Boiler Blowdown Rate from Water Analysis

Actual boiler blowdown rate and cycles of concentration from feedwater and boiler water readings of conductivity, chloride or silica, with the blowdown flow.

Method: Dissolved-solids mass balance of the boiler drum

Input parameters

Unit system: SI

Parameter	Value	Unit
Feedwater reading (conductivity, chloride or silica) Any conserved quantity that steam does not carry: use the same unit for both readings.	150.00	
Boiler water reading (same parameter and unit)	3,000.0	
Steam flow (for the blowdown flow)	10,000	kg/h

Calculated results

Parameter	Value	Unit
Blowdown, share of steam	5.2632	%
Blowdown, share of feedwater	5.0000	%
Cycles of concentration	20.000	
Blowdown flow	526.32	kg/h

Formula and method

$$N = \frac{B}{f} \qquad b_{fw} = \frac{f}{B} \qquad b_s = \frac{f}{B - f} \qquad \dot{m}_{bd} = b_s \, \dot{m}_s$$

Variables

f	feedwater reading	any (same for both)
B	boiler water reading	any (same for both)
$\dot{m}_s$	steam flow	kg/s
N	cycles of concentration	–
b_{fw}	blowdown, share of feedwater	–
b_s	blowdown, share of steam	–
$\dot{m}_{bd}$	blowdown flow	kg/s

Method and standards

Steady mass balance of a substance that the steam does not carry: what enters with the feedwater leaves with the blowdown.

Assumptions and limits

- Steady operation; the parameter is conserved and not carried by steam.
- Conductivity is read as measured (unneutralised); hydroxide and phosphate dosing raise boiler water conductivity, so the cycles come out high. Silica is carried by steam at high pressure. Chloride is the safest reading.

References

- Dissolved-solids mass balance of the boiler drum

Report details

Report reference	FCC-Z12G-J7MY (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/water-treatment/blowdown-from-water-analysis

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.