

An American National Standard

IEEE Recommended Practice for Preferred Metric Units for Use in Electrical and Electronics Science and Technology

Sponsor

IEEE Standards Coordinating Committee 14 on Quantities and Units

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1. Purpose

The purpose of this recommended practice is to aid in the selection of metric units so as to promote uniformity in the use of metric units and to limit the number of different metric units that will be used in electrical and electronics science and technology. ANSI/IEEE Std 268-1982, American National Standard Metric Practice, prescribes how metric units are to be used and gives guidance concerning correct metric practice.

Table 1 — Multiples and Submultiples of SI Units

Multiplying Factor	Prefix	Letter Symbol
1 000 000 000 000 000 000 = 10^{18}	exa	E
1 000 000 000 000 000 = 10^{15}	peta	P
1 000 000 000 000 = 10^{12}	tera	T
1 000 000 000 = 10^9	giga	G
1 000 000 = 10^6	mega	M
1 000 = 10^3	kilo	k
100 = 10^2	hecto*	h
10 = 10^1	deka*	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	μ
0.000 000 001 = 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

*To be avoided where practical. See ANSI/IEEE Std 268-1982.

2. Space and Time

Item	Quantity	SI Symbol (Unit)	Preferred Multiples of the SI Units	Other Units Permitted for Use with SI	Typical and Recommended Applications and Explanatory Notes
2.1	plane angle	rad (radian)		° (degree)	Engineering and scientific calculations Measurement of angles in surveys, plans, electrical calculations (Use of decimal divisions of degrees instead of minutes and seconds is encouraged)
2.2	solid angle	sr (steradian)			Engineering and scientific calculations
2.3	length (width, height, thickness, radius, diameter, depth)	m (meter)	km (kilometer) cm (centimeter) mm (millimeter) μm (micrometer) nm (nanometer)		When converting to SI, the meter generally replaces the yard and foot, the kilometer replaces the mile, the centimeter replaces the inch, and smaller submultiples replace the fractions of an inch. The hectometer, dekameter, and decimeter are used only rarely and are not recommended for general use. In many engineering applications the centimeter is avoided for fear of confusion or of proliferation of different unit multiples. Thus, all dimensions on mechanical engineering drawings are expressed in millimeters; dimensions for construction projects are expressed in meters or millimeters, but not in centimeters.
2.4	area	m ² (square meter)	km ² (square kilometer) cm ² (square centimeter) mm ² (square millimeter)	ha (hectare)	Area of floors, walls, and small property size Surveying and land measurement Drainage area, watershed, or lake area Cross sectional area of conductors
2.5	volume	m ³ (cubic meter)	dm ³ (cubic decimeter) cm ³ (cubic centimeter) mm ³ (cubic millimeter)	L (liter) mL (milliliter) μL (microliter)	All volumes The expression of 10 ⁶ m ³ should be used for volumes of reservoirs 1 dm ³ = 1 L 1 mL = 1 cm ³ NOTE: Use of the liter is restricted to volumetric capacity, dry measure, and measure of fluids (both liquid and gases).