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

ANGLE OF DISC OPENING

Ultraflo 400 / 422

Valve Size	10°	20°	30°	40°	50°	60°	70°	90°
2"	2	8	18	30	50	80	130	220
2.5"	3	11	25	44	70	110	180	320
3"	4	16	38	66	110	170	280	500
4"	6	28	63	110	180	280	460	820
5"	10	44	100	180	280	450	740	1300
6"	17	60	140	250	400	640	1100	1900
8"	24	110	250	440	690	1100	1800	3200
10"	38	180	400	710	1100	1800	3000	5100
12"	57	260	590	1000	1700	2700	4400	8000
14"	75	340	770	1400	2200	3400	5600	10000
16"	100	440	1000	1800	2800	4500	7400	13000
18"	130	570	1300	2300	3600	5800	9600	18000
20"	150	710	1600	2900	4600	7200	12000	22000
24"	220	1000	2300	4000	6400	10000	16500	30000

Ultraflo 410 / 412

24"	259	1028	2387	4244	6962	11040	18235	33154
30"	420	1652	3986	7080	11328	18090	28844	52443
36"	740	2775	5936	9790	15572	25053	40086	77089
42"	783	3502	7879	12997	21010	35016	54584	102989
48"	1023	4651	10365	17010	27242	43853	70431	132888

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.

* Thick discs are discs with thru stems.
Ultraflo 400, 422, 410, & 412

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.)

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

$$= 460 \sqrt{\frac{.5 \times 62.4}{62.4}}$$

$$= 460 \times .707$$

Q = 325.3 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?

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

$$= \frac{(2000)^2 \times 55}{(3200)^2 \times 62.4}$$

ΔP = .34 pounds per square inch

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)
 $\Delta P < 1/2$ 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)
 $\Delta P < 1/2$ INLET ABSOLUTE PRESSURE

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

ZONE	REV	DATE	BY	APP'D	DESCRIPTION	 Ultraflo Corporation A Subsidiary of Bray International, Inc.			#8 Trautman Ind. Dr. Ste. Genevieve, Mo. 63670 800-950-1762
							NAME	DATE	FLOW COEFF. (RATED Cv)
						DRAWN BY	TJM		
						CHECKED			
E-3	4	06/20/08	TAL	CJH	CORRECTED HEADING ERROR	PART: Ultraflo Thick Disc Valves (Ultraflo 400, 422, 410, and 412)			
B-4	3	04/11/07	TAL	CJH	CORRECTED Cv USED IN EX. CALCS				
C-1	2	10/02/07	CJH	CJH	CORRECTED GAS FORMULA TITLE				
C-4	1	02/03/04	CJH	CJH	ADDED 42"	SCALE: NONE DWG: Flow Rate-2			