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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

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IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland
Email: inmail@iec.ch
Web: www.iec.ch

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Email: csc@iec.ch
Tél.: +41 22 919 02 11
Fax: +41 22 919 03 00

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

FOREWORD

This first edition of IEC Guide 115 has been prepared in accordance with Annex A of Part 1 of the ISO/IEC Directives by the IECEE/CTL.

The text of this guide is based on the following documents:

Approval document	Report on voting
C/1446/DV	C/1457/RV

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

INTRODUCTION

This Guide 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 Guide 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 guide is of particular interest to the following IEC Technical Committees which may decide to make use of it if necessary:

TECHNICAL COMMITTEE 13: EQUIPMENT FOR ELECTRICAL ENERGY MEASUREMENT, TARIFF AND LOAD CONTROL
TECHNICAL COMMITTEE 17: 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
TECHNICAL COMMITTEE 23: ELECTRICAL ACCESSORIES
TECHNICAL COMMITTEE 32: FUSES
TECHNICAL COMMITTEE 33: POWER CAPACITORS
TECHNICAL COMMITTEE 34: LAMPS AND RELATED EQUIPMENT
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 ELECTRICAL APPLIANCES
TECHNICAL COMMITTEE 61: SAFETY OF HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES
TECHNICAL COMMITTEE 62: ELECTRICAL EQUIPMENT IN MEDICAL PRACTICE
TECHNICAL COMMITTEE 64: ELECTRICAL INSTALLATIONS AND PROTECTION AGAINST ELECTRIC SHOCK
TECHNICAL COMMITTEE 65: INDUSTRIAL-PROCESS MEASUREMENT AND CONTROL
TECHNICAL COMMITTEE 66: SAFETY OF MEASURING, CONTROL AND LABORATORY EQUIPMENT
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TECHNICAL COMMITTEE 80: MARITIME NAVIGATION AND RADIOCOMMUNICATION EQUIPMENT AND SYSTEMS
TECHNICAL COMMITTEE 82: SOLAR PHOTOVOLTAIC ENERGY SYSTEMS

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. Clause 4 describes the application of uncertainty of measurements principles. Clause 5 provides guidance on making uncertainty of measurement calculations. Annex A gives some examples relating to uncertainty of measurement calculations for product conformity assessment testing.

2 Reference documents

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]

3 Terms and definitions

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

3.1
coverage factor
number that, when multiplied by the combined standard uncertainty, produces an interval (the expanded uncertainty) about the measurement result that may be expected to encompass a large, specified fraction (e.g. 95 %) of the distribution of values that could be reasonably attributed to the measurand

3.2
combined standard uncertainty
result of the combination of standard uncertainty components

3.3
error of measurement
result of a measurement minus a true value of the measurand (not precisely quantifiable because true value lies somewhere unknown within the range of uncertainty)

3.4
expanded uncertainty
obtained by multiplying the combined standard uncertainty by a coverage factor

3.5
level of confidence
probability that the value of the measurand lies within the quoted range of uncertainty