

SI

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MKSA(meter-kilogram-second-ampere) ,

가 CGS(centimeter-gram-second) .

“The international system of units”

Le Système international d’Unités “SI” 가

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1975 12 23 , 94-168 “ ”

SI , 44

10 SI

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2. SI

SI 가

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SI

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SI (Multiples submultiples) 가 .

10^{-18} 10^{18} 10^{36}

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SI .

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SI 가

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SI

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기호		
SI 기본 단위		
길이	: meter	m
질량	: kilogram	kg
시간	: second	s
전류	: ampere	A
온도*	: kelvin	K
물질의 양	: mole	mol
조도	: candela	cd
SI 보조 단위		
평면 각도	: radian	rad
고체 각도	: steradian	sr

* 1°C의 온도 간격은 1°K의 온도 간격과 같다.
그러나 0°C=273.15°K이다.
다시 말해서 섭씨에서 x°C일 때 kelvin에서는
(x+273.15)°K이다.

SI

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SI m/s m · s⁻¹

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가 SI m/s² m · s⁻² .

SI (, ,) .

SI 가 가 . SI

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5.

1975 가

17 가 . < 2> 가

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· 1950 SI (前身)

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6.

26 , , 가

SI

1 가 . 1

가 SI 10

(幕)

SI

10, 10^{-2} , 10^{-3} , 10^6 가

가 SI 7 1

가 SI

가 < 3>

< 2> 17

$1\text{kg}\cdot\text{m}/\text{s}^2=1\text{N}$	1 newton of force
$1\text{N}/\text{m}^2 = 1\text{Pa}$	1 pascal of pressure or stress
$1\text{N}\cdot\text{m} = 1\text{J}$	1 joule of work, energy or quantity of heat
$1\text{J}/\text{S} = 1\text{W}$	1 watt of power or radiant energy flux
$1\text{W}/\text{A} = 1\text{V}$	1 volt of electric potential, potential difference or electromotive force
$1\text{A}/\text{V} = 1\text{S}$	1 siemens of electric conductance
$1\text{V}/\text{A} = 1\Omega$	1 ohm of electric resistance
$1\text{V}\cdot\text{S} = 1\text{Wb}$	1 weber of magnetic flux
$1\text{Wb}/\text{A} = 1\text{H}$	1 Henry of inductance
$1\text{Wb}/\text{m}^2 = 1\text{T}$	1 tesla of magnetic flux density or magnetic induction
$1\text{A}\cdot\text{S} = 1\text{C}$	1 coulomb of electric charge or quantity of electricity
$1\text{C}/\text{V} = 1\text{F}$	1 farad of electric capacitance
$1(\text{cycle})/\text{S}=1\text{Hz}$	1 hertz of frequency
$1(\text{disintegration})/\text{S}=1\text{Bq}$	1 becquerel of activity
$1\text{J}/\text{kg} = 1\text{Gy}$	1 gray of absorbed dose of ionizing radiation
$1\text{cd}\cdot\text{sr} = 1\text{lm}$	1 lumen of luminous flux
$1\text{lm}/\text{m}^2 = 1\text{lx}$	1 lux of illuminance

Physical quantity	SI unit	
	Symbol	Name
area	m ²	square meter
volume	m ³	cubic meter
speed, velocity	m/s	meter per second
acceleration	m/s ²	meter per second squared
kinematic viscosity, thermal diffusivity	m ² /s	square meter per second
absolute viscosity, dynamic viscosity	Pa·s	pascal second
wavenumber	m ⁻¹	1 per meter
mass per unit area	kg/m ²	kilogram per square meter
density, mass density	kg/m ³	kilogram per cubic meter
concentration (of amount of substance)	mol/m ³	mole per cubic meter
molality	mol/kg	mole per kilogram
surface tension	N/m	newton per meter
molar energy	J/mol	joule per mole
molar heat capacity, molar entropy	J/(mol·K)	joule per mole kelvin
heat capacity, entropy	J/K	joule per kelvin
specific energy	J/kg	joule per kilogram
specific heat capacity, specific entropy	J/(kg·K)	joule per kilogram kelvin
Arrhenius-plot abscissa, temperature coefficient	K ⁻¹	reciprocal kelvin
radiant intensity	W/sr	watt per steradian
thermal conductivity	W/(m·K)	watt per meter kelvin
thermal transmittance	W/(m ² ·K)	watt per square meter kelvin
irradiance, radiant heat flux density	W/m ²	watt per square meter
luminance	cd/m ²	candela per square meter

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가 < 4>

SI

(multiples submultiples)

SI

가 SI

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Factor	Prefix	symbol
10^{18}	exa	E
10^{15}	peta	P
10^{12}	tera	T
10^9	giga	G
10^6	mega	M
10^3	kilo	K
10^{-3}	milli	m
10^{-6}	micro	μ
10^{-9}	nano	n
10^{-12}	pico	p
10^{-15}	femto	f
10^{-18}	atto	a

SI (multiple sub-multiple)

10^{-6}kg , 10^{-3}kg , 10^3kg

mg, g, Mg

kg .(

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가

kJ/kg mN/m 가 J/g N/km 가 가 .

c(centi. 10^{-2}), d(deci. 10^{-1}), da(deca. 10^1), h(hecto. 10^2)

< 4> . 가
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 10 . $1\text{cm}^3 = (10^{-2}\text{m})^3 = 10^{-6}\text{m}^3$
 가 .
 가
 . (Nanometer), (Micrometer),
 (kilometer) , , .

8. SI

. Government Printing
 Office Style manual(1973 1) 1975 6 24
 meter . ASTM meter
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 SI kg
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 SI 가 가 .
 가 .
 $1\text{kg} \cdot \text{m/s}^2$. 1
 . (stress)
 . 1N/m^2 가 .
 $1\text{N/m}^2 = 1\text{Pa}$.

To convert from	to	multiply by
atmosphere (standard)	pascal, Pa	$1.013\ 250^* \times 10^5$
British thermal unit (International Table)	joule, J	$1.055\ 056 \times 10^3$
Btu (International Table) per hour	watt, W	$2.930\ 711 \times 10^{-1}$
Btu (International Table) · in. / (s · ft ² · °F)		
(k, thermal conductivity)	watt per meter kelvin, W/(m · K)	$5.192\ 204 \times 10^2$
calorie (International Table)*	joule, J	$4.186\ 800^*$
calorie (thermochemical)	joule, J	$4.184\ 000^*$
centipoise	pascal second, Pa · s	$1.000\ 000^* \times 10^{-2}$
centistokes	square meter per second, m ² /s	$1.000\ 000^* \times 10^{-3}$
foot	meter, m	$3.048\ 000^* \times 10^{-1}$
square foot	square meter, m ²	$9.290\ 304^* \times 10^{-2}$
cubic foot	cubic meter, m ³	$2.831\ 685 \times 10^{-2}$
foot pound-force	joule, J	1.355 818
foot pound-force per minute	watt, W	$2.259\ 697 \times 10^{-3}$
foot per second squared	meter per second squared, m/s ²	$3.048\ 000^* \times 10^{-1}$
free fall, standard (g)	meter per second squared, m/s ²	9.086 650*
gallon (U.S. liquid)	cubic meter, m ³	$3.785\ 412 \times 10^{-2}$
horsepower (electric)	watt, W	$7.460\ 000^* \times 10^2$
inch	meter, m	$2.540\ 000^* \times 10^{-2}$
square inch	square meter, m ²	$6.451\ 600^* \times 10^{-4}$
cubic inch	cubic meter, m ³	$1.638\ 706 \times 10^{-4}$
inch of mercury (60°F)	pascal, Pa	$3.376\ 85 \times 10^2$
inch of water (60°F)	pascal, Pa	$2.488\ 4 \times 10^2$
kilogram-force per square centimeter	pascal, Pa	$9.806\ 650^* \times 10^4$
ounce (U.S. fluid)	cubic meter, m ³	$2.957\ 353 \times 10^{-4}$
ounce-force (avoirdupois)	newton, N	$2.780\ 139 \times 10^{-3}$
ounce-mass (avoirdupois)	kilogram, kg	$2.834\ 952 \times 10^{-2}$
ounce-mass (avoirdupois) per square foot	kilogram per square meter, kg/m ²	$3.051\ 517 \times 10^{-3}$
ounce-mass (avoirdupois) per square yard	kilogram per square meter, kg/m ²	$3.390\ 575 \times 10^{-3}$
ounce (avoirdupois) per gallon (U.S. liquid)	kilogram per cubic meter, kg/m ³	7.489 152
pint (U.S. liquid)	cubic meter, m ³	$4.731\ 765 \times 10^{-4}$
pound-force, lbf avoirdupois	newton, N	4.448 222
pound-mass, lbm avoirdupois	kilogram, kg	$4.535\ 924 \times 10^{-1}$
pound-force per square inch, psi	pascal, Pa	$6.894\ 757 \times 10^3$
pound-mass per cubic inch	kilogram per cubic meter, kg/m ³	$2.766\ 990 \times 10^4$
pound-mass per cubic foot	kilogram per cubic meter, kg/m ³	$1.601\ 846 \times 10^3$
quart (U.S. liquid)	cubic meter, m ³	$9.463\ 529 \times 10^{-4}$
ton (short, 2000 lbm)	kilogram, kg	$9.071\ 847 \times 10^2$
torr (mm Hg, 0°C)	pascal, Pa	$1.333\ 22 \times 10^2$
watt hour	joule, J	$3.600\ 000^* \times 10^3$
yard	meter, m	$9.144\ 000^* \times 10^{-1}$
square yard	square meter, m ²	$8.361\ 274 \times 10^{-1}$
cubic yard	cubic meter, m ³	$7.645\ 549 \times 10^{-1}$

* 정확한 값

(소숫점을 중심으로 3자리씩 띄워 쓴다. 그러나 구분점은 찍지 않는다.)

- a. 물리학자들은 칼로리를 물 1g을 1°C 올리는 데 필요한 열량으로 사용한다. 그러나 일부 과학자들은 칼로리를 밀로칼로리와 같은 뜻으로 사용한다.

Physical Quantity	To convert from	to	multiply by
Air Permeability	(cubic foot of air per minute) per square foot of fabric; pressure drop of 0.5 inch of water	(m ³ of air/s)/m ² of fabric; pressure drop of 124 pascals	0.005 080
Bending Rigidity	gram-force square millimeter, gf·mm ²	millinewton square millimeter, mN·mm ²	9.807
Breaking Load, Tearing Strength	gram-force, gf	millinewton, mN	9.807
	kilogram-force, kgf	newton, N	9.807
	pound-force, lbf	newton, N	4.448
Breaking Tenacity	gram-force per denier, gf/den	kilometer, km, of breaking length	9.000*
	gram-force per tex, gf/tex	kilometer, km, of breaking length	1.000*
Bursting Pressure	pound-force per square inch, psi, lbf/in. ²	kilopascal, kPa	6.895
Density, Bale Density	gram per cubic centimeter, g/cm ³	kilogram per cubic meter, kg/m ³	1000. *
	pound per cubic foot, lb/ft ³	kilogram per cubic meter, kg/m ³	16.02
Fabric Areal Density	thousandth of an ounce per square inch, 0.001 oz/in. ²	gram per square meter, g/m ²	43.94
Fabric Mass Per Unit Area, Fabric Weight	ounce per square yard, oz/yd ²	gram per square meter, g/m ²	33.91
Fabric Yield (Areal)	square yard per pound, yd ² /lb	square meter per kilogram, m ² /kg	1.843
Fabric Yield (Linear)	yard per pound, yd/lb	meter per kilogram, m/kg	2.016
Flame Propagation Rate	inch per minute in./min	millimeter per second, mm/s	0.4233
Mass Burning Rate	gram per second centimeter, g/(s·m)	gram per second meter, g/(s·m)	100.0*
Mass Transformation Rate	ounce per minute inch, oz/(min·in.)	gram per second meter, g/(s·m)	18.60
Irradiance, Radiant Heat Flux Density	Btu (thermochemical)/(ft ² ·h)	watt per square meter, W/m ²	3.152
	cal (thermochemical)/(cm ² ·min)	watt per square meter, W/m ²	697.3
	cal (thermochemical)/(cm ² ·s)	kilowatt per square meter, kW/m ²	41.84*
	erg per square centimeter second, erg/(cm ² ·s)	milliwatt per square meter, mW/m ²	1.000*
	watt per square inch, W/in. ²	kilowatt per square meter, kW/m ²	1.550
Length, Thickness, Width, Distance, Diameter	angstrom, Å	nanometer, nm	0.1000*
	inch, in.	millimeter, mm	25.40*
	micron, μ	micrometer, μm	1.000*
	mil, 0.001 inch	micrometer, μm	25.40*
	yard, yd	meter, m	0.9144*
Linear Density, Direct Yarn Number	denier, den	milligram per meter, mg/m	0.1111
	tex	milligram per meter, mg/m	1.000*
Surface Tension	dyne per centimeter, dyn/cm	millinewton per meter, mN/m	1.000*
	erg per square centimeter, erg/cm ²	millinewton per meter, mN/m	1.000*
Tensile Strength	kilogram-force per square millimeter, kgf/mm ²	megapascal, MPa	9.807
	pound-force per square inch, lbf/in. ² , psi	kilopascal, kPa	6.895
Twist	turn per inch, turn/in.	turn per meter, turn/m	39.37

* 정확한 값

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· 1J 1Nm ·
 1J/s 1J/s
 1W · 非

가 17 SI
 cgs (ESU) cgs (EMU)

9.

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 () ASTM · <
 6> 가 가 ·

$$1 \text{ oz/yd}^2 \rightarrow \text{kg/m}^2$$

$$1 \text{ oz} = 0.02835 \text{ kg}$$

$$1 \text{ yd}^2 = 0.83610 \text{ m}^2$$

$$\frac{1 \text{ oz}}{\text{yd}^2} = \frac{0.02835 \text{ kg}}{0.83610 \text{ m}^2} = 0.03391 \text{ kg/m}^2$$

$$0.03391 \quad 3.391 \times 10^{-2}$$

$$2$$

$$\text{oz}/(\text{min} \cdot \text{in}) \rightarrow \text{kg}/(\text{s} \cdot \text{m})$$

$$1 \text{ oz} = 0.02835 \text{ kg}$$

$$1 \text{ min} = 60 \text{ s}$$

$$1\text{in} = 0.02540\text{m}$$

$$\frac{1\text{oz}}{(\text{min} \cdot \text{in})} = \frac{0.02835\text{kg}}{60\text{s} \cdot 0.02540\text{m}}$$

$$= 0.1860\text{kg}/(\text{s} \cdot \text{m})$$

$$0.01860 \qquad 1.860 \times 10^{-2}$$