Stack Emission Rate from Concentration and Flue Gas Flow

Mass emission rate of a pollutant from its stack concentration (mg/Nm³) and the flue gas flow at the same basis, per hour, per year and per unit of fuel heat input.

Method: Mass flow = concentration × normal volume flow

Input parameters

Unit system: SI

Parameter	Value	Unit
Concentration (same basis as the flow)	50.000	mg/Nm³
Flue gas flow (normal, same basis)	150,000	Nm³/h
Operating hours per year	8,000.0	h
Fuel heat input, GCV or NCV basis as your limit uses (0 to skip) Emission limits in g/GJ are set on a gross (GCV) or net (NCV) heat input; enter the heat input on the same basis. The result follows that basis.	120.00	MW

Calculated results

Parameter	Value	Unit
Emission rate	7.5000	kg/h
Annual emission	60.000	t
Emission per heat input	17.361	g/GJ

Notes for this case

- Concentration and flow must share the basis (dry or wet, and reference O_2); correct first if they do not. The emission per heat input is on the GCV or NCV basis of the heat input entered.

Formula and method

$$\dot{E} = C\dot{V}_N, \quad E_y = \dot{E}t, \quad e = \frac{\dot{E}}{\dot{Q}_f}$$

Variables

C	Concentration (same basis as the flow)	kg/m³
$\dot{V}_N$	Flue gas flow (normal, same basis)	Nm³/s
t	Operating hours per year	s
$\dot{Q}_f$	Fuel heat input, GCV or NCV basis as your limit uses (0 to skip)	W
$\dot{E}$	Emission rate	kg/s
E_y	Annual emission	kg
e	Emission per heat input	kg/J

Method and standards

Mass flow.

Assumptions and limits

- Steady emission.
- The emission per heat input follows the basis of the heat input entered (gross or net calorific value); regulatory g/GJ limits differ by basis. With the heat input left at 0 it is not shown.

References

- Mass flow = concentration × normal volume flow

Report details

Report reference	FCC-NVNK-8KQ3 (the same inputs always give the same reference)
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Release checks	2 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/environmental/air-pollution/stack-emission-rate

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.