

Commonly used units in CE319F (Elementary Fluid Mechanics) - ©S.A. Kinnas

(to be continuously enhanced and improved!)

Remember also multiples of units: h(ecto)=100; k(ilo)=10³; M(ega)=10⁶; G(iga)=10⁹; T(era)=10¹²; Peta=10¹⁵, and

sub-multiples of units: c(enti)=10⁻²; m(illi)=10⁻³; μ (micro)=10⁻⁶; n(ano)=10⁻⁹; pico=10⁻¹²

Quantity	SI units	U.S. customary units	Definitions/equations
L (Length)	m (=100 cm=1000 mm)	ft (=12 inches=0.3048 m)	
M (Mass)	kg	slug [=32.2 lbm(pound mass)=14.59 kg]	
T (time)	sec or s	sec or s	
v (velocity)	m/sec	ft/sec	Velocity=Distance/Time
a (acceleration)	m/sec ²	ft/sec ²	Acceleration=Velocity/Time
ω (angular velocity)	rad(ians)/sec or sec ⁻¹	rad/sec or sec ⁻¹	v(elocity)=ω*r(adius)
f (frequency)	cycles/sec = Hz (Hertz) = RPS (Revs Per Sec) [often RPM (Revs Per Min)]		ω=2 π f=2 π/T
T (period)	sec	sec	T=1/f
F (Force)	N(ewton)=1kg*1m/sec ²	lbf (pound force)=1slug*1ft/sec ²	Force=Mass*Acceleration
W (Weight)	1kg (on earth) weighs: 1kg*9.81 m/sec ² =9.81 N (=1 kp or kilopond)	1 slug (on earth) weighs: 1slug*32.2 ft/sec ² =32.2 lbf	Weight=M*g(accel. of gravity)
g (accel. of gravity)	g=9.81 m/sec ²	g=32.2 ft/sec ²	
M(Moment) or Q(Torque)	N.m	lbf.ft	Moment=Force*Arm(distance)
W (Work)	J(oule)=N.m	lbf.ft	Work=Force*Distance
P (Power)	W(att)=J/sec	hp=550 lbf.ft/sec (1hp=0.746 kW)	Power=Work/Time
T (Temperature)	°K(elvin)=273.15 + °C(elcius)	°R(ankine)=459.67 + °F(ahrenheit)	°F=9/5*°C+32 ; °C=(°F-32)*5/9
p (pressure)	Pa(scal)=N/m ² ; 1bar=10 ⁵ Pa; 1mbar=100Pa=1hPa; 1 atm = 101.3 kPa; 1 Torr=1 mmHg	psi (lbf/in ²) or psf (lbf/ft ²)	pressure=Normal Force/Area
p (standard atm pressure)	p _{atm} =101.3 kPa=1,013 mbar=760mmHg	p _{atm} =14.696 psi =29.92 inHg	
τ (shear stress)	Pa(scal)=N/m ²	psi (lbf/in ²) or psf (lbf/ft ²)	shear stress=Shear Force/Area
ρ (density)	kg/m ³	slugs/ft ³	ρ=Mass/Volume
γ (specific weight)	N/m ³	lbf/ft ³	γ=Weight/Volume=ρ g
S.G. (specific gravity)	unitless!	unitless!	S.G.=γ/γ _{water} =ρ/ρ _{water}
μ (dynamic viscosity)	Pa.sec = N.sec/m ² (1 poise= 10 ⁻¹ Pa.sec)	lbf.sec/ft ²	τ=μ dv/dy
ν (kinematic viscosity)	m ² /sec (1 stokes=10 ⁻⁴ m ² /sec)	ft ² /sec	ν=μ/ρ
σ (surface tension)	N/m	lbf/ft	Force=σ * Length