



BSI Standards Publication

Reference materials — Good practice in using reference materials

National foreword

This Published Document is the UK implementation of ISO GUIDE 33:2015. It supersedes PD 6532-3:2000 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee RMI/1, Reference Materials.

A list of organizations represented on this committee can be obtained on request to its secretary.

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© The British Standards Institution 2015. Published by BSI Standards Limited 2015

ISBN 978 0 580 59592 9

ICS 01.120; 71.040.30

This Published Document was published under the authority of the Standards Policy and Strategy Committee on 31 August 2015.

Amendments issued since publication

Date	Text affected
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*Matériaux de référence — Bonne pratique d'utilisation des
matériaux de référence*





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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is ISO/TC 31, *Committee on reference materials*.

This third edition cancels and replaces the second edition (ISO Guide 33:2000), and ISO Guide 32:1997 which have been technically revised.

Introduction

The aim of this Guide is to provide general recommendations on the use of RMs. These recommendations are exemplified by real-world examples, which to some degree also reflect the level of complexity associated with RMs. This level of detail is deemed to be useful for anyone who has a responsibility in the quality management in laboratories, such as drafters, reviewers, managers, and assessors of procedures, working instructions, standard operating procedures and the like.

The main applications of reference materials are calibration, establishing traceability, method validation, assigning values to other materials, and quality control.

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Reference materials — Good practice in using reference materials

1 Scope

1.1 This Guide describes good practice in using reference materials (RMs), and certified reference materials (CRMs) in particular, in measurement processes. These uses include the assessment of precision and trueness of measurement methods, quality control, assigning values to materials, calibration, and the establishment of conventional scales. This Guide also relates key characteristics of various types of RMs to the different applications.

1.2 For CRMs, the metrological traceability of the property values to international scales or other measurement standards has been established. For RMs not being CRMs, this kind of traceability of property values has often not been established. Nevertheless, these RMs can still be used for assessing parts of measurement procedures, including evaluating various levels of precision.

1.3 Mainstream applications of RM include precision control ([Clause 6](#)), bias assessment ([Clause 9](#)), calibration ([Clause 10](#)), preparation of calibration RMs ([Clause 11](#)) and maintaining conventional scales ([Clause 12](#)).

NOTE Not all types of RMs can be used for all indicated purposes.

1.4 The preparation of RMs for calibration is also part of the scope of ISO Guides 34[1] and 35[2]. The treatment in this Guide is limited to the fundamentals of small-scale preparation of RMs and the value assignment, as used by laboratories to calibrate their equipment. Larger scale production of such RMs, with the possible aim of distribution is beyond the scope of this Guide. This type of activity is covered in ISO Guides 34[1] and 35[2].

1.5 The development of working standards, as used in, e.g. natural gas analysis, clinical chemistry, and the pharmaceutical industry is not covered in this Guide. This type of activity is covered in ISO Guides 34[1] and 35[2].

2 Normative references

ISO 3534-1, *Statistics — Vocabulary and symbols — Part 1: General statistical terms and terms used in probability*

ISO Guide 30, *Terms and definitions used in connection with reference materials*

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

ISO/IEC Guide 99:2007, *International vocabulary of metrology — Basic and general concepts and associated terms (VIM)*

NOTE The “Guide to the expression of uncertainty in measurement” is referred to as “GUM”, whereas the “International vocabulary of basic and general terms in metrology” is referred to as “VIM”.