CIRCLE SEAL CONTROLS, INC.

500 Series

Adjustable Popoff & Inline Relief Valves
0.5 to 150 psig (10 bar)

Features

- Popoff or inline valves
- Adjustable crack pressure
- Zero leakage
- Optional factory preset
- Accurate set pressure
- Wide range of cracking pressure
- Tamper-proof adjustment
- 100% seat leakage tested
- PED certifications and CE marking available for most models

Applications

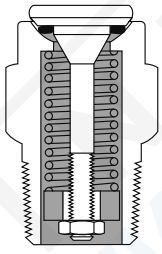
- System overpressure protection
- Storage tanks
- Freon® recovery systems
- Medical equipment
- Refrigeration & heating equipment
- Measuring & dispensing pumps
- Communications equipment
- Process control instruments
- R & D pilot plants
- Vacuum pump safety

Technical Data

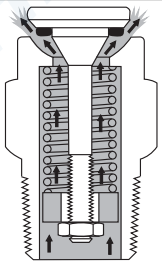
Body Construction Materials	Aluminum, brass, 303 or 316 stainless steel
O-ring Materials	Buna N, ethylene propylene, neoprene, silicone, Teflon®, or Viton®
Spring Materials	302 stainless steel or 17-7 PH stainless steel
Operating Pressure	Vacuum to 200 psig (14 bar)
Inline Valve Proof Pressure	400 psig (28 bar)
Inline Valve Burst Pressure	Above 500 psig (34 bar)
Temperature Range	–320° F to +400° F (–196° C to +204° F) *Based on o-ring & body material, see "How to Order"*
Connection Sizes	⅛ inch to 1¼ inch

Note: Proper filtration is recommended to prevent damage to sealing surfaces.

How it Works



Closed
Resilient seal design prevents leakage. Sealing efficiency increase with increased pressure up to cracking pressure. Metal-to-metal poppet stop supports spring load, prevents sticking.



Open
When system pressure overcomes spring force, poppet opens. As pressure continues to rise, variable orifice between poppet and body increases, allowing greater flow.

Reseating
Resilient seal automatically establishes line of contact with spherical seat. Seal provides zero leakage at reseat.

Circle Seal Controls
2301 Wardlow Circle, Corona, CA 92880
Phone (951) 270-6200 Fax (951) 270-6201
www.circle-seal.com

relief valves

500 Series

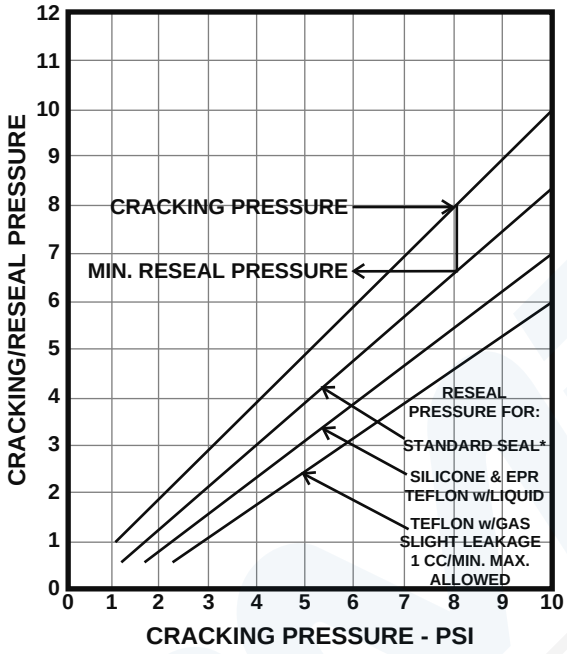
Flow at Cracking Pressure
Elastomeric seals: 5cc/min
Teflon®: 0.02 scfm

Cracking Pressure Tolerance: ±5%
Cracking pressure on initial crack may be higher than cracking pressure tolerance due to inherent characteristics of seals. Cracking pressure tolerance will be greater than ±5% if set pressure is ≤ 1 psi. (Consult factory)

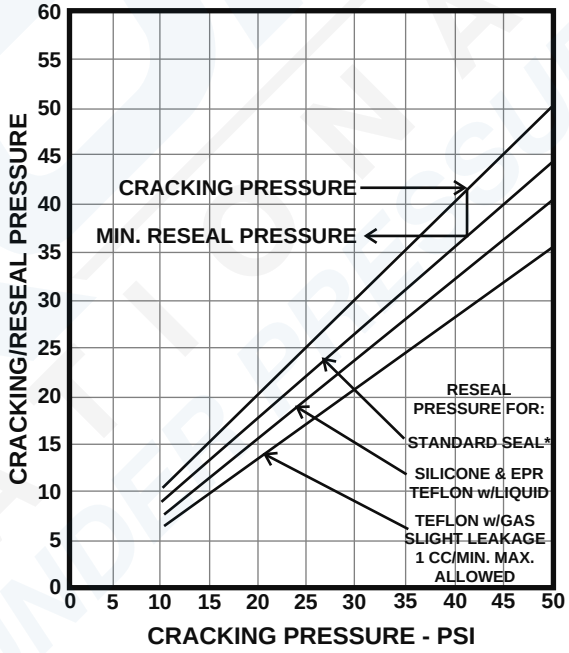
Leakage, Ascending Pressure
Standard seals: 0 to 95% of cracking pressure
Silicon & EPR: 0 to 80% of cracking pressure
Teflon®:
- Cracking pressures up to 2.4 psi: 4cc/min at 0 to 50% of cracking pressure
- Cracking pressures 2.5 psi and higher: 1cc/min at 0 to reseat pressure, 10cc/min from reseat to 90% of cracking pressures

Leakage at Reseat Pressure
All elastomeric seals: Zero
Teflon®: 1cc/min for cracking pressures 2.5 psi and higher

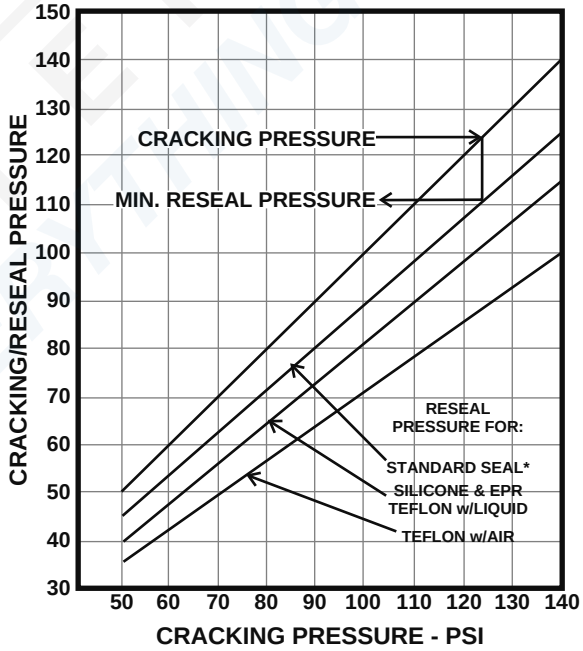
0 to 10 psi (0.7 bar)



10 to 50 psi (0.7 – 3 bar)



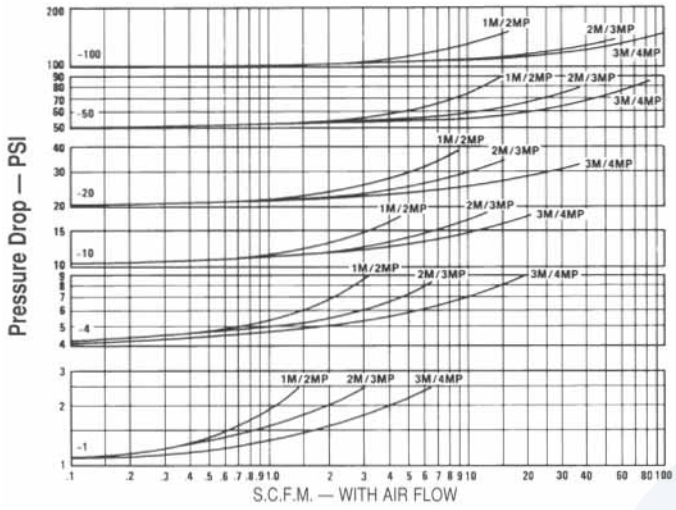
50 to 140 psi (3 – 10 bar)

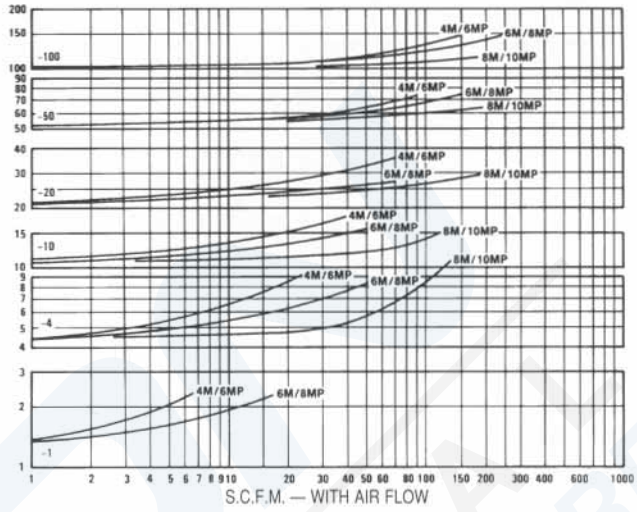


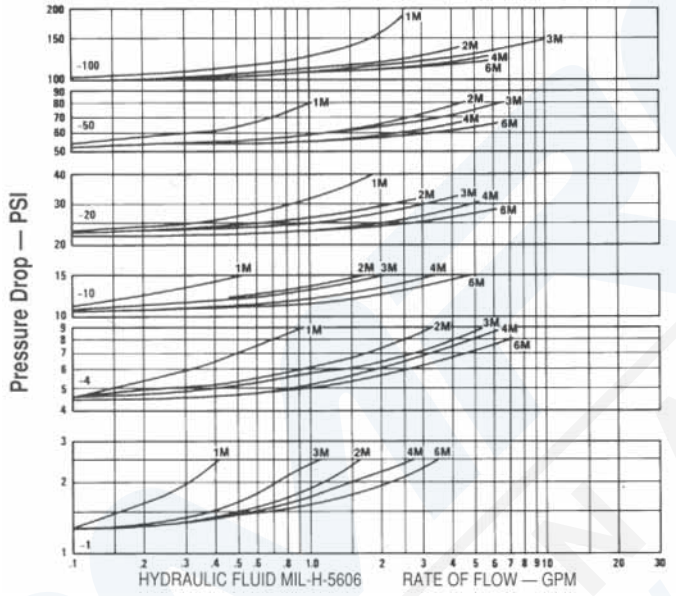
* *Standard seals:*
Buna N (559)
Viton® (532)
Neoprene (533)

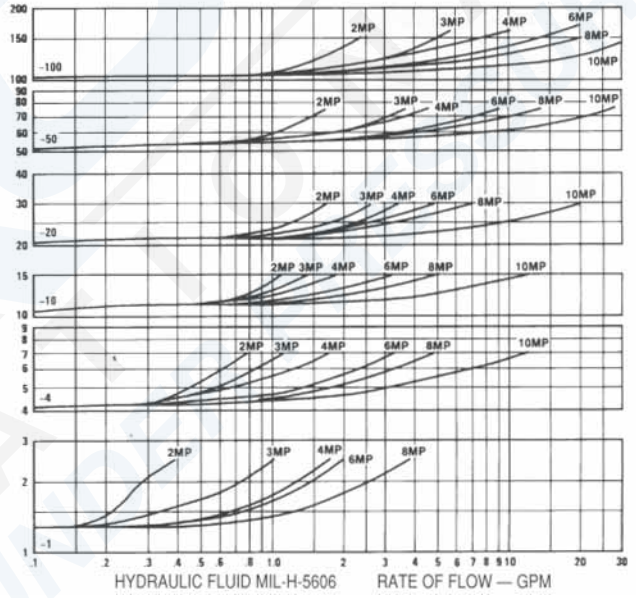
500 Series

Air and Hydraulic Flow Curves (500–M and –MP) Relief Valves

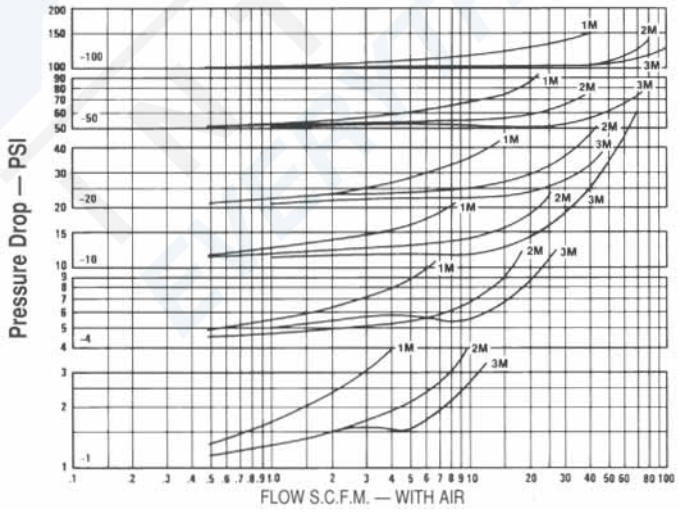


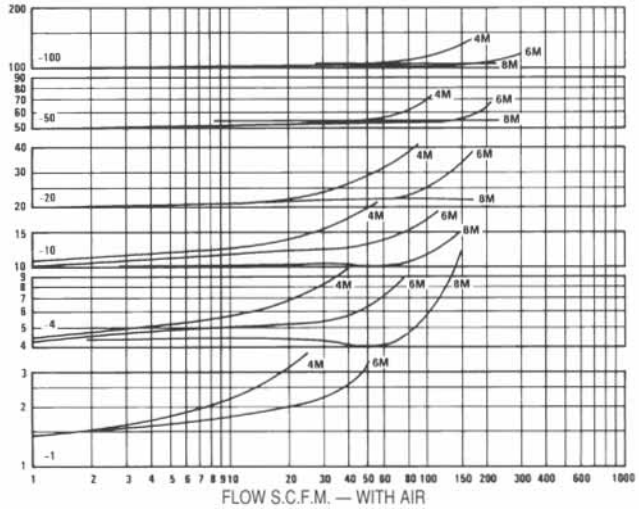






Air Flow Curves (D500–M) Popoff Relief Valves





500 Series

Air Flow Rates (500–M and –MP)

M = Popoff valves, ⅛″–⅜″; MP = Inline valves, ¼″–½″

Crack Pressure *PSIG*	Percent Over Pressure Beyond Cracking *(SCFM air at room temperature)*								
	10%			25%			50%		
	1M/2MP	2M/3MP	3M/4MP	1M/2MP	2M/3MP	3M/4MP	1M/2MP	2M/3MP	3M/4MP
0.5	.08	.08	.08	.12	.17	.45	.14	.60	1.1
1	.10	.10	.10	.17	.35	.65	.20	.80	1.6
1.5	.12	.12	.15	.25	.46	.90	.40	1.0	2.0
2	.15	.14	.20	.34	.62	1.2	.63	1.4	2.5
2.5	.17	.17	.30	.42	.75	1.5	.80	1.8	3.1
3	.20	.21	.40	.50	.85	1.7	1.1	2.2	3.6
4	.23	.24	.50	.70	1.05	2.0	1.5	3.0	5.4
5	.28	.30	.50	.86	1.3	2.2	1.7	3.7	6.0
10	.60	.70	.60	1.65	3.2	3.8	3.2	7.0	11
15	.80	1.2	1.6	2.3	4.2	8.5	4.2	8.5	20
20	1.1	1.5	2.5	2.9	5.0	11.5	5.2	10	28
25	1.2	2.0	3.0	3.4	7.9	15	6.0	14	33
30	1.6	2.4	4.0	4.0	10.1	19.5	7.0	18	36
40	1.9	3.5	7.0	5.1	13	24.5	8.8	26	53
50	2.3	4.4	9.0	6.0	15	29	10.6	32	60
60	2.5	5.4	9.8	6.7	18	33	11.6	39	69
70	2.9	6.6	10.9	7.5	22.5	38	12.7	47	79
80	3.2	7.6	12	8.2	26	43	13.8	56	91
90	3.6	8.7	13.5	9.0	30.5	47	14.9	66	101
100	4.0	9.5	15	9.8	34	52	15.8	75	108
110	4.4	11.3	17.5	10.2	38	53.5	17.0	77.5	114
120	4.8	13.2	20.8	10.6	42.5	56.5	18.3	80	122
130	5.2	14.9	24	11	47	58.5	19.6	83	131
140	5.6	16.5	27.5	11.5	51	61.5	20.9	87	138
150	6.0	18	30	12	56	63	22.0	90	145

M = Popoff valves, ½″–1″; MP = Inline valves, ⅜″–1¼″

Crack Pressure *PSIG*	Percent Over Pressure Beyond Cracking *(SCFM air at room temperature)*								
	10%			25%			50%		
	4M/6MP	6M/8MP	8M/10MP	4M/6MP	6M/8MP	8M/10MP	4M/6MP	6M/8MP	8M/10MP
.5	.07	.07	—	.50	.50	—	.80	2.2	—
1	.10	.10	—	.70	.70	—	1.7	3.2	—
1.5	.30	.30	—	1.0	1.4	—	2.2	5.5	—
2	.50	.50	—	1.2	1.7	—	3.0	7.0	—
2.5	.60	.60	—	1.8	3.0	—	4.2	10.5	—
3	.80	.80	—	2.2	4.0	—	5.0	13	—
4	1.0	1.0	1.5	3.0	5.0	30	7.5	17	56
5	1.0	1.2	2.5	3.5	6.0	34	9.0	20	64
10	1.0	2.4	7.0	6.0	12	60	19	40	115
15	1.6	3.0	7.0	8.5	22	60	27	80	160
20	2.0	5.0	7.0	10	30	60	34	110	190
25	3.0	5.5	9.0	13.5	34	72	43	116	—
30	3.5	6.0	11.5	16	37	80	50	121	—
40	5.5	8.5	18	24	48	115	72	136	—
50	7.0	10	23	30	56	140	90	150	—
60	11	13	35	38	64	160	100	165	—
70	15	17	59	47	72	185	111	182	—
80	20	21	77	56	81	215	123	204	—
90	26	26	88	68	94	235	138	225	—
100	30	30	100	75	105	250	150	240	—
110	33	38	115	80	112	258	166	—	—
120	37	47	132	86	125	270	183	—	—
130	41	57	150	93	150	282	201	—	—
140	46	71	175	102	163	290	222	—	—
150	50	80	190	110	175	300	240	—	—

500 Series

Air Flow Rates (D500–M)

Popoff valves with deflector cap, ⅛″–⅜″

Crack Pressure *PSIG*	Percent Over Pressure Beyond Cracking *(SCFM air at room temperature)*								
	10%			25%			50%		
	1M	2M	3M	1M	2M	3M	1M	2M	3M
.5	.12	.20	.15	.24	.50	.50	.44	1.2	1.1
1	.21	.30	.30	.40	.85	.85	.73	2.0	1.9
1.5	.21	.30	.30	.42	1.0	1.0	.80	2.7	3.1
2	.21	.30	.30	.45	1.2	1.2	.95	3.5	5.0
2.5	.22	.30	.30	.49	1.3	1.3	1.1	4.3	6.2
3	.23	.30	.30	.52	1.6	1.6	1.25	5.4	8.0
4	.23	.30	.30	.58	2.1	2.1	1.5	7.5	12
5	.32	.30	.30	.60	2.2	4.5	1.7	8.3	14
10	.70	.34	.40	1.6	2.5	14	3.2	12.6	23
15	1.4	1.3	1.5	2.0	6.0	18	3.9	16.5	29
20	1.8	2.2	3.0	2.7	10	23	5.4	21	36
25	1.9	3.0	8.0	2.8	11.5	27	6.0	23	40
30	2.0	4.0	14	3.0	14	32	7.0	27	47
40	2.3	5.9	26	3.5	18	42	9.0	33	59
50	2.4	8.0	39	3.8	25	54	10.5	40	74
60	3.2	17	43	4.6	33	62	11.4	46	—
70	4.0	26	47	5.5	41	70	12.4	52	—
80	4.9	36	52	6.4	50	79	13.7	59	—
90	5.9	46	58	7.5	61	89	15	67	—
100	7.0	56	65	8.5	72	100	16	76	—
110	7.3	56	65	9.5	73	113	24	80	—
120	7.7	57	66	12.8	74	127	33	84	—
130	8.1	58	67	16.2	76	142	43	89	—
140	8.6	59	68	20	78	158	53	96	—
150	9.0	61	70	25	80	176	60	104	—

Popoff valves with deflector cap, ½″–1″

Crack Pressure *PSIG*	Percent Over Pressure Beyond Cracking *(SCFM air at room temperature)*								
	10%			25%			50%		
	4M	6M	8M	4M	6M	8M	4M	6M	8M
.5	.15	.15	—	.30	.30	—	1.0	1.0	—
1	.30	.30	—	.50	.50	—	1.7	1.7	—
1.5	.40	.40	—	.60	1.5	—	3.2	7.5	—
2	.50	.60	—	.90	3.0	—	5.0	14.5	—
2.5	.60	.70	—	1.1	4.0	—	6.5	21	—
3	.70	1.0	—	1.4	5.5	—	9.0	29	—
4	1.0	1.5	—	3.0	9.0	—	13	45	—
5	1.0	1.8	—	4.0	13	—	15.5	49	—
10	1.5	4.0	92	10	36	115	28	75	145
15	9.0	26	127	22	66	—	42	101	—
20	18	50	170	36	100	—	58	131	—
25	21	60	173	43	112	—	65	—	—
30	25	74	177	51	128	—	74	—	—
40	33	100	188	67	158	—	91	—	—
50	42	130	200	85	195	—	110	—	—
60	49	148	225	95	220	—	—	—	—
70	56	167	251	106	247	—	—	—	—
80	64	188	278	117	275	—	—	—	—
90	73	212	308	130	305	—	—	—	—
100	85	240	340	145	340	—	—	—	—
110	89	246	355	152	347	—	—	—	—
120	93	253	372	159	355	—	—	—	—
130	98	261	390	167	363	—	—	—	—
140	103	270	415	176	375	—	—	—	—
150	110	280	440	185	390	—	—	—	—

500 Series

How to Order

D 5 59 A – 2 M – 10

VARIATION ††
- **D** Deflector cap
- **K** Cryogenic service, special cleaning & testing (stainless steel only)

SEAL MATERIAL & TEMPERATURE RANGE
- **20** Teflon®
  520 Series**: -100° F to +400° F (-73°C to +204°C)
  K520 Series**: -320° F to +165° F (-196°C to +74°C)
- **24** Silicone*, -70° F to +450° F (-57°C to +232°C)
- **32** Viton®, -20° F to +400° F (-29°C to +204°C)
- **33** Neoprene, -40° F to +300° F (-40°C to +149°C)
- **59** Buna N, -65° F to +275° F (-54°C to +135°C)
- **62** Ethylene propylene, -65° F to +300° F (-54°C to +149°C)
- **80** Teflon®, -320° F to +165° F (-196°C to +74°C)

BODY MATERIAL
- **A** Aluminum
- **B** Brass
- **T** 303 stainless steel†
- **T1** 316 stainless steel

VALVE SIZE
Pipe sizes in ⅛″ increments
(see "Valve Size & Type Codes" table, below)

CONNECTION
See "Valve Size & Type Codes" table, below

CRACKING PRESSURE
Specify cracking pressure setting in psig
(0.5 – 150 psig)

'D' Variation: Prefixed part number is supplied with a cap which diverts high pressure blasts from personnel and instruments, and serves as a rain and dust shield.

* *Not available over 74.9 psi (5 bar)*

** *520 Series: Teflon® o-ring*
K520 Series: Polished Teflon® o-ring, cryogenic testing and serialization
580 Series: Polished Teflon® o-ring

† *Not available for PED applications*

†† *Blank if not required*

Valve Size & Codes

Size	Pipe Thread Male	Pipe Thread Male/Female	British Pipe Thread Male/ Female	British Taper Pipe Male
⅛″	–1M	—	—	–1S
¼″	–2M	–2MP	–2SX	–2S
⅜″	–3M	–3MP	–3SX	–3S
½″	–4M	–4MP	–4SX	–4S
¾″	–6M	–6MP	–6SX	–6S
1″	–8M	–8MP	—	–8S
1¼″	—	–10MP	—	—

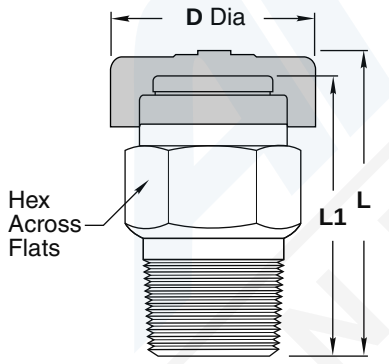
To specify PED certification, add PED prefix to the part number.

Please consult your Circle Seal Controls distributor or our factory for information on special connections, operating pressures and temperature ranges.

Repair Kits
In normal service, the only part(s) which may require replacement is(are) the seal(s). A repair kit may be ordered by placing a "K/" in front of the complete part number (i.e. K/559A–2M–10).

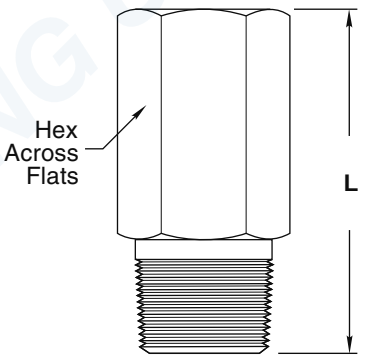
Dimensions (Inches)

Popoff



Pipe Size, Male	L	L1	Hex	D Dia. Max.
⅛″	1.14	0.98	½	0.63
¼″	1.38	1.20	⅝	0.90
⅜″	1.43	1.25	¾	1.21
½″	1.98	1.74	1	1.45
¾″	2.31	2.07	1⅛	1.45
1″	3.16	2.86	1½	1.89

Inline



Pipe Size, Male & Female	L	Hex
¼″	1.62	¾
⅜″	2.08	⅞
½″	2.34	1⅛
¾″	2.72	1¼
1″	3.62	1½
1¼″	4.67	1⅞

For Your Safety

It is solely the responsibility of the system designer and user to select products suitable for their specific application requirements and to ensure proper installation, operation, and maintenance of these products. Material compatibility, product ratings and application details should be considered in the selection. Improper selection or use of products described herein can cause personal injury or property damage.

Freon® is a registered trademark of DuPont.
Viton® is a registered trademark of DuPont Dow Elastomers.
Teflon® is a registered trademark of the DuPont Company.