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GUIDE

colour inside

Application of uncertainty of measurement to conformity assessment activities in the electrotechnical sector

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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APPLICATION OF UNCERTAINTY OF MEASUREMENT TO CONFORMITY ASSESSMENT ACTIVITIES IN THE ELECTROTECHNICAL SECTOR

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.
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This second edition of IEC Guide 115 has been prepared, in accordance with ISO/IEC Directives, Part 1, Annex A, by IECEE/CTL. This is a non-mandatory guide in accordance with SMB Decision 136/8.

This second edition cancels and replaces the first edition published in 2007.

The main changes with respect to the previous edition are as follows:

a) editorial alignment to ISO/IEC 17025:2017 without adapting the technical content;
b) references to ISO/IEC 17025:2005 and ISO/IEC 17025:2017 in order to help for the transition to the new edition of ISO/IEC 17025.

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The language used for the development of this Guide is English.

This publication has been drafted in accordance with the 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. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

IMPORTANT – The 'colour inside' logo on the cover page of this publication 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 has been prepared by the IECEE Committee of Testing Laboratories (CTL) to provide guidance on the practical application of the measurement uncertainty requirements of ISO/IEC 17025 to the electrical safety testing conducted within the IECEE CB Scheme.

The IECEE CB Scheme is a multilateral, international agreement, among over 40 countries and some 60 national certification bodies, for the acceptance of test reports on electrical products tested to IEC standards.

The aim of the CTL is, among other tasks, to define a common understanding of the test methodology with regard to the IEC standards as well as to ensure and continually improve the repeatability and reproducibility of test results among the member laboratories.

The practical approach to measurement uncertainty outlined in this document has been adopted for use in the IECEE Schemes, and is also extensively used around the world by testing laboratories engaged in testing electrical products to national safety standards.

This document is of particular interest to the following IEC technical committees, which ~~may~~ can decide to make use of it if necessary:

TECHNICAL COMMITTEE 13: ~~EQUIPMENT FOR ELECTRICAL ENERGY MEASUREMENT, TARIFF AND LOAD CONTROL~~ ELECTRICAL ENERGY MEASUREMENT AND CONTROL

TECHNICAL COMMITTEE 17: HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR

TECHNICAL COMMITTEE 18: ELECTRICAL INSTALLATIONS OF SHIPS AND OF MOBILE AND FIXED OFFSHORE UNITS

TECHNICAL COMMITTEE 20: ELECTRIC CABLES

TECHNICAL COMMITTEE 21: SECONDARY CELLS AND BATTERIES

TECHNICAL COMMITTEE 22: POWER ELECTRONIC SYSTEMS AND EQUIPMENT

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TECHNICAL COMMITTEE 33: POWER CAPACITORS AND THEIR APPLICATIONS

TECHNICAL COMMITTEE 34: ~~LAMPS AND RELATED EQUIPMENT~~ LIGHTING

TECHNICAL COMMITTEE 35: PRIMARY CELLS AND BATTERIES

TECHNICAL COMMITTEE 38: INSTRUMENT TRANSFORMERS

~~TECHNICAL COMMITTEE 39: ELECTRONIC TUBES~~

TECHNICAL COMMITTEE 40: CAPACITORS AND RESISTORS FOR ELECTRONIC EQUIPMENT

TECHNICAL COMMITTEE 47: SEMICONDUCTOR DEVICES

TECHNICAL COMMITTEE 59: PERFORMANCE OF HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES

TECHNICAL COMMITTEE 61: SAFETY OF HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES

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TECHNICAL COMMITTEE 66: SAFETY OF MEASURING, CONTROL AND LABORATORY EQUIPMENT

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APPLICATION OF UNCERTAINTY OF MEASUREMENT TO CONFORMITY ASSESSMENT ACTIVITIES IN THE ELECTROTECHNICAL SECTOR

1 Scope

This Guide presents a practical approach to the application of uncertainty of measurement to conformity assessment activities in the electrotechnical sector. It is specifically conceived for use in IECEE Schemes as well as by testing laboratories engaged in testing electrical products to national safety standards. It describes the application of uncertainty of measurement principles and provides guidance on making uncertainty of measurement calculations. It also gives some examples relating to uncertainty of measurement calculations for product conformity assessment testing.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*

~~*Guide to the expression of uncertainty in measurement* (GUM) (1995)~~
~~[BIPM, IEC, IFCC, ISO, IUPAC, IUPAP, OIML]~~

~~*International vocabulary of basic and general terms in metrology* (VIM) (1996)~~
~~[BIPM, IEC, IFCC, ISO, IUPAC, IUPAP, OIML]~~

IEC GUIDE 115

Edition 2.0 2021-03

GUIDE

GUIDE

Application of uncertainty of measurement to conformity assessment activities in the electrotechnical sector

Application de l'incertitude de mesure aux activités d'évaluation de la conformité dans le secteur électrotechnique

IEC GUIDE 115:2021-03(en-fr)

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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

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APPLICATION DE L'INCERTITUDE DE MESURE AUX ACTIVITÉS D'ÉVALUATION DE LA CONFORMITÉ DANS LE SECTEUR ÉLECTROTECHNIQUE

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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.
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Cette deuxième édition du Guide IEC 115 a été préparée par le CTL de l'IECEE selon les Directives ISO/IEC, Partie 1, Annexe A. Ceci est un guide non obligatoire selon la Décision 136/8 du SMB.

Cette deuxième édition annule et remplace la première édition publiée en 2007.

Les modifications majeures par rapport à l'édition précédente sont les suivantes:

a) alignement rédactionnel sur l'ISO/IEC 17025:2017 sans adaptation du contenu technique;
b) références à l'ISO/IEC 17025:2005 et à l'ISO/IEC 17025:2017 afin de faciliter la transition vers la nouvelle édition de l'ISO/IEC 17025.

Le texte du présent Guide IEC est issu des documents suivants:

Vote des quatre mois	Rapport de vote
SMBNC/8/DV	SMBNC/14/RV

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

La langue employée pour l'élaboration de ce Guide 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. Les principaux types de documents développés par l'IEC sont décrits plus en détail sous www.iec.ch/standardsdev/publications.

INTRODUCTION

Le présent document a été établi par le Comité des laboratoires d'essai (CTL, *Committee of Testing Laboratories*) du système IEC d'essais de conformité et de certification des équipements électriques (IECEE, I*EC System of Conformity Assessment Schemes for Electrotechnical Equipment and Components*) afin de donner des recommandations pour l'application pratique des exigences concernant l'incertitude de mesure de l'ISO/IEC 17025 aux essais de sécurité électrique réalisés dans le cadre de la méthode des organismes de certification (OC) du système IECEE.

La méthode OC du système IECEE est un accord international multilatéral conclu entre plus de 40 pays et quelque 60 organismes nationaux de certification pour l'acceptation des rapports d'essai sur les produits électriques soumis à essai selon les normes IEC.

Le but du CTL est, entre autres tâches, de définir une analyse commune de la méthodologie d'essai selon les normes IEC ainsi que d'assurer et d'améliorer de manière continue la répétabilité et la reproductibilité des résultats d'essai entre les laboratoires membres.

L'approche pratique de l'incertitude de mesure décrite dans le présent document a été adoptée pour être utilisée dans les méthodes du système IECEE et elle est également largement utilisée dans le monde par les laboratoires d'essai pour les essais des produits électriques selon les normes nationales de sécurité.

Le présent document présente un intérêt particulier pour les Comités d'études suivants de l'IEC, qui peuvent, si nécessaire, décider de l'utiliser.

COMITE D'ETUDES 13: COMPTAGE ET PILOTAGE DE L'ÉNERGIE ÉLECTRIQUE

COMITE D'ETUDES 17: APPAREILLAGE HAUTE TENSION

COMITE D'ETUDES 18: INSTALLATIONS ÉLECTRIQUES DES NAVIRES ET DES UNITÉS MOBILES ET FIXES EN MER

COMITE D'ETUDES 20: CÂBLES ÉLECTRIQUES

COMITE D'ETUDES 21: ACCUMULATEURS

COMITE D'ETUDES 22: SYSTÈMES ET ÉQUIPEMENTS ÉLECTRONIQUES DE PUISSANCE

COMITE D'ETUDES 23: PETIT APPAREILLAGE

COMITE D'ETUDES 32: COUPE-CIRCUITS À FUSIBLES

COMITE D'ETUDES 33: CONDENSATEURS DE PUISSANCE ET LEURS APPLICATIONS

COMITE D'ETUDES 34: ÉCLAIRAGE

COMITE D'ETUDES 35: PILES

COMITE D'ETUDES 38: TRANSFORMATEURS DE MESURE

COMITE D'ETUDES 40: CONDENSATEURS ET RÉSISTANCES POUR ÉQUIPEMENTS ÉLECTRONIQUES

COMITE D'ETUDES 47: DISPOSITIFS A SEMICONDUCTEURS

COMITE D'ETUDES 59: APTITUDE À LA FONCTION DES APPAREILS ÉLECTRODOMESTIQUES ET ANALOGUES

COMITE D'ETUDES 61: SÉCURITÉ DES APPAREILS ÉLECTRODOMESTIQUES ET ANALOGUES

COMITE D'ETUDES 62: ÉQUIPEMENTS ÉLECTRIQUES DANS LA PRATIQUE MEDICALE

COMITE D'ETUDES 64: INSTALLATIONS ÉLECTRIQUES ET PROTECTION CONTRE LES CHOCS ÉLECTRIQUES

COMITE D'ETUDES 65: MESURE, COMMANDE ET AUTOMATION DANS LES PROCESSUS INDUSTRIELS

COMITE D'ETUDES 66: SÉCURITÉ DES APPAREILS DE MESURE, DE COMMANDE ET DE LABORATOIRE

COMITE D'ETUDES 76: SÉCURITÉ DES RAYONNEMENTS OPTIQUES ET MATÉRIELS LASER

COMITE D'ETUDES 77: COMPATIBILITÉ ÉLECTROMAGNÉTIQUE

COMITE D'ETUDES 78: TRAVAUX SOUS TENSION

COMITE D'ETUDES 80: MATÉRIELS ET SYSTÈMES DE NAVIGATION ET DE RADIOCOMMUNICATION MARITIMES

COMITE D'ETUDES 82: SYSTÈMES DE CONVERSION PHOTOVOLTAÏQUES DE L'ÉNERGIE SOLAIRE

COMITE D'ETUDES 110: AFFICHAGES ÉLECTRONIQUES

APPLICATION DE L'INCERTITUDE DE MESURE AUX ACTIVITÉS D'ÉVALUATION DE LA CONFORMITÉ DANS LE SECTEUR ÉLECTROTECHNIQUE

1 Domaine d'application

Le présent Guide présente une approche pratique de l'application de l'incertitude de mesure aux activités d'évaluation de la conformité dans le secteur électrotechnique. Il est spécifiquement conçu pour être utilisé dans les méthodes du système IECEE ainsi que par les laboratoires qui réalisent les essais des produits électriques selon les normes nationales de sécurité. Il décrit l'application des principes de l'incertitude de mesure et donne des recommandations pour la réalisation des calculs de l'incertitude de mesure. Le présent Guide donne également quelques exemples de calculs de l'incertitude de mesure pour des essais d'évaluation de la conformité de certains produits.

2 Références normatives

Les documents suivants sont cités dans le texte de sorte qu'ils constituent, pour tout ou partie de leur contenu, des exigences du présent document. Pour les références datées, seule l'édition citée s'applique. Pour les références non datées, la dernière édition du document de référence s'applique (y compris les éventuels amendements).

ISO/IEC 17025, *Exigences générales concernant la compétence des laboratoires d'étalonnages et d'essais*