

FED. SUPPLY CLASS

MISC

1. SCOPE

- 1.1 This document lists the preferred metric units, alternative units and conversion factors for a number of commonly-used quantities in the aerospace industry. The selection shown, while not intended to be restrictive, will prove helpful in presenting values of quantities in an identical manner in similar contexts within the aerospace industry.

2. CONTENT

- 2.1 The preferred metric units, alternative units, and conversion factors are shown in Table I, grouped in categories as listed below. Notes and an Index are also provided. For convenience, Tables II thru VI list the SI base units, supplementary units, derived units, acceptable non-SI units, standard prefixes, and definition for selected physical constants and non-SI units.

Table I – Preferred Metric Units:

Sheet

1. Space and Time	2
2. Mass	3
3. Force.....	4
4. Mechanics.....	5
5. Flow	6
6. Thermodynamics.....	7
7. Electricity and Magnetism	9
8. Light	10
9. Acoustics	10
Notes	11
Index	12
Table II – SI Base and Supplementary Units.....	15
Table III – SI Derived Units	15
Table IV – Non-SI Units Accepted for Use with SI	16
Table V – Prefixes for SI Units	16
Table VI – SI Definitions for Selected Physical Constants and Non-SI Units.....	16

- 2.2 The basic units listed in this document are derived from the International Organization for Standardization document ISO 1000 and are in agreement with, and supplementary to, the American Society for Testing and Materials Standard for Metric Practice, E380-84, ICAO Annex 5 and IEEE Standard 268-1982 (conumbered ANSI/IEEE 268-1982).
- 2.3 When the preferred unit appears without a prefix, multiples of that unit may be used as necessary at the user's discretion. (See /h/ for the prefix to be used with liter.)
- Where a prefix appears with the unit, it is the preferred prefix.
- 2.3.1 Prefix Usage
- /a/ Do not use multiple prefixes. Example: pF not $\mu\mu$ F.
- /b/ Do not use a prefix alone. Example: kilogram not kilo.
- /c/ Avoid the use of prefixes in the denominator. An exception to this occurs when the base unit kilogram is used. Example: km/s not m/ms but MJ/kg not kJ/g.
- 2.4 The conversion factors given are exact, unless the last digit is underlined. The level of error is 0,1% or less.

③ COMPLETELY REVISED

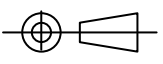
THIRD ANGLE PROJECTION		CUSTODIAN NATIONAL AEROSPACE STANDARDS COMMITTEE	REVISION 3
PROCUREMENT SPECIFICATION NONE		TITLE PREFERRED METRIC UNITS FOR AEROSPACE	CLASSIFICATION STANDARD PRACTICE NAS10001 SHEET 1 OF 16

TABLE I – PREFERRED METRIC UNITS

	QUANTITY	PREFERRED METRIC UNIT /a/	ALTERNATIVE UNITS (and Notes)	CONVERSION FACTORS
1. SPACE & TIME				
1.1	time	s (second)	min (minutes) h (hour) d (day)	See Table IV
1.2	plane angle	rad (radian)	° degree /b/	1 degree = 0,017 453 3 rad See Table IV
1.3	solid angle	sr (steradian)		
1.4	length	mm (millimeter)	/c/	1 in = 25,4 mm 1 ft = 304,8 mm 1 yd = 914,4 mm
1.4.1	distance (long)	km (kilometer)	nautical mile /d/	1 statute mile = 1,609 344 km 1 nautical mile (US) = 1,852 km 1 nautical mile (UK) = 1,853 km
1.4.2	distance (short)	m (meter)	/e/	1 ft = 0,3048 m 1 yd = 0,9144 m
1.4.3	visibility	km (kilometer)	/f/	1 statute mile = 1,609 344 km
1.4.4	altitude	m (meter)	/g/	1 ft = 0,3048 m
1.4.5	vibration amplitude	mm (millimeter)		1 in = 25,4 mm
1.4.6	surface texture; thickness of surface coating	µm (micrometer)		1 microinch = 0,0254 µm
1.5	area	m ² (square meter)		1 in ² = 645,16 mm ² 1 ft ² = 0,092 903 04 m ² 1 acre = 0,4047 hm ² 1 sq mile = 2,590 km ²
1.6	volume	m ³ (cubic meter)		1 in ³ = 16 387,064 mm ³ 1 ft ³ = 0,028 316 847 m ³ 1 yd ³ = 0,764 554 86 m ³ 1 gal (US dry) = 0,004 405 m ³
1.6.1	fluid tank; water heating tank; high pressure oxygen	L (liter)	m ³ (cubic meter) /h/ /u/	1 ft ³ = 28,317 L 1 gal (US liq) = 3,785 412 L 1 gal (UK liq) = 4,546 092 L 1 gal (Can liq) = 4,546 090 L 1 fl oz (US) = 29 573,53 mm ³ 1 fl oz (UK) = 28 413,07 mm ³ 1 fl oz (Can) = 28 413,062 mm ³

AEROSPACE INDUSTRIES ASSOCIATION OF AMERICA, INC.
1000 WILSON BLVD.
ARLINGTON, VA 22209

THIS DRAWING SUPERSEDES ALL ANTECEDENT STANDARD DRAWINGS FOR THE SAME
PRODUCT AND SHALL BECOME EFFECTIVE NO LATER THAN SIX MONTHS FROM THE LAST
REVISION DATE.

FORM 09-01

③ COMPLETELY REVISED

REVISION
3
NAS10001
SHEET 2

Document Sharing Hub

TABLE I – PREFERRED METRIC UNITS (CONTINUED)

	QUANTITY	PREFERRED METRIC UNIT /a/	ALTERNATIVE UNITS (and Notes)	CONVERSION FACTORS
2.	MASS			
2.1	mass	kg (kilogram)	/v/	1 oz (avoir) = 28,349 52 g 1 lb (avoir) = 0 453 592 37 kg 1 long ton (2240 lb) = 1016,047 kg 1 short ton (2000 lb) = 907,1847 kg
2.1.1	gross mass; payload	kg (kilogram)	t (tonne)	1 long ton = 1,016 047 t 1 short ton = 0,907 185 t
2.1.2	hoisting provision	kg (kilogram)	t (tonne)	
2.1.3	cargo capacity (gravimetric)	kg (kilogram)	t (tonne)	
2.1.4	fuel capacity (gravimetric)	kg (kilogram)	t (tonne)	
2.2	linear density	kg/m (kilogram per meter)		1 lb/ft = 1,488 16 kg/m 1 lb/yd = 0,496 055 kg/m
2.3	density; concentration	kg/m ³ (kilogram per cubic meter)	kg/L (kilogram per liter) /h/	1 lb/in ³ = 27 679,9 kg/m ³ 1 lb/ft ³ = 16,018 46 kg/m ³ 1 short ton/yd ³ = 1186,5526 kg/m ³ 1 lb/gal (Can) = 99,776 37 kg/m ³ 1 lb/gal (US) = 119,8264 kg/m ³ 1 oz/gal (Can) = 6,236 024 kg/m ³ 1 oz/gal (US) = 7,489 152 kg/m ³
2.3.1	air density	kg/m ³ (kilogram per cubic meter)	/w/	1 slug/ft ³ = 515,379 kg/m ³
2.3.2	cargo density	kg/m ³ (kilogram per cubic meter)	t/m ³ (tonne per cubic meter)	
2.3.3	gas density	kg/m ³ (kilogram per cubic meter)	/w/	1 lb/ft ³ = 16,018 46 kg/m ³
2.3.4	liquid density	kg/m ³ (kilogram per cubic meter)	g/L (gram per liter)	
2.4	relative humidity	g/kg (gram per kilogram)	/i/	
2.4.1	absolute humidity	g/m ³ (gram per cubic meter)	/i/	
2.5	balance moment	kg·m (kilogram·meter)	g·mm (gram millimeter)	
2.6	moment of inertia	kg·m ² (kilogram·square meter)		1 lb·in ² = 2,9264 X 10 ⁻⁴ kg·m ² 1 lb·ft ² = 0,031 140 kg·m ²
2.7	momentum	kg·m/s (kilogram·meter per second)		1 lb·ft/s = 0,138 255 kg·m/s
2.8	moment of momentum	kg·m ² /s (kilogram square meter per second)		1 lb·ft ² /s = 0,042 140 kg·m ² /s

③ COMPLETELY REVISED

REVISION

3

NAS10001
SHEET 3



Document Sharing Hub

USE OF OR RELIANCE UPON THIS DOCUMENT OR ANY NATIONAL AEROSPACE STANDARD IS ENTIRELY VOLUNTARY. AIA DOES NOT QUALIFY SUPPLIERS OR CERTIFY

Copyright Aerospace Industries Association of America Inc. MS PRODUCED UNDER NATIONAL AEROSPACE STANDARD: AIA MAKES NO REPRESENTATION OR CLAIM RESPECTING (1) THE SUITABILITY OF
Provided by IHS under license with AIA/NAS. ANY PARTICULAR APPLICATION OR (2) THE EXISTENCE OF OR APPLIC Licensee= www.sepana.ir/5991803002, User=sam, albert
No reproduction or networking permitted without license from IHS Not for Resale, 01/04/2016 10:26:48 MST TRADEMARK RIGHTS.

Full document details: AIA NAS10001 2012

TABLE I – PREFERRED METRIC UNITS (CONTINUED)

	QUANTITY	PREFERRED METRIC UNIT /a/	ALTERNATIVE UNITS (and Notes)	CONVERSION FACTORS
3.	FORCE			
3.1	force	N (newton)		1 lb _f = 4,448 222 N
3.1.1	handle operating load	N (newton)		
3.1.2	jet and rocket engine thrust	kN (kilonewton)		
3.1.3	rocket engine total impulse	MN·s (meganewton·second)		
3.1.4	rocket engine, fuel specific impulse	N·s/kg (newton·second per kilogram)		
3.2	vacuum	Pa (pascal)	mbar (millibar)	1 bar = 10 ⁵ Pa
3.3	pressure	kPa (kilopascal)	bar (bar)	1 PSI = 6,894 752 kPa 1 in H ₂ O (39,2 °F) = 0,249 08 kPa 1 in H ₂ O (60 °F) = 0,248 84 kPa 1 in Hg (32 °F) = 3,386 39 kPa 1 in Hg (60 °F) = 3,376 85 kPa
3.3.1	air pressure (general)	kPa (kilopascal)		1 atmos (std) = 101,325 kPa
3.3.2	air pressure (meteorological)	kPa (kilopascal)	/j/	1 torr = 133,322 Pa = 0,133 32 kPa
3.3.3	hydraulic pressure	kPa (kilopascal)		1 PSI = 6,894 752 kPa
3.3.4	fuel supply pressure	kPa (kilopascal)		
3.3.5	aerodynamic and static wing loading	kPa (kilopascal)	N/m ² (newton per square meter)	1 lb _f /ft ² = 0,047 880 26 kPa
3.3.6	floor loading	kPa (kilopascal)	N/m ² (newton per square meter)	
3.4	stress	MPa (megapascal)	N/mm ² (newton per square millimeter)	1 KSI = 6,894 752 MPa 1 KSI = 6,894 752 N/mm ²
3.4.1	elastic limit; proportional limit; endurance limit	MPa (megapascal)		
3.4.2	modulus of elasticity; Young's modulus; modulus of rigidity	MPa (megapascal)		10 ⁶ PSI = 6894,752 MPa
3.5	fracture toughness	MPa·m ^{1/2} (megapascal·meter ^{1/2})	N·mm ^{1/2} /mm ² (newton·millimeter ^{1/2} per square millimeter)	1 KSI·in ^{1/2} = 1,1 MPa·m ^{1/2} 1 KSI·in ^{1/2} = 34,7 N·mm ^{1/2} /mm ²
3.6	strain energy per unit volume	J/m ³ (joule per cubic meter)		

③ COMPLETELY REVISED

REVISION

3

NAS10001
SHEET 4



Document Sharing Hub

TABLE I – PREFERRED METRIC UNITS (CONTINUED)

	QUANTITY	PREFERRED METRIC UNIT /a/	ALTERNATIVE UNITS (and Notes)	CONVERSION FACTORS
3. FORCE (CONT)				
3.7	torque; moment of force	N·m (newton·meter)		1 in·lb _f = 0,112 984 8 N·m
3.8	bending moment	N·m (newton·meter)		1 ft·lb _f = 1,355 818 N·m
3.9	bending moment per unit length torque per unit length	N·m/m (newton·meter per meter)		1 lb _f ·ft/in = 53,378 66 N·m/m 1 lb _f ·in/in = 4,428 222 N·m/m
3.10	stiffness moment	N/m (newton per meter)		1 lb _f /in = 175,127 N/m
3.11	surface tension	mN/m (millinewton per meter)		
4. MECHANICS				
4.1	section modulus	mm ³ (cubic millimeter)		1 in ³ = 16 387,064 mm ³
4.2	second moment	mm ⁴ (quadruple millimeter)		1 in ⁴ = 416 231,43 mm ⁴
4.3	frequency	Hz (hertz)		
4.4	rotational frequency and speed	r/s (revolutions per second)	r/min (revolutions per minute) /k/ /u/	
4.5	angular velocity	rad/s (radian per second)		
4.5.1	rate of trim	°/s (degree per second)	/u/	
4.6	angular acceleration	rad/s ² (radian per second ²)		
4.7	velocity	m/s (meter per second)	km/h (kilometer per hour)	1 ft/s = 0,3048 m/s 1 mile/h = 1,609 344 km/h
4.7.1	airspeed	km/h (kilometer per hour)	/l/ /u/	1 knot (US) = 1,852 km/h 1 knot (UK) = 1,853 km/h
4.7.2	land speed	km/h (kilometer per hour)	/l/ /u/	1 mile/h = 1,609 344 km/h
4.7.3	windspeed	km/h (kilometer per hour)	/m/ /u/	1 mile/h = 1,609 344 km/h

③ COMPLETELY REVISED

REVISION

3

NAS10001
SHEET 5



Document Sharing Hub

USE OF OR RELIANCE UPON THIS DOCUMENT OR ANY NATIONAL AEROSPACE STANDARD IS ENTIRELY VOLUNTARY. AIA DOES NOT QUALIFY SUPPLIERS OR CERTIFY

Copyright Aerospace Industries Association of America Inc. MS PRODUCED UNDER NATIONAL AEROSPACE STANDARD: AIA MAKES NO REPRESENTATION OR CLAIM RESPECTING (1) THE SUITABILITY OF
Provided by IHS under license with AIA/NAS. Licensee= www.sepana.ir/5991803002, User=sam, albert
No reproduction or networking permitted without license from IHS. Not for Resale, 01/04/2016 10:26:48 MST. TRADEMARKS RIGHTS.

Full document details: AIA NAS10001 2012