
**Wool — Determination of percentage
of medullated fibres by the projection
microscope**

*Laine — Détermination du pourcentage de fibres médulleuses au
microscope à projection*

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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 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*, Subcommittee SC 23, *Fibres and yarns*.

This second edition cancels and replaces the first edition (ISO 2647:1973), which has been technically revised.

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

- the normative reference ISO/R 137 has been changed to ISO 137;
- the mandatory [Clause 3](#), “Terms and definitions”, including the terms medullated fibre ([3.1](#)), normal medullated fibre ([3.1.1](#)) and kemp fibre ([3.1.2](#)), have been added;
- the atmosphere for conditioning and testing has been revised according to ISO 139 in [Clause 6](#) (former Clause 5);
- the procedure for determining the percentage of medullated fibres has been revised in [Clause 8](#) (former Clause 7);
- the result expression has been revised in [Clause 9](#) (former Clause 8);
- the appearance images of typical fibres have been added as informative [Annex A](#);
- the Bibliography has been added.

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.

Wool — Determination of percentage of medullated fibres by the projection microscope

1 Scope

This document specifies a method of test for determining the percentage of medullated wool fibres by means of the projection microscope.

The method is applicable to woollen and worsted products, at all stages, from raw materials to yarn.

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 137, *Wool — Determination of fibre diameter — Projection microscope method*

ISO 139, *Textiles — Standard atmospheres for conditioning and testing*

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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

medullated fibre

animal fibre containing medulla

Note 1 to entry: This includes *normal medullated fibre* (3.1.1) and *kemp fibre* (3.1.2).

3.1.1

normal medullated fibre

medullated fibre (3.1) in which the diameter of the medulla is less than 60 % of the diameter of the fibre

Note 1 to entry: Medulla is either continuous or discontinuous.

3.1.2

kemp fibre

medullated fibre (3.1) in which the diameter of the medulla is 60 % or more of the diameter of the fibre

4 Principle

Magnified images of the profiles of fibre snippets are projected on a screen, and the number of medullated fibres is counted and expressed as a percentage of the total fibres examined.

The percentage of normal medullated fibres and the percentage of kemp fibres are separately calculated in order to provide more valuable data.

NOTE In practical, normal medullated fibre still maintains certain strength and resilience, which can be applied to products. While kemp fibre is coarse, brittle with very poor strength, so it has less application value.

5 Apparatus

Projection microscope, microtome, mounting media, etc. as specified in ISO 137.

6 Atmosphere for conditioning and testing

The atmosphere for conditioning and testing shall be the standard atmosphere as specified in ISO 139.

7 Preparation of test specimens

Sample the wool, prepare the specimens and mount them as directed in ISO 137.

8 Procedure

8.1 The test may be carried out conveniently at the same time as diameter measurement.

8.2 Apply the procedure as described in ISO 137, except that when the width of the fibre image is read off, it is also examined for medullation at the point of measurement.

8.3 Two slides are prepared for each sample, and the total number of fibres for each slide is at least 1 000 unless otherwise agreed. If the length of the fibre in the projector screen is less than 25 mm, the number will not be counted.

8.4 For the fibres examined, measure the diameters of both the medulla and the fibre, calculate the ratio of medulla diameter to fibre diameter, and classify the fibre as either normal medullated fibre (3.1.1) or kemp fibre (3.1.2).

8.5 Count and record the number of normal medullated fibres, kemp fibres and the total number of fibres examined.

NOTE The appearance images of typical fibres are given in Annex A.

9 Calculation and expression of results

9.1 Separately calculate the percentage of normal medullated fibres and the percentage of kemp fibres based on the total number of fibres examined by using the [Formula \(1\)](#) and [Formula \(2\)](#).

$$C_m = \frac{m}{N} \times 100 \quad (1)$$

$$C_k = \frac{k}{N} \times 100 \quad (2)$$

where

C_m is the percentage of normal medullated fibres, %;

C_k is the percentage of kemp fibres, %;

m is the number of normal medullated fibres;

k is the number of kemp fibres;

N is the total number of fibres examined.

9.2 The mean value of the results for two slides is expressed as test results, to the nearest 0,1 %.

10 Test report

The test report shall include the following information:

- a) a reference to this document, i.e. ISO 2647:2020;
- b) the total number of fibres examined;
- c) the percentage of normal medullated fibres;
- d) the percentage of kemp fibres;
- e) any deviation from the specified procedure;
- f) the date of the test.

Annex A (informative)

Appearance images of typical fibres

The appearance images of typical fibres, including non-medullated fibre, normal medullated fibre and kemp fibre, are given in [Figure A.1](#) to [Figure A.4](#).



Figure A.1 — Non-medullated fibre



Figure A.2 — Normal medullated fibre
(continuous medulla)



**Figure A.3 — Normal medullated fibre
(discontinuous medulla)**



Figure A.4 — Kemp fibre

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