



IEC 62623

Edition 2.0 2022-04  
REDLINE VERSION

# INTERNATIONAL STANDARD



---

**Desktop and notebook computers – Measurement of energy consumption**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

ICS 35.160

ISBN 978-2-8322-1103-8

**Warning! Make sure that you obtained this publication from an authorized distributor.**

## 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 .....                  | 12 |
| 4 Specifications for EUT .....               | 13 |
| 4.1 Computer descriptions .....              | 13 |
| 4.1.1 Desktop computer .....                 | 13 |
| 4.1.2 Notebook computer .....                | 13 |
| 4.1.3 Two-in-one notebook .....              | 13 |
| 4.1.4 Multiscreen notebook .....             | 13 |
| 4.1.5 Slate/Tablet .....                     | 13 |
| 4.1.6 Portable all-in-one computer .....     | 14 |
| 4.1.7 Integrated desktop computer .....      | 14 |
| 4.2 Power modes .....                        | 14 |
| 4.2.1 Off mode .....                         | 14 |
| 4.2.2 $P_{\text{off}}$ .....                 | 14 |
| 4.2.3 Sleep mode .....                       | 14 |
| 4.2.4 $P_{\text{sleep}}$ .....               | 15 |
| 4.2.5 $P_{\text{sleepWoL}}$ .....            | 15 |
| 4.2.6 Alternative low power mode .....       | 15 |
| 4.2.7 $P_{\text{alpm}}$ .....                | 15 |
| 4.2.8 On mode .....                          | 15 |
| 4.2.9 $P_{\text{on}}$ .....                  | 15 |
| 4.2.10 Idle modes .....                      | 15 |
| 4.2.11 Active (work) mode .....              | 16 |
| 4.2.12 $P_{\text{work}}$ .....               | 16 |
| 4.3 Profile attributes .....                 | 16 |
| 4.3.1 Profile .....                          | 16 |
| 4.3.2 Majority profile .....                 | 17 |
| 4.3.3 Minority profile .....                 | 17 |
| 4.3.4 Profile study .....                    | 17 |
| 4.3.5 Product active power ratio .....       | 17 |
| 4.3.6 PAPR .....                             | 17 |
| 4.3.7 PAWR .....                             | 17 |
| 4.3.8 Product TEC error .....                | 17 |
| 4.3.9 Profile TEC error .....                | 17 |
| 4.4 Categorisation attributes .....          | 17 |
| 4.4.1 General .....                          | 17 |
| 4.4.2 Cores .....                            | 18 |
| 4.4.3 Channels of memory .....               |    |
| 4.4.4 System memory .....                    |    |
| 4.4.5 System fan .....                       |    |

|                                  |                                                                                                             |               |
|----------------------------------|-------------------------------------------------------------------------------------------------------------|---------------|
| 4.4.3                            | Expandability score (ES) .....                                                                              | 18            |
| 4.4.4                            | Performance score .....                                                                                     | 18            |
| 4.4.5                            | Graphics capability .....                                                                                   | 18            |
| 4.4.6                            | TEC adders .....                                                                                            | 18            |
| 5                                | Test procedure and conditions, categorisation, TEC formula, meter specifications and results reporting..... | 18            |
| 5.1                              | General.....                                                                                                | 18            |
| 5.2                              | Test setup.....                                                                                             | 19            |
| 5.3                              | Test procedure.....                                                                                         | 21            |
| 5.3.1                            | General .....                                                                                               | 21            |
| 5.3.2                            | Measuring off mode .....                                                                                    | 21            |
| 5.3.3                            | Measuring sleep mode.....                                                                                   | 21            |
| 5.3.4                            | Measuring alternative low power mode .....                                                                  | 22            |
| 5.3.5                            | Measuring long idle mode.....                                                                               | 22            |
| 5.3.6                            | Measuring short idle mode.....                                                                              | 22            |
| 5.3.7                            | Measuring active power mode (optional, see 5.6) .....                                                       | 23            |
| 5.4                              | Test conditions .....                                                                                       | 23            |
| 5.5                              | Categorisation .....                                                                                        | 24            |
| 5.5.1                            | General .....                                                                                               | 24            |
| <del>5.5.2</del>                 | <del>ULE category.....</del>                                                                                | <del>24</del> |
| 5.5.2                            | TEC adders .....                                                                                            | 24            |
| 5.6                              | Annualised energy consumption formulas .....                                                                | 25            |
| 5.6.1                            | General .....                                                                                               | 25            |
| 5.6.2                            | Estimated annualised energy consumption formula (estimated active workload).....                            | 25            |
| 5.6.3                            | Measured annualised energy consumption formula (with an active workload).....                               | 26            |
| 5.6.4                            | Criteria for an active workload .....                                                                       | 27            |
| 5.7                              | True RMS watt meter specification.....                                                                      | 28            |
| 5.8                              | True RMS watt meter accuracy .....                                                                          | 29            |
| 5.9                              | Ambient light meter specification.....                                                                      | 30            |
| 5.10                             | Reporting of results.....                                                                                   | 30            |
| Annex A (informative)            | Overview of profile methodology.....                                                                        | 33            |
| Annex B (informative)            | Majority profile .....                                                                                      | 35            |
| Annex C (informative)            | Method for conducting a profile study .....                                                                 | 38            |
| C.1                              | General.....                                                                                                | 38            |
| C.2                              | Profile study example.....                                                                                  | 38            |
| Annex D (informative)            | Sample TEC calculations .....                                                                               | 42            |
| D.1                              | General.....                                                                                                | 42            |
| D.2                              | Notebook computer example.....                                                                              | 42            |
| D.3                              | Desktop computer example .....                                                                              | 43            |
| <del>Annex E (informative)</del> | <del>ENERGY STAR V5 compliant testing methodology.....</del>                                                | <del>48</del> |
| Annex E (informative)            | Power measurement methodology.....                                                                          | 48            |
| E.1                              | General.....                                                                                                | 48            |
| E.2                              | Sampling method .....                                                                                       | 48            |
| E.3                              | Average reading method .....                                                                                | 49            |
| E.4                              | Direct meter reading method .....                                                                           | 50            |
| <del>Annex G (normative)</del>   | <del>Procedure for the registration of categories for IEC 62623.....</del>                                  | <del>50</del> |

|                                                                                                             |                  |
|-------------------------------------------------------------------------------------------------------------|------------------|
| Bibliography.....                                                                                           | 54               |
| Figure 1 – Typical test setup.....                                                                          | 20               |
| Figure 2 – Example of estimated annualised energy consumption formula (estimated active workload).....      | 26               |
| Figure 3 – Measured annualised energy consumption formula (with an active workload).....                    | 27               |
| Figure A.1 – Example of a typical profile.....                                                              | 33               |
| <del>Figure B.1 – TEC error summary chart.....</del>                                                        | <del>.....</del> |
| Table 1 – External display connection priority.....                                                         | 19               |
| Table 2 – Test conditions.....                                                                              | 24               |
| Table 3 – Ambient light meter specifications.....                                                           | 30               |
| Table B.1 – Duty cycle attributes for the enterprise and residential majority profile duty cycle study..... | 35               |
| <del>Table B.2 – Summary of the enterprise energy study.....</del>                                          | <del>.....</del> |
| Table C.1 – Profile study 1.....                                                                            | 39               |
| <del>Table C.2 – ENERGY STAR® V5 computer study.....</del>                                                  | <del>.....</del> |
| Table C.2 – Profile study, duty cycles.....                                                                 | 40               |
| Table C.3 – Profile study, TEC <sub>actual</sub> and TEC <sub>estimated</sub> calculations.....             | 40               |
| <del>Table E.1 – Duty cycle attributes for V5 compliant testing.....</del>                                  | <del>.....</del> |

## 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.

**This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 62623:2012. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.**

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 ~~includes~~ ~~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 ~~criteria~~ ~~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 ~~that should~~ to be used with this document which enables conversion of average power into energy within the **TEC** formulas;
- ~~— a system of categorisation enabling like for like comparisons of energy consumption between EUTs;~~
- 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 ~~should~~ define such criteria.

## 2 Normative references

~~The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.~~

~~ECMA-389, *Procedure for the Registration of Categories for ECMA-383 2nd edition*~~

There are no normative references in this document.

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE



---

**Desktop and notebook computers – Measurement of energy consumption**

**Ordinateurs de bureau et ordinateurs portables – Mesurage de la consommation d'énergie**

## 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.

## SOMMAIRE

|                                                       |    |
|-------------------------------------------------------|----|
| AVANT-PROPOS .....                                    | 49 |
| INTRODUCTION.....                                     | 51 |
| 1    Domaine d'application .....                      | 52 |
| 2    Références normatives .....                      | 52 |
| 3    Termes, définitions et abréviations .....        | 52 |
| 3.1    Termes et définitions .....                    | 52 |
| 3.2    Abréviations.....                              | 55 |
| 4    Spécifications relatives à l'EUT.....            | 56 |
| 4.1    Descriptions des ordinateurs.....              | 56 |
| 4.1.1    Ordinateur de bureau.....                    | 56 |
| 4.1.2    Ordinateur portable.....                     | 57 |
| 4.1.3    Ordinateur portable deux-en-un .....         | 57 |
| 4.1.4    Ordinateur portable à plusieurs écrans ..... | 57 |
| 4.1.5    Ardoise/tablette .....                       | 57 |
| 4.1.6    Ordinateur portable tout-en-un.....          | 57 |
| 4.1.7    Ordinateur de bureau intégré.....            | 58 |
| 4.2    Modes d'alimentation .....                     | 58 |
| 4.2.1    Mode arrêt.....                              | 58 |
| 4.2.2 $P_{\text{off}}$ .....                          | 58 |
| 4.2.3    Mode sommeil .....                           | 58 |
| 4.2.4 $P_{\text{sleep}}$ .....                        | 58 |
| 4.2.5 $P_{\text{sleepWoL}}$ .....                     | 58 |
| 4.2.6    Mode basse alimentation alternative .....    | 59 |
| 4.2.7 $P_{\text{alpm}}$ .....                         | 59 |
| 4.2.8    Mode marche.....                             | 59 |
| 4.2.9 $P_{\text{on}}$ .....                           | 59 |
| 4.2.10    Modes d'attente .....                       | 59 |
| 4.2.11    Mode actif (travail).....                   | 60 |
| 4.2.12 $P_{\text{work}}$ .....                        | 60 |
| 4.3    Attributs de profil .....                      | 60 |
| 4.3.1    Profil.....                                  | 60 |
| 4.3.2    Profil majoritaire .....                     | 60 |
| 4.3.3    Profil minoritaire .....                     | 60 |
| 4.3.4    Etude de profil .....                        | 60 |
| 4.3.5    Rapport de puissance active du produit ..... | 61 |
| 4.3.6    PAPR .....                                   | 61 |
| 4.3.7    PAWR.....                                    | 61 |
| 4.3.8    Erreur de TEC de produit.....                | 61 |
| 4.3.9    Erreur de TEC de profil.....                 | 61 |
| 4.4    Attributs de classification .....              | 61 |
| 4.4.1    Généralités .....                            | 61 |
| 4.4.2    Cœurs .....                                  | 61 |
| 4.4.3    Score d'extensibilité (ES).....              | 61 |
| 4.4.4    Score de performance .....                   | 61 |
| 4.4.5    Fonction graphique .....                     | 62 |

|                                                                                                               |                                                                                                                                              |    |
|---------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----|
| 4.4.6                                                                                                         | Additionneurs de TEC .....                                                                                                                   | 62 |
| 5                                                                                                             | Procédure et conditions d'essai, classification, formules de TEC, spécifications des appareils de mesure et compte-rendu des résultats ..... | 62 |
| 5.1                                                                                                           | Généralités .....                                                                                                                            | 62 |
| 5.2                                                                                                           | Montage d'essai .....                                                                                                                        | 62 |
| 5.3                                                                                                           | Procédure d'essai .....                                                                                                                      | 65 |
| 5.3.1                                                                                                         | Généralités .....                                                                                                                            | 65 |
| 5.3.2                                                                                                         | Mesurage du mode arrêt .....                                                                                                                 | 65 |
| 5.3.3                                                                                                         | Mesurage du mode sommeil .....                                                                                                               | 65 |
| 5.3.4                                                                                                         | Mesurage du mode basse alimentation alternative .....                                                                                        | 66 |
| 5.3.5                                                                                                         | Mesurage du mode attente longue .....                                                                                                        | 66 |
| 5.3.6                                                                                                         | Mesurage du mode attente courte .....                                                                                                        | 66 |
| 5.3.7                                                                                                         | Mesurage du mode actif (facultatif, voir 5.6) .....                                                                                          | 67 |
| 5.4                                                                                                           | Conditions d'essai .....                                                                                                                     | 67 |
| 5.5                                                                                                           | Classification .....                                                                                                                         | 68 |
| 5.5.1                                                                                                         | Généralités .....                                                                                                                            | 68 |
| 5.5.2                                                                                                         | Additionneurs de TEC .....                                                                                                                   | 68 |
| 5.6                                                                                                           | Formules de consommation d'énergie annualisée .....                                                                                          | 69 |
| 5.6.1                                                                                                         | Généralités .....                                                                                                                            | 69 |
| 5.6.2                                                                                                         | Formule de consommation d'énergie annualisée estimée (charge de travail active estimée) .....                                                | 69 |
| 5.6.3                                                                                                         | Formule de consommation d'énergie annualisée mesurée (avec une charge de travail active) .....                                               | 70 |
| 5.6.4                                                                                                         | Critères pour une charge de travail active .....                                                                                             | 71 |
| 5.7                                                                                                           | Spécifications relatives au wattmètre efficace vrai .....                                                                                    | 72 |
| 5.8                                                                                                           | Exactitude du wattmètre efficace vrai .....                                                                                                  | 73 |
| 5.9                                                                                                           | Spécifications relatives à l'appareil de mesure de la lumière ambiante .....                                                                 | 74 |
| 5.10                                                                                                          | Rapport des résultats .....                                                                                                                  | 74 |
| Annexe A (informative)                                                                                        | Vue d'ensemble de la méthodologie de profil .....                                                                                            | 77 |
| Annexe B (informative)                                                                                        | Profil majoritaire .....                                                                                                                     | 79 |
| Annexe C (informative)                                                                                        | Méthode pour réaliser une étude de profil .....                                                                                              | 80 |
| C.1                                                                                                           | Généralités .....                                                                                                                            | 80 |
| C.2                                                                                                           | Exemple d'étude de profil .....                                                                                                              | 80 |
| Annexe D (informative)                                                                                        | Exemples de calculs de TEC .....                                                                                                             | 84 |
| D.1                                                                                                           | Généralités .....                                                                                                                            | 84 |
| D.2                                                                                                           | Exemple d'ordinateur portable .....                                                                                                          | 84 |
| D.3                                                                                                           | Exemple d'ordinateur de bureau .....                                                                                                         | 85 |
| Annexe E (informative)                                                                                        | Méthodologie de mesure de la puissance .....                                                                                                 | 86 |
| E.1                                                                                                           | Généralités .....                                                                                                                            | 86 |
| E.2                                                                                                           | Méthode d'échantillonnage .....                                                                                                              | 86 |
| E.3                                                                                                           | Méthode de lecture moyennée .....                                                                                                            | 88 |
| E.4                                                                                                           | Méthode de lecture directe de l'appareil de mesure .....                                                                                     | 89 |
| Bibliographie                                                                                                 | .....                                                                                                                                        | 90 |
| Figure 1 – Montage d'essai type                                                                               | .....                                                                                                                                        | 64 |
| Figure 2 – Exemple de formule de consommation d'énergie annualisée estimée (charge de travail active estimée) | .....                                                                                                                                        | 70 |
| Figure 3 – Formule de consommation d'énergie annualisée mesurée (avec une charge de travail active)           | .....                                                                                                                                        | 71 |

|                                                                                                                                          |    |
|------------------------------------------------------------------------------------------------------------------------------------------|----|
| Figure A.1 – Exemple de profil type .....                                                                                                | 78 |
| Tableau 1 – Priorité de connexion des écrans externes .....                                                                              | 63 |
| Tableau 2 – Conditions d'essai .....                                                                                                     | 68 |
| Tableau 3 – Spécifications relatives à l'appareil de mesurage de la lumière ambiante .....                                               | 74 |
| Tableau B.1 – Attributs de cycle de service pour l'étude des cycles de service du profil<br>majoritaire domestique et d'entreprise ..... | 79 |
| Tableau C.1 – Etude de profil 1 .....                                                                                                    | 81 |
| Tableau C.2 – Etude de profil, cycles de service .....                                                                                   | 81 |
| Tableau C.3 – Etude de profil, calculs de $TEC_{actual}$ et de $TEC_{estimated}$ .....                                                   | 82 |

## COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

**ORDINATEURS DE BUREAU ET ORDINATEURS PORTABLES –  
MESURAGE DE LA CONSOMMATION D'ÉNERGIE****AVANT-PROPOS**

- 1) La Commission Electrotechnique Internationale (IEC) est une organisation mondiale de normalisation composée de l'ensemble des comités électrotechniques nationaux (Comités nationaux de l'IEC). L'IEC a pour objet de favoriser la coopération internationale pour toutes les questions de normalisation dans les domaines de l'électricité et de l'électronique. À cet effet, l'IEC – entre autres activités – publie des Normes internationales, des Spécifications techniques, des Rapports techniques, des Spécifications accessibles au public (PAS) et des Guides (ci-après dénommés "Publication(s) de l'IEC"). Leur élaboration est confiée à des comités d'études, aux travaux desquels tout Comité national intéressé par le sujet traité peut participer. Les organisations internationales, gouvernementales et non gouvernementales, en liaison avec l'IEC, participent également aux travaux. L'IEC collabore étroitement avec l'Organisation Internationale de Normalisation (ISO), selon des conditions fixées par accord entre les deux organisations.
- 2) Les décisions ou accords officiels de l'IEC concernant les questions techniques représentent, dans la mesure du possible, un accord international sur les sujets étudiés, étant donné que les Comités nationaux de l'IEC intéressés sont représentés dans chaque comité d'études.
- 3) Les Publications de l'IEC se présentent sous la forme de recommandations internationales et sont agréées comme telles par les Comités nationaux de l'IEC. Tous les efforts raisonnables sont entrepris afin que l'IEC s'assure de l'exactitude du contenu technique de ses publications; l'IEC ne peut pas être tenue responsable de l'éventuelle mauvaise utilisation ou interprétation qui en est faite par un quelconque utilisateur final.
- 4) Dans le but d'encourager l'uniformité internationale, les Comités nationaux de l'IEC s'engagent, dans toute la mesure possible, à appliquer de façon transparente les Publications de l'IEC dans leurs publications nationales et régionales. Toutes divergences entre toutes Publications de l'IEC et toutes publications nationales ou régionales correspondantes doivent être indiquées en termes clairs dans ces dernières.
- 5) L'IEC elle-même ne fournit aucune attestation de conformité. Des organismes de certification indépendants fournissent des services d'évaluation de conformité et, dans certains secteurs, accèdent aux marques de conformité de l'IEC. L'IEC n'est responsable d'aucun des services effectués par les organismes de certification indépendants.
- 6) Tous les utilisateurs doivent s'assurer qu'ils sont en possession de la dernière édition de cette publication.
- 7) Aucune responsabilité ne doit être imputée à l'IEC, à ses administrateurs, employés, auxiliaires ou mandataires, y compris ses experts particuliers et les membres de ses comités d'études et des Comités nationaux de l'IEC, pour tout préjudice causé en cas de dommages corporels et matériels, ou de tout autre dommage de quelque nature que ce soit, directe ou indirecte, ou pour supporter les coûts (y compris les frais de justice) et les dépenses découlant de la publication ou de l'utilisation de cette Publication de l'IEC ou de toute autre Publication de l'IEC, ou au crédit qui lui est accordé.
- 8) L'attention est attirée sur les références normatives citées dans cette publication. L'utilisation de publications référencées est obligatoire pour une application correcte de la présente publication.
- 9) L'attention est attirée sur le fait que certains des éléments du présent document de l'IEC peuvent faire l'objet de droits de brevet. L'IEC ne saurait être tenue pour responsable de ne pas avoir identifié de tels droits de brevets.

L'IEC 62623 a été établie par le domaine technique 19: Aspects liés à l'environnement et à l'énergie des systèmes et équipements multimédias, du comité d'études 100 de l'IEC: Systèmes et équipements audio, vidéo et services de données. Il s'agit d'une Norme internationale.

Cette seconde édition annule et remplace la première édition parue en 2012. Cette édition constitue une révision technique.

La première édition de la présente norme a été établie sur la base de l'ECMA-383.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

- a) des termes et définitions ont été ajoutés, et les descriptions relatives aux termes attente courte et attente longue ont été modifiées;
- b) le montage d'essai a été modifié pour les ordinateurs portables dont le bloc de batteries ne peut pas être retiré pour les essais;

- c) la procédure de classification issue de l'ECMA-389 a été supprimée;
- d) le profil majoritaire a été remplacé par une nouvelle étude des cycles de service; de nouveaux attributs de cycle de service ont été ajoutés pour les ordinateurs de bureau et les ordinateurs portables destinés à une application domestique et d'entreprise;
- e) les références à la spécification et à la méthodologie d'essai ENERGY STAR V5 ont été supprimées.

Le texte de cette Norme internationale est issu des documents suivants:

| Projet       | Rapport de vote |
|--------------|-----------------|
| 100/3583/CDV | 100/3669/RVC    |

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à son approbation.

La langue employée pour l'élaboration de cette Norme internationale est l'anglais.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2, il a été développé selon les Directives ISO/IEC, Partie 1 et les Directives ISO/IEC, Supplément IEC, disponibles sous [www.iec.ch/members\\_experts/refdocs](http://www.iec.ch/members_experts/refdocs). Les principaux types de documents développés par l'IEC sont décrits plus en détail sous [www.iec.ch/standardsdev/publications](http://www.iec.ch/standardsdev/publications).

Dans la présente norme, les caractères d'imprimerie ou formats suivants sont utilisés:

- exigences proprement dites et annexes normatives: caractères romains;
- notes/explications: petits caractères romains;
- termes définis en 3.1: **caractères gras**.

Le comité a décidé que le contenu de ce document ne sera pas modifié avant la date de stabilité indiquée sur le site web de l'IEC sous [webstore.iec.ch](http://webstore.iec.ch) dans les données relatives au document recherché. A cette date, le document sera

- reconduit,
- supprimé,
- remplacé par une édition révisée, ou
- amendé.

**IMPORTANT – Le logo "colour inside" qui se trouve sur la page de couverture de ce document indique qu'il contient des couleurs qui sont considérées comme utiles à une bonne compréhension de son contenu. Les utilisateurs devraient, par conséquent, imprimer cette publication en utilisant une imprimante couleur.**

## INTRODUCTION

Le présent document donne les définitions relatives aux modes d'économie d'énergie ainsi que des recommandations d'économie d'énergie générales pour les concepteurs d'ordinateurs de bureau et d'ordinateurs portables, en définissant une méthodologie de mesurage de la consommation d'énergie d'un produit et en fournissant des attributs de classification clés qui permettent de comparer la consommation d'énergie de produits analogues.

Le présent document a été établi sur la base de l'ECMA-383 et complète les recommandations fournies dans l'IEC 62075.

## ORDINATEURS DE BUREAU ET ORDINATEURS PORTABLES – MESURAGE DE LA CONSOMMATION D'ÉNERGIE

### 1 Domaine d'application

Le présent document traite des produits informatiques personnels. Il s'applique aux ordinateurs de bureau et aux ordinateurs portables définis en 4.1, qui sont commercialisés en tant que produits finaux et appelés ci-après matériel à l'essai (EUT, *Equipment Under Test*) ou produit.

Le présent document spécifie:

- une procédure d'essai pour mesurer la consommation de puissance et/ou d'énergie dans chacun des modes d'alimentation de l'EUT;
- des formules pour calculer la **consommation d'énergie type** (**TEC**, *Typical Energy Consumption*) sur une période donnée (annuellement en général);
- le profil majoritaire à utiliser avec le présent document pour convertir la puissance moyenne en énergie dans les formules de **TEC**;
- un format prédéfini pour la présentation des résultats.

Le présent document n'établit aucun critère de réussite/d'échec pour les EUT. Ces critères sont définis par les utilisateurs des résultats d'essai.

### 2 Références normatives

Le présent document ne contient aucune référence normative.