REGULATION ON LEGAL UNITS OF MEASUREMENT AND THE MANNER OF THEIR USE

”Official Gazette of RS”, No 132/2021

Article 1.

This Regulation in more detail regulates the legal units of measurement used in the Republic of Serbia, their names, markings, as well as the manner of their use.

The provisions of this Regulation do not apply to units of measurement used in the field of air, water and railway transport, which are different from those whose application is mandatory under this Regulation, if the use of such units is provided by international conventions and treaties binding on the Republic of Serbia.

Article 2.

Certain terms within the meaning of this Regulation have the following meanings: 1) legal units of measurement are units of measurement whose application is mandatory in the Republic of Serbia and which are used to express quantities;

2) showing is the expression of size in legal units of measurement;

3) additional indication is another or more indication of size in units of measurement that are not legal units of measurement, and which is associated with the indication.

Article3.

The legal units of measurement used in the Republic of Serbia are listed in the Annex - Legal units of measurement (hereinafter: the Annex), which is printed with this Regulation and forms an integral part thereof.

The legal measuring units referred to in paragraph 1 of this Article must be used when using measuring instruments, performing measurements and showing the quantities expressed in measuring units.

Article 4.

The use of additional indications is allowed.

Exceptionally, the use of additional indications is not allowed on measuring instruments for which the prescribed metrological requirements prescribe the use of only the legal unit of measurement.

The indications expressed in units of measurement prescribed by this Regulation must be dominant and must be expressed in characters not greater than those for the corresponding indications in the units given in the Annex to this Regulation.

Article 5.

The writing method of measuring units must be in accordance with the standard SRPS EN ISO 80000.

Article 6.

The use of legal units of measurement referred to in this Regulation is not mandatory for:

1) products and equipment already on the market, ie in use until the day this Regulation enters into force;

2) components and parts of products and equipment that are necessary for supplementing or replacing components or parts of products and equipment referred to in point 1) of this paragraph.

Exceptionally, the indicators on the measuring instruments, ie the display of the measuring instruments must be exclusively in legal units of measurement.

Article 7.

On the day this Regulation enters into force, the Regulation on certain legal units of measurement and the manner of their use ("Official Gazette of RS", No. 43/11) ceases to be valid.

Article 8.

This Regulation shall enter into force on the eighth day from the day of its publication in the "Official Gazette of the Republic of Serbia".

Annex

LEGAL UNITS OF MEASUREMENT

1. SI UNITS AND THEIR DECIMAL MULTIPLES AND SUBMULTIPLES

1.1. SI base units:

Quantity	Unit	
	Name	Symbol
Lenght	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Amount of substance	mole	mol
Luminous intensity	candela	cd

SI units are expressed over seven defined constants, namely:

- transition frequencies between two hyperfine levels of the ground state of a cesium atom $\Delta\nu_{Cs}$,
- speed of light in vacuum ... *c,*
- Planck constants *h,*
- elemental charge *e,*
- *Boltzmann constants k,*
- Avogadro's constants... N_{A},
- light efficiencies of defined visible radiation... K_{cd}.

Each unit is defined by fixing the exact numerical value of the specified constants, so that the product of the numerical value and the unit is equal to the value of the constant.
The numerical values of the constants and the units they define are as follows:

Константа constant	**бројчана вредност numerical values**	**Јединица unit**
$\Delta\nu_{Cs}$	9 192 631 770	Hz
c	299 792 458	$m\ s^{-1}$
h	$6{,}626\ 070\ 15 \times 10^{-34}$	J s
e	$1{,}602\ 176\ 634 \times 10^{-19}$	C
k	$1{,}380\ 649 \times 10^{-23}$	$J\ K^{-1}$

N_A	6,022 140 76 x 10^{23}	mol^{-1}
K_{cd}	683	lm W^{-1}

The numerical values of these seven constants do not have measurement uncertainty.

Definitions of SI base units:

Unit of length

The metre, symbol m, is the SI unit of length. It is defined by taking the fixed numerical value of the speed of light in vacuum c to be 299 792 458 when expressed in the unit m/s, where the second is defined in terms of $\Delta\nu_{Cs}$.
(26. General Conference on Weights and Measures - CGPM (2018))

Unit of mass

The kilogram, symbol kg, is the SI unit of mass. It is defined by taking the fixed numerical value of the Planck constant h to be 6,626 070 15 × 10^{-34} when expressed in the unit J s, which is equal to kg m 2 s^{-1}, where the metre and the second are defined in terms of c and $\Delta\nu_{Cs}$.

(26. CGPM (2018)),

Unit of time

The second, symbol s, is the SI unit of time. It is defined by taking the fixed numerical value of the caesium frequency $\Delta\nu_{Cs}$, the unperturbed ground-state hyperfine transition frequency of the caesium 133 atom, to be 9 192 631 770 when expressed in the unit Hz, which is equal to s^{-1}.

(26. CGPM (2018)),

Unit of electric current

The ampere, symbol A, is the SI unit of electric current. It is defined by taking the fixed numerical value of the elementary charge e to be 1,602 176 634 × 10^{-19} when expressed in the unit C, which is equal to A s, where the second is defined in terms of $\Delta\nu_{Cs}$.

(26. CGPM (2018))

Unit of thermodynamic temperature

The kelvin, symbol K, is the SI unit of thermodynamic temperature. It is defined by taking the fixed numerical value of the Boltzmann constant k to be 1,380 649 × 10^{-23} when expressed in the unit J K^{-1}, which is equal to kg m^2 s^{-2} K^{-1}, where the kilogram, metre and second are defined in terms of h, c and $\Delta\nu_{Cs}$.

(26. CGPM (2018))

Unit of amount of substance

The mole, symbol mol, is the SI unit of amount of substance. One mole contains exactly 6,022 140 76 × 10^{23} elementary entities. This number is the fixed numerical value of the Avogadro constant, N_A, when expressed in the unit mol^{-1} and is called the Avogadro number.

The amount of substance, symbol n, of a system is a measure of the number of specified elementary entities. An elementary entity may be an atom, a molecule, an ion, an electron, any other particle or specified group of particles.
(26. CGPM (2018))

Unit of luminous intensity

The candela, symbol cd, is the SI unit of luminous intensity in a given direction. It is defined by taking the fixed numerical value of the luminous efficacy of monochromatic radiation of frequency 540 × 10^{12} Hz, K cd , to be 683 when expressed in the unit lm W^{-1} , which is equal to cd sr W^{-1} , or cd sr kg^{-1} m^{-2} s^3 , where the kilogram, metre and second are defined in terms of h, c and $\Delta\nu_{Cs}$.

(26. CGPM (2018))

1.1.1. Special name and symbol of the SI derived unit of temperature for expressing Celsius temperature:

Quantity	Unit	
	Name	Symbol
Celsius temperature	degree Celsius	°C

Celsius temperature t is defined as the difference $t = T - T_0$ between the two thermodynamic temperatures T and T_0 where T_0 = 273,15 K. An interval or difference of temperature may be expressed either in kelvins or in degrees Celsius. The unit ‘degree Celsius’ is equal to the unit ‘kelvin’.

1.2. SI derived units

1.2.1. General rule for SI derived units

Units derived coherently from SI base units are given as algebraic expressions in the form of products of powers of the SI base units with a numerical factor equal to 1.

1.2.2. SI derived units with special names and symbols

Quantity	Unit		Expresion	
	Name	Symbol	In terms of other SI units	In terms of SI base units
Frequency	hertz	Hz		s^{-1}
Force	newton	N		$m\ kg\ s^{-2}$
Pressure, stress	pascal	Pa	$N\ m^{-2}$	$m^{-1}\ kg\ s^{-2}$
Energy, work, quantity of heat	joule	J	N m	$m^{2}\ kg\ s^{-2}$
Power, radiant flux	watt	W	$J\ s^{-1}$	$m^{2}\ kg\ s^{-3}$
electric charge, Quantity of electricity	coulomb	C		s A
Electric potential, potential difference, electromotive force	volt	V	$W\ A^{-1}$	$m^{2}\ kg\ s^{-3}\ A^{-1}$
Electric resistance	ohm	Ω	$V\ A^{-1}$	$m^{2}\ kg\ s^{-3}A^{-2}$
Capacitance	farad	F	$C\ V^{-1}$	$m^{-2}\ kg^{-1}\ s^{4}\ A^{2}$
Conductance	siemens	S	$A\ V^{-1}$	$m^{-2}\ kg^{-1}\ s^{3}\ A^{2}$
Magnetic flux	weber	Wb	V S	$m^{2}\ kg\ s^{-2}\ A^{-1}$
Magnetic flux density	tesla	T	$Wb\ m^{-2}$	$kg\ s^{-2}\ A^{-1}$
Inductance	henry	H	$Wb\ A^{-1}$	$m^{2}\ kg\ s^{-2}\ A^{-2}$
Luminous flux	lumen	lm	cd sr	cd
Illuminance	lux	lx	$lm\ m^{-2}$	$m^{-2}\ cd$
Activity (of a radionuclide)	becquerel	Bq		s^{-1}

Absorbed dose, specific energy imparted, kerma, absorbed dose index	gray	Gy	J kg^{-1}	$m^2 s^{-2}$
Dose equivalent	sievert	Sv	J kg^{-1}	$m^2 s^{-2}$
Catalytic activity	katal	kat		mol s^{-1}
Plane angle	radian	rad		m m^{-1} = 1
Solid angle	steradian	sr		$m^2 m^{-2}$ = 1
(*) Special names for the unit of power: the name volt–ampere (symbol 'VA') when it is used to express the apparent power of alternating electric current, and var (symbol 'var') when it is used to express reactive electric power. The 'var' is not included in GCPM resolutions.				

Units derived from SI base units may be expressed in terms of the units listed in Chapter I.

In particular, derived SI units may be expressed by the special names and symbols given in the above table; for example, the SI unit of dynamic viscosity may be expressed as $m^{-1} \cdot kg \cdot s^{-1}$ or $N \cdot s \cdot m^{-2}$ or $Pa \cdot s$.

1.3. Prefixes and their symbols used to designate certain decimal multiples and submultiples:

Factor	Prefix	Symbol
10^{24}	yotta	Y
10^{21}	zetta	Z
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^{2}	hecto	h
10^{1}	deca	da
10^{-1}	deci	d
10^{-2}	centi	c
10^{-3}	milli	m
10^{-6}	micro	μ
10^{-9}	nano	n
10^{-12}	pico	p
10^{-15}	femto	f
10^{-18}	atto	a
10^{-21}	zepto	z
10^{-24}	yocto	y

The names and symbols of the decimal multiples and submultiples of the unit of mass are formed by attaching prefixes to the word 'gram' and their symbols to the symbol 'g'.

Where a derived unit is expressed as a fraction, its decimal multiples and submultiples may be designated by attaching a prefix to units in the numerator or the denominator, or in both these parts. Compound prefixes, that is to say prefixes formed by the juxtaposition of several of the above prefixes, may not be used.

1.4. Special authorized names and symbols of decimal multiples and submultiples of SI units:

Quantity	Unit		
	Name	Symbol	Value
Volume	litre	l, L*	$1\ l = 1\ L = 1\ dm^3 = 10^3\ cm^3 = 10^{-3}\ m^3$
Mass	tonne	t	$1\ t = 1\ Mg = 10^3\ kg$
Pressure, stress	bar	bar	$1\ bar = 10^5\ Pa$
* The two symbols 'I'and 'L' may be used for the litre unit. (CIPM 1879 16. CGPM (1979))			

The prefixes and their symbols listed in point 1. subpoint 1.3 may be used in conjunction with the units and symbols contained in point 1. subpoint 1.4.

2. In addition to the units of measurement covered by the SI units and listed in point 1 of this Annex, the following units of measurement may be used in the Republic of Serbia:

2.1. Units and names of units permitted in specialized fields only:

Quantity	Unit		
	Name	Symbol	Value
Vergency of optical systems	dioptre		1 dioptre= 1 m^{-1}
Mass of precious stones	carat		1 carat= $2x10^{-4}$ kg
Area of farmland and building land	are hectare	a ha	1 a = 100 m^2 1 ha = 10^4 m^2
Mass per unit length of textile yarns and threads	tex	tex	1 tex = 10^{-6} kg m^{-1}
Blood pressure and pressure of other body fluids	Millimetre of mercury	mm Hg	1 mm Hg = 133,322 Pa
Effective cross-sectional area	Barn	b	1 b = 10^{-28} m^2

The prefixes and their symbols listed in point 1. subpoint 1.3 may be used in conjunction with the units and symbols listed in point 2. subpoint 2.1. of this Annex, with the exception of the millimetre of mercury and its symbol.

2.2. Units which are defined on the basis of si units but are not decimal multiples or submultiples thereof:

Quantity	Unit		
	Name	Symbol	Value
Plane angle	revolution*		1 revolution = 2 π rad
	grade or gon	gon	$1\ \text{gon} = \frac{\pi}{200}\ \text{rad}$
	degree	°	$1° = \frac{\pi}{180}\ \text{rad}$
	minute of angle**	′	$1' = \frac{\pi}{10800}\ \text{rad}$
	second of angle	″	$1'' = \frac{\pi}{648000}\ \text{rad}$
Time	minute**	min	$1\ \text{min} = 60\ \text{s}$
	hour	h	$1\ \text{h} = 3600\ \text{s}$
	day	d	$1\ \text{d} = 864000\ \text{s}$
* No international symbol exists			
** The use of the name "minute" is allowed			

The prefixes listed in point 1. subpoint 1.3 may only be used in conjunction with the names ‘grade’ or ‘gon’ and the symbol ‘gon’.

2.3. Units used with the si, whose values in si are obtained experimentally:

Quantity	Unit		
	Name	Symbol	Definition
Energy	Electronvolt	eV	The electron volt is the kinetic energy acquired by an electron in passing through a potential difference of 1 volt in vaccum
Mass	Unified atomic mass unit	u	The unified atomic mass units is equal to 1/12 of the mass of an atom of the nuclide ^{12}C.

The prefixes and their symbols listed in point 1. subpoint 1.3 may be used in conjunction with these two units and with their symbols.

3. Compound units

Combinations of the units listed in Chapter I form compound units.