

GUIDE 115

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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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INTERNATIONAL
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**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 IEC/CTC.

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

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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 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