

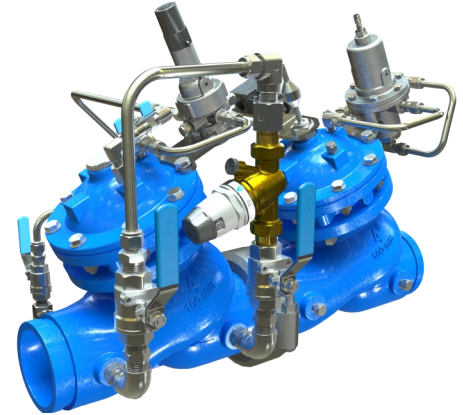


## PRESSURE REDUCING SYSTEM

With “Watchdog” Hydraulic Backup Valve and Off Peak Flows Bypass

**Model: 72S 2B H**

The BERMAD 72S-2B-H is a hydraulically operated, diaphragm actuated pressure reducing system, consisting of a BERMAD 720-2B PRV with low flow by-pass and an integral “Watchdog” backup valve. The system reduces a high upstream pressure to a lower, constant downstream pressure, regardless of fluctuating demand or varying upstream pressure. The “Watchdog” backup valve is fully open in normal operation due to its double chamber configuration, minimizing head loss and maximizing flow through the valve.



Should pressure rise downstream of the BERMAD 720-2B because of valve failure, the “Watchdog” quickly responds and triggers an alarm, while providing stable pressure to consumers until the PRV is repaired.

### 1.0 General Information:

- Valve type: diaphragm actuated, single and double chamber
- Valve pattern: Y (oblique)
- Available sizes: 1.5”-24”/ DN40-600
- Maximum working pressure: 250 or 300 psi/ 16 or 21 bar
- End connections:
  - Grooved: (OGS) ANSI/AWWA C606 (1.5”-8”/DN40-200)
  - Flanged: ANSI B16.5 class #150 & #300 (1.5”-24”/DN40-600)
- Working temperature: water up to 140°F/60°C

### 2.0 Certificates:

- NSF 61
- NSF 372
- Others:



DVGW  
Germany



ACS  
France



GOST  
Russia



PZH  
Poland



ISO 9001-  
2008

#### Job/Owner

System No.	
Location	

#### Contractor

Submitted by	
Date	

#### Engineer

Spec Section	
Paragraph	
Approved	
Date	





### 3.0 Construction Materials:

#### Main Valves

- Body, cover and partition:
  - Standard: Ductile Iron, Epoxy Fusion Bonded Coating
  - Optional: Stainless Steel 316
- Internals:
  - Stainless Steel, Bronze, coated Steel, POM
- Bolts, nuts and studs:
  - Stainless Steel 316
- Elastomers:
  - Diaphragm: EPDM, Nylon fabric-reinforced
  - Seal: NBR
  - O-Rings: EPDM
- Control trim:
  - Control accessories: Stainless Steel 316
  - Tubing & fittings: Stainless Steel 316

#### Low Flow By Pass

- Body: DRZ low-lead forged brass
- Cover: Glass reinforced nylon
- Internals: Stainless Steel, PTFE
- Filter screen: Stainless steel 303
- Elastomers: EPDM
- By-Pass trim: Stainless steel

### 4.0 Control Information

- Pilot setting range:
  - Standard: 14.5-145 psi / 1-10 bar
  - Other: on request
- By-Pass setting range: 15-90 psi / 1-6 bar
- Open Valve Signal" SPDT (with N.C and N.O terminals)

Note: By-Pass should be set 5-7 psi above main valve pilot setting  
 Watchdog pilot should be set 15 psi above By-Pass

### 5.0 General Notes:

- By-Pass Sizes:
  - Main valve 1.5"-3" / DN40-DN80: By-Pass ½" / DN15
  - Main Valve 4"-8" / DN100-DN200: By-Pass ¾" / DN20
- Recommendation:
  - Install a pressure relief valve model 73Q at downstream side
  - Install a strainer (stone and gravel trap) model 70F at valves upstream

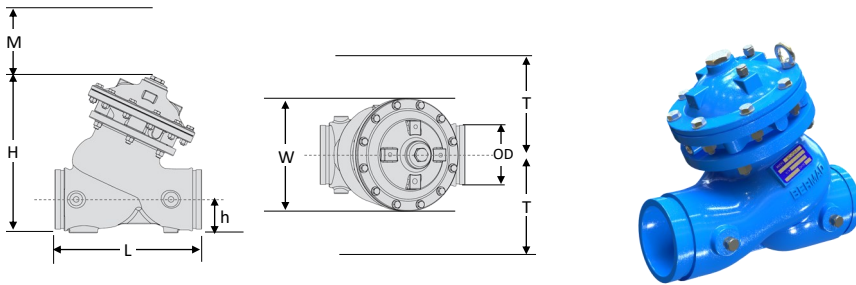
### 6.0 Specify When Ordering:

- Minimum and maximum flow rate (gpm, m<sup>3</sup>/h)
- Inlet pressure (psi, bar)
- Outlet pressure - Pilot setting (psi, bar)
- Body material: Ductile Iron (standard) or Stainless Steel
- End connections: Grooved (standard) or Flanged





## 7.1 Grooved Valves - Ductile Iron, ANSI/AWWA C606 (Standard)



		1.5"	2"	2.5"	3"	4"	6"	8"
		40	50	65	80	100	150	200
OD	Inch	1.90	2.37	2.87	3.50	4.50	6.63	8.63
	mm	48.3	60.3	73	88.9	114.3	168.3	219.1
L	Inch	8.07	8.27	8.46	9.84	12.60	16.34	19.69
	mm	205	210	215	250	320	415	500
W	Inch	4.80	4.80	4.80	6.61	7.87	12.60	15.35
	mm	122	122	122	168	200	320	390
h	Inch	1.30	1.57	1.57	2.36	2.91	3.74	4.92
	mm	33	40	40	60	74	95	125
H	Inch	7.64	7.91	7.91	10.43	12.80	18.31	20.83
	mm	194	201	201	265	325	465	529
Weight	lb.	13	14	14	37	64	128	225
	Kg	6	6.2	6.5	17	29	58	102
M	Inch	3.86	3.86	4.17	5.67	6.89	12.36	15.43
	mm	98	98	106	144	175	314	392
T	Inch	8.46	8.74	8.74	9.06	9.29	9.88	10.35
	mm	215	222	222	230	236	251	263

■ Notes:

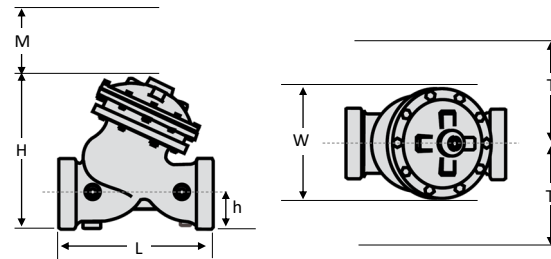
- Clearances T are based on the use of both sides of the valve for control accessories. In cases where both sides are not used, the clearance of the unused side should be equal to W
- M - Minimal required space for actuator replacement and trim clearance
- Dimensions & Weights tables refer to basic valves
- Envelope dimensions vary according to valve model
- Control loop and control accessories adds approximately 5 lbs./2.3 kg to the weight of a basic valve





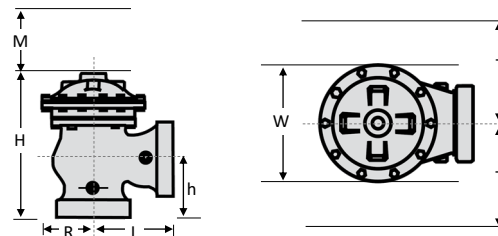
## 7.2 Threaded Valves - Ductile Iron, NPT, BSP

Nominal Size	Inch	1.5"	2"	2.5"	3"
	mm	40	50	65	80
L	Inch	6.10	6.10	8.35	9.84
	mm	155	155	212	250
W	Inch	5.08	5.08	5.08	6.42
	mm	129	129	129	163
h	Inch	1.46	1.57	1.89	2.20
	mm	37	40	48	56
H	Inch	7.91	7.99	8.23	10.39
	mm	201	203	209	264
Weight	lb.	12	12	18	37
	Kg	5.5	5.5	8	17
M	Inch	3.86	3.86	4.17	5.67
	mm	98	98	106	144
T	Inch	8.46	8.74	8.74	9.06
	mm	215	222	222	230



## 7.3 Threaded Valves Angle - Ductile Iron, NPT, BSP

Nominal Size	Inch	1.5"	2"	2.5"	3"
	mm	40	50	65	80
L	Inch	-	4.76	5.51	6.26
	mm	-	121	140	159
R	Inch	-	2.44	2.44	3.15
	mm	-	62	62	80
W	Inch	-	4.84	4.84	6.42
	mm	-	123	123	163
h	Inch	-	3.27	4.02	4.53
	mm	-	83	102	115
H	Inch	-	8.86	9.53	11.57
	mm	-	225	242	294
Weight	lb.	-	12	15	33
	Kg	-	5.5	7	15
M	Inch	-	3.86	4.17	5.67
	mm	-	98	106	144
T	Inch	-	8.74	8.74	9.06
	mm	-	222	222	230



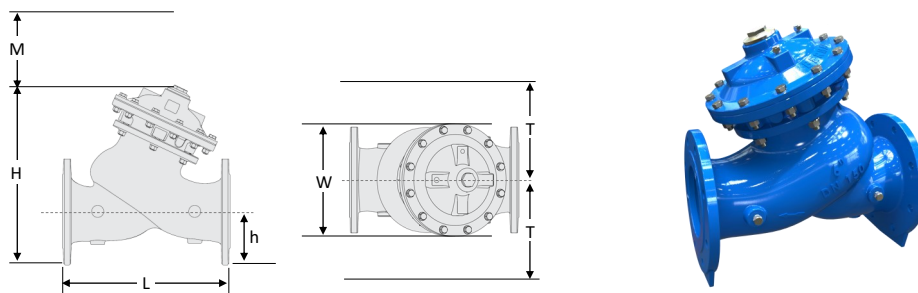
■ Notes:

- Clearances T are based on the use of both sides of the valve for control accessories. In cases where both sides are not used, the clearance of the unused side should be equal to W
- M - Minimal required space for actuator replacement and trim clearance
- Dimensions & Weights tables refer to basic valves
- Envelope dimensions vary according to valve model
- Control loop and control accessories adds approximately 5 lbs./2.3 kg to the weight of a basic valve





## 7.4 Flanged Valves - Ductile Iron, Sigma Series - Class ANSI150 and ANSI300



Nominal Size	Inch mm	1.5"	2"	2.5"	3"	4"	6"	8"	10"	12"	14"*	16"	18"*	20"*	24"*
		40	50	65	80	100	150	200	250	300	350*	400	450*	500*	600*
L	Inch	9.06	9.06	11.42	12.20	13.78	18.90	23.62	28.74	33.46	38.58	43.31	47.24	49.21	57.09
	mm	230	230	290	310	350	480	600	730	850	980	1100	1200	1250	1450
W	Inch	6.10	6.50	7.48	8.27	10.04	12.60	15.75	18.90	22.44	23.03	32.09	32.09	32.09	36.22
	mm	155	165	190	210	255	320	400	480	570	585	815	815	815	920
h	Inch	3.19	3.39	3.82	4.25	5.12	6.42	7.60	8.94	10.71	11.77	13.15	14.21	15.67	19.29
	mm	81	86	97	108	130	163	193	227	272	299	334	361	398	490
H	Inch	9.21	9.69	11.57	13.11	15.59	20.24	24.33	28.54	34.69	35.79	46.10	47.05	48.03	48.82
	mm	234	246	294	333	396	514	618	725	881	909	1171	1195	1220	1240
Weight	lb.	26	31	60	77	121	212	348	564	888	1008	2147	2258	2392	2844
	Kg	12	14	27	35	55	96	158	256	403	457	974	1024	1085	1290
M	Inch	3.86	3.86	4.25	5.67	6.89	12.36	15.43	19.96	24.21	24.21	32.48	32.48	32.48	32.48
	mm	98	98	108	144	175	314	392	507	615	615	825	825	825	825
T	Inch	8.86	8.86	9.06	9.17	9.92	9.92	10.35	10.83	11.38	12.72	13.31	12.72	14.49	14.49
	mm	225	225	230	233	252	252	263	275	289	323	338	323	368	368

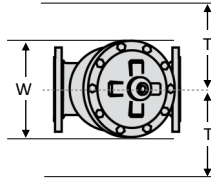
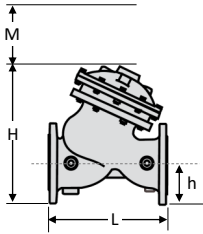
■ Notes:

- \* Reduced bore
- Clearances T are based on the use of both sides of the valve for control accessories. In cases where both sides are not used, the clearance of the unused side should be equal to W
- M - Minimal required space for actuator replacement and trim clearance
- Dimensions & Weights tables refer to basic valves
- Envelope dimensions vary according to valve model
- Control loop and control accessories adds approximately 5 lbs./2.3 kg to the weight of a basic valve





## 7.5 Flanged Valves - Stainless Steel



Nominal Size		Inch	1.5"	2"	2.5"	3"	4"	6"	8"	10"	12"
		mm	40	50	65	80	100	150	200	250	300
ANSI 150# & PN 10/16	L	Inch	8.07	8.07	8.46	9.84	12.60	16.34	19.69	23.82	28.54
		mm	205	205	215	250	320	415	500	605	725
	W	Inch	6.10	6.50	7.01	7.87	8.78	12.60	15.35	18.90	21.93
		mm	155	165	178	200	223	320	390	480	557
	h	Inch	3.07	3.27	3.50	3.94	4.37	5.63	6.77	8.15	9.53
		mm	78	83	89	100	111	143	172	207	242
H	Inch	9.41	9.61	9.84	12.17	14.21	20.16	22.99	27.40	32.36	
	mm	239	244	250	309	361	512	584	696	822	
Weight	lb.	20	23	29	49	82	165	276	478	816	
	Kg	9.1	10.6	13	22	37	75	125	217	370	
ANSI 300# & PN25	L	Inch	8.07	8.27	8.74	10.39	13.19	17.05	20.63	25.08	30.00
		mm	205	210	222	264	335	433	524	637	762
	W	Inch	6.10	6.50	7.48	8.27	10.00	12.60	15.35	18.58	21.93
		mm	155	165	190	210	254	320	390	472	557
	h	Inch	3.07	3.27	3.74	4.13	5.00	6.26	7.52	8.78	10.28
		mm	78	83	95	105	127	159	191	223	261
H	Inch	9.41	9.61	10.12	12.36	14.88	20.79	23.70	27.99	33.27	
	mm	239	244	257	314	378	528	602	711	845	
Weight	lb.	22	27	33	55	95	187	322	540	904	
	Kg	10	12.2	15	25	43	85	146	245	410	
M	Inch	3.86	3.86	4.17	5.67	6.89	12.36	15.43	19.96	24.21	
	mm	98	98	106	144	175	314	392	507	615	
T	Inch	8.46	8.74	8.74	9.06	9.29	9.88	10.35	10.87	11.54	
	mm	215	222	222	230	236	251	263	276	293	

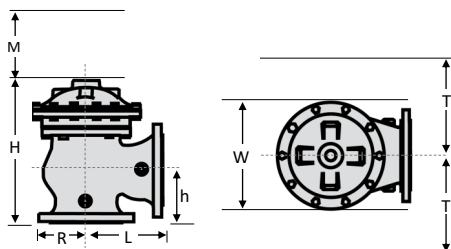
■ Notes:

- Clearances T are based on the use of both sides of the valve for control accessories. In cases where both sides are not used, the clearance of the unused side should be equal to W
- M - Minimal required space for actuator replacement and trim clearance
- Dimensions & Weights tables refer to basic valves
- Envelope dimensions vary according to valve model
- Control loop and control accessories adds approximately 5 lbs./2.3 kg to the weight of a basic valve





## 7.6 Flanged Valves - Ductile Iron, Angel



Nominal Size		Inch	1.5"	2"	2.5"	3"	4"	6"	8"	10"	12"	14"*	16"	18"*
		mm	40	50	65	80	100	150	200	250	300	350*	400	450*
ANSI 150# & PN 10/16	L	Inch	4.88	4.88	5.87	5.98	7.52	8.86	10.43	12.60	15.59	15.75	17.72	17.72
		mm	124	124	149	152	191	225	265	320	396	400	450	450
	R	Inch	3.27	3.27	3.74	3.94	4.53	6.30	7.68	7.99	10.98	10.39	12.60	12.60
		mm	83	83	95	100	115	160	195	203	279	264	320	320
	W	Inch	6.50	6.50	7.01	7.87	9.02	12.60	15.35	18.90	21.97	21.97	29.13	29.13
		mm	165	165	178	200	229	320	390	480	558	558	740	740
	h	Inch	3.35	3.35	4.29	4.02	5.00	5.98	7.99	8.74	10.83	10.98	14.57	14.57
		mm	85	85	109	102	127	152	203	222	275	279	370	370
	H	Inch	8.94	8.94	9.88	11.06	13.39	17.32	21.61	24.92	30.63	30.75	42.68	42.68
		mm	227	227	251	281	340	440	549	633	778	781	1084	1084
	Weight	lb.	21	22	26	47	77	157	260	452	772	816	1764	1808
		Kg	9.5	10	12	21.5	35	71	118	205	350	370	800	820
ANSI 300# & PN25	L	Inch	4.88	4.88	5.87	6.26	7.87	9.21	10.91	13.23	16.34	16.50	18.39	18.39
		mm	124	124	149	159	200	234	277	336	415	419	467	467
	R	Inch	3.07	3.27	3.74	4.13	5.00	6.26	7.52	8.78	10.28	11.54	12.76	14.09
		mm	78	83	95	105	127	159	191	223	261	293	324	358
	W	Inch	6.50	6.50	7.48	8.27	10.00	12.60	15.00	17.52	20.51	23.03	25.59	27.99
		mm	165	165	190	210	254	320	381	445	521	585	650	711
	h	Inch	3.35	3.35	4.29	4.29	5.31	6.50	8.50	9.29	11.57	11.77	15.20	15.20
		mm	85	85	109	109	135	165	216	236	294	299	386	386
	H	Inch	8.94	8.94	9.88	11.30	13.78	17.83	21.97	25.55	31.34	31.54	43.27	43.27
		mm	227	227	251	287	350	453	558	649	796	801	1099	1099
	Weight	lb.	24	25	30	51	90	179	304	514	860	937	1885	1918
		Kg	11	11.5	13.5	23	41	81	138	233	390	425	855	870
M	Inch	3.86	3.86	4.17	5.67	6.89	12.36	15.43	19.96	24.21	24.21	32.48	32.48	
	mm	98	98	106	144	175	314	392	507	615	615	825	825	
T	Inch	8.46	8.74	8.74	9.06	9.29	9.88	10.35	10.87	11.54	11.54	12.24	12.24	
	mm	215	222	222	230	236	251	263	276	293	293	311	311	

■ Notes:

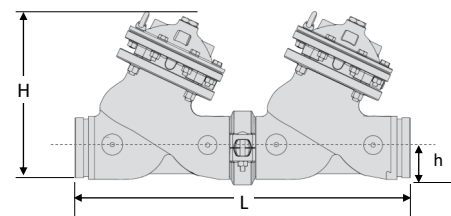
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- M - Minimal required space for actuator replacement and trim clearance
- Dimensions & Weights tables refer to basic valves
- Envelope dimensions vary according to valve model
- Control loop and control accessories adds approximately 5 lbs./2.3 kg to the weight of a basic valve





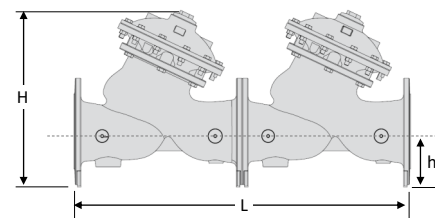
## 7.7 Grooved Dual Combo Valves 72S-H - ANSI/AWWA C606 (Standard)

Nominal Size	Inch	1.5"	2"	2.5"	3"	4"	6"	8"
	mm	40	50	65	80	100	150	200
OD	Inch	1.90	2.37	2.87	3.50	4.50	6.63	8.63
	mm	48.3	60.3	73	88.9	114.3	168.3	219.1
L	Inch	16.19	16.69	17.08	19.83	25.35	32.83	39.57
	mm	411	424	434	504	644	834	1005
W	Inch	4.80	4.80	4.80	6.61	7.87	12.60	15.35
	mm	122	122	122	168	200	320	390
h	Inch	1.30	1.57	1.57	2.36	2.91	3.74	4.92
	mm	33	40	40	60	74	95	125
H	Inch	7.64	7.91	7.91	10.43	12.80	18.31	20.83
	mm	194	201	201	265	325	465	529
Weight	lb.	31	32	33	79	132	263	457
	Kg	14	14.4	15	36	60	120	208



## 7.8 Flanged, Dual Combo Valves 72S-H– Ductile Iron, Sigma Series

Nominal Size	Inch	1.5"	2"	2.5"	3"	4"	6"	8"
	mm	40	50	65	80	100	150	200
L	Inch	18.23	18.23	22.95	24.53	27.68	37.91	47.36
	mm	463	463	583	623	703	963	1203
W	Inch	6.10	6.50	7.48	8.27	10.04	12.60	15.75
	mm	155	165	190	210	255	320	400
h	Inch	3.19	3.39	3.82	4.25	5.12	6.42	7.60
	mm	81	86	97	108	130	163	193
H	Inch	9.21	9.69	11.57	13.11	15.59	20.24	24.33
	mm	234	246	294	333	396	514	618
Weight	lb.	54	63	120	155	244	424	698
	Kg	25	29	55	71	111	193	317



- Notes:
  - Dimensions & Weights tables refer to basic valves
  - Envelope dimensions vary according to valve model
  - Control loop and control accessories adds approximately 10 lbs./ 5 kg to the weight of a basic valves







## 8.1 Design Flow Rate (based on 10 ft/s)

Inch	1.5"	2"	2.5"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"
mm	40	50	65	80	100	150	200	250	300	350	400	450	500	600
GPM	55	98	153	220	391	881	1,566	2,447	3,523	Consult Factory				
m <sup>3</sup> /hr	13	22	35	50	89	200	356	556	800					
l/sec	3.5	6.2	9.6	13.9	24.7	55.6	98.8	154.4	222.3					

## 8.2 Design Flow Rate (based on 8 ft/s)

Inch	1.5"	2"	2.5"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"
mm	40	50	65	80	100	150	200	250	300	350	400	450	500	600
GPM	44	78	122	176	313	705	1,253	1,957	2,819	Consult Factory				
m <sup>3</sup> /hr	10	18	28	40	71	160	285	445	640					
l/sec	2.8	4.9	7.7	11.1	19.8	44.5	79.0	123.5	177.8					

## 8.3 Minimum Flow Rate

Inch	1.5"	2"	2.5"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"
mm	40	50	65	80	100	150	200	250	300	350	400	450	500	600
GPM	1	1	1	1	1	1	1	1	1	Consult Factory				
m <sup>3</sup> /hr	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23					
l/sec	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06					

## 8.4 Flow Properties - Grooved, Threaded and Stainless Steel Flanged Valves

	Inch	1.5"	2"	2.5"	3"	4"	6"	8"
	mm	40	50	65	80	100	150	200
Cv	psi, GPM	42	50	54	113	196	452	800
Kv	m <sup>3</sup> /hr/bar	36	43	47	98	170	391	693
K	-	3.1	5.3	12.7	6.7	5.4	5.2	5.2

## 8.5 Flow Properties - Flanged, Ductile Iron Sigma Series

	Inch	1.5"	2"	2.5"	3"	4"	6"	8"	10"	12"	14"*	16"	18"*	20"*	24"*
	mm	40	50	65	80	100	150	200	250	300	350*	400	450*	500*	600*
Cv	psi, GPM	53	55	84	118	162	523	886	1513	2241	2145	3430	3430	3430	3430
Kv	m <sup>3</sup> /hr/bar	46	48	73	102	140	453	767	1310	1940	1857	2970	2970	2970	2970
K	-	1.9	4.3	5.3	6.2	8	3.9	4.3	3.6	3.4	6.8	4.6	7.3	11.1	23

## 8.6 Differential Pressure Calculation (for fully open valve)

Valve flow coefficient, Kv or Cv  $Kv(Cv) = Q \sqrt{\frac{Gf}{\Delta P}}$

Where:

Kv = Valve flow coefficient (flow in m<sup>3</sup>/h at 1bar ΔP)

Cv = Valve flow coefficient (flow in gpm at 1psiΔP)

(Cv = 1.155 Kv)

Q = Flow rate (m<sup>3</sup>/h ; gpm)

ΔP = Differential pressure (bar ; psi)

Gf = Liquid specific gravity (Water = 1.0)

Practical formulas for water:

$$Q = Kv \sqrt{\Delta P} \quad \Delta P = \left( \frac{Q}{Kv} \right)^2$$

Flow resistance or Head loss coefficient,  $K = \Delta H \frac{2g}{V^2}$

Where:

K = Flow resistance or Head loss coefficient (dimensionless)

ΔH = Head loss (m ; feet)

V = Nominal size flow velocity (m/sec ; feet/sec.)

g = Acceleration of gravity (9.81 m/sec<sup>2</sup> ; 32.18 feet/sec<sup>2</sup>)

Practical formula:

$$\Delta H = K \frac{V^2}{2g}$$





## 9.1 Flow Properties - Grooved, Threaded and Stainless Steel Flanged Valves

	Inch	1.5"	2"	2.5"	3"	4"	6"	8"
	mm	40	50	65	80	100	150	200
Cv	psi, GPM	49	58	64	133	231	531	941
Kv	m <sup>3</sup> /hr/bar	42	50	55	115	200	460	815
K	-	2.3	3.9	9.3	4.9	3.9	3.8	3.8

## 9.2 Flow Properties - Flanged, Ductile Iron Sigma Series

	Inch	1.5"	2"	2.5"	3"	4"	6"	8"	10"	12"	14"*	16"	18"*	20"*	24"*
	mm	40	50	65	80	100	150	200	250	300	350*	400	450*	500*	600*
Cv	psi, GPM	66	72	113	150	231	624	1045	1709	2472	2472	3812	3812	3812	3812
Kv	m <sup>3</sup> /hr/bar	57	62	98	130	200	540	905	1480	2140	2140	3300	3300	3300	3300
K	-	1.2	2.6	2.9	3.8	3.9	2.7	3.1	2.8	2.8	5.1	3.7	5.9	9	18.7

## 9.3 Differential Pressure Calculation (for fully open valve)

Valve flow coefficient, Kv or Cv       $Kv(Cv) = Q \sqrt{\frac{Gf}{\Delta P}}$   
 Where:

Kv = Valve flow coefficient (flow in m<sup>3</sup>/h at 1bar ΔP)

Cv = Valve flow coefficient (flow in gpm at 1psiΔP)

(Cv = 1.155 Kv)

Q = Flow rate (m<sup>3</sup>/h ; gpm)

ΔP = Differential pressure (bar ; psi)

Gf = Liquid specific gravity (Water = 1.0)

Practical formulas for water:

$$Q = Kv \sqrt{\Delta P} \quad \Delta P = \left( \frac{Q}{Kv} \right)^2$$

Flow resistance or Head loss coefficient,       $K = \Delta H \frac{2g}{V^2}$   
 Where:

K = Flow resistance or Head loss coefficient (dimensionless)

ΔH = Head loss (m ; feet)

V = Nominal size flow velocity (m/sec ; feet/sec.)

g = Acceleration of gravity (9.81 m/sec<sup>2</sup> ; 32.18 feet/sec<sup>2</sup>)

Practical formula:

$$\Delta H = K \frac{V^2}{2g}$$

