Hydrometer or Glass Density Meter for Alcohol → Strength

True density and alcoholic strength from a hydrometer for alcohol (soda-lime glass) or a borosilicate density meter read at t, OIML R 22 Tables IX and X.

Method: OIML R 22 (1973); Alcoholometry; …

Input parameters

Unit system: SI

Parameter	Value	Unit
Reading (density graduated at 20 °C)	951.00	kg/m³
Temperature of the liquid R 22 formula range −20 to +40 °C.	20.000	°C
Instrument glass	Soda-lime glass (25 × 10^{-6} /°C)	

Calculated results

Parameter	Value	Unit
Cubical expansion used	25.000	µm/(m·K)
True density at t	951.00	kg/m³
Strength by mass	31.633	%
Strength by volume at 20 °C	38.116	%

Formula and method

The formula is shown on the calculator page: https://calc.firecad.com/sugar-ethanol/alcoholometry/hydrometer-density-glass-correction

Variables

\rho'	Reading (density graduated at 20 °C)	kg/m³
t	Temperature of the liquid	K
glass	Instrument glass	-
a	Cubical expansion used	1/K
ρ_t	True density at t	kg/m³
p	Strength by mass	-
q	Strength by volume at 20 °C	-

Method and standards

R 22 Annex I method for Tables IX and X.

Assumptions and limits

- Graduated at 20 °C; no surface-tension correction.

References

- OIML R 22 (1973)
- Alcoholometry
- and International Alcoholometric Tables (1975)
- Annex I
- Tables IXa
- IXb
- Xa and Xb

Report details

Report reference	FCC-S5BW-SC5Q (the same inputs always give the same reference)
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Method last reviewed	13 November 2026
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/sugar-ethanol/alcoholometry/hydrometer-density-glass-correction

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.