Spirit Tank Stock: Absolute Alcohol from Dip and Hydrometer

Litres of absolute alcohol and bulk litres at 20 °C in a steel tank from the dip volume at t, a glass hydrometer density reading and temperature (OIML R 22 IX, XI).

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

Input parameters

Unit system: SI

Parameter	Value	Unit
Tank volume from the dip at t	50,000	L
Hydrometer reading (density at 20 °C graduation)	815.00	kg/m³
Temperature of the liquid R 22 formula range −20 to +40 °C.	20.000	°C
Cubical expansion of the tank steel	36.000	µm/(m·K)
Cubical expansion of the hydrometer glass Soda-lime glass 25 × 10^{-6} /K (R 22); borosilicate is lower, about 10 × 10^{-6} /K by the maker. Enter 0 for a density meter, which reads true density.	25.000	µm/(m·K)

Calculated results

Parameter	Value	Unit
True density at t	815.00	kg/m³
Strength by mass	91.076	%
Strength by volume at 20 °C	94.049	%
Bulk volume at 20 °C	50,000	L
Absolute alcohol at 20 °C	47,024	L

Formula and method

The formula is shown on the calculator page: https://calc.firecad.com/sugar-ethanol/alcoholometry/spirit-tank-stock-absolute-alcohol

Variables

V_t	Tank volume from the dip at t	m³
\rho'	Hydrometer reading (density at 20 °C graduation)	kg/m³
t	Temperature of the liquid	K
β	Cubical expansion of the tank steel	1/K
α_g	Cubical expansion of the hydrometer glass	1/K
ρ_t	True density at t	kg/m³
p	Strength by mass	-
q	Strength by volume at 20 °C	-
V_{20}	Bulk volume at 20 °C	m³
$\mathcal{V}$	Absolute alcohol at 20 °C	m³

Method and standards

R 22 Annex I (Tables IX and XI) combined.

Assumptions and limits

- Hydrometer glass expansion as entered (soda-lime 25 × 10^{-6} /K by default; 0 for a density meter); tank calibrated at 20 °C; well-mixed tank.

References

• OIML R 22 (1973)
• Alcoholometry

- and International Alcoholometric Tables (1975)
- Annex I
- Tables IX and XI

Report details

Report reference	FCC-XBYC-VBN6 (the same inputs always give the same reference)
Generated	17 November 2026, 19:50 UTC
Calculator	Spirit Tank Stock: Absolute Alcohol from Dip and Hydrometer
Method last reviewed	13 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/sugar-ethanol/alcoholometry/spirit-tank-stock-absolute-alcohol

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.