

# Pressure Drop Chart and C<sub>v</sub> Values

Butterfly Valves — Models: 51M, 52M, 53, 58, 65M, 66M, 89G

The flow characteristic of a valve is described as its C<sub>v</sub> value. C<sub>v</sub> is defined as the maximum flow of 60°F water expressed in GPM (Gallons Per Minute) which produces a 1psi drop across the valve.

**Formula for fluids**

$$C_v = Q \sqrt{\frac{G}{\Delta P}}$$

Q = Flow GPM

DP = Pressure Drop in psi

G = Specific Gravity

**To size a valve:**

For "On/Off" service: use C<sub>v</sub> data 30° to 60° disc opening value for C<sub>v</sub> table.

**Valve sizing for throttling, follow these steps.**

1. Flow required in the system (Q).  
Maximum allowable pressure drop (P). Specific Gravity of pipe line medium (G).
2. Calculate C<sub>v</sub> using above formula.
3. Determine valve size and degree disc must be open from C<sub>v</sub> table.
4. Make sure that maximum line velocity does not exceed the recommended maximum valve velocity, i.e., LIQUIDS: 20ft/second. GASES: 15,000 ft/min

$$V = \frac{Q \times .321}{A} \quad (\text{liquid only})$$

A = area of pipe in square inches

**Example: Throttling Service**

Given: Q= 5,000 GPM (flow)

DP= 1.75psi (pressure drop)

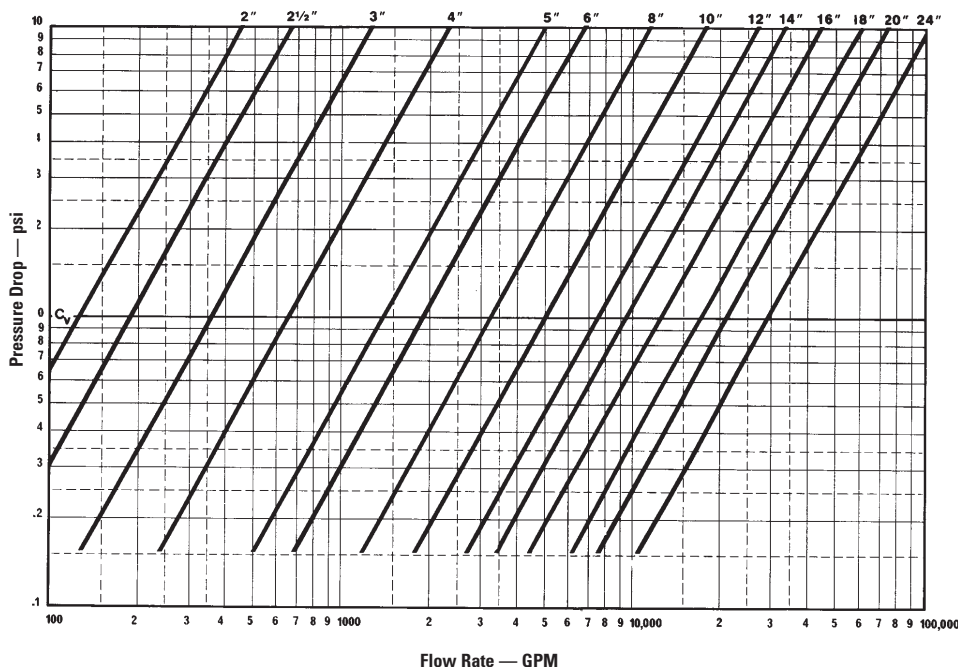
G= .750 (specific gravity/gasoline)

1.  $C_v = Q \sqrt{\frac{G}{\Delta P}} = 5000 \sqrt{\frac{.750}{1.75}} = 3273$
2. From C<sub>v</sub> table: 12" valve has C<sub>v</sub> range 825-3450, 30° - 60° open disc.

$$3. \text{ Velocity} = V = \frac{Q \times .321}{A} = \frac{5000 \times .321}{113.1} = 14.2\text{ft/sec}$$

which is within the limits, so for the given conditions a 12" valve should be used.

**Maximum Flow Valve Full Open**



SIZES	C <sub>v</sub> VALUES						
	2	2½	3	4	5	6	8
2	130	87	60	43	25	14	6
2½	190	127	87	63	36	21	9
3	360	241	166	119	68	39	18
4	650	435	300	214	123	71	32
5	1,400	938	644	462	266	154	70
6	1,900	1,273	875	627	361	209	95
8	3,300	2,200	1,518	1,089	627	363	165
10	5,000	3,350	2,300	1,650	950	550	250
12	7,500	5,025	3,450	2,475	1,425	825	375
14	9,500	6,365	4,370	3,135	1,800	1,050	475
16	13,400	8,978	6,165	4,420	2,550	1,475	670
18	17,200	11,500	7,910	5,676	3,270	1,892	860
20	21,300	14,270	9,800	7,030	4,050	2,350	1,065
24	30,000	20,100	13,800	9,900	5,700	3,300	1,500
		/	/	/	/	/	/
	FULL OPEN	72°	60°	50°	40°	30°	20°

