Int. J. Heat Mass Transfer. Vol. 9, pp. 837–844. Pergamon Press 1966. Printed in Great Britain

THE INTERNATIONAL SYSTEM OF UNITS

EDITORIAL ANNOUNCEMENT

SCIENTISTS and engineers concerned with numerical work in the field of heat and mass transfer have to familiarize themselves with a great variety of units. There are only two major systems, usually called "British" and "Metric", but within each system many different units are in use for the same quantities; there is no uniformity as to the choice of the hour or the second, the foot or the inch, the calorie, kilocalorie or joule, the British thermal unit or the Centigrade heat unit, the normal atmosphere or the technical atmosphere, the pound-force or the poundal, and so on and so on. This problem of units adds quite substantially to the difficulty of the subject.

Over the last few years, a new system of units—the International System—has emerged. It appears to have every prospect of being adopted throughout the world, and of eventually superseding all others, in every branch of science, engineering and commerce. The Editors have naturally observed this development with great interest, and have now agreed that the time has come to announce their full support for the International System and their hope that authors will use it increasingly in the future. A statement to this effect will be included in the *General Information for Authors* which appears in every issue of the Journal. The purpose of the present article is to draw attention to this development, and to provide certain basic information about the International System for future reference.

The system is a logical development of the metre–kilogramme–second system (MKS) which began to gain popularity early in the present century. In 1935, the International Electrochemical Commission (I.E.C.) accepted the recommendation of Professor Giorgi that this system of units of mechanics should be linked with the electro-magnetic units by the adoption of any one of the latter as a fourth basic unit. In 1950 the I.E.C. adopted the ampere as the fourth basic unit, giving the MKSA or Giorgi system.

The tenth Conférence Générale des Poids et Mesures (C.G.P.M.) in 1954 adopted a system of units based on the four MKSA units, the degree Kelvin as the basic unit of temperature and the candela as the unit of luminous intensity. The eleventh C.G.P.M. in 1960 [1] formally gave it the full title "Système International d'Unités", for which the abbreviation is SI in all languages.

The SI units have now been adopted by the International Organisation for Standardisation (I.S.O.) and the I.E.C. They have been given legal force in France and have been recommended by the national standardizing bodies in many countries. All other units are now defined in terms of SI units, which are therefore really the basic units even in countries where they are not yet popular.

In addition to having the obvious advantage of offering a real prospect of uniformity, the International System will be found superior to any other in current use, because it is a completely "coherent" system. In such a system the product or quotient of any two unit quantities leads to a unit of the resultant quantity; no numerical factors are involved, and there is only one unit for each type of quantity. The system can without difficulty be extended to provide the units required for all branches of science, so that everyone can speak the same "language", and (for example) the analogies between different processes are no longer obscured by the use of different units.

Detailed information about the International System can now be obtained from many sources and a list is given at the end of this note. [2–11] As already stated, SI is based on six basic units which, together with two supplementary units that have been officially adopted, are listed in Table 1.

Table 1. Basic and supplementary SI units

Quantity	Name of unit	Unit symbol
Length	metre	m
Mass	kilogramme	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature*	degree Kelvin	°K
Luminous intensity	candela	cd
Plane angle	radian	rad
Solid angle	steradian	sr

* No final decision has been reached, at international level, concerning the symbols to be used for temperature. It is generally agreed that an absolute temperature will be denoted by °K; a temperature in the Celsius (centigrade) scale will be denoted by °C. A temperature difference, which will be the same in either scale, may be denoted by deg, °K, °C, or K. In this note deg will be used, but there are some advantages in using K and it is thought likely that international usage may move in this direction.

The definitions of these basic units are given in ISO Recommendation R31 Part I [2], and in many national documents and published papers. From these units all others are derived, and Table 2 includes most of those likely to be needed for papers published in this Journal.

For convenience, special names and symbols have been agreed for some of the more important derived units, and these names can be used in forming further derived units. Nevertheless, all derived units can be expressed, if desired, in terms of the basic units.

Some important features of the International System can be illustrated by a brief discussion of the units of mechanics and heat. Each unit is built up from the appropriate basic units. Accordingly, since acceleration is length divided twice by time, its unit is the metre per second squared, or m/s^2. Force is proportional to mass times acceleration so that its unit is the $kg\,m/s^2$; it has been given the special name of newton, with the symbol N; it is the force required to impart an acceleration of 1 m s^2 to a mass of 1 kg.

In some widely-used "technical" systems of units, the "weight" of unit mass is used as the unit of force—for example the kilogramme-force or kilopond, and the pound-force. Since the force of gravity varies from place to place, an arbitrary standard value has to be adopted. When using such a system, if the units of force and mass are to be related it is necessary to introduce a proportionality factor, usually represented by g, having a value numerically equal to the standard gravitational acceleration in appropriate units. If, as is frequently the case, the force of gravity is not involved in the problem at all, its apparent introduction creates confusion and is a common source of error. There are of course various ways of avoiding this confusion, such as the use of the "algebra of quantities" [12], but the necessity of introducing an awkward factor still remains. The International System (in common, of course, with some others) avoids this difficulty; the newton is independent of gravity. For a situation where the force of gravity is indeed involved, we say (for example) that the weight of a mass M kilogrammes is a force of Mg newtons; here g is the *local* value of the acceleration due to gravity, expressed in m/s^2.

Pressure is force divided by area, so that the unit is the newton per square metre, N/m^2; it can be written in basic units as $(kg\,m/s^2)/m^2$ or $kg/m.s^2$. It is sometimes called the pascal or Pa.

Energy in the form of work is force times distance, and the unit is the newton-metre, Nm; in basic terms it is the $(kg\,m/s^2)m$ or $kg\,m^2/s^2$. It has been given the special name of joule and the symbol J. Heat is also a form of energy, but by convention—and unnecessarily—in many systems a different unit is used, so that heat must either be carefully distinguished from work or else converted into the proper units by means of the "mechanical equivalent of heat". No such

Table 2. Derived SI units

Quantity	Name(s) of unit	Unit symbol or abbreviation, where differing from basic form	Unit expressed in terms of basic or supplementary units
Area	square metre		m^2
Volume	cubic metre		m^3
Frequency	hertz, cycle per second†	Hz	s^{-1}
Density, concentration*	kilogramme per cubic metre		kg/m^3
Velocity	metre per second		m/s
Angular velocity	radian per second		rad/s
Acceleration	metre per second squared		m/s^2
Angular acceleration	radian per second squared		rad/s^2
Volumetric flow rate	cubic metre per second		m^3/s
Force	newton	N	$kg\,m/s^2$
Surface tension	newton per metre, joule per square metre	N/m, J/m^2	kg/s^2
Pressure	newton per square metre, pascal†	N/m^2, Pa†	$kg/m.s^2$
Viscosity, dynamic	newton-second per square metre, poiseuille†	$N\,s/m^2$, Pl†	kg/m.s
Viscosity, kinematic; diffusivity; mass conductivity*	metre squared per second		m^2/s
Work, torque, energy, quantity of heat	joule, newton-metre, watt-second	J, N m, W s	$kg\,m^2/s^2$
Power, heat flux	watt, joule per second	W, J/s	$kg\,m^2/s^3$
Heat flux density	watt per square metre	W/m^2	kg/s^3
Volumetric heat release rate	watt per cubic metre	W/m^3	$kg/m.s^3$
Heat transfer coefficient	watt per square metre degree	$W/m^2\,deg$	$kg/s^3\,deg$
Latent heat, enthalpy (specific)	joule per kilogramme	J/kg	m^2/s^2
Heat capacity (specific)	joule per kilogramme degree	J/kg deg	$m^2/s^2\,deg$
Capacity rate	watt per degree	W/deg	$kg\,m^2/s^3\,deg$
Thermal conductivity	watt per metre degree	W/m.deg, $\frac{J.m}{sm^2\,deg}$	$kg\,m/s^3\,deg$
Mass flux, mass flow rate*	kilogramme per second		kg/s
Mass flux density, mass flow rate per unit area*	kilogramme per square metre-second		$kg/m^2\,s$
Mass-transfer coefficient*	metre per second		m/s
Quantity of electricity	coulomb	C	A.s
Electromotive force	volt	V, W/A	$kg\,m^2/A\,s^3$
Electric resistance	ohm	Ω, V/A	$kg\,m^2/A^2s^3$
Electric conductivity	ampere per volt metre	A/V m	$A^2s^3/kg\,m^3$
Electric capacitance	farad	F, A s/V	$A^3s^4/kg\,m^2$
Magnetic flux	weber	Wb, V s	$kg\,m^2/A\,s^2$
Inductance	henry	H, V s/A	$kg\,m^2/A^2s^2$
Magnetic permeability	henry per metre	H/m	$kg\,m/A^2s^2$
Magnetic flux density	tesla, weber per square metre	T, Wb/m^2	$kg/A\,s^2$
Magnetic field strength	ampere per metre		A/m
Magnetomotive force	ampere		A
Luminous flux	lumen	lm	cd.sr
Luminance	candela per square metre		cd/m^2
Illumination	lux, lumen per square metre	lx, lm/m^2	$cd.sr/m^2$

* Other definitions also used: see text.
† Not used in all countries.

manoeuvre is necessary when using the International System because there is only one unit for any quantity: the units of heat and work are identical.

Power is work divided by time, so that the unit is the joule per second, J/s (or N m/s, or kg m^2/s^3). The joule per second is called the watt, so that a direct link is provided with a unit familiar in the field of electricity. Conversely, the joule can be regarded as the watt-second or W s and it is apparent that the three important forms of energy—work, heat and electrical energy—all have the same unit; it may be called the newton-metre, or joule, or watt-second, according to the application, but these are only different names for the same thing.

A further illustration can be provided by considering an elementary application of the analogy between heat transfer and momentum transfer. If it is assumed that the Stanton number is proportional to the friction factor, both can be expressed in terms of the same function of the Reynolds number. When working out a practical example in the British system of units, the heat transfer part of the calculation will probably be carried out in terms of the foot, pound, hour, degree Fahrenheit and British thermal unit, and the result will be expressed in British thermal units per hour. It would be natural to use the same units in calculating the pressure drop, but the result would then be given in terms of the lb/ft h^2, which is a totally unfamiliar unit of pressure; to obtain the customary lbf/in^2 it must be divided by $4{\cdot}17 \times 10^8$ (standard gravity in the foot-hour system) and by 144. Very probably the pressure drop will be used to calculate the power requirements, which will be obtained first in ft lbf/s and will then be converted into horse-power by dividing by 550. In the International System the same units are used throughout. The heat transfer is given in joules per second, i.e. watts. The pressure drop will be expressed in N/m^2, and the power required will be in N.m/s, i.e. watts. No conversion factors are required at any stage in the calculation.

The International System has a similar advantage over the metric technical system, since the latter includes the kcal as unit of heat and kgf as unit of force, and it is customary to use the hour in one part of the calculation and the second in the other.

The criticism is frequently made that some of the SI units are of inconvenient size. This difficulty is overcome by the use of multiplying prefixes, and agreement has been reached on names and abbreviations covering the range 10^{12}–10^{-18} (Table 3).

Table 3. Multiplying prefixes

tera	T	10^{12}	deci	d	10^{-1}
giga	G	10^{9}	centi	c	10^{-2}
mega	M	10^{6}	milli	m	10^{-3}
kilo	k	10^{3}	micro	μ	10^{-6}
hecto	h	10^{2}	nano	n	10^{-9}
deca (deka)	da	10^{1}	pico	p	10^{-12}
			femto	f	10^{-15}
			atto	a	10^{-18}

Multiplying prefixes are printed immediately adjacent to the unit symbols with which they are associated. Only one prefix is used with each unit symbol; the "millimicrometre", for example, is not allowed: it should be called the nanometre. Once attached, the prefix becomes part of the unit, so that 1 cm^2 = $(10^{-2}\text{m})^2$ = 10^{-4}m^2; in principle, however, one may write 1 c(m^2) = 10^{-2}m^2, though this is seldom done. Caution is needed when using a prefix for the unit of mass. Thus dag, the decagramme, does not mean 10 kg, but 10 g = 10×10^{-3} kg = 10^{-2} kg. The centikilogramme is clumsy, and could be regarded as forbidden by the single-prefix rule. It is probably safer to use the kg only.

To maintain the coherence of the system and avoid errors, only unprefixed SI units should be used in combination to form derived units. Suppose, for example, that the N/m^2 is too small a unit for a particular purpose; then the N/mm^2, which is a million times greater, might be more convenient. Experience shows that mistakes can easily be made when introducing such a unit into calculations and a better name for this unit is M(N/m^2). In this instance the brackets can be removed, giving MN/m^2, without risk of confusion. It is as well to replace any prefixes by the corresponding powers of ten before embarking on calculations. Thus if a complicated unit such as the MJ/dm^3 should be encountered, write MJ/dm^3 = 10^6J/(10^{-1}m)^3 = 10^9J/m^3. It would have been preferable to call this unit a gigajoule per cubic metre, or GJ/m^3.

The product of two units, for example the watt and the second, is represented in symbols either as W.s or W s: note the space between the unit symbols in the latter case. Care should be taken to distinguish between m as the unit symbol for metre and m as the multiplying prefix. The mN (letters adjacent) is the millinewton, and the m N (letters separated) is the metre-newton or joule; for obvious reasons it is safer to write m.N for the latter. In this particular instance reversing the order and calling the unit the newton-metre avoids the difficulty since N m is unambiguous. A dot should always be used to indicate a product if clarity is thereby improved.

Ratios between units can be indicated by a solidus, as in N/m^2, or by negative indices, as in N.m^{-2}. One solidus only is permitted, unless brackets are used; for example J/kg/deg is ambiguous and should be avoided at all costs; it should be replaced by J/kg deg. (J/kg)/deg is permissible, though cumbrous and unnecessary in this instance; this method may, however, increase clarity in some cases.

Much work on heat and mass transfer is presented in terms of dimensionless groups. When introducing numerical quantities it is necessary to use a coherent set of units, and the International System will be found particularly convenient. Consider, for example, the calculation of a Reynolds number: with velocity in m/s, length in m, density in kg/m^3 and dynamic viscosity in kg/m.s, it is obvious that the dimensions are correct, and no conversion factors are necessary. Again, to avoid the risk of error, only the units themselves and not their multiples or submultiples should be used.

The quantities introduced in mass-transfer calculations can be expressed in many different ways. Mass can be given in normal units or molar units, and the driving force for mass transfer in terms of concentration or partial pressure; concentration can be variously defined. A summary of the more important methods is given by Spalding [13].

Suppose that mass is expressed in normal units and the driving force in terms of concentration, defined as the mass of the component per unit volume. In SI units mass will be in kg and concentration in kg/m^3. The mass flux density will be in kg/m^{2}s, and can be equated either to a concentration gradient in kg/m^4 multiplied by a mass conductivity (diffusivity) in m^2/s, or to a concentration difference in kg/m^3 multiplied by a mass-transfer coefficient in m/s. Concentration can also be defined as the mass of one component in a given volume divided by the mass of all the material in that volume; it is then dimensionless, though it may sometimes be helpful to express it in terms of kg/kg. The mass-transfer coefficient is then required in kg/m^2.s.(kg/kg) and the mass conductivity in kg/m.s.(kg/kg).

The mole* (symbol: mol) as a unit of "quantity of matter" has been recommended by the I.S.O. for use in chemistry and chemical engineering, as an extension of the International System. Logically one should use the kmol, which may be regarded as representing M kg of a substance whose relative molecular mass (molecular weight) is M. No difficulty arises if this unit is used consistently; if, for example, concentrations are expressed in kmol/m^3, the mass transfer will be given as kmol/m^{2}s.

When the driving force is expressed in terms of partial pressure, the unit most often used is the atmosphere, but there is no fundamental reason for this and no difficulty will be found in

* One mole is that amount of a substance which contains as many molecules (or other designated particles) as there are atoms in 0·012 kg of ^{12}C.

using the N/m^2. To obtain a mass flux density in kg/m^2s, the mass-transfer coefficient is expressed in $kg/m^2s(N/m^2)$, which can be reduced to s/m; similarly the mass conductivity must be expressed in $kg/m.s(N/m^2)$, which reduces to s. Within the usual limits, concentration C in kg/m^3 and partial pressure p in N/m^2 are linked by the ideal gas law $C = p/RT$, where R is the gas constant and T the absolute temperature. It follows that the units of R will be N.m/kg K, which can be reduced to $m^2/s^2{}^\circ K$. The universal gas constant, that is, the gas constant for any substance divided by the relative molecular mass of that substance, is 8314·3 N.m/kmol°K. This constant is given in the literature in a great variety of units; in particular either work or heat units may be used in the numerator. In the International System the difficulty does not arise, as the N.m and the J are identical.

The use of SI units in magnetohydrodynamics can be illustrated by considering some of the dimensionless groups which are encountered. The Hartmann number, variously written as $\mu Ha(\sigma/\eta)^{\frac{1}{2}}$ or $(\sigma B^2a^2/\eta)^{\frac{1}{2}}$, introduces the magnetic permeability μ in H/m, the magnetic field strength H in A/m, the electrical conductivity σ in A/Vm, the density of magnetic flux B $(=\mu H)$ in T; a is a characteristic length and η the dynamic viscosity. All these units can be expressed in terms of the six basic units, and the non-dimensionality of the number can then be quickly verified: the unit of $(\sigma B^2a^2/\eta)^{\frac{1}{2}}$ is

$$\{(A^2s^3/kg\,m^3)(kg/A\,s^2)^2m^2/(kg/m.s)\}^{\frac{1}{2}} = 1.$$

The magnetic Reynolds number $\sigma\mu Va$, and the magnetic Grashof number $Gr.4\pi\sigma\mu\eta/\rho$ introduce no additional quantities. (The group $\rho/\sigma\mu$ is sometimes called the magnetic viscosity; ρ is the density of the fluid.)

For calculating radiation in SI units it is only necessary to note that Stefan's constant is $5{\cdot}6697 \times 10^{-8}$ $W/m^2{}^\circ K^4$.

Some of the SI units, such as the newton and the joule, may be unfamiliar even to those accustomed to the metric system. This difficulty will gradually disappear as the system is used. To assist in this process an Appendix gives notes about certain important units, indicating their magnitude and their relations with units in other systems. No attempt has been made to provide a complete set of conversion factors, since the space required would be prohibitive and they can now be obtained from many other sources. There are a number of familiar, named units in the cgs system which differ from corresponding SI units only by powers of 10; some of these are mentioned in the Appendix, but it is expected that they will gradually die out, since though conversion is simple errors can easily be made.

ACKNOWLEDGEMENTS

I gratefully acknowledge the assistance of my co-editors and many others in the preparation of this Announcement, and wish particularly to mention Professor E. J. Le Fevre. Responsibility for the accuracy of the statements is, however, my own.

A. J. EDE

REFERENCES

1. Comptes Rendus des Séances de la Onzième Conférence Générale des Poids et Mesures, p. 87. Gauthier-Villars, Paris (1960).
2. ISO Recommendation R31 (several parts). International Organisation for Standardisation, 1960.
3. British Standard 3763:1964, The International System (SI) Units. B.S.I., London.
4. P. H. BIGG, The International System of Units (SI Units). *Br. J. Appl. Phys.* **15**, 1243, 1964.
5. PAMELA ANDERTON and P. H. BIGG, *Changing to the Metric System.* Conversion factors, symbols and definitions. Her Majesty's Stationery Office, London (1965).
6. W. HAEDER, Towards the International System of Units. Deutscher Normen Ausschuss (DNA). Beuth-Vertrieb GmbH, Berlin (1964).
7. W. HAEDER, The "newton" unit of force used in engineering calculations. Deutscher Normen Ausschuss (DNA). Beuth-Vertrieb GmbH, Berlin (1964).
8. P. VIGOUREUX, Electric and magnetic units in the International System. *Bull. Inst. Phys., Lond.* **15** (10), 241 (1964).
9. V. P. KOROTKOV, Introduction of the International System of Units (SI) in the U.S.S.R. *Instrument Construction* No. 7, 1 (1963).
10. I.U.P.A.P. Document UIP 11 (SUN 65-3); Symbols, Units and Nomenclature in Physics. German translation. Vieweg & Sohn, Braunschweig (1965).
11. The use of SI units. Publication PD 5686; B.S.I., London (1965).

12. U. STILLE, *Messen und Rechnen in der Physik*. Vieweg & Sohn, Braunschweig (1955).

13. D. B. SPALDING, *Convective Mass Transfer*. Edward Arnold, London (1963).

APPENDIX

Notes on particular units

Length:	1 ft = 0·3048 m (exactly).
Mass:	1 lb = 0·453 592 37 kg (exactly).
Density, concentration:	1 kg/m^3 = $10^{-3} g/cm^3$ = g/litre.
	Density of water is about $10^3 kg/m^3$.
	Density of air is about 1 kg/m^3 at N.T.P.
	1 lb/ft^3 = 16·0185 kg/m^3.
Acceleration:	Standard gravity = 9·806 65 m/s^2.
Force:	1 N = 10^5dyn. The weight of an apple is about one newton!
	1 kgf = 9·806 65 N (exactly). 1 lbf = 4·448 22 N.
	1 pdl = 0·138 255 N.
Pressure:	1 N/m^2 = 10 dyn/cm^2. 10^5 N/m^2 is called the bar and is roughly equal to atmospheric pressure.
	1 lbf/in^2 = 6894·76 N/m^2 $\simeq$ 7 kN/m^2.
	1 kgf/cm^2 (technical atmosphere) = 98 066·5 N/m^2 (exactly).
	1 atm (normal or standard atmosphere) = 101 325 N/m^2 (exactly).
	1 mm Hg = 133·322 N/m^2. 1 in H_2O = 249·089 N/m^2.
	1 torr = 133·322 N/m^2.
Dynamic viscosity:	1 $N.s/m^2$ (poiseuille) = 10 poise.
	Dynamic viscosity of water is about 10^{-3} poiseuille, or 1 mPl.
	1 $lbf.s/ft^2$ = 47·8803 Pl. 1 lb/ft.h = 4·133 77 × 10^{-4} Pl.
Kinematic viscosity:	1 m^2/s = 10^4 stokes. 1 ft^2/s = 0·092 903 0 m^2/s.
	1 ft^2/h = 2·580 64 × 10^{-5} m^2/s.
Energy, work, heat, etc.:	1 J = 10^7 erg.
	1 ft.lbf = 1·355 82 J. 1 kgf.m = 9·806 65 J.
	1 cal (int. table) = 4·1868 J (exactly).
	1 Btu (int. table) = 1055·06 J (exactly).
	1 kW.h = 3·6 × 10^6 J.
Power, heat flux, etc.:	1 W = 10^7 erg/s.
	1 kgf.m/s = 9·806 65 W. 1 ft.lbf/s = 1·355 82 W.
	1 horsepower (British) = 745·700 W.
	1 horsepower (metric) = 735·499 W.
	1 kcal/h = 1·163 W (exactly).
	1 Btu/h = 0·293 071 W.
Heat flux density:	1 $kcal/m^2h$ = 1·163 W/m^2 (exactly).
	1 Btu/ft^2h = 3·154 59 W/m^2.
Heat-transfer coefficient:	1 $kcal/m^2h\,deg$ = 1·163 W/m^2deg.
	1 $Btu/ft^2h\,degF$ = 5·678 26 W/m^2deg.
Enthalpy, latent heat (specific):	1 kcal/kg = 4·1868 kJ/kg (exactly).
	1 Btu/lb = 2326 J/kg (exactly).
	Latent heat of boiling water is about 2 MJ/kg.
Heat capacity (specific):	1 kcal/kg deg = 1 Btu/lb degF = 4·1868 kJ/kg deg (exactly).

	Specific heat capacity of water is about 4 kJ/kg deg; of air, 1 kJ/kg deg at N.T.P.
Thermal conductivity:	1 kcal/m.h deg = 1·163 W/m deg.
	1 Btu/ft.h degF = 1·73073 W/m deg.
	Thermal conductivity of water is about 0·6 W/m deg.

Electric and magnetic units		*Equivalent cgs units* *Electromagnetic*	*Electrostatic*
Electric current	1 A	$= 10^{-1}$	$10^{-1}c$
EMF, potential	1 V	$= 10^{8}$	$10^{8}/c$
Electrical field strength	1 V/m	$= 10^{6}$	$10^{6}/c$
Electric charge	1 C	$= 10^{-1}$	$10^{-1}c$
Electric flux density	1 C/m^2	$= 10^{-5}$	$10^{-5}c$
Resistance	1 Ω	$= 10^{9}$	$10^{9}/c^2$
Capacitance	1 F	$= 10^{-9}$	$10^{-9}c^2$
Permittivity	1 F/m	= —	$4 \times 10^{-11}\pi c^2$
Magnetic field strength	1 A/m	$= 4 \times 10^{-3}\pi$ (oersted)	—
Magnetic flux	1 Wb	$= 10^{8}$	—
Magnetic flux density	1 T	$= 10^{4}$ (gauss)	—
Inductance	1 H	$= 10^{9}$	—
Magnetic permeability	1 H/m	$= 10^{7}/4\pi$	—

(c = speed of light in vacuum = $2{\cdot}997925 \times 10^{8}$ m/s.)

1. М. Г. Богуславский, П. П. Кремлевский, Б. Н. Олейник, Е. Н. Чегурина, К. П. Широков, Под редакцией К. П. Широкова, *Таблицы перевода единиц измерений*. Стандартгиз, Москва (1961).
2. Г. Д. Бурдун, Н. В. Калашников, Д. Р. Стоцкий, Под редакцией Г. Д. Бурдуна, *Международная система единиц*. Изд. Высшая школа. Москва (1964).
3. Г. Д. Бурдун, *Единицы физических величин*. Стандартгиз. Москва (1962).
4. Н. И. Кузнецов, *Международная система единиц* (С И). Издательство Высшая школа. Минск (1965).