



BSI Standards Publication

## Desktop and notebook computers — Measurement of energy consumption

---

## National foreword

This British Standard is the UK implementation of EN IEC 62623:2022. It is identical to IEC 62623:2022. It supersedes BS EN 62623:2013, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee EPL/100, Audio-visual equipment.

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

### Contractual and legal considerations

This publication has been prepared in good faith, however no representation, warranty, assurance or undertaking (express or implied) is or will be made, and no responsibility or liability is or will be accepted by BSI in relation to the adequacy, accuracy, completeness or reasonableness of this publication. All and any such responsibility and liability is expressly disclaimed to the full extent permitted by the law.

This publication is provided as is, and is to be used at the recipient's own risk.

The recipient is advised to consider seeking professional guidance with respect to its use of this publication.

This publication is not intended to constitute a contract. Users are responsible for its correct application.

© The British Standards Institution 2022  
Published by BSI Standards Limited 2022

ISBN 978 0 539 05123 0

ICS 27.015; 35.020; 35.160

### **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 30 September 2022.

### Amendments/corrigenda issued since publication

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

---

EUROPEAN STANDARD

**EN IEC 62623**

NORME EUROPÉENNE

EUROPÄISCHE NORM

June 2022

ICS 35.160

Supersedes EN 62623:2013

English Version

**Desktop and notebook computers - Measurement of energy  
consumption  
(IEC 62623:2022)**

Ordinateurs de bureau et ordinateurs portables - Mesure de  
la consommation d'énergie  
(IEC 62623:2022)

Desktop- und Notebook-Computer - Messung des  
Energieverbrauchs  
(IEC 62623:2022)

This European Standard was approved by CENELEC on 2022-06-01. CENELEC 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 CENELEC 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 CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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



European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

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

## European foreword

The text of document 100/3583/CDV, future edition 2 of IEC 62623, prepared by IEC/TC 100 "Audio, video and multimedia systems and equipment" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62623:2022.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2023-03-01
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2025-06-01

This document supersedes EN 62623:2013 and all of its amendments and corrigenda (if any).

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

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

## Endorsement notice

The text of the International Standard IEC 62623:2022 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

IEC 62075      NOTE      Harmonized as EN 62075

## CONTENTS

FOREWORD .....	5
INTRODUCTION .....	7
1 Scope .....	8
2 Normative references .....	8
3 Terms, definitions and abbreviations .....	8
3.1 Terms and definitions .....	8
3.2 Abbreviated terms .....	11
4 Specifications for EUT .....	12
4.1 Computer descriptions .....	12
4.1.1 Desktop computer .....	12
4.1.2 Notebook computer .....	12
4.1.3 Two-in-one notebook .....	12
4.1.4 Multiscreen notebook .....	13
4.1.5 Slate/Tablet .....	13
4.1.6 Portable all-in-one computer .....	13
4.1.7 Integrated desktop computer .....	13
4.2 Power modes .....	13
4.2.1 Off mode .....	13
4.2.2 $P_{\text{off}}$ .....	14
4.2.3 Sleep mode .....	14
4.2.4 $P_{\text{sleep}}$ .....	14
4.2.5 $P_{\text{sleepWoL}}$ .....	14
4.2.6 Alternative low power mode .....	14
4.2.7 $P_{\text{alpm}}$ .....	14
4.2.8 On mode .....	14
4.2.9 $P_{\text{on}}$ .....	14
4.2.10 Idle modes .....	14
4.2.11 Active (work) mode .....	15
4.2.12 $P_{\text{work}}$ .....	15
4.3 Profile attributes .....	15
4.3.1 Profile .....	15
4.3.2 Majority profile .....	16
4.3.3 Minority profile .....	16
4.3.4 Profile study .....	16
4.3.5 Product active power ratio .....	16
4.3.6 PAPR .....	16
4.3.7 PAWR .....	16
4.3.8 Product TEC error .....	16
4.3.9 Profile TEC error .....	16
4.4 Categorisation attributes .....	16
4.4.1 General .....	16
4.4.2 Cores .....	17
4.4.3 Expandability score (ES) .....	17
4.4.4 Performance score .....	17
4.4.5 Graphics capability .....	17

4.4.6	TEC adders .....	17
5	Test procedure and conditions, categorisation, TEC formula, meter specifications and results reporting.....	17
5.1	General.....	17
5.2	Test setup.....	17
5.3	Test procedure.....	20
5.3.1	General .....	20
5.3.2	Measuring off mode .....	20
5.3.3	Measuring sleep mode.....	20
5.3.4	Measuring alternative low power mode .....	20
5.3.5	Measuring long idle mode.....	21
5.3.6	Measuring short idle mode.....	21
5.3.7	Measuring active power mode (optional, see 5.6) .....	22
5.4	Test conditions .....	22
5.5	Categorisation .....	22
5.5.1	General .....	22
5.5.2	TEC adders .....	23
5.6	Annualised energy consumption formulas .....	23
5.6.1	General .....	23
5.6.2	Estimated annualised energy consumption formula (estimated active workload).....	23
5.6.3	Measured annualised energy consumption formula (with an active workload).....	24
5.6.4	Criteria for an active workload .....	25
5.7	True RMS watt meter specification.....	26
5.8	True RMS watt meter accuracy .....	27
5.9	Ambient light meter specification.....	28
5.10	Reporting of results.....	28
Annex A (informative)	Overview of profile methodology.....	31
Annex B (informative)	Majority profile .....	33
Annex C (informative)	Method for conducting a profile study .....	34
C.1	General.....	34
C.2	Profile study example.....	34
Annex D (informative)	Sample TEC calculations .....	38
D.1	General.....	38
D.2	Notebook computer example.....	38
D.3	Desktop computer example.....	39
Annex E (informative)	Power measurement methodology.....	40
E.1	General.....	40
E.2	Sampling method .....	40
E.3	Average reading method .....	41
E.4	Direct meter reading method .....	42
Bibliography	.....	44
Figure 1	– Typical test setup.....	19
Figure 2	– Example of estimated annualised energy consumption formula (estimated active workload).....	24
Figure 3	– Measured annualised energy consumption formula (with an active workload).....	25

Figure A.1 – Example of a typical profile .....	31
Table 1 – External display connection priority .....	18
Table 2 – Test conditions .....	22
Table 3 – Ambient light meter specifications .....	28
Table B.1 – Duty cycle attributes for the enterprise and residential majority profile duty cycle study.....	33
Table C.1 – Profile study 1.....	35
Table C.2 – Profile study, duty cycles .....	35
Table C.3 – Profile study, $TEC_{actual}$ and $TEC_{estimated}$ calculations .....	36

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**DESKTOP AND NOTEBOOK COMPUTERS –  
MEASUREMENT OF ENERGY CONSUMPTION**

## FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 62623 has been prepared by technical area 19: Environmental and energy aspects for multimedia systems and equipment, of IEC technical committee 100: Audio, video and multimedia systems and equipment. It is an International Standard.

This second edition cancels and replaces the first edition published in 2012. This edition constitutes a technical revision.

The first edition of this standard was originally based on ECMA-383.

This edition includes the following significant technical changes with respect to the previous edition:

- a) Additions to terms & definitions and modification to short & long idle descriptions.
- b) Test setup modifications for notebooks where battery pack cannot be removed for testing.
- c) Categorisation procedure based on ECMA-389 removed.
- d) Replace majority profile with new duty cycle study including new duty cycle attributes for desktop and notebook in a residential and enterprise application.
- e) Removal of any reference and test methodology to ENERGY STAR V5.



The text of this International Standard is based on the following documents:

Draft	Report on voting
100/3583/CDV	100/3669/RVC

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at [www.iec.ch/members\\_experts/refdocs](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/standardsdev/publications](http://www.iec.ch/standardsdev/publications).

In this standard, the following print types or formats are used:

- requirements proper and normative annexes: in roman type;
- notes/explanatory matter: in smaller roman type;
- terms that are defined in 3.1: **bold**.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under [webstore.iec.ch](http://webstore.iec.ch) in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

**IMPORTANT – The "colour inside" logo on the cover page of this document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.**

## INTRODUCTION

This document provides definitions of energy saving modes and generic energy saving guidance for designers of desktop and notebook computers, by defining a methodology on how to measure the energy consumption of a product whilst providing key categorisation attributes that enable energy consumption comparisons of similar products.

This document is originally based on ECMA-383 and complements the guidance given in IEC 62075.

# DESKTOP AND NOTEBOOK COMPUTERS – MEASUREMENT OF ENERGY CONSUMPTION

## 1 Scope

This document covers personal computing products. It applies to desktop and notebook computers as defined in 4.1 that are marketed as final products and that are hereafter referred to as the equipment under test (EUT) or product.

This document specifies:

- a test procedure to enable the measurement of the power and/or energy consumption in each of the EUT's power modes;
- formulas for calculating the **typical energy consumption (TEC)** for a given period (normally annual);
- a majority profile to be used with this document which enables conversion of average power into energy within the **TEC** formulas;
- a pre-defined format for the presentation of results.

This document does not set any pass/fail criteria for the EUTs. Users of the test results define such criteria.

## 2 Normative references

There are no normative references in this document.

## 3 Terms, definitions and abbreviations

For the purposes of this document, the following terms and definitions apply.

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

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

### 3.1 Terms and definitions

#### 3.1.1

##### **active workload**

simulated amount of productive or operative activity that the EUT performs as represented in the  $P_{\text{work}}$  (see 4.2.12) and  $T_{\text{work}}$  (see 3.1.11.6) attributes of the **TEC** equation (see 5.6)

#### 3.1.2

##### **category**

classification within a product type that is based on product features and installed components

#### 3.1.3

##### **duty cycle**

divisions of time the EUT spends in each of its individual power modes

Note 1 to entry: A duty cycle is expressed as a percentage totalling 1.