0.50	0.70	0.90	1.00	1.00	1.00	1.10	1.10
	.187 (4.74)	**0.59**	0.20	0.50	0.77	1.00	1.30	1.40	1.50	1.50	1.50	1.50
	.250 (6.35)	**0.78**	0.28	0.72	1.11	1.50	1.80	1.95	2.08	2.13	2.15	2.17
	.375 (9.52)	**0.91**	0.40	1.10	1.60	2.20	2.70	2.90	3.10	3.20	3.20	3.20
	.50 (12.7)	**0.94**	0.70	1.90	2.90	4.00	4.80	5.20	5.50	5.60	5.70	5.70
Equal Percentage	**.125 (3.17)**	**0.73**	0.01	0.02	0.03	0.04	0.06	0.09	0.15	0.26	0.32	0.34
	.250 (6.35)	**0.66**	0.05	0.10	0.14	0.19	0.29	0.58	0.93	1.27	1.63	1.99
	.50 (12.7)	**0.78**	0.16	0.32	0.47	0.60	0.93	1.74	2.99	4.41	5.65	6.49
2" High Pressure Control Valve											
Flow Characteristic	**Trim Size in. (mm)**	**CF**	**Valve Opening Percentage**								
			10	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
Nominal	**.250 (6.35)**	**0.55**	0.40	1.00	1.50	2.00	2.50	2.70	2.80	2.90	2.90	3.00
	.375 (9.52)	**0.77**	0.53	1.33	2.06	2.80	3.40	3.60	3.90	4.00	4.00	4.00
	.50 (12.7)	**0.78**	0.94	2.38	3.67	4.97	5.98	6.48	6.91	7.06	7.13	7.20
	.750 (19.0)	**0.80**	1.60	4.00	6.20	8.40	10.10	11.00	12.00	12.00	12.00	12.00
	1.00 (25.4)	**0.77**	2.80	7.00	11.00	15.00	18.00	19.00	20.00	21.00	21.00	21.00
Equal Percentage	**.250 (6.35)**	**0.65**	0.10	0.14	0.19	0.23	0.27	0.55	0.82	1.12	1.62	1.72
	.437 (11.1)	**0.60**	0.10	0.30	0.50	0.70	1.00	1.50	2.60	3.80	4.80	5.40
	.625 (15.8)	**0.58**	0.30	0.50	0.90	1.10	1.40	2.30	3.90	6.40	8.70	10.80
	.875 (22.2)	**0.66**	0.40	0.90	1.57	2.10	3.00	4.20	6.30	9.60	13.00	17.00

Kimray flow equations conform to ANSI/ISA - 75.01.01-2002

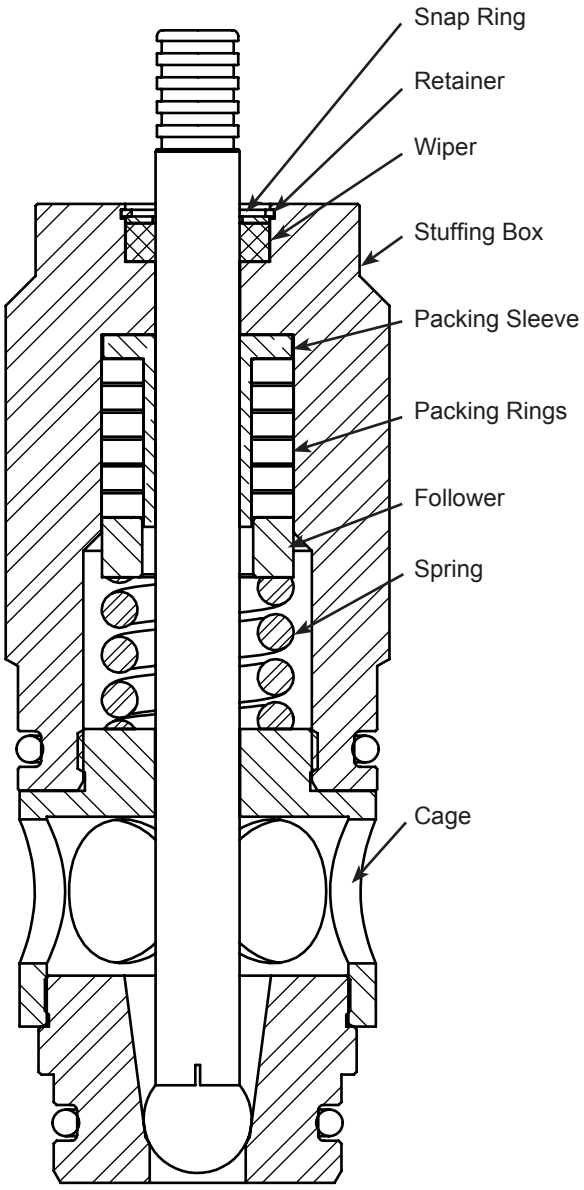


Figure 8

Live Load Packing Box: A spring is used to apply constant pressure against packing rings that squeeze a Teflon seal around the stem. When the Teflon sleeve begins to wear, the spring pressure provides leak-proof service. Optional packing rings are available to match the service conditions, see table 9.

Table 9 - Packing Box Materials

Part	Material	Optional Materials
Stuffing Box	D-2 Tool Steel	316SS6
Packing Rings	Buna-N	Aflas, FKM, Low Temp Nitrile
Packing Sleeve	Teflon	None
Spring	316SS6	Hastelloy C
Follower	316SS6	None

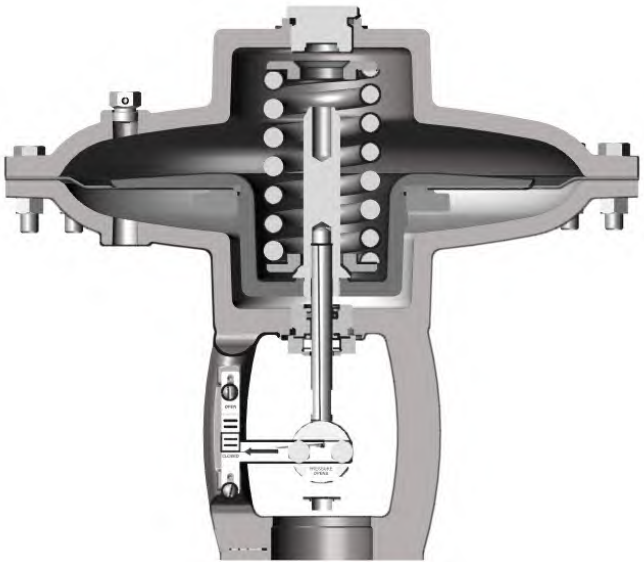


Figure 9

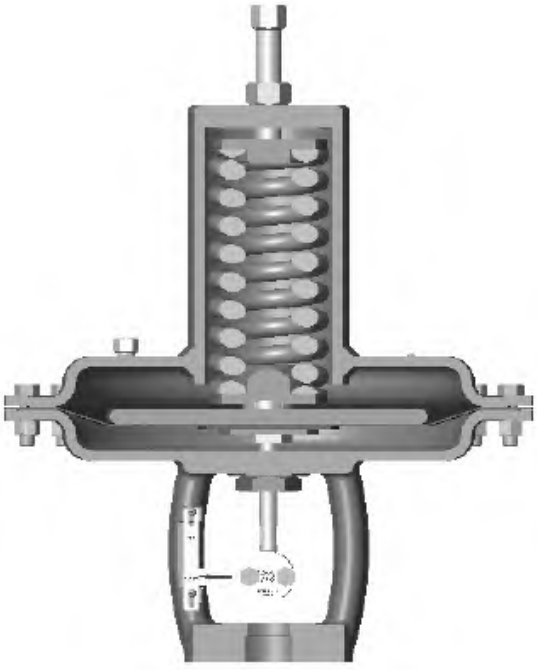


Figure 10

Actuator:

The Kimray High Pressure Control Valve with a pneumatic diaphragm actuator and single acting spring return supplies the force and motion to position the closure member. Optional springs are available for a maximum travel diaphragm pressure of 10 psi, 20 psi, and 30 psi for the 1" and 15 psi, 20 psi and 30 psi for the 2" valve.

"Table 12 - Actuator Crack to Full Open Pressure" lists the diaphragm pressure required to initially unseat and fully travel the closure member. The actuator can be in either fail open or fail closed configuration without the need for additional parts.

Table 10 - Optional Springs

Size	PSI	Colors
1"	10	None
	20	Red
	30	Green
2"	15	None
	20	Red
	30	Yellow

65 Topworks:

The 65 topworks has an effective diaphragm area of 65 square inches and is furnished with a spring designed for 10 to 30 psig maximum travel diaphragm pressure. This affects the amount of pressure required to actuate the valve and allows for finer control when used with both back pressure and pressure reducing controllers.

Table 11 - Actuator Diaphragm Area and Valve Stem Travel

Valve Size	Diaphragm Area	Stem Travel
1" Topworks	32 $in.^2$ (209 cm^2)	.50 MAX (1.625 cm)
2" Topworks	65 $in.^2$ (419 cm^2)	.75 MAX (1.875 cm)

Table 12 - Actuator Crack to Full Open Pressure (1" HPCV)											
Valve Description	ΔP	0 psig (0 bar)		100 psig (6.8 bar)		500 psig (34.4 bar)		1000 psig (68.9 bar)		1500 psig (103.4 bar)	
	Spring	Crack	Full	Crack	Full	Crack	Full	Crack	Full	Crack	Full
1400 SMT PO 1/8" IV	621 (10 lbs)	3 psig (0.21 bar)	9.5 psig (0.66 bar)	3 psig (0.21 bar)	9 psig (0.62 bar)	3 psig (0.21 bar)	8.5 psig (0.59 bar)	2 psig (0.13 bar)	7 psig (0.48 bar)	2 psig (0.13 bar)	6 psig (0.41 bar)
	463 (20 lbs)	6.5 psig (0.44 bar)	20.5 psig (1.41 bar)	6 psig (0.41 bar)	20 psig (1.37 bar)	6 psig (0.41 bar)	19.5 psig (1.34 bar)	5.5 psig (0.37 bar)	18 psig (1.24 bar)	5.5 psig (0.37 bar)	17.5 psig (1.20 bar)
	464 (30 lbs)	9.5 psig (0.65 bar)	34 psig (2.34 bar)	9.5 psig (0.65 bar)	34 psig (2.34 bar)	9 psig (0.62 bar)	33 psig (2.27 bar)	9 psig (0.62 bar)	32 psig (2.20 bar)	8.5 psig (0.58 bar)	31 psig (2.13 bar)
1400 SMT PO 1/8" IV EP	621 (10 lbs)	3.5 psig (0.23 bar)	10 psig (0.68 bar)	3.5 psig (0.23 bar)	10 psig (0.68 bar)	3 psig (0.21 bar)	8.5 psig (0.58 bar)	2.5 psig (0.17 bar)	7.5 psig (0.51 bar)	2 psig (0.13 bar)	6 psig (0.41 bar)
	463 (20 lbs)	7 psig (0.48 bar)	21.5 psig (1.48 bar)	7 psig (0.48 bar)	21 psig (0.44 bar)	6.5 psig (0.44 bar)	19.5 psig (1.34 bar)	6 psig (0.41 bar)	18.5 psig (1.27 bar)	6 psig (0.41 bar)	17.5 psig (1.20 bar)
	464 (30 lbs)	12.5 psig (0.86 bar)	38 psig (2.61 bar)	12.5 psig (0.86 bar)	38 psig (2.61 bar)	11 psig (0.75 bar)	35.5 psig (2.44 bar)	10.5 psig (0.72 bar)	34.5 psig (2.37 bar)	10 psig (0.68 bar)	33 psig (2.27 bar)
1400 SMT PO 3/16" IV	621 (10 lbs)	3.5 psig (0.23 bar)	10.5 psig (0.72 bar)	3.5 psig (0.23 bar)	10 psig (0.68 bar)	3.5 psig (0.23 bar)	9 psig (0.62 bar)	3.5 psig (0.23 bar)	7.5 psig (0.51 bar)	3 psig (0.21 bar)	6.5 psig (0.44 bar)
	463 (20 lbs)	6.5 psig (0.44 bar)	21.5 psig (1.48 bar)	6.5 psig (0.44 bar)	21 psig (1.44 bar)	7.5 psig (0.51 bar)	21 psig (1.44 bar)	7 psig (0.48 bar)	19.5 psig (1.34 bar)	7 psig (0.48 bar)	18.5 psig (1.27 bar)
	464 (30 lbs)	11 psig (0.75 bar)	36 psig (2.48 bar)	10.5 psig (0.72 bar)	36 psig (2.48 bar)	11 psig (0.75 bar)	35 psig (2.41 bar)	11 psig (0.75 bar)	34 psig (2.34 bar)	10.5 psig (0.72 bar)	32.5 psig (2.23 bar)
1400 SMT PO 1/4" IV	621 (10 lbs)	3 psig (0.21 bar)	9.5 psig (0.65 bar)	3 psig (0.21 bar)	9 psig (0.62 bar)	3 psig (0.21 bar)	8.5 psig (0.58 bar)	2.5 psig (0.17 bar)	7.5 psig (0.51 bar)	2.5 psig (0.17 bar)	6.5 psig (0.44 bar)
	463 (20 lbs)	6 psig (0.41 bar)	20.5 psig (1.41 bar)	6 psig (0.41 bar)	20 psig (1.37 bar)	6 psig (0.41 bar)	19.5 psig (1.34 bar)	5.5 psig (0.37 bar)	18 psig (1.24 bar)	5.5 psig (0.37 bar)	17 psig (1.72 bar)
	464 (30 lbs)	10 psig (0.68 bar)	35 psig (2.41 bar)	10 psig (0.68 bar)	35 psig (2.42 bar)	10 psig (0.68 bar)	34 psig (2.34 bar)	9.5 psig (0.65 bar)	33 psig (2.27 bar)	9 psig (0.62 bar)	32 psig (2.20 bar)
1400 SMT PO 1/4" IV EP	621 (10 lbs)	3 psig (0.20 bar)	10 psig (0.68 bar)	3 psig (0.20 bar)	9.5 psig (0.65 bar)	2.5 psig (0.17 bar)	8 psig (0.55 bar)	2.5 psig (0.17 bar)	7 psig (0.48 bar)	2 psig (0.13 bar)	6 psig (0.41 bar)
	463 (20 lbs)	6.5 psig (0.44 bar)	21.5 psig (1.48 bar)	6.5 psig (0.44 bar)	20 psig (1.37 bar)	6 psig (0.41 bar)	20 psig (1.37 bar)	6 psig (0.41 bar)	18.5 psig (1.27 bar)	6 psig (0.41 bar)	17.5 psig (1.20 bar)
	464 (30 lbs)	12 psig (0.83 bar)	40 psig (2.75 bar)	11.5 psig (0.79 bar)	39 psig (2.68 bar)	9.5 psig (0.66 bar)	35 psig (2.42 bar)	9 psig (0.62 bar)	33 psig (2.27 bar)	9 psig (0.62 bar)	32 psig (2.20 bar)
1400 SMT PO 3/8" IV SNAP	621 (10 lbs)	4.5 psig (0.31 bar)	10.5 psig (0.72 bar)	4.5 psig (0.31 bar)	10.5 psig (0.72 bar)	5.5 psig (0.38 bar)	9.5 psig (0.66 bar)	6.5 psig (0.44 bar)	8 psig (0.55 bar)	7.5 psig (0.51 bar)	7 psig (0.48 bar)
	463 (20 lbs)	7 psig (0.48 bar)	21.5 psig (1.48 bar)	7 psig (0.48 bar)	21 psig (1.44 bar)	9.5 psig (0.65 bar)	21 psig (0.44 bar)	10.5 psig (0.72 bar)	20 psig (1.37 bar)	11 psig (0.75 bar)	19 psig (1.31 bar)
	464 (30 lbs)	11 psig (0.75 bar)	35 psig (2.41 bar)	11 psig (0.75 bar)	35 psig (2.41 bar)	13 psig (0.89 bar)	35 psig (2.42 bar)	14 psig (0.97 bar)	33 psig (2.27 bar)	15.5 psig (1.06 bar)	32 psig (2.20 bar)
1400 SMT PO 3/8" IV	621 (10 lbs)	3 psig (0.20 bar)	9 psig (0.62 bar)	3 psig (0.20 bar)	9 psig (0.62 bar)	5 psig (0.34 bar)	9 psig (0.62 bar)	6.5 psig (0.44 bar)	7.5 psig (0.51 bar)	7.5 psig (0.51 bar)	6.5 psig (0.44 bar)
	463 (20 lbs)	6 psig (0.41 bar)	20.5 psig (1.41 bar)	6 psig (0.41 bar)	20 psig (1.37 bar)	8.5 psig (0.58 bar)	21 psig (0.44 bar)	9.5 psig (0.65 bar)	20 psig (1.37 bar)	10.5 psig (0.72 bar)	18.5 psig (1.27 bar)
	464 (30 lbs)	9.5 psig (0.66 bar)	34 psig (2.34 bar)	9.5 psig (0.66 bar)	34 psig (2.34 bar)	11.5 psig (0.79 bar)	33 psig (2.27 bar)	12.5 psig (0.85 bar)	32 psig (2.20 bar)	13.5 psig (0.93 bar)	31 psig (2.14 bar)
1400 SMT PO 1/2" IV	621 (10 lbs)	3 psig (0.20 bar)	10.5 psig (0.72 bar)	3 psig (0.20 bar)	10 psig (0.68 bar)	5.5 psig (0.38 bar)	8.5 psig (0.58 bar)	7 psig (0.48 bar)	7.5 psig (0.51 bar)	9 psig (0.62 bar)	6.5 psig (0.44 bar)
	463 (20 lbs)	6.5 psig (0.44 bar)	21 psig (0.44 bar)	6 psig (0.41 bar)	20.5 psig (1.41 bar)	8.5 psig (0.58 bar)	19.5 psig (1.34 bar)	10 psig (0.68 bar)	18.5 psig (1.27 bar)	12 psig (0.83 bar)	17.5 psig (1.20 bar)
	464 (30 lbs)	11.5 psig (0.79 bar)	37 psig (2.54 bar)	11 psig (0.75 bar)	36 psig (2.48 bar)	13.5 psig (0.93 bar)	35 psig (2.41 bar)	15 psig (1.03 bar)	34 psig (2.34 bar)	17 psig (1.72 bar)	33 psig (2.27 bar)
1400 SMT PO 1/2" IV EP	621 (10 lbs)	3.5 psig (0.24 bar)	10 psig (0.68 bar)	3.5 psig (0.24 bar)	9.5 psig (0.66 bar)	7 psig (0.48 bar)	10 psig (0.68 bar)	7.5 psig (0.52 bar)	7.5 psig (0.51 bar)	9.5 psig (0.65 bar)	6 psig (0.41 bar)
	463 (20 lbs)	7 psig (0.48 bar)	21.5 psig (1.48 bar)	7.5 psig (0.51 bar)	21.5 psig (1.48 bar)	10.5 psig (0.72 bar)	21 psig (0.44 bar)	12.5 psig (0.86 bar)	20.5 psig (1.41 bar)	14 psig (0.97 bar)	19 psig (1.31 bar)
	464 (30 lbs)	11 psig (0.75 bar)	37 psig (2.54 bar)	11 psig (0.75 bar)	37 psig (2.54 bar)	14 psig (0.97 bar)	35 psig (2.41 bar)	16 psig (1.10 bar)	34 psig (2.34 bar)	18 psig (1.24 bar)	33 psig (2.27 bar)

Table 13 - Actuator Crack to Full Open Pressure (2" HPCV)											
Valve Description	ΔP	0 psig (0 bar)		100 psig (6.8 bar)		500 psig (34.4 bar)		1000 psig (68.9 bar)		1500 psig (103.4 bar)	
	Spring	Crack	Full	Crack	Full	Crack	Full	Crack	Full	Crack	Full
2400 SMT PO 1/4" EP IV	1245 (15 lbs)	3.5 psig (0.24 bar)	15.5 psig (1.06 bar)	3 psig (0.20 bar)	15 psig (1.03 bar)	2.5 psig (0.17 bar)	15 psig (1.03 bar)	2 psig (0.13 bar)	14.5 psig (1.00 bar)	1.5 psig (0.10 bar)	13 psig (0.89 bar)
	538 (20 lbs)	3.5 psig (0.24 bar)	18 psig (1.24 bar)	3.5 psig (0.24 bar)	17.5 psig (1.20 bar)	3.5 psig (0.24 bar)	17.5 psig (1.20 bar)	2.5 psig (0.17 bar)	16.5 psig (1.13 bar)	1.5 psig (0.10 bar)	15 psig (1.03 bar)
	508 (30 lbs)	7.5 psig (0.52 bar)	32 psig (2.20 bar)	7 psig (0.48 bar)	32 psig (2.20 bar)	6.5 psig (0.44 bar)	31 psig (2.14 bar)	6 psig (0.41 bar)	30 psig (2.07 bar)	5.5 psig (0.38 br)	29 psig (2.00 bar)
2400 SMT PO 1/4" IV	1245 (15 lbs)	3.5 psig (0.24 bar)	16 psig (1.10 bar)	3.5 psig (0.24 bar)	16 psig (1.10 bar)	3 psig (0.20 bar)	14.5 psig (1.00 bar)	3 psig (0.20 bar)	13 psig (0.89 bar)	3 psig (0.20 bar)	12.5 psig (0.85 bar)
	538 (20 lbs)	4 psig (0.27 bar)	18.5 psig (1.27 bar)	3.5 psig (0.24 bar)	18.5 psig (1.27 bar)	3.5 psig (0.24 bar)	18 psig (1.24 bar)	3 psig (0.20 bar)	17.5 psig (1.20 bar)	3 psig (0.20 bar)	16.5 psig (1.13 bar)
	508 (30 lbs)	6.5 psig (0.44 bar)	32 psig (2.20 bar)	6.5 psig (0.44 bar)	33 psig (2.27 bar)	7 psig (0.48 bar)	31 psig (2.14 bar)	6.5 psig (0.44 bar)	30 psig (2.07 bar)	6.5 psig (0.44 bar)	29 psig (2.00 bar)
2400 SMT PO 1/4" IV SNAP	1245 (15 lbs)	3.5 psig (0.23 bar)	15.5 psig (1.06 bar)	4 psig (0.27 bar)	15.5 psig (1.06 bar)	3 psig (0.20 bar)	15 psig (1.03 bar)	2.5 psig (0.17 bar)	14.5 psig (1.00 bar)	2 psig (0.13 bar)	14 psig (0.97 bar)
	538 (20 lbs)	4 psig (0.27 bar)	18 psig (1.24 bar)	4 psig (0.27 bar)	18 psig (1.24 bar)	3 psig (0.20 bar)	17 psig (1.72 bar)	2.5 psig (0.17 bar)	17 psig (1.72 bar)	2 psig (0.13 bar)	16.5 psig (1.13 bar)
	508 (30 lbs)	6.5 psig (0.44 bar)	32 psig (2.20 bar)	7 psig (0.48 bar)	32 psig (2.20 bar)	6 psig (0.41 bar)	31 psig (2.14 bar)	5 psig (0.34 bar)	30 psig (2.07 bar)	4 psig (0.27 bar)	29 psig (2.00 bar)
2400 SMT PO 3/8" IV	1245 (15 lbs)	4 psig (0.27 bar)	16.5 psig (1.13 bar)	4 psig (0.27 bar)	16 psig (1.10 bar)	3.5 psig (0.23 bar)	16 psig (1.10 bar)	3.5 psig (0.23 bar)	15.5 psig (1.06 bar)	3.5 psig (0.23 bar)	15 psig (1.03 bar)
	538 (20 lbs)	4.5 psig (0.31 bar)	18 psig (1.24 bar)	4 psig (0.27 bar)	18 psig (1.24 bar)	4 psig (0.27 bar)	17 psig (1.72 bar)	4 psig (0.27 bar)	16.5 psig (1.13 bar)	4 psig (0.27 bar)	16.5 psig (1.13 bar)
	508 (30 lbs)	8 psig (0.55 bar)	32 psig (2.20 bar)	8 psig (0.55 bar)	32 psig (2.20 bar)	7.5 psig (0.51 bar)	32 psig (2.20 bar)	7.5 psig (0.51 bar)	31 psig (2.13 bar)	7.5 psig (0.51 bar)	30 psig (2.07 bar)
2400 SMT PO 3/8" IV SNAP	1245 (15 lbs)	4 psig (0.27 bar)	14.5 psig (1.00 bar)	3.5 psig (0.23 bar)	14.5 psig (1.00 bar)	4.5 psig (0.31 bar)	14 psig (0.97 bar)	4.5 psig (0.31 bar)	14 psig (0.97 bar)	4.5 psig (0.31 bar)	13.5 psig (0.93 bar)
	538 (20 lbs)	4 psig (0.27 bar)	17.5 psig (1.20 bar)	4 psig (0.27 bar)	17 psig (1.72 bar)	5 psig (0.34 bar)	17 psig (1.72 bar)	5 psig (0.34 bar)	16.5 psig (1.13 bar)	5 psig (0.34 bar)	16 psig (1.10 bar)
	508 (30 lbs)	7.5 psig (0.51 bar)	32 psig (2.20 bar)	7 psig (0.48 bar)	32 psig (2.20 bar)	8 psig (0.55 bar)	31 psig (2.13 bar)	8.5 psig (0.58 bar)	30 psig (2.07 bar)	8.5 psig (0.58 bar)	29 psig (2.00 bar)
2400 SMT PO 7/16" EP IV	1245 (15 lbs)	4 psig (0.27 bar)	15.5 psig (1.06 bar)	4 psig (0.27 bar)	15.5 psig (1.06 bar)	3.5 psig (0.23 bar)	15 psig (1.03 bar)	3.5 psig (0.23 bar)	14.5 psig (1.00 bar)	3.5 psig (0.23 bar)	14 psig (0.97 bar)
	538 (20 lbs)	4.5 psig (0.31 bar)	18.5 psig (0.31 bar)	4.5 psig (0.31 bar)	18.5 psig (1.27 bar)	4.5 psig (0.31 bar)	17.5 psig (1.20 bar)	4 psig (0.27 bar)	16 psig (1.10 bar)	4 psig (0.27 bar)	15 psig (1.03 bar)
	508 (30 lbs)	8 psig (0.55 bar)	32 psig (2.20 bar)	8 psig (0.55 bar)	31 psig (2.13 bar)	7.5 psig (0.51 bar)	30 psig (2.07 bar)	7.5 psig (0.51 bar)	29 psig (2.00 bar)	7.5 psig (0.51 bar)	28 psig (1.93 bar)
2400 SMT PO 1/2" IV	1245 (15 lbs)	4 psig (0.27 bar)	15 psig (1.03 bar)	4 psig (0.27 bar)	15 psig (1.03 bar)	4.5 psig (0.31 bar)	14.5 psig (1.00 bar)	5 psig (0.34 bar)	13.5 psig (0.93 bar)	5 psig (0.34 bar)	12 psig (0.83 bar)
	538 (20 lbs)	4 psig (0.27 bar)	17 psig (1.72 bar)	3.5 psig (0.23 bar)	16.5 psig (1.13 bar)	4.5 psig (0.31 bar)	16.5 psig (1.13 bar)	4.5 psig (0.31 bar)	15.5 psig (1.06 bar)	5 psig (0.34 bar)	14 psig (0.97 bar)
	508 (30 lbs)	7 psig (0.48 bar)	30 psig (2.07 bar)	7 psig (0.48 bar)	30 psig (2.07 bar)	8 psig (0.58 bar)	30 psig (2.07 bar)	8 psig (0.55 bar)	28 psig (1.93 bar)	8.5 psig (0.58 bar)	27 psig (1.86 bar)
2400 SMT 1/2" IV SNAP	1245 (15 lbs)	3 psig (0.20 bar)	16 psig (1.10 bar)	3 psig (0.20 bar)	15 psig (1.03 bar)	4.5 psig (0.31 bar)	14.5 psig (1.00 bar)	5 psig (0.34 bar)	14 psig (0.97 bar)	5 psig (0.34 bar)	13.5 psig (0.93 bar)
	538 (20 lbs)	3.5 psig (0.23 bar)	17 psig (1.72 bar)	3 psig (0.20 bar)	16.5 psig (1.13 bar)	4.5 psig (0.31 bar)	16 psig (1.10 bar)	5 psig (0.34 bar)	15 psig (1.03 bar)	5 psig (0.34 bar)	14.5 psig (1.00 bar)
	508 (30 lbs)	7 psig (0.48 bar)	32 psig (2.20 bar)	7.5 psig (0.51 bar)	32 psig (2.20 bar)	7.5 psig (0.51 bar)	31 psig (2.14 bar)	7.5 psig (0.51 bar)	30 psig (2.07 bar)	8 psig (0.55 bar)	29 psig (2.00 bar)

Actuator Crack to Full Open Pressure (2” HPCV) Continued											
Valve Description	ΔP	0 psig (0 bar)		100 psig (6.8 bar)		500 psig (34.4 bar)		1000 psig (68.9 bar)		1500 psig (103.4 bar)	
	Spring	Crack	Full	Crack	Full	Crack	Full	Crack	Full	Crack	Full
2400 SMT PO 5/8” EP IV	1245 (15 lbs)	4 psig (0.27 bar)	16 psig (1.10 bar)	4 psig (0.27 bar)	16 psig (1.10 bar)	6 psig (0.41 bar)	16.5 psig (1.13 bar)	7.5 psig (0.51 bar)	16 psig (1.10 bar)	8.5 psig (0.58 bar)	15.5 psig (1.06 bar)
	538 (20 lbs)	4 psig (0.27 bar)	19 psig (1.31 bar)	4 psig (0.27 bar)	19 psig (1.31 bar)	6.5 psig (0.44 bar)	18.5 psig (1.27 bar)	7.5 psig (0.51 bar)	17.5 psig (1.20 bar)	9 psig (0.62 bar)	17 psig (1.72 bar)
	508 (30 lbs)	8 psig (0.55 bar)	32 psig (2.20 bar)	8.5 psig (0.58 bar)	32 psig (2.20 bar)	10 psig (0.68 bar)	31 psig (2.14 bar)	11.5 psig (0.79 bar)	30 psig (2.06 bar)	12.5 psig (1.48 bar)	29 psig (2.00 bar)
2400 SMT PO 3/4” IV	1245 (15 lbs)	5 psig (0.34 bar)	17 psig (1.72 bar)	5 psig (0.34 bar)	17 psig (1.72 bar)	7.5 psig (0.51 bar)	14.5 psig (1.00 bar)	8.5 psig (0.58 bar)	13 psig (0.89 bar)	10 psig (0.68 bar)	12 psig (0.83 bar)
	538 (20 lbs)	5.5 psig (0.37 bar)	19 psig (1.31 bar)	5.5 psig (0.37 bar)	19 psig (1.31 bar)	7 psig (0.48 bar)	17 psig (1.72 bar)	9 psig (0.62 bar)	16 psig (1.10 bar)	11 psig (0.75 bar)	14 psig (0.97 bar)
	508 (30 lbs)	9 psig (0.62 bar)	34 psig (2.34 bar)	9 psig (0.62 bar)	34 psig (2.34 bar)	11 psig (0.75 bar)	33 psig (2.27 bar)	13 psig (0.89 bar)	32 psig (2.20 bar)	15 psig (1.03 bar)	30 psig (2.07 bar)
2400 SMT PO 3/4” IV SNAP	1245 (15 lbs)	4 psig (0.27 bar)	15 psig (1.03 bar)	4 psig (0.27 bar)	15 psig (1.03 bar)	6.5 psig (0.44 bar)	14.5 psig (0.96 bar)	8 psig (0.55 bar)	13.5 psig (0.93 bar)	9 psig (0.62 bar)	12 psig (0.83 bar)
	538 (20 lbs)	5 psig (0.34 bar)	18.5 psig (1.27 bar)	5 psig (0.34 bar)	18.5 psig (1.27 bar)	6.5 psig (0.44 bar)	16.5 psig (1.13 bar)	8 psig (0.55 bar)	15.5 psig (1.06 bar)	9.5 psig (0.66 bar)	14 psig (0.97 bar)
	508 (30 lbs)	9 psig (0.62 bar)	32 psig (2.20 bar)	9 psig (0.62 bar)	32 psig (2.20 bar)	10 psig (0.68 bar)	31 psig (2.14 bar)	11 psig (0.75 bar)	30 psig (2.07 bar)	12.5 psig (0.86 bar)	29 psig (2.00 bar)
2400 SMT PO 7/8” EP IV	1245 (15 lbs)	3.5 psig (0.23 bar)	15 psig (1.03 bar)	4 psig (0.27 bar)	15 psig (1.03 bar)	7 psig (0.48 bar)	14.5 psig (1.00 bar)	11 psig (0.75 bar)	14 psig (0.97 bar)	13.5 psig (0.93 bar)	13.5 psig (0.93 bar)
	538 (20 lbs)	3.5 psig (0.23 bar)	17.5 psig (1.20 bar)	4 psig (0.27 bar)	17.5 psig (1.20 bar)	7.5 psig (0.51 bar)	17 psig (1.72 bar)	10.5 psig (0.72 bar)	16.5 psig (1.13 bar)	13.5 psig (0.93 bar)	16 psig (1.10 bar)
	508 (30 lbs)	7 psig (0.48 bar)	30 psig (2.07 bar)	7.5 psig (0.51 bar)	30 psig (2.07 bar)	10.5 psig (0.72 bar)	29 psig (2.00 bar)	14 psig (0.97 bar)	28 psig (1.93 bar)	17 psig (1.72 bar)	27 psig (1.86 bar)
2400 SMT PO 1” IV	1245 (15 lbs)	4.5 psig (0.31 bar)	14.5 psig (1.00 bar)	5 psig (0.34 bar)	14 psig (0.97 bar)	8.5 psig (0.58 bar)	13 psig (0.89 bar)	12.5 psig (0.86 bar)	11.5 psig (0.79 bar)	16 psig (1.10 bar)	11 psig (0.75 bar)
	538 (20 lbs)	4.5 psig (0.31 bar)	17 psig (1.72 bar)	5 psig (0.34 bar)	17 psig (1.72 bar)	8.5 psig (0.58 bar)	16 psig (1.10 bar)	12.5 psig (0.86 bar)	15 psig (1.03 bar)	17 psig (1.72 bar)	14 psig (0.97 bar)
	508 (30 lbs)	7 psig (0.48 bar)	31 psig (2.14 bar)	7.5 psig (0.51 bar)	31 psig (2.14 bar)	12 psig (0.83 bar)	30 psig (2.07 bar)	16 psig (1.10 bar)	29 psig (2.00 bar)	19.5 psig (1.34 bar)	28 psig (1.93 bar)
2400 SMT PO 1” IV SNAP	1245 (15 lbs)	4.5 psig (0.31 bar)	16.5 psig (1.13 bar)	4.5 psig (0.31 bar)	16.5 psig (1.13 bar)	8.5 psig (0.58 bar)	15.5 psig (1.06 bar)	11.5 psig (0.79 bar)	15 psig (1.03 bar)	15 psig (1.03 bar)	15 psig (1.03 bar)
	538 (20 lbs)	4.5 psig (0.31 bar)	19 psig (1.31 bar)	4.5 psig (0.31 bar)	19 psig (1.31 bar)	8.5 psig (0.58 bar)	16 psig (1.10 bar)	11.5 psig (0.79 bar)	15.5 psig (1.06 bar)	15 psig (1.03 bar)	15 psig (1.03 bar)
	508 (30 lbs)	8 psig (0.55 bar)	32 psig (2.20 bar)	8 psig (0.55 bar)	32 psig (2.20 bar)	12 psig (0.83 bar)	31 psig (2.14 bar)	16 psig (1.10 bar)	30 psig (2.07 bar)	19.5 psig (1.34 bar)	29 psig (2.00 bar)

Base Code
Code
Three character base code from page ii

Special Process*	
Code	Description
-	Standard
PC	Pressure Close (i.e. ECPPC= 2200 SMT PC 1"IV)
MOD1	Modified Version of an item built specifically for a customer's special application approved by Kimray Applications Dept. and or Engineering
IT	I/P Indirect transducer
DT	I/P Direct transducer
PS2P	PS2 4-20HART POSITION PLASTIC STD.
PS2XP	PS2 4-20HART POSITIONER EXPLOSION PROOF
PS2S6	PS2 4-20HART POSITIONER S6

Trim Material	
Code	**Description**
-	Standard
PH	17- 4 Trim
ZR	Zirconia Trim
440C	440C Trim
S6	316SS6 Trim
S6B	316SS Trim & 316SS6 Body

Elastomer	
Code	**Description**
-	Standard (Buna-N)
AF	Aflas
FG	Fawn Gylon
G	Gylon
GF	Grafoil Packing
HSN	High Saturated Nitrile
LTN	Low Temp Nitrile
T	Teflon Seat
-	FKM
High Pressure Control Valve Only	
VPK	Vee Packing
-	FKM Diaphragm (Used on HPMVS for diaphragm in bonnet)
PEK	PEEK

Pilot (HPCV only)		
Code	**Description**	**Control Range (psig)**
-	Standard (no pilot)	n/a
3B	30 HHPCV Back Pressure	10 to 300
3P	30 HPCV Pressure Reducing	10 to 300
7B	75 HPCV Back Pressure	75 to 750
7P	75 HPCV Pressure Reducing	75 to 750
15B	150 HPCV Back Pressure	125 to 1500
15P	150 HPCV Pressure Reducing	125 to 1500
25B	250 HPCV Back Pressure	200 to 2500
25P	250 HPCV Pressure Reducing	200 to 2500
5POZ	HPCV Ounces Pressure Reducing	3 ounce to 5
5BOZ	HPCV Ounces Back Pressure	3 ounce to 5
2.5POZ	HPCV Ounces Pressure Reducing	1 ounce to 2.5
2.5BOZ	HPCV Ounces Back Pressure	1 ounce to 2.5
20POZ	HPCV Ounces Pressure Reducing	.5 to 20
20BOZ	HPCV Ounces Back Pressure	.5 to 20

Spring	
Code	**Description**
-	Standard
High Pressure Control Valves	
10	10# Spring
15	15# Spring
20	20# Spring
30	30# Spring

Coating	
Code	**Description**
-	No Coating
EB	Endurobond Coated
PR	Primer Color Painted

Certification	
Code	**Description**
-	No Certifications
CRN	Canadian Registration
CERTS	Material Certifications on Weld necks, Blind Plates, & Hammer Unions
NC	Nace
MTR	Material Test Reports (i.e. Steel Casting)
SPT	Static Pressure Tests

Export Crate	
Code	**Description**
-	No crate
XPT	Export crated items

*For special item such as positioners, transducers, or a specialized valve that has been approved by the engineering or applications department.
i.e. EQJMOD1

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Base Codes for Kimray High Pressure Control Valves

Code	Description
EAL	1” FMT 1500RF 1/4” IV
EHC	1” FMT 150RF PO 1/8” IV
EHD	1” FMT 150RF PO 3/16” IV
EHE	1” FMT 150RF PO 1/4” IV
EHF	1” FMT 150RF PO 3/8” IV
EHG	1” FMT 150RF PO 1/2” IV
EHH	1” FMT 300RF PO 1/8” IV
EHI	1” FMT 300RF PO 3/16” IV
EHJ	1” FMT 300RF PO 1/4” IV
EHK	1” FMT 300RF PO 3/8” IV
EHL	1” FMT 300RF PO 1/2” IV
EHM	1” FMT 600RF PO 1/8” IV
EHN	1” FMT 600RF PO 3/16” IV
EHO	1” FMT 600RF PO 1/4” IV
EHP	1” FMT 600RF PO 3/8” IV
EHQ	1” FMT 600RF PO 1/2” IV
EQN	1” FMT 1500RTJ 1/2” IV
EQQ	1” FMT 1500 RF 1/2” IV TAPPED
EVR	1” FMT 1500 RTJ PO 1/8” IV
MAB	1” FMT 1500 RTJ PO 1/4” IV

Code	Description
EDP	2” FMT 600RF PO 3/8” IV
EGO	2” FMT 600RF PO 3/4” IV
EGP	2” FMT 600RF PO 1” IV
EGQ	2” FMT 1500RF PO 3/4” IV
EGR	2” FMT 1500RF PO 1” IV
EGS	2” FMT 600RF PO 5/8” EPIV
EGT	2” FMT 600RF PO 7/8” EPIV
EGV	2” FMT 1500RF PO 5/8” EPIV
EGW	2” FMT 1500RF PO 7/8” EPIV
EGY	2” FMT 1500RTJ PO 7/8” EPIV
EGZ	2” FMT 1500RTJ PO 1” IV
EHR	2” FMT 150RF PO 1/4” IV
EHS	2” FMT 150RF PO 3/8” IV
EHT	2” FMT 150RF PO 1/2” IV
EHU	2” FMT 150RF PO 3/4” IV
EHV	2” FMT 150RF PO 1” IV
EHW	2” FMT 150RF PO 1.5” IV
EHX	2” FMT 150RF PO 7/16” IV
EHY	2” FMT 150RF PO 7/8” IV
EID	2” FMT 600RF PO 7/16” EPIV
EIE	2” FMT 600RF PO 1/2” IV
EIF	2” FMT 600RF PO 1/4” EP
EIO	2” FMT 600RTJ PO 7/8” EPIV
ENV	2” FMT 600RTJ PO 7/16” EPIV
ENW	2” FMT 300RTJ PO 5/8” EPIV

Code	Description
ENY	2” FMT 600RTJ PO 5/8” EPIV
EPA	2” FMT 300RF PO 1/4”
EPB	2” FMT 300RF PO 3/8”
EPC	2” FMT 300RF PO 1/2”
EPD	2” FMT 300RF PO 3/4”
EPE	2” FMT 300RF PO 1” IV
EPF	2” FMT 300RF PO 1.5” IV
EPG	2” FMT 300RF PO 7/16” EPIV
EPH	2” FMT 300RF PO 7/8” EPIV
EPI	2” FMT 300RF PO 5/8” EPIV
EPJ	2” FMT 600RF PO 1/4”
EPK	2” FMT 1500RF PO 1/4”
EPM	2” FMT 1500RF PO 3/8”
EPN	2” FMT 1500RF PO 1/2”
EPO	2” FMT 600RF PO 1.5” IV
EPQ	2” FMT 1500RF PO 1.5” IV
EPR	2” FMT 1500RF PO 7/16”
EQU	2” FMT 1500RTJ PO 1/2” IV
EQY	2” FMT 150RF PO 5/8” EPIV
EQZ	2” FMT 600RTJ PO 3/4”
ESO	2” FMT 1500RTJ PO 1/4” IV
EVF	2” FMT 600RTJ PO 1” IV
EVM	2” FMA 600RF PO 1” IV
EVP	2” FMT 2500RTJ PO 1” IV
EVQ	2” FMT 1500RF2” M/MS6AFVPKGFOPTVE
EXS	2” FMT W / 3” 300RF PO 1” IV
EZA	2” FMT 150RF PO 5/8” EPIV
MBA	2” FMT W / 3” 600RF PO 7/8” EPIV

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Base Codes for Kimray High Pressure Control Valves Continued

Code	Description
EAA	1400 SMA PO 1/4” IV
EAB	1400 SMA PO 3/8” IV
EAC	1400 SMA PO 1/2” IV
EAD	SMA PO 1” IV
EAE	1400 SMT PO 1/8” IV
EAF	1400 SMT PO 3/16” IV
EAG	1400 SMT PO 1/4” IV
EAH	1400 SMT PO 3/8” IV
EAI	1400 SMT PO 1/2” IV
EAJ	1400 SMT PO 3/8” CB
EAK	1400 SMT PC 1/2” IV
EBK	1400 SMT PO IV
ECE	2100 SMT PO 1/2” IV
ECF	2100 SMT PO 3/4” IV
ECG	2100 SMT PO 1” IV
ECH	2100 SMT PO 1 1/2” IV
ECI	2100 SMT PC 1/2” IV
ECJ	2100 SMT PC 1” IV
ECK	2200 SMA PO 1/2” IV
ECL	2200 SMA PO 3/4” IV
ECM	2200 SMA PO 1” IV
ECN	2200 SMT PO 1/2” IV
ECO	2200 SMT PO 3/4” IV
ECP	2200 SMT PO 1” IV
ECQ	2400 SMA PO 3/4” IV
ECR	2400 SMT PO 1/2” IV
ECS	2400 SMT PO 3/4” IV
ECT	2400 SMT PO 1” IV
ECU	2400 SMA PO 1” IV

Code	Description
ECX	200 SMT PO 3/4” W/POS IND
ECY	2400 SMA PO 7/8” IV
EDH	2100 SMT PO 1/4” EP
EDI	2200 SMT PO 1/4” EP
EDJ	2400 SMT PO 1/4” EP
EDK	2200 SMA PO 5/8” EP
EDL	2200 SMA PO 7/16” EP
EDM	2200SMA PO 7/8” EP
EDS	2200 SMT PO 3/8” IV
EDU	2400 SMT PO 7/16” EPNT
EDX	2400 SMA PO 5/8” IV
EDY	2400 SMA 1/4” EP
EFP	2200 SMT PO 7/8” EP
EFS	2200 SMT PO 1 1/2” IV
EFT	1400 SMA PO 1/8” IV
EPL	2400 SMT PO 1 1/2” IV
EQK	2200 SMA PO 3/8” IV
EQL	2100 SMT PO 3/8” IV
EQM	2200 SMT PO 1/4” IV
EQV	2200 SMA PO 1 1/2” IV
ESB	2400 SMA PO 7/16” EP
ESN	2200 SMT PO 7/16” EP HI / LOW GAP
ETA	2200 SMT PO 5/8” EP
ETB	2400 SMA PO 1/2” IV
ETC	2400 SMT PO 5/8” EP

Code	Description
ETT	2200 SMT PO 7/16” EP
ETU	2100 SMT PO 7/16” EP
ETX	2400 SMT PO 7/16” EP
EXT	2400 SMT PO 1/4” IV
EXZ	2400 SMT PO 3/8” IV

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Kimray is an ISO 9001- certified manufacturer.
Kimray quality assurance process maintains strict controls
of materials and the certification of parts used in kimray control valves.

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