# Gas Burner Flow (Nm³/h, Actual m³/h, Velocity)

Fuel gas flow for a burner in Nm³/h and actual m³/h at line pressure and temperature, and the velocity in the gas train pipe, from heat input and net calorific value.

**Method:** Ideal-gas law with compressibility; normal conditions 0 °C and 101.325 kPa

## Input parameters

Unit system: SI

| Parameter | Value | Unit |
|---|---|---|
| Burner heat input (on NCV) | 5,000.0 | kW |
| Net calorific value of the gas, per Nm³ | 34.000 | MJ/Nm³ |
| Gas pressure in the line<br>Shown as gauge (bar g, kg/cm² g, psig) as line gauges read; choose an absolute unit to enter absolute pressure. | 0.98675 | bar g |
| Gas temperature | 20.000 | °C |
| Pipe inside diameter | 80.000 | mm |
| Compressibility factor | 1.0000 | |

## Calculated results

| Parameter | Value | Unit |
|---|---|---|
| Gas flow at normal conditions (0 °C, 1.01325 bar) | 529.41 | Nm³/h |
| Actual gas flow in the line | 287.85 | m³/h |
| Velocity in the pipe | 15.907 | m/s |

## Formula and method

$$\dot{V}_n = \frac{\dot{Q}}{NCV} \qquad \dot{V} = \dot{V}_n \frac{p_n}{p} \frac{T}{T_n} Z \qquad v = \frac{\dot{V}}{\pi D^2/4}$$

### Variables

| | | |
|---|---|---|
| $\dot{Q}$ | burner heat input on NCV | W |
| $NCV$ | net calorific value per Nm³ | J/m³ |
| $p$ | line pressure (absolute in SI; shown and entered as gauge) | Pa |
| $T$ | gas temperature | K |
| $D$ | pipe inside diameter | m |
| $Z$ | compressibility factor | – |
| $\dot{V}_n$ | flow at normal conditions | Nm³/s |
| $\dot{V}$ | actual flow | m³/s |
| $v$ | velocity in the pipe | m/s |
| $p_n$$, $$T_n$ | normal pressure and temperature, 101 325 Pa and 273.15 K | Pa, K |

### Method and standards

Ideal-gas conversion between normal and line conditions with a compressibility factor.

### Assumptions and limits

- Single gas composition; compressibility at line conditions as entered (1 is fine at low pressure); at normal conditions Z is taken as 1 (about 0.998 for natural gas, a 0.2 % difference).
- Normal volumes are at 0 °C and 101.325 kPa, and the NCV per Nm³ is on that same basis; scfm and Btu/scf are converted to the US standard cubic foot (60 °F, 14.696 psia).
- The 20 m/s velocity warning is a common design limit, not a code value.

### References

- Ideal-gas law with compressibility; normal conditions 0 °C and 101.325 kPa

## Report details

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|---|---|
| Report reference | FCC-VWD5-3YAP (the same inputs always give the same reference) |
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| Release checks | 3 reference cases of this calculator, computed independently, are checked on every release |

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

### This calculator online

https://calc.firecad.com/boilers-power-plant/combustion/gas-train-flow

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.