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Wool — Determination of fibre length using a single-fibre length-measuring machine

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Textile fibres — Determination of length and length distribution of staple fibres — Method by measurement of single fibres

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up 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.

Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

Prior to 1972, the results of the work of the Technical Committees were published as ISO Recommendations; these documents are now in the process of being transformed into International Standards. As part of this process, International Standard ISO 1822 replaces ISO Recommendation R 1822-1970 drawn up by Technical Committee ISO/TC 38, *Textiles*.

The Member Bodies of the following countries approved the Recommendation :

Belgium	Greece	Poland
Canada	Hungary	Portugal
Colombia	India	South Africa, Rep. of
Czechoslovakia	Israel	Spain
Denmark	Italy	Sweden
Egypt, Arab Rep. of	Netherlands	Switzerland
Finland	New Zealand	Turkey
France	Norway	United Kingdom
Germany	Peru	U.S.S.R.

The Member Body of the following country expressed disapproval of the Recommendation on technical grounds :

U.S.A.*

* Subsequently, this Member Body approved the Recommendation.

Printed in Switzerland

Wool — Determination of fibre length using a single-fibre length-measuring machine

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies a method for the determination of wool fibre length using a machine which semi-automatically measures the length of individual fibres.[1)]

This method is applicable to wool in any form and to man-made fibres processed on the woollen and worsted systems, and also to blends of these fibres.

2 REFERENCES

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

ISO/R 1130, *Methods of fibre sampling for testing.*

3 PRINCIPLE

A numerical sample of the fibres is taken. The length of each fibre is measured under controlled tension on a machine, and the frequency distribution of fibre lengths is then obtained.

4 APPARATUS

4.1 Machine that semi-automatically measures fibre length under controlled tension[2)], classifies the fibre lengths in 5 mm groups and registers the number of fibres in each of these groups. A suitable machine is described in the annex.

The machine used shall be capable of providing results within the confidence limits specified for the number of fibres given in 6.3.

4.2 Two pairs of pointed forceps with ground ends.

4.3 Short scale with two white marks spaced 5 mm apart for classifying very short fibres.

4.4 Clip for the preparation of specimens. The clip shall have flat jaws, about 150 mm wide, one edge of which is ground so that it is parallel to the second edge which is bent and bears a thin strip of leather in such a way that single wool fibres may be held firmly at all points along the clip edge.

5 CONDITIONING AND TESTING ATMOSPHERE

The fibres shall be conditioned and the test conducted in one of the standard atmospheres for conditioning and testing defined in ISO 139.[3)]

6 PREPARATION OF SPECIMENS

6.1 Conditioning

Condition the fibres before testing in one of the standard atmospheres for conditioning and testing specified in clause 5, until they are in equilibrium with that atmosphere. If the laboratory sample is well opened out, conditioning for 1 h is generally sufficient to achieve a state of equilibrium.

6.2 Sampling

Select the test specimens by using one of the methods for sampling wool fibres described in ISO/R 1130.[4)]

1) This method is primarily intended for use in quality control testing. When more precise measurement is required, the less rapid method given in ISO/R 270, *Determination of fibre length by measuring the length of individual fibres,* shall be used.

2) The tension may conveniently be applied by a small presser foot (area approximately 3 mm^2) applied to the fibre so as to exert a normal force of 1,5 cN (1,5 gf) and controlling the amount by friction. The material and surface finish of the presser foot shall be highly polished. This arrangement gives a small increase of tension with increasing fibre diameter : it is just sufficient to remove crimp from wool fibres in the practical diameter range of 20 to 40 μm. The accuracy of length measurements shall be to the nearest millimetre.

3) If acceptable to the interested parties, conditioning may, as a matter of convenience, be effected in an atmosphere having a relative humidity of 50 to 70 %.

4) Before taking the test specimens from scoured, loose wool where the fibres are very tangled and matted, it may be necessary to separate the individual fibres by means of a comb or similar device.

6.3 Number of fibres

Determine the number of fibres to be taken for the test, according to the confidence limits required[1], by use of the tables given in ISO/R 1130.

7 PROCEDURE

7.1 Testing atmosphere

Conduct all fibre measurements in one of the standard atmospheres for conditioning and testing specified in clause 5.

7.2 Measurement

Using the pointed forceps, grip each fibre successively, as near to the end as possible, and pull it over the approach pad into the traverse screw. A device detects the other end of the fibre and stops the traverse screw so that the distance traversed is known and thus the fibre length is determined. The fibre lengths are classified in such a way that the number of fibres in each group is recorded automatically in the course of the length determinations.

Fibres with length less than 5 mm shall be classified by eye, using the short scale bearing marks 5 mm apart.

8 CALCULATION AND EXPRESSION OF RESULTS

8.1 Calculation

Read and record the number of fibres in each length group.

Calculate the average fibre length, to the nearest millimetre, and the coefficient of variation.

8.2 Expressions for distribution

If a graph of fibre length distribution is required, express it as

— a histogram showing the percentage of fibres in each 5 or 10 mm length interval plotted against fibre length (column 3 in the table below, plotted against the reading in column 1, for the example given in this table);

— or a cumulative frequency curve showing the percentage of fibres greater than a given length plotted against the fibre length (column 4 in the table, plotted against the left-hand readings in column 1 for this example);

— or a histogram showing the percentage total length of fibre in each length interval, plotted against the fibre length (column 6 in the table, plotted against the readings in column 1 for this example).

TABLE — **Example of distribution in length intervals of 5 mm**

1 **Length intervals** mm	2 **Number of fibres**	3 **Percentage number**	4 **Cumulative percentage number**	5 **Total length** mm	6 **Percentage total length**
0 to 5	5	5,2	100	12,5	0,6
5 to 10	4	4,1	94,8	30,0	1,3
10 to 15	8	8,2	90,7	100,0	4,4
15 to 20	12	12,4	82,5	210,0	9,2
20 to 25	25	25,8	70,1	562,5	24,6
25 to 30	20	20,6	44,3	550,0	24,1
30 to 35	12	12,4	23,7	390,0	17,1
35 to 40	8	8,2	11,3	300,0	13,1
40 to 45	3	3,1	3,1	127,5	5,6
	97	100,0		2 282,5	100,0

9 TEST REPORT

The test report shall state that the procedure followed was in accordance with this method, in addition to the results obtained, the type of apparatus used, operational details not specified in this method and any incidents likely to have influenced the results.

1) It is necessary to have at least an approximate value of coefficient of variation of length to calculate (or read off from tables) the number of fibres required to obtain a mean result with the desired confidence limits. Coefficients obtained from previous experience with similar material are generally good enough.