EQUATIONS FOR FLOW THROUGH ORIFICES

The following equations give an approximate flow through orifices and short tubes based on orifice size, pressures and gas involved. They are simple equations that provide only an estimate of flow rate and Aqua Environment Co. Inc. makes no representation or warrenties concerning these equations. They should not be depended on in critical applications. They can be used for round orifices or short tubes where the length does not exceed more than a few times the tube diameter.

WHEN DOWNSTREAM PRESSURE IS LESS THAN 1/2 THE UPSTREAM PRESSURE FOR AIR

$$Q = 11 \, P_u \, D^2 \qquad D = 0.3 \, (Q/P_u)^{1/2}$$

Where: Q is the flow rate in SCFM
          P_u is the upstream pressure going to the orifice or hole in PSI
          D is the orifice or hole inside diameter in inches
          The superscript $^{"2"}$ means square the value
          The superscript $^{"1/2"}$ mean take the square root of the value in parenthesis

WHEN DOWNSTREAM PRESSURE IS MORE THAN 1/2 THE UPSTREAM PRESSURE APPLY THE FOLLOWING CORRECTION.

Downstream press. as % of upstream press.	Correction - multiply Q by:
0 to 50%	1.00
60%	0.90
70%	0.65
80%	0.46
90%	0.33
95%	0.23
98%	0.14
99%	0.10

WHEN GASES OTHER THAN AIR ARE USED MULTIPLY THE ABOVE Q BY:

Helium gas	2.6
Nitrogen	1.0
Natural gas	1.3
Carbon dioxide	0.8

AN APPROXIMATE CONVERSION OF ORFICE DIAMETER TO C_V VALUE IS GIVEN BY:

$$C_V = 15 \, D^2$$

where D is the orfice diameter in inches.

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