



BSI Standards Publication

Quantities and units

Part 5: Thermodynamics

National foreword

This British Standard is the UK implementation of EN ISO 80000-5:2019+A1:2025. It is identical to ISO 80000-5:2019, incorporating amendment 1:2025. It supersedes BS EN ISO 80000-5:2019, which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to ISO text carry the number of the ISO amendment. For example, text altered by ISO amendment 1 is indicated by A1 A1.

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 committee manager.

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EUROPEAN STANDARD
NORME EUROPÉENNE
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EN ISO 80000-5:2019+A1

August 2025

ICS 01.060; 17.200.01

Supersedes EN ISO 80000-5:2013

English Version

**Quantities and units - Part 5: Thermodynamics (ISO
80000-5:2019)**

Grandeurs et unités - Partie 5: Thermodynamique (ISO
80000-5:2019)

Größen und Einheiten - Teil 5: Thermodynamik (ISO
80000-5:2019)

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

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European foreword

This document (EN ISO 80000-5:2019) 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of an identical text or by endorsement, at the latest by April 2020, and conflicting national standards shall be withdrawn at the latest by April 2020.

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Endorsement notice

The text of ISO 80000-5:2019 has been approved by CEN as EN ISO 80000-5:2019 without any modification.

European foreword to Amendment 1

This document (EN ISO 80000-5:2019/A1:2025) has been prepared by Technical Committee ISO/TC 12 "Quantities and units" in collaboration with CCMC.

This Amendment to the European Standard EN ISO 80000-5:2019 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 2026, and conflicting national standards shall be withdrawn at the latest by February 2026.

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Endorsement notice

The text of ISO 80000-5:2019/Amd 1:2025 has been approved by CEN as EN ISO 80000-5:2019/A1:2025 without any modification.

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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).

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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 Technical Committee IEC/TC 25, *Quantities and units*.

This second edition cancels and replaces the first edition of (ISO 80000-5:2007), which has been technically revised.

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

- the table giving the quantities and units has been simplified;
- some definitions and the remarks have been stated physically more precisely.

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.

Quantities and units —

Part 5: Thermodynamics

1 Scope

This document gives names, symbols, definitions and units for quantities of thermodynamics. Where appropriate, conversion factors are also given.

2 Normative references

[A1] 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.

BIPM *The International System of Units (SI)*, 9th ed. (2019) **[A1]**

3 Terms and definitions

[A1] Names, symbols, definitions and units for quantities used in thermodynamics are given in Table 1 and in the International System of Units (SI). **[A1]** 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/>

Table 1 — Quantities and units used in thermodynamics

Item No.	Quantity		Unit	Remarks
	Name	Symbol		
5-1	thermodynamic temperature	T, θ	K	<p>It is measured with a primary thermometer, examples of which are gas thermometers of different kinds, noise thermometers, or radiation thermometers.</p> <p>The Boltzmann constant (ISO 80000-1) relates energy at the individual particle level with thermodynamic temperature.</p> <p>Differences of thermodynamic temperatures or changes may be expressed either in kelvin, symbol K, or in degrees Celsius, symbol °C (item 5-2).</p> <p>Thermodynamic temperature is one of the seven base quantities in the International System of Quantities, ISQ (see ISO 80000-1).</p> <p>The International Temperature Scale of 1990</p> <p>For the purpose of practical measurements, the International Temperature Scale of 1990, ITS-90, was adopted by CIPM in 1989, which is a close approximation to the thermodynamic temperature scale.</p> <p>The quantities defined by this scale are denoted T_{90} and t_{90}, respectively (replacing T_{68} and t_{68} defined by the International Practical Temperature Scale of 1968, IPTS-68), where</p> $\frac{t_{90}}{1^{\circ}\text{C}} = \frac{T_{90}}{1\text{ K}} - 273,15$