Boiler Blowdown Set by Water Limits (TDS, Silica, Alkalinity)

Blowdown needed to keep boiler water TDS, silica and alkalinity within your limits from the feedwater analysis; the highest of the three governs.

Method: Dissolved-solids mass balance of the boiler drum

Input parameters

Unit system: SI

Parameter	Value	Unit
TDS	100.00	ppm
Silica, as SiO_2	2.0000	ppm
Total alkalinity, as $CaCO_3$	40.000	ppm
TDS limit	3,000.0	ppm
Silica limit	100.00	ppm
Total alkalinity limit	600.00	ppm

Calculated results

Parameter	Value	Unit
Blowdown needed, share of steam	7.1429	%
Blowdown for TDS	3.4483	%
Blowdown for silica	2.0408	%
Blowdown for alkalinity	7.1429	%
Cycles of concentration	15.000	

Notes for this case

- alkalinity sets the blowdown.

Formula and method

$$b_i = \frac{f_i}{L_i - f_i} \quad (i = TDS,\ SiO_2,\ alk) \qquad b = \max_i b_i \qquad N = \frac{1+b}{b}$$

Variables

$f_{TDS}\$, \$f_{SiO_2}\$, \$f_{alk}$	feedwater TDS, silica, alkalinity	–
$L_{TDS}\$, \$L_{SiO_2}\$, \$L_{alk}$	boiler water limits	–
b	blowdown needed, share of steam	–
b_{TDS}	blowdown for TDS	–
b_{SiO_2}	blowdown for silica	–
b_{alk}	blowdown for alkalinity	–
N	cycles of concentration	–

Method and standards

Steady mass balance of a conserved solute in the drum: what enters with the feedwater leaves with the blowdown at the boiler water concentration (steam carries none).

Assumptions and limits

- Steam carries no solids; parameters conserved in the drum; steady operation. At high pressure silica is carried by the steam; a note appears when silica governs.
- A feedwater value of zero leaves that parameter out of the comparison; when two give the same blowdown, both are named.

References

- Dissolved-solids mass balance of the boiler drum

Report details

Report reference	FCC-DHX4-H06P (the same inputs always give the same reference)
Generated	17 November 2026, 19:37 UTC
Calculator	Boiler Blowdown Set by Water Limits (TDS, Silica, Alkalinity)
Method last reviewed	11 November 2026
Software release	FireCAD Calc, release of 17 November 2026
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/boiler-water-limits-blowdown

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.