

Heating power [kW]

$$P = 2.2 \cdot 10^{-5} \cdot \dot{V} \cdot (T_z - T_A)$$

P :	Electrical power	[kW]
\dot{V} :	Air flow volume	[l/min]
T_z :	Target temperature	[°C]
T_A :	Ambient temperature	[°C]

Example: 1200 l/min. air is to be heated up to 600°C
 Ambient temperature = 30°C
 Required power P

$$P = 2.2 \times 10^{-5} \times 1200 \times (600 - 30) = \underline{15 \text{ kW}}$$

Air velocity [m/s]

$$V = \frac{\dot{V}}{F \cdot 3600}$$

V :	Air velocity	[m/s]
\dot{V} :	Air flow volume	[m³/h]
F :	Area	[m²]

Example: Square nozzle outlet
 220 x 15 mm
 Air flow 60 m³/h
 Required air velocity V

$$V = \frac{60}{0.22 \times 0.015 \times 3600} = \underline{5.6 \text{ m/s}}$$

Air expansion in hot state [l/min]

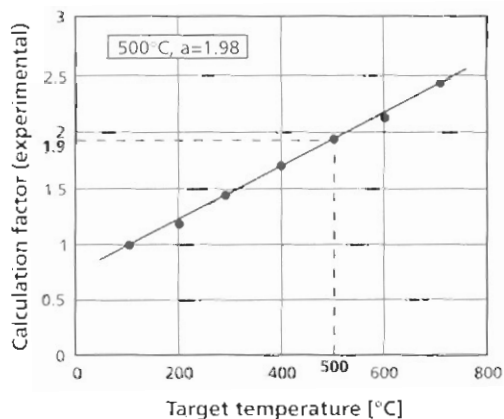
$$\dot{V}_2 = a \cdot \dot{V}_1$$

\dot{V}_2 : Air flow at desired temperature
 \dot{V}_1 : Air flow at ambient temperature
 a : Calculation factor (see diagram)

Example: Air flow at 20°C = 800 l/min.
 Required air flow at 500°C \dot{V}_2

The calculation factor a is derived from the diagram
 Target temperature 500°C = 1.98

$$\dot{V}_2 = 1.98 \times 800 = \underline{1584 \text{ l/min.}}$$



Conversion formulae

$$^{\circ}F = (^{\circ}C \cdot \frac{9}{5}) + 32 \text{ K}$$

$$^{\circ}C = (^{\circ}F - 32 \text{ K}) \cdot \frac{5}{9}$$

$$1 \text{ cft} = \sim 28 \text{ l}$$

$$1 \text{ PSI} = 6.895 \text{ kPa}$$

$$1 \text{ kPa} = 0.01 \text{ bar} = 10 \text{ mbar} = 100 \text{ mm/ws}$$