

Mühendisliğe Giriş

Birimler ve Simgeler

Uluslararası Birimler Sisteminin (SI) Temel Büyüklükleri ve Birimleri

TABLE 2.1
Base Units in the
SI

Quantity	SI Base Unit	Abbreviation
Length	meter	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Temperature	Kelvin	K
Amount of substance	mole	mol
Light intensity	candela	cd

Türetilmiş Birimler

TABLE 2.2
Certain Derived
Units in the SI

Quantity	SI Derived Unit	Abbreviation	Definition
Length	micrometer or micron	μm	$1 \mu\text{m} = 10^{-6} \text{ m}$
Volume	liter	L	$1 \text{ L} = 0.001 \text{ m}^3$
Force	newton	N	$1 \text{ N} = 1 (\text{kg} \cdot \text{m})/\text{s}^2$
Torque, or moment of a force	newton-meter	$\text{N} \cdot \text{m}$	—
Pressure or stress	pascal	Pa	$1 \text{ Pa} = 1 \text{ N}/\text{m}^2$
Energy, work, or heat	joule	J	$1 \text{ J} = 1 \text{ N} \cdot \text{m}$
Power	watt	W	$1 \text{ W} = 1 \text{ J}/\text{s}$
Temperature	degree Celsius	$^{\circ}\text{C}$	$^{\circ}\text{C} = \text{K} - 273.15$

Although a change in temperature of 1 Kelvin equals a change of 1 degree Celsius, numerical values are converted using the formula.

Birimlerin Üst ve Alt Katsayıları

TABLE 2.3
Order-of-
Magnitude
Prefixes in the SI

Name	Symbol	Multiplicative Factor
tera	T	1,000,000,000,000 = 10^{12}
giga	G	1,000,000,000 = 10^9
mega	M	1,000,000 = 10^6
kilo	k	1000 = 10^3
hecto	h	100 = 10^2
deca	da	10 = 10^1
deci	d	0.1 = 10^{-1}
centi	c	0.01 = 10^{-2}
milli	m	0.001 = 10^{-3}
micro	μ	0.000,001 = 10^{-6}
nano	n	0.000,000,001 = 10^{-9}
pico	p	0.000,000,000,001 = 10^{-12}

Temel Amerikan Birimleri

TABLE 2.4
Base Units in the
USCS

Quantity	USCS Base Unit	Abbreviation
Length	foot	ft
Force	pound	lb
Time	second	s
Electric current	ampere	A
Temperature	degree Rankine	°R
Amount of substance	mole	mol
Light intensity	candela	cd

Quantity	USCS	SI		
Length	1 in.	= 25.4 mm		
	1 in.	= 0.0254 m		
	1 ft	= 0.3048 m		
	1 mi	= 1.609 km		
	1 mm	= 3.9370×10^{-2} in.		
	1 m	= 39.37 in.		
	1 km	= 3.2808 ft		
Area	1 in ²	= 645.16 mm ²	Mass	1 slug = 14.5939 kg
	1 ft ²	= 9.2903×10^{-2} m ²		1 lbm = 0.45359 kg
	1 mm ²	= 1.5500×10^{-3} in ²	1 kg = 6.8522×10^{-2} slugs	1 kg = 2.2046 lbm
	1 m ²	= 10.7639 ft ²		
Volume	1 ft ³	= 2.832×10^{-2} m ³	Force	1 lb = 4.4482 N
	1 ft ³	= 28.32 L		1 N = 0.22481 lb
	1 gal	= 3.7854×10^{-3} m ³	Pressure or stress	1 psi = 6895 Pa
	1 gal	= 3.7854 L		1 psi = 6.895 kPa
	1 m ³	= 35.32 ft ³		1 Pa = 1.450×10^{-4} psi
	1 L	= 3.532×10^{-2} ft ³		1 kPa = 0.1450 psi
	1 m ³	= 264.2 gal	Work, energy, or heat	1 ft · lb = 1.356 J
	1 L	= 0.2642 gal		1 Btu = 1055 J
		1 J = 0.7376 ft · lb		
			1 J = 9.478×10^{-4} Btu	
			Power	1 (ft · lb)/s = 1.356 W
				1 hp = 0.7457 kW
				1 W = 0.7376 (ft · lb)/s
				1 kW = 1.341 hp

Türetilmiş Amerikan Birimleri

TABLE 2.5
Certain Derived
Units in the USCS

Quantity	Derived Unit	Abbreviation	Definition
Length	mil	mil	1 mil = 0.001 in.
	inch	in.	1 in. = 0.0833 ft
	mile	mi	1 mi = 5280 ft
Volume	gallon	gal	1 gal = 0.1337 ft ³
Mass	slug	slug	1 slug = 1 (lb · s ²)/ft
	pound-mass	lbm	1 lbm = 3.1081 × 10 ⁻² (lb · s ²)/ft
Force	ounce	oz	1 oz = 0.0625 lb
	ton	ton	1 ton = 2000 lb
Torque, or moment of a force	foot-pound	ft · lb	—
Pressure or stress	pound/inch ²	psi	1 psi = 1 lb/in ²
Energy, work, or heat	foot-pound	ft · lb	—
	British thermal unit	Btu	1 Btu = 778.2 ft · lb
Power	horsepower	hp	1 hp = 550 (ft · lb)/s
Temperature	degree Fahrenheit	°F	°F = °R – 459.67

Although a change in temperature of 1 degree Rankine also equals a change of 1 degree Fahrenheit, numerical values are converted using the formula.