# Silica Geothermometer and Amorphous Silica Scaling Index

Reservoir temperature from the silica in a spring or well sample (quartz geothermometer, with or without steam loss) and the silica scaling index after flashing.

**Method:** Fournier–Potter silica geothermometers and Fournier–Rowe amorphous silica solubility

## Input parameters

Unit system: SI

| Parameter | Value | Unit |
|---|---|---|
| Silica measured in the sample (mg/kg) | 400.00 | |
| Steam loss before sampling | Maximum (flashed to atmospheric pressure) | |
| Separator or flash temperature to check for scaling | 160.00 | °C |

## Calculated results

| Parameter | Value | Unit |
|---|---|---|
| Quartz geothermometer, no steam loss (1309/(5.19 − log S)) | 232.66 | °C |
| Reservoir temperature (Fournier–Potter, chosen steam-loss case) | 213.67 | °C |
| Silica in the reservoir liquid (mg/kg) | 312.18 | |
| Steam fraction at the separator | 11.477 | % |
| Silica in the separated brine (mg/kg) | 352.65 | |
| Amorphous silica solubility at T_sep (mg/kg) | 679.77 | |
| Saturation index C/S_am | 0.51878 | |

### Notes for this case

• Fournier–Potter quartz correlations (valid about 20–340 °C) and the Fournier–Rowe amorphous silica solubility log S = 4.52 − 731/T (S in mg/kg, T in K). SI above 1 means the brine is supersaturated in amorphous silica and may scale pipes, separators and reinjection wells; kinetics often allow a short-lived SI up to about 1.2.

## Formula and method

$$T = \frac{1309}{5.19 - \log_{10} S} - 273.15, \quad C = \frac{Q(T_{res})}{1 - x_{sep}}, \quad SI = \frac{C}{S_{am}(T_{sep})}, \quad \log_{10} S_{am} = 4.52 - \frac{731}{T}$$

### Variables

| | | |
|---|---|---|
| $S$ | Silica measured in the sample (mg/kg) | - |
| $\mathrm{loss}$ | Steam loss before sampling | - |
| $T_{sep}$ | Separator or flash temperature to check for scaling | K |
| $T_{qtz}$ | Quartz geothermometer, no steam loss (1309/(5.19 − log S)) | K |
| $T_{res}$ | Reservoir temperature (Fournier–Potter, chosen steam-loss case) | K |
| $Q$ | Silica in the reservoir liquid (mg/kg) | - |
| $x_{sep}$ | Steam fraction at the separator | - |
| $C$ | Silica in the separated brine (mg/kg) | - |
| $S_{am}$ | Amorphous silica solubility at T_sep (mg/kg) | - |
| $SI$ | Saturation index C/S_am | - |

### Method and standards

Silica geochemistry.

### Assumptions and limits

- Equilibrium with quartz at depth; no dilution or re-equilibration on the way up.

### References

Fournier–Potter silica geothermometers and Fournier–Rowe amorphous silica solubility

## Report details

| | |
|---|---|
| Report reference | FCC-B4B1-B8T5 (the same inputs always give the same reference) |
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Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

### This calculator online

https://calc.firecad.com/environmental/geothermal-ocean/silica-geothermometer-scaling

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.