INTERNATIONAL STANDARD

ISO 80000-1

Second edition
2022-12

Quantities and units —

Part 1: General

Grandeurs et unités —

Partie 1: Généralités

Reference number
ISO 80000-1:2022(E)

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Published in Switzerland

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 12, *Quantities and units*, in collaboration with IEC/TC 25, *Quantities and units*.

This second edition cancels the first edition (ISO 80000-1:2009), which has been technically revised. It also incorporates the Technical Corrigendum ISO 80000-1:2009/Cor.1:2011.

The main changes are as follows:

— More focus on concepts and terminology based on a system of quantities, particularly following the recent major revision of the International System of Units (SI) and the proposed revisions of the International vocabulary of metrology (VIM).

— At the same time, subclauses of previous editions of this document which essentially reproduced content from other sources – particularly metrological vocabulary, descriptions of SI units and compilations of fundamental constants – have been substantially removed from the present edition, in accordance with a resolution taken by ISO/TC 12 in 2020.

A list of all parts in the ISO 80000 and IEC 80000 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Systems of quantities – as defined in ISO/IEC Guide 99 – can be treated in many consistent, but different, ways. Which treatment to use is partly a matter of convention.

The quantities and relations among the quantities used here are those almost universally accepted for use throughout the physical sciences. They are presented in the majority of scientific textbooks today and are familiar to all scientists and technologists.

The quantities and the relations among them are essentially infinite in number and are continually evolving as new fields of science and technology are developed. Thus, it is not possible to list all these quantities and relations in the ISO/IEC 80000 series; instead, a selection of the more commonly used quantities and the relations among them is presented.

It is inevitable that some readers working in particular specialized fields may find that the quantities they are interested in using may not be listed in this document or in another International Standard. However, provided that they can relate their quantities to more familiar examples that are listed, this will not prevent them from defining units for their quantities.

The system of quantities presented in this document is named the International System of Quantities (ISQ), in all languages. This name was not used in ISO 31 series, from which the present harmonized series has evolved. However, the ISQ does appear in ISO/IEC Guide 99 and is the system of quantities underlying the International System of Units, denoted “SI”, in all languages according to the SI Brochure.

Quantities and units —

Part 1: General

1 Scope

This document gives general information and definitions concerning quantities, systems of quantities, units, quantity and unit symbols, and coherent unit systems, especially the International System of Quantities (ISQ).

The principles laid down in this document are intended for general use within the various fields of science and technology, and as an introduction to other parts of this International Standard.

The ISO/IEC 80000 series does not, as yet, cover ordinal quantities and nominal properties.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC Guide 99, *International vocabulary of metrology — Basic and general concepts and associated terms (VIM)*

BIPM *The International System of Units (SI)*, 9th edition (2019), https://www.bipm.org/en/publications/si-brochure

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC Guide 99 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

4 Quantities

4.1 The concept of quantity

In this document, it is accepted that things (including physical bodies and phenomena, substances, events, etc.) are characterized by properties, according to which things can be compared, in terms of having the same property or not, such as the shape of rigid bodies or the blood group of human beings. Some properties make things comparable also by order, so that for example winds can be compared by their strength and earthquakes can be compared by their magnitude. Finally, some properties make things comparable not only in terms of equivalence and order, but also in more complex ways, and in particular by ratio, as is the case for most physical quantities, according to which the mass or the electric charge of a body might be twice the mass or the electric charge of another body, and so on.