Unit Weight Converter (kN/m³, kgf/m³, lbf/ft³)

Convert a unit (specific) weight between N/m³, kN/m³, kgf/m³, kgf/cm³, lbf/ft³ and lbf/in³, with the matching density in kg/m³ under standard gravity.

Method: Unit definitions per NIST SP 811 and the SI Brochure (exact where defined)

Input parameters

Unit system: SI

Parameter	Value	Unit
Unit weight (choose its unit)	24.000	kN/m³

Calculated results

Parameter	Value	Unit
N/m³	24,000	N/m³
kN/m³	24.000	kN/m³
kgf/m³	2,447.3	kgf/m³
lbf/ft³	152.78	lbf/ft³
lbf/in³	0.088415	lbf/in³
Density at standard gravity	2,447.3	kg/m³

Notes for this case

• Unit weight is weight per volume, γ = ρg. Structural codes give unit weights in kN/m³ (reinforced concrete 25, brickwork 19–20, steel 78.5, water 9.81); older practice in kgf/m³ equals the density in kg/m³ numerically under standard gravity (9.80665 m/s²). 1 lbf/ft³ is 157.09 N/m³.

Formula and method

$$\gamma = \rho g, \quad g = 9.80665\ \mathrm{m/s^2}$$

Variables

γ	Unit weight (choose its unit)	N/m³
ρ	Density at standard gravity	kg/m³

Method and standards

Unit weight.

Assumptions and limits

- Standard gravity.

References

Unit definitions per NIST SP 811 and the SI Brochure (exact where defined)

Report details

Report reference	FCC-K2N8-1B6X (the same inputs always give the same reference)
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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/general/unit-conversions/specific-weight-converter

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.