

This is a preview of "BS EN ISO 80000-2:20...". [Click here to purchase the full version from the ANSI store.](#)



**BSI Standards Publication**

## Quantities and units

---

Part 2: Mathematics (ISO 80000-2:2019)

This is a preview of "BS EN ISO 80000-2:20...". [Click here to purchase the full version from the ANSI store.](#)

## National foreword

This British Standard is the UK implementation of EN ISO 80000-2:2019. It supersedes BS EN ISO 80000-2:2013, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee SS/7, General metrology, quantities, units and symbols.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2019  
Published by BSI Standards Limited 2019

ISBN 978 0 580 94511 3

ICS 01.060; 01.075

**Compliance with a British Standard cannot confer immunity from legal obligations.**

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 October 2019.

### Amendments/corrigenda issued since publication

Date	Text affected
------	---------------

---

This is a preview of "BS EN ISO 80000-2:20...". Click here to purchase the full version from the ANSI store.

## EUROPÄISCHE NORM

October 2019

ICS 01.060; 01.075

Supersedes EN ISO 80000-2:2013

English Version

## Quantities and units - Part 2: Mathematics (ISO 80000-2:2019)

Grandeurs et unités - Partie 2: Mathématiques (ISO 80000-2:2019)

Größen und Einheiten - Teil 2: Mathematik (ISO 80000-2:2019)

This European Standard was approved by CEN on 5 May 2019.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

This is a preview of "BS EN ISO 80000-2:20...". [Click here to purchase the full version from the ANSI store.](#)

<b>Contents</b>	<b>Page</b>
<b>European foreword.....</b>	<b>3</b>

This is a preview of "BS EN ISO 80000-2:20...". [Click here to purchase the full version from the ANSI store.](#)

## **European foreword**

This document (EN ISO 80000-2:2019) has been prepared by Technical Committee ISO/TC 12 "Quantities and units" in collaboration with Technical Committee CEN/SS F02 "Units and symbols" the secretariat of which is held by CCMC.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2020, and conflicting national standards shall be withdrawn at the latest by April 2020.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 80000-2:2013.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

## **Endorsement notice**

The text of ISO 80000-2:2019 has been approved by CEN as EN ISO 80000-2:2019 without any modification.

This is a preview of "BS EN ISO 80000-2:20...". [Click here to purchase the full version from the ANSI store.](#)

This is a preview of "BS EN ISO 80000-2:20...". [Click here to purchase the full version from the ANSI store.](#)

Second edition  
2019-08

---

---

## Quantities and units —

### Part 2: Mathematics

*Grandeurs et unités —  
Partie 2: Mathématiques*



Reference number  
ISO 80000-2:2019(E)

© ISO 2019

This is a preview of "BS EN ISO 80000-2:20...". Click here to purchase the full version from the ANSI store.



## **COPYRIGHT PROTECTED DOCUMENT**

© ISO 2019

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
CP 401 • Ch. de Blandonnet 8  
CH-1214 Vernier, Geneva  
Phone: +41 22 749 01 11  
Fax: +41 22 749 09 47  
Email: [copyright@iso.org](mailto:copyright@iso.org)  
Website: [www.iso.org](http://www.iso.org)

Published in Switzerland



This is a preview of "BS EN ISO 80000-2:20...". Click here to purchase the full version from the ANSI store.

## Contents

	Page
Foreword .....	iv
Introduction .....	v
<b>1 Scope .....</b>	<b>1</b>
<b>2 Normative references .....</b>	<b>1</b>
<b>3 Terms and definitions .....</b>	<b>1</b>
<b>4 Variables, functions and operators .....</b>	<b>1</b>
<b>5 Mathematical logic .....</b>	<b>2</b>
<b>6 Sets .....</b>	<b>3</b>
<b>7 Standard number sets and intervals .....</b>	<b>4</b>
<b>8 Miscellaneous symbols .....</b>	<b>6</b>
<b>9 Elementary geometry .....</b>	<b>7</b>
<b>10 Operations .....</b>	<b>8</b>
<b>11 Combinatorics .....</b>	<b>10</b>
<b>12 Functions .....</b>	<b>11</b>
<b>13 Exponential and logarithmic functions .....</b>	<b>15</b>
<b>14 Circular and hyperbolic functions .....</b>	<b>16</b>
<b>15 Complex numbers .....</b>	<b>18</b>
<b>16 Matrices .....</b>	<b>18</b>
<b>17 Coordinate systems .....</b>	<b>19</b>
<b>18 Scalars, vectors and tensors .....</b>	<b>21</b>
<b>19 Transforms .....</b>	<b>25</b>
<b>20 Special functions .....</b>	<b>26</b>
<b>Bibliography .....</b>	<b>32</b>
<b>Alphabetical index .....</b>	<b>33</b>

This is a preview of "BS EN ISO 80000-2:20...". Click here to purchase the full version from the ANSI store.

## 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](http://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](http://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](http://www.iso.org/iso/foreword.html).

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

This second edition cancels and replaces the first edition (ISO 80000-2:2009), which has been technically revised.

The main changes compared to the previous edition are as follows:

- [Clause 4](#) revised to add clarification about writing of font types; revised rule for splitting equations over two or more lines;
- [Clause 18](#) revised to include clarification on scalars, vectors and tensors;
- missing symbols and expressions added in the second column "Symbol, expression" of the tables, and additional clarifications given in the fourth column "Remarks and examples" when necessary;
- Annex A deleted.

NOTE Although missing symbols and expressions have been added in this second edition of ISO 80000-1, the document remains non exhaustive.

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

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](http://www.iso.org/members.html).

This is a preview of "BS EN ISO 80000-2:20...". [Click here to purchase the full version from the ANSI store.](#)

## Introduction

### Arrangement of the tables

Each table of symbols and expressions (except [Table 13](#)) gives hints (in the third column) about the meaning or how the expression may be read for each item (numbered in the first column) of the symbol under consideration, usually in the context of a typical expression (second column). If more than one symbol or expression is given for the same item, they are on an equal footing. In some cases, e.g. for exponentiation, there is only a typical expression and no symbol. The purpose of the entries is identification of each concept and is not intended to be a complete mathematical definition. The fourth column "Remarks and examples" gives further information and is not normative.

[Table 13](#) has a different format. It gives the symbols of coordinates, as well as the position vectors and their differentials, for coordinate systems in three-dimensional spaces.

This is a preview of "BS EN ISO 80000-2:20...". [Click here to purchase the full version from the ANSI store.](#)

This is a preview of "BS EN ISO 80000-2:20...". Click here to purchase the full version from the ANSI store.

# Quantities and units —

## Part 2: Mathematics

### 1 Scope

This document specifies mathematical symbols, explains their meanings, and gives verbal equivalents and applications.

This document is intended mainly for use in the natural sciences and technology, but also applies to other areas where mathematics is used.

### 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 80000-1, *Quantities and units — Part 1: General*

### 3 Terms and definitions

Tables 1 to 16 give the symbols and expressions used in the different fields of mathematics.

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

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

### 4 Variables, functions and operators

It is customary to use different sorts of letters for different sorts of entities, e.g.  $x, y, \dots$  for numbers or elements of some given set,  $f, g$  for functions, etc. This makes formulas more readable and helps in setting up an appropriate context.

Variables such as  $x, y$ , etc., and running numbers, such as  $i$  in  $\sum_i x_i$  are printed in italic type. Parameters, such as  $a, b$ , etc., which may be considered as constant in a particular context, are printed in italic type. The same applies to functions in general, e.g.  $f, g$ .

An explicitly defined function not depending on the context is, however, printed in upright type, e.g.  $\sin, \exp, \ln, \Gamma$ . Mathematical constants, the values of which never change, are printed in upright type, e.g.  $e = 2,718\ 281\ 828 \dots$ ;  $\pi = 3,141\ 592 \dots$ ;  $i^2 = -1$ . Well-defined operators are also printed in upright type, e.g. **div**,  $\delta$  in  $\delta x$  and each  $d$  in  $df/dx$ . Some transforms use special capital letters (see [Clause 19](#), Transforms).

Numbers expressed in the form of digits are always printed in upright type, e.g. 351 204; 1,32; 7/8.

Binary operators, for example  $+, -, /$ , shall be preceded and followed by thin spaces. This rule does not apply in case of unary operators, as in  $-17,3$ .