
Paper, board and pulps — Estimation of uncertainty for test methods

*Papiers, cartons et pâtes — Estimation de l'incertitude pour les
méthodes d'essai*



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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

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Contents

Page

Foreword.....	iv
Introduction	v
1 Scope	1
2 Background information	1
2.1 General	1
2.2 Special conditions in the testing of pulp, paper and board	1
2.3 Available publications for estimation of precision	2
3 Terms and definitions.....	2
4 Discussion of the definitions.....	3
5 Analysis	4
6 Recommendation.....	4
Bibliography	6

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.

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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.

In exceptional circumstances, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example), it may decide by a simple majority vote of its participating members to publish a Technical Report. A Technical Report is entirely informative in nature and does not have to be reviewed until the data it provides are considered to be no longer valid or useful.

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Introduction

One step in the development of any new standard test method is to estimate the uncertainty of the method. This is normally performed in a precision experiment, in which samples are sent to a number of laboratories and the results are compared. Such a precision experiment is often referred to as "interlaboratory comparative testing".

The procedures for conducting a precision statement are outlined in ISO 5725 (all parts), which is general and does not cover the special conditions that apply in the testing of pulp, paper and board.

There are, however, a number of different standards and publications available for the estimation of precision in pulp, paper and board testing. The focuses of these standards differ, depending on the purpose of the test.

There are three main purposes identified for testing:

- Research, where the main question is whether there is a difference between two samples, for instance, papers produced using different pulp mixtures.
- Testing in order to verify compliance with a specification. This can be both at the production site and in an independent laboratory
- Evaluation of a new test method, where the aim is to verify that the precision of the test method is acceptable.

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Paper, board and pulps — Estimation of uncertainty for test methods

1 Scope

This Technical Report presents guidelines for the selection of the best method for the estimation of the precision of methods for testing pulp, paper and board.

2 Background information

2.1 General

A "Precision statement" is included in most of the ISO test methods for pulp, paper and board.

Such a "Precision statement" is usually based on collaborative interlaboratory experiments.

ISO 5725 (all parts) describes the procedure for generating the numbers for conducting such collaborative interlaboratory experiments. However, there are specific conditions in the testing of pulp, paper and board which are not covered by ISO 5725.

2.2 Special conditions in the testing of pulp, paper and board

Paper and board materials are very sensitive to humidity and temperature. In addition, the variation in the properties increases drastically when the sample size decreases. The coefficient of variation for grammage (mass per area), for instance, can increase from 1 % to 10 % if the averaging area is decreased from 1 m² to 1 mm².

In addition, many tests carried out on pulp, paper and board are destructive.

For many pulp, paper and board properties, it is also a reality that there is no "absolute" true value. A simple example is thickness, which is dependent on such factors as measurement pressure, speed of applying this pressure, air humidity and for how long the sample has been in the measurement climate. This means that only the thickness of paper measured under specific circumstances can be determined. Due to the complexity of paper, all the variable circumstances are not taken into account in this Technical Report. Consequently, there is no absolute true thickness value for a paper.

One effect of the large product variations between small areas is that a fairly large number of samples is, in practice, always required in order to achieve sufficient precision. Most test methods are therefore based on 10 or more measurements. The result of such a test is generally the average of these measurements.

Another specific feature of paper is that, not only are the surface properties of paper often very important, for instance for the result of printing, but there is a risk that they can be modified by merely handling the paper.

These reasons make it necessary to have special instructions for precision experiments for pulp, paper and board.