

Flow Calculations for a '319000254' on Air at 18 bar g. and 15°C, sized to BS EN ISO 4126

P	Pressure (bar a.)	20.81 (18 x 1.1 + 1.013)
Pb	Back Pressure (bar a.)	1.013
Kb	Critical Flow	1
T	Temperature (°K)	288.15 (15°C + 273.15)
A	Flow Area (mm²)	70.88 (9.5mm Bore)
M	Molecular Mass	28.97
k	Isentropic Exponent	1.4
C	Dimensionless Factor	2.7 Function of the Isentropic Exponent, k
Z	Compressibility Factor	1
Kdr	Coefficient of Discharge	0.485

Gas Calculations (Mass)

$$Qm = P.C.A.Kdr.Kb.\sqrt{\frac{M}{Z.T}}$$

$$\therefore Qm = 613.31 \text{ kg/hour}$$

$$Qm \times 2.2046 = 1,352.11 \text{ lb/hour}$$

Conversions to Volumetric flows

$$Qv = 6.568 \times \frac{Qm}{M} = 139.05 \text{ litres/sec, at 1.013 bar a. and 15°C}$$

$$Qv = 13.936 \times \frac{Qm}{M} = 295.03 \text{ SCFM at 14.7 psi a. and 60°F}$$

$$Qv = 22.414 \times \frac{Qm}{M} = 474.52 \text{ Nm³/hour at 1.013 bar a. and 0°C}$$

These flows are calculated to the applicable standard stated in the appropriate valve data sheet. For display purposes values are shown to 2 decimal places.