Part 305
Units of measurement to be used in air and ground operations

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Units of Measurement to be Used in Air and Ground Operations

305.1 Applicability

The Units of Measurement contained in this part shall be applicable to all aspects of Egyptian civil aviation air and ground operations.

305.3 Definitions

Ampere (A). The ampere is that constant electric current which, if maintained in two straight parallel conductors of infinite length, of negligible circular cross-section, and placed 1 metre apart in vacuum, would produce between these conductors a force equal to 2×10^{-7} newton per metre of length.

Becquerel (Bq). The activity of a radionuclide having one spontaneous nuclear transition per second.

Candela (cd). The luminous intensity, in the perpendicular direction, of a surface of 1/600 000 square metre of black body at the temperature of freezing platinum under a pressure of 101 325 newtons per square metre.

Celsius temperature (t°C). The Celsius temperature is equal to the difference $t°C = T - T_0$ between two thermodynamic temperatures T and To where To equals 273.15 kelvin.

Coulomb (C). The quantity of electricity transported in 1 second by a current of 1 ampere.

Degree Celsius (°C). The special name for the unit kelvin for use in stating values of Celsius temperature.

Farad (F). The capacitance of a capacitor between the plates of which there appears a difference of potential of 1 volt when it is charged by a quantity of electricity equal to 1 coulomb.

Foot (ft). The length equal to 0.304 8 metre exactly.

Gray (Gy). The energy imparted by ionizing radiation to a mass of matter corresponding to 1 joule per kilogram.

Henry (H). The inductance of a closed circuit in which an electromotive force of 1 volt is produced when the electric current in the circuit varies uniformly at a rate of 1 ampere per second.

Hertz (Hz). The frequency of a periodic phenomenon of which the period is 1 second.

Joule (J). The work done when the point of application of a force of 1 newton is displaced a distance of 1 metre in the direction of the force.

Kelvin (K). A unit of thermodynamic temperature which is the fraction 1/273.16 of the thermodynamic temperature of the triple point of water.

Kilogram (kg). The unit of mass equal to the mass of the international prototype of the kilogram.

Knot (kt). The speed equal to 1 nautical mile per hour.

Litre (L). A unit of volume restricted to the measurement of liquids and gases which is equal to 1 cubic decimetre.

Lumen (lm). The luminous flux emitted in a solid angle of 1 steradian by a point source having a uniform intensity of 1 candela.

Lux (lx). The illuminance produced by a luminous flux of 1 lumen uniformly distributed over a surface of 1 square metre.

Metre (m). The distance travelled by light in a vacuum during 1/299 792 458 of a second.

Mole (mol). The amount of substance of a system which contains as many elementary entities as there are atoms in 0.012 kilogram of carbon-12.

Nautical mile (NM). The length equal to 1 852 metres exactly.

Newton (N). The force which when applied to a body having a mass of 1 kilogram gives it an acceleration of 1 metre per second squared.

Ohm (Ω). The electric resistance between two points of a conductor when a constant difference of potential of 1 volt, applied between these two points, produces in this conductor a current of 1 ampere, this conductor not being the source of any electromotive force.

Pascal (Pa). The pressure or stress of 1 newton per square metre.

Radian (rad). The plane angle between two radii of a circle which cut off on the circumference an arc equal in length to the radius.

Second (s). The duration of 9 192 631 770 periods of the radiation corresponding to the transition between the two hyperfine levels of the ground state of the caesium-133 atom.

Siemens (S). The electric conductance of a conductor in which a current of 1 ampere is produced by an electric potential difference of 1 volt.

Sievert (Sv). The unit of radiation dose equivalent corresponding to 1 joule per kilogram.

Steradian (sr). The solid angle which, having its vertex in the centre of a sphere, cuts off an area of the surface of the sphere equal to that of a square with sides of length equal to the radius of the sphere.

Tesla (T). The magnetic flux density given by a magnetic flux of 1 weber per square metre.

Tonne (t). The mass equal to 1 000 kilograms.

Volt (V). The unit of electric potential difference and electromotive force which is the difference of electric potential between two points of a conductor carrying a constant current of 1 ampere, when the power dissipated between these points is equal to 1 watt.

Watt (W). The power which gives rise to the production of energy at the rate of 1 joule per second.

Weber (Wb). The magnetic flux which, linking a circuit of one turn, produces in it an electromotive force of 1 volt as it is reduced to zero at a uniform rate in 1 second.

305.5 Standard application of units of measurement

(a) SI Units: The International System of Units developed and maintained by the General Conference of Weights and Measures (CGPM) shall, subject to the provisions (c), (d),(e) below be used   as the standard system of units of measurement for all aspects of Egyptian Civil Aviation   air and ground operations.

(b) Prefixes: The prefixes and symbols listed in Table -1 shall be used to form names and symbols of the decimal multiples and sub-multiples of SI units.

(c) Non-SI Units for permanent use with the SI : The non-SI units listed in Table -2 shall be used in addition to SI units as primary units of measurement but only as specified in Table -4.

(d) Non-SI alternative units permitted for temporary use with the SI :
The non-SI units listed in Table -3 are permitted for temporary use (till further Notification) as alternative units of measurement but only for those specific quantities listed in Table -4.

(e) Application of specific units :

   (1) The application of units of measurement for certain quantities used in international civil   aviation air and ground operations shall be in cordance with Table -4.

   (2) Means and provisions for design, procedures and training should be tablished for operations in environments involving the use of standard and non-SI alternatives of specific units of measurement, or the transition between environments using different units, with due consideration to human performance.

Table –1

SI unit prefixes

Multiplication factor	*Prefix*	*Symbol*
$1000\ 000\ 000\ 000\ 000\ 000 = 10^{18}$	Exa	E
$1\ 000\ 000\ 000\ 000\ 000 = 10^{15}$	Peta	*P*
$1\ 000\ 000\ 000\ 000 = 10^{12}$	Tera	*T*
$1000000000 = lo^{9}$	Giga	*G*
$1\ 000\ 000 = 10^{6}$	Mega	*M*
$1000 = 10^{3}$	Kilo	*K*
$100 = 10^{2}$	Hecto	*H*
$10 = 10^{1}$	Deca	*Da*
$0.1 = 10^{-1}$	Deci	*D*
$0.01 = 10^{-2}$	Centi	*C*
$0.001 = 10^{-3}$	Milli	*M*
$0.000\ 001 = 10^{-6}$	Micro	$\mu\Pi$
$0.000000001 = 10^{-9}$	Nano	*N*
$0.000\ 000\ 000\ 001 = 10^{-12}$	Pico	*P*
$0.000\ 000\ 000\ 000\ 001 = 10^{-15}$	Femto	*F*
$0.000\ 000\ 000\ 000\ 000\ 001 = 10^{-18}$	atto	*a*

Table-2

Non-SI units for use with the SI

Specijic quantities in Table -4 related to	Unit	Symbol	Definition(in items of SI unit)
Mass	Tonne	T	1t=103 kg
Plane angle	Degree Minute Second	O ′ "	$1° = (\Pi / 180)$ rad $1′ = (1/60)° = (\Pi / 10\ 800)$ rad $1" = (1/60)′ = (\Pi / 648\ 000)$ rad
Temperature Time Volume	Degree Celsius Minute Hour Day Week , month, year litre	°C min h d --- L	1 unit ° C =1 unit Ka) 1 min = 60 s 1 h =60 min = 3 600 s 1 d =24 h = 86 400 s 1 L = 1 dm3 = 10-3 m3

Table –3
Non-SI alternate units permitted for temporary use with the SI

Specijic quantities in Table -4 related to	Unit	Symbol	Definition(in items of SI unit)
Distance (long) Distance (vertical)[a)] Speed a) altitude elevation , height , vertical speed	Nautical mile Foot Knot	NM Ft kt	1 NM = 1.852 m 1 ft =0.304 8 m 1 kt = 0.514 444 m/s

Table –4

Standard application of specific units of measurement

Ref.No.	Quantity	Primary unit (symbol)	Non SI alternative unit (symbol)
1.1	altitude	m	ft
1.2	area	m^2	
1.3	distance (long)[a]	km	NM
1.4	distance (short)	m	ft
1.5	elevation	m	
1.6	endurance	h and min	
1.7	height	m	ft
1.8	latitude	° ' "	
1.9	length	m	
1.10	longitude	° ' "	
1.11	plane angle (when required, decimal subdivisions of the degree	°	
1.12	shall be used)	m	
1.13	runway length	m	
1.14	runway visual range	L	
1.15	tank capacities (aircraft)[b]	s	
	time	min	
		h	
		d	
		week	
		month	
		year	
		km	
1.16		m^3	
1.17	Visibility [c]		
1.18	volume	°	
	wind direction (wind directions other than for a landing and		
	take-off shall be expressed in degrees true; for landing and take-off		
	wind directions shall be expressed in degrees magnetic)		
2.	***Mass-related***		
2.1	air density	Kg/m^3	
2.2	area density	Kg/m^2	
2.3	cargo capacity	Kg	
2.4	cargo density	Kg/m^3	
2.5	density (mass density)	Kg/m^3	
2.6	fuel capacity (gravimetric)	Kg	
2.7	gas density	Kg/m^3	
2.8	gross mass or payload	Kg	
		T	
2.9	hoisting provisions	Kg	
2.10	linear density	Kg/m	
2.11	liquid density	Kg/m^3	
2.12	mass	Kg	
2.13	moment of inertia	Kg.m^2	
2.14	moment of momentum	Kg/m^2/s	
2.15	momentum	Kg/m/s	
3	***Force-related***		
3.1	air pressure (general)	kPa	
3.2	altimeter setting	hPa	
3.3	atmospheric pressure	hPa	
3.4	bending moment	k N . m	

Ref.No.	Quantity	Primary unit (symbol)	Non SI alternative unit (symbol)
3.5	force	N	
3.6	fuel supply pressure	kPa	
3.7	hydraulic pressure	kPa	
3.8	modulus of elasticity	MPa	
3.9	pressure	kPa	
3.10	stress	MPa	
3.11	surface tension	mN/m	
3.12	thrust	kN	
3.13	torque	N . m	
3.14	vacuum	Pa	
4.0	*Mechanics*		
4.1	airspeed [d]	km/h	kt
4.2	angular acceleration	rad/s^2	
4.3	angular velocity	rad/s	
4.4	energy or work	J	
4.5	equivalent shaft power	kW	
4.6	frequency	Hz	
4.7	ground speed	km/h	kt
4.8	impact	J/M^2	
4.9	kinetic energy absorbed by brakes	MJ	
4.10	linear acceleration	m/s^2	
4.11	power	kW	
4.12	rate of trim	ᵒ/s	
4.13	shaft power	kW	
4.14	velocity	m/s	ft/min
4.15	vertical speed	m/s	kt
4.16	wind speed	km/h	
5.0	*Flow*		
5.1	engine airflow	Kg/s	
5.2	engine waterflow	Kg/h	
5.3	fuel consumption (specific)		
	piston engines	Kg/(kW.h)	
	turbo-shaft engines	Kg/(kW.h)	
	jet engines	Kg/(kW.h)	
5.4	fuel flow	Kg/h	
5.5	fuel tank filling rate (gravimetric)	kg/min	
5.6	gas flow	kg/s	
5.7	liquid flow (gravimetric)	g/s	
5.8	liquid flow (volumetric)	L/s	
5.9	mass flow	kg/s	
5.10	oil consumption		
	gas turbine	kg/h	
	piston engines (specific)	g / (kW. h)	
5.11	oil flow	g/s	
5.12	pump capacity	L/min	
5.13	ventilation airflow	m3/min	
5.14	viscosity (dynamic)	Pa . s	
5.15	viscosity (kinematic)	m2/s	
6.0	*Thermodynamics*		
6.1	coefficient of heat transfer	W/(m2.K)	
6.2	heat flow per unit area	J/m2	
6.3	heat flow rate	W	
6.4	humidity (absolute)	g/kg	
6.5	coefficient of linear expansion	ᵒC^{-1}	
6.6	quantity of heat	J	
6.7	temperature	ᵒC	
7.0	*Electricity and magnetism*		

Ref.No.	Quantity	Primary unit (symbol)	Non SI alternative unit (symbol)
7.1	capacitance	F	
7.2	conductance	S	
7.3	conductivity	s/m	
7.4	current density	A/m2	
7.5	electric current	A	
7.6	electric field strength	c/m2	
7.7	electric potential	v	
7.8	electromotive force	v	
7.9	magnetic field strength	A/m	
7.10	magnetic flux	Wb	
7.11	magnetic flux density	T	
7.12	power	W	
7.13	quantity of electricity	C	
7.14	resistance	Ω	
8.0	*Light and related electromagnetic radiation's*		
8.1	illuminance	1x	
8.2	luminance	cd/m^2	
8.3	luminous exitance	$1m/m^2$	
8.4	luminous flux	1m	
8.5	luminous intensity	cd	
8.6	quantity of light	1m.s	
8.7	radiant energy	J	
8.8	wavelength	m	
9.0	*Acoustics*		
9.1	frequency	Hz	
9.2	mass density	Kg/m^3	
9.3	noise level	dB [e]	
9.4	period, periodic time	S	
9.5	sound intensity	W/m^2	
9.6	sound power	W	
9.7	sound pressure	Pa	
9.8	sound level	dB [e]	
9.9	static pressure (instantaneous)	Pa	
9.10	velocity of sound	m/s	
9.11	volume velocity (instantaneous)	m^3/s	
9.12	wavelength	m	
10.0	*Nuclear physiand ionking radiation*		
10.1	absorbed dose	Gy	
10.2	absorbed dose rate	Gy/s	
10.3	activity of radionuclides	Bq	
10.4	dose equivalent	Sv	
10.5	radiation exposure	C/kg	
10.6	exposure rate	C/kg . s	

(a) As used in navigation, generally in excess of 4 000 m.
(b) Such as aircraft fuel, hydraulic fluids, water, oil and high pressure oxygen vessels.
(c) Visibility of less than 5 km may be given in m.
(d) Airspeed is sometimes reported in flight operations in terms of the ratio MACH number.
(e) The decibel (dB) is a ratio which may be used as a unit for expressing sound pressure level and sound power level. When used, the reference level must be specified.