International Standard

ISO 19983

Rubber — Determination of precision of test methods

Caoutchouc — Détermination de la fidélité des méthodes d'essai

Third edition
2024-06

Reference number
ISO 19983:2024(en)

© ISO 2024



COPYRIGHT PROTECTED DOCUMENT

© ISO 2024

All rights reserved. Unless otherwise specified, or required in the context of its implementation, 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
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

Contents

Page

Foreword ..... **iv**
Introduction ..... **v**
1 Scope **1**
2 Normative references **1**
3 Terms and definitions **1**
4 Symbols **2**
5 Interlaboratory test programme **3**
6 Procedures **3**
6.1 Application 3
6.2 Repeatability conditions 4
6.3 Day-to-day repeatability conditions 4
6.4 Reproducibility conditions 4
6.5 Testing elements 4
6.6 Planning 4
6.7 Methodology 5
6.7.1 Method A 5
6.7.2 Method B 5
6.7.3 Method A versus Method B — Day-to-day repeatability value 6
6.7.4 Method A versus Method B — Number of replicates 6
6.8 Detection of outliers 6
6.9 Treatment of outliers 6
7 Report **8**
Annex A (normative) **Calculations for Method A** **9**
Annex B (normative) **Calculations for Method B** **12**
Annex C (normative) **Calculating the *h* and *k* values (Mandel's statistics)** **13**
Annex D (informative) **Example of general precision determination** **15**
Annex E (informative) **Guidance for using precision results** **20**
Annex F (informative) **Example of outlier treatment for Method A** **22**
Annex G (informative) **An example of outlier treatment for Method B** **28**
Bibliography **37**

© ISO 2024 – All rights reserved

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 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 45, *Rubber and rubber products*, Subcommittee SC 2, *Testing and analysis*.

This third edition cancels and replaces the second edition (ISO 19983:2022), which has been technically revised.

The main changes are as follows:

— Annex F has been modified to provide an example of outlier treatment for Method A;

— previous Annex F has been changed to Annex G;

— a comparison of Method A and Method B is shown in 6.7.3 and 6.7.4.

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.

© ISO 2024 – All rights reserved

Introduction

The procedures used for several years for estimating precision of test methods by means of interlaboratory tests (ISO/TR 9272[1)]) were closely related to ASTM D4483. ISO/TR 9272 was found to have serious flaws which users were using work-arounds to counteract. This document has therefore been developed to replace ISO/TR 9272 and includes using ISO 5725-1 and ISO 5725-2 with specific choices and variations of procedures to suit the particular requirements of rubbers.

This document provides two methods for determining the precision values of a test method:

— Method A based on ISO 5725-1, ISO 5725-2 and ISO 5725-3 to calculate repeatability, day-to-day repeatability, and reproducibility;

— Method B based on ASTM D4483 to calculate day-to-day repeatability and reproducibility.

1) Cancelled and replaced by ISO 19983:2017.

© ISO 2024 – All rights reserved

Rubber — Determination of precision of test methods

1 Scope

This document provides guidelines and specifies requirements for estimating the precision of rubber test methods by means of interlaboratory test programmes based on the procedures given in:

— Method A using ISO 5725-1, ISO 5725-2 and ISO 5725-3;

— Method B using ASTM D4483.

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 3534-2, *Statistics — Vocabulary and symbols — Part 2: Applied statistics*

ISO 5725-1:2023, *Accuracy (trueness and precision) of measurement methods and results — Part 1: General principles and definitions*

ISO 5725-2, *Accuracy (trueness and precision) of measurement methods and results — Part 2: Basic method for the determination of repeatability and reproducibility of a standard measurement method*

ISO 5725-3, *Accuracy (trueness and precision) of measurement methods and results — Part 3: Intermediate measures of the precision of a standard measurement method*

ASTM D4483, *Standard Practice for Determining Precision for Test Method Standards in the Rubber and Carbon Black Industries*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 3534-1, ISO 3534-2, ISO 5725-1, ISO 5725-2, ISO 5725-3, ASTM D4483, and the following 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/

3.1
day-to-day repeatability
precision under the conditions where independent test results are obtained with the same method on identical test items in the same laboratory by the same operator using the same equipment

Note 1 to entry: The time interval between repeated tests is normally between one and seven days.

© ISO 2024 – All rights reserved