BIRD
PRECISION DATA SHEET

Estimated Flow Guides (Liquid)

To Calculate Liquid Flow (water) thru Orifice

Estimated Cv Values	*Orifice Size*
0.00001	0.0008"
0.00003	0.0012"
0.000053	0.0016"
0.000090	0.0020"
0.00012	0.0024"
0.00017	0.0028"
0.00022	0.0031"
0.00028	0.0035"
0.00035	0.0040"
0.00061	0.0050"
0.00086	0.0060"
0.0012	0.0070"
0.0015	0.0080"
0.0019	0.0090"
0.0025	0.0100"
0.0028	0.0110"
0.0034	0.0120"
0.0038	0.0130"
0.0043	0.0140"
0.0050	0.0150"
0.0055	0.0160"
0.0067	0.0170"
0.0073	0.0180"
0.0080	0.0190"
0.0088	0.0200"
0.0096	0.0210"
0.011	0.0220"
0.012	0.0230"
0.013	0.0240"
0.014	0.0250"
0.020	0.030"
0.028	0.035"
0.036	0.040"
0.041	0.043"
0.048	0.047"
0.059	0.052"
0.081	0.060"
0.088	0.063"
0.100	0.067"
0.110	0.070"
0.120	0.073"
0.140	0.079"
0.150	0.081"
0.170	0.086"
0.180	0.089"
0.200	0.094"
0.210	0.096"
0.23	0.100"
0.25	0.104"
0.27	0.109"
0.34	0.120"
0.37	0.125"

$Q = Cv \sqrt{DP}$
Q=GPM (gallons per minute)
P=pressure differential in PSIG
Cv=flow factor

Example for flow of .005" orifice at 25 psi

$Q = Cv \sqrt{DP}$
$Q = .00061 \times \sqrt{25}$
$Q = .00061 \times 5$
$Q = .003$ GPM

To convert GPM to liters P/M
3.75 liters per gallon
.003 x 3.75 = .01125 liters P/M

To convert to milliliters (CCM's)
1,000 CCM's = 1 liter
1,000 x .01125 = 11.25 ML/PM

The Cv factor is based on the number of U.S. gallons of water that can pass through a given orifice area in one minute at a pressure drop of one psi.

$Q = Cv \sqrt{(DP/S.G.)}$

Liquid Flow Values are based on 60 degree F and are estimates only

Specific Gravity of Common Liquids

LIQUID	SQ
Acetone	0.790
Alcohol, Methyl	0.79
Ammonia	0.662
Carbonic Acid	1.08
Diesel Oil	0.85
Ether	0.736
Freon	1.490
Gasoline	0.748
Kerosene	0.80
Linseed Oil	0.93
Mercury	13.54
Milk	1.03
Nitric Acid, 60%	1.37
Oil, Vegetable	0.91
Oil, Mineral	0.88
Water	1.00
Water, Sea	1.03

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BIRD PRECISION DATA SHEET

Estimated Flow Guides (Gas)

Flow Estimates SCCM DRY AIR

Orifice # Size	22329 .0004″	22104 .0008″	22143 .0010″	22111 .0012″	22114 .0016″	22276 .0018″	22021 .0020″	22025 .0025″
5 PSI	<1.00	2.66	5.0	7.0	13.0	14.5	25.6	37.0
10 PSI	1.25	4.50	8.0	11.5	20.0	25.0	40.0	55.0
15 PSI	1.75	6.00	11.0	17.0	25.0	35.0	50.0	72.0
20 PSI	2.35	7.75	13.0	21.0	32.0	39.5	60.0	85.0
25 PSI	2.75	8.75	16.0	25.0	40.0	49.0	70.0	100.0
30 PSI	3.20	10.0	18.0	29.0	45.0	60.0	80.0	120.0
40 PSI	4.18	12.5	24.0	40.0	52.0	75.0	95.0	145.0
50 PSI	5.14	15.0	28.0	50.0	65.0	95.0	115.0	170.0
60 PSI	6.00	18.00	32.0	60.0	75.0	120.0	140.0	200.0
70 PSI	7.00	21.00	37.0	68.0	83.0	135.0	155.0	220.0
80 PSI	8.00	24.50	43.0	77.0	96.0	155.0	172.0	250.0
100 PSI	10.00	29.00	50.0	100.0	120.0	200.0	220.0	310.0
CHOKE	1.2	3.5	6.5	9.0	14.0	18.0	22.0	37.0

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Flow Estimates SCCM DRY AIR

Orifice # Size	22033 .0030″	22034 .0035″	22037 .0040″	22012 .0060″	22045 .0080″	22081 .0100″	22010 .0120″	22061 .0160″
5 PSI	48.0	69.0	90.0	200.0	370.0	550.0	875.0	1500.0
10 PSI	75.0	100.0	135.0	310.0	570.0	775.0	1200.0	2100.0
15 PSI	92.0	130.0	165.0	375.0	694.0	1000.0	1490.0	2600.0
20 PSI	109.0	156.0	200.0	450.0	810.0	1190.0	1790.0	3100.0
25 PSI	128.0	185.0	230.0	530.0	936.0	1390.0	2000.0	3600.0
30 PSI	150.0	210.0	280.0	590.0	1100.0	1595.0	2400.0	4000.0
40 PSI	180.0	260.0	330.0	750.0	1320.0	1900.0	2900.0	5000.0
50 PSI	215.0	315.0	390.0	875.0	1550.0	2200.0	3500.0	6000.0
60 PSI	250.0	360.0	450.0	1000.0	1800.0	2600.0	4000.0	7000.0
70 PSI	280.0	400.0	510.0	1150.0	2000.0	2900.0	4500.0	8000.0
80 PSI	313.0	455.0	583.0	1275.0	2222.0	3300.0	5000.0	9000.0
100 PSI	400.0	575.0	745.0	1600.0	2700.0	4000.0	6000.0	11000.0
CHOKE	47.0	69.0	88.0	200.0	353.0	525.0	790.0	1407.0

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To convert to ALTERNATIVE GASES divide Air Flow by $\sqrt{}$ (Specific Gravity New Gas)

Example:

.010" orifice @ 50 PSI = 2200 Sccm Dry Air from chart

To convert to Carbon Dioxide:

$2200\sqrt{1.520} = 2200 \div 1.23 = 1789$ Sccm

1789 Sccm
Carbon Dioxide @ 50 PSI

Specific Gravity of GAS

GAS	SG
Acetylene	0.905
Air	1.000
Alcohol, Ethyl	1.590
Alcohol, Methyl	1.110
Ammonia	0.590
Argon	1.379
Benzene	2.695
Bufane	2.071
Carbon Dioxide	1.520
Carbon Disulfide	2.630
Carbon Monoxide	0.970
Chlorine	2.470
Ether	2.550
Flourine	1.310
Helium	0.138
Hydrogen	0.069
Hydrogen Chloride	1.270
Hydrogen Sulfide	1.189
Methane	0.555
Nitrogen	0.967
Nitrous Oxide	1.530
Octane	3.943
Oxygen	1.105
Propane	1.547
Silane	1.114
Sulpher Dioxide	2.210
Water (Steam)	0.620

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