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PEOPLE'S REPUBLIC OF CHINA**

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**Guide to the evaluation and expression of uncertainty in
measurement**

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Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009.

This standard uses a redrafted law to amend the ISO /IEC Guide 98-3:2008 "Measurement uncertainty - Part 3. Measurement uncertainty

Degrees represent guidelines.

There is no technical difference between this standard and the ISO /IEC Guide 98-3:2008, but there are some adjustments in the structure, listed in Appendix H.

This is a comparison list of the chapter numbering of this standard and the ISO /IEC Guide 98-3:2008.

This standard also made the following editorial changes.

--- The standard name was changed to "Measurement and Expression of Measurement Uncertainty";

--- Removed some footnotes in the International Standard regarding changes to the 2008 version of the document;

--- Removed French content quoted in international standards;

--- The first paragraph of International Standard Chapter 4 "A practical guide to assess the uncertainty component can be found in Appendix F" adjusted to the chapter

The last paragraph;

--- Rounding off the values in some examples of international standards;

--- This standard replaces "confidence intervals" and "confidence levels" in international standards with "containment intervals" and "contains probabilities";

--- Modified the content of the international standard "B.2.1.1 Being Measured" and added

the term "Measured" in VIM Version 3 and VIM Version 2

a description of the difference in

--- Appendix B adds B.1.4.9 to explain the difference between the term "measurement results" in VIM Version 3 and VIM Version 2;

--- Appendix G forms have added column names;

--- Deleted the footnote in the reference, the content of the original footnote was adjusted to the corresponding entry and given by note;

--- The reference literature has added two domestic related documents.

This standard is proposed and managed by the National Certification and Accreditation Standardization Technical Committee (SAC/TC261).

This standard was drafted by. China National Accreditation Center for Conformity Assessment, China Institute of Metrology, Tianjin Entry-Exit Inspection and Quarantine Bureau, Beijing

Institute of Technology, China Shipbuilding Industry Corporation Seventh Five-Year Institute, Beijing Great Wall Metrology and Measurement Technology Institute, China Test Technology Research Institute

Research institute.

Introduction

0.1 When reporting physical quantity measurement results, a quantitative description of the quality of the measurement results should be given so that the user can evaluate its reliability.

degree. If there is no such explanation, the measurement results cannot be compared with each other. The measurement result cannot be compared with the reference value given in the standard or specification.

Compare. Therefore, an easy-to-implement, easy to understand, and recognized method is needed to characterize the quality of the measurement results. This standard gives

One such method is to evaluate and express its measurement uncertainty.

0.2 Although error and error analysis have long been part of measurement science or metrology, the notion of uncertainty as a quantitative feature is still

A relatively new concept. Now everyone realizes that when the known or suspected error components are all assessed and properly repaired

Afterwards, such measurements still have uncertainty.

0.3 Just as the International System of Units (SI) has been used universally in all scientific and technical measurements worldwide, the uncertainty of measurement worldwide a consensus on the assessment and presentation methods, giving easy-to-understand and properly interpreted rules that will be applied to science, engineering, commerce, and industry.

A large number of measurements are extremely important. In the era of market globalization, the promotion and application of unified assessments and tables of uncertainties

The method is imperative, so that measurements made by different countries can easily be compared with each other.

0.4 The ideal method for assessing and expressing the uncertainty of measurement results should be.

--- Universal applicability. The method should be applicable to all types of input used in all types of measurements and measurements.

The actual amount used to represent uncertainty should be.

Internally coordinated. It should be directly derived from the components that contribute to it, and how these components are grouped and how these components are

It is irrelevant whether to decompose into sub-component

---Transitive. If the result of the first measurement is used in the second measurement, then the uncertainty of the first result should be available

As a component of evaluating the uncertainty of the second measurement.

In addition, in many fields of industry, commerce, and health and safety, it is often necessary to provide a range of measurement results that can be expected in this area.

The majority of the reasonable distribution of measured values is contained. The ideal method of assessing and expressing the uncertainty of measurement should be able to easily give such a

Interval, especially in the interval that contains the actual probability or confidence level.

0.5 The method proposed by this standard is based on the outline given in the Recommendation INC-1 (1980)[2], which is based on the requirements of the CIPM.

The request was drafted by the Working Group on Uncertainty Statements organized by BIPM. The rationality of this method is discussed in Appendix C. It satisfies

All the above requirements. Most other methods used today are not. Recommendation INC-1 (1980) was approved by CIPM and

It is reconfirmed in its Recommendation 1 (CI-1981)[3] and Recommendation 1 (CI-1986)[4]; A.2 and A.3 in Appendix A are CIPM constructions, respectively.

The CI-1981 and CI-1986 books. Since the Recommendation INC-1 (1980) is the basis for these documents, the full text of this introduction in 0.7

Gives its content. The legal text of the INC-1 (1980) Recommendation authority is found in A.1 of ISO /IEC Guide 98-3:2008.

0.6 Chapter 8 of this standard outlines the procedures for assessing and representing measurement uncertainty, and details some of them in Appendix F.

example. In addition, there are other appendices to this standard. For example, Appendix B is "True" values, errors and uncertainties, and other concepts; Appendix D is an assessment.

Specific recommendations for the uncertainty component; Annex E is the degree of freedom and confidence level (including probability); Appendix G is the basic mathematical symbol used in this standard

No.; and bibliography.

0.7 Recommendation INC-1 (1980) "Expression of experimental uncertainty"

1) The uncertainty of the measurement result usually contains several components, which are divided into two categories according to the evaluation methods of their values.

Category A. Components assessed using statistical methods;

Class B. Components assessed by other methods.

Class A and B uncertainties and previously used "uncertainties introduced by random effects" and "uncertainties introduced by systemic effects"

There is not always a simple correspondence between degrees. The term "system uncertainty" is misleading and should be avoided.

use.

Any detailed report on uncertainty should have a complete breakdown of the weights, with a numerical value for each component

Get method.

2) The A-class component is characterized by the estimated variance s^2_i (or the estimated standard deviation s_i) and the degree of freedom ν_i . Covariance should be given when appropriate.

3) Class B components should be characterized by u_{2j} . It can be considered that u_{2j} is an approximation of the corresponding variance assumed to exist. Can be treated like a