PD ISO/TS 20460:2015

BSI Standards Publication

Paper and board — Automated on-line testing — Metrological comparability between standardized measurements and output of on-line gauges

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National foreword

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TECHNICAL SPECIFICATION

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Paper and board — Automated on-line testing — Metrological comparability between standardized measurements and output of on-line gauges

Papiers et cartons — Essais en ligne automatisés — Comparabilité métrologique entre mesures normalisées et résultats de jauges en continu

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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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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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 6, *Paper, boards and pulps*.

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Introduction

There are two concepts discussed in this Technical Specification, calibration and correlation. The calibration process compares the output of an instrument to primary standards having known measurement characteristics. Correlation, in the context of this Technical Specification, is the degree of association between the quality control laboratory and the online sensor.[20]

Online gauge users are looking to evaluate the capability (in a SPC "Statistical Process Control" sense) of their equipment. This is done usually through a measuring process which mixes a calibration process of the gauge itself, as presented in 4.1, and a correlation process with laboratory equipment, as presented in 4.2.

The requirements for online measuring equipment and its measurement process in the context of paper and board manufacturing is discussed in 4.1. Usual acceptable tolerances for the instrument itself and for the process to be measured are given.

The gauge itself may regularly be verified automatically through a so-called "automatic standardization" or "internal standardization". A "static calibration" often refers to an operation during which the gauge is removed from the moving web. A "dynamic calibration" often refers to an operation on the moving web, either in a fixed position or traversing.

The requirements for periodic calibration procedures and for decision-making are given in 4.2. This type of verification is a correlation or a comparison between online and off-line measuring system.

Results of actions of either 4.1, or 4.2, or both, may lead to a physical "calibration adjustment" of the gauge sensor and constitutes the metrological comparability.

Calculations of uncertainties are widely described in several ISO documents[18] and uncertainties linked to equipment are not within the scope of this Technical Specification.

Properties such as formation, fibre orientation, optical roughness and air permeance are measured widely with online gauges. For these properties, ISO standards for laboratory equipment do not exist or international reference materials are not available, and therefore testing of these properties are out of the scope of this document. However, it is recommended to use methodology requirements of 4.1 and calibration procedure principles of 4.2.1.

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1 Scope

This Technical Specification establishes guidelines to link and, where applicable, calibrate the online gauge, following laboratory measurement for a given paper and board property.

Paper and board online measuring equipment is mostly based on different technology to that of laboratory equipment. Therefore, this Technical Specification specifies the International Standards to be chosen for the determination of physical properties of paper and board when measured online. It is applicable to all kind of paper and board.

In case of dispute, the usual reference is the laboratory testing but the parties may decide that the online measurements are valid based on the application of this International Standard.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 187, *Paper, board and pulps — Standard atmosphere for conditioning and testing and procedure for monitoring the atmosphere and conditioning of samples*

ISO 287, *Paper and board — Determination of moisture content of a lot — Oven-drying method*

ISO 534, *Paper and board — Determination of thickness, density and specific volume*

ISO 536, *Paper and board — Determination of grammage*

ISO 1762, *Paper, board and pulps — Determination of residue (ash) on ignition at 525 degrees C*

ISO 2469, *Paper, board and pulps — Measurement of diffuse radiance factor (diffuse reflectance factor)*

ISO 8254-1, *Paper and board — Measurement of specular gloss — Part 1: 75 degree gloss with a converging beam, TAPPI method*

ISO 15397, *Graphic technology — Communication of graphic paper properties*

ISO 22514-1, *Statistical methods in process management — Capability and performance — Part 1: General principles and concepts*

ISO 22514-7, *Statistical methods in process management — Capability and performance — Part 7: Capability of measurement processes*

3 Terms and definitions

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

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3.1
calibration
operation that, under specified conditions, in a first step, establishes a relation between the quantity values with *measurement uncertainties* (3.7) provided by measurement standards and corresponding indications with associated measurement uncertainties and, in a second step, uses this information to establish a relation for obtaining a *measurement result* (3.5) from an indication

Note 1 to entry: A calibration may be expressed by a statement, calibration function, calibration diagram, calibration curve, or calibration table. In some cases, it may consist of an additive or multiplicative correction of the indication with associated measurement uncertainty.

Note 2 to entry: Calibration should not be confused with adjustment of a measuring system, often mistakenly called "self-calibration", nor with *verification* (3.15) of calibration.

Note 3 to entry: Often, the first step alone in the above definition is perceived as being calibration.

[SOURCE: ISO/IEC Guide 99:2007, 2.39]

3.2
certified reference material
CRM
reference material, accompanied by documentation issued by an authoritative body and providing one or more specified property values with associated uncertainties and traceabilities, obtained using valid procedures

EXAMPLE Calibration service for Photometric calibration described in ISO 2469:2014, Annex A for the measurement of diffuse radiance factor (diffuse reflectance factor).

Note 1 to entry: "Documentation" is given in the form of a "certificate" (see ISO Guide 31:2000).

Note 2 to entry: Procedures for the production and certification of certified reference materials are given, e.g. in ISO Guide 33 and ISO Guide 35.

Note 3 to entry: In this definition, "uncertainty" covers both 'measurement uncertainty' and 'uncertainty associated with the value of a nominal property', such as for identity and sequence. "Traceability" covers both "*metrological traceability* (3.9) of a quantity value" and "traceability of a nominal property value".

Note 4 to entry: Specified quantity values of certified reference materials require metrological traceability with associated measurement uncertainty (Accredited Quality Assurance, 2006).[21]

Note 5 to entry: ISO/REMCO has an analogous definition (Accredited Quality Assurance, 2006) but uses the modifiers "metrological" and "metrologically" to refer to both quantity and nominal properties.

[SOURCE: ISO/IEC Guide 99:2007, 5.14]

3.3
control chart
chart on which some statistical measure of a series of samples is plotted in a particular order to steer the process with respect to that measure and to control and reduce variation

Note 1 to entry: The particular order is usually based on time or sample number.

Note 2 to entry: The control chart operates most effectively when the measure is a process variable which is correlated with an ultimate product or service characteristic.

[SOURCE: ISO 3534-2:2006, 2.3.1]

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