Spherical Tank Volume at a Liquid Level

Liquid volume in a spherical tank or Horton sphere at any level from its diameter and the liquid height, with the total volume, fill share and liquid mass.

Method: Spherical cap volume

Input parameters

Unit system: SI

Parameter	Value	Unit
Inside diameter of the sphere	10.000	m
Liquid level from the bottom	6.0000	m
Liquid density	550.00	kg/m³

Calculated results

Parameter	Value	Unit
Liquid volume	339.29	m³
Total volume of the sphere	523.60	m³
Share filled	64.800	%
Liquid mass	186.61	t

Formula and method

$$V = \frac{\pi h^2 (3R - h)}{3}$$

$$V_{tot} = \frac{\pi D^3}{6}$$

$$V/V_{tot}, \quad m = V\rho$$

Variables

D	inside diameter	m
R	radius	m
h	liquid level	m
ρ	liquid density	kg/m³
V	liquid volume	m³
V_{tot}	total volume	m³
V/V_{tot}	share filled	-
m	liquid mass	kg

Method and standards

The liquid occupies a spherical cap of height h; its volume is π h² (3R − h)/3.

Assumptions and limits

- Perfect sphere; internals not deducted.

References

- Spherical cap volume

Report details

Report reference	FCC-T3Q7-BS24 (the same inputs always give the same reference)
Generated	17 November 2026, 19:45 UTC
Calculator	Spherical Tank Volume at a Liquid Level
Method last reviewed	12 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/mechanical/vessels/spherical-tank-partial-volume

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.