INTERNATIONAL STANDARD

ISO 1833-1

Second edition
2020-06

Textiles — Quantitative chemical analysis —

Part 1: General principles of testing

Textiles — Analyse chimique quantitative —

Partie 1: Principes généraux des essais

Reference number
ISO 1833-1:2020(E)

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Published in Switzerland

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Foreword

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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).

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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 38, *Textiles*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 248, *Textile and textile products*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 1833-1:2006), which has been technically revised. It also incorporates the Technical Corrigendum ISO 1833-1:2006/Cor 1:2009.

The main changes compared to the previous edition are as follows:

— Introduction, A.2 and bibliography: a reference to ISO/TR 11827 regarding the fibre identification has been added;

— Clause 2: normative references have been added;

— Clause 4: references to ISO 2076 and ISO 6938 have been added for the use of the generic names in the ISO 1833 series;

— Clause 5: warning sentences and reference to grade 3 water have been introduced;

— Clause 6: stoppered weighing bottles have been added;

— 8.2: all pretreatments have been described in Annex A (including pretreatment with light petroleum) a requirement for reporting if any pretreatment is carried out [see Clause 12, e)] has been introduced;

— 9.1.1: instructions for handling have been added;

— 9.1.2: instructions for short drying period have been added;

— 9.1.6 (former 9.1.5): a note has been removed;

— 9.2: a requirement regarding the number of test specimens has been added;

— Clause 10: deletion of former 10.3 (consideration of only percentage additions for moisture, case included in the new 10.3 covering percentage additions for moisture and non-fibrous matter, and/or percentage losses of fibrous matter by pre-treatment);

— 10.3: additional instructions in case of calculated percentage greater than 100 % have been given;

— Annexes A and B have been changed to normative;

— Table A.1 and concerned subclauses: additional cases regarding elastane (see A.5.1.2), elastolefin (see A.5.1.3), bast fibres (see A.5.25) have been introduced;

— B.8.1 and B.8.2: a requirement regarding the number of test specimens has been added.

A list of all parts in the ISO 1833 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.

Introduction

Methods for the quantitative analysis of fibre mixtures are based on two main processes, the manual separation and the chemical separation of fibres.

It is preferable to use the method of manual separation, which is given in Annex B, whenever possible since it generally gives more accurate results than the chemical method. It can be used for all textiles whose component fibres do not form an intimate mixture, for example in the case of yarns composed of several elements each of which is made up of only one type of fibre, or woven fabrics in which the fibre of the warp is of a different kind to that of the weft, or knitted fabrics capable of being unravelled made up of yarns of different types.

In general, the methods described in the different parts of ISO 1833 are based on the selective dissolution of an individual component. After the removal of a component, the insoluble residue is weighed, and the proportion of soluble component is calculated from the loss in mass. This document gives the information which is common to the analyses, by this method, of all fibre mixtures, whatever their composition. This information is intended to be used in conjunction with the other parts of ISO 1833; these parts contain the detailed procedures applicable to particular fibre mixtures. Where, occasionally, an analysis is based on a principle other than selective dissolution, full details are given in the appropriate part.

Mixtures of fibres obtained during processing and, to a lesser extent, in finished textiles can contain non-fibrous matter, such as fats, waxes or dressings, or water-soluble matter, either occurring naturally or added to facilitate processing. Non-fibrous matters are removed before analysis.

A method of pre-treatment for removing oils, fats, waxes and water-soluble matter is given in Annex A.

Dye in dyed fibres is considered to be an integral part of the fibre and is not removed.

In addition, textiles can contain resins or other matter added to bond the fibres together or to confer special properties, such as water-repellence or crease-resistance. Such matter, including dyestuffs in exceptional cases, can interfere with the action of the reagent on the soluble component and/or it can be partially or completely removed by the reagent. This type of added matter can also cause errors and are removed before the sample is analysed. If it is impossible to remove such added matter, the methods of analysis are no longer applicable.

Most textile fibres contain water, the amount depending on the type of fibre and on the relative humidity of the surrounding air. Analyses are conducted on the basis of dry mass, and a procedure for determining the dry mass of test specimens and residues is given in this document.

The result is therefore obtained on the basis of clean, dry fibres.

Provision is made for recalculating the result on the basis of

a) agreed moisture regain

   NOTE The agreed moisture regain of each fibre is specified in some regional legislation or after agreement between interested parties.

b) agreed moisture regain and also for

   1) fibrous matter removed in the pre-treatment, and

   2) non-fibrous matter (for example, fibre dressing, processing oil, or size) that can be properly regarded as part of the fibre as an article of commerce.

In some methods, the insoluble component of a mixture can be partially dissolved in the reagent used to dissolve the soluble component. Where possible, the reagents that have been chosen are those that have little or no effect on the insoluble fibres. If loss in mass is known to occur during the analysis, the result is corrected; correction factors for this purpose are given. These correction factors have been

determined in several laboratories by treating, in the appropriate reagent as specified in the method of analysis, fibres cleaned by the pre-treatment.

These correction factors apply only to undegraded fibres, and different correction factors might be necessary if the fibres have been degraded during processing.

The procedures given apply to single determinations; at least two determinations on separate test specimens are made, both in the case of manual separation and in the case of chemical separation, but more may be carried out if desired.

Before proceeding with any quantitative analysis, it is assumed that all the fibres present in the mixture have been identified. For this purpose, ISO/TR 11827 may be used.

For confirmation, unless it is technically impossible, it is recommended that use be made of alternative procedures whereby the component that would be the residue in the standard method is dissolved out first.

Textiles — Quantitative chemical analysis —

Part 1: General principles of testing

1 Scope

This document specifies a common method for the quantitative chemical analysis of various mixtures of fibres. This method and the methods described in the other parts of ISO 1833 are applicable, in general, to fibres in any textile form. Where certain textile forms are excepted, these are listed in the scope of the appropriate part.

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 105-C10, *Textiles — Tests for colour fastness — Part C10: Colour fastness to washing with soap or soap and soda*

ISO 2076, *Textiles — Man-made fibres — Generic names*

ISO 3696, *Water for analytical laboratory use — Specification and test methods*

ISO 5089, *Textiles — Preparation of laboratory test samples and test specimens for chemical testing*

ISO 6938, *Textiles — Natural fibres — Generic names and definitions*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5089 and the following apply.

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

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

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

3.1
non-fibrous matter
processing aids such as lubricants and sizes or naturally occurring non-fibrous substances

4 Principle

After the identification of the components of a mixture, the non-fibrous matter is removed by suitable pre-treatment and then one of the components is determined usually by selective dissolution or manual separation (see Annex B). The insoluble residue is dried and weighed, and the proportion of soluble component calculated from the loss in mass. It is usually preferable to dissolve the fibre present in the greater proportion, thus obtaining the fibre present in the smaller proportion as residue.

The fibre names in the ISO 1833 series are in accordance with the generic names listed in ISO 6938 for the natural fibres and ISO 2076 for the man-made fibres.

5 Reagents

Use only reagents of analytical grade. Reagents are listed in Table A.1.

WARNING — The ISO 1833 series may call for the use of substances/procedures that may be injurious to the health/environment if appropriate conditions are not observed. It refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety/environment at any stage.

5.1 Water, grade 3 (according to ISO 3696).

6 Apparatus

6.1 Glass filter crucible, capacity 30 ml to 40 ml, with sealed-in sintered disk filter with pore size of 90 µm to 150 µm.

In place of a glass filter crucible, any other apparatus giving identical results may be used.

6.2 Stoppered weighing bottles, large enough to contain such crucibles.

6.3 Vacuum flask.

6.4 Desiccator, containing self-indicating silica gel.

6.5 Ventilated oven, for drying test specimens at (105 ± 3) °C.

6.6 Analytical balance, with a resolution of 0,000 2 g or better.

6.7 Soxhlet extraction apparatus, or any other apparatus giving identical results.

NOTE Soxhlet size of a volume, in millilitres, equal to 20 times the mass, in grams, of the laboratory test sample has been found convenient.

7 Conditioning and testing atmosphere

Because dry masses are determined, it is unnecessary to condition the test specimen. The analysis is carried out under ordinary room conditions.

8 Sampling and pre-treatment of laboratory test sample

8.1 Sampling

Take a laboratory test sample, as described in ISO 5089, that is representative of the laboratory bulk sample and sufficient to provide all the test specimens, each of at least 1 g, that are required. Fabrics may contain yarns of different composition and account should be taken of this fact in the sampling of the fabric. Treat the laboratory test sample as described in 8.2.

8.2 Pre-treatment of laboratory test sample

Laboratory test sample shall be pretreated by a suitable method (as described in Annex A) which does not affect any of the fibre components.

NOTE 1 The purpose of the pretreatment is to remove non-fibrous matter, which is not to be taken into account in the percentage calculations.

If the pretreatment is not applied, it shall be reported with the reasons of this deviation of the given procedure.

NOTE 2 The non-application of certain pretreatments is known to have a negligible effect on the results.

9 Procedure

9.1 General instructions

9.1.1 Handling

Avoid handling crucibles and weighing bottles, test specimens or residues with bare hands during the drying, cooling and weighing operations.

9.1.2 Drying

Conduct all drying operations for not less than 4 h and not more than 16 h at (105 ± 3) °C in a ventilated oven with the oven door closed throughout.

If the drying period is less than 14 h, the test specimen or the residue shall be weighed to check that its mass has become constant.

The mass may be considered to have become constant if, after a further drying period of 60 min, its variation is less than 0,05 %.

9.1.3 Drying of test specimens

Dry the test specimen in a weighing bottle with its stopper beside it. After drying, close the weighing bottle with its stopper before removing it from the oven, and transfer it quickly to a desiccator.

9.1.4 Drying of crucible and residue

Dry the filter crucible with the residue in a weighing bottle with its stopper beside it in the oven. After drying, close the weighing bottle with its stopper before removing it from the oven and transfer it quickly to the desiccator.

Where apparatus other than a filter crucible is used, drying operations in the oven shall be conducted in such a way as to enable the dry mass of the fibres to be determined without loss.

9.1.5 Cooling

Conduct all cooling operations in the desiccator, the latter placed beside the balance, until complete cooling of the weighing bottles is attained, and in any case for not less than 2 h.

9.1.6 Weighing

After cooling, complete the weighing of the test specimen in a weighing bottle or crucible with the residue in a weighing bottle within 2 min of its removal from the desiccator.

Weigh to the nearest 0,000 2 g.

9.2 Testing execution

From the pre-treated laboratory test sample, take a test specimen weighing about 1 g. Cut the yarn or dissected fabric into lengths of about 10 mm. Dry the test specimen in a weighing bottle, cool it in the desiccator and weigh it (see 9.1).