AS 2900.0—2002
ISO 31-0:1992/Amd.1:1998

AS 2900.0

Australian Standard™

Quantities and units

Part 0: General principles

Standards Australia

This Australian Standard was prepared by Committee ME-071, Quantities, Units and Conversions. It was approved on behalf of the Council of Standards Australia on 21 June 2002 and published on 5 August 2002.

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CSIRO, Telecommunications and Industrial Physics

National Standards Commission

National Association of Testing Authorities Australia

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Part 0: General principles

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PREFACE

This Standard was prepared by the Standards Australia Committee ME-071, *Quantities, Units and Conversions,* to supersede AS 2900.0—1986, *Quantities, units, and symbols,* Part 0: *General principles concerning quantities, units, and symbols*.

This Standard is identical with, and has been reproduced from, ISO 31-0:1992/Amd.1:1998, *Quantities and units,* Part 0*: General principles*.

The amendment to ISO 31-0:1992 is included in this document and is shown by a bar line set against the affected text.

The objective of this Standard is to provide users with general information about principles concerning physical quantities, equations, quantity and unit symbols, and coherent unit systems, especially the International System of Units, SI.

Users of this Standard are advised by Standards Australia, under arrangements with ISO and IEC, as well as certain other Standards organizations, that the number of this Standard is not reproduced on each page; its identity is shown only on the cover and title pages.

For the purpose of this Standard, the ISO text should be modified as follows:

(a) *Terminology* The words 'this Australian Standard' should replace the words 'this International Standard' wherever they appear.

(b) *Decimal marker* Substitute a full point for a comma where it appears as a decimal marker.

(c) *References* The reference to the International Standards should be replaced by reference to the following Australian Standard:

Reference to International Standard or other Publication			*Australian Standard*		
ISO			AS		
31	Quantities and units		2900	Quantities and units	
31-1	Part 1:	Space and time	2900.1	Part 1:	Space and time
31-3	Part 3:	Mechanics	2900.3	Part 3:	Mechanics
31-4	Part 4:	Heat	2900.4	Part 4:	Heat
31-5	Part 5:	Electricity and magnetism	2900.5	Part 5:	Electricity and magnetism
31-10	Part 10:	Nuclear reactions and ionizing radiations	2900.10	Part 10:	Nuclear reactions and ionizing radiations
31-11	Part 11:	Mathematical signs and symbols for use in the physical sciences and technology	2900.11	Part 11:	Mathematical signs and symbols for use in the physical sciences and technology
31-12	Part 12:	Characteristic numbers	2900.12	Part 12:	Characteristic numbers
31-13	Part 13:	Solid state physics	2900.13	Part 13:	Solid state physics

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AUSTRALIAN STANDARD

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Part 0:
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1 Scope

This part of ISO 31 gives general information about principles concerning physical quantities, equations, quantity and unit symbols, and coherent unit systems, especially the International System of Units, SI.

The principles laid down in this part of ISO 31 are intended for general use within the various fields of science and technology and as a general introduction to the other parts of ISO 31.

2 Quantities and units

2.1 Physical quantity, unit and numerical value

In ISO 31 only physical quantities used for the quantitative description of physical phenomena are treated. Conventional scales, such as the Beaufort scale, Richter scale and colour intensity scales, and quantities expressed as the results of conventional tests, e.g. corrosion resistance, are not treated here, neither are currencies nor information contents.

Physical quantities may be grouped together into categories of quantities which are mutually comparable. Lengths, diameters, distances, heights, wavelengths and so on would constitute such a category. Mutually comparable quantities are called "quantities of the same kind".

If a particular example of a quantity from such a category is chosen as a reference quantity called the *unit*, then any other quantity from this category can be expressed in terms of this unit, as a product of this unit and a number. This number is called the *numerical value* of the quantity expressed in this unit.

EXAMPLE

The wavelength of one of the sodium lines is

$$\lambda = 5{,}896 \times 10^{-7}\ \mathrm{m}$$

Here λ is the symbol for the physical quantity wavelength; m is the symbol for the unit of length, the metre; and $5{,}896 \times 10^{-7}$ is the numerical value of the wavelength expressed in metres.

In formal treatments of quantities and units, this relation may be expressed in the form

$$A = \{A\} \cdot [A]$$

where A is the symbol for the physical quantity, $[A]$ the symbol for the unit and $\{A\}$ symbolizes the numerical value of the quantity A expressed in the unit $[A]$. For vectors and tensors the components are quantities which may be expressed as described above.

If a quantity is expressed in another unit which is k times the first unit, then the new numerical value becomes $1/k$ times the first numerical value; the physical quantity, which is the product of the numerical value and the unit, is thus independent of the unit.

EXAMPLE

Changing the unit for the wavelength from the metre to the nanometre, which is 10^{-9} times the metre, leads to a numerical value which is 10^{9} times the numerical value of the quantity expressed in metres.