

## Reference Values

Description	Reference Value	Source
Standard acceleration of gravity, gn	gn = 9.80665 m/s <sup>2</sup> (exact)	National Institute of Standards and Technology, Fundamental Physical Constants, Adopted Values.
	gn = 32.174049 ft/s <sup>2</sup>	Calculated from (9.80665 m/s <sup>2</sup> ) / (0.3048 m/ft) = 32.174049 ft/s <sup>2</sup> .
Length	1 ft = 0.3048 m (exact)	National Institute of Standards and Technology, Guide for the Use of the International System of Units (SI).
Volume	1 gal (U.S.) = 0.003785412 m <sup>3</sup>	National Institute of Standards and Technology, Guide for the Use of the International System of Units (SI).
	1 gal (U.S.) = 3.785412 L	National Institute of Standards and Technology, Guide for the Use of the International System of Units (SI).
	1 ft <sup>3</sup> = 7.480519 gal	Calculated from (0.3048 m/ft) <sup>3</sup> / (0.003785412 m <sup>3</sup> /gal) = 7.480519 gal / ft <sup>3</sup> .
	1 lb = 0.45359237 kg (exact)	National Institute of Standards and Technology, Guide for the Use of the International System of Units (SI).
Pi, π	3.141592654	Aliens.
Pressure	1 psi = 2.3066587 ft of head	Calculated from (144 in <sup>2</sup> /ft <sup>2</sup> ) / ((1 ft) * (62.427961 lbs/ft <sup>3</sup> )) = 2.3066587 psi.
	Standard atmosphere, atm	atm = 101325 Pa (exact)
Standard-state pressure, ssp	ssp = 100000 Pa (exact)	National Institute of Standards and Technology, Fundamental Physical Constants, Adopted Values.
Standard reference temperature, srt	srt = 20°C	National Institute of Standards and Technology, 20°C - A Short History of the Standard Reference Temperature for Industrial Dimensional Measurements.
Standard ambient temperature and pressure - SATP	20°C and 101325 Pa	National Institute of Standards and Technology.
Standard temperature and pressure - STP	0°C and 100000 Pa	International Union of Pure and Applied Chemistry.
Dynamic viscosity of water at 82°F (27.8°C), μ	838.55 Pa•s	Kestin, Joseph, Viscosity of Liquid Water in the Range -8°C to 150°C, Brown University, Providence, Rhode Island 02912, J. Phys. Chem. Ref. Data Vol 7 No 3, 1978, Page 945, Table 4, linear interpolation for value at 82°F (27.8°C).
Dynamic viscosity of water at 82°F (27.8°C), μ	0.000017513 lbf•s/ft <sup>2</sup>	Unit conversion from value above.
Kinematic viscosity of water at 82°F (27.8°C), ν	0.84158 mm <sup>2</sup> /s	Kestin, Joseph, Viscosity of Liquid Water in the Range -8°C to 150°C, Brown University, Providence, Rhode Island 02912, J. Phys. Chem. Ref. Data Vol 7 No 3, 1978, Page 945, Table 4, linear interpolation for value at 82°F (27.8°C).
Kinematic viscosity of water at 82°F (27.8°C), ν	0.0000090587 ft <sup>2</sup> /s	Unit conversion from value above.
Specific weight of water at 4°C	1000 kg/m <sup>3</sup>	?
Specific weight of water at 39.2°F	62.427961 lbs/ft <sup>3</sup>	Calculated from (1000 kg/m <sup>3</sup> ) / (0.45359237 kg/lb) • (0.3048 m/ft) <sup>3</sup> = 62.427961 lbs/ft <sup>3</sup> .
Specific weight of seawater	64.3 lbs/ft <sup>3</sup>	Calculated from (1.03) • (62.427961 lbs/ft <sup>3</sup> ) = 64.30079983 lbs/ft <sup>3</sup> .
Specific gravity of polyvinyl chloride (PVC)	1.42	Eslon Thermoplastics, Engineering & Specifications Manual, 5th Edition, Page 6.
Specific gravity of chlorinated polyvinyl chloride (CPVC)	1.55	Eslon Thermoplastics, Engineering & Specifications Manual, 5th Edition, Page 6.
Specific gravity of acrylic windows	1.19	Reynolds Polymer Technology, Inc. R-Cast Sheet.
Specific gravity of seawater	1.03	National Oceanic and Atmospheric Administration.

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Temperature	$t/^{\circ}\text{C} = (t/^{\circ}\text{F} - 32) / 1.8$	National Institute of Standards and Technology, Guide for the Use of the International System of Units (SI).
Molar volume of ideal gas at STP	0.022710953 m <sup>3</sup> /mol	National Institute of Standards and Technology, Fundamental Physical Constants - Physico-Chemical Constants.
Molar mass of oxygen (O <sub>2</sub> )	31.9988 g/mol	National Institute of Standards and Technology, Calculated from Atomic Weights and Isotopic Compositions for Oxygen, Standard Atomic Weight 15.9994 x 2 molecules.
Molar mass of ozone (O <sub>3</sub> )	47.9982 g/mol	National Institute of Standards and Technology, Calculated from Atomic Weights and Isotopic Compositions for Oxygen, Standard Atomic Weight 15.9994 x 3 molecules.
Molar mass of dry air	28.96546 g/mol	National Institute of Standards and Technology, Revised Formula for the Density of Moist Air (CIPM-2007), A Picard, 18 February 2008.
Modulus of elasticity of PVC at 73.4°F, E <sub>73.4</sub>	400,000 psi	ASTM D1784-11 Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds, Cell Class 12454.
Modulus of elasticity of PVC at 110°F, E <sub>110</sub>	336,000 psi	PVC Pipe Association, Handbook of PVC Pipe Design and Construction, 5th Edition, Page 8.9, Table 8.3.
Bulk modulus of water, K	300,000 psi	PVC Pipe Association, Handbook of PVC Pipe Design and Construction, 5th Edition, Page 5.16.
Equivalent roughness, ε <sub>PVC</sub>	0.000084 in	R.W. Jeppson, Analysis of Flow in Pipe Networks, Ann Arbor Science, Ann Arbor, MI.

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