

Flow Calculations and Cv Values

The valve coefficient, Cv, is a number which represents the capability of a valve (or any flow component) to flow a fluid. The larger the Cv, the larger the flow at a given pressure differential. By definition, a Cv value of one is the Cv required to flow one gallon per minute (gpm) of water at 60° F with a pressure differential of one psi. Flow is proportional to the value of Cv. For example, a Cv of 150 would then equate to 150 gpm of water at 60° F with a differential pressure of one psi. The formula below allows for calculation of flow rate and pressure drop through a valve with a specified Cv value. During the process of valve size selection, the same formula is used to determine the valve Cv necessary for a required flow rate and desired pressure drop. Butterfly valve Cv values vary with the disc angle and valve size. In the chart below, we show the approximate Cv value of butterfly valves ranging from 2" to 24" and at various disc angles.

$$GPM = Cv \sqrt{\Delta P}$$

Where:

Cv = Valve Coefficient

GPM = Water Flow Rate in Gallons per Minute

ΔP = Differential Pressure (Upstream Pressure Minus Downstream Pressure)

Butterfly Valve Cv Values								
Valve Size	Cv at Various Butterfly Disc Positions							Full 90° Open Cv
	20°	30°	40°	50°	60°	70°	80°	
2"	4.06	14.2	26.3	44.5	70.6	105	135	159
2-1/2"	6.17	20.9	38.6	65.3	140	156	215	266
3"	13.6	31.4	57.9	98.0	156	240	342	457
4"	23.9	55.1	102	173	274	423	625	860
5"	37.2	85.6	158	268	426	656	970	1,320
6"	53.3	123	227	384	610	941	1,420	2,020
8"	94.3	217	401	679	1,080	1,660	2,500	3,540
10"	145	334	617	1,040	1,660	2,560	3,830	5,580
12"	209	481	888	1,500	2,390	3,690	5,620	8,080
14"	335	670	1,226	1,935	2,893	4,406	6,752	9,578
16"	443	886	1,622	2,560	3,827	5,829	8,933	12,671
18"	567	1,138	2,075	3,275	4,896	7,457	11,429	16,211
20"	711	1,422	2,609	4,116	6,156	9,377	14,371	20,385
24"	1,038	2,078	3,792	5,985	8,947	13,628	20,887	29,627