IEC TR 62617

Edition 2.0 2015-11

TECHNICAL REPORT

Home laundry appliances – Uncertainty reporting of measurements

IEC TR 62617:2015-11(en)

IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

About the IEC
The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications
The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

IEC Catalogue - webstore.iec.ch/catalogue
The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

IEC publications search - www.iec.ch/searchpub
The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,…). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished
Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and also once a month by email.

Electropedia - www.electropedia.org
The world's leading online dictionary of electronic and electrical terms containing more than 30 000 terms and definitions in English and French, with equivalent terms in 15 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary
More than 60 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

IEC Customer Service Centre - webstore.iec.ch/csc
If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: csc@iec.ch.

IEC TR 62617

Edition 2.0 2015-11

TECHNICAL REPORT

Home laundry appliances – Uncertainty reporting of measurements

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 97.060

ISBN 978-2-8322-3033-6

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

HOME LAUNDRY APPLIANCES – UNCERTAINTY REPORTING OF MEASUREMENTS

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.

The main task of IEC technical committees is to prepare International Standards. However, a technical committee may propose the publication of a technical report when it has collected data of a different kind from that which is normally published as an International Standard, for example "state of the art".

IEC 62617, which is a Technical Report, has been prepared by subcommittee 59D: Performance of household and similar electrical laundry appliances, of IEC technical committee 59: Performance of household and similar electrical appliances.

This second edition cancels and replaces the first edition published in 2010. This edition constitutes a technical revision.

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

- alternative expression of expanded uncertainties in absolute values;
- expanded uncertainty for horizontal drum washing machines according to IEC 60456:2010;

- expanded uncertainties for washer-dryer according to IEC 62512:2012
- clarifications of the examples of expanded uncertainty calculation.

The text of this technical report is based on the following documents:

Enquiry draft	Report on voting
59D/430/DTR	59D/432/RVC

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

Words in **bold** in the text are specifically defined in Clause 3.

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

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

A bilingual version of this publication may be issued at a later date.

INTRODUCTION

To encourage the efficient use of energy and other resources, National governments and regional authorities have issued regulations, which mandate the provision of information to consumers regarding the energy and water consumption of household appliances and associated performance characteristics. This information is usually conveyed by labels attached to appliances at the point of sale and also by brochures provided by manufacturers.

Methods for measuring declared values for energy and water consumption and performance characteristics should be of sufficient accuracy to provide confidence to governments, consumers and manufacturers. The accuracy of a test method is expressed in terms of bias and precision. Precision, when evaluating test methods, is expressed in terms of two measurement concepts: repeatability and reproducibility. Therefore, standard procedures should be used for determining the repeatability and the reproducibility of test methods developed by technical committee 59 and its subcommittees. The repeatability of a test method should be sufficiently accurate for comparative testing. The reproducibility of a test method should be sufficiently accurate for the determination of values which are declared and for checking these declared values.

Uncertainty reporting is essential to ensure measured data are interpreted in a correct way. Especially when data of measurements are compared between laboratories or when normative requirements are set up, it is necessary to know the uncertainty with which data can be measured.

HOME LAUNDRY APPLIANCES – UNCERTAINTY REPORTING OF MEASUREMENTS

1 Scope

This Technical Report (TR) applies to uncertainty reporting of measurements of home laundry electrical appliances.

It allows to estimate the uncertainty of a measured result and to predict the range of values that may be measured when the same appliance is measured in another laboratory following the same measurement method.

NOTE The provisions in this TR can also be used to evaluate other kinds of products.

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.

IEC TR 61923:1997, *Household electrical appliances – Method of measuring performance – Assessment of repeatability and reproducibility*

ISO/IEC Guide 98-3:2008, *Uncertainty of measurement – Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)*

3 Terms and definitions

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

3.1
repeatability conditions
conditions where independent test results are obtained with the same method on identical test items in the same laboratory by the same operator using the same equipment within short intervals of time

[SOURCE: IEC TR 61923:1997, 3.6]

3.2
repeatability standard deviation
standard deviation of test results obtained under **repeatability conditions**

[SOURCE: IEC TR 61923:1997, 3.7]

3.3
reproducibility conditions
conditions where test results are obtained with the same method on identical test items in different laboratories with different operators using different equipment

[SOURCE: IEC TR 61923:1997, 3.9]

3.4
reproducibility standard deviation
standard deviation of test results obtained under **reproducibility conditions**

[SOURCE: IEC TR 61923:1997, 3.10]

3.5
statistical uncertainty
repeatability standard deviation obtained in one laboratory under **repeatability conditions**

3.6
expanded uncertainty
confidence interval, which allows to calculate the minimum and maximum value where the average measured result may be found when the measurement is re-done at any other laboratory following **reproducibility conditions**

4 The approach to uncertainty measurement

4.1 The importance of the uncertainty

When a measurement has been performed giving a figure as a result for some quantity (i.e. the measurand), how sure is this figure? In other words:

- if the measurement is repeated, will the same figure be achieved as the result?
- if another group or another laboratory performs the measurement, how close will the results expected to be?

By means of an uncertainty amount an uncertainty interval $y \pm U$ may be calculated, where y is the measurement result and U the **expanded uncertainty** that is determined to give the interval a high probability (often 95%) to cover the true value, y, of the measurand. U is said to be the uncertainty associated with the result y.

The uncertainty interval of a measurement is therefore a basis for qualifying the measurement. The more narrow the confidence interval is desired, i.e. the smaller the value of the uncertainty U is pursued, the more careful the measurement method, the measuring equipment, the training of the operators and the number of repetitions of the same experiment have to be.

4.2 Ways to access uncertainty

There are in principle two ways to estimate uncertainty: a bottom up method and a top down method. The two methods should often be used in parallel to achieve a reliable uncertainty amount.

a) The bottom up method (refer to ISO/IEC Guide 98-3:2008, Clause 2)

   In this method the test result y is expressed as a function of input quantities. This function is often the formula used for the calculation of the result.

   In the case of home laundry appliances, y may be one of the final test results like water consumption, energy consumption, washing performance, spin speed, spin drying performance, program duration or rinsing efficiency. The input quantities may be temperature, masses, times, power etc.

   The magnitude of all the uncertainty contributions of each input quantity is estimated.

   By combining the uncertainties of the input quantities according to the law of propagation of uncertainty (see ISO/IEC Guide 98-3:2008, Clause 2) the uncertainty of the result y can be calculated.

   With this calculation it can be seen how a specific uncertainty contribution from an input quantity does influence the combined uncertainty of the final result and therefore how a