Iron and Copper Transport to the Boiler

Corrosion products carried into a boiler per hour and per year from their feedwater concentration and flow: the source of tube deposits.

Method: Mass balance: rate = concentration × flow

Input parameters

Unit system: SI

Parameter	Value	Unit
Iron (or copper) in feedwater	10.000	ppb
Feedwater flow	100.00	t/h
Operating hours per year	7,500.0	h

Calculated results

Parameter	Value	Unit
Transport rate	1.0000	g/h
Transported per year	7.5000	kg

Notes for this case

- This is the mass carried into the boiler. Most of it deposits, mainly on the hottest tubes, and part leaves with the blowdown; compare with deposit weight density from tube samples.

Formula and method

$$\dot{m}_{Fe} = c\,\dot{m}, \quad M_a = \dot{m}_{Fe}\,t$$

Variables

c	Iron (or copper) in feedwater	-
$\dot{m}$	Feedwater flow	kg/s
t	Operating hours per year	s
$\dot{m}_{Fe}$	Transport rate	kg/s
M_a	Transported per year	kg

Method and standards

Mass balance.

Assumptions and limits

- Average concentration. The result is the mass transported, not the mass deposited; operating hours are limited to one year (8784 h at most).

References

- Mass balance: rate = concentration × flow

Report details

Report reference	FCC-15AA-44Z4 (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/boilers-power-plant/water-treatment/iron-copper-transport

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.