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FLOW OF FLUIDS THROUGH VALVES FITTINGS AND PIPE

Resistoflex PLASTIC LINED PIPE & FITTINGS

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PRODUCT INFORMATION

Diaphragm Valve Sizing

Flow computations

Since rate of flow depends upon the pressure drop through the valve, the C_V values are given at vaious stages of the opening. The C_V is the valve coefficient of the flow and represents the flow of water through the valve in gpm with a 1 psig pressure drop. To calculate flow with the C_V table, use 100% opening for ON-OFF service and 50% opening for THROTTLING service.

LIQUID FLOW FORMULA
At pressure drops of other than 1 psig

$$Q = C_V (P/G)^{1/2}$$

Where:
Q = actual flow (gpm)
P = actual pressure drop (psig)
G = specific gravity
C_V = flow factor from table

GAS FLOW FORMULA

$$Q = 1360\, C_V (P/GT)^{1/2} \left[\frac{P_1 + P_2}{2} \right]^{1/2}$$

Where:
Q = volumetric flow (scfh)
G = specific gravity of gas (air at 0 psig and 60&degF is 1.0)
T = absolute temperature of flowing medium (&degF + 460)
P_1 = inlet pressure (saia)
P_2 = outlet pressure (psia)
P = (P_1 - P_2) pressure drop (psia) C_V = flow factor from table

Liquid velocity

Liquid velocity is a very important design consideration. In order to assure maximum life of liner and diaphgram, it is recommended that velocity be kept to a maximum of 10 feet per second over the weir. When handling abrasive liquids, special considerations are necessary. Consult you Resistoflex representative.
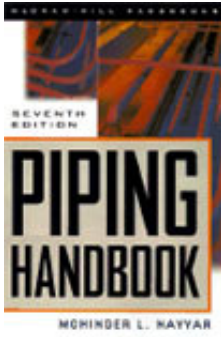
LIQUID VELOCITY FORMULA

$$V = .321\ (Q/A)$$

Where:
V = velocity (ft/s)
Q = flow (gpm)
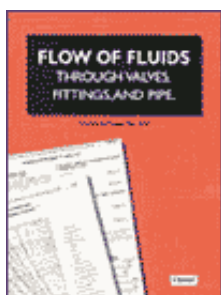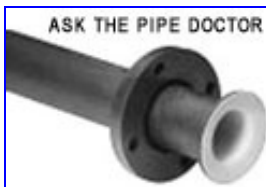
A = Area over wier from table

Valve coefficient of flow				
Valve size[1] inches	C_V flow factors % valve opening			
	25%	50%	75%	100%
1	5.9	7.1	7.1	7.2
1 1/2	15.0	21.8	23.2	24.4
2	34.3	46.3	46.5	46.7
2 1/2[2]	—	—	—	68.0
3	58.0	93.0	101.0	107.0
4	115.0	117.0	213.0	233.0
6	252.0	334.0	378.0	403.0
8	675.0	1035.0	1062.5	1082.5

[1]The 1, 1 1/2, 2, 3, 4, 6, and 8-inch sizes were tested by an independent testing laboratory in accordance with Fluid Controls Institute, Inc., "Recommended Voluntary Standards for Measurement Procedures for Determining Control Valve Flow Capacity."

[2]The C^V for the 2 1/2-inch size was calculated by an area relationship assuming constant velocity.

Area over the wier square inches										Dimensions:
Valve Size inches	% Open									
	10	20	30	40	50	60	70	80	90	100
1	.10	.18	.25	.32	.39	.45	.51	.56	.61	.64
1 1/2	.23	.42	.61	.80	.96	1.10	1.25	1.38	1.50	1.58
2	.40	.72	1.06	1.32	1.63	1.88	2.10	2.32	2.52	2.66
2 1/2	.56	1.06	1.53	1.96	2.36	2.74	3.08	3.40	3.63	3.88
3	.86	1.62	2.32	2.95	3.56	4.18	4.66	5.12	5.58	5.90
4	1.40	2.66	3.78	4.84	5.80	6.80	7.62	8.40	9.09	9.60
6	3.20	5.90	8.20	10.50	12.60	14.62	16.41	18.25	19.72	21.00
8	5.92	11.41	16.25	20.62	25.00	29.00	32.80	36.00	38.80	41.00

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