

FLOW COEFFICIENTS

The size of butterfly valve used for control purposes should be calculated on the basis of the operating characteristics. In order to achieve optimum control, the flow coefficients (Cv, Kv) below need to be considered.

SIZE	DISC OPENING															
	20°		30°		40°		50°		60°		70°		80°		90°	
	Kv	Cv	Kv	Cv	Kv	Cv	Kv	Cv	Kv	Cv	Kv	Cv	Kv	Cv	Kv	Cv
2	6.7	8	7.8	9	16	18	24	28	48	55	62	72	95	110	116	135
2-1/2	8.6	10	13	15	23	27	38	44	73	85	95	110	145	168	181	210
3	13	15	20	23	34	39	56	65	112	130	142	165	216	250	267	310
4	23	27	35	41	61	71	99	115	198	230	259	300	401	465	466	540
5	50	58	74	86	129	150	211	245	414	480	526	610	845	980	948	1100
6	83	96	121	140	211	245	345	400	677	785	871	1010	1392	1615	1647	1910
8	142	165	211	245	354	410	591	685	1099	1275	1478	1715	2302	2670	2746	3185
10	220	255	328	380	560	650	974	1130	1810	2100	2328	2700	3664	4250	4224	4900
12	319	370	466	540	819	950	1353	1570	2629	3050	3405	3950	5129	5950	6336	7350
14	388	450	647	750	1120	1300	1905	2210	3517	4080	4836	5610	6964	8078	9665	11200
16	552	640	776	900	1483	1720	2405	2790	4310	5000	6336	7650	9284	10770	11121	12900
18	630	730	1078	1250	1978	2295	3190	3700	6078	7050	7914	9180	11983	13900	15086	17500
20	785	910	1375	1595	2457	2850	3991	4630	7414	8600	9914	11500	15121	17540	19310	22400
24	1078	1250	1974	2290	3448	4000	5250	6090	10776	12500	14224	16500	20336	23590	24397	28300

Cv is the volume of water in U.S. gallons per minute that passes through the valve at a pressure drop of 1 PSI at 68°F. Cv is in imperial units; in metric units, the same coefficient (often called the Flow Factor) is Kv and corresponds to the flow rate of water in cubic meters (m³) per hour at a pressure drop of 100kPa (1 bar) at 20°C.

The approximate corresponding formulas for flow are:

$$Q = C_v \times \sqrt{\frac{\Delta P \times 62.4}{D}}$$

Where:

- Q = Valve flow rate in gallons per minute (USGPM)
- ΔP = Pounds per square inch (PSI) pressure drop across the valve
- 62.4 = Conversion factor for fluids computed in relation to water
- D = Density of fluids in pounds per cubic foot

$$Q = K_v \times \sqrt{\frac{\Delta P \times 1000}{D}}$$

Where:

- Q = Valve flow rate in cubic meters per hour (m³/h)
- ΔP = pressure drop across the valve in Bar
- 1000 = Conversion factor for fluids computed in relation to water
- D = Density of fluids in kilograms per cubic meter (kg/m³)

The relationship between Cv and Kv, expressed in the above mentioned unit of measure, is as follows:

$$C_v = 1.16 \times K_v$$