Conversion Tables

Length (m)	
1 in (inch)	25.40 mm = 0.0254 m
1 ft (foot) = 12 inches	0.3048 m
1 yd (yard) = 3 ft = 36 inches	0.9144 m
1 statute mile = 1760 yds	1609 m
1 n mile (international nautical mile)	1852 m

Area (m^2)	
1 sq. in (square inch)	$0.6452 \cdot 10^{-3}$ m^2
1 sq. ft (square foot)	$92.90 \cdot 10^{-3}$ m^2

Pressure (1 N/m^2 = 1 Pa, 1 bar = 105 Pa, 1 mbar = 10^{-3} bar)	
1 kp/cm^2 = 1 at = 0.9678 atm	98.7 · 103 Pa = 0.9807 bar
1 at = 735.5 mm Hg* = 10 m H_2O** (T = 277 K)	
750 mm Hg*	105 Pa = 1 bar
1 mm Hg* (T = 273 K)	133.3 Pa = 1.333 mbar
1 mm H_2O** (T = 277 K)	10^{-4} at = 9.807 Pa = $98.07 \cdot 10^{-3}$ mbar
1 in Hg* (T = 273 K)	3386 Pa = 33.86 mbar
1 in H_2O** (T = 277 K)	249.1 Pa = 2.491 mbar
1 atm (standard atmosphere) = 760 mm Hg*	1.013 · 105 Pa = 1013 mbar
1 atm = 1.033 at	
1 lb/sq.in (psi)	6895 Pa = 68.95 mbar

* Mercury, 1 mm Hg = 1 Torr
The values in the table are based on normal gravitational acceleration gn = 9.80665 m/s^2
** Water column (WC)

Volume (1 m^3 = 1000 l)	
1 cub. in (cubic inch)	$16.39 \cdot 10^{-6}$ m^3
1 cub. ft (cubic foot)	$28.32 \cdot 10^{-3}$ m^3 = 28.32 l
1 gallon (imperial UK)*	$4.546 \cdot 10^{-3}$ m^3 = 4.546 l
1 gallon (US)*	$3.785 \cdot 10^{-3}$ m^3 = 3.785 l
1 barrel (US petroleum barrel) = 42 gallons (US)	0.1590 m^3
1 bbl (dry barrel, US)	0.1156 m^3
1 register ton = 100 cub. ft	2.832 m^3

* 1 gallon = 4 quarts = 8 pints

Stress (1 N/mm^2 = 10^{-6} N/mm^2)	
1 kp/mm^2 = 100 kp/cm^2	9.807 N/mm^2
1 lbf/sq.in (psi) = 0.07031 at	$6.895 \cdot 10^{-3}$ N/mm^2

Dynamic viscosity (N s/m^2)	
1 kp s/m^2	9.807 N s/m^2 = 98.07 P (poise)
1 poundal s/aq.ft	1.488 N s/m^2
1 lbf/sq. ft	47.88 N s/m^2

poise is a term taken from the CGS system. 1 P = 0.1 Pa s
1 cP = 1 mPa s = 10^{-3} Pa s

Velocity (m/s) (3.6 km/h 0 1 m/s)	
1 kn (knot) = 1 nautical mile/h	1.852 km/h = 0.5144 m/s

(Convert other velocities using linear dimensions)

Kinematic viscosity (m^2/s^2)	
1 sq.ft/s	$92.90 \cdot 10^{-3}$ m^2/s = $92.90 \cdot 10^3$ cSt*

* cSt (centi stoke) = 10^{-6} m^2/s. Stokes is a term taken from the CGS system. 1 St = 10^{-4} m2/s

Mass (kg)	
1 lb (pound mass) = 16 oz (ounces)	0.4536 kg
1 ctw (UK) (hundredweight) = 112 lbs	50.80 kg
1 long ton (UK) = 20 cwt = 2240 lbs	1.016 metric tons = 1016 kg
1 short ton (US) = 2000 lbs	0.907 metric tons = 907 kg
1 slug	14.59 kg

Energy, work (1 N m = 1 J, Wh)	
1 cal IT	4.187 J*
1 kpm	9.807 J
1 hp (metric)	$2.648 \cdot 10^6$ J = 0.7355 kWh
1 ft lbf	1.356 J
1 hph (UK, US)	$2.685 \cdot 10^6$ J = 0.7457 kWh
1 BTU (UK, US)	$1.055 \cdot 10^3$ J = 1.055 kJ

* Exact value: 4.1868 J
I. T. = International Steam Table

Density	
1 lb/cub. ft	16.02 kg/m^3

Force (1 kg m/s^2 = 1 N)	
1 kp (kilopond)*	9.807 N
1 poundal**	$138.3 \cdot 10^{-3}$ N

* sometimes termed kgf (kilogram force) in English-speaking countries
Standard gravitational acceleration g_n = 9.80665 m/s^2
** unit of force in ft-lb-s system

Power (1 kg m^2/s^3 = 1 N m/s = 1 J/s = 1 W)	
1 kpm/s	9.807 W
1 hp (metric) = 75 kpm/s	735.5 W = 0.7355 kW
1 $kcal_{IT}/h$	1.163 W
1 ft lbf/s	1.356 W
1 hp (UK, US) = 550 ft.lbf/s	745.7 W
1 BTU/h	0.2931 W

Source: Meier-Peter, Hansheinrich; Bernhardt, Frank (Eds.), Compendium Marine Engineering: Operation – Monitoring – Maintenance, 2009, by courtesy of PMC Media House GmbH: www.pmcmedia.com

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Conversion Tables

Torque, force moment ($kg\ m^2/s^2 = N\ m$)
Can easily be derived from the above list

Moment of inertia ($kg\ m^2$)	
1 GD^2 (old nomenclature)	$= 4 \cdot I^*\ kg\ m^2$
1 WR^2 (old nomenclature)*	$= 1 \cdot I^*\ kg\ m^2$
$^* I = dm_r \cdot r^2$	m_r = mass at radius r
G = W = mass in kg	D = diameter of rotation
R = radius of rotation	

Specific fuel consumption * (g/kWh)	
1 g/hph (metric)	1.360 g/kWh

* also see list further below

Temperature difference (K)	
1 °C (Celsius)	1 K
1 °F (Fahrenheit)	5/9 K

Temperature level (K) (See remark in table 14.3 also)	
1 °C (Celsius)	$t_C + 273.15 = K$
1 °F (Fahrenheit)	$5/9\ (t_F - 32) + 273.15 = K$
Conversion of Fahrenheit into Celsius	$t_C = 5/9\ (t_F - 32)$
Conversion of Celsius into Fahrenheit	$t_F = 9/5 \cdot t_C + 32$

Specific heat capacity (J/(kg K))	
1 $kcal_{IT}/(kg \cdot °C)$	$4.187 \cdot 10^3$ J/(kg K)
1 BTU*/(lb · °F) = 1 $kcal_{IT}$/(kg °C)	$4.187 \cdot 10^3$ J/(kg K)

* British Thermal Unit, see also conversion factors for energy units

Heat transfer ($W/(m^2 K)$)	
1 $cal_{IT}/(cm^2 \cdot s \cdot °C)$	41.87 · 103 $W/(m^2 K)$
1 $kcal_{IT}/(m^2 \cdot h \cdot °C)$	1.163 $W/(m^2 K)$
1 BTU*/(ft2 · h · °F)	5.678 W/(m K)

* British Thermal Unit, see also conversion factors for energy units

Physical data of some materials that are important from an operational aspect, in SI units					
T = Temperature in °C	ΔK = Temperature difference				
ρ = Density in kg/m^3	C_P = specific heat in J/(kg ΔK)				
	t	ρ	C_P	t_{Range}	C_P
Water	18	999	$4.18.10^3$		
Lubrication oil (approximate value)*	15	900	$1.96.10^3$		
Air (atmospheric, dry) (p = 1 bar)	0	1.276	998	0-150	1005
Exhaust gas				200-400	1080
* Viscosity: 100-140 cSt at 40 °C					
750 mm Hg = 1 bar = 10^5 Pa					
1 atm (standard pressure at sea level)			= 760 mm Hg = 1013 mbar		
Gas constant for air and exhaust gas			= 287 J/(kg · K)		
Evaporation heat, water at 100 °C/1.013 bar			= $2.256 \cdot 10^6$ J/kg		
Lower net specific energy of fuel			Hu = $41\text{-}43 \cdot 10^6$ J/kg		
ISO 3046/1 – 1986 Standard reference fuel			Hu = $43 \cdot 10^6$ J/kg		

SFOC Specific fuel oil consumption, b_e and standard conditions		
Data about specific fuel consumption must be related to the brake horsepower and the following standard conditions (ISO):		
Intake air temperature at entry of preliminary blower:	25 °C	298 K
Intake air pressure at entry of preliminary blower:		1000 mbar
Charge air cooling water temperature:	25 °C	298 K
Lower net specific energy of fuel (10200 kcal/kg)		42707 kJ/kg

Source: Meier-Peter, Hansheinrich; Bernhardt, Frank (Eds.), Compendium Marine Engineering: Operation – Monitoring – Maintenance, 2009, by courtesy of PMC Media House GmbH: www.pmcmedia.com