Conductivity Cell Constant and Measured Conductivity

Cell constant of a conductivity sensor from its reading in a standard solution, and the conductivity of a sample from its measured conductance or resistance.

Method: κ = K·G; K = L/A (electrochemistry definitions; ASTM D1125 principle)

Input parameters

Unit system: SI

Parameter	Value	Unit
Standard solution conductivity at temperature	1,413.0	µS/cm
Measured conductance in the standard	1,400.0	µS
Sample resistance measured	5,000.0	Ω

Calculated results

Parameter	Value	Unit
Cell constant	1.0093	1/cm
Sample conductance	200.00	µS
Sample conductivity	201.86	µS/cm

Notes for this case

• Standards: 0.01 mol/kg KCl ≈ 1,413 µS/cm at 25 °C. Choose cell constants of 0.01–0.1 cm^{-1} for pure water and condensate, 1–10 cm^{-1} for process liquids. Compensate both readings to the same temperature.

Formula and method

$$K = \frac{\kappa_{std}}{G_{std}}, \quad \kappa_s = K \cdot \frac{1}{R_s}$$

Variables

κ_{std}	Standard solution conductivity at temperature (µS/cm)	-
G_{std}	Measured conductance in the standard (µS)	-
R_s	Sample resistance measured	Ω
K	Cell constant (1/cm)	-
G_s	Sample conductance (µS)	-
κ_s	Sample conductivity (µS/cm)	-

Method and standards

Definitions.

Assumptions and limits

- Linear cell; same temperature.

References

• κ = K·G
• K = L/A (electrochemistry definitions; ASTM D1125 principle)

Report details

Report reference	FCC-MH90-SMSC (the same inputs always give the same reference)
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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/instrumentation/analysers/conductivity-cell-constant

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.