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Rated Flow Coefficient (Cv) Ultraflo Ultra-thin Disc* Butterfly Valves

ANGLE OF DISC OPENING

| Valve Size | 15° | 20° | 30° | 40° | 50° | 60° | 70° | 80° | 90° |
|-----------------|-------|-------|-------|-------|------|------|------|------|-------|
| 2" | .3125 | 2.81 | 11.13 | 19.45 | 33 | 53 | 94 | 167 | 277 |
| 3" | .728 | 7.18 | 28.81 | 50 | 86 | 137 | 244 | 435 | 720 |
| 4" | 1.35 | 13.62 | 54.7 | 95 | 164 | 260 | 464 | 826 | 1366 |
| 5" | 2.18 | 21.94 | 87.67 | 153 | 263 | 416 | 745 | 1326 | 2192 |
| 6" | 2.91 | 29.02 | 116 | 202 | 348 | 551 | 985 | 1757 | 2901 |
| 8" | 5.41 | 54.18 | 216 | 379 | 650 | 1029 | 1840 | 3276 | 5416 |
| 10" | 8.63 | 86.42 | 345 | 605 | 1036 | 1643 | 2938 | 5226 | 8640 |
| 12" | 12.48 | 124 | 500 | 875 | 1501 | 2377 | 4253 | 7566 | 12511 |
| %Cv vs. 90°Cv = | 0.1 | 1 | 4 | 7 | 12 | 19 | 34 | 60.5 | 100 |

Rated Cv = The volume of water in United States gallons per minute that will pass through a given valve opening with a pressure of 1 lb. per sq. inch.

* Ultra-thin discs are one piece disc-stems.
Ultraflo 390; 399; 392.

This chart does not apply to Elastomer covered or Teflon® covered discs.

This chart should be used as a GENERAL GUIDE.

Cv values, given above, may be employed in the formula:

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

Where: Q = Gallons per minute of flow through the valve.
 ΔP = Pounds per square inch of pressure drop across the valve.
 D = Density of fluid in pounds per cubic foot.

Pressure drop is computed by rearranging the formula to:

$$P = \frac{Q^2 \times D}{Cv^2 \times 62.4}$$

Sample Computations:

What is the flow rate of water at ambient temperature through a 4" butterfly valve 70° open when pressure drop across the valve is 0.5 psi? (Density of water at 68°F is 62.4 pounds per cubic foot.)

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

$$= 464 \sqrt{\frac{.5 \times 62.4}{62.4}}$$

$$= 464 \times .707$$

Q = 328 gallons per minute

What is the pressure drop across an 8" butterfly valve fully open, flowing 2000 gallons Q per minute of solvent with a density of 55 pounds per cubic foot?

$$\Delta P = \frac{Q^2 \times D}{Cv^2 \times 62.4}$$

$$= \frac{(2000)^2 \times 55}{(5416)^2 \times 62.4}$$

ΔP = .12 pounds per square inch

Teflon® is a registered trade name of E.I. DuPont Co.

Basic Sizing Formulas:

Liquid

$$Cv = Q \sqrt{\frac{SG}{\Delta P}}$$

WHERE:

Q = FLOW (U.S. GALLONS PER MINUTE)
 SG = SPECIFIC GRAVITY (WATER=1)
 ΔP = PRESSURE DROP ACROSS VALVE (LBS. PER SQ. IN.)

Gas

$$Cv = Q \sqrt{\frac{SG}{P_2 \Delta P}}$$

WHERE:


Q = FLOW (STD. CU. FEET PER MINUTE)
 SG = SPECIFIC GRAVITY (AIR=1)
 ΔP = PRESSURE DROP ACROSS VALVE (LBS. PER SQ. IN.)
 P₂ = OUTLET ABSOLUTE PRESSURE (LBS. PER SQ. IN. ABSOLUTE)
 ΔP < 1/2 INLET ABSOLUTE PRESSURE

Steam

$$Cv = \frac{W}{3 \sqrt{P_2 \Delta P}}$$

WHERE:

W = FLOW (LBS. PER HOUR)
 ΔP = PRESSURE DROP ACROSS VALVE (LBS. PER SQ. IN.)
 P₂ = OUTLET ABSOLUTE PRESSURE (LBS. PER SQ. IN. ABSOLUTE)
 ΔP < 1/2 INLET ABSOLUTE PRESSURE

| ZONE | REV | DATE | BY | APP'D | DESCRIPTION | <div> Ultraflo Corporation A Subsidiary of Bray International, Inc.</div> <div>#8 Trautman Ind. Dr. Ste. Genevieve, Mo. 63670 800-950-1762</div> | | | |
|------|-----|----------|-----|-------|--------------------------------|---|------|------|---------------------------|
| | | | | | | DRAWN BY | NAME | DATE | FLOW COEFF. (RATED Cv) |
| | | | | | | CHECKED | TJM | | |
| B-4 | 3 | 04/11/07 | TAL | CJH | CORRECTED Cv USED IN EX. CALCS | PART: Ultraflo Ultra-thin Disc Valves | | | |
| C-1 | 2 | 10/02/07 | CJH | CJH | CORRECTED GAS FORMULA TITLE | (Ultraflo 390, 399, and 392) | | | |
| D-2 | 1 | 02/21/07 | CJH | CJH | CORRECTED 3" 50° | SCALE: NONE DWG: Flow Rate-1 | | | |