

**Graphic technology
and photography —
Certified reference
materials for reflection
and transmission
metrology —
Documentation and
procedures for use,
including
determination of
combined standard
uncertainty**

ICS 37.100.01

National foreword

This British Standard reproduces verbatim ISO 15790:2004 and implements it as the UK national standard.

The UK participation in its preparation was entrusted to Technical Committee PAI/43, Graphic technology, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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Cross-references

The British Standards which implement international publications referred to in this document may be found in the *BSI Catalogue* under the section entitled “International Standards Correspondence Index”, or by using the “Search” facility of the *BSI Electronic Catalogue* or of British Standards Online.

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Summary of pages

This document comprises a front cover, an inside front cover, the ISO title page, pages ii to v, a blank page, pages 1 to 20, an inside back cover and a back cover.

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Graphic technology and photography — Certified reference materials for reflection and transmission metrology — Documentation and procedures for use, including determination of combined standard uncertainty

*Technologie graphique et photographie — Matériaux de référence
certifiés pour la métrologie par réflexion et transmission —
Documentation et procédures à utiliser, y compris la détermination
d'une incertitude normale combinée*



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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 15790 was prepared by Technical Committee ISO/TC 130, *Graphic technology*.

Introduction

The International Organization for Standardization (ISO), in ISO Guide 30 ^[1], defines a certified reference material (CRM) as a “reference material, accompanied by a certificate, one or more of whose property values are certified by a procedure which establishes traceability to an accurate realization of the unit in which the property values are expressed, and for which each certified value is accompanied by an uncertainty at a stated level of confidence”. Thus, CRMs are well-characterized materials with values traceable to stated references (see 3.1.12). They may be used to calibrate or to determine the performance characteristics of measurement systems in order to facilitate the exchange of data and to assist in quality control. Their use will help to assure the long-term adequacy and integrity of the measurement and quality control processes.

Densitometers, colorimeters and spectrophotometers are widely used to make measurements for quality and process control in the graphic arts, photographic and other imaging industries. The intent of this International Standard is to establish documentation requirements that describe characteristics of reflection and transmission certified reference materials that may be used for verifying performance of these instruments. In many areas (e.g. cyan, magenta, yellow colorants) there are no readily available reference materials that are traceable to international and national standards. This International Standard can still provide guidance in such circumstances by showing how to determine the reproducibility of the results of measurements, even in the absence of CRMs.

Although the calibration reference materials provided with many reflection and transmission instruments used in graphic arts and photography are not identified as CRMs, they could often meet the requirements as such. Instrument manufacturers are encouraged to document the characteristics of their calibration materials as CRMs where appropriate.

This International Standard describes practical procedures to determine values that represent components of the uncertainty of measurements for the graphic arts, photography and other image-technology industries. A computational procedure is also provided to combine these components to determine “combined standard uncertainty” (see 3.1.3). A more rigorous and detailed approach is described in the *Guide to the expression of uncertainty in measurement*.

Furthermore, general procedures are identified for the use and maintenance of these certified reference materials. Through use of this International Standard, manufacturers of CRMs can provide consistent general-use information for the verification of measurement-system performance described above. This International Standard lists appropriate documentation that should accompany CRMs, including the following:

- a) areas where a CRM is and is not applicable;
- b) physical characteristics of CRMs for density, colour values, uniformity, etc. (see Annex A);
- c) traceability of CRM values to stated reference;
- d) expected lifetime of a CRM;
- e) care and storage of a CRM;
- f) general procedures on how to use a CRM.

Other useful documents providing guidance in metrology and the uncertainty of measurement can be found in the Bibliography.

This International Standard provides guidance and is a resource for manufacturers and users of CRMs. Using CRMs as part of quality assurance activities is essential for verification and calibration of measurement systems and can increase confidence in data obtained from measurement instruments. It provides a useful tool in support of ISO 9001 ^[15] registration and ISO/IEC 17025 ^[22] accreditation by providing information relevant to graphic technology, photographic and other imaging industries.

Graphic technology and photography — Certified reference materials for reflection and transmission metrology — Documentation and procedures for use, including determination of combined standard uncertainty

1 Scope

This International Standard specifies the documentation requirements for certified reference materials (CRMs), procedures for the use of CRMs, and procedures for the computation and reporting of the combined standard uncertainty of reflectance and transmittance measurement systems used in graphic arts, photographic and other imaging industries.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the reference document (including any amendments) applies.

Guide to the expression of uncertainty in measurement, published jointly by BIPM/IEC/IFCC/ISO/IUPAC/IUPAP/OIML, 1995

3 Terms, definitions and symbols

3.1 Terms and definitions

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

3.1.1

calibration

set of operations that establish, under specified conditions, the relationship between values of quantities indicated by a measuring instrument or measuring system, or values represented by a material measure or a reference material, and the corresponding values realized by standards

[adapted from *International vocabulary of basic and general terms in metrology*] [2]

NOTE Contrary to a common misconception, calibration is not the process of adjusting a measurement system such that it produces values that are believed to be correct. Calibration permits either the assignment of values of measurands to the indications (creating a reference table) or the decision to reset or adjust the device. Following the resetting or adjusting of the device, a calibration is normally repeated to ensure that the new device setting(s) provide indications within the accepted ranges.

3.1.2

certified reference material

CRM

reference material, accompanied by a certificate, one or more of whose property values are certified by a procedure which establishes traceability to an accurate realization of the unit in which the property values are expressed, and for which each certified value is accompanied by an uncertainty at a stated level of confidence

[ISO Guide 30] [1]