Mercury Mass Balance and Stack Concentration

Mercury in, captured and emitted from the fuel's mercury content and the capture by dust and gas cleaning, with the stack concentration and yearly emission.

Method: Mass balance on mercury; capture share by user input

Input parameters

Unit system: SI

Parameter	Value	Unit
Fuel fired	20.000	t/h
Mercury in the fuel, as fired Use the as-fired value, not dry basis (mg/kg = ppm by mass).	0.10000	mg/kg
Capture by ESP, filter and scrubber	30.000	%
Flue gas flow (dry, normal)	100,000	Nm³/h
Operating hours per year	7,500.0	h

Calculated results

Parameter	Value	Unit
Mercury in	2.0000	g/h
Mercury emitted	1.4000	g/h
Stack concentration (dry, normal, at the actual O_2)	14.000	µg/Nm³
Emitted per year	10.500	kg

Notes for this case

- Capture depends on mercury speciation (oxidised mercury is caught far better than elemental) and on unburnt carbon in the ash.

Formula and method

$$\dot{m}_{out} = \dot{m}_f w_{Hg}(1-\eta), \quad c = \frac{\dot{m}_{out}}{\dot{V}_n}$$

Variables

$\dot{m}_f$	Fuel fired	kg/s
w_{Hg}	Mercury in the fuel, as fired	kg/kg
η	Capture by ESP, filter and scrubber	-
$\dot{V}_n$	Flue gas flow (dry, normal)	Nm³/s
t	Operating hours per year	s
$\dot{m}_{in}$	Mercury in	kg/s
$\dot{m}_{out}$	Mercury emitted	kg/s
c_{Hg}	Stack concentration (dry, normal, at the actual O_2)	kg/m³
M_a	Emitted per year	kg

Method and standards

Mass balance.

Assumptions and limits

- Steady firing.
- Fuel mercury as fired (on the same basis as the fuel flow).
- The concentration is at the actual O_2 of the gas flow entered; correct it to the reference O_2 before comparing with a limit.

References

- Mass balance on mercury; capture share by user input

Report details

Report reference	FCC-YT22-DKN1 (the same inputs always give the same reference)
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Calculator	Mercury Mass Balance and Stack Concentration
Method last reviewed	13 November 2026
Software release	FireCAD Calc, release of 17 November 2026
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/boilers-power-plant/emissions-stacks/mercury-mass-balance

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.