



BSI Standards Publication

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

National foreword

This Published Document is the UK implementation of ISO/TS 20460:2015.

The UK participation in its preparation was entrusted to Technical Committee PAI/11, Methods of test for paper, board and pulps.

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

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2015.

Published by BSI Standards Limited 2015

ISBN 978 0 580 89161 8

ICS 85.060

Compliance with a British Standard cannot confer immunity from legal obligations.

This Published Document was published under the authority of the Standards Policy and Strategy Committee on 30 November 2015.

Amendments/corrigenda issued since publication

Date	Text affected
-------------	----------------------

TECHNICAL
SPECIFICATION

ISO/TS
20460

First edition
2015-11-15

**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*



Reference number
ISO/TS 20460:2015(E)

© ISO 2015



COPYRIGHT PROTECTED DOCUMENT

© ISO 2015. Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

	Page
Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Methodology requirements	7
4.1 Requirements for the measuring equipment and its measurement process.....	7
4.1.1 General requirements for measuring systems.....	7
4.1.2 Consistency of the online equipment itself.....	8
4.1.3 Consistency of the online measurement process.....	8
4.2 Requirements for comparison of online and off-line equipment.....	8
4.2.1 Calibration procedure principles.....	8
4.2.2 Calibration procedure requirements.....	9
5 Methods to evaluate comparability	9
5.1 Sampling operations, conditioning and stability.....	9
5.2 Basis weight.....	10
5.3 Thickness.....	10
5.4 Moisture content.....	10
5.5 Brightness, colour, whiteness, k and s.....	10
5.6 Ash content.....	11
5.7 Gloss.....	11
Annex A (informative) Typical tolerances	12
Annex B (informative) Examples of graphical evaluations	13
Annex C (informative) Online gauges principles, limitations to correlations, sources of errors	14
Bibliography	17

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).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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*.

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](#).

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

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.