BSI Standards Publication

Accuracy (trueness and precision) of measurement methods and results

Part 5: Alternative methods for the determination of the precision of a standard measurement method

bsi.

National foreword

This British Standard is the UK implementation of ISO 5725-5:2025. It supersedes BS ISO 5725-5:1998, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee SS/6, Statistical procedures for measurement methods and results.

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

Contractual and legal considerations

This publication has been prepared in good faith, however no representation, warranty, assurance or undertaking (express or implied) is or will be made, and no responsibility or liability is or will be accepted by BSI in relation to the adequacy, accuracy, completeness or reasonableness of this publication. All and any such responsibility and liability is expressly disclaimed to the full extent permitted by the law.

This publication is provided as is, and is to be used at the recipient's own risk.

The recipient is advised to consider seeking professional guidance with respect to its use of this publication.

This publication is not intended to constitute a contract. Users are responsible for its correct application.

Published by BSI Standards Limited 2025

ISBN 978 0 539 27966 5

ICS 03.120.30; 17.020

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

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 October 2025.

Amendments/corrigenda issued since publication

Date	Text affected

ISO 5725-5

Second edition
2025-10

Accuracy (trueness and precision) of measurement methods and results —

Part 5: Alternative methods for the determination of the precision of a standard measurement method

Exactitude (justesse et fidélité) des résultats et méthodes de mesure —

Partie 5: Méthodes alternatives pour la détermination de la fidélité d'une méthode de mesure normalisée

Reference number
ISO 5725-5:2025(en)

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

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 document 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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

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

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 69, *Applications of statistical methods*, Subcommittee SC 6, *Measurement methods and results*.

This second edition cancels and replaces the first edition (ISO 5725-5:1998), which has been technically revised. It also incorporates the Technical Corrigendum ISO 5725-5:1998/Cor.1:2005.

The main changes are as follows:

— alternative experimental designs (split-level and design for heterogeneous material) have been transferred to ISO 5725-3;

— an additional robust approach, the Q method, which has improved breakdown properties, has been added.

A list of all parts in the ISO 5725 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

This document uses two terms, trueness and precision, to describe the accuracy of a measurement method. Trueness refers to the closeness of agreement between the average value of a large number of test results and the true or accepted reference value. Precision refers to the closeness of agreement between test results.

General consideration of these quantities is given in ISO 5725-1 and so is not repeated here. This document should be read in conjunction with ISO 5725-1 because the underlying definitions and general principles are given there.

ISO 5725-2 is concerned with estimating, by means of interlaboratory experiments, standard measures of precision, namely the repeatability standard deviation and the reproducibility standard deviation. It gives a basic method for doing this, including methods of calculation. This document describes alternative calculation methods to this basic method:

— The basic method requires the preparation of a number of identical samples of the material for use in the experiment. With heterogeneous materials this may not be possible, so that the use of the basic method then gives estimates of the reproducibility standard deviation that are inflated by the variation between the samples. The design for a heterogeneous material given in this document yields information about the variability between samples which is not obtainable from the basic method; it may be used to calculate an estimate of reproducibility from which the between-sample variation has been removed.

— The basic method requires tests for outliers to be used to identify data that should be excluded from the calculation of the repeatability and reproducibility standard deviations. Excluding outliers can sometimes have a large effect on the estimates of repeatability and reproducibility standard deviations, but in practice, when applying the outlier tests, the statistical expert may have to use judgement to decide which data to exclude. This document describes robust methods of data analysis that may be used to calculate repeatability and reproducibility standard deviations from data containing outliers without using tests for outliers to exclude data, so that the results are no longer affected by the statistical expert's judgement.

Accuracy (trueness and precision) of measurement methods and results —

Part 5: Alternative methods for the determination of the precision of a standard measurement method

1 Scope

This document describes the use of robust methods for analysing the results of precision experiments without using outlier tests to exclude data from the calculations, and in particular, the detailed use of several such methods. The robust methods described in this document allow the data to be analysed in such a way that it is not required to make decisions about outliers that affect the results of the calculations.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

ISO 5725-1, *Accuracy (trueness and precision) of measurement methods and results — Part 1: General principles and definitions*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 3534-1 and in ISO 5725-1 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

4 Symbols and abbreviations

b_p	Correction factor used for reproducibility standard deviation in the Q method
c_p	Correction factor used for repeatability standard deviation in the Q method
D	Within-cell difference between measurement results (used with subscripts as required).
$\bar{D}$	Average of within-cell differences
$d_1 \ldots d_6$	Interpolation nodes for each value y_i (Hampel estimator, non-iterative)
$E\{\}$	Expectation of a statistical variable